The Immersive United Nations: An Actor-Network Theory Examination of the UN's Adoption of Virtual Reality Technology for Collaboration, Advocacy, and Training

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Abstract

This thesis investigates the adoption of Virtual Reality technology across three United Nations organisations, examining three distinct applications: i) multi-user VR for collaboration (ITC-ILO), ii) cinematic VR for advocacy (UNDP), and iii) VR simulations for training (ILO). These applications correspond to core UN functional roles as global connector (*collaboration*), knowledge provider (*advocacy)*, and capacity builder (*training*). Actor-Network Theory (ANT) is employed to trace relations between human and non-human actors and to examine how these relations reconfigure existing practices. The analysis is structured around three research questions. The first investigates how VR adoption impacts operational practices within the three UN organisations studied; the second compares these impacts across cases, examining what the variations reveal about VR's potential to shape UN work; the third considers the broader implications of VR adoption for the evolution of UN practices in a digitalising international sphere. A qualitative methodology combines interviews with UN practitioners and external stakeholders with first-person observation of VR environments and contextual document analysis, enabling an empirically grounded analysis. Ultimately, I argue that VR operates as a dynamic agent within the networks studied, altering the practices of the organisations studied while simultaneously being influenced by their operational needs. This mutual shaping generates new VR-enabled 'emerging properties' (such as social dialogue, focused presence, and interactive engagement), that vary in their degree of transferability. These properties, in turn, reveal how VR reconfigures digital practices in ways that may affect the UN's core functional roles. Finally, building on these findings, I advance two broader arguments: first, that studying VR adoption highlights the distributed nature of agency in global governance; second, that where VR is adopted, it reconfigures organisational conceptions of space, giving rise to embodied spatialities. In doing so, the thesis contributes to the literature on IOs' digitalisation and immersive technologies, and extends Science and Technology Studies into International Relations, fostering cross-disciplinary dialogue.

Humans in interaction with nonhumans engage in the making of future

Esguerra, A.

Future Objects: Tracing the Socio-Material Politics of Anticipation

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List of Abbreviations

3D	Three-Dimensional
AI	Artificial Intelligence
AIVR	Artificial Intelligence Virtual Reality
AR	Augmented Reality
ANT	Actor-Network Theory
CG	Computer Generated
CGI	Computer-Generated Imagery
CGVR	Computer-Generated Virtual Reality
CVE	Collaborative Virtual Environment
CVR	Cinematic Virtual Reality
DIR	Digital International Relations
EVO	Embodied Virtual Observation
GB	Gigabyte
GG	Global Governance
HMD	Head-Mounted Display
HQ	Headquarters
ICRC	International Committee of the Red Cross
ICT	Information and Communication Technology
ICT4D	Information and Communication Technology for Development
ILO	International Labour Organisation
IO	International Organisation
IoT	Internet of Things
IPS	International Political Sociology
IPT	International Practice Theory
IR	International Relations
ITU	International Telecommunications Union
ITC-ILO	International Training Centre of the International Labour Organisation
MR	Mixed Reality
NGO	Non-Governmental Organisation
OOO	Object Oriented Ontology
OPP	Obligatory Passage Point
SCOT	Social Construction of Technology

SDGs	Sustainable Development Goals
STS	Science and Technology Studies
STS-T	Socio-technical Systems Theory
ToT	Training of Trainers
UAV	Unmanned Aerial Vehicle
UI	User Interface
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDESA	UN Department of Economic and Social Affairs
UNDGC	United Nations Department of Global Communications
UNDP	United Nations Development Program
UNDPPA	United Nations Department of Political and Peacebuilding Affairs
UNEP	United Nations Environment Programme
UNESCO	United Nations Education
UNHCR	United Nations High Commissioner for Refugees
UNIN	United Nations Innovation Network
UNSG	United Nations Secretary General
UNSSC	United Nations System Staff College
VE	Virtual Environment
VR	Virtual Reality
VRPT	Virtual Reality Perspective-Taking
WFP	World Food Programme
XR	Extended Reality

Specific to ITC-ILO case study

EPAP	Employment Policy and Analysis Programme
TVET	Technical and Vocational Education and Training
ACTRAV	Bureau for Workers' Activities
UOCRA	Unión Obrera de la Construcción de la República Argentina
EYPA	Employers Young Professionals' Academy
CLI	Chief of Learning Innovation
CIO	Chief Information Officer
IEEP	UNESCO's International Institute for Educational Planning (IEEP)

Specific to ILO case study

5Ds	The 5 Ds of SH prevention: Distract; Delegate; Document; Delay; Direct.
BW	Better Work (ILO initiative on improving standards in the garment industry)
BWI	Better Work Indonesia (Better Work Indonesia Branch)
DWGSC	Decent Work in Garment Supply Chains Asia
GBV	Gender-Based Violence
IBF	Indonesia Business Forum
IFC	International Finance Corporation
RESPECT	Respectful Workplace Programme
SH	Sexual Harassment

Specific to UNDP case study

CoE	Council of Europe
DG-NEAR	Directorate-General for Neighbourhood and Enlargement Negotiations of the European Commission
DCS	Digital Communications Specialist
EDD	European Development Days
ERGO	European Roma Grassroots Organisations Network
EC	European Commission
ENI	European Neighbourhood Instrument
EP	European Parliament
EU	European Union
HCAP	Head of Communication, Advocacy, and Partnerships
IRH	Istanbul Regional Hub (UNDP) – UNDP's Regional Office for Europe and Central Asia
MEP	Member of the European Parliament
RSF	Regional Support Facility for improving the capacity to make real progress on Roma inclusion – official name of the 'Roma Inclusion Project'.
SCPS	Social Cohesion Programme Specialist
SIPO	Social Inclusion Project Officer
UXOs	Unexploded Ordnances

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CHAPTER 1: INTRODUCTION

In recent years, Virtual Reality (VR) technology has expanded beyond specialised laboratories to become more widely adopted across diverse domains. Among these, international organisations (IOs) have begun to experiment with VR for a variety of purposes, a trend that remains largely underexplored. Why are IOs adopting VR? What does this reveal about their capacity for innovation, and how might it affect their role in an increasingly digital international sphere? This thesis began as an exploration of these questions and has developed into an in-depth analysis of three case studies that trace the adoption of VR within the United Nations (UN) system. This chapter sets the stage by tracing how my initial interest in VR surfaced a research puzzle, how this puzzle was refined into research questions, and how these were pursued through a specific approach and methodology.

The broader context of this thesis is the significant transformation IOs have undergone in recent years. Processes of digitalisation and the emergence of new technologies have and continue to shape the environments in which IOs operate, compelling them to adapt to a changing international sphere (Goheer, 2020: 128). As a result, scholars increasingly investigate how digitalisation is challenging the established ways in which IOs and international bodies work (Hedling & Bremberg, 2021). These efforts have evolved into established research fields – for example, digital international relations, digital diplomacy, and digital humanitarianism – which this thesis engages with in depth (Section 2.3). Within this momentum of change and adaptation, this thesis investigates a particular phenomenon: the emergence of VR technology and its adoption by multiple UN organisations. For the purposes of this thesis, VR refers to immersive Virtual Environments (VEs) that users can observe, navigate, and interact with to varying degrees, typically experienced through a head-mounted

display (Halik, 2018; Speicher et al., 2019). However, the term 'VR' is itself contested and used in varying ways: Section 2.2 reviews these debates in greater detail.

1.1. The puzzle of VR adoption

I first reflected on VR use by IOs during my Master's in Media and Communications at the London School of Economics, when I came across a physical stand of a UN organisation handing out VR headsets to passers-by for fundraising purposes. From there, my curiosity grew: the people using it appeared fully immersed, expressions of awe visible on their faces. Moreover, it was a new and emerging technology, which raised questions about its potential. I began to ask myself: what was that organisation hoping to achieve by turning to VR? Was it connected to the immersive experience of being inside a virtual environment? Were there other advantages or reasons for its use? And beyond this case, were other IOs experimenting with VR, and if so, were they doing so for similar purposes, or for different ones?

What began as a curiosity developed into this DPhil thesis. I began by mapping the range of IOs experimenting with VR and the purposes for which they used it, which led to three key insights. First, VR was being used in diverse ways across IOs, with a notable concentration across the UN ecosystem. Crucially, these applications differed significantly, a complexity often overlooked in mainstream media, where distinct practices were grouped under a single 'VR' label. This indicated a more nuanced landscape than initially assumed and informed the development of a three-function framework that categorises VR projects into the functions of virtual collaboration, advocacy, and training (Section 2.6). Second, as I learned more about the technology, it became clear that it was experiencing a particular momentum: once costly and difficult to access, it had recently become more affordable, sophisticated, and

user-friendly (Barnes, 2016; Cipresso et al., 2018a; Ivanovitch, 2017a), making this a timely investigation. Third, I identified a gap in the literature: while some research exists on institutional change and technology adoption within IOs, studies on UN adoption of emerging technologies, and VR in particular, remain scarce (Ambos & Tatarinov, 2022a). At the same time, a puzzle emerged: although VR was gaining momentum, its adoption within IOs remained constrained by substantial barriers. Compared with other technologies, VR is still niche, characterised by high acquisition costs, limited global distribution, steep learning curves, and specific ethical concerns. More fundamentally, adoption appeared to contradict portrayals of IOs as resistant to change – often depicted as inert entities with little entrepreneurial drive or autonomy (Colomina, 2020). This tension made VR adoption both puzzling and analytically intriguing: Were IOs perceiving specific advantages in VR that justified its adoption despite these barriers? Was perhaps the portrayal of IOs as non-innovative reductive, or perhaps no longer accurate?

I hope through this empirical study to have illuminated different ways and reasons why organisations within the UN ecosystem are turning to VR, and to have reflected on what this might mean for IOs practices more broadly in the years ahead. While this topic is vast and the questions it raises will require further research, this thesis seeks to take a step forward in advancing the conversation. How it does so, and through which specific research questions, is outlined in the next sections.

1.2. From the puzzle to developing research questions

The next step was to organise the 'puzzle' into clear research questions and determine how to approach them. Before arriving at the final formulation of my questions, I made four key decisions.

1.2.1. Focusing on UN organisations

First, a conscious decision was made to narrow the focus on organisations within the UN system, rather than the broader universe of IOs.[2] This choice was motivated by four main considerations: First, the UN system offered a particularly rich collection of VR initiatives. While other IOs had launched VR projects, no other institutional system displayed such a variety of functions. This variety allowed for comparison across different uses of VR while remaining within the same institutional framework. At the same time, it is also important to acknowledge that 'the UN' is, of course, not reducible to a single actor (see Section 4.7. for a discussion). Second, as the largest multilateral and humanitarian institutional system, the UN remains one of the most influential actors in global affairs (Tatarinov & Ambos, 2022). Understanding how UN organisations adopt and integrate emerging technologies such as VR is therefore crucial for understanding and perhaps anticipating trajectories of global governance (Ecker-Ehrhardt, 2024). Third, propelled by innovative leaders such as Ban Ki-moon and António Guterres, the UN system has recently placed strong emphasis on digital innovation (Ambos & Tatarinov: 2022a; Nakamitsu, 2018; Scott-Smith, 2016; Zhenmin, 2018). This shift is reflected in numerous strategic documents and initiatives (UNIN, 2024; UNSG 2020; UNAI, 2021; UN, 2018, 2023) and in the proliferation of 'innovation spaces'

[2] While centred on the UN, the findings may also yield insights for other IOs. Issues of generalisability are addressed in the Methodology chapter (Section 4.8).

across the system (Bloom & Faulkner, 2016a), providing a timely setting to study VR adoption within the UN ecosystem specifically.[3] Moreover, VR projects among UN organisations have proliferated, particularly since the COVID-19 pandemic underscored the need for immersive solutions when in-person interactions were impossible (Section 2.5.2). Finally, despite this momentum, research on UN organisations' adoption of emerging technologies remains limited (Buch et al., 2022; Dimitrov, 2014; Garcia, 2022).

1.2.2. UN functions, UN practices

Another conscious decision was to focus on *functions* or *practices*. VR adoption could be studied in many ways – for instance, in relation to institutional legitimacy, or the technology's symbolic role – but this thesis examines its practical functions. I chose to focus on what seemed to me the heart of the matter: how might VR change the way UN entities 'do things'? I became increasingly interested in how this specific technology might influence daily operations, workflows, and practices and, in turn, how such changes could reshape UN organisations' role in the international system. To analyse these practice-level transformations, I needed a framework that could account for the interplay between technology and organisational processes, which led me to choosing Actor-Network Theory (ANT).

1.2.3. Choosing Actor-Network Theory (ANT)

Rooted in Science and Technology Studies (STS), ANT examines how technologies and humans are enrolled in networks of interaction, and how these networks are transformed through the process of 'translation' (Callon, 1984; Latour, 2005). I will not explain ANT in detail here, as this is done in a dedicated chapter (Chapter 3). However, to briefly summarise,

[3] Recent research suggests the UN system is adapting effectively to the digital era, leveraging digital tools to enhance its practices (Bjola, 2025)

ANT's distinct strength lies in its flat ontology, which posits that non-human actors – such as material objects and technologies – hold influence over the social world just as human ones (Law, 1994: 9-10). This sociotechnical ontology (which views technology and social systems as interconnected and mutually shaping each other) is particularly well-suited for this research, as it enables an understanding of VR as an agentic actor capable of influencing existing practices. In this project, I will apply ANT in three waysto uncover the sociotechnical dynamics in VR adoption through the 4-stage translation process (see Section 3.3.3); to examine the emerging properties and capacities that arise through translation, along ANT's principle that networks are 'productive' (see Section 3.3.3); and to create visual maps that illustrate the networks of VR adoption (Section 4.5).

1.2.4. Case studies and empirical reasons

To investigate VR adoption within the UN system, this thesis focuses on specific case studies. This choice followed partly from ANT, which lends itself to empirical tracing of how practices change with technology adoption, and partly from the need to account for variation: as mentioned earlier, VR is used in diverse ways across the UN system, making case comparison effective for capturing this variation. The initiatives selected exemplify modes of implementation: multi-user VR for collaboration (ITC-ILO; Chapter 5), cinematic VR for advocacy (UNDP; Chapter 6), and VR simulations for training (ILO; Chapter 7). The first case study investigates ITC-ILO's integration of multi-user VR into its virtual collaboration initiatives; the second examines the ILO's pilot VR simulation to train garment factory workers in Indonesia on sexual harassment prevention (ILO, 2022); the third examines UNDP's adoption of cinematic VR for advocacy through the film *I am Fatmira* on the Roma community in Albania.[4] Each of the three functions – *collaboration*, *advocacy*, and *training* –

[4] For clarification on the different kinds of VR mentioned here, see Section 2.2.2.

also speaks to a broader role associated with the UN system: collaboration speaks to the UN as a *global connector*, advocacy to the UN as a *knowledge provider*, and training to the UN as a *capacity builder*. Linking the case studies to these roles allows the analysis to move beyond specific VR initiatives to the wider question of what VR adoption implies for established UN practices. In other words, examining VR through these case studies makes it possible to assess whether and how technologies like VR are beginning to reconfigure the UN's role as *global connector*, *knowledge provider*, and *capacity builder*. This conceptual link is elaborated in greater detail in Section 2.6.

1.3. Statement of research questions

These reflections led me to develop the research questions. Research Question 1 examines the impact of VR adoption on the practices of the organisations under study:

1. *How does the adoption of VR technology in the UN system impact its operational practices?*

To address this question, the thesis operationalises ANT through two complementary steps. First, it draws on ANT's concept of translation (cf. Section 3.3.3) to illuminate the sociotechnical dynamics involved in VR adoption. By tracing how human and non-human actors interact and align across the different stages of adoption, this step reveals how VR becomes integrated in organisational practices. Secondly, it identifies the 'emerging properties' generated through these sociotechnical interactions (cf. Section 1.2.3 and 3.3.3). Developed in detail in the case study chapters, these properties capture the effects produced by VR adoption, thereby showing the specific ways in which VR impacts the organisational

practices of the UN organisations under study. Together, these steps provide the analytical pathway through which RQ1 is addressed.

The second research question introduces a comparative dimension between the case studies (Schoch, 2020: 253), aiming to determine the variation of VR's influence across different functions. This is particularly valuable for identifying the areas where the technology could exert the most profound influence on future UN operations:

2. *How does the process of VR adoption vary across the functions of collaboration, advocacy, and training, and what might these differences suggest about the potential for VR to shape the UN's work in the future?*

Finally, the third research question 'zooms out' (Nicolini, 2009) to explore:

3. *What are the broader implications of VR adoption for the evolution of UN and IO practices in a digitalising international sphere?*

By seeking to understand what happens when key functions are carried out through VR, this question promises to offer insights into how VR fits in broader UN system priorities and how UN entities, and more broadly IOs, adapt and evolve within an increasingly digital global landscape. Examining these questions together is crucial because they build incrementally: the first begins at the 'micro' level, tracing VR's impact on specific organisationalpractices; the second widens the lens to compare how these effects vary across the three functions; and the third moves further outward, addressing the broader implications of VR adoption for the UN's core roles.

1.4. Methodological choices

To answer the research questions, this study employs a tripartite methodology, combining semi-structured interviewing, embodied observation of VR environments, and contextual document analysis (Chapter 4). Interviews provided rich, situated accounts of how VR was adopted and enacted in practice, offering insights into processes that are rarely documented, and aligning with ANT's emphasis on tracing sociotechnical relations. Data analysis followed a thematic approach reoriented through ANT, enabling the identification of actants, the tracing of translation processes, and the articulation of emerging properties across the three case studies. EVO enabled direct engagement with the VR environments, capturing their affordances and embodied effects in ways that complemented interview data. Finally, contextual document analysis helped situate the case studies within broader organisational strategies, policies, and frameworks, while also recognising documents as active participants in sociotechnical networks. Together, these methods enabled data triangulation and supported a robust and multi-sided analysis of VR adoption in the organisations under study (Bowen, 2009; Yin, 2018).

1.5. Core arguments of the thesis

Ultimately, this thesis argues that UN organisations' adoption of VR should be understood as a sociotechnical process in which the technology acts as a dynamic participant within ANT networks: shaped by institutional identities and needs, while simultaneously introducing new *emerging properties* that alter established practices (see Section 3.3.3). The case studies demonstrate that VR does indeed affect practices, generating distinct properties that transform collaboration, advocacy, and training, thus addressing RQ1. These properties are discussed in the respective case study chapters, and in the Discussion chapter (Ch. 8). A comparative analysis shows, however, that they not operate uniformly: some can cut across functions as

they operationalise new technological affordances to meet diverse organisational needs and objectives (*high-transferable),* while others remain tied to specific organisational functions (*low-transferable).* This suggests that VR's potential to shape practices within the UN system lies not in a uniform transformation, but in its selective adoption where it aligns with particular objectives and contexts. This addresses RQ2, which examines how VR adoption varies across functions and what this variation implies for its future role in development work. Finally, the thesis considers broader implications (RQ3). Examining how these changes in practices affect the UN's roles as *global connector*, *knowledge provider*, and *capacity builder*, it advances two wider arguments (Section 8.4): first, that VR adoption highlights the distributed nature of agency in global governance, with outcomes emerging from heterogeneous networks of human and non-human actors rather than from institutions or technologies alone, and second, that VR reconfigures the spatial conditions under which UN entities and IOs operate, producing digitally mediated spatialities through which collaboration, advocacy, and training are enacted.

1.6. Key contributions

This thesis seeks to advance knowledge both theoretically and empirically. These contributions are discussed here and revisited in the concluding chapter, where they are assessed in light of the findings and considered in relation to future research.

1.6.1. Theoretical contributions

Theoretically, this thesis makes three main contributions. First, it engages with, and contributes to, the literature on IO digitalisation across the fields of digital IR, digital humanitarianism, digital diplomacy, ICT4D, and organisational innovation (Section 2.3). By tracing how UN entities adopt and operationalise VR, and how this impacts their practices, it contributes to wider debates on IO change, IO technology adoption (Bjola & Manor, 2022;

Ecker-Ehrhardt, 2019), and innovation in global governance (Ambos & Tatarinov, 2019a, 2022b; Bagattolli, 2021; Helfer, 2006a). More broadly, it also contributes to work that conceptualises IOs as actors in their own right, capable of influencing the international sphere and acting as 'managers of global change' (Biermann & Siebenhüner, 2009). Second, this thesis extends the VR research landscape (Section 2.2): although VR has been widely studied in domains such as healthcare, gaming, and education (Becker & Freitas, 2024), its use in IOs and the UN system remains largely unexplored. By analysing VR in this context, this thesis contributes empirical evidence from a new domain, opening up space for interdisciplinary dialogue with the IR field. Third, by applying ANT, it advances the dialogue between IR and STS. While STS perspectives have been introduced into IR, their application remains limited despite calls for greater cross-fertilisation (Section 2.4). Using ANT to study VR adoption demonstrates how concepts such as translation, networks, and emergence can illuminate IO practices and how they change when a new technology is introduced. This also challenges state- and institution-centric perspectives in IR, highlighting instead how agency is distributed across networks of human and non-human actants, including VR technology itself (cf. Chapter 3 and Section 8.4.1).

1.6.2. Empirical contributions

Empirically, and in line with the ANT tenet of 'following the actants' (Bisconti & Possati, 2023), this thesis aims to move beyond abstract claims about digital transformation and provide a grounded, detailed account of how VR is adopted within the UN system. This empirical contribution has two main dimensions: First, it examines three original case studies (ILO, ITC-ILO, and UNDP), tracing how VR initiatives were designed and implemented, and through which actors and mechanisms. This offers an empirically grounded analysis of how VR reshapes practices of collaboration, advocacy, and training. Second, it identifies a set of

emerging properties that arise from the sociotechnical interactions between VR technologies and human actants (cf. Section 3.3.3). Inductively drawn from interviews, virtual observations, and documents, these properties show how VR impacts the practices under study. They are then placed in dialogue with established research on VR affordances (such as immersion, spatial presence, and empathy), in some cases corroborating them, in others refining or extending them. In this way, the empirical feeds back to the theoretical debates. The study also generates practical insights for IOs. By documenting VR adoption processes and tracing the role of human and non-human actants within them, it offers organisations a clearer understanding of how VR can be operationalised, what properties it may generate, and how these could transform their practices and align with their objectives and mandates. This may assist IOs in assessing the technology's relevance for their own contexts.

1.7. Thesis roadmap

To orient readers, the remainder of the thesis is structured as follows. Chapter 1 is this introduction, which sets the stage by explaining the project, its objectives, its expected contributions, and its value. Chapter 2 reviews the literature, first introducing VR technology and the research landscape surrounding it, then turning to debates on the digitalisation of IOs, including digital diplomacy, digital humanitarianism, and ICT4D. It then discusses interdisciplinary approaches to IOs, particularly those drawing on STS and International Political Sociology (IPS). Finally, it situates the study within the UN system's broader storyline of digitalisation and synthesises existing knowledge on how VR is used across that system, both in terms of academic research and existing projects. Chapter 3 illustrates the theoretical framework of ANT, focusing on its three central elements – actants, networks, and translation – to demonstrate its suitability for analysing VR adoption and to clarify how it will be applied in this study. Chapter 4 outlines the research design and methodology, including

the chosen methods and their limitations, as well as practical and ethical considerations. Chapters 5, 6, and 7 examine the three case studies. Using ANT, they trace the VR adoption processes and analyse how VR impacts the practices of collaboration, advocacy, and training, and how these processes produce specific emerging properties. Chapter 5 examines the ITC-ILO's adoption of multi-user VR for collaboration, Chapter 6 investigates the UNDP's use of cinematic VR for advocacy, and Chapter 7 explores the ILO's adoption of VR simulations for training. Chapter 8 is the discussion chapter, structured around the three research questions. It addresses the three research questions by (i) assessing how VR impacts collaboration, advocacy, and training (RQ1); (ii) comparing findings to highlight patterns and differences, including stabilising and destabilising forces (RQ2); and (iii) considering the broader implications for global governance (RQ3). Chapter 9 concludes by summarising the findings in light of the research questions and suggesting directions for future research.

CHAPTER 2: LITERATURE REVIEW

The advent of the digital era … has brought new actors into play and pushed existing ones to adapt to the digital age, precipitating a paradigmatic shift in the theoretical and empirical understanding of international relations.

Baykov, A. & Zinovieva, E. *Digital International Relations*

2.1. Introduction

To investigate the adoption of VR technology across three UN organisations, it is first necessary to provide an overview of the broader academic context and related work in the field. Readers need clarity, first and foremost, on what VR means and entails: how it is defined, what forms it can take, and what conceptual vocabulary surrounds it. Equally important is the need to situate this thesis within the body of research that explores how IOs are adopting emerging technologies and what implications this carries for their work and practices. Since this literature can be approached from multiple research areas and methodological angles, this chapter provides an overview to help readers situate the thesis and understand its distinctive contribution. The review is organised as follows: Section 2.2 introduces VR technology – its definition, key concepts, and the current research landscape. Section 2.3 turns to IOs' digitalisation and their engagement with emerging technologies. While much of existing literature has focused on digitalisation in terms of, for example, social media or digital platforms more broadly, there is now a growing interest in how IOs are experimenting with emerging technologies such as blockchain and Artificial Intelligence. This is particularly striking given IOs' traditionally risk-averse and bureaucratic nature, thus raising new questions about how such technologies are introduced and how they impact IOs' practices. This study

contributes to this agenda by focusing on VR, a technology which remains underexplored in this context. Furthermore, IOs' adoption of new technologies has been studied through several, often overlapping, research domains: digital International Relations (IR), digital diplomacy, digital humanitarianism, ICT for Development (ICT4D), and studies of organisational change and innovation. Because this thesis explores VR adoption across different functions, it intersects with these overlapping strands of scholarship. Section 2.4 then builds on the above to examine the intersection between IOs and VR, with particular focus on the UN system. It addresses two guiding questions: What forms of VR use have been documented within IOs and the UN specifically? And to what extent has this been investigated academically? By 'zooming in' on how VR has been operationalised across UN contexts, this section sets the stage for the functional typology developed in Section 2.5. There, the three organisational functions structuring this thesis (collaboration, advocacy, and training) are illustrated in more detail: These functions not only correspond to distinct uses of VR within the UN system but also reflect broader roles that 'the UN' plays in global governance: as *global connector*, *knowledge provider*, and *capacity builder.* It is worth noting that this part of the literature review departs from more conventional formats. While there is existing research on VR in relation to each of the three functions – for example, studies on VR for collaboration explore how immersive environments can enhance team interaction or reduce geographic constraints – this 'functional literature' is not examined here, but in the respective case study chapters. This allows each case study chapter to engage directly with its specialised literature, ensuring that key concepts and debates remain fresh in the reader's mind when encountering the case and the emerging properties, many of which are in direct dialogue with existing scholarship. Finally, Section 2.6 serves as a conceptual bridge to the next chapter, which presents ANT as a theoretical framework. As ANT emerges from two broader intellectual traditions – STS and IPS – it is important to first introduce these traditions and outline how they have approached questions of technology and global governance.

2.2. Virtual Reality technology: foundations and research landscape

2.2.1. Introducing VR technology

Virtual Reality (VR) refers to a class of technologies designed to simulate immersive, three-dimensional environments, typically experienced through a 'head-mounted display' (HMD) that responds to users' movements and isolates them from their physical environment by covering their entire field of view (Halik, 2018; Speicher et al., 2019). Unlike traditional screens, VR is three-dimensional, and thus offers a sense of 'being inside' the digital space, enabling interaction and exploration within a fully constructed 'virtual environment' ('VE'). The term was coined by Jaron Lanier, a computer scientist who pioneered the first commercially available VR headset (Swann & Watts, 2023). One seminal definition defines VR as being 'the sum of the hardware and software systems that seek to perfect an all-inclusive, sensory illusion of being present in another environment' (Biocca & Levy, 1995). A more recent definition by the International Telecommunications Union defines it as 'a simulated environment rendered through visual and audio elements to create an immersive user experience' (ITU Standardization Sector, 2025).[5] Motion-tracking sensors, hand controllers, and, in some cases, haptic feedback devices (J. N. Bailenson & Yee, 2007) are also typically integrated into these systems, enabling real-time interaction with the VE and producing a sense of 'immersion', a key characteristic of VR (cf. Section 2.2.3). Wearing an HMD and using these inputs therefore allows users to 'step into' VEs they can observe, navigate, and control to varying degrees. Equally important is the software: users may access

[5] In reality, VR definitions vary across disciplines – for an overview of this definitional diversity, see Kardong-Edgren (2019: 30-31)

applications, games, simulations, or collaborative platforms hosted on different operating systems. While many popular VR applications are designed for Meta's headsets (e.g., Quest), others run on independent or cross-device platforms such as SteamVR, HTC Viveport, or enterprise systems. VR thus comprises both a physical interface (the hardware) and a software layer, which together enable the immersive experience.

From the above, VR may appear reducible to a set of components, from HMDs to controllers to 'immersion'. Yet these elements do not constitute a single, uniform entity: VR is a 'multidisciplinary technology' (Swann & Watts, 2023) which exists in multiple configurations, with varying degrees of immersion and different technical assemblies. While Section 2.2.2 outlines typologies that begin to capture this diversity, even such classificatory efforts cannot resolve the absence of a universally agreed definition. Despite this, it remains productive to analyse these technologies under the shared label of 'VR'. While VR may differ in form and function, what is counted as VR generally shares certain features: immersive, three-dimensional environments mediated through HMDs. While the degree of immersion or the extent of control over the VE may vary, grouping these technologies under the label 'VR' remains a productive simplification, enabling comparison across cases while remaining attentive to their differences. A central aim of this thesis is precisely to illustrate how different kinds of VR are deployed in different UN organisations, thereby demonstrating the plurality of its manifestations. Furthermore, as elaborated in Section 8.4.2, these forms nonetheless converge around a shared *spatial* dimension.

Despite its futuristic allure, VR is not a novel technology: its first conceptualisations date back to the 1960s (Aukstakalnis, 2016). Since then, it has undergone cycles of growth and stagnation (Belisle & Roquet, 2020). What changed in recent years, however, is its increased accessibility and technological sophistication, as it moved from a laboratory tool for

specialised military and research applications, to becoming a ‘consumer product’ (Blackman, 2022). More recently still, a renewed wave of interest followed the so-called ‘metaverse vision’: in 2021, social media company ‘Facebook’ strategically rebranded as ‘Meta’ and invested heavily in immersive platforms, igniting public and institutional attention (Chayka, 2021; Olcott, 2021). Other companies, including Microsoft, Nvidia, Epic Games and Roblox, advanced similar visions. At its core, the metaverse refers to an ecosystem of interconnected virtual spaces, with VR providing the embodied, three-dimensional interface which users would navigate (Mystakidis, 2022).[6] In financial terms, since Meta’s rebranding in 2021, forecasts anticipated worldwide spending on VR and AR to grow from $12 billion to $72.8 billion by 2024 (Chandar, 2021; Fortune Business Insights, 2021). In reality, the optimism around Meta’s rebranding was striking, as markets only reached $16.3 billion that year (Fortune Business Insights, 2025). Even so, growth remains robust, with spending predicted to hit $123 billion by 2032, and user numbers expanding rapidly, with China and the United States leading global investment (Market.us & Pangarkar, 2025).

Another point deserves emphasis: at first glance, VR may appear to be a purely technical innovation, yet it is deeply entangled with political-economic interests. Specifically, it is designed, built, and monetised by specific actors who also determine the values and norms embedded in VR systems. As noted above, VR’s recent rise has been driven largely by Meta, alongside Google, Microsoft, HTC, Sony, Valve, and more recently Apple. As Egliston and Carter observe (2021), a handful of firms control the core hardware and platforms, concentrating capital and decision-making power. This concentration raises concerns about inequality and the embedding of corporate logics within the technology itself. Meta illustrates

[6] For in-depth discussions, see Ball (2022), Benítez Rojas (2024) and Deniz (2023).

the point: although it sells Oculus headsets, its core business model is advertising. VR thus becomes not only a consumer product but also a frontier for data extraction and targeted advertising (cf. Section 4.6.2). Such dynamics are crucial to bear in mind when analysing UN organisations' adoption, because their use of VR for training, collaboration, or advocacy remains dependent on infrastructures governed by corporate actors, creating specific tensions. For example, interviewees lamented the requirement that Oculus users hold a Facebook account, highlighting how Meta's infrastructural control imposed who was allowed to participate (Interviews 21; 22; Robertson, 2020).

2.2.2. Clarifying VR types: Cinematic VR, single-user and multi-user CGVR.

As noted earlier, this thesis examines VR use across three distinct functions. To clarify this, it is useful to first define the different types of VR technologies, and the terminology used. The typology outlined here is not exhaustive, but offers a framework to make sense of the case studies analysed in this thesis. This is particularly necessary given that the term 'VR' is often used as a catch-all label for technologies that differ greatly in design and application. A key initial distinction is between VR based on real-life captured video and VR built from computer-generated (CG) graphics. The former involves 360° panoramic videos recorded with an omnidirectional camera (Vasarainen et al., 2021: 5). These are, by design, single-user experiences, as they present a pre-recorded environment. They are sometimes called 'VR film' (W. Chang, 2016), 'VR cinema' (Zarka & Shah, 2016), or 'cinematic VR' (CVR) (Mateer, 2017) the term used in this thesis. In CVR, users exercise only 'peripheral agency': they may look around but cannot interfere with the narrative (Moody, 2017: 45).[7] In contrast, CGVR involves digitally constructed environments built with 3D modelling and rendering technologies, akin to videogames. They can support both single-user and multi-user

[7] For a taxonomy of CVR, see Rothe and colleagues (2019).

interactions. 'Multi-user' VR enables participants to interact with one another through speech, body language, chat, or other embedded tools (Shen et al., 2021; Slocum et al., 2009), while single-user CGVR typically involves navigating VEs individually, often for the purposes of training or simulation, and interacting with pre-programmed scenarios or virtual agents.[8]

TABLE 1:

VR TYPOLOGY

Type of VR	Content Source	User experience	Interaction type	UN case study
Cinematic VR *(Here: VR for advocacy)*	Real-life captured footage	Single-user	Exploratory (user controls viewpoint)	*UNDP 'I Am Fatmira'* (Chapter 6)
Single-user CGVR *(Here: VR simulations for training)*	Computer-generated environment	Single-user	Interactive (user explores and interacts with VEs)	*ILO training simulation* (Chapter 7)
Multi-user CGVR *(Here: collaborative VEs)*	Computer-generated environment	Multi-user	Interactive and collaborative (user interacts with VE and other users)	*ITC-ILO collaboration initiatives* (Chapter 5)

It is also important to distinguish VR from related technologies such as Augmented Reality (AR), Mixed Reality (MR), and eXtended Reality (XR). Whereas VR immerses users in a fully virtual environment, typically replacing their physical surroundings entirely, AR overlays

[8] Recent research suggests that generative AI is increasingly used in VR programming to adapt scenarios dynamically to user input through Procedural Content Generation (Rocha & Prada, 2025; Valmorisco et al., 2024). This development raises new questions for CVR, as content may become entirely generated, indicating that current classifications may soon evolve.

digital content onto the real world, and MR combines the two, allowing virtual and physical objects to interact. XR serves as an umbrella term encompassing all three.[9]

2.2.3. Key concepts in VR research

Having outlined the technological foundations of VR, this section turns to key concepts central to its study: immersion, presence, the plausibility illusion, embodiment, avatars and virtual selves.

First, *immersion* refers to the extent to which a VR system 'envelops' the user and isolates them from the physical world, drawing them into the VE through sensory and perceptual cues. It is often linked to technical features such as high-resolution visuals, spatial audio, and responsive systems, which together enhance the feeling of being 'inside' a virtual world. Immersion has also been linked to users' subjective sense of *presence* – the psychological sensation of 'being there' in a VE. Triberti and colleagues (2025) for example consider presence the psychological counterpart of technological immersion. Accordingly, studies suggest that more immersive systems tend to produce a stronger sense of presence (Pavic et al., 2023). Scholars distinguish two forms of presence: *spatial presence,* or the perception of being physically located within the VE, and *social presence* (also called *co-presence*) the perception of others as present within it (C. S. Oh et al., 2018; Schroeder, 2011). A central concept – so much so that it has given rise to a dedicated field of research known as 'presence theory' (Lombard et al., 2015; Zhang et al., 2022) – *presence* recurs throughout this thesis, particularly as it informs some emerging properties.

[9] For recent overviews, see Vohra (2025) on XR, Boulanger (2024) and Veen (2025) on AR, and Cronin (2025) on MR.

Another key concept is the so-called *plausibility illusion* (Slater, 2009), which captures how users' sensory and cognitive systems engage with a VE in ways consistent with real-world experience, even when they remain aware of its simulated nature (Eckhoff et al., 2025; Slater, 2009). Classic demonstrations, such as the 'plank over a city street', illustrate this effect: participants know they are safe yet often hesitate or display fear responses (El Basbasse et al., 2023). Likewise, in virtual pedestrian crossings, users instinctively check for cars and proceed cautiously (Bhagavathula et al., 2018). These illusions are crucial to explaining VR's capacity to evoke strong emotional and behavioural reactions – a theme revisited later in this thesis.

Connected to the above are the concepts of *embodiment* – sometimes termed *body ownership illusion* – and *avatars.* Embodiment refers to the feeling that a virtual body is one's own (Palma Stade et al., 2023; Schultze, 2010; Slater, 2017). This sense of ownership emerges through the *avatar*: when users enter a VE via an HMD, it is not their physical body that appears and acts, but a virtual proxy commonly known as an avatar, or a 'personal digital representation' (Fraser et al., 2024) which and is perceived as a bodily extension (Maister et al., 2014). Research has explored how avatars mediate identity in two main ways. On the one hand, avatars function as tools for virtual self-expression: users actively construct, customise, and control their avatars, which serve as flexible vehicles for identity representation (Freeman et al., 2020). In fact, since avatars are not constrained by physical embodiment, they can be easily modified to express alternative or aspirational selves. For example, avatars frequently diverge from a user's physical appearance (Hooi & Cho, 2014; Kyrlitsias & Michael-Grigoriou, 2022), thus enabling both anonymity and identity play.[10] This flexibility may be

[10] This goes beyond mere visual similarity: avatars become sites of embodied identity, with whom many users form deep affective ties (Boellstorff, 2011; Warburton, 2008). They also enable identity experimentation (Kafai et al., 2010), thereby complicating conventional understandings of body semiotics (McVeigh-Schultz and Isbister, 2021). A particularly intriguing phenomenon in this context is *homuncular flexibility*, a term that describes the brain's remarkable ability to adapt to non-human or altered virtual bodies (Won et al., 2015). Interestingly, users maintain body ownership even in avatars with atypical features – such as extra limbs or atypical proportions – if visuo-motor and visuo-tactile cues remain synchronised.

particularly valuable in specific contexts, such as among individuals with social anxiety (Deighan et al., 2023; Zamanifard & Robb, 2023) but it also holds relevance in high-stakes settings such as global governance, where visibility, representation, and identity are often highly charged. In such environments, the capacity to selectively reveal or obscure one's identity through an avatar opens up new avenues for navigating power dynamics and self-presentation in negotiations.

On the other hand, avatars also exert influence on users themselves, influencing behaviour and attitudes through phenomena such as the Proteus Effect (Ratan & Sah, 2015; Slater, 2017; Yee & Bailenson, 2007a). The Proteus Effect describes how individuals temporarily adjust their attitudes or behaviours in line with the traits of their avatars.[11] For example, users assigned tall avatars negotiate more assertively than those with shorter ones (Yee & Bailenson, 2007a) while women embodying sexualised avatars have been shown to internalise those traits, including increased self-objectification (Fox et al., 2013b).[12] These effects occur online and persist, to some extent, offline (Poleac, 2023; Yee et al., 2009).[13] The Proteus Effect holds particular interest for global governance. Bjola (2023), for example, suggests that strategically deployed avatars could reshape participation in international arenas, fostering new forms of state–citizen engagement. We can also imagine IOs or political bodies leveraging it by shaping, intentionally or not, users' dispositions by manipulating avatar traits such as height, gender, or appearance. This raises important questions about behavioural engineering. Accordingly, the conclusion returns to avatars' role in global governance to highlight their potential as a site of future research.

[11] For a recent review of the concept and the theoretical frameworks that help explain it, see Coesel and colleagues (2024).
[12] However, Sherrick and Hoewe (2014) found no evidence of a Proteus Effect when comparing masculine and feminine avatars.
[13] The effect also occurs in conventional videogames, but immersive VR may intensify it (Beyea et al., 2022).

2.2.4. An overview of the VR research landscape

The academic literature on VR is vast, with research spanning computer science, social sciences, and the humanities (Cipresso et al., 2018b). In the field of human-computer interaction (HCI), research has focused on user experience in VEs, examining immersion and embodiment – for instance, how to design convincing sensory illusions and avatar integration to enhance presence (Boletsis et al., 2017; Riva et al., 2014). Media and communication studies approached VR as an emerging digital medium, investigating how it shapes attitudes, emotional responses, and information retention (Mandela, 2024). Critical scholars, meanwhile, interrogate the power dynamics and representational politics embedded in VR (Bystrom & Mosse, 2020; Nash, 2018a, 2018b). Bystrom and Mosse (2020), for example, argue that humanitarian VR campaigns are often 'subsumed by a reliance on empathy' that risks turning viewers into passive recipients of emotions, rather than agents of structural change, while Nash warns that VR's 'immersive witnessing' carries the moral danger of 'improper distance', collapsing boundaries between Global North selves and Global South 'others.' Within the social sciences, a significant strand of scholarship addresses VR's ethical dimensions, including issues of representation (Brey, 1999; Cotton, 2021; Rueda & Lara, 2020), design ethics (Kenwright, 2019), mental health (Spiegel, 2017), and privacy and data protection (O'Brolcháin et al., 2015), alongside wider risks to users (Joey J. Lee & Elliot Hu-Au, 2021; Parsons, 2019; Ramirez, 2021; Slater et al., 2020). Game studies also have a rich tradition of researching VR (Bertoldi & Mariotti, 2022; Blackman, 2022; Brooks, 2023, 2023; Cai & Cao, 2021; Hassapopoulou, 2018). For example, Blackman (2022) analysed how VR videogames cultivate immersion, presence and performative spatiality, arguing that head-tracked embodiment reconfigures players' presence. Bertoldi and Mariotti (2022) designed a social-VR 'docu-game' on the Asia Minor Catastrophe, reporting higher engagement and

learner autonomy compared to textbooks. Brooks and Brooks (2023) found VR rehabilitation games to increase patient motivation and therapy adherence, and Cai & Cao (2021) demonstrated that VR serious games helped children with autism acquire everyday living skills at lower cost and with greater flexibility. Beyond games, VR is widely used in cultural heritage, for instance in museums that allow visitors to virtually explore otherwise inaccessible sites and artefacts (Iacono et al., 2024). In educational contexts, it enriches learning by letting students interact with heritage objects and environments, deepening understanding and retention (Zhao et al., 2025). Methodologically, VR is examined through experiments, content analyses, qualitative studies, and ethnographies of social VR communities.[14] In practice, established uses range from training and simulation to entertainment and urban development.[15] The technology is used extensively in military and aviation training (Pallavicini et al., 2016) and medical and psychiatry practice (Cieślik et al., 2020; Gallagher et al., 2005), including interventions for phobias and anxiety disorders (Botella et al., 2017; Garrett et al., 2018). It is also leveraged in industrial contexts such as construction (X. Li et al., 2018) and urban planning (Dembski et al., 2020), as well as virtual tourism (Prandi et al., 2021; Wagler & Hanus, 2018).

Rather than a comprehensive survey, the above examples illustrate the diverse research areas in which VR has been explored. Yet, as noted in the introduction, IR, IOs and global governance scholars have largely overlooked VR. This gap may stem from the limited and experimental nature of VR adoption in these domains. Nevertheless, some research has examined VR in the UN system, particularly its use in advocacy and fundraising (Bystrom & Mosse, 2020; Gruenewald & Witteborn, 2020; Irom, 2018; Simoni, 2023). This research is taken up later in the chapter. Having outlined what VR is and how it has been studied, the next

[14] For methodological reflections on how to study VR, see Bender and Broderick (2021), Jones (2022) and Mathysen and Glorieux (2021).
[15] For a recent overview of XR applications, see Becker and Freitas (2024).

step is to situate these insights within the broader literature on IO digitalisation, before connecting them to UN-specific VR initiatives.

2.3. The digitalisation of International Organisations (IOs)

2.3.1. Changing IOs in a world in flux

From the telegraph, which enabled the first forms of instantaneous transnational communication, through the digital revolution that reshaped information flows and organisational infrastructures, to today's emerging technologies such as AI and VR, technological change has persistently reconfigured the practices of global governance, with far-reaching implications for IOs' mandates and operations. In recent years, many IOs have been observed 'going digital' (Bjola & Zaiotti, 2021c) by adopting a range of new technologies. Scholars have shown that IOs must continually adapt to new technologies to remain effective (Bjola, 2025; Bjola & Manor, 2022b; Ecker-Ehrhardt, 2024; Goheer, 2020b), oftentimes amidst contestation (Ecker-Ehrhardt, 2020a; Morse & Keohane, 2014). How they do so, and how such technologies reshape their operations and engagement with global issues, has become a pressing concern across various subfields. Despite differing emphases, these literatures converge on a common thread: a critical 'rethinking' of IOs in the digital age (Bjola & Zaiotti, 2021c). This review surveys five key subfields – Digital IR, Digital Diplomacy, Digital Humanitarianism, ICT4D, and IO Innovation Studies – to assess their contributions at the intersections of technology and global governance.

2.3.2. Digital International Relations

Digital International Relations (DIR) is an emerging subfield that examines the transformative effects of digital technologies on world politics (Bjola & Kornprobst, 2023a; Richmond,

2020). It therefore aligns closely with this thesis's aim of investigating how VR adoption reshapes IO practices. A central theme in DIR scholarship is the recognition that digital technologies disrupt established IR dynamics, including conceptions of space, time, and power. For example, Bjola & Kornprobst (2023) highlight how state relationships are increasingly shaped by processes such as datafication, accelerated interactions, technological pervasiveness. Similarly, Richmond (2020: 328) emphasises that the advent of digital technologies is driving a fundamental shift from 'analogue' IR, characterised by territoriality and state-centrism, towards a networked, virtual, and rapidly evolving system. These transformations have prompted calls for a 're-coding', of traditional IR frameworks to account for the changes introduced by digital technologies, thereby giving rise to DIR. Importantly, DIR is not about adding a 'cyber-' prefix to existing concepts or creating a new theoretical silo. Rather, as Bjola and Kornprobst (2023) argue, it seeks to *upgrade* traditional IR frameworks by rethinking the core of existing research programmes to reflect the transformative potential of digital technologies. Engaging with DIR literature provides essential context for understanding VR adoption within the UN system: as elaborated in Chapter 3, this study begins with a micro-level focus on specific UN organisations and their organisational practices, before turning to the broader implications for IOs. DIR is especially relevant here, as it situates these organisational changes within wider disruptive patterns of digital transformation, showing how emerging technologies like VR are embedded in global shifts that are reshaping 'analogue' international relations. These changes are often understood in terms of disruption (Harknett, 2023; Owen, 2016; Richmond, 2020: 328), seen as both 'immensely creative and potentially destructive (Bjola & Kornprobst, 2023a). Both aspects – the 'dark' and the 'light sides' – are explored across DIR clusters ranging from the changing role of the state, to the transformation of war and peace, and the governance of emerging technologies.

One prominent DIR cluster examines how digitalisation reconfigures power, decentralising authority away from states and empowering new actors such as tech companies, activists, and transnational networks (Harknett, 2023; Kello, 2023; Owen, 2016). While power itself is not a central concern of this thesis – given ANT's limited engagement with questions of power (see Section 3.4) – it is nevertheless relevant to note that scholars emphasise how cyberspace unsettles traditional state-centric notions of power rooted in territoriality and military dominance. Instead, authority operates through fluid infrastructures and rapidly evolving threats that demand constant adaptation (Bjola & Manor, 2022b). This includes a shift from territorial space to cyberspace, now conceived as a strategic environment in IR (Harknett, 2023).[16]

Another DIR cluster examines the changing character of war and peace. Scholars argue that digital technologies are transforming both the processes of peace-making and peacekeeping (Richmond, 2020) as well as the nature of war and conflict (see, e.g., Kello, 2013; Robinson et al., 2015). Research on digital peacekeeping highlights the dual potential of technology to support peacebuilding while also introducing new risks, cautioning against both 'tech-solutionism' and 'tech-scepticism' (Firchow et al., 2017; Tellidis & Kappler, 2016). Parallelly, studies on cyber warfare examine the implications of cyberweapons for international security and the emergence of 'hybrid warfare', where conventional, irregular, and digital strategies increasingly overlap (Hoffman, 2007: 31; see also: Johnson, 2018; Nilsson et al., 2021). This body of literature provides critical context for the study of IOs' VR adoption. In peacebuilding, VR has shown promise as a tool for conflict resolution and mediation. Hasson and colleagues (2019) demonstrated that VR experiences can foster more positive attitudes towards out-group members, with effects persisting both immediately and in the long term. Subsequent research by Hasler and colleagues (2021) then revealed that VR can

[16] The concept of space and spatialities is central to this thesis, as VR operates precisely within the hybrid realm of shifting spatialities (Section 8.4.2).

also amplify hostile emotions towards in-group members, making people more critical of their own groups. The potential of VR to mediate conflict is further illustrated by *The Enemy* project (2017), a multi-user VR installation which enables users to meet 'face-to-face' with combatants and hear testimonies from both sides of the conflict. Additionally, Pelletier and Drozda-Senkowska (2020) explored VR's role in countering violent extremism, showing how perspective-taking through VR (such as envisioning one's future self) can support de-radicalisation from extremist ideologies.

The third cluster of DIR research examines the challenge of creating regulatory environments for emerging technologies that remain 'fit for purpose' amidst rapid technological change, engaging substantive and ethical questions about their development, deployment, and societal implications (Girasa & Scalabrini, 2022). While not the focus of this study, acknowledging this cluster situates IOs' VR adoption within broader debates on global regulation of VR and the 'metaverse', sometimes termed 'meta-regulation' (Cosgrove, 2023). This cluster also researches the ethical development, design, and deployment of VR (see, e.g., Bye et al., 2019; Hogenhout, 2021; Joey J Lee & Elliot Hu-Au, 2021; Kenwright, 2019; Madary & Metzinger, 2016). These discussions are particularly pertinent given the absence of specific VR frameworks (Ball, 2022; Kalpokas & Kalpokienė, 2023), a gap that may hinder effective VR adoption (Shwedeh, 2024).

2.3.4. Digital diplomacy

While DIR explores the broader impacts of digitalisation on global politics, the field of *digital diplomacy* narrows the focus to examine how the diplomatic profession and its practices are adapting to the digital age (Bjola & Holmes, 2015; Hedling & Bremberg, 2021: 1596). Scholars have observed that the advent of new technologies is challenging traditional

diplomatic practices (Hedling & Bremberg, 2021). The digital transition accelerated by the COVID-19 pandemic and now by the rise of AI has shifted diplomacy increasingly towards virtual negotiations and summits, replacing many face-to-face interactions (Stockholm Environment Institute et al., 2021a). As diplomatic practices become increasingly digitally mediated (Adler-Nissen & Eggeling, 2022: 643), key diplomatic actors – including diplomats themselves, Ministries of Foreign Affairs, and IOs – are learning to adapt to those changes. Given that these changes now permeate all aspects of IOs' work (Bouchard, 2024), scholars are investigating diverse dimensions of this transformation.

One prominent strand investigates how digital technologies are affecting the internal processes and structures of diplomacy, including negotiations and multilateral interactions (Bjola & Manor, 2022b; Bramsen & Hagemann, 2021; C. Crawford, 2021; Höne, 2020). Since the pandemic, diplomatic collaboration has undergone a significant shift from face-to-face interactions to predominantly online engagements, facilitated by video-conferencing platforms. Tools such as Zoom, Teams, and even word processing software have not only enabled this transition but also shaped practices by promoting certain behaviours and discouraging others (Adler-Nissen & Drieschova, 2019a). This strand of research connects directly to the focus of this thesis, particularly the function of virtual collaboration (Chapter 5). Just like these studies investigate how platforms like Zoom alter diplomatic practices, this thesis explores how VR influences and transforms IOs' practices of virtual collaboration.

Another central strand of digital diplomacy research focuses on public diplomacy, examining how states and IOs use digital tools to engage global audiences and shape their international presence. Much of this work analyses social media platforms and their role in projecting identities and advancing foreign policy goals (Duncombe, 2017; Kaneva et al., 2023). Yet digital public diplomacy extends well beyond social media, encompassing innovations such as virtual embassies (e.g., Sweden, Maldives, Estonia) (Bengtsson, 2011;

Stevens, 2015; Williamson, 2023) virtual pavilions at world expos (e.g., Osaka Virtual Expo 2025) (Shaw, 2025), and immersive VR events like #ACTNOW (Section 2.5.2). This is directly relevant to this study, as the function of *advocacy* is a core dimension of public diplomacy. The literature on public digital diplomacy therefore provides valuable context for understanding UN organisations' use of VR for advocacy.

Furthermore, digitalisation has introduced several cross-cutting changes in diplomatic interaction. It has accelerated the pace of bilateral and multilateral diplomacy, where governance processes unfold more quickly (Adler-Nissen & Drieschova, 2019a; Ecker-Ehrhardt, 2024; Seib, 2012), as well as the pace of public diplomacy (Barston, 2019; Bjola & Jiang, 2015). Digital diplomacy scholars – echoing insights from DIR – also note how digitalisation broadens the diplomatic landscape, extending beyond states and IOs to new actors such as tech companies and Silicon Valley (Cornut & Dale, 2019). This diversification is significant for this study, as it underscores the growing, active role of emerging technologies, including VR itself, in shaping diplomatic practices. Furthermore, the involvement of technology companies, central to this research, links to the literature on Science, Technology and Innovation (STI) Diplomacy, which examines how scientific and technological advances intersect with global governance (Kaltofen & Acuto, 2018b, 2018a; Miremadi, 2016; Ruffini, 2020). Scholars increasingly recognise that the digital diplomacy 'revolution' extends beyond established communication tools to a wider range of emerging technologies, from AI and machine learning to robotics (J. Robertson, 2020). These technologies – many still poorly understood – hold considerable potential to reshape diplomatic practice. For example, Bjola and Manor (2024a, 2024b) explore how AI can impact diplomacy by automating tasks, identifying patterns in data, and providing real-time insights. Similarly, VR may introduce shifts in diplomatic practices: Ertem-Eray and Eyun-Jung (2024) analysed a public diplomacy VR video by Hong Kong Tourism, finding it negatively

influenced foreign audiences' perceptions of the government, its people, and the country. Mehdiyev (2025) explored VR applications in diplomatic practice, arguing that VR provides critical tools for diplomatic simulations and conflict management despite associated security and digital divide challenges.

2.3.5. Digital humanitarianism

Given the UN's role as the world's leading humanitarian institutional system and the humanitarian and development dimensions inherent in all the case studies, *digital humanitarianism* is another key area of relevance for this research. The literature on digital humanitarianism examines how humanitarian practice is becoming increasingly digitalised and reliant on emerging technologies, and the broader implications of this shift (Aarvik, 2020; Burns, 2019; M. Duffield, 2016; M. R. Duffield, 2019; Johns, 2023). In recent years, technological developments led IOs to pour their hopes into the promise of scientific and technological innovation to support their work and further their mandates, leading to the rise of the 'humanitarian cyberspace', a social arena where they 'negotiate activities and outcomes in ways that are both enabled and constrained by technology' (Sandvik 2016: 21). This has given rise to 'humanitarianism at a distance,' with interventions being increasingly conducted remotely and enabled by digital tools and capabilities, such as online collaboration and citizen participation (Aarvik, 2020). Crucially, scholars argue that digital humanitarianism is not simply the addition of digital tools to existing practices; rather, it represents a fundamental shift in the *logic* of humanitarianism, potentially reshaping the dynamics between the international order and the beneficiaries of humanitarian action (Aradau, 2024; Johns, 2023). The digitalisation of humanitarian practices has however raised concerns: IOs may overstate the power of innovation (Scott-Smith, 2016), risk becoming increasingly distanced from on-the-ground realities, a process of 'bunkerisation' (Aarvik, 2020; M. Duffield, 2012, 2014), or

reinforce global inequalities through ‘techno-colonialism’ (Madianou, 2019). Scholars broadly agree that humanitarian technology carries potential for both empowerment and exploitation (Cheesman, 2023), with scholars advocating for a more nuanced, critical engagement with digital humanitarianism (Aradau, 2024).

Digital humanitarianism research examines a range of humanitarian innovations. Key clusters focus on SMS and GPS (Abushaikha & Schumann-Bölsche, 2016; Kaiser et al., 2003), biometric technologies (Jacobsen, 2015b; Sandvik & Jacobsen, 2016), and data-driven approaches (Fejerskov et al., 2024; Meier, 2015). Data has become a central concern, with scholars warning that datafication can reinforce inequalities through the creation of ‘humanitarian ignorance’ (Aradau, 2024; Fejerskov et al., 2024). Another prominent strand investigates the digitalisation of humanitarian supply chains, considering how technological advances affect efficiency and sustainability (Shrivastav & Bag, 2024). VR has also been studied as a humanitarian technology, with research highlighting the aforementioned dilemma between empowerment and exploitation: On the one hand, scholars stress VR’s potential to raise awareness and advocate for social justice. Atkinson and Kennedy, for example, emphasise VR’s capacity to extend empathy by allowing users to experience others’ perspectives across geographical and social boundaries (Atkinson & Kennedy, 2018. See also Nash, 2018; Section 2.2.4 and cf. concept of 'mediated intimacy', Cefai & Couldry, 2019). Others, however, observe that VR’s specific ‘emotional style’ risks perpetuating ‘poverty tourism’, whereby audiences consume stories of suffering without engaging with deeper structural issues (Gruenewald & Witteborn, 2020). Similarly, Schlembach and Clewer (2021) argue that VR films are inherently manipulative, capable of ‘forcing empathy’ by bypassing critical engagement.

2.3.6. Information and Communication Technologies for Development (ICT4D)

Another relevant research field is ICT4D, which examines the use of technology within international development contexts and its relationship with socio-economic change (Avgerou, 2017). ICT4D research spans a variety of topics and technologies. Ramadani and colleagues (2018), for example, divide the field based on thematic distinctions, including 'technology transfer', 'social-embeddedness', and 'transformative ICT4D', while Walsham (2017) provides an overview of key debates. Pyram's valuable typology (2024) classifies ICT4D artefacts into nine groups based on technology type, including hardware (e.g., tablets, biometric devices), software (e.g., e-learning platforms, mobile banking), communication tools (e.g., social media), connectivity infrastructure, e-governance solutions, and healthcare applications. Like the fields above, ICT4D also investigates technology as a 'double-edged sword,' capable of both promoting development (Wobcke et al., 2023; Z. H. Yin & Choi, 2023) and exacerbating inequalities and digital divides (Chipidza & Leidner, 2019; F.-F. Rothe et al., 2023; Unwin, 2017).[17]

Since its emergence in the 1960s, ICT4D has evolved significantly, recently entering what Heeks describes as the 'ICT4D 3.0' era (2020a, 2020b). This phase is marked by a paradigmatic shift towards 'digital-for-development', where ICTs are understood not merely as tools but as *mediators* of development. This recognition of technology's active role in shaping development is echoed by Avgerou (2017), who argues for drawing on STS to develop more nuanced, sociomaterial accounts of technology's role in development, thereby avoiding technological determinism and advancing ICT4D's theoretical foundations. Her perspective aligns with this thesis' approach, which draws on sociomaterial traditions to examine UN

[17] For scholarly reflections on the dual impact of technology within ICT4D, see Meng and Xiao (202), Qureshi (2006), and Unwin (2009).

organisations' adoption of VR (see Section 2.4 and Chapter 3). ICT4D research also examines how emerging technologies can advance the UN's Sustainable Development Goals (SDGs) (Andersson & Hatakka, 2023), with growing work on emerging technologies such as AI (Bjola, 2022; Goralski & Tan, 2020; Kulkov et al., 2024), blockchain (Mangla et al., 2021), and drones (Gryech et al., 2024).

Several recent studies have explored how VR technologies might contribute to the SDGs. While not centred on organisational practices, they offer insights into how immersive technologies might advance the UN's broader SDG agenda. Umar (2022), for example, examines how a blockchain-VR metaverse could fast-track all 17 SDGs in developing states, while flagging policy and data-governance risks. Similarly, Kunitake (2023) argues that globally connected VR communities can support SDGs through applications ranging from ecotourism and skills training to health, education, and public service delivery, citing pilots such as the Seoul Metropolitan Government (2021). Along similar lines, Bekaroo (2024) highlights the potential of XR technologies across all SDGs but warns that adoption barriers, inequality, and safety concerns must be addressed through interdisciplinary efforts. Very recently, Crespo and colleagues (2025) reviewed the immersive learning literature between 2020 and 2024, mapping how the SDGs are taught and promoted through immersive technology. A more practice-oriented study sees Stavroulia and colleagues (2025) develop a VR training tool addressing three SDGs to address gaps in sustainability education.

2.3.7. Organisational change and innovation studies and IOs

The fields discussed thus far primarily address more 'typical' IR questions and preoccupations around global governance and the systemic impacts of digitalisation on the international sphere. In contrast, *Organisational Change Studies* (OCS) and the closely related field of

Innovation Studies shift attention to IOs' internal operations and processes, particularly how they adapt to and manage change in the face of technology adoption. This reflects a more 'sociological' approach, treating IOs as legitimate objects of study in their own right rather than as mere instruments of state power (Ness & Brechin, 1988). This is aligned to this thesis' objective of examining the changes to UN organisations' practices brought about by VR adoption. As such, although this thesis adopts a sociotechnical approach grounded in STS and ANT rather than OCS, this literature is useful for understanding the institutional context in which VR adoption might take place.

The literature on organisational change and innovation encompasses a broad range of conceptual frameworks and approaches (Godin et al., 2021a: 2-3; Poole & Van de Ven, 2021b). Crucially, it covers not only technological, but also institutional and managerial change within IOs, though the latter is less relevant for this thesis (e.g., Bauer & Knill, 2007; Schön-Quinlivan, 2008). In the case of technology-driven change, however – perhaps for their reputation as innovation adverse, 'slow-but-stable' entities (Abbott et al., 2016; Hannan & Freeman, 1984) – OCS has tended to overlook IOs, focusing instead on private sector organisations (Ambos & Tatarinov, 2022a). Recently, however, scholars began to take an interest in IO innovation, driven by two key motivations: first, IO innovation processes differ markedly from those of private firms; second, IOs themselves are becoming more innovative, particularly in response to digitalisation and global pressures (Bjola, 2025)

Several distinctions set IOs apart from private companies. First, unlike firms, IOs are designed to pursue socially oriented mandates rather than profit (Ambos & Tatarinov, 2022a: 92; Burt & Taylor, 2003). Consequently, they tend to be heavily bureaucratic, with complex political decision-making, accountability frameworks, and risk-averse cultures designed to minimise harm (Burt & Taylor, 2003; McGreal, 2015; Tatarinov & Ambos, 2022). Secondly,

and relatedly, they also operate in frugal environments, leaving little room for high-risk or experimental innovation initiatives (Chyba et al., 2023; Tatarinov & Ambos, 2022). Further challenges include international dispersion (Tatarinov & Ambos, 2022) and legitimacy pressures (Ecker-Ehrhardt, 2017). Together, these factors create a distinct environment where IOs need to navigate a very fine balance if they want to adopt innovative technologies (Burt & Taylor, 2003).[18] A counter-narrative, however, highlights public bodies' capability to foster innovation and entrepreneurialism (Kattel et al., 2019; Kelman, 2021; Mazzucato, 2013; Mazzucato & Kattel, 2018), alongside IOs' expanding role in the global digital sphere (Bjola & Zaiotti, 2021). This innovative momentum is also reflected in the range of innovation and digitalisation initiatives recently implemented across the UN system (Section 2.5.1).

Studies have focused on different aspects of IOs' innovation and technology adoption processes.[19] A strand of studies investigated the determinants of technological change, distinguishing between exogenous and endogenous factors. Exogenous determinants include external pressures, such as global technological progress (Bloom & Faulkner, 2016: 1371; Finger & Ruchat, 2000) (Ambos & Tatarinov, 2022: 93), legitimation needs (Ecker-Ehrhardt, 2020b), critical historical 'junctures' (Kapur, 2002: 337) or systemic shocks like COVID-19 (Bjola & Manor, 2022).[20] VR adoption by UN organisations can be seen as partly responding to such pressures to innovate and adapt to an increasingly digital global environment. Endogenous change, by contrast, originates within IOs ('intentional perspective', Toshkov, 2016) and is frequently linked to individual leadership, institutional entrepreneurship, or

[18] Interestingly, scholars have suggested that the unique characteristics of IOs may lead to forms of innovation distinct from private-sector models, yet still innovative: for example, social (Patiño-Valencia et al., 2022), responsible (Ambos & Tatarinov, 2022a), and sustainable innovation (Godin & Gaglio, 2019).

[19] For an in-depth study on change in IOs, see Haas (2018), who illustrates how applying organisational theory to IOs can generate insights into fostering their capacity for innovation, for example through improvements in their design, structure, and performance. See also the review by Walk and colleagues (2024) on organisational change in the non-profit sector, which classifies changes by scope (incremental vs. comprehensive) and external relationship (reactive vs. anticipatory).

[20] Accordingly, COVID-19 is in fact often cited in UN reports as a driver of digitalisation (Westley & Antadze, 2010; World Economic Forum & Wyman, 2016).

'intrapreneurship' (Battilana et al., 2009; Beckert, 1999) (Ambos & Tatarinov, 2022a; Berzin et al., 2016). It may also reflect organisational strategies to expand influence and prestige (Manor, 2020) or survival (Barnett & Coleman, 2005; S. Cho, 2014; Goheer, 2020b; Vaubel, 2006). Change may also originate from functional motives and material considerations, such as improving functionality and effectiveness (Arendt-Cassetta, 2021; UN Secretary General, 2020). In this study, the innovators who drove VR projects exemplify such endogenous dynamics (Chapters 5, 6, 7).

Beyond exogenous and endogenous determinants, scholars analyse *how* IOs adapt to digital technologies. A key focus has been on the different types of technology-driven change, ranging from rapid to gradual transformations, as well as more specific mechanisms such as institutional layering, conversion, path dependence, critical junctures, and punctuated equilibria (Rabitz, 2023). Empirical work illustrates both obstacles and trajectories of change: for example, Goheer (2020b) examines the digital transformation of the Commonwealth Secretariat, highlighting challenges such as internal bureaucratic resistance, political dynamics among member states, and tensions arising from the changing nature of diplomacy in the digital age. Bjola and Manor (2022b) differentiate between digital adaptation and digital adoption in their analysis of Ministries of Foreign Affairs (MFAs), showing how organisations transition from responding to external pressures (adaptation) to integrating innovations comprehensively into their operations (adoption). Focusing specifically on the UN system, Tatarinov and colleagues (2023) analyse how four UN-driven digital solutions are developed and scaled internationally, while Ruchat and Finger (2000) investigated the processes of change within the UNCTAD, revealing common organisational pathologies during the transition from bureaucratic structures to a more 'entrepreneurial organisation'. Frameworks have also been proposed to guide such transformations, including seven-step models for change management (Flanding & Grabman, 2022).

2.4. Sociotechnical Approaches to IOs: STS, IPS, and the 'path' to ANT

2.4.1. The turn to interdisciplinary and sociotechnical approaches

Section 2.3 provided an overview of key literatures on IO innovation. Despite their shared focus on technology adoption, these works are organised around thematic clusters rather than a common theoretical framework. In contrast, other strands of literature distinguish themselves by their shared assumptions and approaches to understanding specific phenomena. The next paragraphs will discuss two of these academic traditions: Science and Technology Studies (STS), and International Political Sociology (IPS). STS investigates the diverse ways in which technology shapes and is shaped by social, political, and global contexts, while IPS explores the intersection of sociology and global governance. Actor-Network Theory (ANT), the framework employed in this thesis (Chapter 3), is situated within, and draws from, both traditions. Understanding their agendas and contributions is thus essential to situating this thesis and clarifying its objectives.

Moreover, both STS and IPS exemplify a broader interdisciplinary move within IR: an effort to integrate sociological and technological insights to better understand global politics. Increasingly, scholars advocate for theoretical pluralism and bridge-building (Ataka, 2024; A. Braun, 2015; M. Haas, 2017) as well as analytic eclecticism (Chernoff et al., 2020; Cornut, 2015). This cross-disciplinary dialogue is seen as capable of generating more comprehensive and multi-dimensional accounts of complex phenomena (Dunne et al., 2013; Ferguson, 2015; Valbjørn, 2017) and improving the translation of technical knowledge into policy (Carr & Nye, 2019).[21] This thesis shares that commitment. To understand the adoption of an emerging

[21] Note that there is debate on the value of interdisciplinarity in IR, with some scholars lamenting that interdisciplinary approaches risk introducing confusion and undermining IR's coherence (e.g., Ataka, 2024: 93-94; Baron, 2014; Buzan & Little, 2001; Schmidt, 2008), and others contending that a coherent IR theory has never truly existed and that IR has always been, and should continue to be, enriched and influenced by other fields and disciplines (See, e.g., Smith, 2008).

technology like VR in IOs, IR must draw on specialised knowledge. STS offers conceptual tools and knowledge on software, hardware, and technological affordances, and an agentic view of technologies, that lie outside of traditional IR (as developed in Section 2.4.2). Similarly, IPS contributes a sociological perspective that foregrounds practices, micro-level dynamics, and the agency of organisations themselves – shifting attention away from state-centrism and toward the everyday workings of global governance (Section 2.4.3).

2.4.2. STS perspectives on IOs' technology adoption

As an interdisciplinary field, STS examines the interplay between science, technology, and society, exploring how science and technology both 'arrange and are rearranged' by contemporary societies (Felt et al., 2016).[22] STS is a 'tradition' broadly unified by its reimagining of conventional perspectives on science and technology (Acuto et al., 2019: 2; Law, 2017). Historically, the field has been rooted in disciplines such as sociology, anthropology, history, and the philosophy of science and technology, and prioritised the study of national and regional contexts over international ones (De Donà, 2023; Kohler, 2020: 20). Nevertheless, questions of global governance and the international scale have gradually gained attention within STS: As early as the 1970s, scholars started to single out technologies as powerful factors generating increasing interdependence and complexity in the world system (Keohane & Nye, 1977; Skolnikoff, 1977, as cited in Ancarani, 1995). This interest intensified in the 21st century: In 2005, S&T scholar Charles Weiss published an influential article advocating for mainstreaming S&T in both the study and practice of IR through the establishment of the distinct subdiscipline of 'Science, Technology, and International Affairs'

[22] Note that this section foregrounds the technology dimension of the STS field, deliberately setting aside the 'science' component due to both considerations of space, and the increasing recognition within STS that science and technology, though interconnected, are distinct and should not be automatically conflated (Acuto et al., 2019).

(C. Weiss, 2005).[23] Calls for interdisciplinary exchange between the fields of STS and IR then continued to increase (Berling & Bueger, 2015; Bjola & Kornprobst, 2023b; Esguerra, 2015; Lidskog & Sundqvist, 2015; Orsini et al., 2017; J. P. Singh et al., 2019), though not without their critics (Compagnon & Bernstein, 2017; Koddenbrock, 2015). STS approaches make three key contributions to IR: First, they provide tools to grasp and analyse the specific attributes of technological artifacts, challenging conventional views of objects and technologies. Second, they highlight the interwoven relationship between society and technology, which it encapsulated in concepts such as 'the sociotechnical' and 'co-production'. Finally, they provide insights into the political dimensions of technology, including its implications for governance. As these three points are developed below, the discussion will also draw on distinctive STS approaches, including new materialist and post-humanist approaches, sociotechnical studies (e.g., Sociotechnical Systems Theory), and critical studies. These approaches, while they might differ in their focuses and preferred methodologies, all converge on an ontological stance that views technology as an integral component of social processes, rather than an external force. Furthermore, discussing these approaches will lay the foundation for understanding the conceptual framing of this thesis, specifically the decision to ultimately adopt ANT as its framework over the alternatives.

Active matter and the character of technology

The first key contribution of STS to IR is its fresh interpretation of the character of technology itself (Jacobsen & Monsees, 2019). Specifically, STS moves beyond the classical materialistic view of technology as purely mechanical, seeing it instead as 'active', or possessing an inherent 'vibrancy' that enables it to shape social relations in ways that extend beyond human intentions

[23] Weiss (2005) contends that the influence of S&T on international affairs is so 'important and pervasive' that the field should be recognised as an independent sub-discipline, indicating a need to move beyond traditional IR frameworks.

(Connolly, 2013).[24] This view of technology, and in general of all matter (see, e.g., Coole, 2013), as vibrant, aligns with a broader 'material turn' (Mutlu & Salter, 2019), evident in the growth of new materialist and post-humanist studies. These approaches share significant characteristics with ANT, making it relevant to briefly illustrate their features and their connection to IR. New materialism is a theoretical movement situated within the broader context of the 'nonhuman turn.' Scholars suggest that the movement emerged in response to postmodern approaches and their representationalist and constructivist tendencies, which often neglected the material realm (Barad, 2003: 801; Ferrando, 2013). Even when these approaches engaged with technological artefacts, they tended to do so from an instrumentalist perspective, viewing technology primarily as a tool rather than as a material actor in its own right (Mayer, 2019: 85-6). The defining characteristic of new materialism is its insistence on the importance of matter as dynamic and active, not static or passively awaiting to be moulded by some external force (Butler, 2011). Instead, matter is seen as continually materialising, actively forming itself through interactions with human and non-human forces (Butler, 2011. See also Alaimo, 2020; Breu, 2014). Related to new materialism is the movement of post-humanism. Both share a challenge of traditional, human-centred perspectives (Franklin, 2023), differing mainly by their different emphases: while new materialism highlights the agency of material actors, posthumanism questions human exceptionalism, decentring the human in our understanding and study of the world and extending its focus to the Anthropocene, planetary-scale concerns, and 'ecopolitics' (Braidotti, 2013; Ferrando, 2013; Franklin, 2023).

When applied to IR, an active understanding of matter and a decentring of the human subject offers intriguing potential to uncover new insights (Amoore & Raley, 2016; Mac Ginty, 2017; Squire, 2015).[25] This potential is exemplified in Hoijtink and Leese's collection (2019),

[24] For a discussion on the 'agency' of technology and this thesis' interpretation of it, see Section 3.3.1.
[25] Conversely, for a discussion of the challenges of applying posthuman concepts to IR theory, see Kaltofen (2018b) and Mac Ginty (2017).

which examines how objects – from drones to satellites to blockchain technologies – actively shape the political landscape. Similarly, Salter's collections (2015, 2016) highlight the role of material objects in IR, from simple benches (E. L. Jackson, 2016) to viruses and microbes (Fishel, 2015; White, 2015) to digital artefacts like smartphones (Chambers, 2016) and *cookies* (Cooke, 2016). Particularly relevant to diplomacy and UN organisations' practices are the works of Jason Dittmer and Debbie Lisle: Dittmer (2017) explores how material elements such as accumulated paperwork and the physical structure of the building can shape diplomatic practices, while Debbie Lisle (2016) highlights how a seemingly insignificant object – a decaying yellow car in the Cyprus buffer zone – can become a key landmark and practical tool for UN peacekeepers, shaping their interactions within a contested space.

The sociotechnical lens and its relevance for IR

The second key advantage of STS approaches in IR is that they enable a more nuanced understanding of the relationship between technology and society. Traditionally, IR has approached technology through a rationalist and 'externalist' perspective (Mayer, 2019), conceptualising it as an external force that informs politics in a linear, one-directional fashion. In other words, technological advancements were studied as the 'independent variable' (Drezner, 2019), rather than as phenomena embedded within social and political processes (Esguerra, 2015; Lidskog & Sundqvist, 2015).[26] Conversely, STS contends that technology and politics are deeply interconnected, each shaping and being shaped by the other (Esguerra, 2015). This dynamic is at the heart of STS scholarship, which has developed two central concepts to explain it: the *sociotechnical* (Bijker & Law, 1992), and *co-production* (Jasanoff, 2004; Latour, 2011). In IR, a sociotechnical lens highlights how technologically advanced

[26] See, for example, the literature on epistemic communities grounded in Haas' seminal article (1992), which, as critiqued by scholars such as Esguerra (2015), often assumed a division between science and politics. In this view, knowledge is understood as generated in a politically insulated scientific arena and then transmitted in a unidirectional flow to the realm of politics, where it informs policymaking.

artefacts not only shape, but are also deeply shaped by political considerations (Nucci & Sio, 2016). Consider the example of drones: their technical capability for precision strikes is deeply shaped by political considerations, such as the need to justify their use under international law and the ethical debates on extrajudicial killings (Ramos & Fisk, 2016; Stuart Maslen et al., 2018). Similarly, the concept of *co-production* (Jasanoff, 2004; Latour, 2011) highlights the process through which technology and society 'co-produce' each other. The focus here is more on the fact that technology and society 'emerge' together through their interactions. The sociotechnical concept is central to this thesis and will be revisited throughout; a more detailed discussion is provided in Section 3.2.

A subfield where this bidirectional relationship is particularly evident is Socio-technical Systems Theory (somewhat confusingly, also abbreviated as STS – henceforth STS-T), which applies systems thinking to examine processes of technological change and innovation. Central to STS-T is the idea that technologies are embedded within larger, complex sociotechnical systems, which encompass not only the technical artifacts themselves, but also the social institutions, people, norms, and regulations that shape and govern their use (G. L. Herrera, 2006; Hughes, 1987). STS-T studies have focused on the evolution of these systems, as well as on the adoption and development of innovations within them, which they see as emerging from the dynamic interplay of these multiple elements and processes within the system (Spijkerboer et al., 2022). A classic example of a sociotechnical system is the power and electric light network, where technologies like turbogenerators and transformers are closely intertwined with social factors, including organisations, regulatory laws, and financial arrangements (Hughes, 1987). Specifically, Hughes explores what happens when an innovation – in this case, alternating current systems replacing direct current systems – is introduced into an existing complex system, arguing that innovation rarely involves outright replacement but instead requires processes of adaptation, integration, and standardisation. A

more transnational study by Herrera (2006) examines transboundary systems like railroads and the atom bomb, highlighting their global character and showing that technological change can induce changes in the nature and distribution of power within the international system, but that systemic level and state-level factors also shape technological change. The potential applicability of STS-T to this research and explanation of why ANT was ultimately preferred are discussed in Section 3.3.4.

The critical IR approach and the politics of technology

Having outlined STS's attention towards active matter and the sociotechnical, its third contribution lies in highlighting the politics of technology (Aradau et al., 2019). STS often understands technologies as inherently political, emphasising their lack of neutrality (G. L. Herrera, 2006). This distinguishes it from ANT, which does not foreground questions of power (cf. Section 3.4). Accordingly, this aspect of STS will not be explored in detail here. What is crucial to note is that STS challenges traditional conceptualisations of political processes by reconceptualising them as products not only of human agency (e.g., politicians and decision-makers), but as co-produced through interactions with objects, technologies, and practices (Aradau et al., 2019). This perspective broadens the scope of IR inquiry by enabling scholars to, in Sheila Jasanoff's words, 'follow power into places where current social theory seldom thinks to look for it' (2004: 24). Examples include research on infrastructure (Aradau, 2010; Hönke & Cuesta-Fernandez, 2017; Schouten & Bachmann, 2022), roadblocks (Bachmann & Schouten, 2018), biometric technologies (Jacobsen, 2015a) and accounting systems (Jasanoff, 2004), all of which reveal political effects in seemingly neutral artefacts.

The relevance of STS approaches and sensibilities to this thesis should now be apparent: as a technological artefact, VR is inherently material and lends itself to analysis through new materialist or posthuman perspectives, particularly in examining how, as an

'active' technology, it impacts UN organisations' practices. Chapter 3 will build on these foundations to demonstrate how ANT aligns with the aforementioned sensibilities, while offering distinct contributions through its conceptual 'toolbox' that will guide the analysis of VR's adoption.

2.4.3. International Political Sociology (IPS) and the 'practice turn'

This thesis, in addition to engaging with STS, is also situated within a tradition of examining international phenomena through a sociological lens, known as 'International Political Sociology' (IPS). An interdisciplinary subfield of IR, IPS emerged as a critique to state-centrism, promoting instead the integration of sociology within IR studies (Bigo & Walker, 2007). It is characterised by its application of specific strands of social theory to IR, including the works of Bourdieu, Deleuze, Derrida, Emirbayer, Foucault, as well as ANT's founder Bruno Latour (Guzzini, 2017). Positioning this thesis within IPS is crucial not only because ANT falls under its broader umbrella, but also because it carries two key implications. First, it implies a particular conception of IOs that moves beyond a state-centric perspective and is central to this study's approach. Second, it foregrounds practices: while this thesis does not employ practice theory per se, it adopts a similar micro-level lens to examine how VR influences UN organisations' practices.[27] ANT, however, occupies a relatively niche position within IPS: it aligns with its sociological ambitions yet differs in its conceptual and methodological approach.

First, sociological approaches in IR share the view of IOs as self-standing entities rather than mere instruments of state interests. This thesis wants to contribute to that tradition by underscoring IOs' capacity to shape the international sphere and act as 'managers of global

[27] Interestingly, some scholars situate ANT within practice theory, though they note that ANT scholars rarely frame their work explicitly in these terms (Bueger & Gadinger, 2014; Pouliot, 2010b).

change' (Biermann & Siebenhüner, 2009; Section 1.6.1). Whereas realist approaches long viewed IOs as instruments for state power (Snidal, 1994), IPS scholars moved beyond questions of organisational creation, design, and membership decisions to explore their impact on behaviour and outcomes (Barnett & Finnemore, 2004; Haftel & Thompson, 2006; Hawkins, 2006). Parallelly, critiques of the realist approach for overlooking the internal life of IOs (Carlsnaes et al., 2012; Reus-Smit & Snidal, 2008) spurred interest in analysing IOs as distinct entities with their own internal logic and structures (Ness & Brechin, 1988). This thesis aligns with this sociological view by examining how IOs adapt and respond to technological opportunities, in this case through the adoption of VR.

Another key contribution of IPS is its interest in the empirical and the 'micro' level, including IOs and the individuals operating within them (Çilkoparan, 2020; Guzzini, 2017), as opposed to the macro structures of global politics. Far from being peripheral, these micro-practices are seen as essential to understanding global dynamics, encapsulated in the idea that 'the global can only ever be dealt with locally'(Kendall & Wickham, 1999). This perspective resonates strongly with ANT, which posits that the global is constructed through the local (Ch. 3). This shift to the micro is also known as the 'practice turn' in IR (Pouliot & Cornut, 2015), also called 'International Practice Theory' (Bueger & Gadinger, 2018; Jonas & Littig, 2017). Practices are broadly understood as 'the things that we do, the organised activities that we encounter and participate in' (Kustermans, 2016: 177). Applied to IOs, this approach thus highlights them as sites of practice (Bueger, 2015), as continuous works in progress (Srivastava, 2013), and as 'dense spaces which host practices, maintain and sustain old ones, or invent new ones' (Schatzki, 2005). This emphasis on the micro is particularly relevant for this thesis, which likewise treats 'micro' organisational practices – such as the adoption of VR technologies in specific UN initiatives – as entry points for understanding broader global dynamics.

Of particular relevance to this study is the growing materialist cluster within IPS (Guillaume & Bilgin, 2016; Hedling & Bremberg, 2021; Schatzki, 2001) which encompasses the literature on global assemblages (Acuto & Curtis, 2014; Ong & Collier, 2005; Sassen, 2006) (cf. Section 3.3.4). This materialist strand is also reflected in demands for a 'more-than-human' practice theory (Constantinou et al., 2021) which recognises the agency of material objects, technologies, and bureaucratic structures alongside human actors (Schatzki, 2019). For example, Rothe (2024) shows how the European Space Agency's 'Digital Twin Earth' operates as a governance tool by enabling policymakers to run simulations and test the outcomes of different policy interventions. Taken together, STS and IPS foreground the role of technologies, materiality, and practices in shaping international politics. With this foundation in place, the analysis now shifts to UN organisations as empirical sites, examining the UN system's digitalisation journey to VR adoption in practice.

2.5. The case of UN innovation and VR adoption

2.5.1. UN system storyline of digitalisation and recent initiatives

To study the adoption of an emerging technology within UN organisations, it is first necessary to understand the UN system's digital evolution and the research surrounding it. This section traces the UN system's engagement with technology and outlines the key digitalisation initiatives shaping its current ecosystem. Organisations within the UN system have long emphasised the importance of technology in advancing their missions. In the mid-19th century, with the advent of the telegraph, the International Telegraph Union (ITU) was created as the first technology-focused agency, eventually becoming a UN specialised agency (Fomerand, 2017; Mueller, 2016). The most significant shift, however, occurred with the emergence of the

Internet and the onset of the ‘digital revolution’ (Mueller, 2016; C. Weiss, 2015: 415-17). This redirected UN efforts from regulation and standardisation to promoting the broader adoption of digital tools in developing countries, often in collaboration with the private sector (Fomerand, 2017a: 289-90). As private sector involvement grew, the 'Third UN' concept emerged, highlighting the growing role of non-state actors – including major tech companies – in global governance (Cf. 'plaftorm power': Calvo et al., 2025. See also Carayannis & Weiss, 2021; Weiss et al., 2009). Simultaneously, regulatory efforts persist, as evidenced by the ITU's ongoing work on the standardisation of emerging technologies, including AI and metaverse technologies (ITU, 2024a).

Since the digital revolution, technology has been consistently recognised as an essential tool for sustainable development, from its inclusion in Agenda 21 (1992) through the Millennium Development Goals, to its central role in the SDGs (Juma, 2005; Schlegel, 2017). This emphasis has also been connected to the leadership of Ban Ki-moon and António Guterres, described as ‘norm entrepreneurs’ who sought to adapt the UN system to technological change (Ki-moon, 2016; SDG Knowledge Hub, 2013; United Nations, 2023b; Werthes, 2022). At the UN’s 75th anniversary in 2020, digital technologies were again underscored as accelerators of the SDGs and drivers of the future of work (UN, 2020; ILO, 2019). There also is a ‘new consensus’ within UN system leadership that UN organisations need to adopt a more innovation-friendly culture (Tatarinov & Ambos, 2022), and some consider UN organisations as frontrunners in deploying new technologies to advance the SDGs (Dimitropoulos, 2022: 331).

A notable recent development is an active focus on innovation and emerging technologies within multiple UN organisations. Although generalising across the vast and complex UN ecosystem is difficult, a noticeable trend has emerged whereby various UN

bodies are increasingly engaging with cutting-edge technologies such as AI, blockchain, and biotechnology. As noted in a recent executive briefing (UN, 2024c), 'humanity's greatest chance of achieving the SDGs may lie in the enabling power of ICTs *and emerging technologies*'. Related initiatives call for a more 'agile' UN, capable of better leveraging these tools to accelerate SDG progress (UN Futures Lab Network, 2023). This has culminated in the proliferation of 'innovation spaces', siloed physical and virtual laboratories that serve as focal points for technological experimentation across the system (Bloom & Faulkner, 2016b; Chyba et al., 2023).[28]

Several major UN-wide digitalisation strategies and initiatives illustrate the system's evolving approach to emerging technologies. The Secretary General's *Strategy on New Technologies* (2018) outlines tools such as AI, biotechnology, and robotics can be integrated into UN operations to advance the SDGs, emphasising the need for alignment with UN principles and partnerships with non-governmental actors (UN, 2018; Hochschild, 2018). Another milestone was the *High-Level Panel on Digital Cooperation*, created to strengthen collaboration among governments, the private sector, and civil society. In 2019 it published the report 'The Age of Digital Interdependence' (2019) and, in 2020, launched the UN's 'Roadmap for Digital Cooperation' (A/74/821), with the aim of fostering global digital cooperation. To support the Roadmap, the Office of the Secretary-General's Envoy on Technology was established (United Nations, 2024a) later transitioning into the UN Office for Digital and Emerging Technologies (ODET) in January 2025. Additionally, the Global Digital Compact, proposed in Guterres's Our Common Agenda (UN, 2021, 2023) and adopted on 22 September 2024 as Annex I to the Pact for the Future, is tasked to establish an inclusive global framework to overcome digital, data and innovation divides and ensure that digital

[28] These innovation spaces abound. Examples are the International Trade Center (ITC)'s innovation lab, the WFP's Innovation Accelerator, UNDP's Accelerator Lab.

technologies are used responsibly and for the benefit of all. In parallel, the UN Inter-Agency Task Team on Science, Technology & Innovation for the SDGs (IATT), co-convened by UN DESA and UNCTAD, promotes coordination on STI across the UN system, and the UN Futures Lab helps UN organisations integrate strategic foresight and futures thinking into planning and decision-making to better address global challenges, including on emerging technologies such as VR and the metaverse (UN Futures Lab Network, 2023, 2024). Finally, reflecting the rising salience of AI governance, the High-level Advisory Body on AI issued its final report *Governing AI for Humanity* (2024), to guide international efforts on responsible AI development, and in 2025 UN member states launched an intergovernmental process, co-facilitated by Spain and Costa Rica, to establish an Independent International Scientific Panel on AI and a Global Dialogue on AI Governance (2025).

Alongside global digital cooperation efforts, UN-wide efforts have emerged to strengthen internal capacity and coordination around STI. Two key initiatives are 'UN 2.0' and the UN Innovation Network (UNIN). UN 2.0, as described by Guterres, aims to strengthen UN expertise in 'data, digital, innovation, foresight, and behavioural science, to build a UN system that can better support Member States in the years to come' (United Nations, 2024b). Complementing this, UNIN serves as an informal, cross-agency community of innovators that fosters collaboration, drives innovation, and shares expertise across the UN system, producing informative content on emerging technologies and resources like the Innovation Toolkit (UN Innovation Network, 2024b).[29]

Noticing this growing institutional focus on digitalisation and innovation, scholars began to investigate the phenomenon. Studies on innovation within the UN system reflect the

[29] Note that this overview is selective; see Bjola and Kornprobst (2023: 11) for further examples.

different thematic strands we outlined in Section 2.3. In the field of digital humanitarianism and peacebuilding, Dorn (2011) offers a comprehensive account of UN organisations' use of technology in peace operations, tracing its evolution, practical applications, and future challenges. In ICT4D, Andersson and Hatakka (2023) provide a historical overview of the SDGs, examining how ICTs have been mobilised to advance – or at times undermine – them. In organisational studies, Ambos and Tatarinov (2019b) compare the innovation journeys of six UN organisations (UNDP, UNHCR, WFP, UNFPA, ITC, and UNAIDS), highlighting shared phases (seeding, scaling, structuring), common enablers, and recurring challenges when innovating across diverse institutional contexts. Their later study investigates how intrapreneurship and scaling dynamics operate in UN contexts and how they might support UN organisations in fulfilling their core missions (Tatarinov & Ambos, 2022). Another line of inquiry focuses on how the expanding use of digital ICTs is reshaping interaction across the UN system (Bouchard, 2020; Ecker-Ehrhardt, 2020; Hofferberth, 2019). Bouchard, for example, analyses how new ICTs have altered UN diplomatic processes, transforming procedural norms and the 'grammar' of diplomatic interactions (Bouchard, 2020a, 2024). Similarly, Ecker-Ehrhardt investigates how the UN Secretariat's Department of Global Communications (UNDGC) has leveraged digital platforms and social media to enhance global public diplomacy and shape international narratives (Ecker-Ehrhardt, 2024). A smaller set of works adopts a historical perspective on innovation within specific agencies: Helfer (2006b), for example, traces the ILO's history of innovation and stagnation, shaped by internal dynamics and external pressures. Several studies investigate the above-cited proliferation of innovation 'labs' across the UN system, examining how they enable agencies to bypass or adapt rigid organisational processes (Bloom & Faulkner, 2016b; Chyba et al., 2023).

A further body of work focuses on UN organisations' adoption of specific technologies. This includes studies on datafication and humanitarian biometrics, particularly in UNHCR

operations (Iazzolino, 2021; Jacobsen, 2015a; Weitzberg, 2025), and on the use of drones in peacekeeping (Karlsrud & Rosén, 2013). Scholarship has also turned to emerging technologies like blockchain, AI, big data, and the Internet of Things (IoT). Walshe and colleagues (2020), for example, examine how AI, big data, IoT, blockchain, and 5G technologies, framed through international standards development, can support SDG-related use cases. Dimitropoulos (2022) examines blockchain adoption across the UN system, including in WFP, UNDP, and UNOPS, focusing on effectiveness and legitimacy. AI has likewise attracted attention, from early experiments such as the AI robot Sophia (UNDP, 2018b) to more recent applications (Fournier-Tombs, 2021; Hogenhout, 2021; Nabil, 2023). Hogenhout and Fournier-Tombs both address the governance of AI within the UN system, with Hogenhout proposing a UN-specific ethical framework to ensure alignment with human rights and organisational values, and Fournier-Tombs advocating for a dedicated regulation to manage high-risk applications and set a global precedent. Nabil, meanwhile, critiques proposals for a new AI agency, instead recommending that existing UN bodies lead domain-specific initiatives. Studies on big data include Hart and Harvey's discussion of the 'Global Pulse Initiative' (2014), Adamczyk (2024) study of UNEP's 'Data for Environmental Alliance' and the 'World Environmental Situation Room' that aim to improve environmental communication through Big Data analytics, and Wobcke and colleagues (2023) case study of WFP's 'HungerMap LIVE', a machine-learning platform for real-time hunger prediction. Finally, several UNorganisations have engaged with the use of VR technology – this is the focus of the next section (2.5.2), which provides an overview of adoption and use of VR technology within the UN system to date, leading to the case studies examined in this thesis.

2.5.2. Reviewing VR adoption in IOs and the UN system

VR technology, as illustrated in Section 2.2, is a multifaceted technology which can support a wide range of applications. Reflecting the broader turn towards emerging technologies, UN organisations have shown increasing interest in exploring VR's potential in diverse contexts. This section provides an overview of how they have engaged with VR to date, drawing on the field mapping that also informed the selection of this thesis' case studies. It summarises both the extent of VR engagement across the UN system and existing research on the phenomenon. Note, however, that function-specific studies on the use of VR for collaboration, advocacy, and training are examined in detail in the respective case study chapters.

VR initiatives across the UN ecosystem

Interest in VR among UN organisations has been on the rise, particularly since the COVID-19 pandemic, which highlighted the need for more immersive solutions when in-person interactions were impossible (UNDOS, 2022; UNIN, 2022; UNVR, 2019; ITU, 2024). One early cross-agency initiative was the UNVR initiative, led by the UN SDG Action Campaign, which sought to foster empathy and raise awareness of pressing global challenges through cinematic VR (CVR) productions (UNVR, 2019). Its most known work, *Clouds Over Sidra* (Arora & Pousman, 2015), offered an immersive portrayal of life in a Syrian refugee camp, drawing attention to VR's potential as a humanitarian communications medium. Another key platform is the above-cited Innovation Network (UNIN), which established a dedicated VR working group to compile repositories of use cases, develop informational resources, and provide tools to support VR and 'metaverse' adoption across UN entities (UN Innovation Network, 2020b, 2020c, 2020d; UNIN, 2022, 2023, 2024). Engagement with VR within the UN system has also taken place under the broader XR umbrella. The *UNITE XR* programme is a cross-agency initiative aimed at adapting XR technologies to improve key UN operational areas, enhancing efficiency and strengthening organisational capabilities across a wide range

of applications (UNGSC-TTDU, 2021). In contrast, the ITU has approached VR primarily through its regulatory mandate, engaging in standard-setting and policy coordination for Member States through its focus group on the metaverse (fg-mv), launched in 2022, which explores the technical and regulatory implications of metaverse development (ITU, 2024a). In 2024, the ITU hosted the 'UN Virtual Worlds Day', bringing together UN actors, including the organisations featured in this thesis, to exchange practices, explore synergies, and discuss future-oriented solutions around VR (ITU, 2024d, 2024b, 2024c).

Even more VR activity is taking place at the level of single-agency initiatives. These sometimes emerge within the 'innovation labs' discussed earlier – such as the Innovation Cell of the UN Department of Political and Peacebuilding Affairs (DPPA) – but not exclusively. The following non-exhaustive overview outlines such initiatives to better situate this project's case studies within the broader UN-VR landscape. In terms of CVR, early projects centred on the cross-UN *UNVR* or 'VR for Good' initiative mentioned above (UNVR, 2019). While that initiative has since receded, CVR production has continued through single-agency efforts. Some UN organisations have been particularly active in this area: the DPPA Innovation Cell, for example, produced *Solidarity for Chad* (2023), *Dreaming of Lebanon* (2023), *Sea of Islands* (2023), *Pathways to Colombia* (2021), and *Sudan Now* (2021). Other notable CVR works include *Frontlines of Peace* (UNMISS, 2024) on peacekeeping, *The Bombs Below* (UNDP LaoPDR, 2016) on unexploded ordnances in Laos, *On the Other Side* on Venezuelan displacement in Ecuador (UNHCR, 2022), and many others.[30]

Beyond CVR, UN organisations also experimented with *single-user CGVR* experiences. On the less interactive side, DPPA's *The State of Global Peace* adapts a flagship

[30] More CVR initiatives are discussed in the *advocacy* case study (Chapter 6).

report for world leaders into an immersive, narrativised briefing (2020b). The VR briefing visualises key statistics: for example, global military spending is represented by plastic soldiers gradually encroaching upon the viewer (Bye, 2022). A similar use of VR can be observed in UN projects addressing environmental concerns. UNEP, for example, also developed a computer-generated VE titled *Meet Your Carbon Footprint* (2020), which immerses viewers in a virtual space where their personal carbon emissions are visualised as an 18-metre-high gas ball. To stay in this environmental focus, the UNSSC used *CVR* at COP27 to take international leaders on a virtual field trip to areas where reliance on lignite coal has caused severe environmental damage (2022). More interactive *CGVR* has supported training: UNDP Serbia, with Microsoft, piloted HoloLens in healthcare for remote medical support (UNDP Serbia, 2025), and the ITC-ILO, with the Government of Qatar, developed a VR training course for labour inspectors (ITC-ILO, 2022).

UN organisations also explored *multi-user CGVR*: through the 'Negotiations XR' initiative, the DPPA aimed to investigate the potential of multi-user VEs as platforms for diplomatic negotiations (DPPA Innovation, 2022). The department planned to implement a CVE specifically designed for practicing peace mediation and conflict negotiation (DPPA Innovation, 2022; Superbright, 2022), though there have been no public updates since. WFP also experimented with multi-user VR, delivering the first fully immersive VR Logistics Response Team (e-LRT) training, enabling 28 participants across 11 countries to experience a realistic emergency simulation from their homes (WFP Global Logistics Cluster, 2021). A different UN initiative involved the use of social VR to foster community building. This happened through the '#ActNow campaign', a series of SDG-focused awareness events hosted on 'AltspaceVR' – a Microsoft-owned social VR platform that allowed users to attend events and interact as avatars. The events were organised with the help and advice of the UNDGC and aimed to bring together a global audience in virtual, gamified, museum-like spaces, with

each monthly event dedicated to a specific SDG. Especially during COVID-19, when face-to-face meetings were impossible, Social VR platforms were presented as a way to build bridges with foreign publics by enabling participants to 'hang out' in the same virtual room. 'AltspaceVR' was later shut down in 2023 as Microsoft shifted its focus to its MR platform Microsoft Mesh (Day, 2022; DreamlandXR, 2024; Millennium Art, 2022). Alongside these initiatives, the three case studies examined in this thesis – the ITC-ILO's use of *multi-user CGVR* for collaboration, the UNDP's *I Am Fatmira CVR* for advocacy, and the ILO's use of *single user CGVR* in the form of a VR simulation for sexual harassment training – are analysed in detail in their respective empirical chapters (Chapters 5, 6 and 7).

To conclude, the UN system hosts some cross-agency networks that showcase, guide, and in some cases regulate VR use (including for Member States), alongside a larger number of individual VR projects. Together, these initiatives indicate an exploratory yet substantive level of VR adoption within the UN system. At the same time, the predominance of single-agency initiatives highlights a persistent fragmentation, a theme that will resurface in the empirical analysis. In many cases, VR projects are not communicated across agencies, resulting in lost knowledge, missed opportunities for resource-sharing, and duplication of efforts. In some cases, cross-agency initiatives like the UNIN's VR page have changed names or websites, resulting in the disappearance of associated data. In other instances, such as in the ITC-ILO and ILO case studies presented in this thesis, there has been active communication and sharing of lessons learned, along with exchange of VR resources. Building on this observation, the next section examines how, and to what extent, engagement with VR in the UN system has been object of scholarly analysis.

Scholarly studies examining VR adoption within the UN system

The academic literature on VR use in the UN system is dominated by analyses of representation and affect (what VR shows and how it makes viewers feel) rather than studies of organisational adoption (how VR is integrated into UN organisations' workflows and functions). The most cited example of VR adoption is the CVR *Clouds Over Sidra,* mentioned above. Bystrom and Mosse (2020) use it to explore how immersion can be used to imagine a form of political agency that transcends national borders. Irom (2018) argues that the film framed displacement through a politics of empathy, and Gruenewald and Witteborn (2020), examining it along UNICEF's *Ready to Learn, Ready to Live*, more critically argue that humanitarian CVR do not simply foster empathy, but stages emotional experiences that gratify viewers' feelings while obscuring the geopolitical causes of crises. Beyond CVR, a study by Simoni (2023) examines a UNESCO initiative that fuses virtual tourism with human-rights education, highlighting VR's fundraising potential yet noting its limited integration into routine organisational workflows. While these studies differ in thematic emphasis, they share a media-centric approach: VR is treated primarily as a storytelling device for humanitarian or educational purposes. The organisational dimension – how and why UN entities adopt VR, how it fits into their operational practices, and how it affects their core functions – remains underexplored. To date, there appear to be no peer-reviewed studies on the adoption of VR for virtual interaction or training by UN organisations, apart from a single ILO report (Pike & Koithara Mathew, 2023), which is studied as part of this study's ILO case study. The fact that this operational lens is absent is notable, given that the internal processes through which UN organisations advocate on specific issues, promote collaboration, and deliver trainings are crucial to their ability to fulfil their respective mandates. It is precisely within this gap that the present study positions itself.

From the SDGs to this study's functional framework

Throughout the above examples, a pattern emerges: whether it is used to spread specific messages, enhance operational efficiency, simulate specific environments, or simply experiment, there seems to be a growing organisational interest in exploring VR as a tool to support UN operations. I argue that what drives this trend is not a single, unified rationale. Rather, the motivations are diverse and context-specific, reflecting the varied mandates and operational priorities of different UN entities. If a common thread can be identified, it lies in the perception that VR can contribute to system-wide objectives by allowing agencies to pursue their own goals within the broader SDG framework.. This connection with the SDGs has been acknowledged in the 2024 UN Executive Briefing on virtual worlds and the metaverse, where multiple UN organisation explored how immersive technologies might contribute to the advancement of the SDGs, showing applications for social inclusion, environmental sustainability, and economic development, while also highlighting challenges related to access, ethics, and governance (United Nations, 2024c). The connection between VR and the SDGs is also made in the literature by Simoni (2023), who offers a goal-by-goal analysis of how VR can support sustainable development, particularly through virtual education and tourism, and by Douvlou (2025), who looks at VR as a tool for fostering intercultural competence, weighing the pedagogical implications and potential contribution to the SDGs. While the latter's work is not focused on institutional adoption, it reflects a growing recognition, both within and beyond the UN system, that VR holds transformative potential in advancing global priorities. Similarly, Kunitake (2023) offers a brief, SDG-by-SDG review of VR's potential, showing its varied applications (from education and gender equality to environmental sustainability), calling for infrastructure and content policies to support this. Taken together, these examples illustrate not only a growing interest in VR within the UN system, but also the multiplicity of purposes it serves across different organisational settings. To better make sense of this diversity, the following section introduces the functional

categorisation developed in this thesis, which frames the use of VR in the UN system around three key functions: *collaboration*, *advocacy*, and *training*. This threefold lens provides a structure for examining and comparing the case studies, illuminating how VR may impact practices across distinct organisational functions.

2.6. Framing VR Use in the UN system: *Collaboration, Advocacy,* and *Training* as Functional Categories

As outlined in the introduction, this thesis uses a *functional* categorisation to distinguish between different uses of VR in the UN system. Rather than focusing on the technology's technical features, the emphasis is on how VR is operationalised to serve specific organisational functions. Mapping of the field revealed three main 'VR functions' in the UN context: (i) *collaboration* – the use of multi-user CGVR environments to facilitate interaction among geographically dispersed participants (ITC-ILO case study), (ii) *advocacy* – the use of CVR to engage distant publics (UNDP's *I Am Fatmira* initiative), and (iii) *training* – the use of single-user CGVR to build professional capacities (e.g. ILO's training for workplace harassment prevention). These functions are not exhaustive: rather, they serve as analytical categories that help organise diverse VR projects and avoid the common pitfall of treating VR as a singular, uniform technology. Moreover, distinguishing functions allows for greater precision in addressing the research questions: assessing VR's impact on UN organisations' practices requires clarity about which practices are under consideration. That said, VR can

support purposes beyond those analysed in this thesis, and in practice it may operate in ways that are multifunctional rather than reducible to one function alone.[31]

Crucially, each of the VR functions of *collaboration, advocacy* and *training* also corresponds to a broader operational 'UN role': (i) *Collaboration → UN as global connector; (ii) Advocacy → UN as knowledge provider (iii) Training → UN as capacity builder.* Collaboration reflects the UN-wide role of bringing together diverse actors across geographical and institutional divides. If we look at VR for collaboration, we are therefore also looking at how the UN enacts its role as a *global connector*, since VR platforms create shared spaces for geographically dispersed actors to interact. Advocacy resonates with the UN's longstanding role in shaping global narratives and disseminating knowledge to influence public opinion and policy. When considering VR for advocacy, we are therefore also considering how the UN performs its role as a *knowledge provider*, as immersive experiences are mobilised to raise awareness among distant publics. Thirdly, training builds on the UN organisations' responsibility for strengthening institutional and human capacities in Member States. If we look at VR for training, we are therefore also looking at how the UN advances its role as a *capacity builder*, because VR simulations enable skill and capacity building in ways that are diverge from traditional methods. This link is analytically important because it forms a conceptual bridge between the adoption of VR and the evolution of long-standing UN roles, enabling reflection on this thesis' central 'so what' question (RQ3). In particular, it addresses RQ3's core concern about the broader implications of VR adoption for the evolution of UN and IO practices in a digitalising international sphere. For example, does VR as a tool for collaboration strengthen the UN's role as a *global connector* by enabling richer interaction

[31] For instance, although multi-user VR is analysed here in relation to collaboration, this form of VR has also been explored in the literature for purposes such as socialising and community building (Maloney & Freeman, 2020; McVeigh-Schultz & Isbister, 2021a). Similarly, beyond advocacy, CVR could be used for data visualisation purposes (cf. Section 4.2.1).

across distance, or might it introduce new forms of exclusion or dependency? These questions matter because they reveal not only *if* VR is reshaping UN organisations' work, but in what direction and with what implications for their ability to deliver on their mandates. This means examining how the UN's roles as *global connector, knowledge provider,* and *capacity builder* are being reconfigured through new technological affordances. Analysing these intersections offers insight into which aspects of global governance and IO practice VR may be altering where it is adopted. As such, the following sections elaborate on each VR function in turn, explaining how it informs this study and how it corresponds to its associated UN role.[32]

2.6.1. VR and the practice of *collaboration*: The UN as *global connector*

The adoption of VR for virtual collaboration speaks directly to what I term the UN's role as a *global connector*. This role captures the UN's long-recognised capacity to act as a forum, bringing together diverse actors (member states, experts, civil society, and other stakeholders) to facilitate dialogue, coordination, and joint action across borders. Falk (2017), for example, highlights the UN system's responsibility for fostering technical forms of cooperation, including the exchange of information, and the management of transboundary issues of different kinds. Another way of understanding this role is through Cox and Jacobson's (1973) concept of a 'forum organisation', in contrast to a *service organisation*. Whereas service organisations deliver technical assistance or operational services, forum organisations primarily convene state and non-state actors to deliberate and address collective problems. In the same vein, Werthes (2022: 130) describes the UN as 'a forum where nations, but also non-state actors, can discuss new problems and design solutions'. In the context of collaboration, UN organisations tend to provide a structured space for stakeholders to meet, negotiate, and pursue collective solutions. A prominent example is the UNFCCC's role in climate

[32] Note that a more detailed review of the literature on VR applications for collaboration, advocacy, and training is included in the respective case study chapters (Chapters 5, 6, and 7), where it can be placed in direct dialogue with the empirical material.

governance, where negotiations among 196 parties were facilitated, leading to the 2015 Paris Agreement.

At the same time, this *connector* role is being reconfigured as it increasingly moves to digital spaces. In the wake of COVID-19, UN organisations were compelled to adapt to operate in remote, digital environments. Virtual collaboration platforms such as Zoom and Microsoft Teams became central to the preparation and conduct of international negotiations and diplomatic summits (Bjola & Kornprobst, 2023a). The importance of ICTs for sustaining and expanding the UN's *global connector* role has long been noted: Juma (2005), for example, argues that they are vital for IOs to maintain and create strong social and economic networks. More recently, this has been captured under the label of 'digital cooperation'. In 2020, the UN's Secretary-General's *Roadmap for Digital Cooperation* was launched, which outlined steps to strengthen global digital cooperation and explicitly positioned the UN system as central in this regard(Arendt-Cassetta, 2021; Bouchard, 2020: 105). This shift toward digital platforms is not a temporary adaptation but has left a lasting imprint on how the UN operates as a *global connector*. The question, then, is what happens when this function, traditionally carried out through physical or video-conferencing forums, begins to take place in VR environments? Here, VR offers new possibilities for immersive, multi-user collaboration that transcend conventional videoconferencing and enable embodied interactions. Research has shown that digital platforms such as Zoom do not merely change the format but can also affect the substantive outcomes of international negotiations (Ashbrook & Zalba, 2021; Bjola & Coplen, 2022). By extension, VR adoption could reconfigure the UN's *global connector* role by affecting how it convenes stakeholders and enabling new forms of technologically mediated interaction. While the fundamental aim would remain to bring together, to *connect,* diverse actors to address global challenges, VR offers the possibility of doing so through shared immersive spaces. This may enhance UN organisations' capacities to link people

worldwide by fostering richer and more meaningful interaction. Yet it may also complicate it: barriers such as technological inequality, accessibility, or the high price of VR platforms could undermine rather than strengthen its connector role.[33] The first case study of this thesis (ITC-ILO, Chapter 5) explores precisely this. By analysing the adoption of VR for collaboration, it examines not only how VR may be altering present organisational practices but also what this implies more broadly for the UN's role as a *global connector*.

2.6.2. VR and the practice of *advocacy* – the UN as *knowledge provider*

The adoption of VR for advocacy purposes aligns with the UN's role as a *knowledge provider*. This role encompasses the UN system's capacity to collect, curate, and disseminate information (Katz Cogan et al., 2016) and thus to act as a 'knowledge provider' (Werthes, 2022) or 'knowledge system' (Svenson, 2016) in the global arena. It is enacted not only through the officials who populate these organisations – who form epistemic communities (Adler & Bernstein, 2004; P. M. Haas, 1992) – but also through the infrastructures, technologies, and processes that support knowledge circulation. Furthermore, scholars highlight how the provision of knowledge is not merely a technical activity but a politically consequential one: By mobilising expertise, IOs enter what Littoz-Monnet (2017) calls a 'politics of expertise': a terrain in which knowledge is not neutral but shapes the agendas of global governance and influences what gets to become a global issue (Rabitz, 2023: 50. See also: Adler & Bernstein (2004). As Meyer and colleagues (1997) similarly argue, IOs act as crucial nodes in the transmission of 'global scripts' through which the world culture imposes itself and state practices become standardised. The UN itself has acknowledged this communicative role, noting how social media are 'key' for a strategy shift towards 'cause

[33] For a systematic overview on VR collaboration, see Sayadi and colleagues (2025), which foregrounds multiple transformation avenues.

communications', in which the aim is not merely to inform but also to inspire and mobilise publics (Ecker-Ehrhardt, 2024, citing United Nations, 2022: 33).

VR may represent the next step in this trajectory: like the *global connector* role, the UN's role as *knowledge provider* has become increasingly mediated by digital technologies. Rapid technological developments have amplified it, enhancing UN organisations' ability to communicate and increasing their influence on public discourse (Bjola & Zaiotti, 2021b; Ecker-Ehrhardt, 2024). VR adoption may therefore carry important implications: existing studies suggest that the technology can deepen users' connection to global issues by increasing emotional engagement (Bujić et al., 2020; Cohen et al., 2021), generating 'affective publics' (Papacharissi, 2014), enhancing information retention (Dos Anjos et al., 2024; Krokos et al., 2019), and by enabling a shift from conventional storytelling to what has been termed 'storyliving' – a more immersive, experiential mode of narrative engagement (Deniz, 2023; Maschio, 2017). Yet, VR could also complicate the UN's role as *knowledge provider*: scholars warn of the risks of emotional manipulation (Rueda & Lara, 2020; Slater et al., 2020), misinformation (Heller & Bar-Zeev, 2021), the oversimplification of complex issues (Irom, 2018), and the depoliticisation of structural problems (Bystrom & Mosse, 2020). The stakes are high: if knowledge is power, then the narratives disseminated through VR, and the ways they are shaped by it, matter. This question of VR for advocacy and its implications for the UN's role as *knowledge provider* is explored in detail in the UNDP case study (Chapter 6).

2.6.3. VR and the practice of *training* – the UN as *capacity builder*

Finally, the adoption of VR for training aligns with the UN role as a *capacity builder.* Many IOs include capacity-building as a core component of their functions or mandates (Coicaud & Le Blanc, 2016). By providing training to beneficiaries in developing countries – ranging from

community-level initiatives to support for the public and private sectors – they aim to strengthen skills in support of long-term, sustainable development. Recalling Cox and Jacobson's (1973) distinction between IOs as service providers and as forums, capacity building would fall into the category of service provision: the development of skills and knowledge to advance sustainable development. The UN itself explicitly recognises capacity building as integral to achieving the SDGs, particularly in addressing poverty (United Nations, 2024c). Individual agencies foreground this role as well: The UNDP for example describes itself as a 'knowledge broker, *capacity builder*, innovator, and facilitator of exchanges in the global development debate' (UNDP, 2025a). Similarly, UNESCO identifies capacity building as a key function of its mandate (Stiles Associates Inc., 2007), while UNCTAD explicitly aims to 'strengthen professionals' knowledge and skills for sustainable development' through its training and advisory services (UN Trade and Development, 2025).

Historically, UN organisations performed their role as *capacity builders* primarily through in-person formats – workshops, seminars, field training missions, and so forth. In recent years, however, this role too has undergone a digital transformation. Increasingly, training is delivered through digital tools or 'blended learning' approaches that combine in-person and online formats (J. Singh et al., 2021; UN Office on Drugs and Crime (UNODC), 2018). E-learning platforms and digital training modules have proliferated across the UN system, a trend accelerated by the COVID-19 pandemic (Sujon et al., 2022). These tools are generally seen as advantageous, expanding both the reach and flexibility of the UN's *capacity building* role, and enabling more equitable access regardless of geographic location (Ikebuchi, 2023; Littenberg-Tobias & Reich, 2020). For example, UNDESA's Digital Learning Centre offers a growing portfolio of publicly accessible online courses designed to support sustainable development efforts worldwide. Within this broader capacity-building function, the adoption of VR introduces the possibility of further change. VR enables new modalities of *learning by*

doing through the simulation of real-world scenarios in immersive environments, an approach often described as 'experiential learning'. This potential has already been demonstrated in several UN organisations' projects. For example, the UNSSC developed a 360° VR site visit based on a sustainable development case study, where participants reported a much richer understanding than through documents or presentations (UNSSC & Duman, 2022). Reflecting this potential, UN-Habitat has described VR as a 'game changer' for learning (UN Habitat & Vasko, 2021). Similarly, in a recent 'executive briefing on virtual worlds', a number of UN organisations highlighted VR's relevance for capacity building and for expanding the participation of marginalised communities in emerging digital spaces (United Nations, 2024c). The educational potential of VR has been widely recognised in academic literature, with numerous studies exploring its impact on learning and training outcomes (Malik, 2024; Simpson et al., 2023; Stromberga et al., 2021).[34] At the same time, significant limitations remain. The absence of physical interaction may reduce learner engagement and opportunities for networking, and learners can experience lower attention spans in purely virtual settings. More importantly, the persistent digital divide raises questions of equity: as UN-Habitat notes, access to VR technologies remains limited and costly, risking the reinforcement of existing inequalities (UN Habitat & Vasko, 2021: 21). This suggests that VR adoption may expand but also limit the UN's role as *capacity builder* – a question at the core of the ILO case study (Chapter 7).

The discussion above has sought to clarify how the adoption of VR intersects with three core 'UN roles': *global connector*, *knowledge provider*, and *capacity builder*. By examining *collaboration*, *advocacy*, and *training* as distinct VR functions, this section provides an overview of how VR adoption is beginning to affect specific UN organisations'

[34] See also the literature reviews by Radianti and colleagues (2020) and Pellas and colleagues (2020).

practices across these roles. This functional mapping is analytically significant because it forms the bridge between the empirical case studies and the broader research questions of this thesis: namely, how VR adoption impacts established practices within the organisations under study, and what this implies for the UN system more widely. At the same time, it is important to note that these three roles do not constitute a comprehensive description of the UN system's work. It is neither possible nor desirable to speak of 'all the UN functions', particularly given that UN organisations' roles are increasingly complex and specialised (Katz Cogan et al., 2016a: 559-668), multidimensional (Falk, 2017) and also evolving continuously (O. R. Young, 2017). Instead, the focus here is on roles in which VR adoption appears most prominent, identified through empirical field mapping. By narrowing the lens in this way, the analysis balances scope with depth: it highlights the areas where VR currently intersects most clearly with UN organisations' operational practices, while recognising that other functions may also be affected in different ways.

2.7. Chapter conclusion

In conclusion, this chapter has sought to illustrate the bodies of work within which this thesis is situated. It has done so through a threefold structure: First, it unpacked the concept of VR technology and the key research strands that have developed around it, clarifying its definitions, types, and key concepts. Second, it turned to the broader digitalisation of the international sphere, focusing on IO and specifically UN organisations' engagement with emerging technologies. This was explored through distinct but overlapping literatures – DIR, digital diplomacy, digital humanitarianism, ICT4D, and OCS – all of which shed light on how digital technologies are reconfiguring UN organisations' practices. Third, the chapter situated this research within a wider epistemological shift in the study of IR, IOs, and global governance. As the international sphere becomes increasingly mediated by digital

technologies, scholars have moved beyond state-centric models to consider the role of non-human actors, micro-level dynamics, and everyday practices (Barnett & Sikkink, 2008; T. G. Weiss & Wilkinson, 2014). It is within this broader movement that this thesis positions itself, drawing particularly on ANT and its roots in STS and IPS. This literature review has therefore served three key purposes: (i) it clarified how this research fits into existing academic debates, (ii) it introduced the concepts needed to make sense of the empirical analysis, and (iii) it highlighted that while IO digitalisation has received scholarly attention, the adoption of VR within IOs remains underexplored, especially at operational level. Finally, by mapping VR use in the UN system onto three functional categories – *collaboration, advocacy*, and *training* – the chapter has shown where VR adoption is most prominent and how these functions intersect with the UN's roles as *global connector, knowledge provider*, and *capacity builder.* With this review, I sought to demonstrate that existing scholarship provides useful foundations but also leaves important gaps: in particular, little is known about how VR is operationalised in specific IO and UN organisations' practices and what this means for their established roles in global governance. Addressing this gap is the task of the following chapters. Chapter 3 turns to ANT, outlining the analytical utility of this theoretical framework, and clarifying how it will be operationalised to address the research questions. After the methodology chapter (Chapter 4), the analysis then proceeds with the three case studies to examine VR adoption in practice.

CHAPTER 3: INVESTIGATING VR ADOPTION THROUGH ACTOR-NETWORK THEORY

3.1. Introduction

This chapter introduces Actor-Network Theory (ANT), the theoretical framework underpinning this research project. I will begin by outlining the ANT approach, tracing its development from being primarily rooted in Science and Technology Studies (STS) to reaching into the fields of IR, diplomacy, and IO studies (3.2). I will then illustrate the framework's suitability to address this project's research questions and highlight how its core analytical concepts assist in this process (3.3). This includes a discussion of ANT's distinctive understanding of (non-human) agency and how it informed the research (3.3.1). Finally, I outline alternative approaches to studying technology adoption and present the main limitations and critiques of ANT, explaining my choice to adopt ANT nonetheless (3.3.4; 3.4). Ultimately, this chapter aims to illustrate how ANT enables me to address this thesis's research questions. Through ANT, we can gain insight into the supportive and hindering dynamics introduced by VR adoption, providing valuable understanding of IOs' evolving practices in an increasingly digitalised international sphere. More specifically, ANT contributes to addressing RQ1 through two analytical steps: tracing the translation process and identifying the emerging properties that result from it (cf. Section 3.3.3). First, ANT's translation process allows us to examine the sociotechnical relationship between VR technology and the practices of collaboration, advocacy, and training within these organisations. Second, ANT is well-suited for tracing what emerges from the adoption of technology (in this thesis, called the 'emerging properties'.) Additionally, ANT contributes to addressing RQ3: *What are the broader implications of VR adoption for the evolution of UN practices in a digitalising international*

sphere? However, the application of ANT to RQ3 involves a more intricate discussion (see 3.4.3).

3.2. Introducing Actor-Network Theory

ANT is a theoretical framework grounded in the STS field, of which it can be considered a current (Best & Walters, 2013a). Sometimes referred to as 'material semiotics' (Law, 2008) or 'the sociology of translation' (Callon, 1984), ANT originates from empirical studies of laboratory practices (Latour, 1987; Latour & Woolgar, 1986), studies on the introduction of scientific and technological artifacts – such as Michel Callon's study on the failure of establishing electric cars in France (1986) and Bruno Latour's study on the 'Personal Rapid Transit' transportation system in Paris (1996) – as well as studies examining environmental and biological interactions (e.g., scallop-harvesting in St. Brieuc Bay (Callon, 1984) and the 'pasteurisation of France' (Latour, 1988). These foundational studies are collectively known as 'classical ANT' studies, with major proponents including Bruno Latour, often credited with 'inventing' ANT, as well as Michel Callon (1984, 1986, Callon et al., 1986), John Law (1991, 1992, 1994) and Annemarie Mol (2002).

In essence, ANT is used to examine the interconnected relationships between human and non-human actors in forming and maintaining networks. These networks are *sociotechnical*, meaning that they are composed of both social and technical elements, which are inextricably linked and mutually shaping – an idea encapsulated by Latour's assertion that 'each human interaction is inherently sociotechnical' (1999). A classic example of a sociotechnical dynamic is the gun: Without a human, a gun could not kill a person: it is the combination of human and non-human that can result in mortality. ANT proves particularly useful when new objects or technologies are introduced into specific environments (Asdal,

2012; Bueger, 2013; Bueger & Mireanu, 2014). In fact, it initially started as attempts to visit the 'construction sites' where innovation, new knowledge, and new entities – such as electric cars or pasteurisation – were manufactured. Through ANT, scholars can trace how these innovations change existing practices by leading to new alignments and associations among actors in the network (Akrich et al., 2002; Harty, 2008). For example, the introduction of an electric car led to a reconfiguration of networks involving engineers, consumers, and regulatory bodies, highlighting how new technological innovations can reshape the interactions and relationships within a network. Similarly, this study aims to study how the adoption of an emerging technology – Virtual Reality – by specific UN organisations may lead to reconfigurations and changes in UN practices. Through a sociotechnical approach, it aims to analyse the interplay between the materiality of VR, a newly introduced technology, and the social-institutional components of the organisations under investigation. The concept of translation (Callon, 1984), which will be elaborated upon later in the chapter, is central to understanding these dynamics.

Building on the intellectual terrain outlined in Section 2.4, ANT is adjacent to approaches such as new materialism, post-humanism, and IPS/practice theory, which share concerns with materiality, sociotechnical entanglements, and everyday practice. What distinguishes ANT here is methodological: it provides a toolkit, especially through the concepts of actants and translation, for analysing how innovations are taken up within networks and alter their configurations. ANT also exhibits similarities with assemblage theory, as both frameworks share a focus on how heterogeneous elements, whether human or non-human, come together to form dynamic and evolving systems. In line with both practice-oriented and assemblage-based approaches, ANT views reality as situated, constituted through practices, and composed of interwoven social, material, and technological elements.

Since the 1990s, ANT has rapidly extended beyond STS into various social science disciplines (Bueger, 2013. Cf. Czarniawska-Joerges, 2008; Law, 1994). This interdisciplinary cross-contamination has given rise to what is now called 'post-ANT' (Michael, 2017). Among post-ANT's developments is its expansion into the IR field, which coincides with the latter's renewed interest in the role of technology in global politics (Bjola & Kornprobst, 2023; Herrera, 2006; Hoijtink & Leese, 2019; Mayer et al., 2014; McCarthy, 2017; Singh, 2019) and intensifying conversation with STS approaches (Bueger & Stockbruegger, 2017). Such exchange contributed to an increasing popularity of sociotechnical approaches in IR, fostering a rise in studies drawing from assemblage theory (Acuto & Curtis, 2014; Bachmann et al., 2014; Curtis & Acuto, 2014; De Landa, 2019; Ong & Collier, 2005; Sassen, 2006) and ANT (Barry, 2013; Best & Walters, 2013b, 2013a; Bueger, 2013; Bueger & Stockbruegger, 2017; Nexon & Pouliot, 2013; Passoth & Rowland, 2015; Salter & Walters, 2016).

Starting in the 2000s, IR scholars started using ANT to disentangle the sociotechnical networks behind international phenomena (Bueger & Bethke, 2014; Bueger & Gadinger, 2007; Bueger & Villumsen, 2007; Flyverbom, 2010; Kendall, 2004; Mayer, 2012; Porter, 2012; Salter, 2015), Lidskog & Sundqvist (2002) Walters (2002), creating a fruitful dialogue between the disciplines (Barry, 2013; Bueger, 2013). Presenting some of these studies can begin to illustrate the value of applying ANT in my research. In their 2014 study, Bueger and Bethke examine how concepts like 'failed states' can be studied through ANT not as static or fixed ideas, but rather as the result of ongoing relationships between various actors (such as academics, politicians, and institutions). The added value of ANT here is that it reveals the dynamic process (the 'translation' process) behind the creation and evolution of a concept, focusing on the struggles, transformations, and negotiations that occur as different actors try to define and standardise what a 'failed state' means. In his 2012 study, Mayer uses ANT to explore how interactions among climatologists, economists, and strategic communities

influence the evolving discourse on climate change, transcending the dualistic notions of science and politics. Porter (2012) uses ANT to analyse numerical indices and peer review processes as governance instruments, revealing how interactions between humans and objects within transnational networks succeed or fail in producing, altering, or resisting power. Another pertinent example is Flyverbom's study (2010), which applied ANT to explore how internet governance and ICTs for development are constructed and consolidated within UN-based multi-stakeholder arrangements. ANT is also making substantial inroads into diplomacy studies (Adler-Nissen & Drieschova, 2019b; Archetti, 2012; Pouliot, 2010b), a shift welcomed for its innovative ways of understanding how digitalisation is impacting diplomatic agency, for example, through the use of algorithms and networks in social media (Hedling & Bremberg, 2021). In their 2019 study, Adler-Nissen and Drieschova draw on the ANT concepts of actants, assemblage, and inscription to examine how diplomats use word processing software to edit and negotiate international documents, illustrating the role of technology in shaping diplomatic practices. Along similar lines, Archetti (2012) examines how communication technologies and diplomats interact within London's information environment. In his 2010 study, Pouliot illustrates how a specific object – here, nuclear warheads – can affect diplomatic interactions by acquiring symbolic significance, leading human actants to 'do things they would not have done otherwise' (2010: 294).

The application of ANT has also been significant in the areas of international and critical security studies (Aradau, 2010; Mitchell, 2013; Pouliot, 2010a; Schouten, 2014; Walters, 2014). For example, in her study of critical infrastructure protection, Aradau (2010) examines how material objects, such as transport systems and energy grids, play an active role in the securitisation process by influencing how security strategies are developed and implemented. Similarly, Schouten (2014) examines how security measures at Amsterdam Airport are crafted through the assembly of diverse elements – such as body scanners, security

protocols, and personnel practices – with material objects playing a critical role in shaping security practices. Finally, another noteworthy IR area where ANT has gained popularity is International Political Economy, particularly in studying how economic theories and models act to shape markets and economic agents (Callon, 1998, 2006; R. B. Hall, 2009; Henriksen, 2013; Kessler, 2011).

ANT has also been applied in research on VR technology, although not in an IR context. In their study, Mabrook & Singer (2019) examine how journalistic VR influences news production and consumption. Through ANT, they uncover the interactions between technological and human actors in the realm of news work, highlighting how these interactions collectively shape journalistic practices and user experiences. Another noteworthy study is Jensen's (2009) application of ANT to examine avatars as personal mediators in non-immersive virtual worlds like EverQuest and Second Life. ANT proved valuable in this case by showing how avatars actively engaged in the social and narrative dynamics of virtual worlds, influencing communication and sense-making within these environments. Across these diverse studies presented above, the added value of ANT lies in its ability to reveal the intricate, often overlooked relationships between human and non-human actors, as well as the dynamic processes that shape international phenomena. Unlike traditional approaches that may focus solely on human agency or institutional frameworks, ANT highlights how material objects, technologies, and other non-human actors actively participate in shaping outcomes. ANT can therefore be particularly useful for this research, as it promises to shed light on the complex interactions between VR technology and human actants within the UN system, as will be explained in detail in the next sections. By tracing the relationships that form between VR technology, UN staff, beneficiaries, and other network actants, ANT can shed light on how VR technology may alter practices like collaboration, advocacy, and training.

3.3. ANT's suitability for this study

The aforementioned examples of ANT applications begin to illustrate the value of this approach for this study. Like these studies highlighted the role of various objects and technologies in shaping practices, I aim to investigate how VR adoption may influence UN organisations' practices. What unique insights can an ANT perspective offer in understanding the process of VR adoption within UN organisations? The subsequent sections will thoroughly explain why an ANT approach is particularly suitable for my project, focusing on the key ANT concepts of actants (and the related concept of agency), networks, and translation.

3.3.1. The agentic quality of VR

A fundamental ANT concept is that of *actants*. The actant concept is central to understand ANT's suitability for this project, because it ensures that the role of technology is appropriately recognised in a way that avoids both human-centric and techno-deterministic biases. It is first essential to define what constitutes an actant within the ANT framework. As discussed earlier, ANT explores the interconnected relationships between human and non-human actors. These actors, whether human or non-human, are all collectively referred to as 'actants'. Actants are ANT's basic unit of analysis, and can be defined as anything that serves as the source of an action, capable of effecting change and influencing outcomes (Sociotube, 2023). In ANT's perspective, non-human entities (objects, machines, animals) are considered actants alongside human entities, and are conceptually treated equally to humans, along the principle of symmetry (Bueger & Stockbruegger, 2017). Crucially, non-human actants are recognised as possessing agency, meaning they can actively influence outcomes and relations within the network (B. Braun et al., 2019a). This conception of agency warrants closer examination, not only because it challenges conventional understandings, but it also shaped both my research design and the interpretation of my findings. As such, clarifying it will help readers engage

more effectively with the arguments developed throughout the thesis. The discussion below elaborates on these points and integrates examples of studies from the IO and diplomatic study fields that have adopted a similar conceptualisation of agency, illustrating the kinds of phenomena it can help to explore and the insights it enables.

ANT's understanding of agency differs from conventional definitions. In the IR field, the concept of agency has been, and continues to be, widely debated. Alexander Wendt, who introduced the 'agent-structure dilemma' to the field, defines agency as the capacity to possess 'a theoretical understanding (however inaccurate) of one's activities', to 'reflexively monitor and potentially adapt behaviour', and to 'make decisions' (Wendt, 1987). While this definition is quite restrictive, most IR approaches nonetheless share a belief that agency is inherently tied to the human, intentionality, and the capacity to make one's own decisions (Braun et al, 2019: 788). ANT's understanding of agency diverges significantly: ANT famously, and perhaps provocatively, asserts that non-human actants also possess agency. It is important however to understand that ANT is not arguing that non-human entities such as objects make intentional choices in the way humans do. In its understanding, agency is not tied to human-like intentionality, but rather to an entity's capacity to be a 'source of action', to influence and shape outcomes within a network (Latour, 1996b) – i.e., an 'actant', as defined earlier. In other words, as long as an entity can make a 'traceable difference' (Latour, 2005) in a network of relations, it qualifies as an actant and possesses agency. In this, ANT aligns with neighbouring theories like posthumanism and performativism, that similarly define agency not by intention, but by actors' capacity to permit or restrict outcomes (Sayes, 2014), to be 'vibrant' (Bennett, 2010) or 'active' (Nicoll, 2015).[35] To illustrate the point, we can use Latour's well-known

[35] Along with the theoretical traditions of poststructuralism and performance studies, ANT sees agency as relational, situational and reflexive (Bucher, 2017; Emirbayer, 1997; P. T. Jackson & Nexon, 1999). For an issue entirely dedicated on the question on agency in IR, including on ANT, see Braun and colleagues (2019b) in the Journal of IR and Development.

example of the door closer: A door closer, while seemingly passive, plays a vital role in a network of actions by shaping human behaviour. It mediates the flow of people and things through a space, and also 'prescribes' certain behaviours, like passing through the door quickly to avoid getting hit (Latour, 1992). Furthermore, different kinds of door closers can further influence human behaviour in different ways: a manual door closer requires human intervention, which might result in more variability in how the door is used (e.g., sometimes left open, sometimes closed, depending on human action). On the other hand, an automatic door closer might consistently ensure doors are shut, controlling the flow of people – potentially enhancing security, but also potentially in-and ex-cluding certain people from accessing the space. Though none of these door closers 'intend' to act, they all serve as 'sources of action' that make a 'traceable difference' by shaping how humans interact with their surroundings. Another often-cited example is that of the scallop:

'[F]ishermen, oceanographers, satellites, and scallops might have some relations with one another, relations of such a sort that they make others do unexpected things. […] Scallops make the fisherman do things just as nets placed in the ocean lure the scallops into attaching themselves to the nets.' (Latour, 2005b: 106-7; referring to Callon's seminal study).

Here, Latour is arguing that a scallop, an invertebrate animal which traditionally would not be granted agency in research, in reality plays a significant role in influencing the actions and decisions of fishermen and other related actors.

This reasoning can be extended to the material domains of diplomacy, IOs, and global governance: for example, a diplomatic protocol, though often seen as a mere formality, plays a crucial role in shaping interactions between states. It mediates the flow of communication and actions in diplomatic settings, and 'prescribes' certain behaviours, such as adhering to

specific procedures during negotiations or maintaining decorum to avoid unintended tensions. Accordingly, IR studies began to examine how specific objects may influence the enacting of diplomacy, either assisting or constraining its effectiveness (Hedling & Bremberg, 2021), with examples including studies on drones (Holmqvist, 2013; Leander, 2018), flags (Bueger, 2013), algorithms (Amoore & Raley, 2016; Aradau & Blanke, 2018), software (Adler-Nissen & Drieschova, 2019b) and a variety of other objects (Salter, 2015). In today's technological era, studies increasingly focus on how digital technologies similarly influence and shape human action. For example, Adler-Nissen & Drieschova (2019: 542) highlight how technological affordances significantly impact how diplomats think and handle text, thereby steering negotiations in particular directions. In the context of algorithms, Amoore and Raley (2016) show how they can reconfigure security practices by extending cognition, agency, and responsibility beyond traditional human and state boundaries. Similarly, Aradau and Blanke (2018) examine how algorithms and Big Data technologies have transformed self/other relations, affecting the concept of the 'other'.

A further clarification is needed: ANT's conception of agency involves more than acknowledging that non-humans can act. It also requires understanding agency as *distributed* across human and non-human entities (Schillmeier, 2012, Passoth & Rowland, 2015). In this view, agency does not reside within any single entity – such as a specific object or technology – but rather emerges from the relationships and interactions between humans and non-humans (Barad, 2003; Braun et al., 2019). This understanding is well captured by the notion of the *sociotechnical*, which, as discussed above, refers to the mutual shaping and co-constitution of social and technical elements. For instance, the act of 'shooting someone' with a gun is not reducible to either the human or the gun alone; it is the result of their entanglement – an illustration of agency as distributed. Another example is diplomatic agency, which is not achieved simply by appointing an ambassador; there must also be an embassy, secure

communication infrastructure, and other constitutive elements (Neumann, 2012; Wille, 2016). Crucially, the idea that agency emerges from sociotechnical relationships is central to this thesis: it was empirically observable across the case studies and constitutes one of the key findings, which suggests that revisiting how agency is conceptualised in IO studies could offer useful insights into the impact of new technologies on existing IO practices (cf. Section 8.4.1).

Understanding VR as an *agentic actant* has had an impact on this thesis' research approach. In particular, it allowed me to assign appropriate ontological and practical weight to technology, which is especially critical in a study where VR is not incidental but central to the research questions. By treating VR as an actant, I could focus on how it both constrains and enables certain actions. More than this, the agentic framing permitted a granular analysis of the 'affordances' of VR – that is, the possibilities for action that a technology enables or inhibits (Evans et al., 2017; Gibson, 1979; Shin, 2022). These affordances are vital for understanding VR as an agentic element, as they shape how users can interact with the system, the actions they can perform within it (Adler-Nissen & Drieschova, 2019: 532-4). This was particularly valuable for the Embodied Virtual Observation (4.3.2), which demanded a close, experiential engagement with the technology's affordances and how they intervened in the unfolding of events – not just as a backdrop to human action. An example is the 'virtual clock' used in the ITC-ILO's CVEs, which regulated the timing of interactions and dictated the rhythm of group activities – and whose influence I could perceive through the EVO – or the avatars which structured interaction through communicative cues such as gestures and proxemics. Furthermore, as discussed in Chapter 2, existing research often treats 'VR' as a homogenous category, overlooking important distinctions among its various forms. However, different VR platforms (differing in both software and hardware) possess distinct affordances and interact with organisational practices in specific ways. An agentic understanding of technology thus supported a more precise and 'disaggregated' examination on my part. The

three case studies examined in this thesis reflect this diversity, each representing a different configuration of what is often simplistically grouped under the umbrella of 'VR'. Furthermore, I used the detailed network maps to show the distributed nature of agency by visually illustrating the relationships and mutual influences between human and non-human entities (see Section 4.5). Finally, including non-anthropocentric perspectives appears to me particularly timely in the current moment of rapid advancements in AI technology – which also pertain to VR through the concept of 'AIVR' (IEEE Computer Society, 2023): While machines may not possess human-like intentions, they are increasingly acquiring human-like characteristics and, in many ways, are able to shape outcomes, thus complicating the traditional boundaries of agency beyond simpler technologies like the door closer (Cf. Section 8.4.1). ANT itself has not overlooked this trend, which it conceptualised as a move towards 'autonomous technology-driven actor-networks' (Williams 2020: 53).

3.3.2. Recognising VR's embeddedness: ANT's network concept

Secondly, ANT is suitable for my study because it enables to examine how VR is adopted in a wider context: the network. According to ANT, the *social* is made up of networks, also called heterogeneous assemblages (Inglis & Thorpe, 2019). Networks consist of human and non-human actants and their interactions, which together form a complex web of relationships (Gad & Bruun Jensen, 2010), also termed sociotechnical assemblages. At ANT's core lies a relational approach which views the world as fundamentally interconnected, held together by a web of relations, connections and associations (Bueger & Bethke, 2014). It is crucial to understand that ANT emphasises co-constitution and hybridity rather than viewing elements as separate entities. In other words, each component of a phenomenon shapes and defines the others through associations in the networks. Through these associations, these entities never remain the same, but are constantly redefined. It is the 'tracing' of these associations that ANT

seeks to undertake. Moreover, ANT avoids dualisms and rigid categories, aiming instead to establish a 'flat ontology' where all actors are equally considered. Networks are fluid and ever-changing, constantly being made and remade. In line with its relational and performative ontology, relations within these networks must be continuously 'performed' to maintain their existence, or the network will dissolve. The work that sustains networks constitutes the essence of ANT's translation process, which will be elaborated on later.

The network provides a useful base concept around which discussions of human-technology interactions can be oriented (Sociotube, 2023). It enables us to achieve two key objectives: Firstly, to identify and map the networks of actants that form around the adoption of a new technology. This step is vital as it prepares us to understand the relationships between actants and their influence on existing practices within the researched organisations (cf. next section). To provide a practical example, consider the above-cited study of scallop farming: there, Callon focused on the efforts of a group of researchers to increase the scallop population by convincing local fishermen to adopt new scallop cultivation techniques. Here, the network was comprised of the human actants (the researchers, the local fishermen, other stakeholders like the government) and non-human actants (the scallops, the water and the climate, the laboratory). Using ANT allowed Callon to explore the interactions of these heterogenous actants as part of a wider network, also accounting for the role of non-human actants therein. In the context of my study, ANT's network concept enables me to map the actants that form around VR adoption through a close abductive dialogue with the qualitative data collected from fieldwork (cf. Methodology chapter, Section 4.4). I can examine VR as an actant within a wider network which includes human (such as UN Staff, beneficiaries, VR developers, external advisors) and non-human actants (virtual spaces and communication platforms, hardware and software, internal and external documents), and explore their interconnections.

Secondly, the network concept helps avoid both tech-deterministic and anthropocentric biases. In a way, ANT is a response to the problems of technological determinism – the belief that technology shapes society, culture, and human behaviour, often with an inevitable and autonomous influence – and anthropocentrism, which prioritises human perspectives and experiences over those of non-human entities. Instead, ANT's network concept recognises the technology's embeddedness in social contexts (Boeri, 2016; Marres, 2017; Timcke, 2021) and accounts for heterogeneous types of influences (Plesner, 2009). It analytically treats technology as an actant tightly integrated in networks with other actants, which are connected and co-constitutive (Plesner, 2009), thus avoiding the tech-deterministic traps into which many studies fall (Hirblinger et al., 2023). For this research project, this approach enables a more nuanced analysis that avoids technological determinism by considering how VR is both influencing and being influenced by human actants. Crucially, VR is considered as not just an autonomous driver of change that imposes new practices, but as an actant that co-produces them through its interactions with other heterogeneous actants in the network (cf. concept of *emerging properties*, Section 3.3.3).

A final important thing to say about ANT's network concept is the question of network stability (and instability). This refers to the degree to which a network becomes durable, sustained, and resistant to breakdown. This concept is central to ANT and forms a key part of my analysis: for each case study, I draw from the data and the translation process to examine the factors that lead to network stability and instability (Section 8.3.4). ANT suggests that stability is not a given but the outcome of successful translation: when human and non-human actants converge around a shared goal, the network temporarily stabilises (Callon, 1990). In many ANT-informed studies of technology adoption, the stability and durability of the network are taken as indicators of a solution's viability (Silvis & Alexander, 2014). In other words, analysing stability allows us to trace whether and how a new technology like VR becomes

embedded in organisational practice, or whether translation remains partial or fragile. What makes the network stable is the process of translation, explained below: establishing the network requires the four stages of translation to be realised in full – otherwise, it never stabilises (Andrade & Urquhart, 2010). In this thesis, each case study chapter discusses the 'forces of (in)stability' behind VR adoption. These forces are then comparatively analysed in Chapter 8. This approach is useful because understanding how VR reshapes UN practices (RQ1, RQ2) requires not only tracing the *emerging properties*, but also evaluating the durability and persistence of these new configurations. Moreover, comparing patterns of (in)stability across the three case studies provides valuable insights into the broader mechanisms by which new technologies may either gain or fail to gain traction within the UN ecosystem and, more broadly, across IOs, thus also addressing RQ3.

As we reflect on ANT's network concept, it is important to address a particular limitation: the problem of where to 'cut' the network, that is, when to stop tracing interactions between actants (Heath et al., 2009; Strathern, 1996). In fact, while ANT is excellent for capturing an actant within a broader environment, its network concept – characterised by fluidity, instability, and porousness – and its broad definition of actants as 'anything that makes a traceable difference', suggest that networks could be theoretically infinite (Decuypere, 2020). This is problematic, not only for the potentially overwhelming scope of ANT studies (cf. Section 3.4.3), but also because such flexibility might raise the risk of narrative manipulation. Given this, determining where to set boundaries can become challenging. I took three steps to mitigate this problem: project-based boundary setting, emphasising salience and researcher sensibility, and acknowledgement. The first step involves establishing inclusion and exclusion criteria for the network based on my case studies. My research is centred on three specific UN VR-based initiatives, and all data collected is directly related to these case studies: the UNDP's *I am Fatmira* VR film project, the ITC-ILO's VR initiatives in CVEs, and the

ILO's VR training on sexual harassment. As such, the activities themselves and the interview data acted as a practical guide to delineate network boundaries (Decuypere, 2020). For example, in tracing the *I am Fatmira* project, my network initially included only the UNDP team, but rapidly expanded to encompass the VR production company, the 360° camera equipment, the Roma activist who viewed the screening, and so forth. However, certain actants were necessarily excluded – some human actants were not interviewed, while some non-human elements may not have been mentioned or rendered visible through the data. The networks I mapped (see visualisations: 5.4.3; 6.4.3; 7.4.3) include only those actants that emerged through the empirical material, primarily interview data (see Methodology chapter, Section 4.4 for more detailed information on the data analysis process). However, I also made deliberate choices about what to exclude. For example, although I conducted contextual document analysis, not every actant mentioned in those documents was included. This was a necessary methodological decision: documents such as the UNDP Digital Strategy reference a wide range of entities, many of which were not directly relevant to the 'I am Fatmira' case study. Including all such references would not only be impractical but would also risk diluting the focus of the analysis. These decisions were guided by analytical relevance. In addition, I excluded some organisational elements – such as internal policies, documents, funding mechanisms – that would have likely been part of the network, but were omitted either due to access limitations (e.g., restricted availability of internal documents or reluctance among interviewees to discuss financial processes), or because their inclusion risked conceptual overload and would have detracted from analytical focus. However, where organisational elements did surface in the data, I ensured they were included in the detailed network visualisations. Even if not all of those actants were analysed in depth within the translation narrative, their presence in the visualisations allows their relational positioning and potential influence within the network to be observed. Importantly, no actants explicitly mentioned in interviews were omitted from the visualised networks.

A limitation of this 'data-based' boundary setting concerns the possibility that some actants are not simply absent, but actively rendered invisible. For example, senior officials who declined to be interviewed were often not mentioned by other participants, nor did their names arise during snowball sampling. As a result, they remain largely invisible in the mapped networks, despite likely playing influential roles behind the scenes. Similarly, certain technologies (e.g. editing software) may have shaped outcomes but were never explicitly named in interviews or documents, and thus remained outside the traced network, perhaps given for granted by interviewees. In this sense, the networks mapped in this research are not exhaustive nor definitive: Rather, they reflect the empirical traces available and the process of 'following the actants' (Latour, 2005) as it unfolded within the study.

Despite the approach of including only what emerged from the data and was directly relevant to the case study at hand, knowing where to cut the network sometimes remained challenging. In those cases, I drew on the criteria of researcher's reflexivity (Jamieson et al., 2023) and salience (Toshkov, 2016a: 141-2) Researcher's reflexivity refers to the nuanced judgment and awareness that researchers employ when making decisions throughout the research process. With salience, I mean that I focused on elements that appeared most salient in the light of my research questions (Toshkov, 2016), such as interactions which are directly impacted by the adoption of VR technology. For example, in the ITC-ILO case study, some VR activities eventually extended beyond the UN staff and the initial beneficiaries to include other beneficiaries – in this case, other Argentinian trade unions. As it was unclear whether the actants met the inclusion criteria, I used researcher reflexivity and salience to conclude that these trade unions' involvement was peripheral to the research questions, as they were not directly engaged in the ITC-ILO initiatives. As such, they were not 'salient' enough to be included.

The final step involved acknowledging the limitations despite the mitigation efforts described above. Despite researchers' attempts to define boundaries, effectively delineating a network is not fully achievable. This constitutes one of the limitations of the ANT approach which must be acknowledged. In research, the absence of clear network boundaries can complicate the analysis, making it difficult to pinpoint stable patterns and blurring the boundaries between different actants and their roles. For example, in my project, including too many actants could lead to an overly complex network, making it difficult to identify the most relevant interactions and influences, and thus to draw clear and concise conclusions. At the same time, it should be noted that ANT's objective is not to delineate perfectly defined networks, but to appreciate how their inherent fluidity helps us capture the complexity of real-life phenomena and avoid modern simplifications, reifications, and dualisms (e.g., nature vs. society, objects vs. humans).

3.3.3. Translation: Understanding change effected by VR adoption

Understanding ANT and its relevance to studying VR adoption by UN organisations hinges on the concept of translation, a central ANT tenet that underscores its designation as 'the sociology of translation' (Callon, 1984; Law & Hassard, 1999; Silvis & Alexander, 2014). Translation, in essence, is the concept that explains how *actants* come together to form a *network*, integrating the two concepts discussed above. As mentioned in the section above, as they come together, human and non-human actants that never interacted before start to behave as part of a network (Bueger & Stockbruegger, 2017). The negotiations and adjustments, as actants work to align their interests and negotiate their positions within the network, are what constitutes ANT's translation process. Through continuous shifting, shaping, and redefining of their roles and relationships, actants work to create and maintain a stable network centred

around a particular solution (Callon, 1984; Callon et al., 1986; Law & Callon, 1992). When the network is maintained and appears stable, translation can be considered successful.

A successful translation process goes through four stages: problematisation, interessement, enrolment, and mobilisation (Callon, 1986), which serve as a chronological framework for understanding the development of an innovation, tracing its evolution from an abstract idea into its materialisation (Williams, 2020a). For the network to stabilise, the four stages are required to be realised in full (Walsham, 1997). In *problematisation*, a focal actant identifies a problem and proposes a solution that necessitates the involvement of other actants. It is the moment where particular actants position themselves as indispensable to others by defining the nature of the problem and offering a possible solution (Callon, 1986: 198, as cited by Flyverbom 2010: 430). To provide the example of VR adoption, the introduction of VR technology within the UN system could be seen as addressing specific 'problems' or needs, such as enhancing training effectiveness, improving collaborative processes, or advocating on critical issues, responding, for example, to the problem of more traditional ICTs not providing satisfactory results. The second stage, *interessement*, involves aligning interests and convincing actants to participate in the network by defining and negotiating their roles. For example, staff may conduct research and gather data on VR technology to assess its viability, as well as identify potential partners and VR developers and strategise the implementation of VR within the organisation. The *enrolment* stage involves actants accepting to participate to support the proposed solution, accepting the roles defined for them. It brings to the fore questions such as 'Who are the human and non-human participants?' and 'how they are expected to act?' (Flyverbom, 2010). In the case studies, enrolment often involves taking steps to lock the actants into the network: enrolling staff who will actively work on the project, delineating the VR activities, and formalising contracts with third parties and technology providers. Finally, in *mobilisation*, the aligned interests are maintained, securing the ongoing

participation of all actants, so that the network functions effectively and the goals of the initiative are met. In mobilisation, actants continuously perform their roles to maintain the network. In the ILO case study, for example, mobilisation involved how the team worked together on VR implementation and deployment, the VR training sessions themselves, as well as associated tasks, such as creating promotional communications about VR training and organising related events. All this work is geared towards supporting the network: as discussed, ANT's performative understanding views networks as held together by relations and inherently unstable, demanding constant upkeep from the actants.

The four-stage framework comes with certain limitations: As Callon (1984: 224) observes, translation is a process before it is a result, and the four moments of translation are in reality never as distinct as they appear in theory (cf. Williams, 2020a). For example, during my analysis, I occasionally observed overlaps between the stages of *interessement* and *enrolment*. Identifying interested actants and securing their commitment often occurred in close succession or even simultaneously, making it difficult to draw a clear boundary between the two. This was evident in the ILO case, where the organisation had already worked with the developer company that later built the simulations, meaning that recognising the actor's relevance (*interessement*) and involving them in the project (*enrolment*) unfolded almost in parallel. Crucially, however, the four stages of translation are helpful as an analytical tool, as they provide a structured framework to trace the transformation of VR from a conceptual idea to a practical tool. To understand how translation helps us make sense of VR adoption by UN organisations, two crucial aspects need to be addressed: the redefinition of identities and the emergence of new properties (called in this thesis *emerging properties*).

First, through the translation process, actant identities – understood here not as fixed attributes but as their roles, capacities, and functions within a network – are continuously

transformed (Bueger & Gadinger, 2014). Unlike conventional network theory, which often assumes that actors have stable identities before they network, ANT's relational ontology posits that actants lack pre-defined identities. Rather, actant identities are transformed through their relations and interactions within the network (Bueger & Bethke, 2014); they are constantly negotiated, 'made and remade dynamically by the actor-network around them' (Mager, 2009: 1130. See also: Callon, 1984, 1986; Flyverbom, 2010; Tatnall & Lepa, 2003). Thus, all actants are understood as hybrid entities, an essential concept in ANT (Acuto & Curtis, 2014; Blok, 2011; Latour, 2011; Michael, 2017). Actors cannot be entirely classified as either human or non-human; rather, they exist within networks as part of sociotechnical systems. This means that in the process of translation, actants are perpetually involved in mutual shaping, continuously 'hybridising' with one another. In this research project, ANT's translation concept thus allows us to see how the introduction of a new technology in the network causes the renegotiation and redefinition of actant identities. For example, UN staff may experience changes in their roles and identities as they adapt to new modes of interaction introduced by a non-human actant like VR technology. Along the same lines, Bjola & Kļaviņš (2024) introduce the concept of digital hybridisation to explain how digital technologies transform diplomacy by forming new entities called digital assemblages.

Second, ANT posits that translation is productive: the sum of the network relationships is greater than the individual contributions of each actant (Dicken et al., 2001). Networks exhibit causal power, or 'performative potential' (Strathern, 2002) which arises from the interactions within the network. Social phenomena[36] and practices emerge from these interactions (Dicken et al., 2001; Crossley, 2015). According to Hedling and Bremberg (2021a: 1608), ANT can be used to map and explain changes in diplomatic practices, such as how the diplomatic

[36] Note, however, that ANT is cautious about using the concept of the 'social' as an *explanans* – rather, the social itself is what ANT seeks to explain (Latour, 2005).

profession evolves as it adapts to digital transformation. Crucially, new practices are produced by both human and material entities (Mulcahy & Perillo, 2011: 124). To capture the specific ways in which new practices emerge from these sociotechnical entanglements, I introduce the concept of *emerging properties*, a concept that recurs throughout this thesis. *Emerging properties* are defined here as new attributes, behaviours, or capacities that arise from the interactions between human and non-human actants within a network. They are not simply features of the technology itself, nor do they reside solely in human users; rather, they result from the *distributed agency* embedded in sociotechnical configurations. In other words, these properties are relational: they emerge only through the dynamic interplay of actants within the process of translation. For example, the property of *interactive engagement* observed in both the ITC-ILO and ILO cases did not stem from the technology nor from user preference alone. Rather, it materialised through the alignment of multiple social and technical elements: the VR headset enabling gesture recognition, the design of the VEs that required active participation, the users' participation and willingness to engage with avatars, and so forth. Taken together, these sociotechnical relationships generated the emerging property of *interactive engagement*. Similarly, in the ITC-ILO case study, a key emerging property was *social presence:* the felt sense of being with others in a shared VE. While neither the VR system nor the human participants could independently generate this phenomenon, their interaction within the CVE resulted in a distinct experience of social presence. This exemplifies how ANT's notion of productive translation can be empirically observed: the network not only assembles existing entities but gives rise to new, emergent practices. *Emerging properties* thus operate as the link between sociotechnical configurations and observable organisational practices, showing how the dynamics of translation materialise in concrete forms of collaboration, advocacy, or training. The process by which emerging properties were operationalised and traced from the data are set out in Section 4.4. This operationalisation allowed me to trace how VR adoption by UN organisations produced effects that were not reducible to either the technology alone

or the intentions of its implementers. In this sense, the concept of *emerging properties* serves not only as an analytical tool, but also as a bridge between ANT's 'theoretical side' and the empirical realities of VR adoption in UN organisations. Emerging properties lie at the heart of my research questions, as they provide the means to trace how VR adoption has impacted the operational practices of the UN organisations in question.

3.3.4. Considering alternative theoretical approaches

Having outlined the strengths of ANT and its relevance to this research, it is also important to briefly reflect on why alternative theoretical approaches were not adopted. Specifically, I identified five alternative frameworks that could have been used to examine the adoption of VR within UN organisations: innovation adoption models, assemblage theory, Socio-Technical Systems Theory (STS-T), practice theory, and critical STS. In the following paragraphs, I outline the potential contributions of each approach and explain my choice to employ ANT.

First, the adoption of innovations in organisational environments is often studied through established technological adoption models. These include frameworks such as the 'Diffusion of Innovations' (DOI) (Rogers, 2003), the 'Technology Acceptance Model' (TAM), and the 'Social Construction of Technology' (SCOT) approach. These models aim to explain why and how technologies are adopted, typically focusing on variables such as user perceptions, organisational readiness, and the attributes of the innovation itself. The reason they were not fully suitable for this project is that they tend to isolate variables and rely on relatively linear understandings of technological change. For example, DOI focuses on the decision to adopt, the drivers and barriers to innovation, but not on the adoption process itself as an unfolding, relational phenomenon (Sarosa, 2012). Since the focus of this research is on

how VR reshaped existing UN organisations' practices, that perspective captures only part of the picture. TAM similarly reduces adoption to user perceptions of usefulness and ease of use, overlooking the sociotechnical dynamics. In contrast, ANT shifts the analytical lens from adoption *decisions* to adoption *processes*, examining the adoption process as a relational, interactive process (Burgess & Tatnall, 2005; McMaster et al., 1997). In other words, rather than asking whether adoption occurred, ANT allows us to trace *how* VR is adopted and what new practices or *emerging properties* materialise as a result. Although SCOT approximates this, given its emphasis on the social construction of technology (Bijker et al., 2012; Pinch & Bijker, 2012), it overlooks non-human agency, which is central for this study.

A further candidate would have been assemblage theory, which, as outlined in Section 2.4, shares with ANT a focus on heterogeneous elements and their provisional alignments. Assemblage approaches have been productively applied in IR to capture fluidity and multiplicity (Acuto & Curtis, 2014; Ong & Collier, 2005; Sassen, 2006). However, they are less often operationalised as an analytical toolkit – unlike ANT, they lack a structured conceptual apparatus such as translation, which is crucial for tracing how technologies become stabilised within organisational practices. For this reason, ANT offered a more precise methodological fit for analysing the micro-processes of VR adoption in IOs.

A third possibility would have been to apply STS-T (cf. 2.4.2), specifically the 'multi-level perspective' (MLP) introduced by Geels (2002). The MLP examines so-called 'transitions': significant shifts in sociotechnical systems involving changes in core technologies and in the system's underlying rules and norm (Sorrell, 2018). It distinguishes three levels: niches (early-stage radical innovations), sociotechnical regimes (dominant practices and rules), and landscapes (wider macro trends and long-term developments). Of particular interest here is the notion of niches as protected spaces where radical innovations, often costly and

underperforming at first, can emerge and develop (Geels, 2002). Later work elaborated this idea through the concept of *strategic niche management*, highlighting deliberate efforts to support and diffuse such innovations (Kemp et al., 1998; Schot & Geels, 2008). In this study, VR could have been conceptualised as a technological niche, nurtured and developed within UN organisations to achieve specific objectives. Nevertheless, while MLP offers a structured framework for examining systemic transitions over time, ANT provides a more granular lens, ideal for studying the micro-level of practices – such as how VR software is used and the capabilities it enables. Given the early and experimental nature of VR integration in global governance, ANT's emphasis on tracing localised, micro-interactions between human and non-human actors was deemed more fitting than STS-T's focus on broader, systemic transformations.[37]

Fourth, I could have approached VR adoption through 'pure' practice theory. After all, this thesis does engage with the concept of practices and examines how they are affected by technological change. A practice-based framework might have provided useful insights by highlighting how organisational activities (such as advocacy campaigns or training sessions) are enacted and potentially modified through the introduction of VR. However, this approach also presented several limitations. First, practice theory often conceptualises practices as routinised patterns of behaviour (Hopf, 2010; Reckwitz, 2002), making it less suited to analysing novel technologies like VR that introduce unfamiliar or experimental practices (Duvall & Chowdhury, 2011). Second, it lacks a structured model equivalent to ANT's translation process to analyse how new sociotechnical configurations emerge. That said, as noted in Section 2.4.3, ANT can itself be understood as a practice-theoretical approach, and practice theory has also successfully engaged with questions of change and innovation.

[37] See Kaghan and Bowker (2001) for a comparative analysis of the two approaches, highlighting the strengths and weaknesses of both.

Finally, this project could have adopted a critical STS perspective (cf. Section 2.4.2), drawing on traditions that view technologies as inherently political and embedded within broader systems of power, governance, and inequality (E.g., Hughes, 1987; Jasanoff & Kim, 2009; Winner, 1980). Such approaches, focusing on technopolitics or the co-production of science, technology, and the social order, would however have prompted different questions, such as: Whose interests are embedded in VR applications? How does VR shape who gets to speak, decide, or participate? And how do narratives of innovation serve particular institutional or ideological agendas? For example, a critical STS lens might have interrogated whether the ILO training simulation reproduced power relations, for example, by privileging certain voices while marginalising others. While this line of inquiry offers valuable insights into the politics embedded in VR's design and deployment, it would have shifted analytical focus away from the adoption process itself and from the emerging properties that arise as VR becomes integrated into UN practices. Given that VR adoption in IOs remains underexplored, such critical perspectives may represent a logical next step after tracing adoption processes. That said, ANT's limited engagement with questions of power is one of its main criticisms, which I address in the following section.

3.4. Addressing ANT's limitations

3.4.1. ANT and the question of power

One of the most persistent criticisms of ANT concerns its apolitical character. Critics argue this for two main reasons. First, its commitment to a 'flat ontology' (3.3.2), which treats human and non-human actants symmetrically, means that it refrains from assuming hierarchical distinctions between actants. While this principle allows for the empirical tracing of

associations without privileging pre-given categories, it has been criticised for masking or downplaying entrenched power differentials. As Aradau and colleagues note (2019), the very concepts used in research do some political work already – it is impossible for analysis to be completely apolitical. From this perspective, ANT's symmetry principle risks a kind of political flattening: by treating all actors as equal, it can obscure how some actants (such as global institutions or dominant technologies) exert disproportionate influence, while others (those without access to technology, or from marginalised genders, races, or communities) are rendered invisible. Second, ANT's emphasis on empirical description and micro-level practices is sometimes seen as displacing engagement with macro-structures of power, such as gender, race, or class. As Wajcman (2000) points out in relation to ANT's gender blindness, it is not simply that such dimensions are overlooked, but that the insistence on empirical neutrality may actively displace them, sweeping political concerns and difficult conversations under the carpet.

While this critique raises legitimate concerns, it does not undermine the value of ANT for this project: First, my aim is not to offer a comprehensive critique of VR or IOs through the lens of power and inequality. Rather, this research is exploratory in nature, focused on mapping how VR technologies are being adopted within UN organisations and impacting its practices. This is a field that remains empirically thin and emerging. Therefore, my aim here is to lay conceptual and empirical groundwork and start an analysis, but not necessarily to look at those power implications myself. In this sense, I understand research as a process: no single study can do everything, and research unfolds incrementally with different contributions offering distinct lenses. This study therefore provides a descriptive and analytical foundation, while inviting future work to pursue more critical directions – a trajectory I outline in the concluding reflections on theory development (Section 9.4). Second, ANT is not a theory in the traditional sense, but a methodological lens designed to explore the social, rather than

explain it through pre-established categories. In other words, it aims to deconstruct, to trace how social phenomena are assembled and maintained, and in this deconstruction it is not sterile but productive: As Latour argued, ANT can look beyond abstract concepts of structure and instead investigate the mundane networks through which power is enacted and sustained (Coole, 2013). In this sense, it can be 'disruptive' as by deconstructing it may reveal at the level of practice what structural accounts may overlook. Importantly, ANT does not deny the existence of macro-structures. Rather, it shows how they emerge through the aggregation and repetition of micro-level practices. Perhaps for this reason, ANT has often been applied in critical security studies to examine how security objects shape practices, highlighting how seemingly mundane artefacts – such as scanners or documents – actively participate in disciplining bodies.

Despite the focus of this thesis, I nonetheless want to briefly reflect on what a more explicitly critical approach could have foregrounded. This is to acknowledge – however minimally – the power dynamics and potential biases embedded in the adoption of VR and in the practices I am researching. Doing so also helps mitigate the risk of inadvertently legitimising inequality or reinforcing 'existing patterns of control' (Russell, 1986). Firstly, there is the question of social factors and the extent to which VR is far from neutral in this regard. In fact, VR's distribution, and use reflect existing hierarchies, both globally (with a strong concentration in the US and China – cf. 2.2), and within societies (e.g., rich vs poor, male vs female, young vs old). Globally, VR users are disproportionately young, male, and based in higher-income regions (Elad, 2024). This demographic raises questions about who VR is designed for, whose experiences it centres, and who may be excluded. Even if the projects examined were developed by UN organisations with the intention to be more inclusive than commercial VR, the reliance on commercially available platforms and hardware means that some of these exclusions and embedded hierarchies are inevitably reproduced.

Furthermore, we must add the digital divide to the equation. Disparities in access are not limited to the VR equipment itself but extend to the necessary infrastructure: a stable connection, digital literacy, enough physical space to use the technology. As such, while VR is often promoted as a tool for inclusion and participation, it can simultaneously reproduce or deepen forms of digital exclusion, particularly affecting older individuals, people with disabilities, and populations in the Global South. Secondly, there is the question of who creates VR applications and for what purposes. The interests driving development – whether commercial profit or political agendas, for example – shape the design, accessibility, and intended use of VR technologies. When profit is the primary driver, inclusivity and equity become secondary concerns, and the resulting technologies may reflect market logics rather than public interest. This raises deeper questions about the power relations embedded within both the software and hardware of VR systems. One illustrative example is the use of algorithms, which are not neutral but encode the assumptions and priorities of their developers, often reflecting broader societal biases. To add a note of critical reflection to the thesis, each case study chapter includes a brief discussion of the risks and challenges associated with the specific VR property that emerged from the data. These reflections, informed by both relevant literature and interviewees' insights, aim to complement the analysis by acknowledging possible limitations and offering readers a more nuanced understanding of VR's role.

3.4.2. The risk of anti-humanism

The second criticism is that ANT's understanding of agency is anti-humanistic, as it does not give humans the importance they deserve. Specifically, critics contend that by equating human and non-human actants through its principle of symmetry, ANT risks undermining the unique agency and ethical responsibilities of humans (Amsterdamska, 1990; Collin, 2014). In other

words, even if we could agree on dome degree of 'vibrancy' of matter (Bennett, 2010), humans and non-humans should not be treated symmetrically because humans possess unique 'human capacities of expression, powers of invention, of fabulation, which cannot be simply gainsaid, in favour of a kind of flattened cohabitation of all things' (Thrift, 2007: 111). It is here important however to 'defend ANT': in fact, ANT does not claim that objects are just as morally important as humans: Edwin Sayes (2014), for example, pointed out that non-human agency clearly differs in intensity and level from human agency. What ANT seeks to do is rather to offer a less anthropocentric perspective than traditional approaches, ensuring that the role of objects in shaping outcomes is also acknowledged and accounted for. The principle of symmetry, in this context, does not imply that objects are subjectively or ethically comparable to humans, but that they deserve analytical attention alongside human actants.

3.4.3. The risk of conceptual overload

The third ANT criticism concerns its lack of clearly defined models and the conceptual 'verbosity' that often accompanies its application. Aradau and colleagues (2019), for example, highlight the issue of 'conceptual multiplicity' in STS, noting the proliferation of complex terms such as *dispositif, assemblage, intra-action, co-production*, and *vibrancy*, could obscure rather than clarify research findings. Similarly, Bignetti and colleagues (2023) argue that ANT involves an overwhelming abundance of concepts and requires researchers to manage a vast volume of empirical material, posing challenges for clarity and coherence. Beneath these specific criticisms lies a broader concern: the difficulty in knowing what constitutes a 'proper' ANT analysis and how one is meant to 'do ANT' in practice. The straightforward response to this criticism is that there is no such thing as a 'proper ANT analysis': ANT is not a *theory* with a fixed methodology: rather, it is an analytical *lens,* a flexible set of tools designed to make sense of specific empirical phenomena – such as the adoption of a specific technology.

A more considered response is that ANT's abundance of concepts and empirical material is a double-edged sword. On one hand, it creates real difficulties: researchers must make continuous decisions about which concepts to mobilise and how to organise heterogeneous empirical material (for how I approached this, see the Methodology chapter). On the other hand, this very flexibility can be seen as ANT's strength: Since there is no definitive 'guidebook' for doing ANT, not using its full conceptual vocabulary is not a flaw, but compatible with its flexible logic. Indeed, I have also omitted certain concepts in this thesis due to constraints of space and relevance. Moreover, ANT's conceptual richness can be understood as an antidote to the opposite danger of 'parsimonious theory' (Aradau et al., 2019). In other words, ANT may offer an advantage over other approaches precisely because it resists the tendency to oversimplify empirical phenomena – something more reductive frameworks are often prone to. In this sense, its conceptual multiplicity may not be an obstacle, but rather a condition of knowledge-making (Aradau et al., 2019).

3.4.4. Post-ANT and 'stretching ANT'

Before turning to the empirical analysis and case study chapters, one final methodological reflection ought to be made: what I refer to as the question of 'stretching ANT'. As discussed above, ANT is particularly well-suited to tracing how the adoption of an innovation reshapes existing networks and practices. Its descriptive, 'flat' ontology enables a fine-grained account of how sociotechnical configurations emerge, evolve, and stabilise. This granularity is not a weakness but a strength, allowing for a detailed understanding of the work involved in technology adoption and the *emerging properties* that result from it. However, ANT is notably wary of working with broad social categories or macro-level 'explanatory frameworks' – one reason why it is criticised as apolitical. Rather than attributing causality to macro-social forces such as 'global inequality' and 'global power structures', ANT views these as outcomes of

heterogeneous micro-practices. As Latour argued, the goal is to trace continuous connections between different 'local' interactions without jumping to a presupposed 'global' explanatory level (Latour, 2005).

Yet, in this thesis, I do engage with the 'global' for two reasons. First, it is arguably impossible to fully eschew social categories in empirical research. Second, my third research question explicitly addresses the *broader implications* of VR adoption for the work of IOs, and therefore necessarily engages with wider social categories. This raises the question of whether RQ3 still falls within the boundaries of ANT. I argue that it does: ANT, particularly in its more recent forms, is flexible and evolving. While Latour's and Callon's 'classic ANT' displayed strong scepticism toward macro-categories, more recent *post-ANT* scholarship has begun to engage more explicitly with institutional or political dimensions (Bueger & Stockbruegger, 2017; Law & Singleton, 2013). This evolution is not a 'betrayal' of ANT's principles, but consistent with its belief that localised practices (the micro) can meaningfully speak to what is often referred to as the global (the macro) because ANT rejects any rigid distinction between the two. As Latour (2013) later noted, 'the global is local at all points'.[38] The key, I believe, is to remain grounded in empirical inquiry, as ANT requires. Rather than beginning with social categories as explanatory assumptions, this approach starts from micro-level analysis and moves transversally to explore broader phenomena.[39]

A similar argument is made by Acuto (2019) in their work on global governance and ANT. They address in particular the scalar challenges of ANT in IR and propose a 'millefeuille

[38] For a discussion see also Kendall and Wickham (1999). Latour illustrates this point through the example of a train journey: while one may appear to move seamlessly across continents, the experience relies entirely on local infrastructures – stations, timetables, personnel, and technologies. In the same way, what appears 'global' is, in fact, an intricate and coordinated assemblage of local actants (Latour, 2011). In other words, 'global' networks are collections of local places that are connected in some way (Robin, 2013).
[39] On this 'transversal movement', see the interview with Claudia Aradau (2019).

approach', an analytic sensibility that acknowledges the layered, interwoven nature of scale rather than reducing complexity to a singular 'big picture'. This approach is particularly valuable for fields like IR, global governance, and development studies, where attention to broader contextual conditions is necessary. As Avgerou (2017) notes, theories of socio-materiality risk becoming insufficient if they do not attend to the 'conditions and processes that extend beyond the immediate setting of human-technology interaction' (cf. Nexon and Pouliot, 2013). In this thesis, then, I inquire into the broader implications of VR adoption not with the intent to 'begin with the global': It is only after tracing how emerging properties arise from the data that I reflect on their broader implications. Through this, I aim to remain grounded in ANT's empirical orientation while also responding to the analytical demands posed by the study of IOs and digital technologies – while remaining reflexive about this analytical 'stretch'.

3.5. Conclusion

This chapter has argued that ANT offers the most fitting analytical lens for examining how VR is adopted within UN organisations and how this adoption reconfigures the practices of collaboration, advocacy, and training. Three points were central. First, by adopting the concept of actants and a non-anthropocentric, distributed view of agency, ANT allows us to see VR not as a neutral backdrop but as an active participant in organisational life, whose affordances both enable and constrain human action. As noted by Hedling and Bremberg (2021), technologies can assist or constrain the enacting of diplomacy and organisational practice. Second, working with networks mitigates both technological determinism and human exceptionalism, highlighting instead the co-constitution of *social* and *technical* elements. Third, the concept of translation offers a way to analyse how sociotechnical interactions evolve over time. Since practices emerge from networked interactions, translation is particularly

useful for tracing how the introduction of a new actant – such as VR – may generate new, practice-level properties like spatial/social presence, interactive engagement, and mediated intimacy (cf. Chapters 5, 6, and 7). The chapter also reflected on the analytical boundaries of this project and on ANT's limitations. Because networks are potentially unlimited, they carry certain risks. In response, I explained how I set boundaries around the case studies and prioritised what was most salient, while remaining reflexive about what was left outside. In the same vein, I acknowledged the common critiques of ANT and outlined how this thesis responds to them. Finally, in reviewing alternative approaches (such as adoption models, assemblage theory, STS-T/MLP, practice theory, and critical STS), I showed that while each offers valuable insights, none provides the same analytical fit for this project. In particular, I argue that ANT's strength lies in its ability to move from micro-interactions to organisational practices, while at the same time according appropriate weight to technology as an actant. The next chapter turns to methodology, setting out how ANT will be operationalised in practice. This is then followed by the empirical analysis in Chapters 5, 6, and 7, where ANT is applied to the three case studies.

CHAPTER 4: METHODOLOGY

4.1. Introduction

This chapter outlines the methodological approach underpinning this thesis. In designing a research project, it is essential to select methods that are appropriate to the thesis' research questions. My aim was to use ANT to explore how UN organisations' operational practices are reconfigured through the adoption of VR, how those dynamics differ across the functions of collaboration, advocacy, and training, and what these reconfigurations imply for global governance. But this immediately raised the practical question of 'how does one *do* ANT?'[40] As noted in Chapter 3, there is no single recipe for conducting ANT research (Wright, 2015). ANT is less a fixed method than a particular way of seeing the world. That said, ANT is firmly empirical in its orientation, requiring close attention to associations and situated practices. In this spirit, I opted for a qualitative, case-based strategy combining multiple sources of data in order to build a rich, triangulated account of each case study. This approach allowed me to stay grounded in practice, follow actants closely, and remain open to emergent properties. This chapter is organised into seven main sections. It begins by presenting the research design, including the rationale for adopting a case study approach, the use of data triangulation, and the abductive research strategy that guided the study (4.2). It then turns to the methods used (semi-structured interviews, embodied virtual observation (EVO), and contextual document analysis) explaining how each was implemented and justified in light of the research aims and the ANT framework (4.3). Then, I describe the process of data analysis, illustrating how thematic coding was combined with ANT-informed categories and how emerging properties were identified (4.4), and the visualisations used (4.5). Section 4.6 then reconstructs the research process and timeline, from mapping the field and selecting case studies to the practicalities of data collection and setbacks encountered. Section 4.7 reflects on ethics and researcher positionality, including ethical procedures for protecting participants and specific

[40] The question as to *why* ANT was chosen is addressed in the theoretical framework chapter, Section 3.3.

considerations related to the use of VR. Finally, I address methodological limitations, particularly those linked to case selection, transferability, the difficulty of isolating the VR factor, human variability, and the study's temporal scope (4.8).

4.2. Research design

4.2.1. Case study research

To consider how VR adoption is impacting the practices of the UN organisations under study, this thesis employs a case study approach. Case study research entails the in-depth investigation of specific instances of social phenomena ('cases') that are bounded by time, space, or subject matter (Feagin et al., 1991) – here, my case studies are three VR-based initiatives within three UN organisations. The decision to use case study research stems from the nature of the research questions, which focus on *how* organisational practices are changing through the introduction of a specific technology. Such 'how' questions call for in-depth exploration and the production of what Geertz (1973) calls 'thick description', as they cannot be addressed through statistical analysis or straightforward answers. This is particularly true in the context of VR adoption within IOs, which remains an emergent, heterogeneous, and often 'messy' phenomenon. In this respect, case study research aligns well with ANT's empirical orientation, enabling the detailed tracing of the sociotechnical processes through which VR is being adopted.

Case selection followed a purposive sampling strategy to select three cases that offered valuable opportunities to examine VR adoption within specific UN contexts. The primary criterion for selection was the *function* each case fulfilled. The overarching objective was to examine a set of cases that, when considered together, would reflect the diversity of the subject (Gerring, 2017: 60) – here, the functional diversity of VR applications – and enable a deeper

understanding of its broader impact on the work of IOs. During an initial mapping phase, I surveyed the emerging landscape of VR use across the UN ecosystem and observed that, although heterogeneous, many initiatives clustered around three core functional domains: virtual collaboration, advocacy, and training. These functions were also central to UN operations (cf. Section 2.6). Nevertheless, it is important to note that while analytically productive, this three-pronged framework is not exhaustive, and may have excluded VR projects that do not fit neatly within the categories of collaboration, advocacy, or training. Some VR applications were more difficult to categorise, appeared less directly aligned with core 'UN functions', or were still in early stages of development and thus inaccessible for research. For example, a project I detected was aimed at using VR to improve data visualisation: it was unclear whether this should be classified as advocacy, collaboration, or as something else entirely. Similarly, UNESCO's immersive initiative 'Museum of Stolen Artifacts' (UNESCO Core Data Portal, 2025), which points toward a potential function of VR in cultural heritage preservation, was ultimately excluded as it was still in its infancy. In this sense, the case selection was also 'strategic' in nature (Ruffa, 2020), guided by a combination of relevance, data availability, and logistics (Allarakia, 2022; Gerring, 2017: 147-8). Once the three core functions had been identified, I selected one 'representative' case study for each function (Gerring, 2017: 60). Here too, practical considerations played a role: data availability, the responsiveness of project teams, and the relative abundance or scarcity of projects within each function all influenced selection. For instance, I found only two viable cases for the collaboration function, one of which declined participation, leaving the ITC-ILO as the sole option. By contrast, for advocacy, a wider pool of projects was available.

4.2.2. Data triangulation and tripartite methodology

Another feature of this study is its reliance on multiple data sources, a common strategy when working with case studies, which typically involve the collection of rich, detailed evidence viewed from multiple angles in order to construct a nuanced understanding of the phenomenon under investigation (Feagin et al., 1991: 2; Yin, 2018). Using multiple data sources provides a form of 'data triangulation' which, by promoting the cross-verification of findings across different types of evidence, enhances the robustness of the analysis (Bowen, 2009; R. K. Yin, 2018b). In this thesis, this is achieved by combining semi-structured interviews, embodied virtual observation (EVO) of VR environments, and contextual document analysis (with each method explained in Section 4.3). These three methods offer complementary perspectives: interviews provide insider narratives, observation allows for experiential insight into the VR applications, and documents help situate each case within its broader organisational and technological context.

4.2.3. Abductive research strategy

Before turning to the specific methods employed, it is important to briefly note the abductive research strategy that underpins this thesis. Abduction refers to an iterative form of reasoning that moves back and forth between empirical observations and theoretical concepts to produce plausible explanations (Friedrichs & Kratochwil, 2009: 715). It combines elements of both deduction (drawing from theory) and induction (deriving insights from empirical data), allowing concepts to be gradually refined in light of evolving empirical insights (ibid: 717). Abduction proved particularly valuable in this study, as it is particularly well-suited to the study of emergent phenomena such as the adoption of VR, where the most salient effects were not immediately evident (Charmaz, 2008: 161). Relying on a fixed deductive framework would have risked imposing specific categories, while a purely inductive approach would have

missed the productive potential of ANT concepts for tracing sociotechnical dynamics. My research was abductive at several points: I began without a fixed conceptual framework: the initial mapping phase was open-ended, and only after the first interview round with ITC-ILO and preliminary analysis did ANT emerge as an appropriate and productive theoretical lens. The analysis then remained iterative: I moved back and forth between data (e.g. interview transcripts, project documents, and my own virtual observations), ANT concepts (such as actants, translation, and networks), and emergent analytical categories (see Section 4.4). For example, creating actant categories was an abductive process. I began by identifying individual actants in the raw data, then compared across interviews and projects, gradually generating provisional groupings, and refining them through engagement with ANT's conceptual vocabulary. The emerging properties – such as *spatial presence* and *interactive engagement* – were likewise identified abductively: they surfaced through the interviews, were further explored in the virtual observation, and further contextualised through dialogue with existing VR literature and scholarly debates.

4.3. Methods chosen

4.3.1. Interviews

Interviews constituted the primary method of data collection, providing rich, in-depth insights into the practices surrounding VR adoption. Interviews emerged as a suitable method for two key reasons: their capacity to access otherwise inaccessible data on an emerging phenomenon such as VR adoption, and their compatibility with ANT. First, interviews offer direct access to insider perspectives and enable the researcher to locate the knowledge that individuals 'carry in their heads' (Holý & Stuchlik, 1983), often undocumented or unavailable otherwise (Greenstein & Mosley, 2020). In this study – perhaps due to the pilot nature of these initiatives – much of the existing, written information relevant to VR adoption is often mentioned in

passing in official documents, for example as part of broader organisational digital strategies. As such, interviews enabled me to obtain detailed, targeted knowledge of how VR was being integrated into institutional practices. Second, ANT necessitates a methodological approach capable of capturing the specificity and complexity of sociotechnical processes by 'following the actants' (Bisconti & Possati, 2023). For example, understanding how a VR training simulation is designed, implemented, and received within an IO involves tracing interactions between institutional goals, VR affordances, and staff experiences. Such dynamics are not easily captured through quantitative methods, but rather require the rich, situated data that interviews provide.

In terms of interview modality, semi-structured interviews were chosen to balance focus with flexibility, allowing participants to expand on their experiences while ensuring key topics were covered (Given, 2008). Purposive sampling was used to identify interviewees based on their relevance to the research interest (Mason, 2002), and then snowball sampling to identify further interviewees. To avoid remaining within a narrow circle of UN staff, I explicitly sought introductions to external evaluators, VR developers, and end-users, thereby mitigating the risk of snowball sampling of 'becoming trapped within a network of interlinked responses who see the world through the same lens' (Mosley, 2013). The final participants' pool included UN staff responsible for the planning, implementation, and execution of the VR projects, as well relevant external collaborators, such as VR designers, technicians, and consultants, and end-users.

The initial design of the interview questions was broadly inductive and open-ended. They reflected the early formulation of this project's research questions, which focused on understanding the rationales behind VR adoption, the mechanisms through which it was implemented, and its perceived impact on the organisation. These questions were open to

accommodate diverse professional backgrounds (e.g., innovators and team leaders, operational staff, technical support), and enabled respondents to narrate their involvement in their own terms. While the language of ANT was not yet part of the analytical framework, these questions already spoke to key ANT dimensions: Questions about the rationale for adopting VR spoke to problematisation, as they concerned how actants define a problem and propose a technological solution to address it. Questions about implementation mechanisms, steps involved, and challenges encountered spoke to interessement, enrolment and mobilisation, as they traced how actants were drawn into the network, how their roles negotiated and stabilised, and how the technology was mobilised. Finally, questions on effects and expectations anticipated ANT's emphasis on productive networks, where the alignment of human and non-human actants gives rise to emerging properties that impact existing practices. As fieldwork progressed, it became increasingly evident that ANT offered a particularly productive lens for analysing the adoption of VR, as interviews revealed sociotechnical interactions, and as I delved deeper into ANT literature. In line with the abductive strategy described above, subsequent interviews were refined to trace more explicitly the role of VR technology in shaping practices. This included asking how the technology altered existing workflows, facilitating or constraining actions, as well as how material issues (e.g., procurement and use of headsets) shaped implementation, and how the technology was translated into specific organisational contexts.

Before moving on to the method of virtual observation, a key limitation needs to be acknowledged: the partial representation of end user or 'beneficiary' perspectives. Although end-users were interviewed, accessibility constraints meant that they formed a minority among participants, meaning that some user-facing challenges may be less fully represented. The triangulated approach of EVO and contextual document analysis was helpful in mitigating this missing data (Barnum, 2022). For example, in the ILO case, no end users were interviewed

directly, but relevant user feedback was accessed through the published evaluator report (Pike & Koithara Mathew, 2023).[41] In the ITC-ILO and UNDP cases, a small number of end users and beneficiaries were interviewed – one in the former and two in the latter. While limited, these interviews were supplemented by the researcher's own experience of the VEs through EVO, which offered an additional layer of insight into the user perspective.

4.3.2. Embodied virtual observation (EVO)

On top of interviews, this research employed embodied virtual observation (EVO), a researcher-led exploration of the VR applications under study. The foundation of my method draws on approaches such as digital ethnography (Chowdhury et al., 2022; Hjorth et al., 2019) and 'netnography' (Kozinets, 2015), which advocate for embodied, immersive ways of engaging with digital media and online spaces 'from within'. These methods have been increasingly recognised as essential for understanding how digitalisation reshapes fields such as diplomacy (Hedling & Bremberg, 2021). In the context of VR specifically, while some studies have adopted embodied approaches, their use remains relatively limited (Vasarainen et al., 2021b). Jones and Osborne (2022) provide an insightful guide to doing VR research, including a section on 'VR autoethnography'. They reference a study on a virtual church, which involved ethnographic observation of religious communities meeting in VR spaces (P. Jones et al., 2022). Other scholars experimented with immersive methods: Kostakos (2019), for example, employed VR 'go-along interviews', Mantelli (2021a) participated in Japanese language classes on the AltspaceVR platform, combining participant observation with in-world interviews, and Shriram and Schwartz (2017) used 'VR ethnography' to study user experiences and behaviours in VEs. Importantly, such methods are not limited to social or

[41] In fact, access to end users was restricted precisely because they had already been involved in earlier research by the evaluators, after which further access was not facilitated. As such, consulting the resulting materials represented the most logical, albeit indirect, course of action to include missing end user perspectives.

multi-user VR: In single-user contexts, Atkinson and Kennedy (2018a) developed a method also termed 'VR ethnography', where researchers alternate between narrating in-headset experiences and recording notes, producing a dialogic account of VR's participatory and affective dimensions. Similarly, Mathysen and Glorieux (2021) suggest conducting semi-structured interviews while participants engage with the VE, thus preserving the immersive aspect while the researcher remains external.

In the case of this research, EVO was employed for two core reasons. First, it was necessary to account for the embodied and immersive nature of VR, which is difficult to capture through interviews alone. In other words, observing the environment 'from within' enables to capture specific affordances – such as particular actions possible within the VR experience or interactions with virtual artifacts – that may not be fully articulated in interviews. Understanding these affordances is crucial, as they reveal how technology enables or constrains the tasks users can perform (Adler-Nissen & Drieschova, 2019: 534). This is also in line with ANT's emphasis on tracing the agency of non-human actants and not relying solely on human accounts of their effects. Second, it served as a means of complementing and enriching the findings generated through interviews, functioning as a form of data triangulation (not in the sense of verifying fixed facts, but in offering a different point of view from which to observe how certain claims were experienced and situated within the VE). For example, when interviewees described the use of *gamification* in the ILO training case, experiencing the simulation firsthand transformed their descriptions into observable experience – it illuminated what those gamified features were, how they were embedded into the VE, and offered a (necessarily subjective) sense of how these elements might be experienced by users.

In practice, EVO involved entering the VEs using a head-mounted display (HMD) – in this case, the researcher's own Meta Quest 2 headset. The experience was recorded and the footage subsequently analysed through repeated viewing, screenshot capture, and comparison with interview data. The approach was used across all three case studies and involved revisiting each VE more than once – once before data analysis, and then after the identification of provisional emerging properties (cf. Section 4.4 on data analysis below). This served both to ensure familiarity, as certain design features only revealed their function or significance through repeated engagement, and also to notice in practice the affordances mentioned in the interviews. In the ITC-ILO's collaborative VE, the observation took place both in the presence of others and alone, while in the UNDP and ILO simulations, the environments were explored individually.[42] Access to the VEs varied by case: For the ITC-ILO project, a support person from the team granted me access and guided me through the environment, providing contextual explanations. In the ILO case, I was given access to the training software and explored the simulation independently. For the UNDP case, I received the 360° video file from my contact point, which I viewed on my headset. My observations were guided by insights emerged from interviewees, as well as an attention to which elements of the VEs 'acted upon the user' and how, following ANT's concept of agentic technology. Drawing on the concept of affordances, I paid attention to how specific features enabled or constrained certain actions, shaped user experience, and affected collaboration, advocacy, or training practices. This included observing the interface design, its content and narrative, the sequencing of events, and how users were positioned in the scenario. For example, in the ILO training simulation I observed how the option to repeat scenarios (a feature interviewees associated with *psychological safety*) functioned in practice. Users could restart conversations multiple times, allowing them to test different responses without penalty or time limit. Experiencing this

[42] This was due to the differing natures of the environments and software: the collaborative platform was designed for multi-user interaction, while the other applications were single-user simulations (cf. Section 2.2.2).

myself helped clarify how the feature worked and how it shaped my experience. I was guided in this, again, by the concept of salience (Toshkov, 2016: 141-2): being alert to what elements stood out as salient in the light of my research questions. These analytical lenses allowed me to approach the VE not as a passive backdrop, but as an active participant in the translation process.

4.3.3. Contextual document analysis

In addition to the interviews and EVO, I also used 'contextual document analysis'. Document analysis is generally regarded as a valuable method for generating rich descriptions of a particular phenomenon, especially in case study research (Bowen, 2009; R. K. Yin, 2018b). Especially when studying organisations, like in the present study, text-based records such as strategic plans, reports, and policy documents are crucial for understanding organisational practices and decision-making processes (D. E. Smith & Turner, 2018). From an ANT perspective, moreover, documents are not just passive records but active participants in the network, which further justifies close attention to their role. Document selection followed a purposive sampling strategy, specifically a convenience sample. This included documents made available to me by interviewees, as well as publicly accessible materials related to VR, identified through online searches and/or interviewee recommendations. The documents analysed comprised: (1) materials referenced or shared by interviewees during discussions of the VR initiatives; (2) documents directly linked to the VR initiatives at ITC-ILO, UNDP, and ILO, particularly those offering strategic, operational, or evaluative insights relevant to the research questions; (3) broader UN frameworks and policies on digital technologies and innovation, particularly those mentioned during interviews; and (4) available communication materials. A full list of the documents consulted is provided in the Appendix. The documents were stored on Microsoft OneDrive alongside interview data and EVO materials.

I describe my approach to documents as 'contextual document analysis'. With this term, I emphasise that I did not conduct a detailed content or thematic analysis of the documents, but that I used the documents as complementary sources of data to illuminate the broader context within which VR technology was adopted and in which participants operated (Bowen, 2009; Mills et al., 2006).[43] As Bowen (2009: 30) aptly put it, such use of documents can 'indicate the conditions that impinge upon the phenomena currently under investigation' and can help 'contextualise data collected during interviews'. For example, consulting the UNDP's broader digitalisation strategy helped situate the VR initiative within the organisation's evolving priorities and strategic commitments at the time, which in turn broadened my understanding of the wider context around the organisation's decision to adopt CVR.

4.4. Data analysis

Given that the interviews were conducted between July 2023 and October 2024 (see Appendix B), the process of data analysis unfolded in parallel with data collection. Throughout the research, I adopted a thematic analysis approach, focusing on searching, identifying, and reporting emerging themes from the data (V. Braun & Clarke, 2006, 2021). In the initial stages, this took the form of exploratory thematic analysis: I engaged in open coding, followed by the grouping of codes into themes that were significant to the research questions (Chhina et al., 2023). As the study progressed and ANT was integrated as a conceptual framework, this approach evolved into what I term an 'ANT-informed thematic analysis.' The resulting approach retained the principles of thematic analysis, the coding of themes and organisation

[43] This use of the term 'contextual analysis' should not be confused with certain forms of discourse or historical analysis that are sometimes referred to by the same name – approaches which focus on examining the sociopolitical context of specific documents.

of patterns, but was reoriented to reflect ANT concepts.[44] I therefore extended the coding process to include a focus on human and non-human actants, on sociotechnical dynamics, and on the process of translation.

Coding human and non-human actants enabled me to identify all the entities involved in the network of VR adoption, which are visualised in the detailed network diagrams (Sections 5.4.3; 6.4.3; 7.4.4). I then ‘condensed’ the data, grouping initial codes into broader analytical categories (Miles et al., 2020), which I refer to as ‘actant categories’ (e.g., innovators, implementers), visualised in the second network maps (Sections 5.4.3; 6.4.3; 7.4.4). These are thematic 'grounded categories' (Kelle, 2007): they emerged inductively from the data. While engaging with the rich interview data, patterns emerged as certain actants exhibited similar roles in the network, leading to the creation of categories. For example, individuals responsible for initiating, designing, or championing VR adoption were grouped as ‘innovators’. While their precise titles or positions varied, their functions converged, making it analytically sensible to treat them together. Looking across the case studies also reinforced these groupings: although the specific actants differed, similar functional roles recurred, allowing me to capture shared functions while also noting variations in how they were enacted in different contexts.

This process was not always straightforward: for example, questions of granularity arose. One example concerned VR technology itself: should it be treated as a single actant, or divided into software and hardware? I opted for the latter, as the interviews revealed that software (e.g. user interfaces, affordances) and hardware (e.g. HMDs and materiality

[44] For ANT studies with similar approaches to data analysis, see Aka (2019), Chhina and colleagues (2023), Payne (2017), and Sarosa (2012). Others, such as Bignetti and colleagues (2023) caution that coding and data reduction may oversimplify the fluid and heterogeneous nature of networks, yet recognise the pragmatic value of such techniques for organising complex qualitative data.

concerns) shaped adoption in distinct ways.[45] Of course, even dividing VR into 'software' and 'hardware' still involves a degree of aggregation. Each of these could be further disaggregated (for example, into different HMD models or software applications), but doing so would risk creating overly complex, analytically unproductive networks. Moreover, in this thesis I treat VR as analytically comparable across cases, even though the specific forms of VR differ (Section 2.2). This choice is not intended to reify VR as a single, uniform entity, but rather to make cross-case analysis possible while still acknowledging its shared features, such as immersion in navigable virtual worlds.

Similar challenges arose for human roles. Here, the criteria for allocating actants to categories were based on their primary role and contribution within the network, as derived from my qualitative interpretation of interview data. Where aggregation helped to bring analytical clarity, such as grouping different staff members under the category of 'implementers' or 'innovators', I did so, while remaining attentive to the specificities of each case. Furthermore, in some cases actants performed multiple functions. To address this, I assigned them to the category most consistent with their primary role in the specific translation process. For example, I classified the ITC-ILO's VR focal point as an 'implementer', even though their responsibilities also include elements of mediation, therefore compatible with the 'mediators' category. The aim was not to impose rigid classifications, but to provide a clear and usable analytical structure for understanding how diverse human and non-human actants contributed to VR adoption. I also acknowledge that some actants could be traced further back: for example, budget-setters, investors, or the sources of innovators' ideas. Some of these influences might have remained 'backgrounded' in the data as they were not directly visible

[45] For a study on software's profound influence on everyday life and the spaces we inhabit, see Kitchin (2017; 2011).

through interviews or documents. Where these kinds of influences surfaced, I included them, but where they did not, I kept the focus on the actants empirically present in the materials.

Another issue was whether to treat documents or the policies they embody as the actants. Following ANT conventions, I treated documents themselves as actants. ANT scholarship has long emphasised that documents and inscriptions are not passive carriers of meaning but active materials that shape how policies circulate and gain authority. In other words, while the underlying policies do matter, ANT's material-semiotic perspective highlights how the document itself, through its material presence and circulation, exerts effects within the network. This aligns with how ANT would view policies, as it would argue that policies do not exist as independent entities but only as assemblages of heterogeneous actants (e.g, texts, forms, signatures, staff, and technologies) that sustain and enact them. Documents, in their material presence and circulation, are therefore analytically significant.

In terms of the translation process, I coded the four moments of problematisation, interessement, enrolment, and mobilisation, and then organised the data into a 'narrative' of adoption (Aka, 2019; Rantakari & Vaara, 2017). To identify the emerging properties – the new attributes, behaviours, or capabilities that emerged from the sociotechnical interactions of VR technology and human or organisational actants in the network – I focused on what emerged from those interactions, paying particular attention to how study participants described their interactions with VR, descriptions of change and transformation, 'added values', as well as challenges specifically connected to engagement with the technology (cf. Section 3.3.3 on emergence in ANT). I was particularly interested in what VR enabled in the domains of collaboration, advocacy, and training that participants felt was not achievable through other media. The guiding question in this phase was: *What does this speaker say VR allows or compels them to do, feel, notice, or neglect, that other media would not?* To illustrate the

process of identifying emerging properties, consider the example of *psychological safety*. I began with open coding of interview transcripts – noticing that one participant had argued that, compared to having a human coach, in VR 'you can say whatever comes through your mind' (Interview 28). Similar sentiments appeared across other interviews, such as 'here, they can just practice whatever in their mind (…) as many [times] as they want' (Interview 23). Through comparison and memo writing, I then analysed the occurrence of such expressions across interviews and noted that they pointed to a shared experience that I categorised under the provisional theme 'VR as a safe space', then refined to *psychological safety*. I then revisited the VR application during the second round of EVO, assessing whether that affordance was also perceptible in my own embodied engagement with the technology. Finally, in line with the thesis' abductive approach, I returned to the literature to explore whether similar affordances had been identified in related studies. This allowed me to assess which emerging properties from my data echoed existing findings, and which appeared less commonly or in more specific forms – thus being able to draw broader reflections on the implications of VR adoption for global governance. In some cases, the properties that surfaced through the data offered more contextual or situated insights than those discussed in the literature, suggesting that the sociotechnical configurations of VR adoption at the UN organisations may give rise to distinctive VR-enabled practices.

It is important to clarify the rationale behind the selection of emerging properties discussed in the case studies. While each case study centres on three key emerging properties, the empirical material yielded a greater number of potential properties. Not all of these are included in the case study chapters. This selection reflects the richness of the empirical data, which generated more insights than could meaningfully be included in a focused analysis (cf. Denzin & Lincoln, 2012: 144). It was therefore necessary to establish criteria for selecting which properties to examine in depth. This selection was guided by two interrelated

considerations: First, I prioritised properties with a patterned recurrence, that is, properties that appeared consistently across different types of data (interviews, EVO, and documents) and were articulated by interviewees occupying diverse roles within the organisation. Their recurrence across different perspectives increased their robustness, justifying their inclusion. Second, selection was guided by their analytical relevance and salience (Toshkov, 2016b) – here, the extent to which a given property shed light on changes in UN operational practices. For example, some properties, although interesting, were excluded from focused discussion because they lacked the conceptual distinctiveness that would make them salient enough to be included. In the ITC-ILO case, several interviewees referred to 'collateral benefits' to existing practices caused by VR adoption: the emergence of new collaborations (Interview 2), the formation of unintended development partnerships (Interview 5), and 'unexpected serendipity stories' (Interview 9). These were undoubtedly meaningful insights, but they did not constitute a well-defined shift in the function of *collaboration* and could not be easily examined as a standalone emerging property. The same reasoning was adopted in the other cases: the goal was not to create a 'catalogue' of every change VR may have introduced, but rather to identify properties that represented shared patterns and could meaningfully increase our understanding of VR's reconfiguration of UN organisations' practices.

To conduct the analysis in practice, I used NVivo, a well-established computer-assisted qualitative data analysis software (CAQDAS). NVivo was chosen both for its coding and data exploration capabilities and because it is the licensed software supported by my institution. However, for the later stage of visualising networks and actant relationships, NVivo's visualisation tools proved too limited. I therefore turned to Microsoft Visio, which offered greater flexibility in its diagramming and visualisation capabilities and allowed for the mapping of complex networks of relationships between actants.

4.5. Diagrams as an exploration and visualisation tool

Constructing ANT networks was not only a visualisation exercise, but a methodological tool for exploration (Moreno, 1953).[46] In fact, the diagrams enabled me to perceive patterns and relationships that were not immediately evident in the interview and EVO data. Beyond this exploration role, the diagrams also served as an effective means of condensing and visually representing a large volume of data. They captured more information than could be easily conveyed in the written narrative, including details which, while not central to the main argument, provided valuable side observations about the networks' sociotechnical relationships. An important methodological question was where to 'cut' a potentially infinite network (Kaniadakis, 2012), already addressed in Section 3.3.2. For each case study, three diagrams were created: a detailed network ecosystem, an actant category map, and a stages of translation flowchart. Their analytical value is explained in detail below, with the case study chapters referring back to this section.

4.5.1. Detailed network map: ecosystem of VR adoption

For each case study, I first created a detailed ecosystem map. These maps are referenced in Sections 5.4.3; 6.4.3; 7.4.4, but submitted separately as PDFs due to size constraints. They contain all the coded human and non-human actants from the interviews. Following ANT principles, the entities cited in the interviews were coded as actants based on their roles and interactions within the network of VR adoption (4.4). These actants and their relationships are visualised in the map, categorised into human, non-human, and organisational actants,

[46] In ANT, limited attention has been given to how networks are constructed and visualised (Decuypere, 2020). (Payne, 2017). Some scholars use tools such as Gephi to analyse macro-structural properties (e.g. density, node size) Decuypere (2020) and Venturini and colleagues (2017), but my case studies instead focus on the qualitative nature of relationships within smaller networks. Ponti (2012) exemplifies this latter approach, using Ethno to trace sequences such as the stages of translation and to generate diagrams that represent these dynamics.

represented by shapes: diamonds indicate non-human actants, circles indicate human actants, and squares indicate organisations. Actant relationships are mapped through connectors accompanied by descriptions of the nature of the interaction. We can understand this map as a 'freeze frame' (Silvis & Alexander, 2014) illustrating the relational distribution of actants in an atemporal way in line with ANT's flat ontology. The value of this 'folding of temporality' (Decuypere, 2020) lies in its ability to capture a granular snapshot of the ecosystem of VR adoption at the organisation in question, and the reciprocal relationships and interactions observable in the network. Furthermore, along ANT's principle of distributed agency – where agency is understood as emerging from relationships rather than from individual actants (Schillmeier, 2012; Passoth & Rowland, 2015) – the map starts to reveal how all actants contribute in various, interconnected ways to VR adoption. Furthermore, comparing the diagrams across cases highlights differences in the density of the surrounding UN ecosystems: some projects were embedded in a broader network of UN institutions, guidelines, and inter-agency collaborations, while others appeared more isolated. These distinctions provided valuable insights for reflecting on network stability across cases (cf. Section 8.3.4).

4.5.2. Second diagram: Mapping actant categories

The second diagram maps actant categories (5.4.3; 6.4.3; 7.4.4), clarifying actants' primary roles and responsibilities. By grouping actants in this way, the diagram avoids an overly granular representation and instead offers an accessible overview of how human, organisational, and non-human entities interact. As in the detailed diagram, symbols distinguish between non-human actants (diamonds), human actants (circles), and organisations (squares), while the positioning of nodes around the initiative at the centre reinforces the ANT insight that agency is distributed rather than concentrated. Its analytical value lies in highlighting the specific responsibilities of each actant within the network.

Understanding these roles is essential, as each actant shapes the adoption process in distinct ways, from influencing project design to determining technical feasibility or logistical constraints. Beyond providing an overview of actant roles, the visualisation also holds analytical value in relation to translation. As theorised in ANT, translation unfolds through ongoing negotiations and adjustments among actants as they align their interests within the network. By providing an overview of these actants' roles, the map provides a basis for understanding the translation process (discussed in Sections 5.5; 6.5, 7.5).

4.5.3. Third diagram: Stages of translation flowchart

The third type of map used in this thesis visualises the distribution of actant activity across the four stages of translation (Sections 5.5.3; 6.5.3; 7.5.3). This visualisation has three key benefits. First, compared to the above diagrams, it includes a temporal dimension, which indicates how actant roles are distributed across the different phases of the translation process. Second, it reiterates that VR adoption does not occur in isolation but requires coordinated work across multiple phases by numerous actants, collectively sustaining the translation process. Finally, it reveals stabilising elements within the network alongside potential vulnerabilities or bottlenecks, as discussed below. Moreover, each case study produces a slightly different configuration of stages, and comparing these variations proves analytically productive.

4.6. The research process

4.6.1. Mapping the field and identifying case studies

I began the research by 'mapping the field' of VR applications. I initially cast a wide net, examining past, ongoing, and planned projects across IOs and public bodies. This was complemented by informal conversations with both academic experts and practitioners working in the field. Early findings revealed a strong focus on advocacy, particularly within

the UN system, which prompted me to explore whether VR was being used for other functions. This, in turn, led to the development of the three-pronged framework guiding this study. In parallel, I acquired a VR headset and tested publicly available applications, including existing applications distributed by UN organisations, to experience IO contents available publicly. Following the initial mapping, I moved to identifying potential case studies and assessing their feasibility. This involved contacting relevant individuals to determine whether the projects aligned with my research aims, express interest and gauge their willingness to participate. My aim was to identify at least one illustrative case per core function. The process was exploratory and at times unpredictable: some promising cases never responded, while new opportunities emerged along the way. For instance, the ILO case study was not part of the original plan, but became feasible after it was recommended by staff at ITC-ILO.

4.6.2. Data collection and analysis: interviews and EVO

Once the Transfer of Status was passed and ethics approval had been obtained, a total of 30 interviews were conducted in the period between July 2023 and October 2024. Some interviews were conducted in Italian and were translated into English: this is noted in Appendix B. All interviews took place online through Microsoft Teams, except one, which took place in VR. Audio recordings were made with consent from the participants. Interview length varied depending on the interviewee's role, the flow of the conversation, and the extent of their involvement in the VR initiative. On average, interviews lasted between 20 minutes and one hour, with most lasting approximately 45 minutes. For some interviewees, particularly those who played a central role in the project and served as key reference points, a second round was conducted which helped clarify specific points or further explore issues that had surfaced in other discussions.

4.6.3. Obstacles and setbacks in the research process

One of the more significant challenges was revising the case study selection twice. Between the Transfer and Confirmation stages (~January 2023-October 2024), two of the three original case studies had to be replaced due to access issues, unresponsive teams, and difficulties in recruiting participants. These forced a recalibration of the research plan and resulted in delays and uncertainty in finding viable alternatives. More generally, while the initial intention was to include a broad range of perspectives, including senior officials and a wider group of end users, this proved difficult in practice. Securing interviews with high-level staff is notoriously challenging in elite contexts (X. Liu, 2018), and representation of end-users varied depending on the case. As a result, the interview sample was slightly skewed towards mid-level UN staff. A final, more mundane obstacle came when one interview (29) was partly lost due to a Teams recording failure, leaving only the second half intact.

4.7. Ethics and reflexivity

4.7.1. Ethical considerations and participant protection

This research received ethical clearance by the Central University Research Ethics Committee (CUREC). In accordance with ethical guidelines, participants were informed about the aims of the study, the voluntary nature of their participation, and their right to withdraw. In terms of data security, all data arising from the interviews – including consent forms, contact details, audio recordings, and transcripts – were stored security on the University's institutional OneDrive. Conducting interviews via Microsoft Teams enabled recordings to be saved directly to this system, thus reducing the risk of data loss or unauthorised access. Participant selection was guided by project relevance and availability, but the final sample was nonetheless gender-balanced and geographically diverse, reflecting the international character of the UN system. While based mainly in Turin, Geneva, Bangkok, Jakarta, Turkey, and Albania, the pool also

included non-UN collaborators from the UK, US, and elsewhere. All participants are anonymised in the thesis, though they were made aware of a slight risk of identifiability given the use of named institutions and references to their roles.

4.7.2. Ethical considerations connected to VR use

VR poses a distinct set of ethical concerns, from physical discomfort (e.g., motion sickness, eye strain) to psychological risks linked to the medium's immersive and emotional intensity (Mabrook, 2019: 88-90; Raja & Al-Baghli, 2025). Notably, certain physical side effects have been found to disproportionately affect women (Stanney et al., 2020), and strong emotional reactions or even manipulation have been documented (Madary & Metzinger, 2016a; Ouyang, 2022). These risks are amplified by VR's 'plausibility illusion' (Section 2.2.3), which can heighten emotional responses. In this study, however, risks did not apply *directly* to participants, who had already used the applications as part of their professional duties before becoming part of the study. Interviews therefore drew on their retrospective accounts.[47] The risks were more relevant to my own EVO, where I interacted directly with the VEs. To mitigate them, I kept sessions limited and remained attentive to the affective intensity of immersion and plausibility.

4.7.3. Researcher positionality and reflexivity

This research embraces the premise that all knowledge is situated: as Donna Haraway famously argues (1988), there is no 'view from nowhere'. Researchers inevitably shape what they see and report, both through standpoint and through the 'power of authorship' that determines what is included or filtered (A. G. D. Holmes, 2020). Even without ill intent, this carries the inevitable consequence, (particularly with rich, qualitative research), that 'less will

[47] Interview 3 was held in a VE in accordance with the interviewee's own preference.

be reported than was learned' (Denzin & Lincoln, 2012: 144). The researcher's own positionality is particularly important to acknowledge here, as ANT explicitly positions the researcher not as an external observer but as a 'performative' part of the network under study (Law, 2004). In other words, it views the researcher not merely as a 'tape recorder' but as a mediator in the network (Skinnerup, 2024). Accordingly, this study does not claim objectivity but commits to reflexivity, seeking to mitigate bias through triangulation, openness to unexpected findings, and continual questioning of assumptions. In my case, a strong interest in emerging technologies heightens sensitivity to what VR can do and where it feels 'exciting', but risks overstating its transformative potential. Digital fluency may also obscure barriers or frustrations faced by less experienced users, for whom simply setting up a HMD may require familiarisation with VR hardware and software, internet connection, email systems, and more. A second reflexivity challenge stems from the institutional context of the research. Working closely with large and influential organisations such as UN organisations brings the risk of unconsciously reproducing their authorised narratives (Mosse, 2013). At the same time, engaging directly with UN staff was essential for understanding how VR was translated in practice. To counterbalance these risks, I incorporated EVO as an independent, if subjective, perspective on the VR applications, and drew on both supportive and critical VR scholarship across the thesis.

4.8. Methodological limitations

A key aspect of reflexive research involves recognising the limitations of one's methodological choices. In addition to the challenges associated with interviews and EVO already noted in Sections 4.3.1 and 4.3.2, I wish to reflect on five methodological limitations that warrant particular attention: the use of purposive sampling, the issue of findings transferability, isolating the 'VR factor', human variability, and temporal scope. First, this study employed a

purposive sampling strategy for case study selection. This approach was deemed appropriate for identifying cases salient to the research questions and for capturing the diversity of the subject (Gerring, 2017: 60), while also taking into account logistical and accessibility constraints. However, purposive sampling carries an implicit risk of 'cherry-picking' (Sriwimon & Zilli, 2017: 136), namely, the researcher selecting cases arbitrarily in a way that confirms their assumptions or aligns too neatly with the desired narrative. In my case, for example, even if the selection was not intentional in that sense, the case studies I was able to identify and access were, by definition, those that had not failed – in ANT's terms, those that had gone beyond the problematisation phase – as well as those who 'wished to be studied'. In other words, they were already somewhat 'positioned to be successful', precisely because they were visible and accessible. As a result, I may have inadvertently overlooked other forms of VR experimentation – especially those involving 'failed translations' (Kendall & Wickham, 1999). This risks obscuring the wider range of sociotechnical dynamics that may arise when VR is resisted, poorly integrated, or simply fails to gain traction. In short, we risk focusing on where VR has worked, but not where it has not.

Second, my methodological choices raise questions about the transferability and generalisability of findings. First, although all case studies are situated within the UN system, it is important to recognise the issue of whether findings are transferable to 'the UN as a whole', and whether it is appropriate to speak of 'the UN' as a coherent actor in the first place. The UN is, in fact, not a monolithic entity, but a complex, diverse system of specialised agencies and programmes with varying mandates and degrees of autonomy. My aim here was not to treat 'the UN' as a coherent or unified actor, but to examine how different parts of this broader institutional system are approaching an emerging technology such as VR. In that sense, 'the UN' was treated as a site of diverse experimentation. Still, I remain aware that generalising beyond individual UN organisations requires caution, as patterns in one UN entity

may not apply to another. More broadly, can insights derived from case studies within the UN system be extended to other IOs? While they may share structural and bureaucratic features, their differences in mandate, scale, membership, and funding mean VR adoption may unfold differently. It is important to note, however, that quality in case study research is not necessarily dependent on generalisability: cases also have intrinsic value in their own right. As Denzin and Lincoln (2012: 156) argue, its strength lies in the 'seeking of particularity' which can compete with the search for generalisability. In an emergent and under-researched field such as VR adoption in IOs, rich, context-sensitive accounts serve not only to generate insight into specific organisational practices but also to lay the groundwork for future work. That said, some transferability is possible: Shared bureaucratic cultures and institutional identities across UN entities suggest they may face comparable challenges and derive similar benefits from VR, particularly when examined through functions that cut across organisational boundaries.

Third is the issue of 'isolating the VR factor'. This refers to the difficulty of determining whether the effectiveness of a VR-based activity stems from the immersive qualities of VR as a medium, from the specific narrative and design choices embedded in the simulation, or from the interaction between technology and participant. Distinguishing which effects are intrinsic to VR itself and which depend on context or user characteristics is a broader challenge in VR research (Ahn et al., 2022; Calogiuri et al., 2022). For example, in the ILO training case, it is difficult to determine to what extent the property of *embodied influence* was due to the qualities of VR, and to what extent a well-designed video role-play exercise might have achieved similar persuasive effects. Some studies address this ambiguity by comparing identical scenarios in VR and non-VR formats – doing so requires an experimental design, which was not the purpose of this study.

The fourth limitation identified is human variability: VR outcomes hinge on the interplay between technology and the users engaging with it. Prior experience, digital literacy, and physical or age-related factors shape this interaction, often producing divergent results (Lehikko et al., 2025; Q. Liu et al., 2020). This was evident in the case studies: for example, in the ITC-ILO's 'UN Fellows' training (Chapter 5), some participants reported positive engagement and enjoyment, while others experienced nausea and chose not to participate at all (Interviews 1; 7). Rather than undermining the analysis, this reinforces the point that emerging properties should not be treated as universal effects. Instead, the VR-enabled practices identified in this thesis are best understood as tendencies generated by sociotechnical relations between humans and VR, always shaped by the diversity of user experience – another challenge inherent to studying VR and technologies more generally.

A final methodological limitation is the question of temporal scope: While my analysis took place at a specific moment in time, technology adoption evolves continuously. A longer-term study could therefore have revealed additional insights about the development, sustainability, and institutional integration of VR practices, such as whether pilot projects led to routine integration (ILO), whether use continued or decreased (ITC-ILO), or whether CVR was used again for further initiatives (UNDP).

4.9. Conclusion

To conclude, this chapter has outlined the methodological choices underpinning this thesis. Taken together, this research design is intended to support an ANT-informed investigation of VR adoption within UN organisations, with the aim of generating new insights into the subject and addressing this thesis three research questions. The following chapters turn to the case

studies themselves, where the methodological approach outlined here is applied in practice and the analytical work begins.

CHAPTER 5: COLLABORATING IN VIRTUAL WORLDS: THE CASE OF THE ITC-ILO

5.1. Introduction

This chapter examines the first case study of this thesis: the International Training Centre of the International Labour Organisation (ITC-ILO) and its adoption of VR technology for virtual collaboration. The focus is on the application of multi-user VR through Collaborative Virtual Environments (CVEs) that provide users with immersive experiences. I will start with discussing how CVEs can support remote collaboration, particularly in a UN context (5.1). Subsequently, a detailed introduction to the case study will outline the context, objectives, and implementation of CVEs within the ITC-ILO (5.3). Following this, the ITC-ILO's VR initiatives will be examined through the lens of ANT, drawing on empirical data collected through qualitative interviews, EVO, and insights from relevant documents. In Section 5.4, the human and non-human actants involved in the project are identified, described, and visually mapped, facilitating a deeper understanding of the roles involved in VR adoption. In Section 5.5, the analysis will highlight the dynamics of ITC-ILO's VR adoption through the concept of translation. Structuring the analysis around the four-phase framework of problematisation, interessement, enrolment, and mobilisation, the section will examine how interests are negotiated and realigned and how actants' identities are shaped in the process. Subsequently, Section 5.6 will examine the emergence of new properties resulting from VR adoption, discussing how they impact the organisation's collaboration practices. Specifically, this chapter argues that VR adoption introduces new collaboration practices – namely, *spatial* and *focused presence*, *social presence* and *social dialogue*, and *interactive engagement* – which are enabled by the sociotechnical interaction between VR technology and human actants in the network. Finally, I examine the implications of these emerging collaboration

practices for the wider UN ecosystem, assessing their potential effects for the UN's role as a *global connector* within a digitalising international context.[48]

Referring back to the research questions introduced in Chapter 1, this chapter thus addresses RQ1 and, partially, RQ3. Regarding RQ1 – *How does the adoption of VR technology in the UN system impact their operational practices?* – the response unfolds in two parts: First, the analysis of the translation process (5.5) illuminates the sociotechnical dynamics involved in the adoption of VR technology within ITC-ILO, corresponding to the first step of ANT operationalisation (cf. 1.3). The four ANT stages of translation provide a detailed understanding of the negotiations and alignments between heterogeneous actants involved in ITC-ILO's VR adoption. Second, Section 5.6 traces the properties that emerge within the network of VR adoption – the second step of ANT operationalisation – and considers how, together, they lead to a reconfigured practice of collaboration. Finally, the discussion on the implications in Section 5.6 begins to address RQ3: *What are the broader implications of VR adoption for the evolution of UN practices in a digitalising international sphere?* Note, however, that this question is addressed in greater detail in the Discussion Chapter (Chapter 8).

[48] Note that the broader implications of VR for the UN's core roles (addressed through RQ3) are considered in the case study chapters, but further developed in the discussion chapter (Chapter 8).

5.2. Multi-user Virtual Environments for collaboration in international organisations

5.2.1. Introducing multi-user Virtual Reality

Multi-user or 'social' VR refers to immersive virtual spaces where multiple users interact via HMDs (Maloney & Freeman, 2020: 510; Section 2.2.2). These environments offer immersive spaces for gathering, meeting, and collaborating synchronously. Communication happens through avatars (2.2.4) in a way that approximates face-to-face conversation. Roehl (2019: 291) highlights four core qualities of multi-user VR platforms: synchronous presence through avatars; navigation; communication, and user recognition. Multi-user VEs serve varied purposes, most commonly socialisation. This use dates back to the early 2000s with non-immersive worlds such as *Second Life* (Linden Lab, 2003), which introduced synchronous interaction through PCs. With the spread of VR headsets, immersive 'social VR' platforms such as *VRChat*, *RecRoom*, and *Horizon Worlds* gained prominence. Currently, more than 150 systems exist, alongside many experimental versions developed in research labs (Schulz, 2024). A subset particularly relevant here are Collaborative Virtual Environments (CVEs), designed for professional collaboration. CVEs can be understood as alternatives to video-conferencing platforms like Zoom and Microsoft Teams. They are not necessarily immersive: platforms such as *Gather.Town* employ a 2D, game-like format, while immersive CVEs include *Spatial*, *Engage VR*, *Horizon Workrooms*, and *Arthur* – the latter adopted by the ITC-ILO. Recent years have seen a significant rise in multi-user VR use, driven by an increase in remote working and a growing interest in the 'metaverse' vision.

5.2.2. Collaborative Virtual Environments: The future of international collaboration?

International collaboration increasingly takes place online (Danielson & Hedling, 2021; Hedling, 2024). Post-pandemic, many meetings that were previously held face-to-face have continued in online formats, largely due to the benefits acknowledged by the international community, such as cost-efficiency (J. Robertson, 2020), avoiding constant security risks (Hedling, 2024), and addressing increasing environmental concerns (Bjola & Coplen, 2022; SEI et al., 2021). For example, in 2022, the UN Geneva Office reported that the number of in-person meetings in Geneva was at 60% of the 2019 level (UNOG, 2023). In the realm of diplomacy, video-conferencing has become an established component of the diplomatic toolbox (Bjola & Coplen, 2022), encapsulated by the term 'Zoom Diplomacy' (Donovan, 2024; The Economist, 2020).

Despite their widespread adoption, video-conferencing platforms have been criticised for several deficiencies, including reduced collaboration, reduced knowledge sharing, and weakened social interactions (Australian Government, 2020), as well as increased passive listening (Majumdar et al., 2020) and 'zoom fatigue' (Bullock et al., 2021). These shortcomings have come to the fore in IO and diplomatic settings as well, with many diplomats deeming these tools inadequate for replicating the dynamics of face-to-face diplomacy, making it challenging to 'read the room' and engage in 'corridor conversations' (Bjola & Manor, 2022: 483; Bjola and Coplen, 2022. See also Heath, 2020). This is also because interaction in traditional platforms follows different rules than real-life interaction: for example, the dynamics of group activities (e.g., break-out rooms) are often rigid, lacking the flexibility and spontaneity of in-person interactions. Diplomats also lament an erosion of authority and presence, spontaneity and shared energy, making it hard to capture the necessary urgency and importance of diplomatic matters (C. Crawford, 2021).

Compared to conventional video-conferencing platforms, multi-user VR offers more realistic, flexible, and intuitive alternatives for collaboration. It does so through several 'affordances' (cf. Section 3.3.1). For example, CVEs enable free movement through 3D spaces, spatial audio (Meta, 2024c), 3D file importation, and other prompts which leverage the environments' 3D nature (e.g., virtual whiteboards, 3D drawing, survey and quiz generators). This can have significant implications for remote collaboration: 3D navigability and spatial audio lead to more realistic social interaction patterns, enabling free movement within the space and control over social conversation dynamics (Mantelli, 2021b). Media files, such as videos and presentations, can be displayed throughout the CVE, enhancing the ability to seamlessly interact with diverse multimedia content. Some platforms also allow users to 'carry their PC' into the CVE, which enables real-time collaboration on documents (Klemens, 2022). Furthermore, many CVEs support 'spatialised recordings', which enable users to re-experience past meetings within the original virtual environment, preserving the spatial arrangement of participants and objects.

The above considerations contributed to a growing interest in exploring how immersive CVEs could support collaboration in various fields (Sayadi et al., 2025), an interest that also drew the attention of several UN organisations. The use of VR for collaborative purposes is particularly promising for UN organisations, characterised as they are by frequent interactions between geographically distant individuals (e.g., staff in headquarters, field-based staff, beneficiaries in target countries). Among the different kinds of VR software, the use of CVEs remains quite niche and experimental, and as such not frequently observable in UN contexts. The most notable example among these is the ITC-ILO, which conducted extensive experimentation with CVEs, as will be detailed later in this chapter. Other intriguing initiatives were the #ActNow initiative in 2022 and *Negotiations XR* (cf. Section 2.5.2), both of which

included collaborative elements in multi-user VR. A final noteworthy (non-UN) IO initiative on collaboration is the World Economic Forum's Global Collaboration Village, the world's first XR platform for public-private cooperation (World Economic Forum, 2024).

5.3. Introducing the ITC-ILO's adoption of multi-user VR

In the UN ecosystem, the adoption of multi-user VR was pioneered by the ITC-ILO. Based in Turin, the ITC-ILO is an international body belonging to the UN system and the training arm of the ILO. Its mandate is to promote sustainable development and decent work by providing training, learning, and capacity development for governments, employers and workers' organisations, and other partners (ITC-ILO, 2024b). Spearheaded by its Learning Innovation Team, the ITC-ILO VR initiatives align with the organisation's broader vision to be a global leader in sustainable capacity development services that promote 'Decent Work for All'. The '2018-21 Strategic Plan' explicitly identifies digital technology as a critical enabler of this mission (ITC-ILO, 2018). Within this framework, the ITC-ILO explored the use of CVEs for digital collaboration, as alternatives to in-person or 2D video-conferencing collaboration. Aligning with these strategic priorities, it also established an 'Innovation Lab', equipped with VR room, XR wall, and 'holobox' (ITC-ILO, 2024a).

Experimentation with CVEs began shortly before the COVID-19 pandemic, initially through pilot projects on the Arthur platform (ITC-ILO, 2024c, Arthur Digital, 2023). Initial sessions involved teams from diverse geographical locations, with the aim of facilitating fully digital in-person meetings without the need for travel and logistics (ILO, 2020). When the pandemic struck and in-person meetings became impossible, these experiments proved especially valuable. '2020 SKILLS Management Forum', cancelled in person, was held entirely in a CVE (ITC-ILO, 2021b). From there, the Centre broadened its use of CVEs to

support constituents and advance its mandate. Beyond virtual summits, it explored VR for holding recurring meetings (e.g., top management meetings, as per Interview 9, 08/09/2023), collaborative learning (holding classes, courses, and trainings), and various team-building activities. From there, the Centre broadened its use of CVEs to support constituents and advance its mandate, applying them in management meetings, collaborative learning, and team-building activities, four of which are covered in this case study and introduced below (see Appendix C for the longer list of VR activities).

1. ***UN Fellows VR Course:*** A month-long orientation for European professionals transitioning to international UN roles, combining VR activities with videoconferencing. Participants joined keynotes, workshops, and gamified activities, culminating in immersive project presentations.

2. ***ACTRAV-Fundación UOCRA:*** The Bureau for Workers' Activities (ACTRAV) program, which offers training to promote labour education for workers' organisations, in collaboration with the Argentinian training centre 'Fundación UOCRA', explored VR use for collaboration and adult learning, aiming to explore the most efficient uses of immersive CVEs (ITC-ILO, 2021e, 2021d). They then integrated VR sessions into the curricular of ITC-ILO's e-campus courses, holding lessons, webinars, and different kinds of activities in the CVE, including for electricians' vocational training.[49]

3. ***VR in Skills Development***: Here, CVEs were used to teach participants how to use VR for Technical and Vocational Education and Training (TVET), equipping them with the tools to deliver effective VR learning projects. Conducted with 30 participants in a

[49] Importantly, although these activities involve elements of training, here they are categorised as collaboration because the analytical emphasis lies not on content transmission, but on the collaborative affordances of shared VEs, where participants can be co-present, exchange, and learn together.

combination of VR and videoconferencing, it was organised by the Employment Policy and Analysis Programme (EPAP).

4. ***VR Emergency Response – WFP*:** In partnership with the WFP Global Logistics Cluster (World Food Programme, 2024), the ITC-ILO used CVEs to simulate early-stage emergency scenarios, preparing logisticians for immediate deployment. Around 30 participants from various countries engaged weekly in shared virtual spaces to conduct VR meetings on emergency management.

Furthermore, as the ITC-ILO developed expertise through these initiatives, it started offering VR consultancy services, gradually earning recognition as 'VR experts' in the wider UN system. For example, in 2021 it organised the 'ITC-ILO XR Expo 2021'(ITC-ILO, 2021c), bringing together stakeholders in the VR sector. Their services now include VR strategy formulation, implementation, rollout, and pilot design (ITC-ILO, 2020b), and the organisation frequently shares their VR expertise across international forums through the delivery of keynote speeches and presentations. At present, the ITC-ILO's use of VR persists but is more selectively employed as a component of integrated learning journeys (Interviews 6, 24/08/2023; 9).

5.4. The network's actants

In exploring the ITC-ILO's use of CVEs for virtual collaboration, it is essential to identify the heterogenous actants involved in the socio-technical network of VR adoption. As outlined in Chapter 3, ANT posits that both human and non-human entities contribute to the formation and functioning of networks. This section therefore identifies and describes the key actants involved in the ITC-ILO's VR initiative. To facilitate this analysis, the actants have been

grouped into categories that were empirically derived from the data (cf. Section 4.4). Their roles are first described in narrative form and then presented through two network visualisations: one mapping the broader ecosystem of VR adoption at the ITC-ILO, and another mapping the empirically derived actant categories (on the diagrams' analytical value, see Sections 4.5.1 and 4.5.2). Crucially, they also lay the groundwork for the analysis of the translation process in Section 5.5, as understanding how the network is assembled and stabilised requires first understanding who and what constitutes it.

5.4.1. The network's human actants

Innovators

The first category identified are 'innovators', which include the Chief of Learning Innovation (CLI) and the Chief Information Officer (CIO). Their combined efforts were instrumental in the exploration and adoption of VR at the ITC-ILO. After exploring the use of VR in 2015 with basic devices such as Google Carboard (Google VR, 2024), the CLI significantly advanced the ITC-ILO's VR capabilities in 2019. Their role's intrinsic emphasis on innovation placed them at the forefront of shaping and developing VR initiatives within the organisation. Familiar with the above-cited *Second Life* platform, they aimed to avoid the earlier mistake of 'Creating first life in Second Life: Exactly the same without any added value' (Interview 9). They understood VR as an advancement capable of bringing added value and enabling unique virtual interactions not feasible in real life (Interview 9). As such, they initiated early research and exploration on the technology which led to the 2020 pilots held during the pandemic. On the other hand, since 2018 the CIO has overseen several IT projects, ensuring alignment with UN requirements and standards. Adopting VR required their involvement in decision-making, managing bureaucratic processes, and ensuring the financial sustainability of the technology (Interview 4, 24/08/2023). They emphasise the importance of choosing VR as a strategic tool

to innovate training methods, emphasising how in 2020, as they had to accelerate on digital services, the technology presented an opportunity 'to differentiate [them]selves from others' (ibid). Both the CLI and CIO spearheaded the adoption of VR technology within the ITC-ILO, from developing the vision to providing strategic oversight and establishing the necessary groundwork.

Implementers

The second category identified comprises implementers who, by translating strategic visions of VR adoption into practical applications, are crucial for the effective operationalisation of CVEs in ITC-ILO workflows. Specifically, this category includes the ITC-ILO's VR Focal Point and Associate Programme Officer, the Learning Innovation Unit's (LIU) Activity Manager, and Activity Managers in charge of the VR activities. The VR Focal Point is significantly involved in the implementation, adaptation, and continuous improvement of VR at the ITC-ILO. Specifically, they work closely with colleagues and technical staff to implement, refine, and adapt VR use for diverse projects. During enrolment, they worked closely with technical staff from Arthur and the ITC-ILO IT department to build a 'library of rooms specifically designed for a wide variety of different types of workshops' (Interview 8, 25/10/2023, my translation). In mobilisation, they oversee the organisation's VR initiatives, with a focus on scaling up the immersive learning portfolio and liaising with Arthur to continuously adapt the CVEs based on the organisation's needs. The LIU's Activity Manager also plays a crucial role in VR adoption at the ITC-ILO. As a Programme Officer and Activity Manager, they engage in various innovative projects while supporting the other units in the training department (e.g., social protection, workers' rights). Their role is to manage and support activities, projects, and training sessions organised in VR: In enrolment, they organised orientation sessions to demonstrate VR benefits and coordinated with external providers: 'We played an active role in ensuring that there were orientation sessions for our

colleagues, so they could understand what it was about (…) and how to use it within a capacity-building project.' (Interview 6, my translation). In mobilisation, their focus was on 'mainstreaming and scaling VR technology in the ITC-ILO to other departments' (ibid), and they were also actively involved in in the ETUI project (cf. Section 3). Thirdly, the Activity Managers played a pivotal role in the practical implementation and mainstreaming of VR technology within the organisation by incorporating and tailoring the use of CVEs within their respective units and projects. ACTRAV's activity manager oversaw the integration of VR for vocational training programs in Latin America, collaborating with Argentinian training centre Fundación UOCRA and their constituents, trade unions. They were involved in implementing the CVE and expanding its use for workers' collaborative learning and training activities. The manager of the UN Fellows course oversaw the moving of the course into the CVE in the year 2021, adapting their training materials and methods to fit collaborative learning in the CVE. Finally, the Activity Manager of the 'VR in Skills Development' project implemented VR technology in their Training of Trainers (ToT) program on TVET, teaching trainers how they could use CVEs in their work.

Mediators

Mediators bridge the gap between the ITC-ILO and the beneficiaries of its VR initiatives. In this role, they act as facilitators, playing a crucial 'translating role' by ensuring that the interests of different actants are aligned within the network. For example, in the ACTRAV project, the UOCRA Focal Point acted as the intermediary, introducing the CVE to Argentinian trade unions, and playing a pivotal role in both the enrolment and mobilisation phases. During enrolment, they engaged the trade unions, identifying the best uses of VR and ensuring alignment with the unions' goals. In the mobilisation phase, they facilitated the transition of VR from ITC-ILO to the trade unions, coordinating activities such as training sessions (Fundación UOCRA & ILO, 2023). Similarly, in the 'VR Emergency Response-WFP' project,

the Head of Training at the WFP Logistics Cluster served as the liaison. They were instrumental for integrating the CVE, ensuring its relevance and benefit to course participants and that it met the cluster's goals for emergency response training by effectively simulating early-stage emergency scenarios (Interview 8).

Technical enablers (VR developers and private sector firms)

Technical enablers such as the support contact points and private sector firms were critical in ensuring the seamless integration, operation, and maintenance of VR technology within the ITC-ILO. For the ITC-ILO multi-user VR initiatives, the Arthur contact point serves as the main liaison between the ITC-ILO and Arthur Digital. They are responsible for ensuring alignment between the organisations, providing ongoing technical and onboarding support, and planning and adapting the CVEs to fit the specific initiatives, with the extent of support varying based on the clients' proficiency with the CVE (Interview 3; 09/07/2023). Private sector firms also played a pivotal role in ITC-ILO's adoption of VR. Meta, in particular, owns the 'Meta Quest' headsets employed by the organisation, which introduces a dual dynamic: On the one hand, the firm enables the use of VR technology through the creation of the hardware, the provision of support, and the ongoing improvements which enhance the functionality and usability of VR systems. On the other hand, it also imposes significant constraints, as it exercises control over the headsets' development, which can render existing equipment obsolete and, a more frequent problem, over the updates, which can lead to mandatory updates that may disrupt ongoing activities: 'Those platforms, they keep evolving, at some point something will not work because we didn't know that they did an update…' (Interview 4; 24/08/2023). Furthermore, Meta's specific usage policies, such as its terms of use and proprietary constraints, create additional barriers, making it difficult to share the headsets with beneficiaries, as they often allow only one user per device or require the existence of a Facebook account (ibid. Cf. discussion in Section 2.2.1). The involvement of

other private firms, such as Arthur Digital, introduces further constraints. Arthur's licensing policies and requirements can influence the budget and financial planning of VR initiatives at ITC-ILO, potentially limiting the scope and scale of projects due to cost considerations (Interviews 4 and 7, 29/08/2023).

End users and beneficiary organisations

Finally, end users and beneficiary organisations are the primary recipients of the added value, but also the challenges, of VR adoption. After being enrolled in the network, participants' active involvement in VR activities during mobilisation can strengthen the network around VR adoption, though resistance – such as participants not attending VR trainings – can also destabilise it. For example, in the UN Fellows Course, many students resisted the technology, deciding to join through the video-conferencing option as opposed to VR (Interview 7). As a course participant noted: 'some people did not appreciate [CVE use] at all' (Interview 1, 08/09/2023).

Collaboration and support networks

Finally, collaboration and support networks comprise various UN entities, departments, and external partners that foster innovation and the integration of emerging technologies such as VR (e.g., UN Innovation Network (UNIN); consultancies). These facilitate the sharing of knowledge, resources, and best practices among different UN organisations, thus supporting experimentation with emerging technologies. For example, the ITC-ILO was, on the one hand, influenced by the UN System Staff College (UNSSC) and its Innovation Toolkit (Interview 6), while simultaneously influencing other networks, for example by being featured in the UNIN's newsletters and knowledge sharing sessions (ibid).

Synthesis

The six identified actant categories (innovators, implementers, mediators, technical enablers, end users and beneficiaries, and collaboration/support networks) capture the multiple and interdependent layers of collaboration necessary for VR adoption at the ITC-ILO. Innovators, notably the CLI and CIO, spearheaded the introduction of VR, providing both strategic vision and organisational alignment. Implementers translated this vision into practice, embedding VR into existing projects. Mediators, including focal points in partner organisations and other UN actors, played a bridging role, ensuring alignment of interests. Technical enablers – most prominently Arthur Digital and Meta – provided the infrastructure and support but also imposed constraints through licensing policies, updates, and usage terms. End users and beneficiary organisations were central to the network's consolidation, with their engagement (or resistance) directly shaping the outcomes of VR adoption. Finally, collaboration and support networks across the UN system (e.g., UNIN, UNSSC) provided legitimacy, resources, and knowledge-sharing opportunities, reinforcing ITC-ILO's efforts and positioning it within broader organisational innovation agendas. Understanding these roles is crucial for tracing ANT's translation process and for grasping how VR was integrated into ITC-ILO's operations. To facilitate clarity, the categories and their contributions are summarised in Appendix A.

5.4.2. The network's non-human actants

VR technology

Having outlined the human actants involved, this section now turns to the non-human actants and their roles within the network. Foremost among these is VR technology itself, divided into hardware and software components to facilitate a more nuanced understanding of their distinct functions.

VR hardware

As regards the hardware, the ITC-ILO procured the Meta Quest (Meta, 2024b), comprising a headset equipped with lenses and a high-resolution display, two hand controllers, which enable interaction in the CVE by enabling gestures, object manipulation, and navigation (Meta, 2024a), and several other components and sensors (Brown, 2024). As discussed in Chapter 3, a central aspect of ANT, also known as 'material semiotics', is its recognition of the critical role of material elements in shaping the social world (Kaltofen, 2018; Srnicek, 2017; Srnicek et al., 2013). This insight is reflected in the interviews, which underscore how the headset's materiality influenced dynamics and practices: for example, interviewees 4, 6, and 9 noted challenges and logistical hurdles related to headset transport. The hardware's clunkiness and the potential for motion sickness represent another drawback, as they may decrease attendance at specific meetings (Interview 7). Moreover, the advanced technological components of VR – such as gyroscopes, motion and eye-tracking sensors, accelerometers, and high-resolution, high-refresh rate displays (Chaney, 2023) – partially account for its high cost, influencing ITC-ILO's strategic decisions. Finally, as hardware is composed of material technologies, it is particularly susceptible to becoming obsolete quickly as a result of rapid technological and scientific advancements (Interviews 1 and 9).

VR software

As regards the software, the CVEs themselves represent another crucial actant whose impact on the network has been highlighted in various interviews. As illustrated in Section 2.2, CVEs are characterised by several 'affordances' (Adler-Nissen & Drieschova, 2019a; Evans et al., 2017; Shin, 2022), referring to what the technology allows users to do or not. Avatars, for example, as virtual embodiments of users, allow the latter to communicate in the virtual space

(Maloney & Freeman, 2020; McVeigh-Schultz et al., 2018, 2019), facilitating social interaction and collaboration (Freeman et al., 2020; Schroeder, 2012). Multiple studies have demonstrated that the avatar one embodies can significantly influence behaviour, a phenomenon known as the Proteus Effect (e.g., Fox et al., 2013; Yee & Bailenson, 2007b). This is significant because it may shape how users participate in VR-based activities, communicate, and collaborate within the CVE and outside. Studies also explored issues of gender and race, showing that biases do not disappear in virtual spaces. For example, gender and sexualization of avatars can impact user experiences by increasing the likelihood of experiencing gender-based cyber-harassment (Behm-Morawitz & Schipper, 2016), and user behaviour has been found to change depending on the racial identity of their avatar (Ash, 2016).

Figure 1 Avatars gathering during the 2021 Skills Forum (ITC-ILO, 2021).

The design of the CVE and the inclusion of specific virtual props and spaces is also of significance. This was highlighted in the interviews, where several key affordances were mentioned, including VR presentations, file sharing, laptop importation, and sticky notes (Interview 3). Interviews emphasised the impact of virtual spatialities such as virtual breakout rooms (Interview 3), gallery walks and virtual trails (Interview 7), 'the igloo' and 'the ice bar' (Interview 8) and the 'Future Worlds foresight tunnel' (Interview 9). Additionally, virtual artifacts and props, such as the representation of Mars, the virtual Savannah, the 'flying taxi'

(Interview 7) and the 'virtual clock' (Interview 8), were emphasised for enabling users to perform specific actions and enhancing the interactive experience.

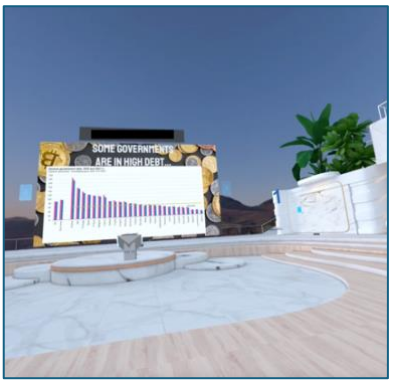


Figure 2 Virtual space with an outdoor presentation area for VR presentations

Figure 4 User interacting with a virtual keyboard and sticky note interface

Figure 3 User interacting with controls in the virtual space

Documents

Another key actant that emerged from the data are documents, divided into internal and external categories. Internal documents comprise plans and strategies, internal materials and notes, reports and evaluations, and communications and presentations. External documents comprise other sources shared by interviewees, including UN-wide frameworks and definitions'.[50] According to ANT, documents possess agency in that they have the ability to guide, prompt, and remind action, thus shaping reality and creating expectations (Pouliot, 2010a; Walters, 2002). In the case of ITC-ILO's VR adoption, documents may enable or constrain certain VR uses. Let us take for example the plans and strategies: The 2018-21 Strategic Plan (ITC-ILO, 2018) and the 2020-21 and 2022-23 Programme & Budget (ITC-ILO, 2021a, 2023) identify digital technology as a critical enabler of capacity development services. As these documents outline the strategic direction of the ITC-ILO, they also create the conditions of possibility for VR adoption. External documents and sources may also exert

[50] See Section 4.3.3 on documents' inclusion criteria. A full list of documents used in provided in Appendix D.

influence by providing frameworks, guidelines, and insights that shape policies and practices. Several such external sources were mentioned in the interviews. For example, the 'UN Reform Agenda 2030' (United Nations, 2025) was cited in interview 7, and the 'UN Innovation Toolkit' (UNIN, 2023) in interview 6. Additionally, formal UN definitions were identified as key actants. For example, the introduction of the 'essential travel' definition (UNEP, 2023) helped narrow the criteria for travel, reducing unjustified trips and encouraging remote collaboration which, in turn, opened the door to CVE use (Interview 9).

External contextual forces

The impact of external contextual forces was also mentioned in the interviews. These include the COVID-19 virus, technological hype cycles, and other (competing) technologies. These elements may collectively shape the network by driving change and creating new opportunities and challenges around VR adoption. In line with the ANT tradition of acknowledging the active role of biological entities like viruses and bacteria (e.g., Latour, 1988; Law, 2006) this research must give due consideration to the critical role played by COVID-19 in influencing the ITC-ILO's VR adoption. The extensive global impact of the virus, including its disruptions to the global economy (McKibbin & Fernando, 2020) and to workplace practices and human relationships (Dingel & Neiman, 2020), is well-documented. At the ITC-ILO, restrictions on physical gatherings and travel necessitated by the pandemic rapidly increased the demand for virtual alternatives: 'Suddenly, the entire ITC-ILO was shut down – the physical campus – and they were looking into technologies [to] meet, collaborate, but also train' (Interview 3; also mentioned in Interview 9). This urgency prompted the ITC-ILO to experiment with and eventually adopt CVEs to facilitate remote interactions and training, thereby maintaining operational continuity. Secondly, interviews highlighted the influence of ideas and expectations, such as technological hype cycles. The excitement and expectations surrounding VR and other digital innovations, exemplified by the 'metaverse moment' significantly

boosted interest and investment in VR technologies, leading to a surge in adoption (Interviews 4, 7, 9). Finally, in addition to VR, other emerging technologies such as AR, AI, and blockchain also interact with network actants in various ways. On the one hand, they are compatible with VR and can be integrated to offer new enhancements and capabilities. On the other hand, these technologies compete with, and may divert attention from, VR initiatives, as is currently happening with the rapid advancements in generative AI where 'you can feel the hype, you know that there are private companies behind it, [which is] why you don't have so many VR projects' (Interview 4).

Synthesis

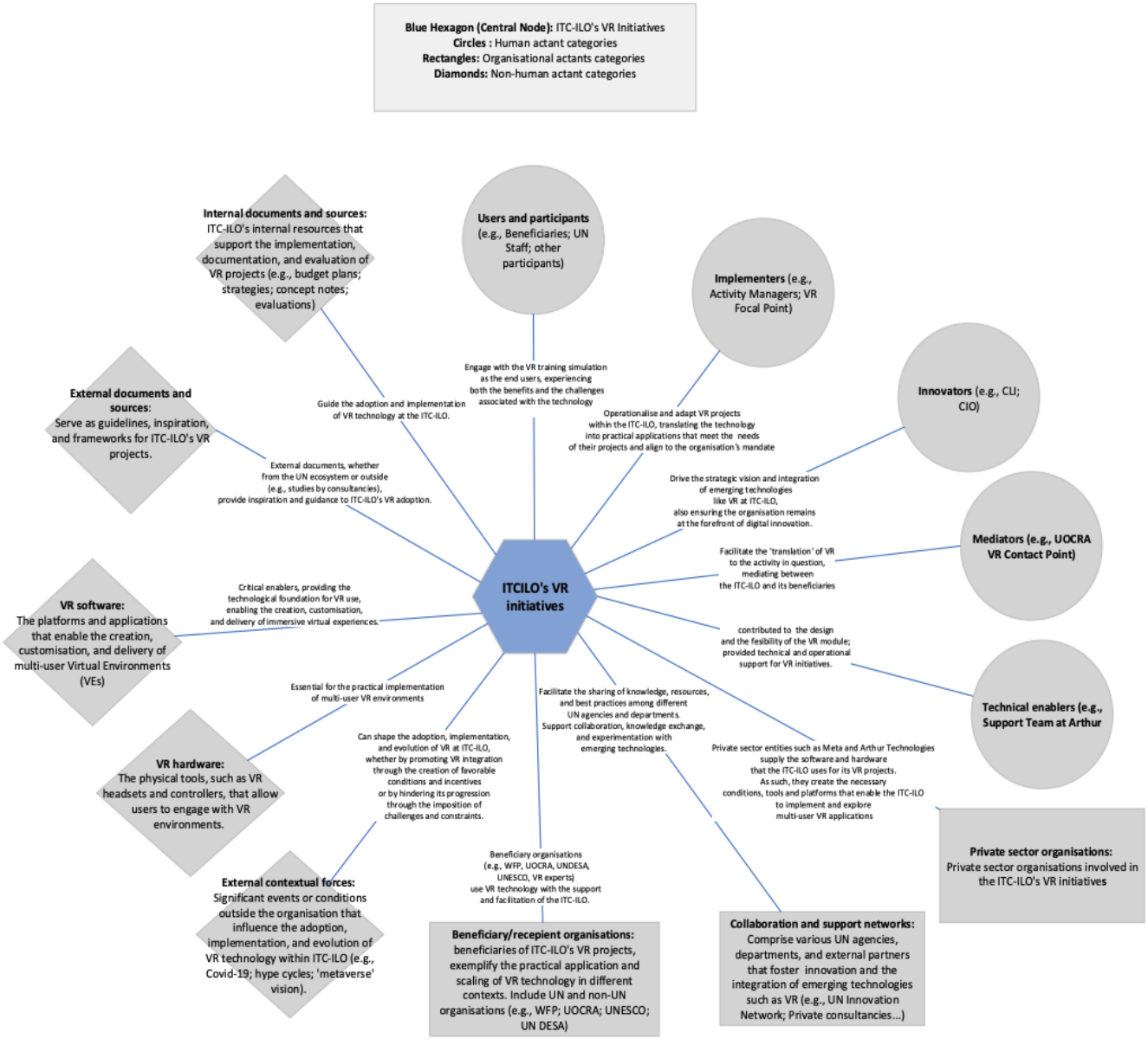
To summarise the above, non-human actants shaping VR adoption at the ITC-ILO can be grouped into four categories: VR technology, documents, and external contextual forces. VR technology itself comprised hardware (Meta Quest headsets, controllers, sensors) and software (CVEs, avatars, virtual props and spaces). Hardware introduced material constraints such as transport logistics, cost, obsolescence, and motion sickness, while software afforded new forms of interaction and collaboration, with avatars and VEs shaping user behaviour and experience. Documents acted as institutional enablers, with strategic plans, programme budgets, and UN-wide frameworks setting directions and legitimising experimentation. They also constrained practices by defining categories such as 'essential travel', which encouraged digital rather than physical meetings. Finally, external contextual forces exerted a decisive influence. COVID-19, in particular, catalysed the search for collaboration alternatives, while hype cycles and competing technologies alternately boosted and diverted attention from VR. Together, these categories highlight how non-human actants enabled, constrained, and reoriented the translation process underlying VR's adoption at the ITC-ILO. The categories and their respective contributions are summarised in Appendix A.

5.4.3. Visualising the network

First network map: Ecosystem of VR adoption at ITC-ILO

The first network map, submitted separately as a PDF due to size constraints ('ITC-ILO Detailed Network') visualises the heterogeneous network of actants empirically identified through systematic coding in NVivo. A guide to reading the map and an explanation of its value are found in Section 4.5.1 of the Methodology chapter.

Second network map: Actant categories



The diagram above distils the network into categories of human, organisational, and non-human actants, clarifying how their distinct roles collectively shape the VR adoption process. These categories provide the basis for understanding the translation analysis, which traces how different actants assume different functions across the stages of adoption.

Building on the ecosystem of actants presented in the first map, the second network map visualises the actant categories described above. To avoid repetition, since this map is used across all case studies, its value and contribution to the analysis are explained once, in the Methodology Chapter (Section 4.5.2). The map is particularly useful for illustrating how human and non-human categories are positioned in relation to one another and for clarifying

their respective roles. Building on these visualisations, the upcoming sections elaborate on the specific roles of human and non-human actants in the translation process.

5.5. Translation processes in practice: analysing the ITC-ILO VR initiatives

5.5.1. The process of translation in ITC-ILO's VR adoption

In the preceding sections, I outlined the heterogeneous actants involved, illustrating a complex network of human and non-human actants forming around the adoption of multi-user VR at the ITC-ILO. As discussed in Section 3.3.3, sustaining such networks requires ongoing work through the process of translation: the continual negotiations and adjustments that enable actants to align their interests, negotiate positions, and stabilise a network around a particular solution (Callon, 1984; Callon et al., 1986; Law & Callon, 1992).[51] Here, we can understand VR technology as the solution around which actants align and which they collectively strive to uphold. Section 5.5.2 examines VR adoption through the four stages of translation: problematisation, interessement, enrolment, and mobilisation. These stages provide useful analytical blocks for tracing the key moments where interests are negotiated and realigned, and how actant identities are redefined in the process. Crucially, translation produces shifts and redefinitions of identity, as actants 'hybridise' with one another (Section 3.3.3). Subsequently, Section 5.5.3 visualises the translation phases and key actant activities in Diagram 3, illustrating their temporal distribution during VR adoption. Section 5.5.4 then reflects on how the translation process illuminates the sociotechnical dynamics of VR adoption, reaffirming the value of an ANT approach. As such, this section addresses Research Question 1a: *How does ANT's process of translation illuminate the sociotechnical dynamics involved in the adoption of VR technology within ITC-ILO?* It also 'prepares the ground' for

[51] As this is the first case study, I provide fuller recaps of key concepts – such as translation and emerging properties. In the subsequent case studies, these will not be repeated, as readers can refer back to the relevant sections for clarification.

discussing the emerging properties of VR: capabilities that materialise only through the sociotechnical interplay of human and non-human elements (cf. Chapter 3).

5.5.2. Analysing the four stages of ANT's translation process

Problematisation

The first key moment of translation and alignment of interests can be observed in the problematisation phase. In this phase, actants identify a problem and propose a 'solution' to address it (Moser & Law, 2006). In this study, instances of problematisation were identified primarily through the interview data, especially in response to questions such as: 'What reasons and considerations led the organisation to adopt VR?' and 'What are, or were, your expectations and objectives for this project? (see Sections 4.3.1 and 4.4). Additional insights also emerged organically – due to the semi-structured nature of the interviews, participants sometimes addressed the issue while discussing other topics. Then, during the data analysis, I noted where participants explained the reasons for adopting VR and the specific organisational challenge or 'problem' it was intended to address. At the ITC-ILO, this phase involved recognising the need to enhance collaboration through innovative solutions. In fact, the ITC-ILO is mandated to 'achieve decent work while exploring the frontiers of the future of work' (ITC-ILO, 2024b). The organisations' interest in VR can thus be understood as a 'solution' to its need to explore innovations and their potential to enhance collaboration and workflows.

During the problematisation phase, innovators and external contextual forces served as key actants in positioning VR technology as the 'solution' mentioned above, imagining ways in which it could enhance virtual collaboration in accordance with the ITC-ILO mandate. The CLI recognised the potential added value of VR beyond traditional video-conferencing platforms (Interview 9), and the CIO recognised VR's potential as a strategic tool to innovate

and differentiate the ITC-ILO from other organisations (Interview 4), an observation echoed in studies discussing UN organisations' hopes of positioning themselves as leaders in digital cooperation (Bjola, 2025; Bouchard, 2020b). External contextual forces, such as COVID-19 and the metaverse vision, also played a role, as highlighted in Section 5.4.2. As an agentic actant in the network, VR technology 'kicked back', influencing the network's priorities by determining what was technically feasible, based on the activities that could or could not be effectively executed in VR. For instance, the technical functionalities of multi-user VR and CVEs drove the decision to turn to this technology, as its affordances – such as enabling synchronous embodied interactions between multiple users – indicated a greater potential to enhance collaboration.

Throughout this process, identities were actively negotiated: By advocating for the adoption of VR, innovators positioned themselves as forward-thinking, innovative leaders. VR technology was shaped by the needs and ideas of the ITC-ILO's mandate, which shaped how it would be integrated into existing workflows, marking the beginning of its 'transformation' from a general technology with multiple uses and affordances, to a specialised tool aligned with the specific functions and goals of the ITC-ILO – a process that will fully develop in the later stages with VR 'entering in a real development dynamics' along the organisation's mandate (Interview 5, 25/08/2023).

Interessement

The interessement phase involves aligning interests and convincing actants to participate in the network by defining and negotiating their roles (O'Connell et al., 2014). Like problematisation, interessement was traced from interview data. Insights into interessement often emerged during interviews with innovators, particularly when they recounted how they became involved in the project and how they mobilised others around the initial idea.

Questions such as ‘Can you tell me about your role in the project?’ (which was asked to each interviewee), and ‘How did this initiative start?’ prompted narratives about the identification of potential actants and the initial formation of project teams. Here, this involved the ITC-ILO engaging with multiple actants to imagine a network that would support multi-user VR adoption. Three key moments of translation were identified during interessement: *partnership exploration*, *strategy development*, and *pilot trials*.

Partnership exploration

In its move towards VR adoption, the ITC-ILO engaged with several VR providers to explore potential collaborations. In 2020, the LIU organised ‘Innovation Day’, an event aimed at bringing together stakeholders in the VR field to identify synergies between ITC-ILO’s work and mission and VR service providers (ITC-ILO, 2020a; Interview 4). In addition to this event, ITC-ILO staff from each technical team participated in a two-day intensive program at the headquarters of a leading VR service provider to gain a comprehensive understanding of AR and VR applications and get to know the service provider (Interview 5). These scouting activities enabled the ITC-ILO to identify companies that could offer the most suitable VR solutions to meet its objectives, while also gaining a clearer understanding of potential applications. The technology exerted influence in this phase, too: its technical affordances and the availabilities in the VR market shaped the ITC-ILO’s decisions on partnership choice. Arthur, the company ultimately selected, was ‘particularly well-suited for collaborative work’ (Interview 5) and provided ongoing technical support through the software provider, which proved to be essential (Interview 8). The decision to choose Arthur, in turn, shaped the subsequent applications of VR technology at ITC-ILO, demonstrating how the technology may affect the practical ways in which virtual collaboration practices are carried out. Through this alignment of interests, VR technology was ‘translated’ from a general concept into a specific application in line with the ITC-ILO’s objectives.

Pilot trials

To evaluate the feasibility and effectiveness of VR, the ITC-ILO team conducted pilot initiatives at the beginning of the COVID-19 outbreak. During this pilot stage, the team engaged with VEs to explore capabilities and applications within the organisational context, which would shape the future direction of the technology's implementation (Interviews 4 and 9). During the pilots, negotiations to achieve the desired outcomes took place among UN staff, VR content developers, and the VR technology itself. The ITC-ILO worked closely with the developers to imagine tailored VR experiences that aligned with their vision (Interview 8). The performance and limitations of the technology discovered during the pilots provided critical feedback that shaped the ITC-ILO's VR implementation. For example, technical limitations like glitches or hardware-related difficulties required adjustments and the learning new skills (interviews 4 and 7).

Strategy development

The third key translation moment involved the development of a VR strategy. This phase included planning and documentation to ensure that the VR initiative complied with internal processes and regulations. This involved planning how VR will be used within the organisation while complying with internal regulations and achieving the ITC-ILO's goals (Interview 4; ITC-ILO, 2018). VR's inherent capabilities and limitations needed to be integrated into the plan: this included considerations such as the cost of the technology – linked, as discussed in Section 5.4.2, to its materials as well as hardware and software licenses (ITC-ILO, 2021a).

Enrolment

The enrolment phase involves 'locking in' and formalising actant roles, ensuring their commitment, and coordinating their responsibilities (Moser & Law, 2006). As with the other translation stages, enrolment was traced through interview data. I focused in particular on how actants described accepting and performing the roles initially defined during problematisation and interessement. Relevant data emerged particularly from implementation-related questions such as: *'*Can you explain to me how VR technology has been implemented for this particular project?' Once I had identified ANT as a guiding framework, I refined my interview focus to trace the enrolment of non-human actants more explicitly: for example, by asking about the procurement and use of headsets, which revealed how the technology itself became 'enrolled' in the initiative. At the ITC-ILO, enrolment entailed securing the commitment of relevant stakeholders, including staff, the IT department, external technology providers, the technology itself, and end-users. A successful enrolment sees actants accepting their roles in the network: UN departments allocate resources for VR projects, developers agree to design VEs with the organisation's objectives in mind, the VR equipment is procured and set up for use, formal agreements with VR partners are established, the technology's functionalities are tailored to meet specific needs, and staff are prepared to integrate these new tools into their workflows. Three key moments of translation were identified during interessement: the *appointment of a VR Focal Point*, *procurement and contracting*, and *curriculum integration*.

Appointment of a VR Focal Point

The ITC-ILO demonstrated its commitment to integrating VR into its operations by appointing a dedicated VR focal point, who serves as the primary coordinator and liaison for all VR initiatives across the organisation. As the VR Focal Point aligns ITC-ILO's interests with the capabilities of VR, the technology undergoes a process of translation, shifting from being an

‘isolated tool’ in the organisational ecosystem, to becoming institutionalised and embedded in the organisation’s processes and operational identity.

Procurement and contracting

Another key moment of translation during enrolment is the formalisation of agreements to secure the necessary VR technology through procurement. At the ITC-ILO, this involved acquiring an Arthur license (Interview 2, 28/09/2023, and 4) and purchasing Meta headsets (interviews 4 and 6). As it formalised a partnership, the interests of ITC-ILO and Arthur had to align around a solution that would fit the ITC-ILO’s objectives. This involved the ITC-ILO articulating its need for a solution that fit their objectives, and Arthur assuming their technological development responsibilities (designing and customising the VEs to meet these needs, as well as providing ongoing support). Furthermore, as it ‘enroled’ the Meta headsets into the network, it had to contend with their materiality: For instance, the shipping of headsets to other countries proved problematic when they were ‘blocked at the border’ on different occasions due to a chip contained within the devices (Interview 4, 6). This underscores once again how the materiality of technological actants can directly impact the functioning of the network and must be duly considered alongside human and organisational factors.

Curriculum integration

The third key moment of translation involved the development of specific VR modules and their integration into the ITC-ILO curriculum. This stage was particularly significant as VR transitioned from general planning to specific application in the ITC-ILO operations. Crucially, curriculum integration involved ensuring that staff were adequately prepared to integrate the new tools into their workflows, with related resistances ‘Why this tool? (…) I was not able to design the four weeks all in one go: it was too much’ (Interview 7) and

adjustments: ‘it turned out better that what I would have imagined’ (ibid). Once Activity Managers were prepared, specific VR modules needed to be planned, developed, and integrated into the projects’ curricula. This process entailed a translation between the specific contents of the courses (e.g., entrepreneurship training; UN Fellows training), and the technology’s modalities of integrating that content. Crucially, VR technology played an active role in this translation, as the specific affordances of VR necessitated adaptations to achieve the desired objectives, depending on the activity in question.

Mobilisation

Mobilisation involves the maintenance of the aligned interests and roles and the securing of actants’ ongoing participation to ensure the network functions effectively and the solution is implemented (Latour, 2005). The goal is to ensure that all actants work to support the network’s objectives (O’Connell et al., 2014). As with the previous stages, mobilisation was identified through the analysis of interview data. I paid particular attention to responses that revealed how the project was maintained, institutionalised, and expanded. Relevant insights emerged from questions on implementation and impact: For example, ‘How is VR technology being practically implemented in UN organisations? And ‘To what extent are the expectations and goals set for the implementation of VR technology being met?’ To explore the initiatives’ future outlook, I also asked: ‘Are there any plans to scale the technology to other areas of the agency, or to other agencies?’ These responses helped me trace the work done to stabilise and extend the network once it had been established. At the ITC-ILO, mobilisation involved implementing and maintaining CVE use in the organisations’ activities around different units and projects. Two key moments of translation were identified: *CVE operationalisation* and *CVE expansion.*

CVE operationalisation

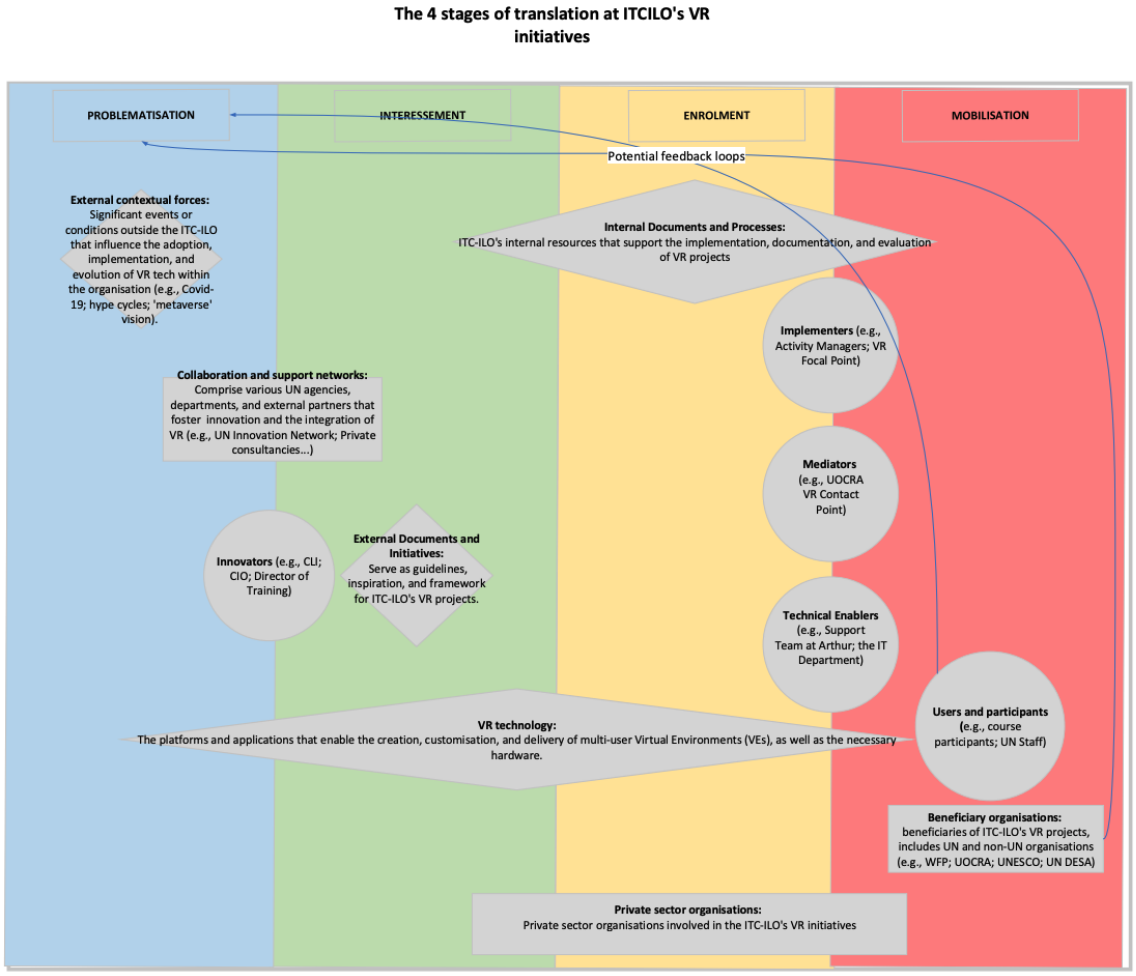
Firstly, mobilisation at the ITC-ILO involves operationalisation of the CVE in the organisation's practices and workflows. Activity Managers and the VR Focal Point are particularly active here, as they oversee how multi-user VR is implemented in their respective projects. They work on the organisation and conduction of the immersive sessions, manage participants, and collaborate with technical enablers, such as the IT Department and the provider. Through the collaboration with technical enablers, continuous adaptation is enabled to ensure the VR technology functions smoothly through mobilisation. This phase represents a critical translation: during this phase, implementers carry out and continuously refine the VR technology based on their initiative's objectives and adapt them to the curricula of the courses offered by ITC-ILO. This involves translating the general capabilities of VR technology into specific, functional applications for the ITC-ILO by working closely with the provider: 'So they said like ok, we imagine or we envision a session or room like this and that, and we [Arthur] execute' (interview 3, corroborated by interviews 7 and 8). Mediators play a crucial role in mobilisation too by mediating between beneficiaries and the organisation. They assess how the technology can meet beneficiaries' needs and ensure they are prepared to use it effectively. For example, in the ACTRAV initiative, the trade union contact point facilitated communication between ITC-ILO and the Argentinian trade union members (Interview 10, 14/09/2023; Fundación UOCRA & ILO, 2023).

CVE expansion

The mobilisation stage at the ITC-ILO is also marked by an expansion or 'scale up' of CVEs beyond the organisation to include external stakeholders and interested UN organisations (Interviews 6 and 9), a process driven by 'clients' demand (Interview 4) and, as discussed in Section 5.4.2, shaped by external forces such as the metaverse and COVID-19. International

bodies, including other UN organisations, began expressing interest in VR and sought to learn from ITC-ILO's experiences. One such example is the 'VR Emergency Response – WFP initiative' outlined in Section 5.3. Here too the technology was 'translated' to meet WFP objectives, which were focused on the idea of providing logistic response training by deploying trainees to a fictional fieldwork. Similarly, as UNESCO's International Institute for Educational Planning (IEEP) expressed interest in the technology, the ITC-ILO organised a 'tailor-made VR Lab': 'We guided the workshop participants through discussions on what VR is, what are the benefits, opportunities, and challenges' (Interview 6, my translation). Another way the technology scaled beyond the organisation was through its independent adoption by the beneficiaries, becoming part of 'a genuine development dynamic' (Interview 4). For instance, the trade unions in Argentina, beneficiaries of the ACTRAC program, are now 'leading the process' of VR use (Interview 2). Similarly, the Technical Education and Skills Development Authority in the Philippines (TESDA), after learning about VR for TVET during a Skills Experts meeting organised by the ITC-ILO, started independent implementation (TESDA, 2023). Meanwhile, VR technology positioned the ITC-ILO as an innovative institution and central knowledge centre for VR initiatives within the UN community, with other agencies 'considering [the organisation] a sort of internal provider' of VR solutions (Interview 9). This, in turn, has an influence on the organisation's perception as a hub for innovation, amplifying its influence within and beyond the UN ecosystem.

5.5.3. Stages of translation flowchart



The flowchart shows how human and non-human actants operate across the four stages of translation, making visible the stabilising mechanisms and vulnerabilities that arise from the way agency is distributed throughout adoption. This temporal mapping also enables comparison across case studies, revealing how different configurations may strengthen or weaken the translation process.

The flowchart above visualises the distribution of actants across the four stages of translation. From this map, two insights and two potential bottlenecks emerge. In terms of insights, the flowchart illuminates the varying roles of actants across different stages, as well as the stabilising role of VR technology.[52] First, it shows that technology adoption is not a singular event or a flat network, but a series of negotiations between different actants distributed across

[52] On the concept of network (in)stability, see Section 3.3.2.

different moments of the adoption process, thus highlighting the importance of coordination to sustain the actor-network. This is itself a source of stability, as VR adoption is 'distributed' across several actants. For example, early stages, such as problematisation and interessement, are dominated by strategic actants like innovators, while later stages, such as enrolment and mobilisation, rely more heavily on operational actants like implementers. As such, the successful adoption of VR technology depends on the coordination and translations between these different actants. The heterogeneous composition of the network demands careful coordination to ensure that each stage transitions smoothly to the others. The second insight provided by the flowchart is that VR technology itself plays a stabilising role throughout the translation process. Unlike human actants, whose involvement may fluctuate depending on the stage, VR remains a consistent presence, acting as a focal point that connects all stages of the process. Far from being a passive tool, VR shapes the trajectory of each stage, ensuring continuity even as human actants shift roles and underscoring ANT's assertion that technological objects can play a crucial role in networks' success. Crucially, however, VR's role is also 'dual', as it acts as both an enabler and a constraint: while it expands collaboration possibilities, it also imposes limitations due to material considerations and accessibility (Section 5.4.2). This dual role underscores the technology's agency in shaping organisational practices.

The flowchart also highlights two potential bottlenecks that can reveal vulnerabilities in the network. The first bottleneck occurs at the transition between innovators and implementers. Once innovators have set the vision for the VR initiative, the latter's success increasingly depends on the operational capacities of implementers to translate the strategic vision into concrete actions and results. This requires a shift in skill sets and responsibilities, involving translations such as adapting VR to the activity's objectives. In the case of ITC-ILO, this transition has largely succeeded, though the CVEs can prove more effective for some

online activities than others (Interview 2). The second bottleneck emerges during problematisation, where the definition of the 'problem' to be solved is influenced not only by internal documents and innovators but also by external contextual forces. This dependence on external factors introduces a vulnerability: if interest in VR declines, the entire network could weaken. Interestingly, this dynamic has partly manifested at ITC-ILO, where decreasing client demand and increasing interest in competing technologies, such as AI, are beginning to undermine the network's stability, challenging the sustainability of the initiative (Interview 4).

5.5.4. Sociotechnical co-constitution in VR adoption at the ITC-ILO

The examination of the translation process around VR adoption at the ITC-ILO has revealed a network of dynamic interactions between the technology and the other actants in the network. We set out this section with the aim of understanding how the process of translation illuminates the sociotechnical dynamics involved in the adoption of VR technology within ITC-ILO. We found that ANT's four-phase framework has enabled us to conduct a detailed, nuanced analysis of how the various actants behave in the network. First and foremost, it showed us that VR adoption at the ITC-ILO is not a static phenomenon; instead, it reflects an ongoing negotiation between several heterogenous actants. A further value of the 4-phase framework is its ability to provide detailed insights into the translation mechanisms, offering a precise, step-by-step understanding of how VR is integrated and adapted within the ITC-ILO and the intricate sociotechnical dynamics involved.

Crucially, the translation process also highlighted the mutual shaping and co-constitution of actants in the network. Across the four stages, we saw VR evolving in response to the needs and practices of the ITC-ILO, while also influencing those very practices. In problematisation, VR affordances encouraged actants to explore its adoption. In interessement,

its technical features defined the possibilities for specific uses and applications, and in enrolment, they shaped the planning and design of the ITC-ILOs initiatives to ensure compatibility with the technology. Finally, in the mobilisation phase, VR facilitated some actions and activities while limiting others, defining the range of possible uses at the organisation. On the other hand, VR technology was also shaped by human actants, which adapted, tailored, and modified it on a case-to-case basis to align with the ITC-ILO organisational context. From problematisation to mobilisation, VR was gradually shaped as the 'solution' to enhance collaboration and adapted to specific needs and contexts through customisation. For example, in the 'ACTRAV-Fundación UOCRA' project, the CVE initially developed by Arthur as a virtual pool house was adapted to serve as a collaborative training space for electricity, gas, and sanitary training.

Figure 5: The room customised by UOCRA and adapted for electricians' collaborative training.

Figure 6: Virtual pool house adapted to display course materials

The ANT analysis of the translation process thus enabled us to see how technology evolves in tandem with human actants in a co-constitutive relationship. Co-constitution posits that all social entities are hybrids of human and non-human elements, 'engaged in constant processes of association and disassociation with other hybrids to produce new assemblages or networks' (C. M. L. Wong & Lockie, 2018).

5.6. 'Exactly there, with a human touch': emerging properties of VR for collaboration and implications for the UN's role as *global connector*

The last section examined the unfolding translation process at the ITC-ILO through the four ANT phases, focusing on the *how* of VR adoption. This section turns to the *what*: the new capacities that have emerged from these sociotechnical translations. Drawing on empirical data and in dialogue with the relevant literature, this section examines the changes in ITC-ILO's practice of collaboration through the concept of emerging properties – new attributes, behaviours, or capabilities that emerge from the sociotechnical interactions of VR technology in the network (Section 3.3.3).[53] They are not reducible to the headset, platform design, or user behaviour taken in isolation, but materialise when these elements interact within a network. Reiterating from ANT, networks are productive systems that give rise to new or altered practices (Dicken et al., 2001; Crossley, 2015; cited in Decuypere, 2020). By tracing the emerging properties of ITC-ILO's collaborative VR activities, I show how specific sociotechnical configurations generated novel capabilities, thereby addressing RQ1. Across this section, these practices are examined not only in themselves but also for what they reveal about the UN's broader role as *global connector* in an era of digital transformation (RQ3).

5.6.1. Spatial and focused presence

The first emerging property identified is what I term *focused presence.* Specifically, interviews highlighted the concept of *spatial presence*, already well established in the literature, alongside a more specific variation that I conceptualise as *focused presence*. In this sense, the interview

[53] For an explanation of how these properties were traced and identified in the data, see Section 4.4.

data not only confirms the relevance of *spatial presence,* but also points to a distinctive nuance within it. I discuss both dimensions in more detail below.

Spatial presence is a core concept in VR research. A seminal definition describes it as the 'perceptual illusion of non-mediation' (Lombard & Ditton, 1997) – the feeling that the technology vanishes and you are actually there, in the VE. More recently, it has been defined as 'the user sensation that their body is located in a mediated environment where they can interact' (Ahn et al., 2022). The sense of *spatial presence* is facilitated by supporting technologies, including the HMD, motion, eye, and hand tracking, spatial audio, environmental interaction, and haptic feedback. In collaborative contexts, *spatial presence* becomes particularly significant due to the user's ability to manipulate the CVEs in spatially meaningful ways. Unlike conventional videoconferencing platforms such as Zoom, CVEs allow for embodied interaction with objects and navigable spaces, which contribute to a heightened sense of 'being there'.

Interviewees highlighted the importance of *spatial presence* in the CVEs used, noting that these spaces fostered a significantly stronger sense of presence compared to conventional videoconferencing platforms. As Interviewee 2 put it, 'you are exactly there', capturing users' embodied sense of being situated within the virtual world. This sense of 'being there' was described by Interviewee 3 as 'very lifelike' in contrast to the flat experience of a screen. As previously discussed, this lifelike quality is closely tied to the ability to navigate the environment spatially and to manipulate its features. Unlike traditional platforms, CVEs allow users to actively shape the space in ways that support collaboration – what some participants described as the ability to 'create worlds' or 'parallel realities' (Interviews 6; 9). For example, interviewee 3 noted: 'We have really a space available with a lot of different contents that [are] very hard to recreate in a Zoom meeting'. For example, Interviewee 8 explained that

participants were invited to create a room or set up a gallery walk and then guide others through their project ‘in a much more creative way’. While participants might simply upload a document with key points, the environment encouraged more inventive approaches: ‘You walk around, you see the person and their work’. Similarly, Interviewee 1 emphasised the ability to design spatial pathways: ‘creating different islands’, which ‘became a kind of path: you started over there and then followed a circuit’, and interviewee 8 argued the same. The sense of presence was further enhanced by the spatial audio, a feature that adjusts sound according to users’ position and movement within the virtual space (Interviews 1; 3).

While the literature extensively speaks about *spatial presence*, interviewees introduced an important nuance: the idea of *focused presence.* This was identified as an added value in several interviews. For example, an implementer noted that, unlike Zoom meetings, where participants easily lost focus, the immersion enabled by the CVE made participants feel fully present: ‘When you are using VR, the immersion is full, so you cannot distract with anything because you are there, exactly there’. Similarly, the CLI observed that once participants put on the headset, they were less likely to be distracted by external factors such as phone notifications or emails: ‘They’re in there (…) You're fully immersed into what is asked from you’ (Interview 9). This is backed by the research, where headsets were found to ‘provide a safe haven from sensory overload triggered by multitasking’ (Bennett et al., 2021). *Focused presence* also led to a collateral benefit at the ITC-ILO. What was theoretically a limitation of VR – the one-hour limit for reasons of comfort – offered new insights into the ITC-ILO's offline workflows: The team discovered that ‘having one-hour senior management meetings [was] possible, something that in face-to-face would take ages, 2 hours’, highlighting the efficiency potential of CVE meetings (Interview 9).

The EVO corroborates these findings, as illustrated in the screenshots below. The screenshots not only capture the immersive nature of the environment but also demonstrate how its spatial affordances support focus and orientation. Figure 7 depicts the welcome area of the 'Management Room', part of a larger environment developed for the UN Fellows Course. The spatial configuration encourages users to anchor themselves within the space, promoting not only orientation but also cognitive focus, as participants are provided with a structured setting that guides their attention. Figure 8 highlights spatial presence by showing how users navigate the CVE and interact with its spatial layout via a pointer. Figure 9, in turn, depicts a virtual lecture hall explicitly designed for large-scale interactions and formal sessions such as lectures. The space itself invites and requires attentional focus, both due to its functional purpose (presentations, knowledge exchange) and its design, which positions participants within a bounded setting that replicates the spatial dynamics of a real lecture hall.

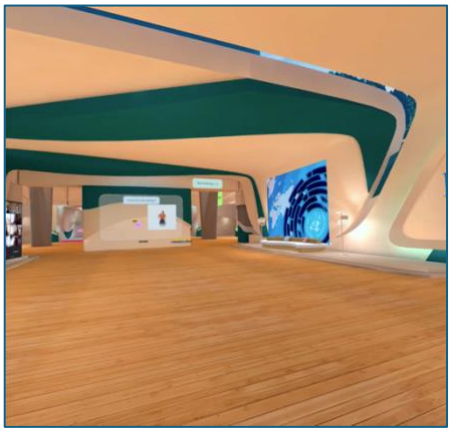


Figure 7 An example of spatial presence: the welcome area of the 'Management Room' with directional banners to guide navigation.

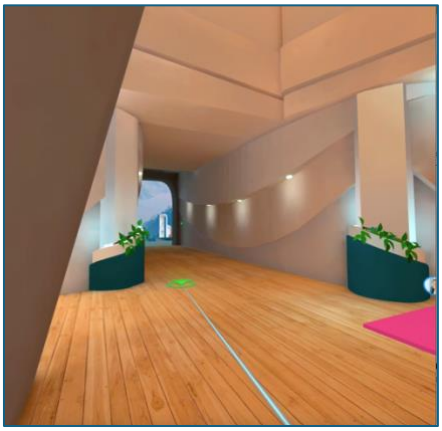


Figure 8 Researcher moving towards virtual lecture room using a 'teleportation pointer'.

Figure 9 Virtual lecture hall designed to support large-scale interactions and gatherings, allowing participants to experience a sense of place and proximity.

The broader implications of *spatial presence* and *focused presence* specifically are significant and merit further investigation. As regards *spatial presence*, existing research on real-world

collaboration highlights the important role of physical space as a resource for negotiating social interaction, promoting peripheral awareness, and sharing artifacts (Bentley et al., 1992, as cited in Benford et al., 2001). Replicating these spatial elements in a CVE could enable similarly effective collaboration when in-person interaction is not feasible or desirable. The figures above exemplify this by showing how a CVE can be organised spatially to replicate a collaborative environment. By offering a range of virtual spaces, from large lecture halls to smaller workshop rooms, CVEs can provide realistic collaborative architectures tailored to diverse interaction needs and with the potential to influence work practices (Plesner, 2009) – at significantly lower costs than physical spaces. For example, Interviewee 3 highlights how users can actively configure and navigate the virtual space to suit different phases of a meeting – this also enables fluidity of movement and task-switching: 'We met over there. Then we walked over here. (…) You can literally have a workable meeting, and at any point just quickly walk back and say "OK, what was that again about the pinboard?" – and we can jump back there.' Beyond *spatial presence, focused presence* could enhance a range of collaborative efforts by providing a more immersive platform which increases efficiency and reduces distractions. This is supported by a PwC study, which found that users were up to four times more focused during VR training than their e-learning peers and 1.5 times more focused than their classroom counterparts, likely due to the absence of interruptions and multitasking options (PwC, 2022). CVEs could also reduce the time needed for collaboration (PwC, 2020), as suggested by interview data as well (Interviews 8 and 9). These efficiency increases could have important implications for global collaboration by streamlining meetings and enhancing productivity. This is important in an IO context as it can enhance remote coordination and decision-making across diverse teams distributed worldwide. VR adoption could extend the UN's broader role as *global connector* role into a new, digitally mediated terrain: by introducing new spatial dynamics and presence in the practice of collaboration, it could

redefine what it means to bring actors together across distance, enabling not only communication but a shared sense of space, and a *focused* one.

Nevertheless, *spatial* and *focused presence* do not come without challenges. Chief among these is the fact that the spatial configuration of a CVE is not a neutral backdrop but an active structuring force: it shapes what forms of interaction are possible, what behaviours are encouraged, and which are rendered difficult or impossible.[54] This can result in *presence illusion* – where users feel fully engaged or 'present' in a shared space, but the conditions for meaningful collaboration may in fact be limited or predetermined by the VEs design. For example, a VE structured like a lecture hall may reinforce specific hierarchies, privileging unidirectional knowledge transfer over dialogue, thus limiting opportunities for co-creation or informal exchange. Conversely, a more open and navigable layout, such as a circular discussion area or a modular co-working space, may foster more egalitarian and spontaneous interactions. This is also argued in the literature, where an intriguing study by Han and colleagues (2024) purposedly varied the spatial dimensions of VR meeting rooms (ceiling height and floor area) and found that those changes affected group behaviour and feelings. A similar experiment was carried out by Chang and colleagues (2024). In this sense, VR does not simply support collaboration, but can actively structure it, with the potential to both enable and constrain. This reinforces the broader point that the spatial affordances of VR – while offering new forms of interaction – also carry implicit assumptions about how people should collaborate, and these assumptions may not align with all needs or subjectivities. This also raises important questions about the power implications of CVEs and questions as to who is designing these tools and why, which future research could investigate (Cf. Sections 2.2.1; 3.4.1).

[54] On the non-neutrality of non-immersive VEs, see Hedling (2024).

Another challenge posed by *focused presence* is temporal limitation. As an implementer observed, VR sessions only last for 60-90 minutes, as headset use can lead to physical discomfort, such as headaches or disorientation (Interview 5). This was evident in the UN Fellows course, where VR sessions were paralleled with Zoom to accommodate participants who experienced discomfort (Interview 7). A similar point was made by CIO: 'Not so many people are happy to stay long within the VR environment: it needs to be a short moment'. This is also argued in the literature, where Kourtesis and colleagues (2019) capped at 55 to 70 minutes the maximum time to spend inside VR, beyond which users are more likely to experience fatigue, disorientation, or motion sickness. Similarly, Ratan and colleagues (2025) found that cognitive performance in CVEs began to decline after approximately 45 minutes. These constraints inevitably qualify the potential of *focused presence* which, at least given current hardware limitations, cannot be sustained over extended periods. Finally, while VR's restriction of multitasking is often cited as an advantage, it can also pose practical limitations. In contexts where users require quick access to external resources or need to interact simultaneously with in-person colleagues, this enforced singular focus may hinder rather than help.[55]

5.6.2. Social presence and social dialogue

The second emerging property impacting the ITC-ILO's practice of collaboration is *social presence* and, more specifically, *social dialogue.* Social presence, or co-presence (Campos-Castillo, 2012; Cefai & Couldry, 2019; Kim & Jo, 2022; van den Berg et al., 2020) refers to the sense of 'being there together' experienced by users when gathered in multi-user VEs (Schroeder, 2008; Schroeder & Axelsson, 2006). It has also been defined as 'the feeling of

[55] These practical challenges could be mitigated with advances in hardware, such as more advanced Mixed Reality HMDs.

being there [in the VE] with a 'real' person' (C. S. Oh et al., 2018; Schroeder & Axelsson, 2006) or the feeling of 'being together with others' (Campos-Castillo, 2012). *Social presence* is therefore distinct from the *spatial presence* described above: whereas spatial presence concerns the felt sense of *being inside* the VE, social presence concerns the felt sense of *being with* others in that environment, perceiving them as aware interlocutors. Interviews not only confirmed the importance of social presence, which is also supported by existing studies, they also extended the concept by suggesting that, in the context of collaboration, social presence may take the specific form of *social dialogue* – an 'declination' of social presence that constitutes a key added value of VR and a way in which it could impact the practice of *collaboration.* Interviewees repeatedly noted that VR fostered a sense of social presence, of 'being there with other people'. Interviewee 6 emphasised how it 'helps to bring, let's say, a human touch' to virtual interactions. Along similar lines, interviewee 8 argued that VR introduces a 'human factor that is simply absent in Zoom', noting that participants who had not seen each other for a long time during the pandemics, were emotionally moved and virtually embraced when they met in the CVE. Similarly, interviewee 1 stated that VR's key added value was precisely 'the feeling of being in the same space (…) even while being apart.'

That one of collaborative VR's added values was this possibility of being *co-present* in a VE is reflected in the literature: Since its emergence, multi-user VR has been viewed as a technology that could radically change interpersonal interactions (C. S. Oh et al., 2018). This is because, compared to traditional videoconferencing platforms, VR has been associated with significantly higher social presence (Steinicke et al., 2020). In other words, by enabling users to interact in shared virtual spaces from geographically distant locations, multi-user VR can foster a sense of social interaction and community that surpasses traditional videoconferencing platforms. A 2018 study on small group interaction in VR found that users were able to bring group behaviours into the VE, and that they felt present and engaged with group members 'on

an intrinsically human level' (Moustafa & Steed, 2018). This human element emerges from the interviews as well (Interviews 6 and 8). Interestingly, according to a 2021, most users employ multi-user VEs for social, rather than collaborative, activities (Sykownik et al., 2021). This could be due to the variety of experiences offered by those environments, including group activities comparable to face-to-face interactions in terms of verbal and non-verbal expression capabilities (Sykownik et al., 2021: 546).

As anticipated, interviewees did not only argue that VR impacted the practice of collaboration through *social presence.* Crucially, one insight that emerged was that CVEs could be used for *social dialogue* (Interviews 2; 10). *Social dialogue* refers to the negotiation, consultation, or exchange of information between representatives of governments, employers, and workers on issues of common interest related to economic and social policy (ILO, 2019). In particular, the potential of VR for social dialogue was highlighted in the interview with the ACTRAV representative, who noted that multi-user platforms like Arthur are particularly well-suited to strengthen trade union networks and generally reproduce social dialogue environments. The 'VR in Skills Development' course highlighted a similar insight, as 83.3% of participants were found to have felt a stronger connection to their learning peers (ITC-ILO & Arthur Digital, 2023). Cross-checking this in the EVO confirmed that CVEs offer multiple affordances for enhancing social dialogue across distance. For example, they enable participants to exchange informally in breakout spaces, to simulate negotiation settings, and to carry out structured group activities that would otherwise have required costly in-person gatherings (cf. Figures 10 and 11 below). Furthermore, recent literature began to explore VR's use for social support and social dialogue. Van Brakel and colleagues (2021) found that feelings of social and self-presence in VR positively influence perceived social support, defined as 'the perception or experience that one is cared for, esteemed, and part of a mutually supportive social network' (Taylor, 2011: 189), indirectly enhancing subjective well-being.

Regrettably, literature on the benefits of VR for *social dialogue*, a significant finding from the ITC-ILO case study, is lacking. According to the ITC-ILO, VR presents an unprecedented

Figure 10: Example of social presence, showing the researcher sharing the same virtual room with another user in avatar form.

Figure 11: Collaboration during the ACTRAV-UOCRA project, illustrating how CVEs can reproduce settings of collective exchange and support practices of social dialogue across distances (ITC-ILO, 2022).

opportunity to promote social dialogue and ensure space for collective bargaining (ILO, 2021), representing yet another area of interest for future research.

The impact of *social presence* and *social dialogue* on collaboration practices can be significant. If social VR can enhance human connection in virtual interactions, remote collaboration could become more personal, fostering authentic and meaningful social interactions over distances (Maloney & Freeman, 2020; Zamanifard & Freeman, 2019). In the UN ecosystem, this is especially important due to the agencies' numerous field offices and the need for collaboration across different locations. Moreover, VR can affect enjoyment or learning during collaborative activities: in the 'VR in Skills Development' course, 72.7% participants reported increased learning motivation due to being surrounded by their peers and instructor in the CVE (ITC-ILO & Arthur Digital, 2023). Another crucial question is how VR affects social interactions: there is a rich ongoing debate about the continuities and discontinuities between the self in virtual and non-virtual environments. On the one hand, studies indicate that VR users interact in a natural way, akin to real-life interactions. The concepts of place illusion and plausibility (Slater, 2009), and the body ownership illusion

(Maselli & Slater, 2013) explain realistic behaviour in immersive VEs. On the other hand, social relationships in VR can differ significantly from those in the offline world and can be impacted by how VEs are designed. For example, social interactions in VR can sometimes be unconventional or 'weird' (McVeigh-Schultz and Isbister, 2021). Moreover, as noted in Section 4.4.1, avatars' characteristics are known to temporarily influence user's behaviour and attitudes both in and outside the VE (Yee & Bailenson, 2007; Ratan and Sah 2015). These considerations can have multiple implications for various activities typically taking place in UN system organisations. For example, VR could surpass traditional videoconferencing in diplomacy by allowing for more realistic behaviour and informal interactions, such as corridor conversations and more authentic exchanges, which are lacking in traditional platforms (Bjola & Coplen, 2022). At the same time, VEs and avatar attributes could be tailored to influence behaviour. For example, a higher avatar could signal power and impact both the online and offline behaviour of the individual embodying it. Similarly, environmental customisation could incorporate elements that signify prestige, integrate cultural symbols, and use gestures and proxemics to attain different things. Moreover, the integration of AI and Virtual Reality (AIVR) opens up yet unknown possibilities for social interaction in VEs (AIVR, IEEE International Conference, s.d.). These considerations are particularly pertinent when discussing *social dialogue*. As previously mentioned, social dialogue encompasses the negotiations between representatives of governments, employers, and workers. While the ITC-ILO's mandate focuses on workers' rights, the discussion on VR's social affordances can extend to different types of negotiations within the UN ecosystem, as it can create dialogue opportunities among geographically distant individuals. For instance, the UNDPPA *Negotiations XR* initiative discussed in Section 2.5.2 raises interesting questions about the application of such technology for peace negotiations. Consequently, the relationship between social dialogue and UN organisations'/IOs' workflows represents an interesting avenue for further research to deepen our understanding of VR's impact on virtual collaboration.

The benefits are, however, accompanied by a corresponding 'dark side'. While users may feel co-present with others, the ability to manipulate one's avatar – intentionally or unintentionally – can lead to distorted perceptions of identity and status, perhaps enabling misrepresentation. For example, 'manufactured' avatar characteristics like height or appearance may unconsciously shape users' behaviour or reinforce hierarchies (Yee & Bailenson, 2007a). Furthermore, if VR interactions can feel unconventional or 'weird' (McVeigh-Schultz & Isbister, 2021b), this unfamiliarity may open novel pathways for communication and collaboration, but also complicate or hinder dialogue in formal contexts such as diplomacy by disrupting established norms and rendering social cues ambiguous or difficult to interpret. Similarly, AIVR could exacerbate surveillance, bias, or exclusion (Todupunuri, 2024). For example, AI moderation tools in Social VR are intended to curb harassment or toxic behaviour, but might inadvertently reflect the biases in its algorithms or over-police certain communities or behaviours (Zhuk, 2024). Similarly, new AI-driven tools can be integrated into VR to analyse and monitor speech within VEs: While these tools are often designed to enhance fairness in group dynamics (for example, by identifying participants who have spoken less and prompting greater inclusivity) they may also inadvertently introduce new forms of control and surveillance. The above risks could also affect *social dialogue*. For instance, while AI integration in VR may frame dialogue as more inclusive, it may in practice impose greater regulation and reinforce dominant communicative norms.

5.6.3. Interactive engagement

The third emerging property identified in the data is *interactive engagement*. A multidimensional construct, engagement has been defined in terms of active involvement in, or attention dedicated to, specific activities (Christenson et al., 2012; Martey et al., 2014) and,

in media spaces, as a sort of 'dynamic agency' (S. Jones et al., 2022). Increased engagement in virtual interactions is facilitated by two primary factors: *interactivity* and *gamification*, mentioned in the interviews. Interactivity is considered a key affordance that sets VR apart from other technologies (Lindgren & Johnson-Glenberg, 2013; Makransky & Petersen, 2021). It is defined as the ability to freely move around a VE, to modify its elements, to control parameters and respond to perceived affordances, environment cues, and system feedback (Roussou et al., 2006). Gamification, on the other hand, refers to the 'application of game design elements in non-game contexts' (Breuer et al., 2022: 16), or, more broadly, as the use of game elements to engage users by increasing the hedonic value of an existing information system (Suh et al., 2018). As previously noted, at the ITC-ILO VR was employed both for virtual gatherings and collaborative learning activities.

The value of interactivity and gamification was highlighted in several interviews. The VR focal point noted that VR leads to more creativity and engagement, and an Activity Manager underscored the hedonic value of VR, noting that participants 'had a lot of fun, they really liked it' (Interviews 7; 8). A participant remarked that gamification was one of the most enjoyable aspects of using VR in the course, citing the example of a 'virtual treasure hunt'. The value of gamification is particularly evident in the yearly 'VR Entrepreneurship Games' organised by the ITC-ILO, where the virtual spaces are specifically designed to support game-based activities (Interview 8). Previously conducted as a face-to-face card game, this activity was transformed in VR into a more engaging experience: Instead of simply holding cards, participants were now required to 'build an igloo, enter it, and then describe what they saw to their team members' (Interview 8), making the exercise more interactive and dynamic. The value of interactivity was similarly highlighted in the interviews. Being able to interact with the CVE, for example by creating VR presentations, was considered a key added value and a way to make collaboration 'less boring' (Interview 1). Similarly, the VR in Skills Development

course found 82.6% of participants agreeing that VR trainings were more interactive and engaging than video-conferencing (ITC-ILO & Arthur Digital, 2023).

The presence of *interactive engagement* was substantiated during the EVO, where several gamified elements were noted. First, as visible in Figure 12, a game was used where users were asked to move their avatars to coloured zones corresponding to their answers. This playful format combined spatial navigation, visual cues, and collective movement, turning a simple poll into an engaging interaction. Figure 11 illustrates another form of synchronous interactivity: participants collaboratively engaged with a 3D virtual whiteboard, contributing their ideas in real time. This format enabled immediate input and playful co-creation, reflecting interviewees' emphasis that VR allowed participants to 'really work together and *co-create*'.

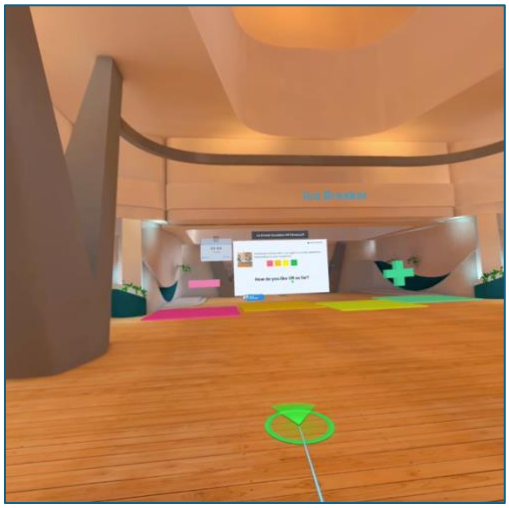


Figure 12: Example of VR gamification: users are asked to move to the relevant color zone based on their responses.

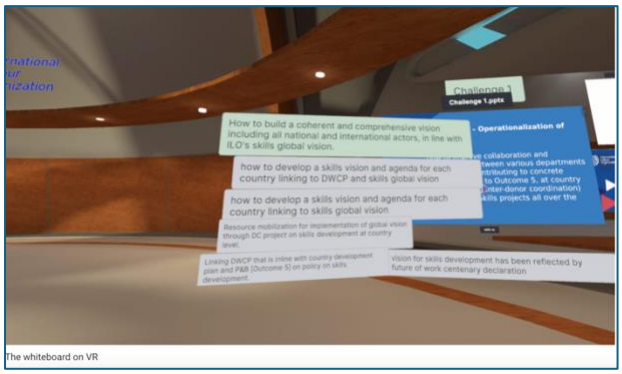


Figure 13: An example of interactive collaboration: participants can interact synchronously with a 3D virtual whiteboard.

The importance of *interactive engagement* is also reflected in the literature, with studies highlighting VR's potential to engage users (Bailey & Bailenson, 2017; Radianti et al., 2020), enhance attention in the education field (B.-H. Cho et al., 2002), and create 'participatory immersion' (Balcerak Jackson, 2024). Similarly, gamification has been found to increase engagement and participation in activities (Park & Kim, 2022; Suh et al., 2018). In an era

where engaging users is more and more difficult because of increased competition (Wang & Fesenmaier, 1998), gamification emerges as particularly important. Engagement has been one of the most sought-after objectives since the beginning of IOs' use of digital communications (García-Orosa & Pérez-Seijo, 2020: 1324). Because it can increase attention and participation, it can motivate people to participate in a wealth of different activities (Suh et al., 2018).

For UN practices, the impact of *interactive engagement* is substantial in two key ways: First, it can foster informal, trust-based collaboration. Second, it can enhance participation and attention. First, playful or game-like collaboration formats have been shown to support trust-building and open dialogue, which are essential to multilateral and diplomatic work. Emotion studies and negotiation research have long highlighted the strategic value of play and humour in professional settings. For example, in their study of business negotiations, Vuorela (2005) found that humour can diffuse tension, mitigate offenses, and help introduce difficult issues. These insights are equally relevant to UN and IO settings, where diplomats often highlight the value of informal, off-the-record exchange for building rapport. A study by the non-profit research organisation CNA, titled *Serious Games with Serious Players*, tested game-based formats with international decision-makers and found that these settings enabled more open and effective dialogue on controversial topics than traditional settings such as conferences or formal meetings. The study further noted that playful collaboration enhanced trust, which in turn increased participants' willingness to share information, and their counterparts' inclination to believe it (Center for Naval Analyses, 2014: 22). This dynamic is particularly relevant to the UN's role as a *global connector.* Eggeling and Versloot (2023) observe that building new trust digitally is more difficult, but at the same time digital tools are essential for maintaining existing trust. Could the introduction of immersive gamification shift these dynamics, facilitating 'new' digital trust-building and strengthening the UN's connective role? Second, the potential of *interactive engagement* to foster broader participation and attention

further underscores its value for the UN's role as *global connector:* It may make diplomats participate more actively in meetings, and could also enhance knowledge transfer (Cercel, 2022). This heightened level of engagement can contribute to more dynamic and responsive interactions, where participants are not only more present but also more invested in the collaborative process. When combined with the property of *focused presence* discussed above, CVEs could thus support highly concentrated and productive forms of collaborative work.

Beyond these advantages, *interactive engagement* also introduces important risks related to exclusion and superficiality: First, not all gamified environments are inherently inclusive. Game mechanics often privilege particular behaviours, such as assertiveness, speed, or competition, which may advantage some users while marginalising others, for example those less familiar with digital platforms or participants with specific personalities, e.g., introverts (Denden et al., 2017; Ghaban & Hendley, 2019). In such cases, gamified formats risk reproducing, rather than mitigating, existing hierarchies or asymmetries. For UN organisations, this raises critical design considerations: if VR tools include gamified elements to support collaboration, attention must also be paid to the norms these tools embed. What forms of interaction are encouraged? What kinds of 'games' are being played, and might the logic of play conceal underlying power relations? Second, there is the risk of superficial collaboration, whereby an emphasis on active participation and task completion may also make more likely the absence of more meaningful or complex dialogue or dissent. In other words, *interactive engagement* risks substituting, rather than supporting, meaningful dialogue, particularly if the structure of the CVE discourages critical reflection. This suggests that UN organisations looking to adopt gamification in CVEs should ask themselves whether the interactive and gamified elements invite challenge and discussion, or whether they streamline behaviour towards predetermined outcomes. These are pressing questions and promising areas for further research, though they fall beyond the scope of this study.

5.7. Chapter conclusion

To conclude, this chapter applied ANT to examine the adoption of VR for collaboration at the ITC-ILO. The aim was to provide a situated, empirically grounded analysis of a broader phenomenon – the integration of VR into UN organisations' operational practices. After presenting the literature around CVEs, I traced the sociotechnical network that enabled VR adoption, identifying the roles of key human and non-human actants and analysing how they mutually shaped one another across the stages of translation. This analysis demonstrated that changes in collaborative practice cannot be attributed to human agency alone, but emerge from the hybrid interplay between humans and technologies. Three key emerging properties were identified as outcomes of this sociotechnical configuration: *Spatial and focused presence*, *social presence and social dialogue,* and *engagement.* These properties not only highlight how collaboration in CVEs can move beyond the constraints of conventional video-conferencing, but also point to broader implications regarding the UN's role as a *global connector.* On the one hand, the adoption of multi-user VR has the potential to augment and facilitate the UN's connective function in an increasingly digital multilateral environment – by fostering more focused, socially rich, and interactive forms of collaboration. On the other, this shift introduces new challenges that require careful consideration, including concerns about the (potentially biased) design of CVEs and avatars, their influence on user behaviour, risks related to surveillance, the 'weirdness' of VR interactions, the danger of superficial engagement, and the material and logistical constraints associated with VR technology itself. As CVEs become more widely adopted, they are likely to transform collaborative practices across sectors (Swallow & Zulu, 2024), potentially influencing meetings and negotiations, as well as the modalities of virtual summitry among geographically dispersed teams. Finally, this chapter lays the groundwork for the comparative analysis that follows in this thesis. It represents the first of three case studies, each examining a different function of VR – collaboration (ITC-ILO), advocacy (UNDP), and training (ILO). By comparing these cases, I aim to assess the

extent to which the emerging properties observed here are consistent or variable, how organisational practices are reconfigured in each case, and whether similar tensions or vulnerabilities persist across functions. In doing so, the thesis aims to offer a deeper understanding of how VR adoption is shaping the operational practices of UN organisations.

CHAPTER 6: 'A NEW WAY TO TELL A STORY': UNDP'S USE OF VR FOR ADVOCACY

6.1. Introduction

This chapter investigates the United Nations Development Programme's (UNDP) adoption of Cinematic Virtual Reality (CVR) through the 'I am Fatmira' initiative, a 360° film designed to advocate for, and raise awareness about, Roma inclusion. By examining how VR reconfigures the operational practice of advocacy – and considering the broader implications of that reconfiguration for the UN system and IOs – it addresses this thesis' research questions. The analytical approach, including the operationalisation of ANT,, follows the same structure outlined in the other case studies (cf. Section 5.1). Theoretically, this chapter contributes to the broader argument of the thesis by examining how VR adoption introduces new socio-technical dynamics into the practice of advocacy. Specifically, it explores how VR impacts the communicative modalities through which IOs attempt to influence publics and policymakers, thereby affecting their role as *knowledge providers* (2.6.2). In doing so, the chapter also engages with debates around presence, empathy, and behavioural persuasion. After the introduction, the chapter continues as follows: Section 6.2 sets the foundations by situating CVR within existing scholarship and IO experimentation with immersive advocacy, introducing key concepts relevant to the subsequent analysis. Section 6.3 introduces the 'I am Fatmira' initiative, locating the film within the UNDP's mandate and its Roma Inclusion Project.[56] Section 6.4 then maps the network of human and non-human actants whose alignment enabled the adoption of VR, and Section 6.5 traces this alignment through the four ANT moments of translation. Then, Section 6.6 argues that the practice of advocacy and, consequently, the UN's role as *knowledge provider* have been impacted by VR adoption in

[56] Note that, throughout the thesis, the denomination *I Am Fatmira* (in italics) refers specifically to the cinematic VR product, whereas 'I Am Fatmira' (in quotation marks) refers to the broader UNDP initiative.

three key ways: first, by collapsing geographical distance between policymakers and marginalised communities through *spatial presence and immersive proximity.* Second, by introducing a more emotionally engaging mode of communication through *emotional resonance.* Thirdly, by enhancing the persuasive impact of advocacy efforts through *embodied influence.*

6.2. Setting the scene: CVR use for advocacy and IO applications

Advocacy is the function most commonly associated with VR in public imagination, with CVR being the predominant format for this purpose. CVR consists of 360° videos filmed with an omnidirectional camera, which allows viewers to experience a pre-recorded environment that they can explore by turning their heads. This section introduces CVR's role in advocacy, tracing its origins in documentary, journalism, and humanitarian studies, and then discusses use cases by IOs. It highlights existing research, particularly in humanitarian communications, where debates around the 'empathy machine' and prosocial behaviour have been central. Engaging with these discussions is key to understand the emerging properties identified in Section 6.6, as they are in dialogue with, and further, these debates. In line with this thesis' abductive approach (Section 4.2.3), the analysis situates empirical findings within these broader academic discussions, showing where they resonate with or diverge from existing work.

Over the past decade, CVR use for advocacy has expanded significantly. Although rooted in the gaming industry, VR's narrative capacities have since been adapted for non-fictional contexts – including advocacy and documentary – facilitating its adoption by IOs. This expansion has attracted attention in documentary, journalism, and humanitarian communications studies. Within documentary studies, scholars have examined CVR and

interactive documentaries (*i-Docs*) from both theoretical and industry perspectives, analysing presence and simulation (Nash, 2018b), the impact on documentary practice (Rose, 2018) and audience responses compared with traditional formats (D. P. Green et al., 2021; Nunes & Lee, 2019; Studt, 2021).[57] The field of immersive journalism has likewise prompted a wide-ranging literature: theoretical debates on frameworks and the future of journalism (Greber et al., 2023; Mabrook & Singer, 2019; Pavlik, 2019), empirical studies on how audiences experience VR storytelling (Gallego Abellán et al., 2024; Greber et al., 2025; Maschio, 2017; Van Damme et al., 2019) and ethical concerns around representation and manipulation (Benítez de Gracia et al., 2021; Kool, 2016; Sánchez Laws & Utne, 2019).[58]

Since around 2015, interest in CVR has also extended to IOs, prompting them to explore its adoption as a tool for raising awareness about their mandates and advocating for development and humanitarian issues (Gorin, 2022: 148). This behaviour also drew scholarly attention, particularly within the field of humanitarian communications. One strand of research examines the evolution of humanitarian communications, tracing key trends and innovations in advocacy strategies. Scholars explored how digital media reshape the ways humanitarian messages are conveyed (Chouliaraki & Vestegaard, 2021) highlighting both new opportunities and inherent limitations (Vilhalva de Campos, 2021). Scholars specifically considered whether VR introduces new affordances that reshape humanitarian communication (e.g., Gorin, 2022). Empirical studies used different methodological approaches: García-Orosa and Pérez-Seijo (2020) combined content analysis with interviews with IO communication directors, showing that CVR can bring distant realities closer to users, boosting awareness, empathy, and a new form of user engagement aimed at fundraising and recruitment. Atkinson and Kennedy (2018b) used direct participant observation to assess the impact of six CVR design features.

[57] For an overview of *i-Docs* research, see Aston and colleagues (2018).
[58] For comprehensive overviews, see Uskali and colleagues (2020) and Sánchez Laws (2023).

They found that these features work together to engineer a ‘subjectivity of implicated and present witnessing’, creating a sense of presence within difficult and unfamiliar environments that humanises subjects and extends empathy. Yoo and Drumwright (2018a) compared the impact of VR and tablets in non-profit fundraising, investigating donation intention and related factors, concluding that VR was associated with significantly higher donation intention than tablets, an effect that is fully mediated by social presence and moderated by the user's sensation-seeking tendency. Parallelly, neo-colonial approaches explored the ethical risks connected with VR’s mediation of distant others’ lived realities in the Global South (Gruenewald & Witteborn, 2020; Irom, 2021; Nash, 2018b).

Furthermore, the literature on VR for advocacy is characterised by two key areas of discussion: VR’s conceptualisation as an ‘empathy machine’ and its potential to promote prosocial behaviour. First, VR has been described by some as an ‘empathy machine’ (Bevan et al., 2019; Bollmer, 2017; Milk, 2015), and several studies support the claim that VR fosters empathetic responses (J. N. Bailenson, 2018; Barbot & Kaufman, 2020; de la Peña, 2016; F. Herrera et al., 2018; Van Loon et al., 2018a). Practitioners in particular have embraced this framing, suggesting that VR’s immersive qualities foster emotional connection with distant others. However, the ‘empathy machine’ narrative has also been subject to critique (Bystrom & Mosse, 2020; Edgar et al., 2022; Hassan, 2020; Schlembach & Clewer, 2021). For example, Edgar and colleagues (2022), drawing on Sontag (1990), warn of the risk of ‘supertourism’ (a voyeuristic mode of engagement that reinforces detachment rather than fostering meaningful connection), while Bystrom and Mosse (2020) caution against conflating immersion with empathy. In parallel, a growing body of research has examined VR’s influence on prosocial behaviour. This line of inquiry was initially driven by the Stanford University Virtual Human Interaction Lab, which found that VR experiences could encourage prosocial outcomes (Ahn et al., 2013, 2016; Markowitz et al., 2018; Rosenberg et al., 2013). Subsequent studies

expanded the scope of inquiry, examining VR's impact on various behaviours, such as helping (Slater & Banakou, 2021), preschool children's prosocial behaviour (Shoshani, 2023), donation (O. Li et al., 2024; Walewijns et al., 2023) and vaccination intentions (Nowak et al., 2020), as well as voting behaviour (Weber et al., 2022).[59] Conflicting evidence comes from Pressgrove and Bowman (2021) who found prosocial effects to be driven by narrative engagement rather than the medium (see Section 4.8 on the difficulty of 'isolating the VR factor'). This has been explored by IOs, too: For example, through its Innovation Unit, the ICRC researched VR's impact through the lens of behavioural science (ICRC Innovation Unit, 2020a, 2020b). Against this backdrop of increasing IO engagement with CVR for advocacy, UNDP's 'I am Fatmira' initiative is as a concrete example of how UNDP integrated this technology into its communication strategies. Before turning to the ANT analysis, the following section outlines the initiative and its place within UNDP's institutional context.

6.3. 'I am Fatmira': Introducing the UNDP's adoption of cinematic VR

6.3.1. Situating the 'I am Fatmira' initiative within the broader UNDP context

The UNDP is the UN's global development agency. It supports countries in achieving the SDGs through policy advice, capacity building, and innovation, across six core development areas: poverty and inequality, governance, resilience, environment, energy and gender equality (UNDP, 2025b). With a presence in over 170 countries, the UNDP operates through country offices coordinated by five regional bureaus, as well as several 'Global Policy Centres' dedicated to specialised thematic areas. Given the organisation's extensive and decentralised structure, it is important to clarify that references to the UNDP's CVR adoption in this thesis specifically concern the 'I am Fatmira' initiative, rather than VR adoption across the organisation. Before examining the initiative in detail, it is essential to situate it within two

[59] For reviews, see Nikolaou and colleagues (2022), and Martínez-Cano and colleagues (2023).

broader contexts: UNDP's broader digital strategy, which shapes its approach to technological innovation and VR technology, and the 'Roma Inclusion Project' (RSF), under whose umbrella *I am Fatmira* was created.

First, the UNDP places a strategic emphasis on innovation and the integration of new technologies to advance its development goals. This commitment, consistently reaffirmed in the organisation's digital strategies (UNDP, 2018a, 2019, 2022), is also visible in the organisation's dedicated Innovation Facility, which has supported numerous country-level experiments exploring how innovation can enhance development impact (UNDP Innovation Facility, 2018). As a result, UNDP is widely perceived within the UN ecosystem as among the most innovative agencies (Interview 27). These innovation efforts extend to VR, both discursively and operationally: References to VR and the metaverse as a potential avenue for more effective development solutions appear in various UNDP publications and communications (Ngodup Massally et al., 2022; UNDP Europe and Central Asia, 2025). In its operations, the UNDP has also actively implemented VR projects across various offices: The UNDP Asia-Pacific Regional Hub (Bangkok Regional Hub) supported several CVR initiatives prior to the filming of *I Am Fatmira* (Interviews 1; 17), including *The Bombs Below* (unexploded ordnances awareness in Laos) (UNDP LaoPDR, 2016). In Kazakhstan, a VR experience was developed to showcase the 'Digital Family Card', an innovative tool designed to streamline social services for vulnerable populations (UNDP Kazakhstan, 2023). Similarly, in Armenia, a VR-based training tool was created for the Armenian Police Educational Complex, providing immersive simulations for crime scene investigation (EU Digital Facility, 2023). Finally, in Serbia, the UNDP supported integration of the Microsoft HoloLens headset into the national healthcare system (UNDP Serbia, 2025). The latter resembles the 'VR for collaboration' function, as it enables a single doctor to virtually enter high-risk zones while remotely collaborating with colleagues outside the contaminated area. While the above

initiatives are helpful to illustrate the UNDP's broader engagement with immersive technologies, they fall outside the scope of this thesis, which focuses specifically on 'I Am Fatmira'.

6.3.2. The 'I am Fatmira' initiative

The 'I am Fatmira' initiative refers to the creation and dissemination of *I am Fatmira,* a CVR experience designed to promote the social inclusion of the Roma community. Through the eyes of Fatmira, a Roma activist, the film explores her personal journey and the daily realities of the Fushë-Kruja Roma community in Albania. The initiative was kickstarted by the UNDP Europe & Central Asia Regional Hub (Istanbul Regional Hub, IRH) and carried out in collaboration with the UNDP Albania Country Office and the UNDP Representation Office in Brussels. It is part of the broader 'Regional Support Facility for Roma Inclusion (RSF)' project, also known as the 'Roma Inclusion Project' (UNDP, 2012), a regional project covering Albania, Serbia, and Macedonia (Interview 11). RSF followed three main objectives: assisting local governments in implementing integration strategies for Roma; enhancing monitoring and evaluation capacities focusing on data collection and research on Roma vulnerability; and promoting the exchange, learning, and mainstreaming of effective approaches (UNDP, 2012). 'I am Fatmira' contributed particularly to the latter, where VR served as a strategic medium for advocacy and dissemination of the issue of Roma inclusion.

In terms of timeline, the initiative began in the summer of 2016, was filmed in 2017, and premiered at the European Parliament (EP) during Roma Week, on April 9, 2018. Produced in collaboration with a VR company that had worked with other UNDP offices, the film required a higher budget than typical video outputs, due to the novelty and complexity of VR technology, which included the need for external specialised developers and equipment

rentals to enable screenings (Interviews 15, 17). Roma Week was strategically chosen to showcase the film, as *I am Fatmira* accompanied the release of a new UNDP study and data collection on the Roma people in the Western Balkans and Turkey (UNDP in Europe and Central Asia, 2018; Interview 15). During the event, the film was screened simultaneously to around 150 government representatives, parliamentarians, and local Roma organisations using VR headsets (UNDP IRH, 2018). The primary goal of the initiative was not only to raise awareness but also to advocate and 'elevate the Roma community on the political agenda (Interview 14) (UNDP in Europe and Central Asia, 2018).

Following its premiere, *I Am Fatmira* was showcased at other high-profile events, including the European Development Days in June 2018, and the EU-Western Balkans Summit in December 2018 (Interview 11; Interview 16). The film was also shown at different locations in Albania in May 2018: At Tirana Europe House and in cinemas across the country (Interviews 13; 14). It was also released on Facebook in June of 2018. The development and dissemination of *I am Fatmira* were the product of a complex network of human and non-human actants involved in the adoption of CVR at the UNDP. The following section maps these actants to provide a clearer understanding of their roles in this process, following ANT's premise that tracing the integration of an innovation requires identifying all entities contributing to its construction (Callon, 1986).

6.4. The network's actants

As in the ITC-ILO case (Section 5.4), I first identified all relevant actants through a systematic coding of the interview data. These actants are visually depicted in the first network map (see Section 4.5.1 for more information on the map's value). Given the multitude of actants, I then organised them into conceptual categories based on their roles in the VR adoption process,

grouping them abductively according to recurring functions observed in the data (see Section 4.4 on data analysis). This categorisation facilitates a clearer understanding of the respective roles and interactions within the network, as opposed to presenting an unstructured list of individual actants. It is important to note that these categorisations are not rigid, as some actants may occupy multiple roles simultaneously. For example, while the DCS is considered an 'innovator,' they also played a significant role in the implementation of 'I am Fatmira' and could, therefore, be partially classified as an 'implementer' (cf. 4.4 for the approach taken in such cases). Categorising actants also holds comparative potential, as it sheds light on similarities and differences across this thesis' three case studies. In this chapter, it will already be visible that while many categories align with the preceding one (ITC-ILO), others diverge, reflecting variations in how VR is adopted and adapted into collaboration, advocacy, and training practices.

6.4.1. The network's human actants

Innovators

Innovators are again identified as a key actant category from the data. Innovators are the individuals who played a key role in conceptualising and driving the adoption of VR at the UNDP in the context of *I am Fatmira*. The central actant was the Digital Communication Specialist (DCS) at the UNDP Istanbul Regional Hub (IRH). The DCS was motivated by a strong interest in immersive media, and, drawing on a background in documentary filmmaking, was eager to explore how VR could enhance storytelling within the UN context (Interview 11). This interest aligned closely with their role, which involves supporting the dissemination of stories from fieldwork in country offices, as well as assisting these offices with their internal communication efforts (ibid). In addition to the DCS, another key innovator was the latter's former senior colleague, who encouraged the DCS to pursue the project. The

DCS not only initiated the idea but also remained actively involved beyond the ideation stage, taking on a key role in the implementation phase. This makes them an 'atypical' innovator compared to the previous case study, as they not only conceptualised the project but also prepared and managed it throughout its development.

Implementers

The second category identified is that of implementers, comprising individuals and teams directly involved in the project's execution. Implementation unfolded in two interconnected stages: the coordination of the film's production, and its strategic dissemination.[60]

First stage – coordination of shooting

The project manager at UNDP Albania had an advisory and facilitation role during the preparation and implementation of the filming. In the early phases, they identified potential film protagonists, drawing on their prior work with vulnerable local communities. During the filming process, they facilitated fieldwork, collaborated with Fatmira to highlight key aspects of her life to be narrated in the film, and coordinated community gatherings to support the shootings (Interview 12).

Second stage – Outreach

The second stage of implementation focused on showing and disseminating the VR film on various platforms. The Policy Expert at UNDP Brussels supported the showing of the VR film's premiere at the European Parliament, while the Communications Specialist at UNDP Brussels supported these efforts by managing communication strategies and coordinating

[60] Given that *I Am Fatmira* is fundamentally a communication initiative, strategic dissemination is integral to its implementation and carried out by the implementers, rather than treated as a separate outreach component as in the other case studies.

additional outreach initiatives (EDDs and Western Balkans Summit) (Interview 16). Outreach activities were also conducted in Albania, where the Head of Communications coordinated screenings for both EU stakeholders (e.g., Tirana Europe House) and local communities in cinemas and other venues (Interviews 13; 14). Importantly, the DCS, as both innovator and implementer, coordinated outreach while also leading independent initiatives, targeting film festivals, cultural institutes, and other platforms to maximise dissemination (Interview 11).

Technical producers and co-creators

The third category consists of the technical producers. *I am Fatmira* was produced by two directors approached by the DCS. They collaborated on developing the film's concept before moving to the filming stage. In February 2018, they travelled to Albania for a week-long scouting trip to plan the production in detail. While their roles partially overlapped, one director focused mainly on narrative and communications, while the other concentrated on cinematography and technical aspects. The narrative director, drawing on a background in video production and communications, as well as over a decade of experience in another UN organisation, crafted the film's storyline, scriptwriting, and certain technical elements such as spatial audio (Interview 17). The cinematography director, also with prior UN experience, handled the film's technical execution, including camera work and post-production (Interview 17). Alongside the producers, this category includes the film's actors: Fatmira herself and the community members who appear in the film. Fatmira, foremost a Roma activist, contributed greatly to shaping the narrative through the sharing of her experiences and her active participation (Interviews 17; 18; 21).

Mediators

Mediators represent another crucial category of actants. Specifically, they serve as bridges between the UNDP's social inclusion objectives, the broader Roma inclusion project, and the *I Am Fatmira* CVR. Two key actants played this role: the former Social Cohesion Programme Specialist (SCPS) at the IRH, and the Social Inclusion Project Officer (SIPO) at UNDP Albania. In the context of the *I Am Fatmira* initiative, the SCPS acted as intermediary by ensuring the alignment of the film's content and narrative with UNDP's broader social inclusion and human rights advocacy objectives. Specialised in minorities and disadvantaged groups, their general role at UNDP was to promote inclusive social protection systems and supporting evidence and human rights-based policymaking. For the film, they therefore advised on content and story development, ensuring that critical topics – such as teenage marriage and economic challenges – were accurately represented (Interview 11). At the country level, a similar intermediary role was performed by the SIPO, responsible for overseeing the social inclusion portfolio, including work with Roma and Egyptian communities. They advised on aligning the film with UNDP Albania's broader social inclusion objectives and connecting it to ongoing office work. For example, they facilitated links with civil society organisations and NGOs that UNDP Albania regularly partners with, which also explains how the project established connections with Fatmira (Interview 14).

Decision-makers and advocacy stakeholders

This category of actants comprises the key individuals and groups targeted by the VR film – fundamentally, its audience. The primary audience included European Parliamentarians, policymakers, and other high-level decision-makers (Interviews 14; 15; 18). This group is particularly significant, as the 'I am Fatmira' initiative was specifically designed to enhance stakeholder engagement concerning Roma issues by targeting EU decision-makers with agenda-setting and policy-shaping powers on Roma-related matters (Interviews 14; 15, 18).

The audience also included government stakeholders directly connected to Roma advocacy, such as activists working within governmental institutions (Interview 19). Beyond these primary advocacy targets, the project reached secondary stakeholders – diplomats, civil servants, and academics – who amplified the film's message within their respective networks (Interview 15). Finally, the broader public, particularly those who attended the summits and exhibitions where the film was showcased, also played a role in advocating for Roma minorities beyond formal policy-making arenas (Interviews 11; 12; 14).

Technical enablers

Another key category are the technical enablers, who in the *I am Fatmira* project ensured the functionality and accessibility of the VR experience, particularly during high-profile events such as the EP screening. Given the technical complexity of simultaneous screenings for 120 participants, dedicated IT and logistical support was required on-site. For example, Wi-Fi was temporarily suspended in parts of the building to establish a dedicated network for the VR experience. Additionally, headsets were sourced externally, with a Dutch company delivering the equipment to Brussels and providing technical assistance on the day (Interview 15). This also included assisting attendees with headset setup, explaining potential issues like dizziness, and facilitate adaptation to the VR equipment (Interviews 11; 15)

Funders

The project received financial and institutional support from key organisations. The primary funder was the EU, supporting both *I Am Fatmira* and the broader Roma inclusion project through the European Neighbourhood Instrument (ENI) (Interview 11). Supplementary funding came from the UNDP IRH's communications budget (Interview 11).

Beneficiaries

The final category of actants are the initiative's beneficiaries: the Roma community and Roma rights organisations. As noted, the project aimed to support the Roma community by raising awareness, challenging stereotypes, and highlighting their rich cultural heritage (Interviews 11; 13; UNDP, 2012). While measuring the impact of communication products remains challenging (Interview 15), the film indirectly benefited Roma communities and organisations by elevating their issues on the public and policy agenda.

Synthesis

The eight identified actant categories – innovators, implementers, technical producers and co-creators, mediators, decision-makers and advocacy stakeholders, technical enablers, funders, and beneficiaries – capture the multiple layers of collaboration necessary for the adoption of CVR in the 'I Am Fatmira' initiative to succeed. Each category plays a distinct yet interdependent role, driving the idea from its conception through to production and dissemination. Understanding these distinct roles is useful to understand ANT's translation process that underpins VR's integration into the UNDP's operations. To facilitate understanding, a table summarising the actant categories and their contributions is available in Appendix A.

6.4.2. The network's non-human actants

Having examined the human actants in the UNDP's VR adoption network, this section shifts to the non-human ones. As in the ITC-ILO case study, VR emerges as a central non-human actant. For analytical clarity, VR is divided into hardware and content, underscoring their distinct roles. Unlike the other case studies, the VE in this case is pre-recorded and consists of

real-life footage rather than CGI. Consequently, there is no 'software' category, as this usually refers to interactive, programmable systems.

VR technology

VR hardware

As previously discussed, ANT understands material elements as 'actants', active components that influence the configuration of networks (Kaltofen, 2018b; Srnicek, 2017; Srnicek et al., 2013). VR technology has a strong material dimension due to its reliance on headsets, which both constrain and enable specific actions. For the main showing at the Parliament, the hardware used was the 'Samsung Gear' headset, while other events featured different devices (for example, SDG Action headsets at the EDD). Interview data highlights the role of VR hardware, with headsets in particular influencing the logistical and technical coordination of events, as illustrated by two examples: delivery and event setup. Furthermore, interview data also points to the role of VR filming equipment.

First, the material properties of the headsets presented significant logistical challenges in terms of their transport and delivery. Unlike conventional video, which can be shared collectively on a single device, VR relies on personalised, one-to-one interaction, and thus requires individual headsets for each viewer. Consequently, in the EP screening, 150 headsets were rented for MEPs, an effort described as 'quite spectacular' (Interview 15). Their bulk not only added considerable weight but also necessitated careful handling and coordination for their delivery and use. Similarly, for the Albania roadshow, headsets were leased from abroad due to lack of local availability (Interview 12). The Western Balkans Summit and the EDD were less logistically demanding, as VR was shown through booths and to fewer people at a time, thus requiring fewer headsets; however, some of the material challenges associated with the hardware persisted (Interview 16). These examples highlight an ANT insight: objects such

as headsets are not passive but shape practices, generating new points of negotiation and friction. Second, the materiality of VR asserted itself in headset setup. Interviews highlighted the need to mount and adjust the headsets for use, while instructing users on proper handling, and ensuring the devices remained undamaged (Interview 13). The process is often noted as challenging, particularly due to the bulkiness of early headsets and cumbersome wires (Interview 17). Here, too, we observe how materiality shapes the network: the necessity of setup and adjustment generates a demand for additional support from both technical staff responsible for the physical setup and IT personnel (Interviews 15; 16).

Finally, while VR hardware is often associated with headsets, another critical component deserves attention: VR filming equipment. The latter differs significantly from conventional video equipment: at the time of the filming, 360° footage initially required placing two cameras back-to-back, each with wide-angle lenses, to achieve full spherical coverage (Interview 17). Such equipment can directly affect how Fatmira's story is captured and conveyed. As noted by Gershon and Malitsky (2010), the materiality of the cinematic

Figure 14 Showing of I am Fatmira *in Fushë-Kruja. The image captures the material and technical setup of VR headsets, showcasing their hardware components as they are worn and interacted with by users*

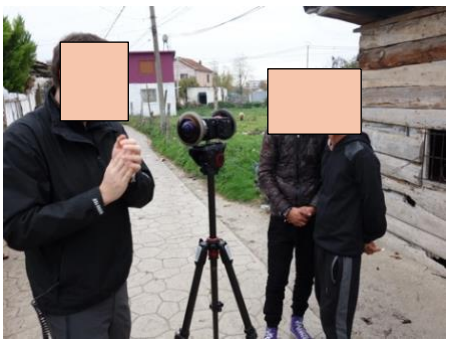


Figure 15 The omnidirectional camera is visible at the centre of the picture

apparatus is central to representations, as it introduces unique narrative possibilities and constraints. For example, the 360° format limits the use of traditional cinematic techniques such as selective framing or close-ups, as viewers can freely explore the visual

environment, making it challenging to direct their attention through conventional visual cues. As a result, storytelling relies more heavily on spatial arrangements and the strategic positioning of key events within the environment to guide the viewer's focus (Interview 17). At the same time, 360° video is argued to be particularly effective for conveying stories where the sense of place or environment is central (Interviews 16; 17): here, enabling viewers to experience a Roma village they might not otherwise see (Interview 11).

VR content

This section focuses on the VR content itself – the *I am Fatmira* CVR film. ANT's conceptualisation of films as active participants within sociotechnical networks offers a compelling lens through which to examine *I Am Fatmira*. While the seminal book by Latour and Woolgar (1986) primarily focused on scientific documents as key mediators that circulate information and stabilise facts, this framework can be productively extended to films. In fact, ANT-informed scholars in film and documentary studies have demonstrated that films, like scientific texts, generate knowledge and can 'naturalise' understandings about the world and what counts as 'truth' (Akrich, 1992; Gershon & Malitsky, 2010). Gershon and Malitsky illustrate this with *The Thin Blue Line* (1988), which directly influenced legal proceedings by shaping perceptions and interactions among police, lawyers, judges, and other networked actors and was pivotal in securing the release of Randall Adams, wrongfully convicted of a 1976 police murder in Dallas. Similarly, *I am Fatmira* can be considered an actant with its own form of agency, shaping policymakers' perceptions and advocating for Roma integration. This, in turn, may reshape relationships between human actants (e.g., MEPs, UNDP staff) and non-human actants (e.g., VR technologies, funding mechanisms). These dynamics are discussed in more detail later in the chapter, when discussing VR's influence on UNDP's advocacy practices.

Figure 16 Official UNDP poster for the 'I am Fatmira' initiative, visually introducing the film's content.

Figure 17 The opening narrative scene of the CVR film, in which Fatmira introduces herself.

Documents

The third identified category of non-human actants from the data are documents, which have been divided into documents internal and external to the project. Internal documents comprise plans and strategies, internal materials and notes (e.g. scripts, production plans, interview records), reports and evaluations, and communications and presentations. Compared with the other case studies, interviewees here referenced few external documents (see Appendix D). As discussed already, ANT sees documents as possessing agency through their capacity to prompt, structure, and legitimise actions (Pouliot, 2010; Walters, 2002).

Internal documents include a range of materials that directly informed the development and implementation of the 'I Am Fatmira' initiative. Key documents such as UNDP data and research reports provided foundational knowledge, shaping the project's thematic focus and narrative direction (Interview 15). Working documents, including script drafts, production plans, and interview records were pivotal in defining the storytelling approach (Interviews 15; 17).[61] The project document of the broader Roma Inclusion Project (RSF) is also as a key actant: The project objectives outlined in it shaped the *I Am Fatmira* initiative, which had to

[61] For further information on how script and project development often work for CVR projects specifically, see Dooley (2021).

align to them – for example, in its portrayal of the Roma community and its focus on specific themes central to the project, such as child marriage. Additionally, communication materials like web pages and flyers (Interviews 13; 14) not only disseminated information but can also frame the project's identity, influencing stakeholder perceptions.

External documents also played a significant role in shaping the UNDP's adoption of VR. On the one hand, the UNDP Digital Strategies provided the broader normative framework, signalling institutional priorities that favoured innovative digital approaches such as experimentation with VR. For example, the UNDP stresses its interest in how new technologies, including modelling and simulation, might become an accelerator of better governance. The UNDP 2019-2021 Digital Strategy specifically noted the potential of VR technology to lead to more powerful demonstrations of development impact (UNDP, 2019: 14), and the 2022-2025 Strategy (UNDP, 2022) similarly stresses the importance to leverage innovative technology and for the UNDP to become a digitally native organisation. Additionally, development datasets and indicators functioned as influential external documents, shaping the network by informing development programmes. The *I Am Fatmira* film was explicitly grounded in programmatic work and analytical data concerning the living conditions of Roma communities in the Western Balkans (Interview 15).

Infrastructure: Technical mediations

Another significant non-human actant in the network is the technical infrastructure. Interview findings highlight two particularly significant aspects: security infrastructure and network infrastructure. These elements actively mediate the deployment of VR, shaping how it is experienced and implemented.

Security infrastructure

Security infrastructure in this context refers to both the physical and digital systems regulating access and movement within venues. This includes scanners, detection systems, and controlled entry points. At the EP event, the venue's high-security status required stringent checks on all incoming equipment. The process was further complicated by the VR headsets, whose quantity and security-sensitive components required logistical coordination. As one interviewee remarked: 'You don't just pitch up with a truck full of equipment at the European Parliament, as you can imagine, so all of that took a bit of an effort' (Interview 15). This recalls the ITC-ILO case (Chapter 5), where VR headsets were blocked at national borders due to specific chips they contained (Interviews 4; 6). The significance of security infrastructure here aligns with broader discussions in Critical Security Studies (Section 2.4), which examine how material and technological systems actively shape security practices (e.g., Amicelle et al., 2015; Aradau et al., 2019). At the EP showing, controlled entry points and their technologies functioned as more than passive screening mechanisms: they determined what could and could not enter the space, constraining VR deployment. This dynamic recalls Latour's well-known example of the door closer (Section 3.3.1) which illustrates how non-human actants can regulate interactions (Latour, 1992).

Network infrastructure

Network infrastructure is another key actant in VR adoption, acting simultaneously as a 'constrainer' and enabler.[62] In the case of the EP screening, as said above, *I am Fatmira* required a dedicated Wi-Fi network (Interview 15). This intervention underscores the critical role of network infrastructure in VR adoption: on the one hand, it can act as a 'constrainer' –

[62] For studies on network infrastructure as an actant through an ANT lens in the ICT4D field, see Devinder Thapa (2011) on Wi-Fi networks in Nepal and Andrade and Urquhart (2010) on internet access via telecentres in rural Peru.

an unstable or insufficient network could render large-scale VR screenings unfeasible. On the other hand, it functions as a technological enabler, as a robust and dedicated Wi-Fi network ensures that VR technology performs as intended.

Synthesis

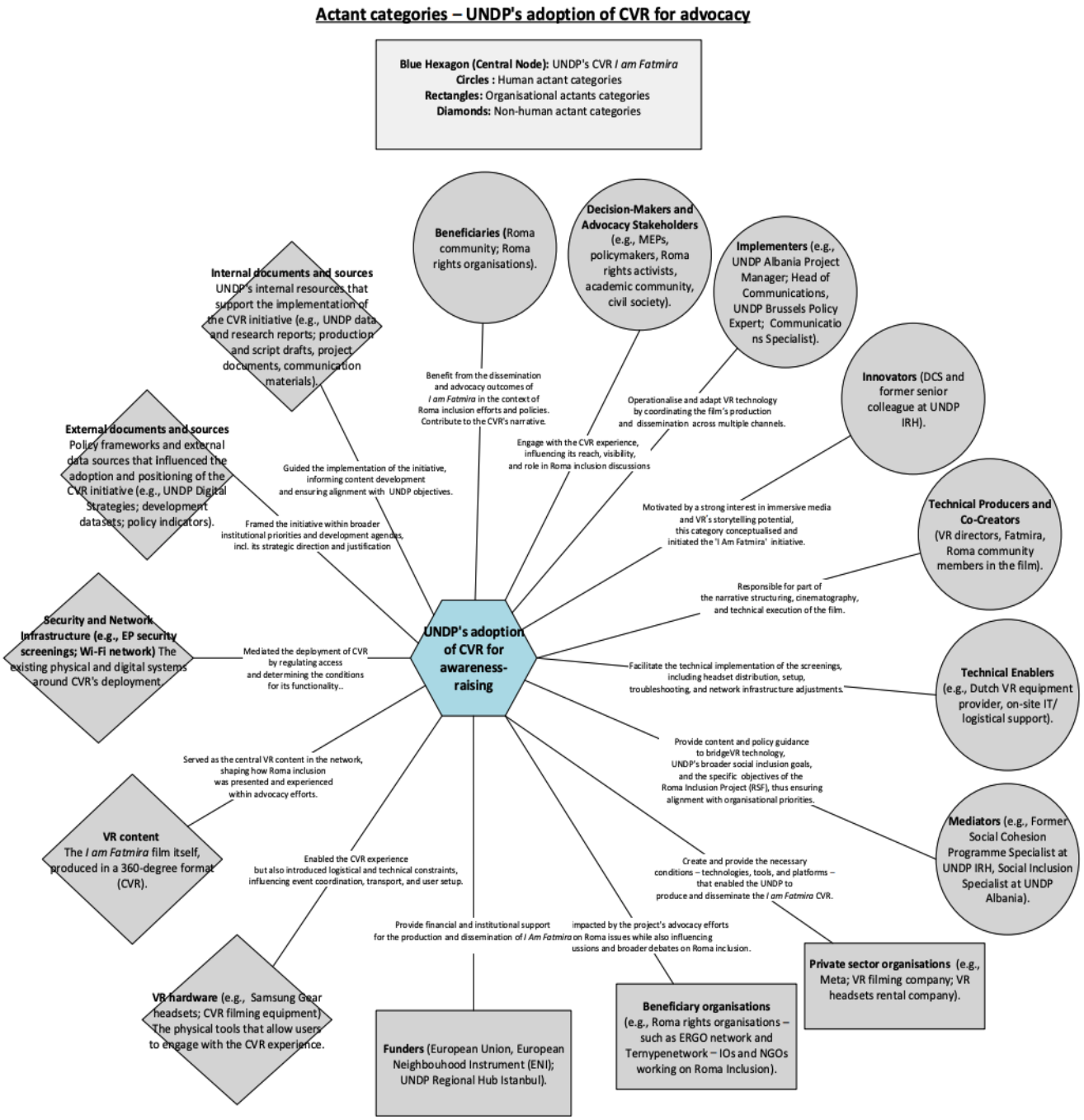
The above section highlighted the distinct ways in which the identified categories of non-human actants – VR hardware and content, documents, and technical infrastructure – shaped the 'I am Fatmira' initiative. Dividing these actants into four categories proved useful in two ways. First, it moved beyond a scattered list of discrete actants, instead illuminating broader categories with shared influences and demonstrating that the agency of non-humans can operate in distinct ways. For example, VR hardware and technical infrastructure introduced material constraints, as seen in the logistical and technical challenges of transporting headsets and ensuring network capacity. In contrast, documents acted more as 'institutional enablers', guiding the initiative. Second, drawing clearer boundaries between categories made it easier to identify where and how they intersect, illuminating interdependencies. For example, VR hardware relied on technical infrastructure (Wi-Fi networks) for large-scale deployment, while both were shaped by documents, such as institutional guidelines and logistical protocols, which determined how the technology could be implemented and accessed in different settings. For clarity, a table summarising non-human actants and their roles is attached in Appendix A.

6.4.3. Visualising the network

First network map: Ecosystem of VR adoption at the UNDP

This map organises the actants into the categories empirically derived from the data, visualising the ecosystem of human and non-human actants involved in the UNDP's adoption of CVR (cf. Section 4.5.1). The objective is to illustrate the diversity of actants and how each contributes in distinct ways to VR adoption. It is submitted separately as a PDF due to size constraints ('UNDP Detailed Network').

Second network map: Actant categories



The diagram above distils the network into categories of human, organisational, and non-human actants, clarifying how their distinct roles collectively shape the VR adoption process. These categories provide the basis for understanding the translation analysis, which traces how different actants assume different functions across the stages of adoption.

Building on the ecosystem of actants presented in the first map, the second network map visualises the actant categories described above (Section 4.5.2). The map is particularly useful

for clarifying and summarising the roles of the human and non-human actants. Building on these visualisations, the upcoming sections elaborate on these roles in the translation process.

6.5. Translation processes in practice: analysing UNDP's 'I am Fatmira'

6.5.1. The process of translation in the UNDP's adoption of VR

Building on the previous actant mapping, this section traces the UNDP's CVR adoption through the four stages of translation: problematisation, interessement, enrolment, and mobilisation.[63] Each of these stages captures a distinct moment in the negotiation and construction of the network surrounding the 'I Am Fatmira' initiative: from the initial identification of a 'problem' and the projection of VR as a potential solution, to the stabilisation of interests and the mobilisation of resources, people, and technologies towards the film screenings. Through this structure, I unpack the multiple translations that occurred, both of the technology itself and of the involved human and organisational actants and their interests. This allows to illuminate the sociotechnical dynamics involved in VR adoption within UNDP, showing how relations are formed, stabilised, and reconfigured throughout the translation process. Crucially, this focus on the sociotechnical dynamics of translation also sets the stage for the discussion of emerging properties (Section 6.6), which are themselves sociotechnical phenomena: new capacities that materialise only through the interplay between human actants and VR technology.

6.5.2. Analysing the four stages of ANT's translation process

[63] See Section 4.4. on how the stages are traced from the data.

Problematisation

Problematisation is the stage in which specific actants (human and non-human) negotiate and stabilise a shared understanding of a 'problem', and how a given technology or intervention might resolve it.[64] In the case of the 'I Am Fatmira' initiative, this involved identifying and positioning VR technology as a viable tool for adoption. Here, VR was not adopted in response to a formally identified issue. Rather, its adoption was an experimental choice, primarily driven by the innovators' interest in immersive media and its storytelling potential (Interview 11). Furthermore, the DCS explained that VR was seen as an opportunity to address the limitations of traditional video in advocacy efforts: audiences are 'inundated with so many pictures, so many videos'. This concern is echoed by one of the co-directors, who notes the limited reach of conventional UNDP video content: 'You can make a very nice, very beautiful video and put it on YouTube, but (…) [i]t's not getting a big audience.' (Interview 17). Similarly, the UNDP Brussels policy expert commented: 'I could do a press release on Fatmira but who will even look at it? (…) [VR] just relates better to how individuals around the world gather information and relate to information' (Interview 15). Such views resonate with the literature on the 'attention economy,' which emphasises that in a context of digital saturation, attention has become a scarce resource (Lanham, 2006).[65] Consequently, competition for visibility has intensified, making it increasingly challenging for IOs to ensure that their content effectively engages their desired audiences. Within this environment, VR was seen as offering an advantage in engaging decision-makers.

Throughout problematisation, VR functioned as an active actant, with its affordances and constraints shaping early adoption. Its ability to capture attention positioned it as a tool

[64] See Section 5.5.2 for an explanation of how problematisation was derived from the data and the interview questions that elicited it. Explanations of how the other phases were traced are also not repeated here, as these are addressed in their respective subsections of 5.5.2.

[65] See Campo and Citton (2024) for a collection of recent research in 'critical attention studies', including the attention economy and its implications for the technopolitics of curiosity and distraction.

for cutting through the noise of the attention economy, while its limits, notably high costs and limited scalability (Interview 11) tempered expectations, requiring human actants to weigh its benefits against its limitations. These dynamics illustrate VR's agency within the network: its affordances and constraints influenced perceptions of engagement and impact, leading innovators to consider and eventually plan for its adoption within the 'Inclusive Roma Project'. VR's translation began in this stage, as it transitioned from an abstract technological possibility to a potential solution for UNDP's advocacy needs.

Interessement

The interessement stage involves attempting to stabilise the emerging network by defining actants' roles and aligning their interests around the technology and its proposed use, as established during problematisation (Section 3.3). In the case of 'I Am Fatmira', this meant institutionalising the initiative as a recognised entity within UNDP. This process unfolded in two key phases: First, providing the initiative with a formal framework by embedding it within an existing project, and second, securing the necessary resources and funding. The first phase began in summer 2016, when the DCS and a senior colleague consulted the Social Inclusion Team at the IRH to identify a suitable context for a VR film. The team's Roma Inclusion Project (RSF) (UNDP, 2012) was selected following various considerations, among which the project's relative underrepresentation in communication efforts, and its unique regional significance for the Europe and Central Asia office (Interview 11). With Roma communities less prevalent in other UNDP regions, their experiences are often overlooked internationally. VR thus offered this regional office a way to foreground a minority central to its work. In December 2016, connections were established with UNDP offices in Serbia, Albania, and Macedonia. Ultimately, Albania was chosen in the summer of 2017 due to its strong Roma and Egyptian programmes (Interview 14) and the enthusiasm and collaborative approach of the country office (Interview 11). In parallel, the interessement stage also required aligning actants

to secure financial support. The 'I am Fatmira' initiative was funded primarily by the EU, with contributions by the IRH (Interview 11). This process demanded internal advocacy to justify VR as a worthwhile medium, led by a Programme Officer in the Social Inclusion Team who ensured the project received funding.

Two dynamics were thus central: embedding VR within the RSF to create institutional fit and aligning actors to secure resources. This reflects ANT's view of interessement as more than identifying actants: it involves aligning interests to stabilise an emerging network. To achieve this, UNDP had to integrate the social inclusion programme, Roma-focused initiatives, and EU-funded projects into a coherent framework that legitimised VR's use. VR itself also shaped the dynamics of interessement: its technological affordances and communicative potential influenced how stakeholders perceived its value, creating new opportunities and constraints in the negotiation process. Rather than being simply 'fitted' into an existing framework, VR's ability to generate immersive experiences redefined how the RSF project could engage audiences, ultimately influencing the kinds of institutional support it received. Initially introduced during problematisation as a conceptual solution to UNDP's advocacy objectives, VR underwent a second translation through its interaction with other actants. No longer just an 'imagined tool', in interessement it was reshaped through the negotiations described above into a structured initiative now embedded within UNDP's institutional framework. This transformation reflects how VR was not only adopted but also *adapted* to meet specific organisational priorities, including the broader UNDP mandate.

Enrolment

Following the exploration, negotiation, and stabilisation of interests in interessement, enrolment entails the formalisation and assignment of actants' roles within the network. In UNDP's adoption of CVR, this meant formally integrating key human and non-human actants

into the initiative. This section focuses on three: VR hardware, the directors, and Fatmira herself.

'Enrolling' VR hardware

VR headsets acted as a key actant in this phase, as securing the necessary technical infrastructure was essential for screening the VR film. This required a procurement process involving headset rental, a task complicated by the strict budget lines and extended timelines of UN procurement (Interviews 11; 15). Procurement challenges varied: the most resource-intensive effort was the EP screening, which required 150 headsets plus additional units for hallway and reception showings (UNDP IRH, 2018). At the time, few companies specialised in large-scale VR rentals, making the process difficult (Interview 11). As noted earlier in the discussion of technical enablers, UNDP sourced the equipment and staff from a Dutch company. For the Albania showings, the hardware had to be imported, increasing logistical complexity and costs (Interview 12). Conversely, for other events, such as the EDDs and the Balkans Summit, separate procurement was unnecessary. At the EDDs, for example, UNDP used headsets provided by the SDG Action Campaign, thereby bypassing the need for independent procurement (Interview 16).

Here, the headsets exemplify the ANT principle that technologies are not passive tools but active participants in sociotechnical negotiations. Throughout the enrolment process, VR emerged as an active force in shaping interactions, both enabling and constraining its own integration. This phenomenon aligns with Callon and Latour's concept of 'resistance' or counter-enrolment, where technology does not seamlessly integrate into a network but instead asserts its own agency (Callon & Law, 1982). On the one hand, the headsets were indispensable to the project's immersive experience. Their presence justified the extensive logistical efforts undertaken by UNDP, reinforcing VR's role as a storytelling medium and legitimising its inclusion within the initiative's network. However, the material resistance of

the headsets dictated how audiences interacted with the technology, introducing practical constraints. Their weight, bulkiness, and fragility necessitated careful handling (Interview 13), while the risk of motion sickness constrained accessibility (Interview 18). These challenges required the network's actants to engage in ongoing negotiation and adaptation to facilitate the technology's integration, from independent Wi-Fi connections to providing human sustainers to guide the process. These adaptations exemplify how technologies are adopted and stabilised within networks through continual processes of adjustment and negotiation. Rather than being static artefacts, headsets became dynamic elements in the sociotechnical landscape of the 'I am Fatmira' initiative, shaping and being shaped by the network in which they are embedded.

'Enrolling' the CVR directors

A crucial aspect of enrolment involved securing the directors' participation, a process that was far from straightforward. As the DCS noted, contracting within the UN is already a significant hurdle, and this was amplified for VR, where project costs ranged widely – from $5,000 to $150,000 for similar initiatives (Interview 11). Unlike traditional video, VR remains poorly understood, creating confusion about requirements and risk of overpricing. Additionally, the pool of experts in VR for social impact was small, with many professionals coming from the gaming industry. This gap was evident in the applicant pool, where filmmakers often lacked the expertise to meet the project's needs (Interview 11). Despite these challenges, the production team eventually identified the co-directors for *I am Fatmira,* selected for their prior UN experience, having created three CVR films in Myanmar, Laos, and Pakistan (Interview 11).

The film protagonist

With the idea established in collaboration with the IRH Social Inclusion and the UNDP Albania teams, the next step was to identify the right protagonist, which roughly coincided with the selection of the VR directors (Interview 11). To identify a protagonist, the DCS travelled to Albania and, together with the UNDP Albania team, conducted a 'canvas of the country', meeting and interviewing Roma community members engaged in UNDP projects across major cities (Interviews 11; 12). A key actant in this selection process was the UNDP Albania project manager, who, having worked closely with Fatmira, recommended her as a strong candidate. The decision to cast Fatmira was then taken for several reasons: she was a committed activist in her community (Interview 12), and her extraordinary personal story defied stereotypical representations of the Roma minority, positioning her as 'a bridge between the Roma and Albanian communities' (Interview 18).

This illustrates how enrolment is rarely a straightforward, uncontested phase. Rather, it involves negotiations and adaptations that define the evolving network. The enrolment of VR hardware clearly exemplified this: headsets were not merely viewing tools, but actants introducing logistical and material constraints. UNDP's efforts adapt to the hardware's requirements exemplify how enrolment is an iterative process of negotiation, where human and non-human actants continuously adjust to one another. The same applied to the selection of directors and Fatmira, which required aligning diverse interests. Together, these processes set the stage for mobilisation.

Mobilisation

Whereas enrolment formalised actants' roles and established key alignments, mobilisation ensures that the network operates as a cohesive and functional entity, directing all actants toward the realisation of the project's objectives. This phase encompassed two key

dimensions: narrative alignment – ensuring that the story reflected the UNDP's advocacy objectives and Fatmira's lived experience – and the film's circulation and reception – the final step aimed at delivering the project's advocacy objectives to its target audiences.

CVR and narrative alignment

An iterative process spanning from the planning stage through post-production, this dimension of mobilisation was about ensuring that actants collectively produced a narrative aligned with UNDP's advocacy goals and with Fatmira's lived experience. Rather than a straightforward process of storytelling, it entailed a delicate act of translation, balancing the interests and constraints of the IRH and Albania offices, different kinds of documents, the directors, Fatmira, and the VR technology itself. First, the Social Cohesion Project Officer (SCPO) at UNDP Albania and the former Social Cohesion Programme Specialist (SCPS) at the IRH were instrumental in shaping the film's thematic scope. They advised on the issues to highlight, including teenage marriage, economic vulnerability, and other relevant themes (Interview 11). Documents also played an active role. The RSF project document established the institutional conditions for *I Am Fatmira* by explicitly outlining the project's objectives, including challenging gender stereotypes, promoting Roma women's empowerment, and raising awareness through positive Roma narratives (UNDP, 2012). The directors' script shaped the narrative structure and dialogue, guiding how the film conveyed its message. Similarly, data collected by UNDP as part of the RSF project informed the project's priorities, ultimately shaping the film's focus by directing attention to key issues (Interview 15). Finally, Fatmira also contributed actively, suggesting locations and families to visit for filming, lending the initiative a dimension of co-creation (Interviews 11; 21). As the DCS noted, there was a 'balance between what the programme was telling us [and] organically (…) the material that came from [Fatmira's] life itself' (Interview 11).

Crucially, the project's objectives had to be mediated through the technical possibilities and constraints of VR filmmaking, meaning the narrative was also shaped by the technology itself – another translation. One of the directors compared VR filmmaking to theatre, an analogy which can be illustrated through two key aspects. First, the directors had less direct control over what unfolded 'on stage', since the 360° camera remained stationary. As one director explained: 'You're setting up a stage, so you put the camera in the middle of a market or whatever… And you don't really know entirely what's going to happen. You try and direct what you can.' (Interview 17). This meant that the narrative could not be fully predetermined, as it was influenced by the spontaneous interactions and movements within the filmed area. At the same time, the static nature of the 360° camera made it more difficult to guide the viewer's attention, requiring more deliberate composition: 'How do you draw the eye of the viewer in a way that you want to, without making it feel like you're forcing them?' (Interview 17). Another way the technology shaped the narrative was through the challenge of capturing close-ups: 'If you were to bring someone within about half a metre of the camera, that face would start to distort. It would get quite big and there were certain lines that, if crossed, would cause the face to cut off, creating all sorts of weird things.' Here the material properties of the VR camera, such as distortion at close range, intervened directly in storytelling, influencing the directors' decisions. This is a form of translation, whereby human intentions (e.g., directing attention, evoking emotions through close-ups) must be reconfigured to align with the affordances of the technology.

Figure 18 Close-range distortion in CVR: the subject's hands disappear due to the 360° camera's affordances.

The circulation and reception of I am Fatmira

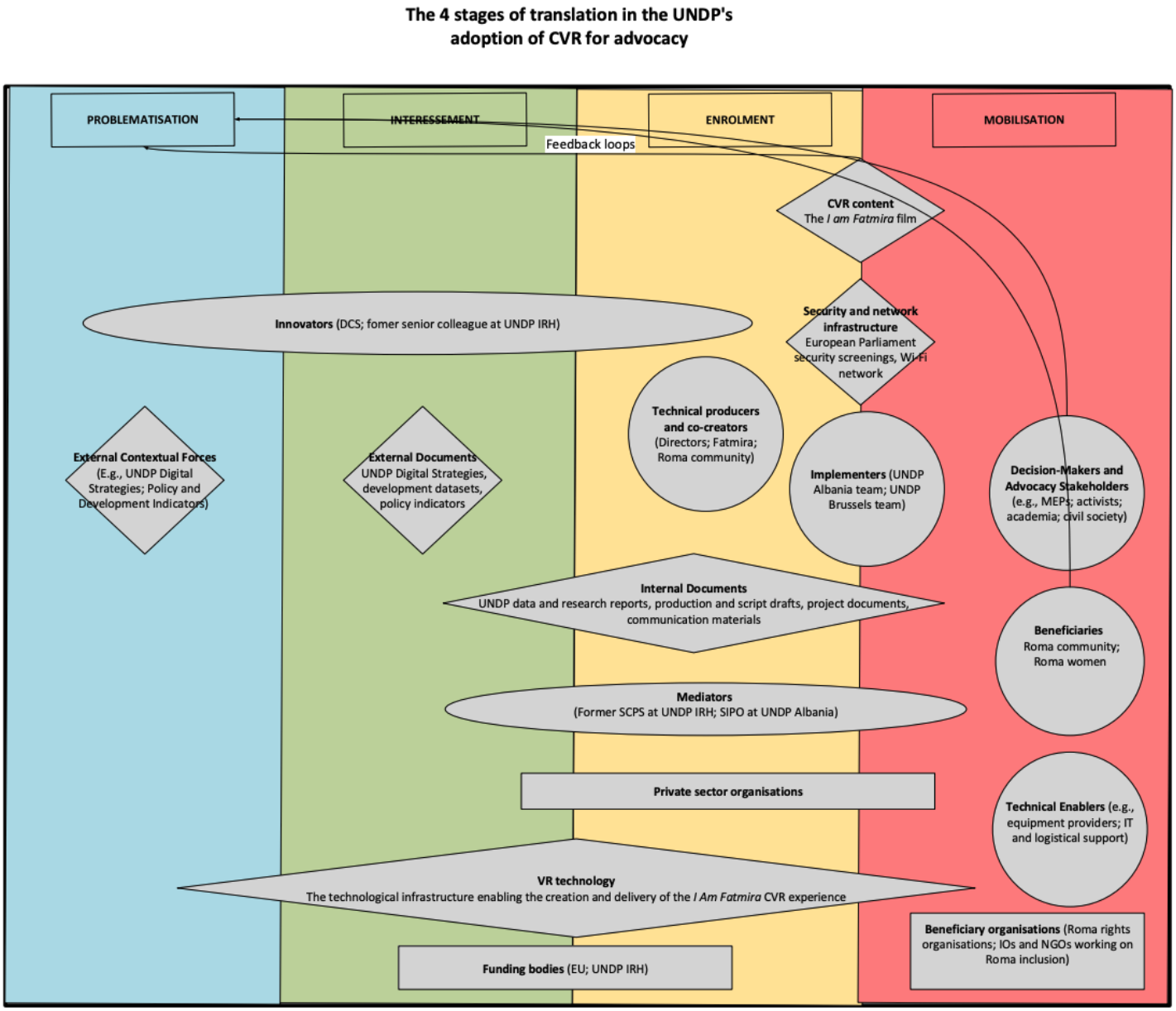
The mobilisation stage of 'I am Fatmira' naturally includes the film's circulation and reception. Given that the initiative's primary goal was to advocate for the Roma minority, this stage represents a critical moment in the translation process. The film's public release unfolded in two key phases: The EP premiere and subsequent screenings at various events. These later screenings can be broadly categorised based on the efforts of three key actors: UNDP Albania, UNDP Brussels, and IRH/DCS. In April 2018, *I am Fatmira* premiered at the EP during Roma Week, an annual event bringing together policymakers, civil society representatives, and Roma activists to discuss Roma inclusion, discrimination, and policy initiatives within the EU (Interviews 11; 15; 16). A particularly significant moment was the viewing of the film by the head of DG-NEAR, whose engagement was deemed impactful given his influence over funding allocations (Interview 11).

Following its premiere, the film was screened at multiple venues: the UNDP Albania nationwide roadshow in May 2018 brought the film to cinemas across several Albanian cities (Interviews 11; 13; 14) and a screening was organised for stakeholders and civil society at Europe House in Tirana, an EU centre for public engagement and dialogue on Albania's

integration (Interview 12). Meanwhile, UNDP Brussels facilitated additional high-profile screenings at the EDD and the Friends of Europe Western Balkans Summit (Interviews 11; 16; UN SDG Action Campaign [@SDGaction], 2018). Efforts were also made by the IRH and the DCS themselves to expand the reach of the CVR through digital platforms and film festivals, including Facebook, which allowed viewers to watch it without a headset (Interview 11). The DCS also submitted it to several festivals, but, as a UN-funded social impact piece, it struggled to compete for limited VR slots often reserved for commercial or artistic works (ibid). Despite these challenges, in December 2022 the film was featured at the 'Documentarist' film festival in Istanbul (2025), alongside VR pieces on governance, climate, and economic issues, situating *I Am Fatmira* within a wider corpus engaging with key international development themes.

Crucially, VR technology was 'translated' in the process, evolving from an imagined intervention into an institutionalised initiative and, ultimately, an embodied medium. As the film circulated, VR's affordances transformed it from a static advocacy tool into an embodied experience. At the same time, VR exerted its own agency: while it is designed to transport audiences into another's perspective, its impact is constrained by technological frictions. For instance, limited access to headsets and controlled screening environments determined who could fully engage with its immersive qualities. This also explains the UNDP's decision to release the film on Facebook to broaden accessibility – yet this choice underscores a fundamental tension between VR's affordances, where expanding reach can come at the cost of immersion.

6.5.3. Diagram 3: Stages of translation flowchart



The flowchart shows how human and non-human actants operate across the four stages of translation, making visible the stabilising mechanisms and vulnerabilities that arise from the way agency is distributed throughout adoption. This temporal mapping also enables comparison across case studies, revealing how different configurations may strengthen or weaken the translation process.

The flowchart depicted provides a visual representation of the distribution of human and non-human actants throughout the translation process (cf. Methodology chapter, Section 4.5.2). Two stabilising elements were identified.[66] Firstly, the network's capacity to distribute tasks strategically across distinct phases of the translation process plays a crucial stabilising role (as

[66] On the concept of network (in)stability, see Section 3.3.2.

in the preceding case; Section 5.5.3). As illustrated in the diagram, each phase mobilises a different constellation of actants, matching their expertise to the requirements of that particular stage. This mitigates the risk of overreliance on any single actant, thereby ensuring both the network's effectiveness and overall coherence. Another notable stabilising factor is the pervasive role of VR technology as an active participant in the network. Beyond its role as a dissemination tool, the translation analysis demonstrated how VR hardware and content actively shape the project across all stages: from conceptualisation in the problematisation phase, through procurement during enrolment, to event logistics in mobilisation. By encouraging collaboration among innovators, implementers, infrastructure, documentary actants, and others, VR technology binds the diverse elements of the network together, effectively serving as the backbone of UNDP's VR adoption process. Yet VR's role is not purely enabling. Its material and technical demands – from hardware compatibility to spatial setup – also introduce constraints (Section 6.4.2). This dual function, as both enabler and obstacle, underscores VR's agency as a non-neutral actor within the network.

The diagram also highlights two key fragilities. The first is the risk of overreliance on key innovators whose involvement often extends beyond project inception. In the *'I Am Fatmira'* case, the DCS represents an intrapreneur who has guided the VR initiative through conceptualisation, institutional approval, financial procurement, and early implementation. While such central figures provide essential continuity and advocacy, their departure or loss of institutional backing may pose a risk to VR adoption. This raises a kind of paradox addressed in the 'intrapreneurship' literature (intrapreneurship referring to 'entrepreneurial behaviour in established organisations'): While intrapreneurs are critical drivers of innovation within not profit-driven organisations (P. Raja, 2022), their centralised role might also create

vulnerabilities because the responsibility should be divided (Porumboiu, 2021).[67] This is all the more so from an ANT perspective, as sustaining a new idea depends on the alignment of multiple network elements (Stanforth, 2006). A second fragility lies in the feedback loops, which – unlike in the forthcoming ILO case study – remain informal and not fully institutionalised. There was no formal project evaluation of the 'I am Fatmira' initiative specifically (Interview 11). This is because the film was not a standalone project, but part of the broader RSF project: its outcomes were therefore not isolated or measured independently. Moreover, as the Policy Expert noted, the impact of advocacy initiatives such as *I Am Fatmira* is inherently difficult to quantify (Interview 15).

6.5.4. Sociotechnical co-constitution in UNDP's CVR adoption

The successful adoption of a technology within an organisation or group will depend on both technical and social aspects (McBride, 2003: 267). This section began with the aim of tracing how the process of translation illuminates the sociotechnical dynamics of the UNDP's adoption of CVR. ANT's four-phase framework, by offering a precise, step-by-step account of how VR was integrated and adapted, has been instrumental in achieving this understanding. Specifically, examining the process of translation highlighted the mutual shaping and sociotechnical co-constitution between non-human and human actants, emphasising the active role of non-humans in the adoption of VR technology.

It is important to isolate and examine the role of VR technology in this context: throughout the four stages, VR evolved in response to the needs and practices of the UNDP while simultaneously shaping them. During problematisation, VR was envisaged as an innovative means to tackle audience saturation and compassion fatigue in advocacy, thereby

[67] Cf. literature on intrapreneurship in the non-profit sector (Ambos & Tatarinov, 2022a; Peris-Ortiz et al., 2017; World Economic Forum & Wyman, 2016).

shaping UNDP's initial focus on immersive storytelling. At the same time, the technology was itself defined by human concerns around cost, accessibility, and determining precisely which type of VR approach would best suit UNDP's objectives. During interessement, by incorporating VR into the RSF project, UNDP reconfigured the technology's deployment through specific institutional frameworks and budgetary structures, while VR's immersive format demanded new alignments and storytelling strategies. In enrolment, VR exerted, again, its influence by necessitating adjustments to procurement and creative processes – for example, shaping the film through the specific VR filming equipment and how it influenced the final product (Interviews 17; 18), while UNDP in turn shaped the technology's application by selecting the technical producers and structuring the narrative. Finally, during mobilisation, VR shaped event logistics and advocacy approaches through its requirement for headset access and other infrastructural conditions, such as a dedicated Wi-Fi network and a support team, while UNDP shaped VR's role as an advocacy tool by selecting audiences and managing its deployment and dissemination. Just as UNDP worked to embed VR within its initiatives, VR itself reshaped the contours of what was institutionally possible. This reciprocal shaping underscores the sociotechnical nature of the adoption process, echoing Latour's notion that technologies actively mediate social practices (Latour, 2005).

6.6. 'A new way to tell a story': emerging properties of VR for advocacy and implications for the UN's role as *knowledge provider*

Interviewee 13, whose words inspire the title of this section, described VR's impact on the organisation as 'a new way to tell a story', adding that 'it brought a new approach to our communication'. This statement encapsulates the core argument of this chapter: that CVR adoption shaped conventional advocacy practices at UNDP. Specifically, I identify three ways in which this transformation occurred: *spatial presence*, *emotional resonance*, and *persuasive*

witnessing. As outlined in the theoretical framework (Section 3.3.3.), such properties are not inherent features of VR or subjective user responses alone, but outcomes of sociotechnical translation. They arise from the alignment of human and non-human actants across the four stages of translation, as new capacities generated by their dynamic interplay. Each of these properties, in turn, is associated with broader implications for how UN organisations may conduct advocacy where they adopt VR technology. This section explores both their influence on the UNDP's current practices, and their potential trajectory and broader impact, particularly in relation to the UN's role as a *knowledge provider* (cf. Section 2.6.2), thus addressing RQ1 on the impact of VR adoption on UN organisations' practices, and RQ3 on the broader implications for the evolution of UN practices.[68] As in the previous case study, the three properties examined below were identified based on recurrence and analytical significance (cf. Section 4.4).

6.6.1. Spatial and proximate presence

The first emerging property identified in the data is what I termed *spatial* and *proximate presence*. As in the ITC-ILO case study (Section 5.6.1), this property reflects both a confirmation of existing findings in the literature and a conceptual refinement that extends them. On the one hand, the data corroborates the well-established concept of *spatial presence*, frequently discussed in VR research.[69] On the other, interview data points towards a specific dimension of spatial presence that I termed *proximate presence*. Regarding *spatial presence,* interviewees repeatedly noted that, compared to conventional video or other media formats, VR elicited a stronger impression of being physically located within the environment depicted. As one participant explained:

[68] This section begins to address RQ2 as well, by introducing a comparative dimension with the preceding ITC-ILO case, although more systematic comparison is undertaken in Chapter 8.
[69] As the concept of *spatial presence* – the sensation of being physically present in a VE– has already been discussed in detail in Section 5.6.1, it will not be elaborated further here.

'It just doesn't happen in normal TV or filmmaking as easily, but with VR, it feels like you're physically putting the person in a room or a location, and they're able to see everything and feel *like they're actually there'* (Interview 18).

They also noted that VR's strength lies in the environment that it creates and that users can 'take in' (ibid). Similarly, one of the directors noted that the CVR format was particularly suited to convey spatially rich environments such as the Füshe-Krüje Roma settlement (Interview 11). Another participant, referring to a CVR piece about a refugee camp, reflected that '*it literally made you feel like you are in that tent*, where all the refugees live' (Interview 16). These reflections illustrate VR's ability to produce a powerful sense of spatial presence in 360° environments. However, interviewees did not only describe a generic feeling of 'being there' within a virtual scene: interestingly, they also described a deeper sense of being transported to a geographically distant context and experiencing closeness to places, people, and issues portrayed. VR, in this sense, did not simply place them 'in' a virtual space: it made them feel *near* to the realities depicted. As one interviewee put it: 'you get really, really close to the issue' (Interview 15). Another remarked that: 'It's there, you can see it. It was… closer to people, if you like' (Interview 13). It is this quality of simulated proximity to distant realities through VR – rather than mere spatial presence in a VE – that I term *proximate presence*. This property contrasts with more 'conventional' communication strategies employed by IOs, which rely on textual, photographic, or video-based storytelling to 'translate' distant realities for global audiences. While earlier media maintained more representational distance, VR appears to dissolve, or at least blur, this boundary, enabling users to virtually inhabit the same spatial and temporal frame as the subjects of the narrative. While some scholars have noted this quality in passing, it has never been explicitly differentiated from spatial presence. Edgar and colleagues (2022: 152), for example, observe that the embodied presence in the virtual world conveys 'the illusion that distance is symbolically and technically annihilated'. Gruenewald and Witteborn (2020)

similarly argue that VR constructs shared 'space-time illusions' in which viewers and protagonists appear to inhabit the same virtual continuum.

Figure 19 Panoramic shot from I am Fatmira *illustrating CVR's capacity to enhance the sense of spatial proximity and spatial awareness by situating the viewer in a Roma settlement.*

Figure 20 Another shot exemplifying how CVR can convey spatial realities (e.g., market layout).

The emergence of *proximate presence* has potentially significant implications for the UN's role as *knowledge provider*. Unlike non-immersive media, immersive proximity may facilitate more 'situated' understandings of global issues, which can make humanitarian causes feel more 'personal and urgent' (Seu & Orgad, 2017) and potentially increase the impact of advocacy campaigns. Moreover, VR's immersive proximity means that it can grant access to otherwise inaccessible spaces. Interviewees noted that in contexts involving communities that are spatially and socially marginalised, such as Roma settlements typically located on the periphery of urban life, CVR proved particularly effective. It allowed engagement with communities that are often 'closed' to outsiders (Interviews 11; 18), located in places one would not typically encounter in everyday life (Interview 18). This capability is particularly relevant specifically to UN and IO mandates which centre on amplifying the voices of marginalised or underrepresented groups. VR may support this goal, and extend the reach of IOs, by enabling temporary access to such communities – be they Roma settlements, refugee camps, or regions affected by armed conflict or climate-related displacement. However, these promises are not without risks: First, the proximity afforded by VR may foster an 'illusion of closeness': a sense of

connection that does not necessarily translate into real understanding or solidarity (Orgad & Seu, 2014). In addition, if these immersive experiences are increasingly granted authority over more conventional modes of communication (such as statistical data or textual reports), this could mark a shift towards a *spatial* form of legitimation. That is, what becomes persuasive is not as much factual evidence as the felt experience of proximity. While this dynamic lies beyond the scope of the present study, it raises important questions about the changing nature of truth-telling in global advocacy.

6.6.2. Emotional resonance

The second property emerging from the data is *emotional resonance*. Several interviewees emphasised the centrality of emotion in CVR, with one noting that it 'makes you *really, literally, feel*, you know, or be in the shoes of those people and really *feel* the struggles they are going through.' *Emotional resonance* took two main forms: care and empathy on the one hand, and surprise and excitement on the other.

First, participants expressed feelings of care and empathy for the issues and characters depicted in *I am Fatmira*. This is particularly notable given VR's strong association with the feeling of empathy (as discussed in Section 6.2). Interviews, however, revealed differing perspectives: while some stressed VR's power for eliciting empathy more effectively than traditional media, others were more cautious (Interviews 11; 17; 18). One co-director strongly endorsed VR's ability to generate empathy, considering it more effective than traditional video (Interview 17), whereas the other highlighted that technical limitations (lack of eye contact, restricted close-up shots, and restricted framing) on the one hand hindered connection to individuals, but on the other enhanced empathy for broader lived realities: 'You can empathise with *physical situations* (…) that's a really wonderful thing that other mediums can struggle

to capture in the same way' (Interview 17). A participant noted that CVR's depiction of human suffering is particularly compelling and powerful, creating a distinct 'sense of connection' with the viewer (Interview 15). A critical view came from the DCS, who challenged the idea of VR as an 'empathy machine,' warning that 'putting you in the shoes' of another risks oversimplifying experiences and encouraging fleeting, privileged forms of engagement (Interview 11).

Figure 21 Another scene from I Am Fatmira*, exemplifying how CVR can convey emotional resonance by conveying the lived realities of distant others.*

The emotions of surprise and excitement emerged as another key emotional reaction, with nearly half of participants reporting it. The Policy Expert at UNDP Brussels, for instance, noted that MEPs were 'really excited about it' (Interview 15). Similarly, two other participants referred to the 'wow effect' of the technology (Interviews 13; 15). A notable theme was VR's 'novelty factor' leading to curiosity and excitement (Interviews 12; 15; 18). VR's capacity to elicit emotional, 'visceral' responses (Gorin, 2022) is a noteworthy finding. While the literature on VR and empathy is already vibrant, the findings here suggest something more: that empathy is only one element within a broader emotional landscape – a broader *emotional resonance* that includes not only empathy but also feelings such as surprise and awe. This broader range of affective responses has not gone entirely unrecognised in the literature. For example, Riva and colleagues (2007) explored VR's connection to emotions of anxiety and relaxation, while Gorin (2022) highlighted its correlation with emotions of shame, outrage,

indignation, and resentment. However, extending the focus beyond empathy to encompass this wider emotional repertoire is a promising direction for future research.

In terms of broader implications, *emotional resonance* raises both opportunities and challenges for IOs, particularly in their role as *knowledge providers*. A more widespread adoption of VR could contribute to a shift toward a more emotionally inflected style of communication (Gruenewald & Witteborn, 2020; Illouz, 2007, 2008), leading to an 'emotionalisation of knowledge' (Leser et al., 2024). On the opportunity side, *emotional resonance* could enhance the effectiveness of IOs' advocacy efforts by fostering a stronger emotional connection between publics, policymakers, and the issues being presented. Bail and colleagues (2017) for example, observe that advocacy organisations employing emotional content tend to attract greater attention. Other studies show that emotionalisation in communication can improve public understanding and information retention (Harp & Mayer, 1997; Schimmack, 2005), and that emotions can – both consciously and unconsciously – significantly guide decision-making (Damasio, 1994; Gray, 1990; Paxton, 2020; Zajonc, 1980).[70] The importance of emotions has gained recognition in IR over the past two decades, with scholars examining their role in political settings (Bleiker & Hutchison, 2008; N. C. Crawford, 2000; Mercer, 2005, 2010) diplomacy (Hall, 2015; Wong, 2020), and IOs (Clément & Koschut, 2024; Hutchison, 2016). *Emotional resonance* may also impact donation behaviours or funding allocations (Paxton et al., 2020). VR in particular has been found to increase both donation intention and amount (J. Bailenson, 2018; O. Li et al., 2024). Notably, Yoo and Drumwright (2018b) isolated emotion as a key factor, showing that it is precisely VR's capacity to foster a sense of interpersonal connection that contributes to increased giving. This sentiment was echoed by the DCS, who remarked: 'donors are people, right? (…) they're

[70] However, Flemming and colleagues (2018) report conflicting results, showing that emotional elements do not uniformly enhance learning outcomes.

also like you and me, they want to see information in a way that (…) connects to them, and touches them' (Interview 11).

Nevertheless, *emotional resonance* also raises concerns, chief among them the risk of vicarious spectating and the broader danger of undermining IOs' evidence-based legitimacy through emotions-driven communication. First, an 'emotional style' risks promoting non-critical engagement by overshadowing factual rigour and critical distance. As noted above, audiences may return to their everyday lives after removing the headset, remaining only briefly and superficially engaged. These concerns align with critiques of 'vicarious spectating in immersive spaces' (S. Gregory, 2016), where the geopolitical roots of humanitarian crises may be sidelined (Gruenewald & Witteborn, 2020; Suzuki, 2022) and existing power asymmetries inadvertently reinforced (Orgad & Seu, 2014). Beyond this immediate concern, *emotional resonance* may also affect how IOs are perceived – and how they legitimise their authority. IOs have historically grounded their legitimacy in claims to rational-legal or technocratic authority (Abbott & Snidal, 1998; Barnett & Finnemore, 1999; van der Veer & Meibauer, 2024). Their authority often rests on a reputation for producing data-driven, evidence-based guidance, which supports their role as neutral, expert-led *knowledge providers*. From this perspective, IOs' legitimacy is tightly linked to their production and communication of credible knowledge. If emotional appeal overshadows this foundation – such as through the uncritical adoption of emotionally powerful media like VR – the perceived objectivity of IO knowledge may be weakened. To mitigate this, VR initiatives should be grounded in robust research. 'I am Fatmira', for example, was anchored in broader data collection (Interviews 14; 15). In such cases, emotional narratives can complement evidence-based work when VR is not the sole medium but part of a contextualised communication strategy: an 'entry point' that leads interested audiences to deeper knowledge (Moore-Kaplan, 2012).

Figure 22 'Intimate' spaces such as the living room in the picture may foster emotional resonance

Figure 23 Another example of emotional resonance through lived contrasts

6.6.3. Embodied influence

The third property emerging from the data is *embodied influence.* Interviewees described VR not merely as an advocacy tool, but as a persuasive one. Several emphasised its advocacy power, highlighting its potential to elevate issues on policy-makers agendas (Interviews 11; 14; 15) and even spur policy change (Interviews 17; 20). These observations align with existing research on VR's prosocial effects, introduced in Section 6.2 above, which suggests that VR experiences are more likely than other media to shift users' perspectives and prompt action on specific social issues. Importantly, the interviews also suggest something further: a bridge between this persuasive potential and concrete political influence. That is, in the context of global governance, VR does not just mobilise publics: it may also influence decision-makers to act. For IOs in their role as *knowledge providers*, this property is particularly significant: if strategically deployed, VR could influence which topics gain political traction and receive resources. Crucially, while CVR is often examined in the context of public awareness and mass fundraising, its potential to engage high-level stakeholders and decision-makers remains less explored.[71]

[71] Cf. the discussion on the 'future of briefings' below (UN Innovation Network, 2023a; UNDPPA, 2022).

A central mechanism underlying *embodied influence,* frequently mentioned by interviewees, is perceived realism. CVR was described as offering an unmediated, 'frameless' depiction of on-the-ground reality – producing the illusion of unrestricted, immediate access to a scene (Manovich, 2013: 179; Milk, 2015; Interview 18). Unlike traditional media, which makes its editorial framing more visible, VR appears to remove the frame altogether. This increases the persuasive force of the experience: because it appears real, viewers are more likely to be convinced and prompted to act. For example, Herrera and Bailenson (2018) showed that the VR condition which offered higher sensory realism led to significantly more prosocial behaviour (petition signing), despite similar self-reported empathy levels across conditions, suggesting that realism, not empathy alone, drove the behavioural effect. Interviewees described VR as providing 'access to tangible testimony' (Interview 15), 'depicting reality with great precision' (Interview 14), and allowing international partners to 'see the truthfulness' of a situation (Interview 13). This sense of perceived realism, in turn, reinforces perceptions of transparency and accountability, enabling stakeholders to see 'where their money is going towards' (Interview 11). This credibility makes the message more persuasive, particularly for high-level stakeholders, underpinning *embodied influence*.

For the UN's role as a *knowledge provider*, this perceived realism is particularly valuable. VR's ability to 'reproduce reality' makes it well suited to conveying complex field conditions and enhancing situational awareness (Conges et al., 2023). This is particularly relevant for contexts where an accurate understanding of on-the-ground conditions is essential (e.g., where access is constrained). Indeed, the UNDPPA adopted CVR specifically for briefing Security Council members, aiming to enhance situational awareness, support decision-making, and provide action-oriented early warnings (UNDPPA, 2022). According to the DPPA, VR is particularly useful in contexts where diplomats and Member State

representatives are unable to travel to conflict zones due to cost, logistics, or safety (UNDPPA, 2022).

However, *embodied influence* also presents risks. More generally, scholars have noted the potential for manipulation and misinformation in immersive environments (see also Section 7.6.1) (J. Brown et al., 2023). Some argue that VR only provides a 'perceptual illusion of non-mediation' (Lombard & Ditton, 1997), while in practice, VR experiences require extensive staging and preparation (Interviews 16; 17). This raises the concern that VR's perceived realism might obscure the constructed nature of the experience and, through *embodied influence,* could end up fostering uncritical engagement.

Figure 24 Screening of I Am Fatmira *at EP, illustrating the use of CVR to engage policymakers.*

Figure 25 A community screening of I Am Fatmira *during the roadshow in Albania, highlighting CVR's role in raising awareness across civil society.*

6.7. Chapter conclusion

In conclusion, this chapter has mapped the sociotechnical ecosystem that enabled the development and diffusion of *I am Fatmira*, highlighting how human and non-human actants shaped the trajectory of VR adoption at UNDP. Rather than acting in isolation, they co-constituted one another, forming a dynamic network through which the project was translated

from concept to CVR immersive experience. From this process, three key emerging properties were identified: *spatial presence*, *emotional resonance*, and *embodied influence*. These properties build on existing understandings of VR's affordances, but also offer new insights into how UN organisations might harness such capabilities to reconfigure advocacy practices. Crucially, the chapter has shown how the adoption of VR for advocacy is not simply a matter of introducing a new medium, but of transforming the very conditions under which stories are told and received. This matters because, as VR becomes more widely used, it may both enable and challenge existing practices of international advocacy, expanding the communicative repertoire of IOs while raising new logistical and ethical considerations. These findings will be revisited in later comparative analysis (Chapter 8), where comparing with other case studies will help deepen our understanding of how VR shapes different kinds of UN, and more broadly IO, practices.

CHAPTER 7: VIRTUAL REALITY AND THE EMERGENCE OF NEW TRAINING MODALITIES: THE CASE OF THE ILO

7.1. Introduction

This chapter examines the third case study of this thesis: the International Labour Organisation (ILO) and its adoption of VR for training purposes. Specifically, it focuses on the ILO initiative to pilot the use of VR simulations for sexual harassment (SH) prevention training in the garment industry (ILO, 2022). The objective is to investigate whether and how VR reconfigures the ILO's operational practice of training – and with it, its role as *capacity builder* – addressing RQ1 on VR's impact on operational practices, and RQ3 on the broader implications of VR adoption for the evolution of UN practices. The analytical approach, including the operationalisation of ANT, follows the same structure outlined in the other case studies (cf. Section 5.1). The chapter will continue as follows: Section 7.2 situates the ILO pilot within the wider literature on VR simulation training. Section 7.3 introduces the VR initiative, detailing its objectives and institutional context. Subsequently, Section 7.4 maps the network of human and non-human actants that enabled VR adoption, while Section 7.5 applies the ANT translation framework to trace the adoption process across problematisation, interessement, enrolment, and mobilisation. Finally, Section 7.6 analyses the outcomes of the translation process, identifying three emerging properties – *embodied influence*, *interactive engagement*, and *psychological safety* – and discussing their implications for UN organisations' training practices and the UN's role as *a capacity builder* (cf. 2.6.3). Building on the earlier cases of collaboration (ITC-ILO) and advocacy (UNDP), this chapter turns to training through VR simulations, where familiar dynamics reappear alongside a new affordance: *psychological safety*.

7.2. Training in Virtual Environments: IOs and their uses and applications of VR simulations

The rationale for using VR simulations for training, including for SH prevention training, is multifaceted and grounded in a robust body of scientific research. Introducing this context here is valuable to understand the rationales and purposes of the ILO's project and its practical implementation. The term 'VR simulations for training' refers to the use of synthetic VEs designed to replicate aspects of reality with the primary purpose of facilitating knowledge transfer and enabling user learning. VR is particularly well-suited for training purposes due to its capacity to simulate real-life situations which 'feel real'. This is known as the principle of 'plausibility or 'behavioural fidelity' (Section 2.2.3), the empirically observed tendency for users to respond to virtual scenarios *as if* they were really happening. Interestingly, according to the scholar Kate Nash (2018a), what sets VR apart from other media is precisely this *as if* interaction – VR's transition 'from representation to simulation'. Building on this, research found that behavioural fidelity extends beyond VEs, with VR proving more effective than other media in influencing users' attitudes and behaviours in the physical world (Bowman et al., 2020). Furthermore, computer-generated environments afford researchers experimental control, high reproducibility and ecological validity (Pan & Hamilton, 2018; T. D. Parsons, 2015). Collectively, these qualities have driven interest in VR's potential for training simulations, particularly in contexts where real-world simulations would involve substantial cost, significant risk, or complex logistical challenges.

In line with these promising findings, studies started to test VR use for training across a wide range of professional and educational fields.[72] Evidence of its effectiveness is largely

[72] See Subburaj (2024) and Xie and colleagues (2021) for multi-sectoral overviews.

positive, particularly its role in encouraging positive social change (Bailey & Bailenson, 2017; Hu-Au & Lee, 2017; Radianti et al., 2020), enhancing learning and information processing (C. S. Green, 2018), critical thinking (Foronda et al., 2017; Huttar & Brintzenhofe-Szoc, 2020), 3D spatial understanding (Nassar et al., 2021), and creativity (Gerry, 2017). Nevertheless, some studies were more cautious, finding no significant advantage compared to PowerPoint (Leder et al., 2018) or other conventional training approaches (Winther et al., 2020).[73] As discussed, a persistent challenge is 'isolating the VR factor' (Section 4.8), since training outcomes may reflect variables beyond VR itself. For example, Leder and colleagues (2018) tested a non-interactive simulation with a small sample, while Winther and colleagues (2020) compared VR users lacking haptic feedback to others working with actual machinery – design differences that make results hard to attribute solely to VR. Such cases underscore the need for further research to disentangle these variables and clarify what drives VR's effectiveness and limitations in training contexts. This thesis contributes to that debate not through controlled comparison, but by empirically tracing how VR's specific affordances and constraints emerged during adoption and implementation. Rather than assuming these effects to be inherent or fixed, it examines how they are shaped through processes of sociotechnical translation. By investigating which properties materialise in practice – how they align with or depart from existing literature, and what new insights they offer – the study advances efforts to disentangle the situated effects of VR in training contexts.

For IOs, a particularly valuable VR application is its ability to replicate high-risk, rare, or ethically sensitive scenarios within a safe and controlled environment (Doel & Cooner, 2002; L. Jensen & Konradsen, 2018). This is especially relevant for organisations within the

[73] For cautious perspectives, see also Makransky and colleagues (2019), Parong and Mayer (2018), and Richards and Taylor (2015). Chang and colleagues (2024) review 20 studies on AI-powered VR, finding it effective for teaching various skills, including to people with disabilities, but limited by lack of standardisation and accessibility.

UN system, whose operations often unfold in conflict zones, disaster areas, or regions with limited infrastructure where real-life training simulations is impractical and potentially risky (Gonsalves, 2015: 1). Organisations such as the International Committee of the Red Cross (ICRC, 2023) already developed a 'mirror world': a VR training ecosystem which offers video game-style simulations of urban warfare, hospitals, and displacement camps, enabling accessible, cost-efficient training. Similarly, VR was used for disaster preparedness and disaster response training (cf. WFP project, Section 5.3).[74] Looking ahead, VR simulations may also become tools for decision support and predictive modelling (Hunt et al., 2016). Recognising this potential, the ILO has piloted its use in the context of sexual harassment (SH), specifically bystander training and the prevention and response to such incidents. To provide context, I will first review the existing literature on VR-based training for SH prevention. Following this, Section 7.3 introduces the project, before proceeding to the in-depth ANT analysis in Section 7.4. The aim of the analysis is to trace how the technology was translated – how it was imagined, negotiated, and operationalised –within the ILO, and how it impacted and potentially reconfigured the organisation's training practices.

VR use in SH training predates the ILO initiative, with prior research examining its effectiveness in simulating realistic scenarios, enhancing emotional and cognitive engagement, and fostering perspective-taking to influence attitudes and behaviour. These studies provide encouraging evidence on VR's potential and likely informed the ILO's decision to pilot it. What the ILO case contributes is the integration of VR into a broader training programme within a UN context, providing a valuable opportunity to examine how the affordances identified in earlier research are operationalised in practice. Empirical work underscores this potential. Sadeh-Sharvit and colleagues (2021) tested a simulation involving

[74] On VR use for disaster response training, see also Alshowair and colleagues (2024), Gunshin and colleagues (2020), and Hsu and colleagues (2013).

harassment by a virtual interviewer and found VR enabled safe, realistic practice of responses. Similarly, Verma (2022) showed that VR training elicited stronger emotional reactions and deeper understanding of SH when users witnessed inappropriate advances. Comparative studies add further nuance: Jouriles and colleagues (2009) found VR role-play, compared to standard role-play, boosted engagement, heightened negative affect, and increased realism in SH prevention training. A follow-up (2011) confirmed VR's value for examining women's responses to coercion and for evaluating intervention strategies. Rawski and colleagues (2022) compared VR and 2D bystander training, showing both were equally effective in improving motivation, knowledge, and attitudes, but only VR increased intentions to adopt informal, non-confrontational interventions. The authors attributed this distinction to VR's realism and embodiment, which likely reinforced the sense of behavioural fidelity and encouraged less confrontational approaches.

A particular relevant subtype of VR simulation is 'Virtual Reality Perspective-Taking' (VRPT), also called 'body-swapping' (Gonsalves & Mallet, 2020). VRPT enables users to experience a situation from another's perspective by virtually 'placing them in their shoes' (F. Herrera et al., 2018). In the ILO simulation, this technique appears as a final activity: users swap bodies with the perpetrator and rewatch the scene through their eyes. Research consistently highlights VRPT's potential to evoke empathy (Louie et al., 2018; Van Loon et al., 2018b; G. W. Young et al., 2021)[75] and foster attitudinal change (Hasler et al., 2021: 2257), including the reduction of racial and gender-based biases (Ahn et al., 2013; Banakou et al., 2016; Gonzalez-Liencres et al., 2020; Maister et al., 2014; Peck et al., 2013; Salmanowitz, 2018). Ventura and colleagues (2021) found VRPT outperformed narrative-based tasks in building empathy when participants embodied a female avatar experiencing harassment.

[75] On empathy, see Section 6.2.

Similarly, Gonzalez-Liencres and colleagues (2020) showed that male perpetrators of intimate partner violence, when embodying a female victim, reported heightened empathy and reduced prejudice compared to those observing in third person. This potential for prejudice reduction prompted discussions about VRPT's applicability in conflict resolution (Gregory, 2020; Hasler et al., 2014; Hasson et al., 2019) – an area that remains underexplored within the UN system. Meanwhile, other public bodies are piloting similar initiatives: for example, the U.S. Department of Veterans Affairs (2024) is testing VRPT for bystander intervention training across 14 medical centres.

As this overview shows, VR training has enjoyed wide scholarly attention, with strong evidence of potential but also inconsistencies that complicate findings. This underscores the need for further investigation to disentangle the specific factors that drive VR's effectiveness, as well as the conditions under which it may fall short. Collectively, these studies offer a valuable foundation from which to approach the ILO case, helping us to imagine ways in which the adoption of VR might affect training practices. One of the reasons why the ILO project is especially intriguing is perhaps its proximity to the research landscape, arguably more so than any other case study in this thesis. This creates an opportunity to examine whether previously observed effects also emerge here, and to do so through the analytical lens of ANT. Before exploring this further, however, it is essential to provide more contextual grounding by introducing the ILO's pilot project itself.

7.3. Introducing the ILO's VR initiative

In 2022, the ILO offices in Geneva, Bangkok, and Jakarta, in collaboration with Better Work Indonesia (BWI) (ILO and IFC, 2024), the ITC-ILO, and the VR provider Bodyswaps, launched a VR training initiative designed to teach factory managers about the risks of SH in

the workplace and promote a zero-tolerance culture within the garment sector (ILO, 2022). Before turning to the initiative itself, it is useful to provide a brief overview of the ILO, its mandate, and how its involvement in this initiative aligns with its broader goals. Established in 1919, the ILO is a specialised UN agency headquartered in Geneva with a network of offices in over forty countries. As the most significant IO addressing labour issues, the ILO is tasked with promoting decent work and labour rights, including the prevention of SH in the workplace, for which it operates a dedicated branch – the Gender, Equality, Diversity, and Inclusion (GEDI) unit (ILO, 2019a).[76] The VR initiative was incorporated into the ILO's 'Decent Work in Garment Supply Chains Asia (DWGSC)' project, funded by the Government of Sweden, and specifically within its Better Work initiative, a joint ILO and IFC initiative which aims at improving labour standards and promoting decent work in global supply chains, with a particular emphasis on the garment industry (ILO and IFC, 2024). The ILO has a discernible track record of innovation: first, the organisation's leadership has formally acknowledged the need to respond to technological change: the 2019 *Centenary Declaration for the Future of Work* (ILO, 2019b) explicitly highlights the 'transformative change' driven by innovation, setting the tone for a future-oriented agenda. This commitment has since been operationalised through initiatives such as the ILO's *Knowledge and Innovation Strategy*, which aims to improve the organisation's operational efficiency by fostering a culture of innovation (ILO, 2023a). The organisation also experimented with AI integration in labour statistics (ILO, 2024a), created an 'Observatory on AI and Work in the Digital Economy' (ILO, 2024c), and investigated blockchain use for improving skills certification (ILO, 2020) and supply chain transparency (ILO, 2023b). Against this backdrop, the decision to pilot VR can be seen as part of a broader organisational tendency to engage and experiment with emerging technologies. Within this context, the VR pilots were implemented as part of DWGSC and

[76] For additional context on the ILO, see Van Daele's literature review (2008), Prugl (2005), and Servais and Goethem (2016). On the organisation's historical development, see Onofrei (2020), on its trajectory of change and innovation, see Standing (2006b), and on its evolving global role, see Maupain (2013).

BWI, aiming to evaluate the effectiveness of VR-based training in addressing sensitive workplace issues and SH in particular.[77] The training targeted managers from selected factories, and aimed to equip them with the skills to identify and respond to SH and to practise bystander intervention (Interviews 20; 21; 22). The VR sessions were conducted over three consecutive days (27-29 September 2022) at the Grand Savero Hotel in Bogor, Indonesia. Each training session lasted a full day and involved 20-25 factory managers, predominantly from HR and compliance roles, representing garment factories in the Jakarta region. The participating factories were those where managers had also undergone the Respectful Workplace Training of Trainers (ToT) Programme (RESPECT) (Interview 24). The VR simulation formed part of a blended training approach, integrating VR-based learning with traditional workshops.

The simulation lasted 1-1.5 hours per user. Participants were first introduced to the VE, given navigation instructions, and selected a customised avatar before meeting their virtual tutors. Although VR simulations can be multi-user, the ILO pilot is an example of single-user CGVR (cf. Section 2.2.2).[78] The training unfolded in three stages. First, participants learned to recognise SH, encountering scenarios of hostile work environments and identifying inappropriate behaviours. Second, they practised Bystander Response Training, exploring the '5Ds' of intervention – Distract, Delegate, Direct, Document, and Delay – and testing different responses. Third, they engaged in VRPT, addressing the perpetrator and then re-experiencing the interaction from an external standpoint. The pilots concluded with surveys, interviews, and focus groups to evaluate effectiveness and identify improvements (Pike & Koithara Mathew,

[77] Interestingly, UNCHR launched a similar initiative with Bodyswaps called *Safeguarding VR*, aimed at training staff to better support disaster victims.
[78] For a helpful typology, see Vasarainen and colleagues (2021b). For example, the ICRC's simulation mentioned earlier is a multi-player training tool.

2023). This overview of the simulation's design and delivery sets the stage for a closer analysis of the network of actants that shaped its translation into ILO training practice.

7.4. The network's actants

The ILO's adoption of VR technology was shaped by a heterogeneous network of human and non-human actants. Examining these actants in greater detail reveals the multiple forms of agency at play and clarifies how alignments were negotiated around the adoption of the VR simulation. As in the previous case studies, I have grouped the actants into analytical categories, beginning with human and then turning to non-human actants (see Section 4.4 for the rationale and method). As we enter the third case study, some interesting comparative patterns begin to emerge. Most notably, the ILO network introduces a category of human actants absent in the other cases: evaluators. Their explicit role in generating feedback will be shown to function as a stabilising factor (see Section 7.5.3). At the same time, certain categories recur across all three studies: Innovators, implementers and mediators are consistently present, though their degree of separation varies: in UNDP, a single innovator also took on implementation roles, whereas in ITC-ILO and ILO the distinction between the two categories was clearly drawn.

7.4.1. The network's human actants

Innovators

This category includes three key ILO staff members: a Gender Specialist and a Senior Gender Specialist based at the Regional Office for Asia Pacific in Bangkok, and the ITC-ILO VR focal

point.[79] These three actants are referred to as 'innovators' because, through their shared vision and concerted efforts, they developed the concept of using a VR simulation for addressing SH, and effectively initiated the project. The Gender Specialist, during their previous tenure at the ITC-ILO, had established professional connections with various VR developer firms. They also had had the opportunity to experiment with a VR simulation training module developed by Bodyswaps for UNHCR (Interview 20, 12/09/2023). Later, after transitioning to the ILO and specialising in violence and harassment, they recalled the potential of VR technology and began actively exploring its application within the ILO: 'I saw the potential and shared it with everyone – taking every opportunity to showcase the demo Bodyswaps provided' (Interview 20, my translation). The ideation phase then gained traction through the involvement of the Senior Specialist, who was instrumental in securing the support and funding for the project. This was achieved by linking it to a broader initiative in the Asian textile sector, for which the Senior Specialist aimed to develop innovative solutions (Interview 20). Finally, the VR focal point at the ITC-ILO also played a crucial role by contributing their technical expertise to the project's conceptualisation: working with the Gender Specialist, they combined their respective gender expertise and technical knowledge to plan how VR would be applied within the initiative (Interview 21, 25/10/2023).

Implementers

The second category of human actants identified from the data are the 'implementers': those who translated the vision of a VR SH intervention into reality through their concrete actions. Key actants in this category include the team at Better Work Indonesia (BWI) and ILO Jakarta, and the team at ILO Geneva. Within the BWI team, four staff members played a pivotal role

[79] This is the same VR Focal Point referenced in the ITC-ILO case study. Regarding the ITC-ILO's involvement in this project: while the initiative is led by the ILO, the ITC-ILO contributed its technical expertise, developed through its prior explorations of VR technology, as discussed in Chapter 5.

in aligning the VR pilot with existing programmes, adapting it to the local context, and managing the logistical aspects of its implementation. The Learning Team Leader played a key role during the development of the simulation, ensuring it was adapted to the context and designed to complement, rather than duplicate, existing workplace programmes – such as the '5D intervention' framework (Interview 22, 14/03/2024). Additionally, they served as the primary contact point for the VR pilot across other ILO offices during the training's implementation. Supporting them, the Senior Training Officer played a crucial role in recruitment of the participants, ensuring that they met the participation criteria, and supporting them in joining the training program (Interview 26, 14/03/2024). Additionally, the Gender Officer served as the gender and inclusion focal point for the project. They facilitated the VR training sessions, worked with the training team on logistics and processes, and helped integrate the training within the 'RESPECT' program (Interview 24, 14/03/2024). Finally, the Team Leader responsible for overseeing the three core services offered by Better Work – assessment, advisory, and training – in the West Java area played a supervisory role in the implementation of the pilot. While not directly involved in the day-to-day technical aspects, they provided overarching support to ensure the project aligned with Better Work's broader objectives (Interview 25, 05/07/2024).

Technical enablers (VR developers and private sector firms)

Technical enablers such as developers at Bodyswaps (the company that developed the VR application) and Meta (the provider of the headsets) were also critical actants in the project. Bodyswaps, the software developing company that developed the VR simulation, collaborated closely with the ILO to design a tailored VR module for SH prevention. The development process involved a team of developers, designers, and recruited actors (Interview 28, 24/09/2024). As the owner of Oculus headsets, Meta had a twofold impact: On the one hand, its acquisition of Oculus and subsequent rebranding from 'Facebook' to 'Meta' significantly

heightened global interest in and demand for VR technology. However, this move also solidified its market dominance, driving up headset costs, which in turn limited accessibility and raised ethical concerns for the ILO (Interview 20. Cf. similar dynamics in Sections 5.4.1 and 6.4.1). Finally, the technical enablers category also included personnel sent by the ITC-ILO during the pilots – a technical specialist and the VR Focal Point – who supported practical VR use (Interviews 22; 24).

Mediators

Another identified category of actants are mediators – specifically, the ILO Geneva Research and Impact (R&I) team within the Better Work programme and the Persons in Charge (PICs) of the participating factories. Once the project was secured, the R&I team – specifically two Technical Officers – served as key mediators in ensuring the VR simulation aligned with the objectives of the BWI programme. Building on the innovators' work, they focused on adapting the training's key points to a VR format, and on devising methods for assessing the training's effectiveness (Interview 21; Interview 27, 09/11/2023). Simultaneously, the PICs at participating factories acted as mediators by bridging the VR technology, the training content, and the end beneficiaries. Their responsibilities included integrating the VR training into the factory's existing training framework and tailoring its delivery to meet workers' needs. For example, one PIC adapted the delivery of the VR training materials by combining it with other learning methods such as Pictionary-inspired drawing sessions – making the training more relatable to the training participants and making it suit their factory's specific context (Interviews 24; 29).

Evaluators

Another category that emerged from the data are evaluators: external researchers tasked with evaluating the impact of the VR initiative. These evaluators designed the research approach,

spent time at the field site to collect data, and then published two reports in 2023 (see: English et al., 2023; Pike & Koithara Mathew, 2023). Their work compares the VR component of the training with traditional training methods, assessing its impact on training outcomes – a focus aligned with the behaviour change studies discussed earlier. The evaluation results were made publicly available on the BW website, reaching a broad range of stakeholders, including donors, Better Work and ILO more broadly, participating factories, but also other interested publics. In this way, the evaluations contributed to the feedback loops within the network, influencing subsequent discussions about VR's utility and effectiveness. This also fostered transparency and accountability – key elements for sustaining trust in the ILO, which in turn can preserve network stability (see Section 7.5.3). The evaluators thus functioned not merely as observers, but as actants whose assessments shaped the narrative around the intervention's value and limitations. Similarly, also the author of this thesis becomes part of the network as an external researcher, engaging with the project through a different analytical lens.

Beneficiaries and beneficiary organisations

The primary beneficiaries of the initiative were the managers in garment factories who participated in the VR SH prevention training. Through the simulation, participants explored various intervention strategies, strengthening their ability to handle workplace harassment effectively. The factories that participated in the initiative also benefitted from it: chosen based on their prior involvement in the RESPECT programme, they gained access to innovative tools for addressing SH and fostering a safer workplace culture (Interview 26). Finally, brands were indirect beneficiaries of the VR pilot project. As part of their commitment to social responsibility goals, they gained value from factories adopting advanced training methods to improve workplace culture (Interview 20).

Synthesis

To summarise the above, the identified categories of human actants (innovators, implementers, technical enablers, mediators, evaluators, and beneficiaries) capture the diverse and interdependent roles that made the adoption of VR for SH prevention possible within the ILO. While innovators provided the initial vision and secured support, implementers adapted and operationalised the project in practice, and technical enablers designed and maintained the VR application and hardware. Mediators linked the project to institutional programmes and factory/local contexts, while evaluators assessed its effectiveness, shaping how the intervention was perceived internally and externally. Finally, beneficiaries, including managers, factories, and brands, benefitted from the initiative, yet were also central to testing and sustaining it. Together, these categories highlight how the project relied on distinctive contributions and feedback loops, each role reinforcing or challenging the network. Understanding this is crucial for tracing ANT's translation process, from ideation to mobilisation. To facilitate clarity, Appendix A summarises these categories and their respective functions.

7.4.2. The network's non-human actants

After outlining the human actants, this section shifts focus to the 'non-human' actants that play a critical role in the ILO network surrounding the VR simulation pilots.

VR technology

As in the ITC-ILO and UNDP case studies, VR technology stands out as the central non-human actant. For analytical clarity, VR is once again divided into two distinct components: VR software and hardware. As discussed in Section 2.2.1, VR is often described as a

monolithic entity, but this conflation risks obscuring the distinct roles and interactions of its components – a phenomenon which ANT refers to as 'black-boxing' (Heeks & Stanforth, 2015). By separating VR technology into its hardware and software components, these roles and interactions are brought to light, leading to a sharper understanding of the translation process.

VR hardware

As regards the hardware, the ILO's training simulation relied on the Meta Quest headset (formerly 'Oculus') – the same model procured by the ITC-ILO for the VR collaboration pilots. The Meta Quest includes goggles with high-resolution lenses and display (Slater & Sanchez-Vives, 2016), two hand controllers, and other components and sensors (Brown, 2024). As discussed, the ANT framework emphasises the influence of material elements on networks (Kaltofen, 2018b; Srnicek, 2017; Srnicek et al., 2013). This dynamic is clearly illustrated in the interviews, which highlight how VR hardware functioned as an active participant in both the design and delivery of the training in several ways: Firstly, the headset itself impacted logistics. As one interviewee commented, 'There is also, in my opinion, a very important logistical component related to the use of VR, which (…) is tied to the headset – and now, by the way, to the Oculus Quest' (Interview 20). This logistical component included the effort required by various offices to arrange delivery and handle the equipment. The bulkiness and weight of the headsets further complicated shipment logistics, causing setbacks (Interview 24. Cf. similar dynamics in other case studies, Sections 5.4.2 and 6.4.2). Additionally, limited headset number caused by the fact that, as physical devices, they could only be used by one person at a time, posed a constraint (Interviews 20; 23; 26). Furthermore, the materiality of the headset risks restricting the accessibility for beneficiaries – for example, where users wear glasses (Interviews 24, 23) or, as research indicates, for individuals – often women – who are more likely to experience motion sickness (Stanney et al., 2020). Second, the cost of VR

headsets, driven both by market demand and by the materials used in their construction, is frequently cited as a significant barrier to scaling and to widespread adoption (Interview 20; 24). Beyond cost, the model and specific characteristics of a VR headset also directly influence the affordances of a VR simulation, which in turn impacts the training experience. In fact, in the context of the ILO SH pilot, the headsets employed were not the latest model, and therefore did not include AI integration – showing the intrinsic connection between hardware and software: the software's potential might be constrained by the hardware's specifications and compatibility (Interview 28). However, while newer headsets often provide enhanced functionalities, they also come with higher costs, potentially presenting IOs with complex challenges and trade-offs.

VR software

As regards the software, the VR simulation itself, including its virtual elements such as avatars, virtual artefacts, and props, actively participates in the network. Unlike the avatars in the multi-user VEs employed by the ITC-ILO, the avatars within the ILO simulation were pre-programmed. This means that, rather than being controlled or inhabited by users, they were programmed virtual entities, akin to Non-Playable Characters (NPCs) in a video game. Their design and functionality influenced the user experience by shaping how the user interacted with the simulation. For example, they provided instructions on navigating the VE, and administered quizzes to assess users' understanding of the material presented (Figure 26). In contrast, the user's avatar was directly controlled and animated by the user (Figure 27). The VE also includes virtual artefacts and props that shape the training experience. For example, the viewer has access to a virtual journal that they can consult at anytime (Figure 28).

Figure 26: Two pre-programmed avatars instruct the user on navigating their virtual body.

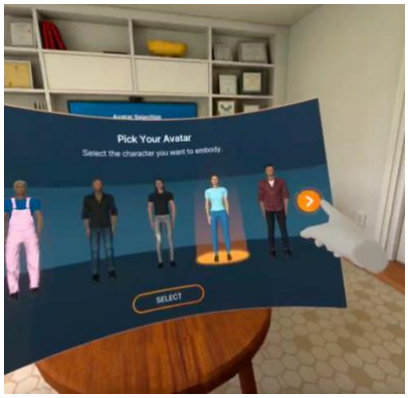


Figure 27: The user is selecting an avatar to represent them during the simulation.

Figure 28: The virtual journal serves as an interactive map as well as a knowledge base, allowing users to track progress and review knowledge

Interviews also mentioned the impact of external contextual forces, notably the COVID-19 virus and AI technology. As we already saw in the ITC-ILO case, the pandemic significantly influenced VR adoption, often acting as a catalyst in the decision to explore VR as an alternative work modality (Interview 22) and overcome travel restrictions (Interview 20). AI was also mentioned frequently as a key non-human actant: Contrarily to the ITC-ILO case, here its development was rather seen as a complement and enhancer of VR. Interviewees noted that VR already demonstrates significant potential for analysing user behaviour (Interviews 27). When combined with AI, this potential increases, as AI could analyse the gaze patterns and gestures (Interview 28). Furthermore, AI's ability to provide instant feedback during training (e.g., analysing tone of voice and word choice, and providing feedback in multiple languages) could not only address language barriers, but also enhance the effectiveness and engagement of soft skills training, particularly for communication skills (Interview 21).

Documents

The ANT framework stresses documents' ability to guide, prompt, and remind action, thus shaping reality and creating expectations (Pouliot, 2010a; Walters, 2002).[80] Here too, documents have been divided into internal and external categories. Internal documents comprise 'plans and strategies', 'internal materials and notes', 'reports and evaluations', and 'communications and presentations'. External documents comprise international legal and normative frameworks that influenced the network from outside the organisation and other external sources. A comprehensive list of the documents is provided in Appendix D. To highlight the importance of documents, consider the example of the ILO Convention No. 190 (C190), adopted in June 2019. C190 is the first international treaty to recognise the right of everyone to a world of work free from violence and harassment, including gender-based violence and harassment. The convention's impact on the network is evident in the heightened interest it generated in addressing these issues within the workplace, as highlighted by the Technical Officer on Gender Equality:

'At the time, I was starting to focus heavily on violence and harassment because the ILO had just adopted this new international convention (…) There was a lot of interest in the topic (…) There wasn't much available to begin raising awareness about this issue from [the gender] perspective.' (Interview 20).

Training materials and frameworks also shaped the VR training. For instance, the 5D SH framework influenced the structure of the training sessions (Interview 22), as did the existing 'RESPECT' training. Reports and evaluations also contributed: for example, the evaluators' study (Pike & Koithara Mathew, 2023) provided data on the effectiveness of VR training that fed back into the network (Section 7.5.3).

[80] See Section 4.4 for a discussion of documents as 'actants', in contrast to the policies they embody, and Section 4.3.3 on documents' inclusion criteria.

Synthesis

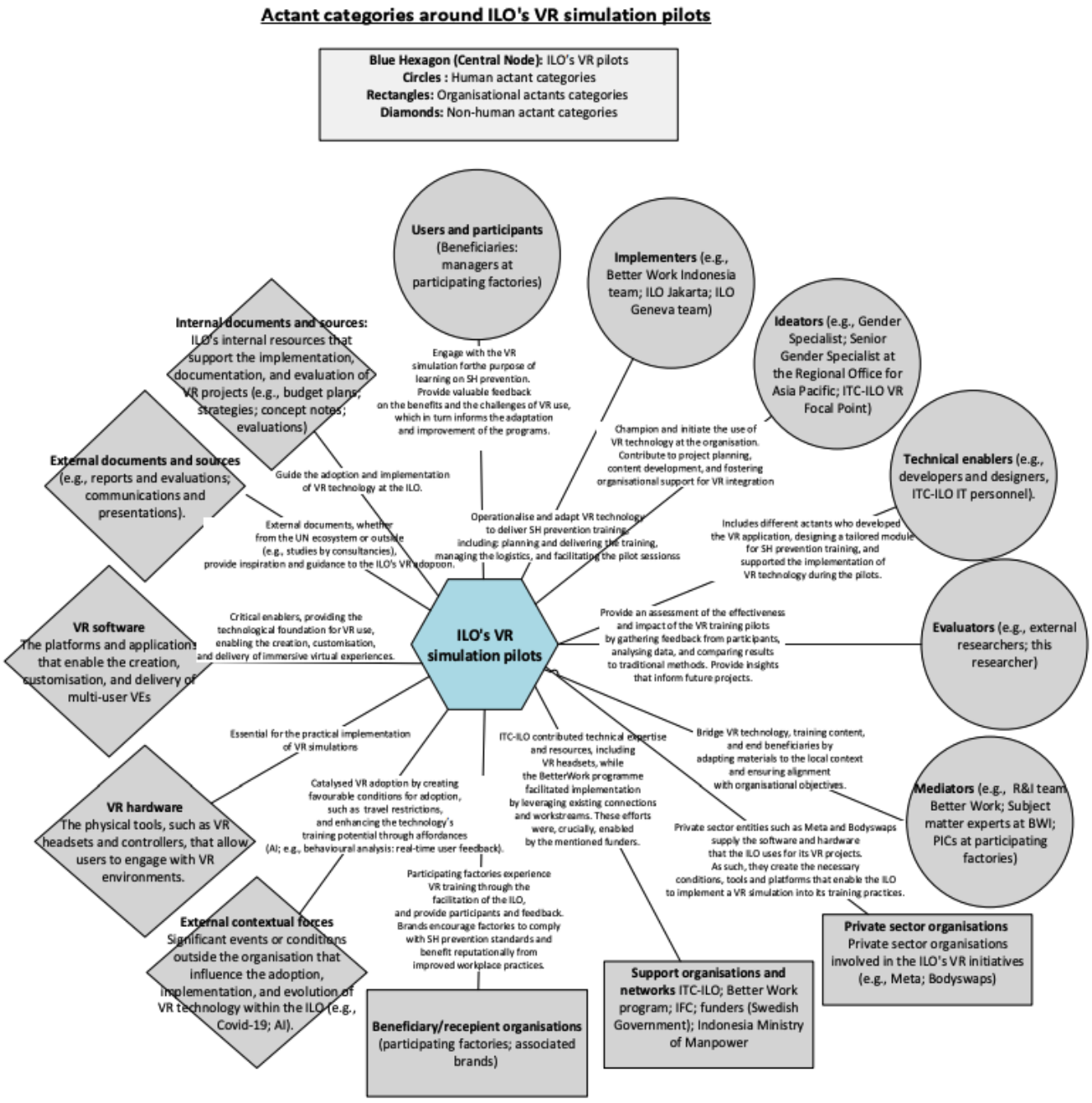
To summarise the above, the non-human actants shaping ILO's VR adoption can be grouped into four categories: VR hardware, VR software, documents, and external contextual forces. While hardware (headsets, controllers, sensors) enabled immersive interaction but also imposed constraints of logistics, cost, limited availability, and accessibility, software (the simulation, avatars, and virtual props) actively structured the training experience, with pre-programmed avatars guiding users through the VE, and artefacts such as the virtual journal shaping how they engaged with the content. Documents, both internal and external, legitimised and guided the project, and external contextual forces, notably COVID-19 and AI, catalysed VR adoption and opened pathways for future integration. Dividing non-human actants in this way makes visible their distinct yet interdependent roles and provides a basis for analysing the translation process in Section 7.5. For clarity, Appendix A summarises these categories and their respective functions.

7.4.3. Visualising the network

First network map: Ecosystem of VR adoption at the ILO

The first network map traces the ecosystem of VR adoption at the ILO. It is submitted separately as a PDF due to size constraints ('ILO Detailed Network'). Its value is described in the Methodology chapter (Section 4.5.1).

Second network map: Actant categories



The diagram above distils the network into categories of human, organisational, and non-human actants, clarifying how their distinct roles collectively shape the VR adoption process. These categories provide the basis for understanding the translation analysis, which traces how different actants assume different functions across the stages of adoption.

As in the preceding case studies, this map visualises the actants according to the categories outlined in section 7.4. These categories are not always mutually exclusive, since some actants may simultaneously occupy multiple roles. For example, the Learning Team Leader at BWI primarily acted as an implementer but also functioned as an intermediary by contributing to

the adaptation of the VE to the local context (see below). In such cases of overlap, I assigned actants according to their primary role and contribution within the network, based on my qualitative interpretation of the interview data (Section 4.4) – in this case, they were classified as implementer.

7.5. Translation processes in practice: analysing the ILO's VR initiative

7.5.1. The process of translation in the ILO's adoption of VR

Having mapped the human and non-human actants active in the network, this section traces the ILO's adoption of VR for training through the four stages of ANT's translation process: problematisation, interessement, enrolment, and mobilisation. Each stage captures a distinct moment in the construction of a sociotechnical network around VR, illuminating how the technology was imagined, defined, adapted, and integrated into the ILO's training ecosystem. By examining the iterative adoption of VR – across innovators, developers, mediators, institutional actors, and the technology itself – I aim to foreground the sociotechnical dynamics at play. I am particularly interested in examining how VR acted not only as a tool of organisational innovation but as an agentic force that constrained, enabled, and redirected human action.

7.5.2. Analysing the four stages of ANT's translation process

Problematisation

Problematisation involves key actants identifying a problem and defining how a specific technology can serve as a solution, thereby justifying its adoption within the organisation (Unnithan & Tatnall, 2014).[81] Here, the 'problem' were the perceived limitations of more traditional training modalities. As one interviewee observed, while providing training in SH prevention was not a new practice for the ILO, 'VR was implemented to see if it [could] be a bit more effective compared to the regular classroom training' (Interview 23). The timing for VR adoption was also particularly favourable due to two key factors that catalysed its introduction: the framework established by the above-cited ILO's Convention No. 190, and the COVID-19 pandemic. First, the entry into force of C190 led to rising attention to gender-based violence (GBV) in the workplace (Interviews 20; 25). This created momentum for innovative initiatives in this thematic field (Interviews 20; 30). Concurrently, the COVID-19 virus acted as an 'external contextual force' which disrupted traditional face-to-face training methods due to travel restrictions, prompting IOs to experiment with alternative methods (Interviews 20; 22). As one interviewee noted, 'The pandemic celebrated the use of technology' (Interview 22). Recognising these emerging needs, the innovators thus identified VR – with its ability to deliver training remotely – as a potential solution.

As an agentic actant in the network, VR technology actively shaped the possibilities and limitations of training practices by determining what could and could not be imagined and achieved. On the one hand, its technical capabilities opened new opportunities, such as enabling remote training and offering innovative learning experiences. On the other hand, it introduced constraints, as certain elements of real-life training cannot be fully replicated in computer-programmed VEs (Interview 28). Thus, VR functioned simultaneously as an enabler

[81] See Section 5.5.2 for an explanation of how problematisation was derived from the data and the interview questions that elicited it. Explanations of how the other phases were traced are also not repeated here, as these are addressed in their respective subsections of 5.5.2.

of new possibilities and as a gatekeeper, defining the boundaries of what could be achieved – a dual role that highlights technology's capacity to influence organisational practices, and that has been observed in the ITC-ILO and UNDP case studies, as well. Throughout this process, identities were (re)-negotiated: By recognising VR as a potential solution and advocating for its adoption, innovators positioned themselves as innovative actants proposing novel solutions. Simultaneously, the ILO itself and its institutional parameters influenced the integration of VR by ensuring its alignment with the organisation's mandate and goals. This influenced the specific forms that VR could take when being integrated in the organisation's workflows, thus marking the initial steps of its transformation. The key translation lies precisely in this reinterpretation of VR, which shifted from an abstract technological possibility into a specialised solution tailored to address specific unmet needs within the ILO – such as more effective remote training.

Interessement

Interessement, the second phase of translation, involves aligning the interests of actants by defining and negotiating their roles within the emerging network (O'Connell et al., 2014). This phase aims to secure buy-in and establish initial support by creating a network where the actants, human and non-human, perceive the new 'solution' as advancing their own objectives. In the case of the ILO, two key moments of translation were identified in interessement: partnership exploration and strategic alignment.

Partnership exploration

To adopt VR technology, the ILO explored private VR development firms as potential partners. Interestingly, this initiative emerged somewhat serendipitously from the personal network of one of the innovators who, during their previous experience at the ITC-ILO, had established

contacts with several VR developers – connections they later recalled upon joining the ILO. The ILO ultimately chose Bodyswaps from a range of potential options, including Ovation, an AI-enhanced public speaking rehearsal module, Arthur, which had been used in ITC-ILO collaboration pilots, and a software designed to create 360° branched experiences that allow users to explore various scenarios based on their decisions (Interview 21). The selection of Bodyswaps represents a pivotal moment of translation, as VR simulations were presented as the optimal solution due to their specific affordances. This decision not only shaped the project's direction but also defined its possibilities and limitations. By enabling certain actions while constraining others, Bodyswaps' affordances significantly influenced what could ultimately be achieved within the project. For instance, the software's focus on interactive role-playing scenarios facilitated the development of SH simulations, but its single user capacity limited broader applications such as remote team collaboration exercises.

Strategic alignment

The second moment of translation during interessement can be described as 'strategic alignment', referring to how the initiative was aligned with the ILO's broader initiatives. This step was crucial for securing funding, as the project needed to align with the organisation's existing priorities. Interestingly, this alignment emerged when the innovators successfully connected the project to a larger ongoing ILO initiative – Better Work Indonesia (BWI) and its extensive network of garment factories (Interview 20). This was the result of persistent effort from the innovators, who consistently presented the idea with various stakeholders over an extended period to gain support (Interview 20). By doing so, the innovators were thus able to leverage Better Work's network, enabling them to plan the project's implementation with significant potential for impact. During the translation process, the identities of both human and non-human actants were renegotiated to fit the emerging network. The innovators were no longer just project proponents, but became strategic brokers, actively aligning the VR

initiative with BWI's objectives. Similarly, VR technology was redefined as a specific solution for SH training and 'kicked back' again by imposing its own affordances and constraints on the network, shaping what was possible within the project.

Enrolment

Enrolment is the phase where the relationships between human and non-human actants are established and formalised. Conceptually, it can be understood as the practical implementation of the alignment strategies initiated during interessement: while interessement focuses on persuading actants to join the network by aligning their interests, enrolment is about formalising these alignments by assigning concrete roles. Two key translation moments were identified during enrolment: contextualization and simulation development.

Contextualisation

Once the project concept and its alignment with the broader BWI initiative were established, a 6-month long consultation period followed, to ensure the VR simulation's contextual relevance and to avoid duplication with existing SH training programmes (Interview 21). This phase involved extensive consultations with subject matter experts from both BWI and the Geneva R&I team (Interviews 21; 22; 26), who played a crucial role as 'mediators', bridging the global ILO team with the local end users. First, to ensure contextual relevance, the language, scenarios, and interactions in the VR training had to align with local norms and customs. For example, as in South Asian contexts SH is a particularly sensitive, 'taboo' topic, the module was tailored to align with the cultural sensitivities of end users (Interviews 25). Second, to avoid duplication, the VR module was designed to complement rather than duplicate existing BWI training contents: For example, while the 'Respectful Workplace Training' programme already addressed certain SH themes, the VR simulation introduced new

content, such as ‘quid pro quo’ scenarios, to ensure added value without redundancy (Interview 29). During this process, the global issue of SH was ‘translated’ into a localised and culturally tailored training simulation for garment workers in Indonesia. Achieving this translation required aligning a network of diverse actants: innovators, subject matter experts, developers, and the VR technology itself.

Development of the VR simulation

After the interessement phase, where Bodyswaps was identified as the primary partner, the enrolment stage marked the formal integration of the company and VR technology into the network. The development of the VR simulation was a highly collaborative, iterative process between ILO and Bodyswaps. As described by interviewees, it involved constant feedback and amendments from the ILO to ensure alignment with their organisational goals (Interview 28). The process began with a content workshop aimed at mapping out key elements of the VR simulation, including the scenarios, learning objectives, target audience, and characters to be featured. Based on the workshop outcomes, Bodyswaps designers created an initial design proposal, which was reviewed and amended by the ILO. Then, the scripting phase involved drafting dialogue, user interface (UI) panels, and other narrative components. Parallel to scripting, avatars were developed using tools such as Character Creator and AI plugins. Real actors were also employed to capture the emotional aspect of the SH topic. The VE was then built and moved into the final stages of alpha and beta testing. We can understand the key translation here to be the transformation of the idea into a physical VR module for the training programme. In other words, the translation of abstract SH concepts – often conveyed through text, lectures, or discussions – into a 3D, interactive VR simulation. This required leveraging the distinct affordances of VR technology – its capacity for immersive visual design, the use of avatars, virtual artefacts, and so forth (cf. Section 7.4.2 on VR software) and translating them into the ILO’s desired narrative.

Mobilisation

Mobilisation refers to the final stage of ANT's translation process, where actants are mobilised to act in alignment with the network's goals. At the ILO, three key translations were identified during this stage: the delivery of the VR training module to its beneficiaries, the evaluation of the project's impact, and the subsequent steps taken towards VR expansion and scaling.

Operationalisation of the VR simulation

Firstly, mobilisation involved the deployment of the training simulation to its beneficiaries, the factory managers. As outlined in Section 7.3, the VR pilot was conducted at a designated hotel venue in September 2022 over three one-day training sessions. Implementers were key actants in this phase, as they oversaw both the planning and the execution of the pilots (Interviews 22; 24; 26). One of the innovators was also present on the day to support the initiative (Interview 24). Additionally, technical enablers were crucial in this phase: ITC-ILO provided the hardware and dispatched both a facilitator and a technical specialist to manage the technical aspects during the pilots (Interviews 21; 22). Viewed through the lens of ANT's translation, this stage represents an important moment where the VR simulation transitioned from being a design-stage, digital training module into a tangible, embodied experience for the beneficiaries. The beneficiaries themselves were central to the translation: their participation in the simulation was not only essential to the pilot's purpose but also provided critical insights into the effectiveness of using VR for SH training. As discussed further in the next section on pilot evaluation, their role extended beyond that of passive recipients or mere 'spectators' of the training. Instead, they were active participants: engaging with the training material, exploring various possibilities for action within the simulation from multiple

perspectives, presenting forms of resistance that required adjustments and refinements to the training approach (Pike & Koithara Mathew, 2023).

Evaluation of the VR pilots

The second key phase was the evaluation of the VR pilots, during which the evaluators played a critical role. Their primary objective was to assess the effectiveness of the project, to determine 'what worked and what didn't' (Interview 21). The process involved gathering feedback directly from participants, who provided integral input to understanding the reception and practical implementation of the VR training. Importantly, the evaluation was not a one-off activity but occurred at multiple points in time. Immediately after the pilots, the team conducted an initial round of evaluations to collect participant feedback (Interview 22). A second, more longitudinal evaluation was conducted approximately a year later. This follow-up sought to verify whether the original evidence remained valid and to assess the ongoing impact of the VR training (Interviews 20; 25). From an ANT's perspective, this evaluation phase represents a crucial process of translation. Evaluations translate participant feedback and turn the data into actionable insights, which in turn influence how the network evolves or stabilises. Furthermore, evaluations establish a feedback loop (cf. Section 7.5.3), which ensures that outcomes, such as recommendations or refinements to the VR simulation, are considered in future endeavours or in a potential scaling of the technology.

VR expansion and scaling

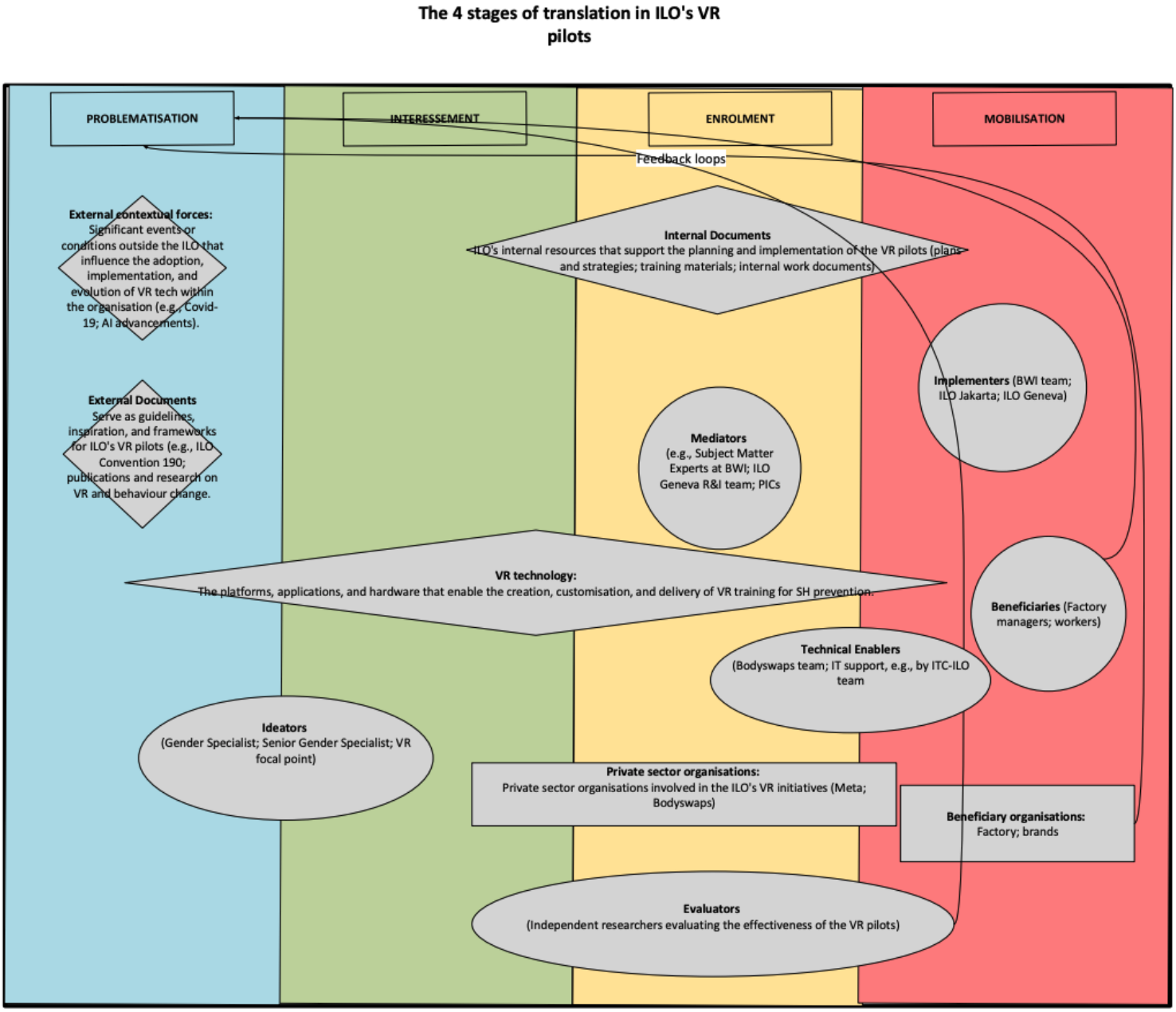
The final key moment during mobilisation is characterised by efforts to expand and scale the VR training simulation. Future plans for scaling the initiative highlight key considerations and challenges. For instance, there is an emphasis on localisation, with interviewees acknowledging the need to translate the simulation into Bahasa Indonesia to ensure its

relevance and effectiveness (Interview 22). Moreover, securing evidence of medium-term impact through the long-term evaluation mentioned above is seen as essential for future fundraising and advocacy efforts: 'If we have evidence of medium-term impact, it's easier to fundraise and argue for expansion' (Interview 20). One notable scaling effort was the showcasing of the VR simulation at the Indonesia Business Forum via a dedicated booth (Interviews 22; 26). This event provided an opportunity for stakeholders –representatives from industries, factories, and organisations – to experience the simulation firsthand. Such strategic visibility was intended to build support for the initiative and generate momentum for wider implementation. From an ANT perspective, this phase represents another critical translation: shifting the VR initiative from a localised pilot to broader visibility and potential integration within other actor-networks.

At the same time, the data also revealed that logistical and budgetary challenges pose significant hurdles to scalability. Interviewees expressed concerns about the high cost of the technology (Interviews 20; 23; 27), the logistical challenges posed by the headsets (Interviews 23; 24; 25), the reliance on external suppliers (Interviews 20; 21) and the need for ongoing technical and logistical support (Interviews 20; 23). To address these challenges, some interviewees proposed potential solutions. For example, successful scaling could involve factories acquiring their own VR headsets, with the ILO providing only the software (Interview 22). This arrangement would shift part of the financial and logistical burden to the participating factories, making, however, scalability heavily dependent on their buy-in. Such concerns are echoed in the literature. Verma (2022), for example, in an article about VR's potential for SH and diversity training, highlights the importance of broader strategies and follow-up, without which VR's impact on workplace culture could be limited. What becomes evident here is also the agency of VR itself: its materiality and technical requirements assert themselves during efforts to scale the initiative, effectively 'kicking back' by introducing new

demands and constraints. These constraints compel human actants within the network to renegotiate their roles and responsibilities, as illustrated by the proposed solution of having factories procure their own headsets.

7.5.3. Stages of translation flowchart



The flowchart shows how human and non-human actants operate across the four stages of translation, making visible the stabilising mechanisms and vulnerabilities that arise from the way agency is distributed throughout adoption. This temporal mapping also enables comparison across case studies, revealing how different configurations may strengthen or weaken the translation process.

The flowchart depicted provides a visual representation of the distribution of human and non-human actants throughout the translation process. This visualisation has three key benefits: First, it highlights how the ILO's adoption of VR technology does not occur in isolation, but

is rather the outcome of a coordinated network of actants whose interdependent roles all sustain the translation process. Second, it allows to trace the phases in which different actants are the most or least active, thus shedding light on the division of roles in this network. In other words, while these roles are already discussed in section 7.4, the flowchart makes them more tangible, revealing insights that may not be immediately evident in text form. Third, by structuring these interactions visually, it becomes possible to identify both stabilising forces within the network and potential vulnerabilities or bottlenecks, which are then compared across case studies in the discussion chapter (Chapter 8). The next paragraphs will examine two key stabilising forces and two potential vulnerabilities.

Firstly, a key stabilising force is VR technology itself, which remains a consistent and active presence throughout the translation process. Unlike human actants, whose involvement fluctuates across different stages, VR technology persists as an ongoing structuring force, shaping each phase as it is translated from an 'imagined technology', an idea, into an applied and embodied experience. Its continuous presence underscores its role not merely as a tool but as an active component in the translation process. Crucially, however, whether VR stabilises the network also depends on various factors – as in the preceding case studies, VR has a dual role as both an enabler and a constraint: while it expands training possibilities through immersive learning, it also imposes limitations due to hardware costs and accessibility. This dual role underscores the technology's agency in shaping organisational practices. A second key stabilising role is played by evaluators, who contribute from interessement to mobilisation, also feeding back into problematisation through feedback loops which provide the ILO with insights into the initiative's successes and areas for improvement. This suggests that research, monitoring, and evaluation roles are not peripheral but integral to reinforcing VR adoption, as they ensure knowledge about which adjustments are needed to eventually integrate VR in the long term.

At the same time, certain aspects of the ILO translation process present points of fragility. A significant bottleneck arises in the shift from innovators to implementers. As seen in the other case studies, a recurring pattern emerges: innovators primarily shape the first two stages (problematisation and interessement), while implementers take responsibility of integrating VR into existing frameworks and managing execution during the final stage (mobilisation). The flowchart reveals a clear handover point between these early stages and mobilisation, marking the transition from strategic vision (led by innovators) to practical execution (led by implementers). This shift can introduce fragility, as the success of the translation process depends on implementers' ability to effectively translate strategic objectives into concrete outcomes, and on the innovators' ability to ensure that their strategic vision is adaptable, and clearly communicated. A crucial mitigating factor is the role of mediators, who function as stabilising elements in this transition: The diagram indicates that mediators play a key role in the enrolment phase, bridging the gap between innovators and implementers to ensure that the project maintains contextual relevance and practical applicability. For example, the BWI Indonesia team acted as an intermediary by adapting the VR module to the specific needs of garment sector workers, ensuring cultural and contextual appropriateness. Their involvement helped prevent misalignment between strategic objectives and on-the-ground realities.

A final vulnerability – also observed in the ITC-ILO case study – stems from the problematisation phase and the influence of external contextual forces. As said above, problematisation is where the issue is defined and the decision to adopt VR is initially framed. The concern here is that some of the factors behind the initial 'problem' – particularly external contextual forces – may lie beyond the ILO's control. For example, while COVID-19 increased ILO's interest in VR as a solution to the problem of travel restrictions, the lifting of

those restrictions has cast doubt on the organisation's long-term commitment to the technology. Will VR continue to be perceived as a 'solution', or has the problem itself dissipated? Will its adoption decline as the urgency diminishes? Similarly, while data suggests that AI can enhance VR's analytical and feedback capabilities, its rapid evolution introduces significant unpredictability.

7.5.4. Summarising the translation process: sociotechnical co-constitution in ILO's adoption of VR simulations

Like in the previous cases, examining the translation process has illuminated how the process of VR adoption at the ILO is shaped by sociotechnical dynamics between human and non-human actants. In particular, VR was not merely adopted but *translated* as it entered into, and evolved within, the ILO network, exerting an active influence. During problematisation, VR was positioned as a response to training limitations exacerbated by two contextual forces: the rise of GBV on the ILO agenda following C190 and the operational disruptions of COVID-19. While innovators imagined VR as a pragmatic solution, the technology also acted on them by expanding their sense of what effective remote training might look like, prompting new visions of learning innovation. In interessement, VR's characteristics directly influenced the selection of Bodyswaps over other options – its capacity for interactive role-play shaped what was deemed feasible and desirable. This, in turn, reoriented human decision-making: the innovators had to adapt their ambitions to what this specific platform could support, narrowing use cases and reconfiguring project goals. Similarly, aligning the initiative with BWI introduced new institutional actants, whose agendas and constraints further shaped how VR would be positioned and deployed. During enrolment, VR's affordances, such as avatar design, branching dialogue, and immersive interfaces, acted upon subject matter experts and developers, requiring them to translate abstract training content into embodied, interactive

simulations. In mobilisation, VR continued to shape human action by imposing specific infrastructural demands: its reliance on headsets and technical support, and its location needs, impacted implementation. At the same time, it was itself shaped by institutional decisions regarding audience targeting, delivery methods and locations, and evaluation methods, which influenced how the technology was deployed and interpreted within the ILO ecosystem. Altogether, looking at the translation process was insightful, as it showed us how VR adoption was not a linear act of implementation but a multi-stage process of sociotechnical co-constitution, during which the technology was both shaped by human actants and institutional logics, but also shaped them in turn, yet again underscoring Latour's idea that technologies actively mediated the evolution of social practices (Latour, 2005).

7.6. 'Training as experience': VR's emerging properties in training and implications for the UN's role as *capacity builder*

As in the ITC-ILO and UNDP case studies, the properties examined below were identified based on recurrence and analytical significance (cf. Section 4.4). What emerged from the data is that the practice of training has been shaped by VR adoption in three key ways: *embodied influence, interactive engagement,* and *psychological safety.* As outlined in the theoretical framework (Section 3.3.3), such properties are not reducible to either technological affordances or individual user responses alone, but materialise through sociotechnical translation. This section examines both the influence of these properties on the ILO's training practices, and their potential trajectory and broader impact, particularly in relation to the UN's role as a *capacity builder.*

7.6.1. Embodied influence

The first emerging property identified across the interviews was, as in the UNDP case, *embodied influence.* Interviewees repeatedly highlighted VR's persuasive capacity to influence users' attitudes and prompt shifts in behaviour following the simulation. This view was shared across different roles, including the Learning Team Leader, the Gender Specialist, and the VR developer (Interviews 20, 22, 28). The Learning Team Leader in particular argued that as a tool, VR is more effective than more traditional tools for behaviour change, as well as for a 'change of mindset', suggesting that VR has the potential to facilitate both attitudinal and cognitive change. Furthermore, one of the mediators noted the significance of this component, especially for public IOs, where behaviour change strategies are not only valued but often central to the implementation of training initiatives (Interview 27).

The notion that VR can influence human attitudes and behaviours is also reflected in the academic literature (cf. UNDP chapter, Section 6.2 and 6.6.3). Studies have generally found VR-based training to be particularly effective in engaging and encouraging positive social change (Bailey & Bailenson, 2017; Hu-Au & Lee, 2017; Radianti et al., 2020). In terms of cognitive change, numerous studies have shown that VR can reduce implicit racial bias (Banakou et al., 2016; Peck et al., 2013; Salmanowitz, 2018) and increase mimicry behaviours typically reserved for in-group members (Hasler et al., 2017. See also Chen & Ibasco, 2023). In terms of attitudinal change, both Slater and Sanchez-Vives (2005) and Hasler and colleagues (2021: 2257) note the technology's potential to shift perspectives on a wide range of social issues. Similarly, Breves (2020) finds that immersive media foster greater issue involvement, thereby increasing the likelihood of attitude change. Other studies support this:

VR experiences have been shown to increase users' sensitivity to environmental risks such as flooding (Zaalberg & Midden, 2013) and to raise vaccination intentions (Nowak et al., 2020).

Beyond its impact on attitudes, research has examined VR's behavioural effects in the domain of prosocial behaviour (Bowman et al., 2020; Ivanovitch, 2017b) The meaning of VR and prosocial behaviour was outlined in Section 6.2 and will not be repeated here. What is relevant for ILO's SH training is that VR is associated with more durable behavioural effects than other training platforms (F. Herrera et al., 2018; Howard et al., 2021). To illustrate, Herrera and colleagues (2018) found that participants who experienced a VR homelessness simulation were significantly more likely to sign a petition supporting homeless people than those who engaged in less immersive perspective-taking tasks. Another strand of research concerns pro-environmental behaviour: participants exposed to immersive environmental scenarios reduced paper consumption by up to 20% for at least a week (Ahn et al., 2016; Ahn & Bailenson, 2014).

What, then, drives VR-induced behavioural change? A growing body of research points to perspective-taking as a key mechanism, uniquely enabled by, or at least significantly enhanced, by VR through VRPT (7.2). Unlike traditional media, VR affords users the ability to inhabit another's position, whether through embodying an avatar or, as in the present case study, by 'swapping' virtual bodies. Perspective-taking here refers to the user's ability to 'step into someone else's shoes', not merely imagining another's experience, but inhabiting it virtually. Studies show that this capability facilitates prosocial outcomes (F. Herrera et al., 2018; Jouriles et al., 2009, 2011; Mado et al., 2021). For example, Mado and colleagues (2021) demonstrated that VRPT increased helping behaviour, particularly when the VR experience was directly related to the target of that behaviour. VRPT's ability to impact behaviour is, as discussed in Section 7.2, attributable to the realism of contextual detail and the heightened

sense of presence. This is noteworthy, as in the UNDP case study it was precisely realism that was identified as the foundation of *embodied influence* (Section 6.6.3).

The importance of perspective-taking is echoed in the interviews, with participants often citing VR's capacity to shift perspective as its key added value. An intermediary noted how one of VR's strengths was enabling users to place themselves in the position of another experiencing violence or harassment (Interview 27). Others viewed this not merely as a feature of the technology but as the foundation of its behavioural impact. Referring to the body-swapping exercise, the VR Focal Point explained how participants first delivered a speech as themselves and then switched avatars to re-watch their performance from the outside, and noted that: 'they see themselves, judge themselves: "How did I do that?" And what we saw, from follow-up conversations with participants, is that they wanted to change a bit, *because they saw themselves*' (Interview 21). Similarly, the Gender Focal Point described body-swapping as the 'real added value of the experience', the 'rehearsing, watching yourself, listening to yourself, seeing yourself from the outside' (Interview 20). This emphasis on self-observation through another's eyes reinforces what experimental literature suggests: perspective-taking not only enhances understanding but can also trigger reflection leading to behavioural change. I propose the term *embodied influence* to capture this emerging property, as it more precisely reflects the sociotechnical dynamic at play. While existing literature often distinguishes between behavioural change and perspective-taking, my interviews revealed their entanglement: it is precisely embodied perspective-taking (experiencing oneself or others from a new vantage point) that catalyses reflection and behavioural shifts. Framing this as embodied influence highlights these effects not as isolated psychological outcomes but as relational properties emerging through the VR experience, underscoring the mutual shaping of technology and users.

To corroborate these interview insights, I turned to the Embodied Virtual Observation (EVO), to examine whether the VE supported this dynamic, and found that it incorporated several design features directly relevant to the concept of *embodied influence.* One was the branched choice between different behavioural responses (Figure 31). In the simulation, the VE gives users the chance to explore the '5Ds' of active bystander intervention. Rather than prescribing a single 'correct' action, the VE allows participants to rehearse different strategies and consider their implications. This encourages reflection and correction, mimicking the iterative learning process necessary for behavioural transformation. Another key feature is the targeted feedback offered after users rehearse a spoken intervention (Figure 30). At this stage, the VE provides immediate commentary on specific behavioural dimensions, such as whether users maintained eye contact, avoided judgmental language, or used 'I' statements. This feedback does not judge 'right or wrong' in absolute terms but instead identifies areas for improvement, prompting users to fine-tune their speaking. By translating abstract social norms into concrete, observable markers, the VE makes behaviour change more actionable. Finally, as stressed above, the VE allows users to observe their own performance from an external perspective: Users rewatch their intervention from a third-person viewpoint, enabling critical reflection beyond recall (Figure 29). This feature influences users by stimulating self-reflection, helping them recognise problematic elements, such as inappropriate tone or delivery, and internalise more effective responses.

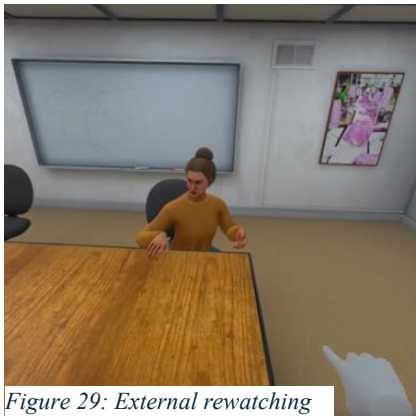


Figure 29: External rewatching through body-swapping

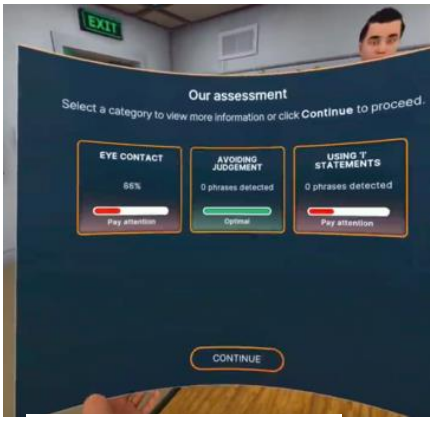


Figure 30: Targeted feedback

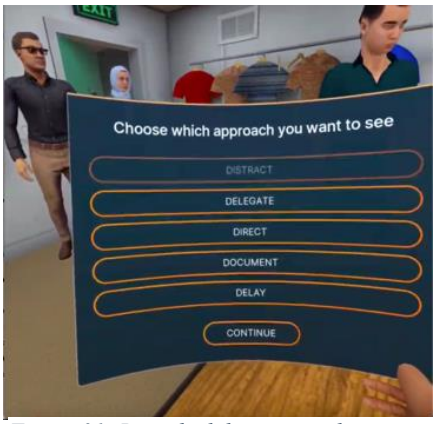


Figure 31: Branched decision-making

VR's *embodied influence* is a particularly valuable outcome for UN organisations to consider. As interviewee 27 noted, shaping trainee behaviour is central to training initiatives, which are designed not merely to inform but to prepare staff for action in high-stakes environments. VR's capacity to foster such change is therefore highly pertinent, its value extending beyond bystander intervention to any context where participants must internalise and enact specific practices. In the humanitarian field, for example, VR simulations can immerse personnel in complex situations – responding to emergencies or supporting victims – where ethical judgement and sensitivity to local conditions are essential.[82] Here, VR could lead to deeper behavioural shifts than conventional methods. Likewise, in environmental sustainability trainings, VR experiences could help entrench habits such as responsible consumption and low-carbon travel. VR could also improve practices reliant on cross-cultural understanding and context-sensitive communication. In conflict-resolution training, replaying an interaction can expose unintended signals, raising awareness of how tone, body language, and word choice influence conflict dynamics (Madonik, 2001). For diplomatic training, where how one is perceived is often as important as what one says (Jönsson & Hall, 2003), VRPT could enable diplomats to refine their behaviour before entering high-stakes negotiations or public engagements.

Embodied influence does not come without challenges. First, some question the extent to which such change genuinely occurs. As Khanna and colleagues (2025) argue, VR prosocial outcomes are highly context-sensitive, shaped by scenario design, the nature of the targeted behaviour, and the technological affordances at play.[83] This concern is echoed in the interviews: one intermediary distinguished between 'real effort' and 'online effort,' doubting

[82] As was the aim of the UNHCR 'Safeguarding VR' initiative (see footnote 10).
[83] Cf. Rawski and colleagues' (2022) nuanced findings, and the issue of 'isolating the VR factor' (Section 4.8).

whether behavioural changes in VR translate to real life. In a SH VR scenario, a female participant could say 'no' in the VE because she knows the perpetrator is virtual and cannot physically react. This may not reflect real-world interactions, where 'virtual courage' is absent (Interview 27). Another challenge relates to the longevity of behaviour change. Bertram and colleagues (2015) found that while knowledge transfer remained consistent across conditions, trainees reported feeling more motivated when training occurred in physical rather than virtual environments. If motivation is indeed a key driver of sustained behavioural change, this finding suggests that VR-based interventions may be less effective over time. This concern was echoed by one interviewee (25), who pointed to the importance of follow-up mechanisms to consolidate behavioural change and ensure long-term impact. Finally, VR's very effectiveness introduces ethical concerns, raising the risk of what Madary and Metzinger (2016b) term 'deep behavioural manipulation' (see also Section 6.6.3). While this potential makes VR a powerful tool, it also demands careful attention to responsible design and deployment.

7.6.2. Interactive engagement

The second property to emerge from the data is *interactive engagement*, driven by interactivity and gamification. As this is also an emerging property in the ITC-ILO case study, I refer the reader to Section 5.6.3 for definitions and a concise discussion of these terms. In the ILO case too, engagement appears to result from the sociotechnical interplay between VR technologies and human users, yielding higher attention compared to more traditional media formats. The role of engagement was emphasised across interviews as a key added value: one intermediary observed that trainees remained attentive 'the whole time' during the session, in contrast to conventional training formats, attributing this to the fact that VR 'felt not boring or dull, but an experience' (Interview 27). The VR Focal Point likewise stressed the importance of

engagement, pointing to VR's creative affordances and the opportunities it opens for designing more varied and dynamic training modules (Interview 21). As discussed in the ITC-ILO case study, engagement is typically driven by two factors: interactivity and gamification. As regards interactivity – the ability to freely move around a VE, to modify its elements, to control parameters and respond to perceived affordances, environment cues, and system feedback (Roussou et al., 2006) – participants typically feel more involved in a virtual experience precisely because of this freedom to act and explore, rather than passively absorbing information. This dynamic was noted in interviews: The Learning Team Leader, for example, contrasted VR's exploratory freedom with the limitations of conventional role-play exercises, noting that VR allows participants to test out multiple scenarios and thereby 'strengthen what is already existing in the training' (Interview 22). Likewise, an evaluator emphasised the 'flexibility' offered by VR, observing that unlike time-bound, linear formats, VR allows users to 'take your time, you know? You can do multiple attempts and then move forward' (Interview 23). This flexibility, which is central to interactivity, was further echoed by a developer, who likewise highlighted VR as a medium encouraging 'exploration' through the opportunity it creates to explore different behavioural responses, including 'the other options, the other wrong answers' (Interview 28).

A particularly salient form of interactivity, which was highlighted by an interviewee and confirmed by the researcher in the EVO, was gamification. Extensively discussed in the international development field (Hammler et al., 2022; Holzer et al., 2020; Jammermann & Tunc, 2022), gamification has been recognised as an effective strategy to sustain attention and motivation. One intermediary noted that, in an increasingly saturated media landscape, training providers are essentially 'doing a battle on which medium to use to get people's attention', with gamification emerging as a promising method to support not only attention

but also reasoning skills (Interview 27).[84] This was substantiated during the EVO, where several gamified elements were noted. First, a self-assessment interface invites users to rate their confidence in using active bystander techniques (Figure 32). Second, timed interaction scenarios required users to respond by pressing a button upon identifying problematic statements related to SH, with performance measured through speed and accuracy (Figure 33). Finally, digital badges were awarded (Figure 34), mirroring familiar reward structures from gaming contexts – such as points, achievements, and leaderboards – which reinforce motivation and sense of accomplishment (Dicheva et al., 2021).

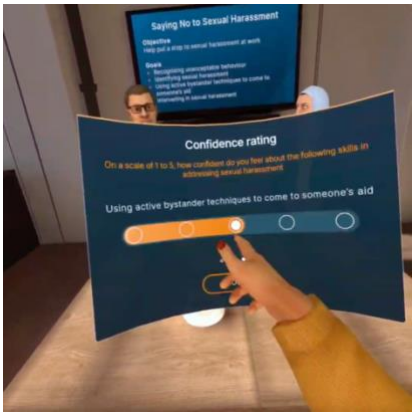


Figure 32: Self-assessment interface

Figure 33: Timed interaction scenarios introducing gamification

Figure 34: Digital badge

VR's capacity to heighten engagement through interactivity and gamification has important implications for IOs. Gamified elements can motivate people to participate in a wealth of different activities (Suh et al., 2018), and specifically on topics that are either difficult to engage with – such as SH or broader inclusivity issues – or generally perceived as unengaging – such as administrative trainings on compliance and procedural rules, often cited among the least compelling (Dvorak, 2021). Furthermore, SH is a particularly delicate topic

[84] Interestingly, considerations on the attention economy and the competition for visibility emerged also in the UNDP case study, with VR being positioned as a potential 'solution' to that problem (Section 6.5.2).

(Interviews 20, 22, 23, 25). The property of *interactive engagement* can therefore 'open up' discussions around otherwise sensitive or avoided topics. As the VR Focal Point noted: VR 'loosens people up, immediately' (Interview 21). This can yield significant benefits for IOs and can support the UN's role as a *capacity builder.*

However, engagement, interactivity, and gamification also raise critical challenges and concerns. In the ITC-ILO chapter, we have thought about the concerns around *interactive gamification* especially as regards environments where multiple users play *together:* there, we identified the challenge of games' in- or exclusivity and superficial participation. This case study added some empirically grounded difficulties related to interactivity and gamification. First, as interviewee 27 pointed out, VR's resemblance to a videogame can be double-edged: while it is compelling and immersive, it also risks detachment from concrete reality. This is a common concern in the literature on VR gaming, where a 2022 study found that 30 minutes of VR gameplay induced mild derealisation (feeling of unreality) and depersonalisation (Peckmann et al., 2022). There is also a certain limit or risk associated with the game-like or simulated nature of VR training, when it comes to applying learned behaviours in the real world. For example, the absence of real-world stakes may lead to a diminished sense of urgency, as trainees know that mistakes won't have real fallout (as argued above. See also: Save the Children, 2020). Finally, the ethical appropriateness of gamifying certain topics must be carefully evaluated. As Save the Children (2020: 15-16) emphasise in their report on serious games use in humanitarian organisations, particular caution is needed when addressing sensitive themes, especially those involving human suffering.[85]

[85] For further reading on VR serious games, see Damianova and Berrezueta-Guzman (2025).

7.6.3. Psychological safety

The third emerging property is *psychological safety*. Edmondson and Lei (2014) define psychological safety as 'people's perceptions of the consequences of taking interpersonal risks in a particular context such as a workplace'. In essence, individuals feel psychologically safe when they believe they can take interpersonal risks – such as speaking up, making mistakes, or expressing concerns – without fear of embarrassment, rejection, or punishment. This dimension of psychological safety emerged strongly across the data, with several interviewees identifying it as an added value of using VR for training. In particular, they noted its significance in sessions addressing sensitive topics such as SH, where participants might otherwise feel uncomfortable or exposed. An evaluator (Interview 23) explained that VR can be more effective than traditional classroom settings because it accommodates the sensitive nature of the topic and cultural factors. As they put it, in specific cultural contexts, 'participants are not gonna be (…) able to talk about (sexual harassment) in very often, right?' VR, in this sense, becomes a medium that allows participants to approach difficult topics with less discomfort and more openness. Similarly, the VR focal point observed that users can practise difficult conversations, such as confronting a virtual perpetrator, 'without the fear of being judged too much' and 'without having to put themselves too much in the spotlight' (Interview 21). Other interviewees echoed this perspective (Interviews 22; 25). The Learning Team Leader (Interview 22) highlighted that it 'allows participants to speak more freely in the privacy of the VR', especially when compared to conventional training sessions:

'If they are doing it in a useful regular training setting, maybe they have to watch out for their image, be careful with what they are saying (…) they don't want to look bad in front of other participants. But with the VR, they are on their own, so they can try as freely and as many [times] as they want. They don't need to be careful with their image, because nobody's watching.'

From the technical enablers side, similar points were raised. The lead developer (Interview 28) underscored the importance of the simulation's 'freedom to fail', noting that trainees are often constrained by fear of saying the wrong thing: 'If you had a human coach, there are always those implicit beliefs, things that if you say you will be frowned upon'. In contrast, VR enables users to 'say whatever comes through [their] mind[s]', to 'try things out' and engage in the learning process without fear of judgment.

This capacity of shielding users from external judgement finds some support in the broader literature on VEs, although direct VR research remains limited. Foundational research by Sherry Turkle (1994) focused on text-based virtual worlds known as MUDs (multi-user dungeons) argued that such online environments can serve as safe spaces by enabling users to experiment with new identities in relatively consequence-free settings. This sense of safety stems, *inter alia,* from the degree of control individuals have over how much of themselves they decide to disclose (Turkle, 1994: 163). Subsequent psychological research confirmed and extended these insights: McKenna and Bargh (2000) demonstrated that anonymity and control over self-presentation in online settings encouraged individuals to express their 'true selves', describing digital environments as offering a 'protective cloak' that shields users from fear of social repercussion. Suler's (2004) concept of the 'online disinhibition effect' echoes this, suggesting that people feel less inhibited and more willing to share in digital environments, which become 'safe spaces' for discussing sensitive or personal topics. While the idea of digital safe spaces is well-established in the context of the internet, it has received comparatively less attention in the domain of VR. One important strand of VR research – particularly in clinical psychology – focuses on safety in the context of exposure therapy for phobias, with consensus that VR-based exposure training has the same benefits of real-life exposure (Carl et al., 2019; T. D. Parsons & Rizzo, 2008; Wechsler et al., 2019), but feels safer, due to VR's immersive yet controlled design (Javaherirenani et al., 2022). This is also due to

the specific affordances, the things that can be created in VEs, as VR an introduce scenarios or stimuli that would be impractical or impossible otherwise – for example, a virtual spider can be made gradually larger than any real spider, to gradually challenge a patient's tolerance. However, this therapeutic model differs substantially from training environments such as those developed by the ILO, where the aim is not to confront fear but to enable users to speak freely without fear of social exposure. Only a limited number of VR-specific sources explicitly discuss this property in the context of training. Two notable exceptions are Kyrlitsias and Michael-Grigoriou (2022), which found that VR can offer a safer environment for learners, particularly in training simulations, and Sadeh-Sharvit and colleagues (2021), who stressed that element of safe, realistic practice of responses. Their study highlights how virtual agents in VR enable individuals to practise public speaking or confront anxiety-inducing situations in a controlled yet immersive setting. Similarly, a blog article from Western Governors University (2021), based on their institutional use of VR classrooms, describes how such environments can function as 'fail-safe' spaces', enabling students to practice difficult conversations and try again without fear of failure.

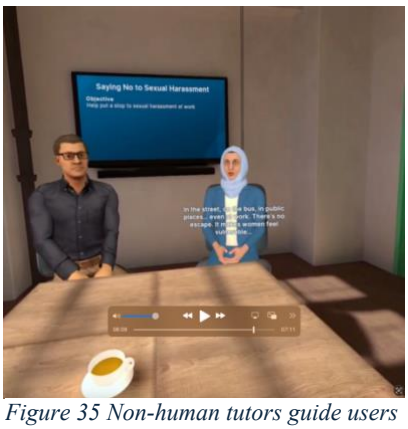


Figure 35 Non-human tutors guide users through sensitive content, creating a psychologically safe learning environment.

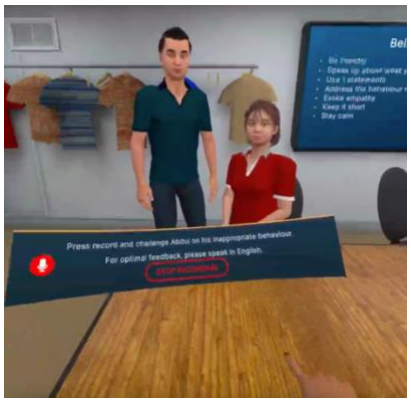


Figure 36: Mediated safety: facing a non-human avatar impersonating the perpetrator can reduce perceived social judgement

Interestingly, a key factor underlying this sense of psychological safety, emphasised both in interviews and in the literature, seems to be the use of avatars, or 'conversational agents'

(Yildirim, 2021). The developer linked VR's safety not only to the immersive, enclosed nature of VEs, but to the fact that users interact with avatars rather than real people, which provides freedom to experiment (Interview 28). This highlights a key distinction from Social VR, where interaction with others is the core strength (cf. Chapter 5): here, the absence of real-time social scrutiny is precisely what enables users to explore freely. This protective function of avatars was echoed by both the Gender Focal Point and the VR Focal Point. The former noted that, while the VR experience is emotionally impactful, its fictional nature, conveyed through the presence of non-human avatars, makes it feel 'safe' to users (Interview 20). Similarly, the latter described the absence of a 'real person' as a 'safety net' that would be difficult to replicate in a real-life setting (Interview 21). These perceptions are supported by existing research.

In addition to Kyrlitsias and Michael-Grigoriou's findings cited above, a study by Lucas and colleagues (2014) showed that avatars, when acting as interviewers, could elicit more honest responses than human interviewers in clinical contexts, enhancing disclosure by removing social pressures.[86] More recently, Hirata (2023) examined the use of Gather, a 2D VE where users navigate as avatars (Gather Presence Inc., 2024), and found that avatar-assisted virtual classrooms significantly reduced students' fear and apprehension when speaking English aloud, improving their speaking confidence. Similar results were observed by Peng and Wan (2025), who found that AI-enhanced teaching assistants offered greater perceived privacy and fairness than their human counterparts, leading to increased psychological safety and self-disclosure – a salient finding, given that contemporary VR simulations are increasingly integrating AI-driven conversational agents (Bodyswaps, 2024).

[86] See, however, contrasting findings by Powers and colleagues (2013), who found higher fear ratings in the VR condition compared to the in vivo condition when studying social anxiety and virtual avatars.

Especially for efforts around difficult or delicate topics, where the absence of judgement is essential for meaningful participation, the property of *psychological safety* emerges as particularly valuable. In delicate areas – such as diversity and inclusion, mental health, conflict resolution and mediation – VR simulations could help participants speak freely, despite the perceived social risks of embarrassment or non-conformity. The same goes for trainings that touch on culturally sensitive or 'taboo' topics. In some cultural contexts, open discussion of themes such as gender and sexuality, violence, power dynamics, whistleblowing, or religious discrimination may be discouraged or considered inappropriate. In such cases, the fact that VR enables participants to engage with challenging content privately, without fear of social judgement can lead to a more inclusive learning environment (Interview 23). This is particularly relevant in the UN context, where a core aspect of the organisation's work involves navigating diverse cultural landscapes. Seen in this light, VR-based psychological safety can support the UN's broader role as *capacity builder* by fostering learning environments that are context-sensitive and psychologically safe.

However, this property too does not come without risks or challenges. First, shielding users from real-time interpersonal exposure can lead to missed interpersonal learning, as the sharing of personal stories or testimonies can play a vital role in learning around sensitive topics and in humanising abstract issues. Two interviewees raised this concern: one noted that VR training 'lacks human interaction' (Interview 27), while an implementer emphasised that 'VR must be complemented with the regular training, because (…) we need the space for discussion, sharing experience and knowledge' (Interview 24). These reflections point to the importance of an integrated training strategy, in which VR is combined with in-person components to balance psychological safety with opportunities for interpersonal exchange. Second, while VR may feel psychologically safe, this perception can obscure other vulnerabilities where it may be 'less safe', such as data privacy (Miller et al., 2020). Although

VR hardware can capture sensitive user data, whether and how it is exploited also depends on the software in use – highlighting the need to adopt platforms that prioritise data protection. Beyond digital privacy, the physical context of VR use also matters: the sense of being unobserved in the VE can be undermined if the real-world environment does not equally support privacy. For example, the Learning Team Leader explained that some training sessions were conducted using partitions to separate users. While they maintained distance so users 'couldn't hear what the others were saying', it still was not a completely private space (Interview 22; echoed in Interview 25). The evaluator also observed that participants were often aware of others queuing to use the headset, which introduced time pressure (Interview 23), thus undermining psychological safety.

7.7. Conclusion

To conclude, this chapter applied ANT to examine the adoption of VR technology for SH bystander training at the ILO, with the aim of understanding how its adoption impacted training practices. Tracing the translation process and mapping the network of human and non-human actants, the chapter demonstrated that VR adoption was not a linear implementation, but rather the outcome of a dynamic translation in which the technology both shaped and was shaped by human and organisational actants. The network diagram helped identify points of stability and instability, revealing tensions and feedback loops that influenced the trajectory of the initiative. From this process, three key emerging properties were identified: *embodied influence*, *interactive engagement*, and *psychological safety*. These properties suggest that VR can enhance training by making it more persuasive, more engaging, and 'safer', or more conducive to open expression. Beyond the specific case of the ILO, these findings have broader implications for the UN's role as *capacity builder,* which could benefit from integrating VR into training programmes, especially where aimed at enhancing behavioural

change, engagement, and inclusion, while remaining mindful of the identified risks and challenges.

CHAPTER 8: DISCUSSING VR ADOPTION IN THE UN SYSTEM: IMPACTS, PATTERNS, AND BROADER IMPLICATIONS

8.1. Introduction

This chapter draws together the central threads of the thesis, reflecting on the insights gained and assessing whether and how they respond to the research questions. In following the adoption of VR across three UN organisations, I aimed to examine, through empirical investigation, how this technology is taken up in practice and how it reshapes the ways in which UN organisations carry out specific functions. The inquiry has been grounded not only in the empirical realities of these cases, but also in existing literature on IOs' adoption of emerging technologies (Ch. 2) and in the framework of Actor-Network Theory (Ch. 3). The structure of the following discussion reflects the three research questions that guided this thesis. The first section, 'Impact of VR adoption on IOs' practices', reflects on how the study has answered the first question:

RQ1: How does the adoption of VR technology in the UN system impact their operational practices?

Bringing together the findings of each case study chapter, it highlights how VR adoption generated function-specific emerging properties – some aligned with existing research, others less expected – which ANT helped uncover (Section 1.3). The second section, 'VR across functions: patterns and divergences', addresses the second question:

RQ2: How does the process of VR adoption vary across the functions of collaboration, advocacy, and training, and what might these differences suggest about the potential for VR to shape the UN's work in the future?

This section explores variation across the three functions along two dimensions. First, it compares the emerging properties identified in each case, highlighting both common patterns and function-specific differences. Then, it compares the translation processes, identifying points of stability and instability within the actor-networks and drawing out the conditions that influenced the stability or fragility of VR adoption in each context. The third and final section, 'Reconfiguring the agentic and spatial dimensions of IO practice', addresses the third research question:

RQ3: What are the broader implications of VR adoption for the evolution of UN and IO practices in a digitalising international sphere?

Building on the preceding analyses, this section advances two core claims that the ANT framework helped to surface, namely that VR adoption points to a wider reconfiguration of the agentic and spatial dimensions of IO practice, two areas that are central to understanding how emerging technologies like VR may be contributing to the evolution of global governance practices. In addition, Sections 8.2 and 8.3 address RQ3 insofar as they reflect on the broader implications of VR adoption for the UN's functions as *global connector, knowledge provider*, and *capacity builder*, highlighting how these roles may be recalibrated within a digitalising international sphere.

Together, these three research questions trace a conceptual arc that moves from the specific to the general, from the empirical to the theoretical. The first question focuses on identifying how VR reshapes organisational practices within UN organisations, capturing concrete,

practice-level changes in collaboration, advocacy, and training. The second question builds on this, comparing the sociotechnical dynamics across functions to reveal broader patterns and variations in how VR becomes integrated into different practices. Finally, the third question broadens the analysis, drawing on the empirical findings to engage with larger theoretical debates about agency and space in global governance. This progression reflects the study's aim to contribute both to empirical understanding and to theoretical conversations on UN organisations' and IOs' adoption of emerging technologies.

8.2. Impact of VR adoption on the organisations' practices

The question of whether and how VR adoption has affected the operational practices of the UN organisations under study has been addressed through an ANT-informed analysis of the case studies. This analysis revealed distinct sets of 'emerging properties' in each case, reflecting how VR shaped the practices of collaboration, advocacy, and training. As a reminder, emerging properties refer to the specific capacities or effects that emerge from the interaction between VR technology and human and institutional actants. They are not pre-programmed features of the technology itself, but outcomes of the sociotechnical configurations in which VR is adopted (cf. Sections 3.3.3 and 4.4). The presence of these properties confirms that VR adoption has, indeed, had a tangible impact on the organisations' operational practices. The diversity across functions requires however a multifaceted answer to RQ1, as each function offers a distinct perspective on VR's impact. The table below serves as a reference point, summarising the main emerging properties from each case, along with their benefits for the relevant function and the challenges they raise, to support the discussion that follows.

TABLE 2: SUMMARY OF EMERGING PROPERTIES					
Emerging property	Description	Manifestation by case study	Relevant literature	Key benefits	Key challenges
Spatial presence	Feeling of 'being there' within the VE	***ITC-ILO*: *Spatial and focused presence*** (via spatial immersion) ***UNDP*: *Spatial and proximate presence*** (presence in distant places)	Lombard & Ditton (1997); Cummings & Bailenson (2016); Gruenewald & Witteborn (2020); Bennett et al. (2021)	Enhances focus and improves meeting efficiency (ITC-ILO); enables access to distant/marginalised contexts (UNDP).	May create illusion of understanding; risks privileging immersion over evidence; impact may diminish as novelty fades (UNDP). Structuring space may constrain interaction; design may create illusion of meaningful presence; limited session duration due to fatigue; restricted multitasking hampers flexibility (ITC-ILO)
Social presence and social dialogue	Perception of others' presence, enabling interaction and shared understanding	***ITC-ILO*: *Social presence and social dialogue*** through co-presence and avatar interaction	Short (1976); Schroeder (2008); Oh et al. (2018); McVeigh-Schultz & Isbister (2021)	Fosters human connection across distances; enables authentic interaction and informal exchange; supports social dialogue	Avatar manipulation may distort identity and status; ambiguous social cues can disrupt communication; AI moderation may reinforce bias or overregulate; surveillance tools may hinder open dialogue.
Interactive engagement	Active user involvement due to interactive and gamified elements	***ITC-ILO*: *Interactive engagement*** through creative, game-based	Roussou et al. (2006); Suh et al. (2018); Bailey & Bailenson	Enhances focus, creativity, and enjoyment in collaboration and collaborative tasks	Risk of detachment due to game-like nature; may not translate to real-world action; Ethical concerns around gamifying serious

		collaborative activities ***ILO***: ***Interactive engagement*** through scenario-based learning and gamified feedback	(2017); Dicheva et al. (2021)	(ITC-ILO); increases attention and enjoyment of learning tasks (ILO)	topics (ILO); may exclude specific users/reinforce existing hierarchies; can prioritise task completion over meaningful dialogue; risks streamlining behaviour and suppressing dissent (ITC-ILO).
Psychological safety	A sense of protection in the VE enabling users to confront sensitive topics more comfortably than in physical settings	***ILO*: *Psychological safety*** through anonymity, freedom to fail, and interaction with avatars rather than humans.	Edmondson & Lei (2014); Turkle (1994); Kyrlitsias & Michael-Grigoriou (2022); Hirata (2023)	Enables open engagement with sensitive topics (e.g., SH); fosters privacy, inclusion, and low-risk rehearsal	Limits interpersonal exchange; real-world setting may simultaneously undermine privacy; data privacy concerns
Embodied influence	The capacity of VR to influence users' perspectives, attitudes, and behaviours	**ILO**: ***embodied influence*** through immersive perspective-taking (e.g. body-swapping), and iterative rehearsal with feedback. **UNDP**: ***Embodied influence*** through perceived realism.	Herrera et al. (2018); Slater & Sanchez-Vives (2005); Banakou et al. (2016); Milk (2015); Lombard & Ditton (1997);	Facilitates attitudinal, cognitive, and behavioural change via VRPT and self-observation (ILO); Strengthens advocacy by simulating 'realness'; helps elevate issues on policy agendas (UNDP)	Effects may be short-lived or context-dependent; could lack real-world stakes; ethical risks of manipulation (ILO); Risk of uncritical reception; staged nature may be obscured; novelty may fade; manipulation concerns (UNDP)
Emotional resonance	Affective response to VR experience	***UNDP*: *Emotional resonance*** through affective impact of	Gorin (2022a, 2022b); Gruenewald &	Enhances donation likelihood, engagement, and	Risks sidelining IOs' expert 'impartial' authority and fostering non-critical

	(empathy, surprise and awe)	immersive narratives	Witteborn (2020); Bailenson (2018); Illouz (2007)	recall through emotional connection; can foster more compelling, affect-driven advocacy	engagement with complex issues

8.2.1. VR for collaboration – the UN as *global connector*

In the first case study, which examined the ITC-ILO's adoption of multi-user VEs, VR was explored in relation to the function of *collaboration* – corresponding to the UN's role as a *global connector* (see Section 2.6). The chapter investigated how multi-user VR was used to replicate in-person meetings within immersive settings. The findings revealed that VR did more than simply mirror face-to-face interactions: it altered collaboration by introducing new affordances that emerged through the process of translation. Specifically, three key emerging properties were identified: *spatial* and *focused presence*, *social presence* and *social dialogue*, and *interactive engagement*.

First, VR use gave rise to *spatial and focused presence*. Compared to conventional videoconferencing tools, multi-user VEs enabled users to feel embedded in a shared virtual space (Section 5.6.1). This immersive quality not only heightened participants' sense of focus and presence, it also introduced new spatial dynamics that could streamline meetings and impact virtual workflows. For example, the ability to design and navigate different virtual room layouts enabled more intentional planning of meeting formats – such as spaces for plenary sessions or breakout discussions – which would be more cumbersome or less intuitive in two-dimensional interfaces. Second, VR use for collaboration fostered *social presence and*

social dialogue. Participants reported a heightened sense of human connection and co-presence, which fostered more authentic interactions and enabled meaningful social dialogue – particularly in the context of trade union engagement and collective bargaining (Section 5.6.2). While rooted in the ITC-ILO's specific context of trade unions, these dynamics point to the broader potential of VR to support relationship-building and deliberative processes across the UN system, especially in domains requiring negotiation, trust-building, and long-term interaction across distances (e.g., peacebuilding, conflict mediation, humanitarian coordination, and beyond, given that coordination and collaboration underpin most UN organisations' activities). Such potential is particularly significant in global governance settings, where political processes such as multilateral negotiations may depend not only on formal agreements but also on trust and relational dynamics (Keating & Ruzicka, 2014; Weinhardt, 2015; Wheeler, 2018), which are often seen as inadequately supported by two-dimensional platforms (Bramsen & Hagemann, 2021; M. Holmes & Wheeler, 2020). Third, VR use was found to generate *interactive engagement:* Interviews highlighted how it boosted attention and enjoyment in participants, leading to deeper involvement in collaborative tasks. For example, in the 'VR Entrepreneurship Games', participants actively co-created and problem-solved within gamified environments (Section 5.6.3). Similar dynamics could enhance involvement in collaboration, supporting tasks like policy co-drafting, multistakeholder consultations, or scenario planning, with potential wider benefits on productivity (Aufegger & Elliott-Deflo, 2022; Werbach, 2020).

While the properties identified in this case highlight VR's potential to reshape collaboration practices, interviewees raised important concerns about the durability and sustainability of these changes. On the positive side, ITC-ILO's engagement with VR since 2019 (Interview 5), its partnerships with external providers (Interviews 3; 5), and the development of training ecosystems and reusable content (Interviews 5; 8) suggest growing

institutionalisation. Organisations like the UOCRA Foundation, WFP (Interview 3) and TESDA in the Philippines (Interview 5) have become largely self-sufficient in their VR use demonstrating a successful transfer of capability. However, cost remains a major barrier (Interviews 4; 6; 7; 8), with challenges linked to licensing models, maintenance needs (Interview 4), and hardware obsolescence (Interview 1). Interviewees also cited post-pandemic fatigue (Interviews 4; 6), user discomfort during long sessions (Interviews 4; 5; 7), and connectivity constraints in field locations (Interviews 1; 4) as limiting factors. Some described the danger of VR interest being overshadowed by emerging priorities like AI (Interviews 4; 7). These reflections underscore that VR's long-term contribution to collaboration will depend on addressing financial, technical, and organisational constraints, and on demonstrating its value relative to more established tools like Teams or Zoom (Interview 4).

Together, the above properties illustrate how VR adoption can shape the practice of collaboration by fostering new modes of presence, dialogue, and engagement. In a system where the effectiveness of mandate delivery often hinges on the ability to coordinate across member states and UN agencies, a technology that strengthens collaborative infrastructures becomes central to operational effectiveness. While it may not replace high-stakes negotiations themselves, preparatory dialogues, informal consultations, and backstage diplomatic interactions where in-person travel is not necessary (Stockholm Environment Institute et al., 2021a) could take place in VR. Moreover, in moments of global disruption, such as pandemics, with growing environmental pressures to reduce air travel, or in contexts where in-person meetings are unsafe – such as during armed conflict – VR could offer a pragmatic alternative for collaboration. This signals a potential evolution in the UN's role as a *global connector*: if VR strengthens UN organisations' ability to support collaboration among geographically dispersed actors, this should be seen not as a secondary effect, but as a central contribution to

its broader connective function. Of course, this potential must be balanced against the practical and ethical challenges that VR use for collaboration entails, including those related to spatial design, identity and communication via avatars and AI, as well as the risks of exclusion and superficiality (Section 5.6). Nonetheless, as collaboration itself becomes recalibrated through digital means, the UN's effectiveness as a *global connector* could be enhanced by its willingness and capacity to engage with immersive collaboration modalities.

8.2.2. VR for advocacy – the UN as *knowledge provider*

The second case study examined UNDP's VR adoption for the function of advocacy, corresponding to the UN's role of *knowledge provider.* Specifically, Cinematic VR (CVR) was found to impact advocacy practices in three ways: *spatial and proximate presence*, *emotional resonance*, and *embodied influence*. First, data confirmed VR's role in producing *spatial presence* and contributed the concept of *proximate presence*, describing users' felt geographical closeness to distant places beyond conventional media experiences (Section 7.6.1). In the UN context, characterised as it is by geographic dispersion across country offices and field operations, such spatial proximity may help bridge distances between global audiences and the often-remote realities that UN organisations seek to communicate. Second, *emotional resonance* emerged as a feature of CVR, with participants describing strong affective responses ranging from empathy to surprise (Section 7.6.2). These responses foster an 'emotional style' of communication (Gruenewald & Witteborn, 2020) that generates new opportunities for engaging publics and influencing decision-makers, while simultaneously posing ethical challenges regarding our relationship with the suffering 'other' (Chouliaraki, 2013). Third, interviewees emphasised *embodied influence*, CVR's capacity to not only inform, but to influence users (Section 7.6.3). They highlighted CVR's persuasive utility in advocacy contexts, exemplified by its use during the European Parliament's Roma Week

screening to draw attention to marginalised issues and push them onto the policy agenda. This represents a powerful tool for the UN role as *knowledge provider*, although the risks of manipulation or uncritical reception remain significant, particularly if the constructed nature of VR content is not acknowledged.

Here too, interviewees raised important concerns about the durability and sustainability of VR-induced impact. VR production continues to be costly (Interviews 11; 12; 13; 15), requiring specialised hardware and software which makes it challenging to reach a wide audience (Interview 11), and UNDP currently lacks the in-house technical capacity to develop or maintain such content (Interview 15). Moreover, rapid advances in VR platforms risk rapidly rendering any project obsolete (Interviews 15; 16). For VR to be more than a one-off initiative, it needs to be carefully integrated with a clear message and follow-up plan, otherwise, as interviewee 15 highlights, 'you are left asking, "But then what?" after the initial "wow" effect fades'. Ultimately, the long-term viability of VR within UNDP hinges less on the success of singular initiatives like *I am Fatmira,* and more on the organisation's ability to build internal capacity and embed immersive technologies within a coherent communication and advocacy strategy.

Taken together, these properties illustrate how VR adoption can reconfigure the practice of advocacy by fostering new forms of presence, affective connection, and persuasion. As in the previous case with VR for collaboration, they also signal a potential evolution in the UN's role as a *knowledge provider.* By bridging spatial distance, amplifying emotional resonance, and enhancing persuasive impact, VR may expand UN organisations' communicative repertoire and open up new pathways for global advocacy. At the same time, the balance between emotional resonance and evidence-based authority – which typically underpins IO legitimacy – remains critical.

8.2.3. VR for training – the UN as *capacity builder*

The third case study explored the adoption of VR for training purposes within the ILO, reflecting the UN's function as a *capacity builder*. The findings highlight three key emerging properties: *embodied influence*, *interactive engagement*, and *psychological safety.*

First, VR simulations generated *embodied influence*, allowing participants to experience workplace scenarios from multiple points of view through virtual 'body-swapping' mechanics. In contrast to in-person role-play, this feature enables a hard-to-replicate understanding of one's actions and power dynamics, encouraging behaviour change (Section 7.6.1). For the UN's role as *capacity builder*, this is compelling not only in the context of SH training, but more broadly for trainings on navigating difference and power dynamics. As an organisation that routinely engages with multiple axes of difference – cultural, gendered, racial, and beyond – VRPT can be applied more widely to enhance trainings and make them more reflexive. Second, VR simulations led to the emergence of *interactive engagement*, supporting active participation and experiential learning in contrast to more passive formats such as lectures or traditional e-learning. For the UN's capacity-building function, this is particularly significant because engagement and interactivity – for example ILO's use of gamified elements such as quizzes and games – can support more memorable, enjoyable, and effective trainings (Section 7.6.2). This becomes especially relevant in contexts where sustained attention and applied understanding are critical, including field missions, humanitarian response training, conflict resolution, and other high-stakes operational settings – as well as typically 'unengaging' training topics where interactivity could enhance participants' engagement and motivation (7.6.2). Third, VR was found to create a psychologically 'safe space' for training through *psychological safety*: an environment in which participants could rehearse, experiment, and make mistakes without fear of judgment or consequence (Section 7.6.3). This affordance is particularly relevant for the UN's capacity-

building efforts in areas that involve sensitive or high-stakes content, such as trauma, inclusion, ethical decision-making, SH, and others. By allowing users to engage with challenging scenarios in a 'safe' setting, VR lowers the social risks associated with in-person training and could support more honest, reflective learning processes.

Here too, along the properties described above, interviewees reflected on the sustainability of VR use. At the ILO, despite desire to continue using VR for SH training (Interviews 24; 26), future rollouts are contingent on securing funding and resolving logistical issues (Interviews 23; 27). As in the previous cases, interviewees stressed headset cost as a primary concern, (20; 22; 24; 27), as well as content development and supplier lock-in (Interview 20). As in the UNDP case, further sustainability challenges were VR's limited reach (20; 27) and lack of in-house capacity (20; 27). To achieve sustainable impact, proposals included developing a more flexible module (ideally with an open-source model) (Interview 20), localising the content for different languages (22; 24; 25; 26) ensuring factories supply their own headsets (22; 24), focusing on smaller high-level audiences (24; 26), and conducting cost-benefit analyses to justify further investment (20; 27). Without such measures, the VR initiative risks remaining a one-off pilot rather than becoming an integrated tool for the ILO's capacity-building programmes.

Taken together, *embodied influence*, *interactive engagement*, and *psychological safety* point to a potential reconfiguration of how training is conceived and delivered, where it is adopted. For the UN's role as *capacity builder*, this could mean a shift in focus from the transmission of information to more reflexive, engaging, and psychologically secure learning experiences for training beneficiaries. This, of course, must be weighed against the challenges discussed in the ILO chapter, such as the risks of detachment and trivialisation.

In conclusion, this section set out to examine the impact of VR adoption on the practices of the UN organisations under study, thereby addressing RQ1. The analysis demonstrates, first, that such an impact is evident, and second, that it manifests in a multi-faceted manner through distinct emerging properties. By enabling new modes of interaction, communication, and knowledge transfer, VR holds the capacity to reshape how the UN fulfils its roles as *global connector, knowledge provider*, and *capacity builder*. Demonstrating that VR alters UN organisations' practices raises a further question: do these alterations unfold in similar ways across functions, or do they vary in context-specific ways? And what might these differences suggest about the potential for VR to shape the work of UN organisations in the future? To answer this, the next section turns to RQ2, comparing cases to trace both patterns and divergences.

8.3. VR across functions: patterns and divergences

This section proceeds in two parts: First, it compares emerging properties across cases, distinguishing between those that are shared across functions and those that are function-specific. Mapping similarities and divergences clarifies how VR is differently enacted across functions, while also offering practical insights for IOs considering adoption: understanding which properties align with which functions can help determine when and where particular VR applications are most effective. Second, it compares the translation processes of VR adoption, paying particular attention to the stabilising and destabilising forces at play.

8.3.1. Comparing emerging properties: insights across cases

The emerging properties identified across the three cases were not uniform: some recurred across functions, while others appeared only in one context. This variation is analytically

significant. On the one hand, recurring properties suggest affordances with broader applicability and adaptability. In such instances, VR's capabilities may constitute core strengths with transferable value across different domains of UN organisations' work. Their recurrence indicates patterns in how VR becomes integrated into organisational practices, pointing to the robustness and versatility of these affordances when aligned with institutional goals. Here, *spatial presence* (collaboration – ITC-ILO; advocacy – UNDP), *engagement and interactivity* (collaboration – ITC-ILO; training – ILO), and *embodied influence* (advocacy – UNDP; training – ILO) all surfaced across multiple cases, indicating high transferability.[87] This suggests that, while functions shape the specific enactment of VR, certain affordances retain cross-functional utility, making them especially valuable for IOs aiming to scale or adapt VR tools across diverse operational areas.

On the other hand, some properties emerged only in a single case study, suggesting a higher context-dependence shaped by the specific function and design of the VR intervention. For example, the sense of *psychological safety* in the training case may be attributed to the pedagogical orientation of the intervention and, more broadly, to the very logic of training, which aims to foster protected environments conducive to learning. Similarly, *social presence* and *social dialogue* emerged only in the collaboration case, where participants were co-present in the VE. This property also appears to be context-dependent, arising in scenarios where interaction, co-presence, and communicative exchange are central to the experience. Such contexts include surely collaborative settings, but also similar cases, such as collaborative learning, team-based meetings, and multilateral summits.

[87] Note that the term 'transferable' does not refer to 'fixed' or intrinsic attributes of the technology itself. Spatial presence, for example, can only materialise through the situated interaction between human users and immersive environments. However, their repeated appearance across different functions and organisational settings suggests a degree of transferability. In this sense, these properties can be understood as what Law and Mol (2001) call *mutable mobiles*: phenomena that circulate across sites but change form as they do so. They are neither universally stable (*immutable mobiles* in Latour's (1987) sense) nor wholly context-dependent. By contrast, what I term low-transferable or context-specific properties are not necessarily uniquely tied to the function in question, but it is to signal that they seem to be less transferable than the others.

TABLE 3: COMPARING EMERGING PROPERTIES			
UN organisation	*Emerging property 1*	*Emerging property 2*	*Emerging property 3*
ITC-ILO	*Spatial and focused presence*	*Social presence and social dialogue*	*Interactive engagement*
UNDP	*Spatial and proximate presence*	*Emotional resonance*	*Embodied influence*
ILO	*Embodied influence*	*Interactive engagement*	*Psychological safety*

8.3.2. Shared, high-transferable properties of VR adoption

Spatial presence

Spatial presence emerged as a shared property across both the collaboration (ITC-ILO) and advocacy (UNDP) case studies, though with important contextual differences. Its recurrence across cases suggests that VR's spatial affordances constitute a particular strength of the medium, with broader implications for how it may be applied across institutional settings (see broader discussion on 'reconfiguring space' in Section 8.4.2). Notably, the data revealed two distinct iterations of spatial presence, shaped by both the VR modality and the organisational function involved. In collaboration, spatial presence referred specifically to the embodied sense of being situated within the VE, shaped by its design and affordances. This included the physical structure of the space and the actions it enabled (e.g., configuring the space in certain

ways), as well as its capacity to reduce external distractions and foster situational focus – a form of *focused presence* absent in conventional videoconferencing settings. By contrast, in the UNDP case spatial presence took the form of *proximate presence*. Interviewees described not only a sense of being inside the 360° environment, but also of geographic presence in a real-world location that was physically distant and otherwise inaccessible. Both fall within the broader category of *spatial presence*, since in each instance VR created a compelling sense of 'being there' – whether in a digitally constructed environment or in a real-world setting captured through 360° video. Yet each produced a distinct nuance: *focused presence* in the context of collaboration, and *proximate presence* in the context of advocacy, highlighting how functional variation shapes the specific forms that emerging properties take, and how distinguishing between them can sharpen our understanding of VR's enactment across functions.

In both contexts, *spatial presence* reinforces the broader aim of many UN system organisations of bridging distances, whether through witnessing or collaboration. In practical terms, this suggests that VR may be particularly effective in domains where UN organisations seek to overcome fragmentation or remoteness, whether by drawing attention to distant communities or situations, or by enabling presence and focus in CVEs. This of course does not come without challenges – for example, as argued in Chapters 5 and 6, the risk of concealing power dynamics and flattening difference. By contrast, spatial presence did not emerge as a salient theme in the ILO training case. This absence may reflect the nature of the training itself, which was oriented towards individual skill acquisition within a scripted simulation. Unlike collaboration or advocacy, spatial presence was not mentioned in the interviews about the training scenario. This absence may seem surprising, given that the sense of being situated within a simulated training environment resembling a factory was a feature of the ILO simulation and something the researcher experienced directly during EVO.

However, *spatial presence* was perhaps not foregrounded in participants' accounts because the simulation was not primarily designed to evoke presence, but rather to support task-oriented learning and behavioural rehearsal. Unlike the collaboration and advocacy cases, its purpose was not to create specific spatial features or to bridge distance to a remote reality, but to facilitate skill acquisition within a controlled scenario.

Interactive engagement

Interactive engagement emerged as a shared property across the training (ILO) and collaboration (ITC-ILO) cases. In both, participants described VR as enhancing attention and active involvement through interactive and gamified elements. Both uses of VR were perceived as highly engaging, contributing to a more enjoyable experience and improving retention. In both contexts, *interactive engagement* supported the functional goals of the experience – whether behavioural rehearsal or collaborative tasks. In this sense, it functioned as a kind of 'glue', holding participants within the experience and making the interaction more focused and consequential. This suggests that VR adoption may be particularly valuable in scenarios where IOs aim to sustain attention or encourage active participation with specific content or tasks. Relevant applications could include simulation-based trainings on various topics beyond SH, such as decision-making under pressure or ethical dilemmas in humanitarian response. In the context of collaboration, this might involve joint planning exercises for peacekeeping or humanitarian operations, team-building activities, or onboarding programmes for staff based in remote locations who are unable to attend in-person sessions – while keeping in mind the associated challenges (Section 5.6.3 and 7.6.2).

By contrast, *interactive engagement* did not emerge in the UNDP advocacy case. This can be attributed to the nature of CVR, which, while immersive, is less interactive than multi-user VR or CGVR simulations. In CVR, users are placed within a pre-scripted narrative and have

limited agency. That said, advocacy-oriented VR could take more interactive or gamified forms – for example, by using CGVR environments rather than 360° video (UN DPPA Innovation Cell, 2022). This would allow for the incorporation of choice-based narratives or interactive tasks that prompt users to act within the scenario, akin to video game dynamics. It may be valuable for UN organisations and IOs more broadly to explore such formats, which connect with a growing body of literature on 'games for good' and serious games (Section 5.6.3). These innovations, however, come with their own design complexities and cost implications, raising a critical question: is the added interactivity justified by the specific aims and intended impact of the advocacy initiative?

Embodied influence

VR's persuasive power emerged as a salient property both in the advocacy (UNDP) and training (ILO) case studies. The fact that VR was described as able to shift users' perspectives and prompt behavioural change across these distinct contexts underscores a specific and high-transferable strength of the technology. A key finding of this study is that *embodied influence* does not arise necessarily from body ownership or empathy (e.g., Slater, 2009; Wienrich et al., 2021), but through distinct mechanisms rooted in perceived realism and situated perspective. In the UNDP case, perceived realism – the sense that the viewer is encountering an unmediated depiction of reality – was identified as the primary driver of action (Section 6.6.3). In the ILO case, by contrast, influence was grounded in perspective-taking (VRPT) and self-observation, enabled by features like body-swapping and external viewpoint replay (Section 7.6.1). Notably, this is not realism, but in some ways its inversion: body-swapping is precisely what we cannot do in real life. This contrast presents a compelling insight: while both cases demonstrate VR's persuasive potential, they achieve it through markedly different mechanisms. This suggests promising directions for future research – both in examining how these different mechanisms function, and in exploring whether they might be combined. At

the same time, it underscores VR's broader potential to support strategic objectives across the UN system, particularly in contexts where behavioural change is central to advocacy, capacity building, or training effectiveness. Yet, persuasion remains one of the most contested aspects of VR: Scholars and practitioners have raised concerns about manipulation, especially when emotional immersion is combined with powerful storytelling (Rueda & Lara, 2020) or, in the near future, when coupled with AI-generated content. Without ethical safeguards and careful design, persuasive VR risks undermining users' autonomy and reinforcing biased narratives (Madary & Metzinger, 2016b).

Interestingly, influence plays no role in the ITC-ILO collaboration case. A possible explanation is that, unlike training and advocacy initiatives, both of which centre on experiences aimed at individual users, collaborative VEs are primarily oriented at shared virtual experiences. The objective is not necessarily to educate, or to elicit reactions, but to foster interaction and exchange through VEs. In this context, VR's *embodied influence* becomes not only unnecessary but potentially counterproductive, as it risks disrupting the relational dynamics and co-working processes that such environments are designed to support.

8.3.3. Low-transferable/context-specific properties

Alongside the high-transferable properties discussed above, several context-specific/low-transferable properties also emerged.

Social presence and social dialogue

Social presence and *social dialogue* emerged as a context-specific property in the ITC-ILO case, enabled by the shared and simultaneous nature of the CVE. Unlike training or advocacy, which were experienced individually and followed a pre-defined, programmed structure, the

CVE's infrastructure and design enabled collaboration to unfold through real-time interaction with other users, making its structure emergent and contingent on participants rather than pre-scripted. In this way, VR operates as a medium of co-presence and mutual enactment, enabling participants to engage in dialogue and collectively shape their collaboration. This capacity is particularly significant for the UN, as it reinforces its core function as facilitator of international cooperation (*global connector*). Conversely, as single-user experiences, both the ILO's training simulation and the UNDP's CVR experience preclude the possibility of real-time social dialogue. Nonetheless, it is conceivable that future advocacy or training initiatives could integrate social elements, particularly in contexts where collective reflection and dialogue would enhance the learning or advocacy objectives. For example, in the context of advocacy, a multi-user VR application could be developed to allow participants to jointly experience a 360° documentary and then engage in dialogue within the same virtual space. The VR platform 'ENGAGE', for example, has developed a '360 video room' within a shared VE, allowing users to watch and discuss 360° videos together (ENGAGE, 2022). This could be particularly powerful in contexts where dialogue is a crucial complement to advocacy efforts: for example, in initiatives aimed at fostering mutual understanding between marginalised communities and broader publics, or in post-conflict reconciliation settings, where hearing diverse perspectives in real-time might deepen understanding beyond the solitary act of viewing.

Emotional resonance

Emotional resonance emerged as a distinctive property in the UNDP case on advocacy. This aligns with the differing objectives associated with each function: in training contexts, VR is primarily designed to support learning outcomes – a focus on emotion might detract from clarity and focus. Similarly, in collaborative settings, the emphasis lies in fostering shared

interaction, and emotional charge may hinder performance or efficiency. In contrast, evoking emotion is central to CVR by enhancing the witnessing 'force' of a situation. This suggests that while VR is often described as an 'empathy machine', this label is overstated when applied across the broader landscape of VR use in IOs. Emotional engagement is far less prominent in functions such as training or collaboration, where priorities like skill acquisition or interaction take precedence.

Psychological safety

Psychological safety, VR's capacity to provide a controlled, repeatable environment in which users can practise responding to challenging or sensitive scenarios – emerged as a low-transferable property in the ILO case study. For the UN's role as *capacity builder*, this affordance could make capacity-building efforts not only more experiential but also more reflexive and human-centred. When understood narrowly as consequence-free rehearsal of skills, this property appears unique to the training function. However, interpreted more broadly, the notion of *psychological safety* may also extend to VR for collaboration, as scholars have pointed to CVEs' capacity to enable forms of anonymity – allowing users to interact through avatars while withholding identity markers such as gender or ethnicity – thus creating alternative forms of safe, or inclusive, virtual spaces.

In conclusion, this section has addressed RQ2, which asked how the impact of VR adoption on the practices of the UN organisations under study varies by function. The analysis demonstrated that the properties emerging from VR adoption are not uniform. Rather, they tend to differ depending on the specific function to which the technology is applied: in other words, VR supports different practices in different ways. However, some properties also emerged in more than one function, which led to the development of a high-transferable vs. low-transferable distinction. In other words, while some VR affordances appear to translate

well across domains, others seem to emerge under specific conditions. This duality provides a more nuanced response to RQ2, highlighting on the one hand the potential versatility of VR, and on the other, the importance of alignment between function and design when the technology's effects are more context dependent. For UN organisations and IOs seeking to tailor VR use to their objectives and to their specific roles as *global connectors*, *knowledge providers*, or *capacity builders,* this insight is actionable: Understanding which properties are more versatile, and which are more targeted or may require tailored design, allows for more strategic adoption of the technology. For example, interactive simulations may be best suited when behaviour change is desired, whereas CVEs should be reserved for tasks requiring dialogue and co-presence. Furthermore, by uncovering these functional variations, this analysis challenges the tendency in journalistic accounts, and at times in the literature, to present VR as a monolithic or function-neutral tool. Instead, it offers a differentiated account of VR's organisational relevance, showing also that the digitalisation of practices within the UN system – especially in the case of emerging technologies like VR – is uneven and deeply relational. That said, to fully grasp why certain properties emerge, and why they differ across cases, it is also necessary to examine the underlying networks that support them, including their (in)stabilities. Building on this, the next section turns to a comparative analysis of the networks of VR adoption across the three organisations.

8.3.4. Comparing translation processes: Forces of (in)stability

Stability, discussed in Chapter 3, is a key ANT concept. Rather than indicating straightforward success or failure, the forces identified in this section contribute to the stability or fragility of a network.[88] To examine the (in)stability of the ITC-ILO, UNDP, and ILO networks of VR

[88] However, it is important to note that, as per ANT, networks are inherently dynamic, and references to stability refer to a particular moment in time and should not be understood as permanent or fixed.

adoption, this section draws on the translation processes as synthesised in the 'Translation Stages' flowcharts in Sections 5.5.3, 6.5.3, and 7.5.3, which examine how each network progressed from problematisation to mobilisation. A close reading of the flowcharts revealed key insights into both the strengths and bottlenecks shaping each network's trajectory. Tracing these forces of (in)stability is useful as it can help IOs seeking to adopt VR technology to identify which elements may need to be strengthened, anticipated, or managed more consciously. Specifically, four recurrent mechanisms were found to enhance network stability and, by extension, support the adoption of VR technology in those organisations: *distributed task allocation*, the *central role of VR, feedback loops*, and *human mediators*. At the same time, *handover points*, where transitions between actants weakened alignment, *external contextual forces*, that introduced volatility beyond the control of the network, and the role of *the material*, were identified as potential forces of instability. For clarity, these are summarised in the table below.

TABLE 4: COMPARING FORCES OF (IN)STABILITY			
VR adoption: Stabilising and destabilising forces	ITC-ILO's VR for collaboration	UNDP's VR for advocacy	ILO's VR for training
STABILISING FORCES			

Task distribution among actants	✓	✓	✓
Central role of VR	✓	✓	✓
Feedback loops	✓(informal)	✓(informal)	✓(formal)
Mediators (boundary-spanning roles)	✓	✓	✓
DESTABILISING FORCES			
Handover from innovators to implementers	✓	✓	✓
External contextual forces	✓	–	✓

Stabilising forces

Task distribution among actants

A stabilising force observed in all three networks was the diversified distribution of tasks across human and non-human actants. In each case, VR adoption involved a varied constellation of actants, who aligned their competencies with the demands of the translation stages. For example, in the ILO case, VR developers enabled the technical realisation of the training, headsets ensured accessibility, and implementers integrated the experience into existing programmes in Indonesian factories. This reflects the ANT concept of 'distributed agency', the idea that action emerges not from individual entities but from the relationship

among actors within heterogeneous networks (Bueger, 2019; Callon & Law, 1997).[89] Such distribution reduces dependence on any single actant, fostering interdependence and thereby enhancing network stability. Latour's example of the 'Berliner key' (Latour, 1992) illustrates this dynamic: the key is designed so that one must relock the door before retrieving it, thereby embedding the intended action into the object itself. Stability is thus made more likely: a single human would be liable to error or forgetfulness, but when combined with another actant – non-human (e.g., the lock) or human – this interdependency effectively generates stability. The diverse distribution of roles in the case studies achieves the same effect, enhancing the stability of each network through task distribution. For IOs seeking to adopt VR, this suggests that fostering a distributed and interdependent network of human and non-human actants is crucial to ensuring network stability.

VR technology's role

Across the three cases, VR technology itself emerged as a stabilising force. More than a passive tool, VR operated as an active participant in the network, shaping each phase of the translation process and fostering continuity across the stages from initial concept to embodied experience. While VR's stabilising role may appear tautological (since VR adoption is the very lens through which these cases are examined), reflecting on this role remains analytically productive for two reasons. First, the fact that VR remained central throughout suggests a relatively successful adoption process, at least within the case study timeframe. One could imagine a configuration in which VR played a role during problematisation and interessement – generating interest and initial alignment – but did not feature in the mobilisation of actants and resources. Such a network would not have achieved a full translation process and would be an example of 'failed' VR adoption. Second, examining VR's role reveals that it functions

[89] Cf. Section 3.3.1 for an in-depth discussion of ANT's understanding of agency.

as an Obligatory Passage Point (OPP) in the ANT sense – that is, a central 'nodal point' through which other actants must pass to remain part of the network (Bueger & Gadinger, 2014; Callon, 1986). Although the concept of the OPP was not foregrounded in earlier chapters due to space constraints, this finding suggests that it could be developed further in future ANT-informed research, which may consider the extent to which VR technologies operate as OPPs in organisational networks. OPPs are effective when other actants are compelled to align with them in order to pursue their own goals. This dynamic is observable across the cases: In the UNDP project, implementers had to work through the constraints and affordances of CVR to reach the mobilisation stage (the showings of *I am Fatmira*). Similarly, at ITC-ILO, collaborative practices were reconfigured to accommodate and operate within multi-user VEs. Moreover, it is important to remember that VR has a dual role across all cases: it acts simultaneously as an enabler and as a constraint. While it expands organisational possibilities – facilitating immersive training, collaboration, and advocacy – it also imposes new demands related to technical infrastructure, cost, access, and affordances. Recognising this dual role reinforces the view of VR not as a neutral instrument, but as a sociotechnical actant with its own structuring effects on UN organisations' and IOs' practices.

Feedback loops

Feedback loops are processes in which the outputs of an intervention are 'fed back' into the system as inputs, enabling that intervention to be adjusted or improved. They are present in all case studies, though in different forms. The ILO established a formal project evaluation by tasking researchers from Toronto's York University to assess VR's impact (Interview 23), a level of formalisation absent in the other initiatives. At UNDP, feedback emerged informally through participant reactions, such as during the *I Am Fatmira* roadshow in Albania, but was

not formally recorded.[90] The ITC-ILO project included both: informal feedback from course participants and partner organisations like WFP and UOCRA (Interviews 2; 9; 10), and a formal evaluation conducted by UOCRA on the use of CVE in trade union contexts (Fundación UOCRA & ILO, 2023). ILO's formal feedback loop not only enabled an assessment of VR's added value over traditional training (Interviews 21; 22) but also, crucially, it supported network stabilisation. The literature strongly supports this connection: effective innovation adoption often hinges on robust feedback mechanisms. For example, Argyris (1976) introduces the concept of 'double-loop learning', where effective action arises through continuous comparisons between decisions and environmental feedback, informing future action. In development contexts, Maru and colleagues (2018) similarly argue that evidence should not merely assess final outcomes but also serve to challenge underlying assumptions and adapt interventions accordingly.

From an ANT perspective, feedback loops can be interpreted as moments when the mobilisation phase re-informs the problematisation phase – as visible in the flowcharts. In this dynamic, actants mobilised through the intervention (such as beneficiaries or evaluators) generate new insights that lead to a reformulation of the original 'problem' the technology was intended to address. In the ILO case, for example, VR was initially framed as a tool to improve SH training. However, feedback from the evaluators' report (Pike & Koithara Mathew, 2023) highlighted challenges related to usability and contextual tailoring which, in turn, prompted a shift in the underlying problematisation. The question shifted and narrowed, from 'Can VR enhance harassment training?' to 'What kind of VR experience is appropriate and scalable within the constraints of ILO training environments?' This does not only refine the intervention but also contributes to network stability, which must be continuously enacted and

[90] Note that I am referring to the VR initiative exclusively, not the wider UNDP project within which *I am Fatmira* was located.

sustained through actants' maintenance work (Latour, 2005: 33). Feedback loops make this possible by enabling networks to rearticulate their goals and realign their actants.

The role of mediators

Across the three cases, a fourth stabilising element recurred: human mediators. ANT defines mediators as actants that 'transform, translate, distort, and modify the meaning of the elements they are supposed to carry', thus reconfiguring relations within the network (Latour, 2005: 39). Through their role, mediators stabilise networks: By interpreting, 'translating' a new technology into terms that would make sense to different stakeholders (e.g., scientific, technical or practitioner stakeholders) mediators 'merge diverse interests into a working alliance' (Scheermesser, 2022). For example, in the seminal study *Aramis,* (1996a) Latour demonstrated that the failure of the Aramis transit system – a proposed personal rapid transit technology for Paris – was due to the absence of effective mediators. Without actants capable of translating between engineers' technical visions, political agendas, and user expectations, the project failed to achieve a stable alignment and ultimately dissolved (Latour, 1996a).[91]

In the case studies, mediators (whether programme officers, training focal points, or subject-matter experts) 'translated' between VR technology, organisational purposes, and other human actants, adapting organisational objectives into VR-compatible formats and explaining the unfamiliar affordances of VR into the existing language and procedures of the organisation. By doing this, they were able to align actant expectations and thus enhance the stability of the network. At ILO, technical officers ensured alignment with Better Work's aims, while the factory Person in Charge tailored delivery to workers' needs. At ITC-ILO, focal points from UOCRA and WFP translated the CVEs into sector-relevant virtual venues. At

[91] A similar argument has been made more recently by Scheermesser (2022).

UNDP, the Regional Hub's Social Cohesion Specialist and UNDP Albania's Social Inclusion Officer worked on the film's institutional fit, ensuring it resonated with the broader Roma Inclusion project and connected with relevant communities. In all three cases, the network around VR adoption was stabilised by the work of mediators who made the technology more 'acceptable' and 'workable', thereby facilitating its institutional embedding. The presence and quality of such mediation work should therefore be understood as a central condition for successful adoption, rather than a peripheral factor. As a practical implication, IOs seeking to adopt VR might consider identifying and empowering mediator roles, ensuring their involvement throughout the adoption process.

Above, we have seen how each stabilising force contributed individually to the resilience of the network. Another dimension worth considering is whether and how these forces worked together. We can imagine these mechanisms operating in concert to reinforce network stability. For example, human mediators strengthened stability by translating between the technical affordances of VR and the institutional language and practices of IOs. This stabilising effect may be stabilised by other forces, such as feedback loops. Feedback processes, by highlighting specific frictions or misalignments, enabled mediators to recalibrate the network accordingly, thus amplifying their capacity to maintain coherence. Another example is UNDP where, although feedback mechanisms were less institutionalised, strong mediating roles and VR's function as an OPP compensated for this, sustaining alignment. These patterns suggest that while each mechanism plays an important role, network stability was most robust when multiple forces co-occurred and reinforced one another. Future research could explore these forms of synergy more systematically to better understand how combinations of stabilising forces contribute to successful technology adoption.

Destabilising forces

Instability, by contrast, refers to the introduction of friction, disruption, or misalignment, between specific actants. Across the case studies, three forces of instability have recurred: handover points, especially between innovators and implementers, the influence of external contextual forces, and the role of the material.

The innovator-implementer handover

Across the three cases, the handover from innovators to implementers emerged as a structurally fragile moment in the VR adoption process. In both the ITC-ILO and ILO cases, a clear handover occurs between innovators, who lead problematisation and interessement, and implementers, responsible for integrating VR into existing frameworks across enrolment and mobilisation. This transition can introduce fragility, as the success of the initiative hinges on implementers' ability to realise the innovators' vision and translate it into concrete actions and results. If implementers are unable to make that transition – perhaps due to different 'thought worlds' (Dougherty, 1992) – there is the risk of what has been termed 'pilot project syndrome', where pilots end without broader implementation (Rohila et al., 2017). In the cases at hand, the handover process was generally successful. However, it remains a potentially fragile point – for example, implementers may sometimes resist the transition (Interview 7). This suggests that moving from a small innovation team to the wider organisation is a critical weak point in technology adoption. IOs aiming to adopt VR should ensure a shared understanding during this handover and recognise, once again, the value of mediators or boundary roles, who can help bridge gaps and facilitate the transition. Conversely, in the UNDP case, the handover dynamic described above is replaced by the sustained involvement of a single innovator, whose commitment spans from problematisation to mobilisation. This continuity ensured coherence and momentum, and serves as a notable example of intrapreneurship within a public sector institution (Ambos & Tatarinov, 2022a; P. Raja, 2022).

However, this model also risks creating a dependency on one individual's sustained interest in VR. Should the innovator's involvement cease, the initiative would lose its driving force, creating a single-point-of-failure risk.

External contextual forces

Another destabilising factor identified across the case studies was the influence of *external contextual forces*. As noted above, sociotechnical networks are inherently precarious. Consequently, the entry, exit, or transformation of specific actants can threaten their stability (A. D. Tatnall, 2010). A classic example is Callon's study of scallops, where the network collapsed when the larvae failed to behave as anticipated (refusing to anchor), thereby triggering network failure (Callon, 1984; Lovell, 2022). In both the ITC-ILO and ILO cases, specific external actants – COVID-19 and AI technology – similarly disrupted expectations, introducing a layer of instability into the network. First, the COVID-19 virus impacted the translation process, especially the problematisation stage: In fact, the onset of the pandemic created an urgent need for remote training and collaboration tools. This elevated VR as a potential 'solution', strengthening its position in the ITC-ILO and ILO networks. However, as the pandemic receded, the urgency to address physical distancing started to diminish. While VR continues to offer value in bridging distances for reasons beyond enforced isolation – such as reducing carbon emissions, enabling hazard-related training, and supporting global outreach – the withdrawal of this central actant introduced a new point of instability in the network, demonstrating how a biological entity may destabilise sociotechnical assemblages (Latour, 1988). A similar dynamic accompanied the rise of generative AI. The problems that had legitimised VR – for example, insufficient engagement in training, or insufficient efficiency in virtual collaboration – were impacted by generative AI's low-cost, screen-based alternatives: chatbots and synthetic tutors promised engaging training (Labadze et al., 2023), while automated summarisation and data analytics promised to streamline virtual meetings

(Jony & Hamim, 2024). As institutional agendas started to reorient towards AI, the 'problems' that VR was positioned to address started to appear less urgent, or were reframed in ways that no longer privileged immersive solutions (Piscione & Drean, 2023). Accordingly, interviews in the ITC-ILO case pointed to a reallocation of resources towards AI (Interview 4), while in the ILO case, interviewees tended to view VR and AI as complementary tools that could be deployed in tandem to address different needs (Interviews 28). For IOs aiming to maintain stable networks around VR adoption, it is crucial to monitor such external forces and develop adaptive capacities that enable the innovation network to absorb or even capitalise on these shocks. This may include, for instance, clearly articulating the added value of VR in comparison to competing or emerging technologies, and grounding decisions in empirical research and strategic assessments, including formal evaluations and feedback loops. Unlike in the other case studies, interviews conducted within the UNDP context did not explicitly reference external contextual forces. While this absence does not necessarily imply that such forces were irrelevant, it may suggest that their influence was less pronounced. One plausible explanation is that VR for advocacy represents a more established application of VR within IOs, having been used since around 2015. In contrast, applications such as VR for collaboration – still emerging – were more directly shaped by disruptive events like the COVID-19 pandemic. As a result, VR adoption in the UNDP appears less dependent on external shocks and more rooted in pre-existing practices.

The role of the material

Finally, across all case studies, material actants emerged not as inert backdrops but as active, at times 'unruly' forces (Harvey & Knox, 2012) enabling and constraining human action, thus influencing the trajectory of VR adoption. At ITC-ILO, the headsets' very materiality – their security-sensitive electronic components – led customs to hold them at the border, delaying

their roll-out across the network. Similarly, in courses such as the UN Fellows Programme, material specifications like limited refresh rates provoked nausea in some participants, deterring them from attending VR sessions (Interviews 1, 7). For UNDP, the materiality of VR complicated the enrolment and mobilisation phases: At the European Parliament screening, for example, security-sensitive hardware components had to undergo stringent security procedures, echoing the challenges encountered by the ITC-ILO. During the event itself, the physical setup – the headsets, wires, and straps – required active management by support staff to ensure the screening proceeded smoothly. Similarly, for the VR roadshow in Albania, the need to rent headsets introduced logistical complications, with the material aspects of the technology once again constraining mobilisation. Similarly, for the ILO, delays in VR shipment disrupted the mobilisation phase, forcing the team in Indonesia to revise their timelines and adjust the original implementation plan (Interview 5). Moreover, the spatial demands of VR, such as the need for a dedicated area in which the experience could properly unfold, compelled the team to rent hotel rooms for the training day. These examples illustrate how VR's material aspects actively shape the networks in which they are embedded. As a result, the stability of these networks depends not only on human actants, but also on the successful collaboration of material forces. As Latour argues in *Technology is Society Made Durable* (1990), the integration of an innovation into an organisation's material fabric (procedures, hardware, skill sets) will make the social relations more 'durable', thereby stabilising the adoption process. Servers provide a straightforward example: irrespective of user activity, the physical infrastructure of servers constitutes a fundamental condition of possibility for internet use. At the same time, as seen above, the material can introduce *in*stability by 'betraying' the network (Rivera & Cox, 2016). In the server example, if the server fails or lacks capacity, the entire network collapses. In all of the case studies, the material introduces moments of fragility and unpredictability into the network that at times exceeded human control – exemplifying what ANT scholars describe as the agency of material

artefacts (cf. Section 3.3.1). For UN organisations or IOs planning to adopt VR technology, this underscores the need to account for material agency in both their plans and infrastructure, anticipating how objects and, specifically, the materiality of VR, might interrupt or enable the network.

Furthermore, just as stabilising mechanisms can work in combination to reinforce network resilience, destabilising forces may interact to compound fragility. For example, handover points between innovators and implementers often introduce structural vulnerability but may also increase the network's susceptibility to material disruptions. It is precisely in these transitional moments that practical challenges, such as the shipment, setup, or spatial requirements of VR, can become more difficult to absorb. For instance, when implementers inherit responsibility for a VR project, they may be left to navigate logistical hurdles with limited continuity. Similarly, external contextual forces may exacerbate existing tensions: at ITC-ILO, the organisational shift in priority toward AI technologies placed additional strain on implementers tasked with sustaining the momentum behind VR adoption. These patterns suggest that destabilising forces are not isolated, but can accumulate and interact in ways that threaten the stability of a network. Recognising such compound effects is crucial for IOs seeking to build a more resilient VR adoption process, and a fruitful avenue for further research.

To conclude, this comparative analysis traced the stabilising and destabilising forces impacting the networks of VR adoption at the ITC-ILO, UNDP, and ILO. By identifying the specific mechanisms that contributed to or undermined network stability in each case, it offered insights to support IOs in embedding VR in ways that support network stability. Having examined how VR adoption impacted practices and how this unfolded differently across the three functions, the next section turns to the broader significance of these findings,

exploring what they reveal about UN organisations' and IOs' evolving practices within a digitalising international sphere (RQ3).

8.4. Reconfiguring the agentic and spatial dimensions of IO practice

This section discusses the broader implications of VR adoption for UN organisations and IOs, corresponding to this thesis' third research question. While aspects of this question have already been explored in Sections 8.2 and 8.3 (particularly in relation to how changes in practice affect the UN's roles as *global connector, knowledge provider*, and *capacity builder*, considered property by property) this section builds on those discussions. Drawing together the insights gained across the thesis, it advances two overarching claims about the reconfiguration of *agency* and *space* in a digitalising international sphere. First, ANT-informed analysis of VR adoption traces agency as *distributed* across human and technological actants, leading us to the insight that global governance can and should be studied as a sociotechnical phenomenon. Recognising the distributed nature of agency furnishes a sharper lens for interpreting UN organisations' and IO practices within a rapidly evolving global governance sphere. Second, I argue that VR, where it is adopted, alters the spatial logics of UN practice by reconfiguring how space is imagined and inhabited. Rather than simply bridging distance, VR generates new *embodied spatialities* that reshape the conditions under which UN organisations collaborate, advocate, and train.

8.4.1. Reconfiguring agency as *distributed:* the sociotechnical foundations of global governance

Analysing VR adoption through ANT led to a key insight: agency appeared to be *distributed* across both human and technological actants. In other words, it did not reside just with human actants, as often assumed (cf. Section 3.3.1), but also emerged from the roles played by non-

human entities, including objects and technologies. This understanding of agency is encapsulated in the notion of the *sociotechnical*, which emphasises the interdependent and relational nature of the social and the technical, which do not act in isolation but are mutually constituted through their interactions. This section advances a twofold argument: first, (a) I argue that the findings substantiate existing claims that global governance is inherently sociotechnical, with agency dispersed across heterogeneous assemblages. While this has been theorised within STS and IPS, empirical evidence from a UN context remains limited. Grounding this theoretical claim in concrete organisational settings provides analytical traction for understanding how governance is enacted through sociotechnical configurations. Second (b), I argue that recognising agency as distributed opens up new analytical and practical avenues for interpreting how UN organisations and IOs adapt and evolve in in response to digital technologies – particularly in relation to their roles as *global connectors, knowledge providers,* and *capacity builders.*

Empirical substantiation of sociotechnical global governance

The notion that agency is distributed across human and non-human actants is central to ANT and to broader STS-informed approaches. Scholars have long emphasised that governance processes are not enacted by human agents alone, but through complex constellations of materials, technologies, and infrastructures. For example, Aradau (2019) highlighted the notion of entanglement, arguing that a distributed understanding of agency can push the boundaries of IR theorising. Research on border security exemplifies this: rather than attributing agency solely to state actors or border agents, scholars have shown how it is distributed across systems such as biometric scanners, databases, and even policy documents (cf. Section 2.4). Bourne and colleagues (2015) for example, examine a European prototype hand-held device used at borders, revealing how even mundane technologies mediate how governance is practised. Similarly, Glouftios (2021) analyses the Visa Information System to

illustrate how governance is co-produced by specific technologies. These research strands also led to broader claims, like Grayson's (2016) notion that technologies are 'productive of the international', and Mayer and Acuto's suggestion (2015) that technological assemblages form the very 'skeleton' of world politics.

The findings from this research provide empirical validation of these claims within the UN system. Across the case studies, patterns of distributed agency were clearly observable, underscoring the sociotechnical nature of the organisations' collaboration, advocacy, and training practices.[92] At the ITC-ILO, the process of translating VR into a tool for collaboration highlighted mutual shaping between human and technological actants. In the ACTRAV-Fundación UOCRA project, for example, a pre-existing CVE originally designed as a virtual pool house was repurposed into a collaborative workspace. The CVE itself exerted agency by delimiting what was possible within its spatial and functional design, enabling and constraining specific actions – for example, by enabling the creation of a soundproof room. Similarly, at UNDP, the narrative structure of *I Am Fatmira* was not only adapted to fit the VR medium, but was actively shaped by the CVR format, which influenced decisions about technical partnerships, reconfigured the design and logistics of events, and foregrounded specific filmic techniques and perspectives. In the case of the ILO, VR simulations for training purposes revealed similar dynamics: The immersive format required significant adaptation in content design and scenario development. Technologies did not simply support pre-existing training content but also partly shaped how training was conceptualised and delivered, while ILO staff adapted the use of VR to fit institutional norms, objectives, and practical constraints. Across all three sites, agency was clearly dispersed across sociotechnical networks, as VR was

[92] Sections 5.5.4, 6.5.4, and 7.5.4 summarise the sociotechnical relationships between VR technology and human actants highlighted in the analyses of translation. Across all cases, this relationship emerged as deeply co-constitutive: technological and human actants did not operate in isolation but continually negotiated, adapted to, and reshaped one another. The distributed nature of agency can also be observed visually in the detailed network maps of each case study (5.4.3; 6.4.3; 7.4.3).

not merely embedded into existing practices but exerted agency by shaping how those practices were enacted. These empirical findings thus reaffirm the claim that agency is distributed, and that global governance should be treated as a sociotechnical phenomenon by itself, challenging human-centric assumptions in IO and IR research. Building on these arguments, it becomes possible to explore why a distributed view of agency offers a valuable perspective for understanding IOs' work, as well as the broader implications this perspective entails.

Broader implications: Rethinking IO roles and practices

Recognising agency as *distributed* has significant implications for both theory and practice. Theoretically, it offers a productive lens for understanding how IOs are transformed in an increasingly digitalised international sphere. One potential research avenue is that IOs may no longer be understood as autonomous actors with pre-given capacities. Instead, they could be considered as sociotechnical assemblages whose identity and function emerge from entanglements with technological infrastructures, affordances, and constraints. In this view, technologies are not merely instruments that IOs deploy: they are constitutive elements that participate in shaping organisational practices and outcomes. Accordingly, the emerging properties identified in this thesis – for example, *spatial presence* and *interactive engagement* – are not inherent to the technology alone: they arise from the distributed agency of both human and non-human actants interacting within particular institutional contexts. This echoes findings by scholars like Bueger (2019), who shows that in the context of maritime security, governance is enacted not by states alone but through heterogeneous assemblages of actants, including navies, private firms, policy documents, and navigation technologies. In such accounts, agency is not concentrated in institutional bodies but distributed across the sociomaterial networks that make action possible. A similar shift in thinking is needed for

understanding IOs today: their practices are increasingly co-produced with, and constrained by, the technologies with which they operate.

This reconceptualisation has practical relevance for the three roles examined in this thesis: As *global connectors,* distributed agency invites us to understand UN organisations and IOs not as merely facilitating interaction between member states and stakeholders, but as part of a sociotechnical assemblage. In other words, the tools they use acquire significance: their ability to connect actors depends not only on the organisations' intent, but on the agentic affordances and constraints of the technologies through which connection is performed. For example, in many VR platforms, features such as spatialised audio or fixed avatar gestures directly affect how participants engage with one another – amplifying some forms of expression while muting others – thereby structuring the experience of collaboration in ways beyond the organisation's sole control. As *knowledge providers*, IOs are also redefined by the recognition that agency is distributed. Specifically, IOs do not merely curate and disseminate information but are part of wider networks where technologies help shape how knowledge is produced, framed, and made meaningful. In other words, IOs are not considered the sole authors and disseminators of advocacy messages, but collaborators with agentic technologies that themselves influence narratives. Applied to broader knowledge roles – such as IOs producing scientific information – this suggests that knowledge is not pre-existing content simply collected and shared. Rather, as Latour's laboratory studies have shown, knowledge emerges through sociotechnical processes in which instruments, data infrastructures, and other tools are active participants. Similarly, in the context of IOs, technologies involved in modelling, forecasting, or visualising global problems become part of IOs' 'knowledge-making apparatus', shaping what is known and acted upon. Finally, as *capacity builders*, IOs are likewise reconfigured by the recognition that agency is distributed. Rather than designing and delivering training in a linear, top-down manner, IOs operate within sociotechnical

systems in which technologies co-produce the very conditions for learning. The ILO case illustrated how VR simulations reshaped training content and delivery, not simply by supporting existing methods, but by requiring the development of different training scenarios, modes of engagement, as well as feedback mechanisms. The result is that capacity building practices also emerge from sociotechnical interactions, with technologies constraining or enabling specific modes of learning. Across the three cases, a distributed view of agency urges IOs to treat technologies not as neutral tools but as active participants in organisational practices.

Looking forward, a distributed understanding of agency is likely to become increasingly relevant as new technologies complicate existing assumptions about agency and responsibility. Foremost among those, the rise of generative AI raises new questions about agency and intentionality (Bar-Gil, 2023; Redaelli, 2024), particularly as such tools are increasingly used in content creation, automated decision support, and data analysis.[93] In these contexts, agency is therefore partially delegated to systems that operate with limited transparency, challenging assumptions about authorship and control in organisational decision-making. Along the same lines, blockchain technologies – applied in areas such as aid delivery and transparency efforts – distribute agency by shifting trust and decision-making away from central authorities and into coded systems (Gazi, 2025; Polcumpally, 2023). This reconfigures how IOs exercise control by verifying actions, often bypassing traditional bureaucratic structures. These technologies are expected to intersect with VR (Almeman et al., 2025). As such, the conditions under which IOs operate – and indeed what IOs *are* – could increasingly be defined by their embeddedness in complex sociotechnical systems. Distributed conceptions of agency, such as those advanced by ANT, will thus become indispensable for

[93] For an overview of applications, see Gama and Magistretti (2025).

understanding the evolving architecture of global governance.

8.4.2. Reconfiguring IOs' spatialities: VR and *embodied space*

Building on the argument that global governance is increasingly sociotechnical in nature, with agency redistributed across human and technological actants, this section turns to a second key dimension shaped by VR: how UN organisations and IOs more broadly experience and operationalise space. Specifically, I argue that VR challenges long-held assumptions about the primacy of geographic distance and physical co-presence, prompting a rethinking of how space is understood and operationalised across IO practices. To capture this shift, I propose the notion of *embodied space*: a spatial form that compresses distance and is constituted not through physical geography, but through lived experience within virtual environments. The section proceeds in two parts: First, I introduce the so-called 'spatial turn', outlining how space has been theorised in relation to IOs' work and introducing how VR has been connected to questions of spatiality. Building on this foundation, I then draw on empirical examples from the case studies to develop the notion of *embodied space*, showing how spatial reconfiguration materialises in practice and proposing this as a way to make sense of how VR reshapes spatiality in IOs. By drawing on examples across the functions of collaboration, advocacy, and training, the analysis shows that this reconfiguration is not function-specific, but rather cuts across functions, pointing to a broader rethinking of spatiality within UN organisations' and IOs' operational practices. The section concludes with a 'spatial reading' of VR adoption in the UN ecosystem, demonstrating how the technology responds to institutional concerns with distance and spatial disconnection across the three functions.

The spatial turn and VR technology

Recent literature has increasingly recognised the significance of space in global governance, particularly through what has been termed the 'spatial turn' (Fischer & Bauer, 2018; Schmid, 2008; Susen, 2020). This intellectual current calls for the integration of 'spatial thinking' into research, arguing that space should not be treated as a passive backdrop to social processes, but as a constitutive dimension of social life itself. This resonates with ANT's understanding of space as enacted through relational networks, rather than as a pre-given container (Latour, 1987; Oppenheim, 2014). The spatial turn has since moved beyond geography into the social sciences, including global governance, where scholars have begun to investigate how spatial configurations shape practices. A notable contribution is Dittmer and McConnell's edited volume (2016), which foregrounds spatiality as integral to diplomatic practice, with chapters exploring how specific sites and settings condition diplomatic cultures. Similarly, Neumann (2014, 2016) argues that global governance is always *sited*, and that attention to the spaces in which diplomacy unfolds provides a powerful analytical lens. In parallel, scholars have explored the relationship between space and technological innovation, arguing that conceptions of space have historically been shaped by technological developments (Castells, 2000; Elden et al., 2003; Knorr-Cetina, 2009). From the telegraph, which allowed communication across distance and time, to contemporary video-conferencing platforms like Microsoft Teams, which enable synchronous collaboration regardless of physical location, digitalisation has reshaped spatial imaginaries by enabling more and more interaction without physical co-presence.[94] In this sense, the spatial turn offers a useful lens: it draws attention to how many technologies have been designed precisely to bridge, compress, or transcend physical space. The idea of geographical space is therefore not fixed, it is evolving. Within

[94] For further reflections on how conceptions of space are changing in response to technological innovation, see Castells' notion of the 'space of flows' (2000) and Knorr-Cetina's concept of *synthetic situations* (2009), social encounters no longer grounded in face-to-face interaction, but rendered situationally present through technological mediation. Presence is here constructed through screens, interfaces, and data flows rather than shared physical locations.

this context, VR marks a further intensification of this change: While earlier technologies began to unsettle traditional spatial dynamics, VR produces synthetic, three-dimensional spatial environments in which interaction occurs, further complicating conventional ideas of space.[95] However, few scholars explicitly applied spatial studies to VR: Deniz (2023) frames the metaverse as a spatial shift that transcends the temporal and geographic limitations of the internet by grounding communication in virtual presence, and Koch (2022) argues that AR leads to a 'refiguration of spaces' which necessitates new approaches in spatial theory. Building on the case studies, I argue that the spatial turn not only provides a productive lens, but that VR is distinct from other innovations in spatial terms: it introduces a novel conception of *embodied space* – one in which geographical distance is collapsed through users' immersive and bodily engagement within the virtual environment.[96]

Spatial reconfiguration in practice

This reconfiguration of space can be observed across the case studies. In the ITC-ILO case, multi-user CVEs enabled real-time co-presence across geographic distance (Interview 5. See also ITC-ILO, 2024c). Participants, though physically dispersed, engaged in shared activities within the same virtual space. CVEs challenge traditional spatial categories: they feel simultaneously local – embodied and immersive for those involved – and global, in that they host actors from across the world and address transnational concerns. Similarly, the CVE made it possible to create meeting rooms with varying shapes, table configurations, and participant

[95] It is important to distinguish this broader reconfiguration of spatiality from the notion of *spatial presence*, which emerges in some of the case studies as an individual, felt experience of 'being there' in a VE. While spatial presence refers to a contingent, perceptual outcome reported by users as they feel present in a specific VE, the reconfiguration of spatiality discussed here is conceptual and structural. It concerns how space is experienced and enacted by IOs through VR, regardless of whether users consciously register a sense of presence. In other words, spatial presence is one possible *effect* of a more fundamental transformation in how spatial environments are constructed and mobilised by IOs.

[96] In this sense, VR challenges the notion that digital technologies lead us ever further toward abstraction and disembodiment through information and patterns (Hayles, c1999). Rather than detaching from the body, VR re-centres embodiment by generating spatial environments in which the body is not only present, but functions as the anchor of perception and experience.

capacities – allowing spatial arrangements to be altered quickly and without logistical burden, in ways that would be difficult or unfeasible in physical settings. For example, the ACTRAV programme virtual environment was designed with a specific meeting room that allowed for selective muting – enabling flexible private side conversations during group interactions. This creates new spatial formations for international dialogue and connection aligned with the UN's role as a *global connector*. VR here facilitates collaborative practices that transcend physical constraints, offering alternative venues for interaction with far-away individuals. In the UNDP case, CVR immerses viewers in narratively constructed spaces that enable forms of witnessing that might otherwise require physical presence. In *I am Fatmira,* viewers are immersed in 360° environments, such as the Roma settlement in Füshe-Krüje and, though not physically present, they experience a strong sense of proximity to distant realities. This illustrates how advocacy, and by extension, the UN's role as *knowledge provider*, would be reconfigured by VR adoption: Rather than informing at a distance, IOs would increasingly rely on spatial technology to elicit understanding of specific issues and to bridge physical distance. Finally, the ILO's use of VR for sexual harassment training entails the production of controlled, repeatable, didactive spaces designed for embodied learning. Unlike traditional training formats, VR creates a synthetic environment where knowledge is enacted rather than received, enabling a form of experiential training that is difficult to replicate in more traditional e-learning modules. This points to a potential shift in how training spaces are conceptualised: less as sites of information transfer and more as environments for embodied, experiential learning. In terms of the UN role as *capacity builder,* VR offers new spatial modalities for delivering training that could transform several dimensions: from the accessibility of learning (by enabling participation without the constraints of geography) to the quality of engagement (through tailored, experiential scenarios), even to the inclusivity of training (by creating safe virtual spaces in which sensitive issues can be addressed). These spatial reconfigurations would recalibrate the conditions under which capacity building is enacted.

Taken together, these cases demonstrate that VR does not simply support existing practices: it could affect the spatial conditions under which they operate. In each instance, space is not merely a backdrop for action but becomes an active dimension of practice. Whether enabling situated collaboration, witnessing, or embodied training, VR introduces spatial arrangements that depart not only from conventional, physically grounded practices, but also from flat, 2D virtual practices. This shift is not uniform across functions but suggests a broader transformation in how IOs organise and inhabit space: spatiality becomes increasingly decoupled from fixed locations such as conference halls, field sites, or classrooms, and is instead produced and enacted through digital technologies.

The spatial reconfiguration enabled by VR is particularly salient in the UN context. As a structurally dispersed and operationally fragmented ecosystem, the UN system encompasses a wide range of agencies with different mandates, geographies, and institutional cultures. Yet across this diversity, spatial concerns are a consistent feature of UN organisations' practices – whether in the coordination of geographically distributed personnel, the delivery of services in remote or hazardous environments, or the staging of diplomatic and development encounters across physical and cultural distance. In this context, VR could offer responses to long-standing spatial challenges faced by the UN system. The technology has been explicitly framed within the UN systemas a technology that will 'eliminate the distance barrier and […] foster inclusivity and development (UNGSC-TTDU, 2021). This appeal is not incidental: much of UN work involves engaging with hard-to-reach populations or operating in environments where physical access is limited or risky (Gonsalves, 2015: 1). And while such work has traditionally unfolded in physical sites – embassies, headquarters, conference venues, humanitarian field missions – VR destabilises these spatial anchors (Hoijtink & Leese, 2019; Neumann, 2014), introducing new virtual spaces where UN organisations' operations

can increasingly unfold. In other words, while UN entities differ in how they adopt and implement VR, a spatial lens reveals a shared preoccupation with how to overcome, manage, or reimagine distance. In this sense, spatial reconfiguration functions as a unifying conceptual thread: whether through enabling collaboration in shared environments (ITC-ILO), witnessing (UNDP), or embodied training (ILO), each use of VR seems to respond to the practical pressures of working across distance.

8.5. Conclusion

This chapter has brought together the empirical and analytical threads of this thesis to address its three central research questions. Applying an ANT lens, it has shown that the adoption of VR by UN organisations is not simply an operational or technical choice, but a sociotechnical intervention that reshapes how they enact their core functions. Across the practices of collaboration, advocacy, and training, VR generated distinct emerging properties that altered these organisations' practices in distinct ways. A comparative analysis revealed that while certain properties – like *spatial presence*, *interactive engagement*, and *embodied influence* – appear high-transferable across organisational contexts, others are more tightly coupled with specific functions. Moreover, the stability of VR adoption was not determined by VR's properties alone, but by the dynamics of the translation process: the distribution of tasks among heterogeneous actants, the presence of human mediators, the role of feedback loops, and the navigation of destabilising forces such as handover moments, material resistance, and shifting contextual landscapes. These findings support the claim that the effects of VR adoption are co-produced within broader actor-networks, moving beyond accounts that treat technology as a mere tool. The outcomes of technological adoption seem to depend on how the technology interacts with other organisational actants and how it is translated within specific institutional logics. This reinforces the value of ANT as a framework for capturing such variability, as it

focuses on the networks of relationships through which multiple actants shape the adoption process. Beyond function-specific impacts, the chapter advanced two broader arguments concerning the reconfiguration of UN organisations' and IOs' practices in a digitalising international sphere. First, it argued that VR adoption foregrounds the distributed nature of agency in global governance, challenging human-centred models and positioning IOs as sociotechnical assemblages shaped by their entanglement with digital technologies. Second, it demonstrated that, where adopted, VR alters the spatial conditions under which UN organisations operate, producing synthetic spatialities that reshape how collaboration, advocacy, and training are imagined and enacted. These two shifts – towards distributed agency and reconfigured spatiality – indicate that engagement with emerging technologies like VR in the UN system is driving a deeper transformation in how global governance is practised and experienced. As the thesis turns to its conclusion, these findings provide a foundation for reflecting on the theoretical and empirical contributions of this research, as well as on the avenues it opens for future research.

CHAPTER 9: CONCLUSION

9.1. Drawing the findings together

This thesis has traced the adoption of VR technology across three UN organisations, analysing its impact on collaboration, advocacy, and training practices. It did so through a qualitative research design that combined case studies, interviews, embodied virtual observation, and contextual document analysis, with Actor-Network Theory providing the analytical framework. We now return to the research questions outlined in the introduction to assess how they have been addressed and what insights have been gained.

The first research question (RQ1) asked whether, and in what ways, VR adoption affected the operational practices of the UN organisations under study. The case studies demonstrated that, where adopted, VR indeed altered how the organisations performed the examined functions. They also illuminated the specific ways in which these impacts unfolded. Specifically, this occurred through the emergence of specific sociotechnical properties, that arose from the interplay between human and non-human actants and impacted how the organisations engaged in collaboration, advocacy, and training. In the case of the ITC-ILO, multi-user virtual environments reconfigured collaborative practices by fostering new forms of *spatial* and *focused presence, social presence* and *social dialogue*, and *interactive engagement*. At UNDP, cinematic VR shifted the usual modes of advocacy by introducing *spatial* and *proximate presence, emotional resonance*, and *embodied influence*. At the ILO, VR simulations shifted training practices through *embodied influence*, *interactive engagement*, and *psychological safety*.

The second research question (RQ2) investigated how VR's impact differed across functions. It revealed that VR impact on practices is not uniform: some properties surfaced in

more than one case, indicating high transferability, while others aligned with a single function, suggesting a more context-specific, or low-transferable, character (Section 8.3). This offered a more nuanced answer than a binary of success or failure, which suggests that VR's future in the UN ecosystem, and IOs more broadly, is greatest when its properties are aligned with the objectives of particular functions, rather than assumed to apply more universally as intrinsic 'VR affordances'. Another comparative insight concerned patterns of stability and instability in the translation processes (Section 8.4.3). VR adoption appeared more stabilised when tasks were distributed across heterogeneous actants, when mediators bridged organisational and technological interests, and when feedback loops allowed networks to adapt and recalibrate. Conversely, fragility was observed at handover points, especially between innovators and implementers, from external shocks such as COVID-19 or the rise of AI, and from the material agency of the technology itself. This suggests that VR adoption will not depend on emerging properties alone, but also on networks and their (in)stability. The implications for IOs are clear: successful adoption depends less on the intrinsic promise of VR and more on their ability to manage the networks that sustain it.

Finally, the third research question (RQ3) examined the broader implications of VR adoption for the evolution of UN practices. It was addressed in two ways. First, I assessed what VR adoption entails for the UN's core roles as *global connector*, *knowledge provider,* and *capacity builder,* showing that, where VR is adopted, these roles evolve in specific ways while also confronting new challenges. For example, in the case of VR for collaboration, the ITC-ILO's adoption of multi-user CVEs reinforced the UN's role as a *global connector* by enabling shared immersive spaces across distance, facilitating more focused collaboration, and fostering social presence (cf. Chapter 5). At the same time, this role can be strained when risks and limitations dominate, such as biases in spatial design, barriers to access, or other constraints.

Second, building on the case studies, I examined the broader implications of VR adoption for IOs' work and identified two central points concerning *agency* and *space*. With respect to agency, using ANT illuminated how agency in the VR adoption process is distributed across human and non-human actants. In other words, it does not rest solely with human actants such as UN staff or technology developers, but extends to non-human actants including VR hardware and software, avatars, and organisational documents. Building on this, I concluded that to understand technology adoption in IOs, it is essential to view IO practices as sociotechnical and IOs themselves as sociotechnical assemblages (Section 8.4.1). This perspective also brings into focus dynamics that might otherwise remain obscured – for example, as shown in this study, how the materiality of headsets, when delayed at borders (ITC-ILO; ILO) or unavailable locally (UNDP), redistributes agency between technology and staff, or how software design can enable and constrain what participants can do in a virtual environment, thereby co-shaping practices alongside human intentions. This, in turn, invites a broader reflection for IOs: as conventional notions of agency are increasingly challenged by emerging technologies such as VR and, even more so, AIVR, which actants are recognised as capable of shaping outcomes, which are sidelined or excluded, and what are the consequences for IO practices? With respect to *space*, considering the examined case studies together revealed that VR adoption reconfigures UN organisations' spatial practices. In VR, space is no longer anchored to physical sites: whether in collaborative multi-user environments, cinematic advocacy projects, or single-user training simulations, VR produces synthetic, *embodied spatialities* that challenge the conventional categories of space central to IOs' work. These 'new' spatialities matter because they could reshape the very conditions under which global governance is imagined and enacted, while simultaneously addressing UN-wide challenges of geographic dispersion.

Answering these three research questions allowed me to move from a detailed account of how VR adoption unfolded within UN organisations (RQ1), through a comparative analysis of how its impact varied across organisational functions (RQ2), to an exploration of its wider implications for the UN system and IOs more widely (RQ3). Together, this provides a layered understanding of VR adoption, revealing the micro-level dynamics of translation, highlighting the different properties that emerge across functions, and situating these findings within broader debates on IO digitalisation. This allows us to return to the initial puzzle: Why are IOs adopting VR despite its high costs and barriers? The findings suggest that adoption occurs because IOs perceive advantages in how VR can alter their practices (for example, making collaboration more focused, advocacy more affective, or training more persuasive – see Sections 5.6; 6.6; 7.6). The emerging properties identified provide evidence of these transformations, showing that the advantages IOs anticipated in adopting VR were indeed realised. Yet these advantages do not derive from the technology alone: they arise through the interaction of human and non-human actants in sociotechnical networks. Adoption, therefore, cannot be attributed simply to institutional entrepreneurship or to the broader 'VR momentum' highlighted in the Introduction. Rather, it results from specific alignments between the technology and the interests of human actants and organisations. At the same time, the findings must be qualified by noting that VR remains a niche technology whose wider trajectory of adoption is uncertain. As Swann and Watts (2023) argue, VR currently occupies a pre-paradigmatic stage: its potential is vast and varied, but it lacks a coherent vision. This thesis has begun to clarify what VR can do for UN organisations and IOs more broadly, and how it can be integrated in their work, yet much remains uncertain. Precisely because its future is unsettled, the present moment offers a valuable vantage point for analysis. As the Collingridge dilemma reminds us, it is in the early stages of technological development that choices matter most: when a technology is still malleable enough to be shaped, but before its consequences can be fully foreseen (Collingridge, 1982). Against this backdrop, the section below reflects

on the contributions of this thesis. While the Introduction outlined the intended aims, here they are revisited to assess what has been achieved, focusing on five key contributions – three theoretical and two empirical.

9.2. Contributions of the thesis

9.2.1. Theoretical contributions

First, the thesis contributes to scholarship on the digitalisation of IOs. While research in fields such as digital IR, digital diplomacy, digital humanitarianism, ICT4D, and organisational innovation has examined how IOs adapt to technological change, the adoption of VR remains an under researched phenomenon (Section 2.3). By tracing how UN organisations adopt and operationalise VR, this study extends existing discussions of institutional adaptation and innovation in a digital age. It shows, in particular, that VR adoption is not a uniform process: the three case studies demonstrate how VR adoption reconfigured collaboration, advocacy, and training in distinct ways, with consequences for the UN's wider roles as *global connector*, *knowledge provider*, and *capacity builder*. The thesis also contributes, as stated above, to wider debates on IOs as sociotechnical entities, co-constituted by the technologies they employ, and to discussions on how the very concept of space is being reimagined through digital and immersive practices (cf. Section 8.4).

Second, the thesis contributes to VR research. Existing studies cluster around the domains of professional training and healthcare, gaming, and education, leaving IOs' VR adoption largely unexplored (Section 2.2). The dialogue between these literatures proved productive: in some respects, the findings corroborated existing knowledge – for example, confirming VR's capacity to generate spatial presence, enhance engagement, and influence behaviour. At the same time, they also uncovered less anticipated dynamics, such as specific

articulations of well-researched VR affordances, and insights into the factors that stabilise or destabilise VR adoption networks. For example, social presence in collaborative VEs was not only experienced as 'being there' with others but translated into *social dialogue*, thereby extending existing debates in VR scholarship (see Section 5.6.2).

The third key theoretical contribution concerns the application of ANT in IR. This thesis set out to respond to a growing call for greater cross-fertilisation between STS and IR (Ataka, 2024; A. Braun, 2015; M. Haas, 2017). ANT, rooted as it is in STS, provided the conceptual and methodological tools for this task. By directing analytical attention to heterogeneous assemblages of human and non-human actants, and to the agentic nature of technology, ANT foregrounded dimensions that traditional IR often treats as secondary (Chapter 3). In this sense, it functioned as a 'productive intervention' (Aradau et al., 2019), enabling this thesis to contribute to STS-informed scholarship within IR.

9.2.2. Empirical contributions

Empirically, this thesis advanced knowledge in two ways: first, by generating original data on the operationalisation of VR within the UN system, and second, by offering actionable insights for IOs as they experiment with and consider adoption. The first contribution lies in providing an early empirically grounded study of VR adoption within the UN system. Through ANT, the thesis traces the translation process of VR adoption as it unfolds in UN settings in practice, identifying the properties that result. These properties are derived inductively from the empirical material and remain situated within the UN context, rather than being imposed deductively from existing theory. Second, this thesis generates actionable insights for UN organisations and IOs considering VR adoption. By tracing how adoption processes unfold, identifying how the organisations' operational practices are affected, and distinguishing

between high and low-transferable properties, it advances our understanding of VR's applicability as well as its challenges. These insights can support IOs in making informed decisions about when the technology merits investment and how to best tailor its use to specific objectives. For example, an organisation exploring VR for collaboration will find that the technology is most effective when fostering presence and interactivity in virtual meetings, whereas the much-discussed notion of empathy is largely irrelevant in this context. By contrast, in advocacy initiatives, mechanisms of empathy and emotional resonance become central to how VR achieves its effects.

9.3. Limitations

The contributions outlined above should be considered alongside the limitations of this study, discussed in detail in the Methodology chapter (Section 4.7). Four limitations merit attention. First, the study relied on purposive sampling to select case studies. This approach naturally favoured initiatives that were sufficiently visible and accessible, creating a potential bias towards projects that were already relatively successful, while less visible or 'failed' cases of VR adoption may have been overlooked. Indeed, two of the original case studies had to be replaced due to lack of access. This narrowing of the empirical base also meant that some possible applications of VR were excluded, with the result that the three functions employed here (collaboration, advocacy, and training) are not exhaustive (cf. discussion in Section 4.2.1). For example, VR has been used for data visualisation, where complex information is presented in immersive environments, for heritage preservation, where it is used as a 3D data repository, and for peacekeeping (4.2.1) – uses that were not represented in this thesis and that warrant closer empirical investigation. Second, this study faces limits of generalisability and scope, as the VR initiatives analysed at the ITC-ILO, UNDP, and ILO remain highly specific. Some degree of transferability is possible, whether due to shared organisational cultures or the

high-transferable nature of certain emerging properties (Section 8.3.2). Nevertheless, the diversity of VR applications makes broad generalisation difficult (cf. Section 4.8). For example, this study examined VR simulations in particular configurations, but it is often unclear whether their effectiveness stems from properties emerging from VR itself, or from other factors such as the content, narrative, or design choices embedded in the simulation, alongside user characteristics that inevitably vary (cf. discussion of 'isolating the VR factor' and human variability in Section 4.8). Third, this thesis' reliance on ANT, though fruitful, inevitably set certain boundaries for the analysis. As outlined in Section 3.4, ANT is particularly effective for tracing sociotechnical relations, yet it pays limited attention to issues such as power asymmetries and political interests. As IOs adopt technologies shaped by commercial and/or geopolitical interests, future research should examine whose interests VR advances, whom it risks excluding, and how the very design of VEs is itself political – including along gendered, postcolonial, and racialised lines. Fourth, this thesis captures a particular moment in time, raising questions of temporality and technological change. VR practices evolve rapidly, and the initiatives studied between 2021 and 2023 have already shifted in design and implementation. This was particularly evident during the 'metaverse moment' of 2020-2022, when expectations of VR's ubiquity surged, only to be tempered as COVID-19 restrictions were lifted. As technologies continue to evolve, these findings must be understood as time bound. Longer-term research will be needed to examine under what conditions VR adoption stabilises, transforms, or fades within IOs.

9.4. Recommendations for future research

Throughout the course of this research, several avenues emerged that warrant further investigation. These include the application of specific VR methodologies, the intersection of

VR and AI, and alternative theoretical lenses or concepts to approach VR adoption.[97] Methodologically, one promising direction lies in extending Embodied Virtual Observation (EVO) to multi-user settings. While this study considered such an approach, practical constraints made it unfeasible. In the ITC-ILO case, for example, I was given a guided tour of the virtual environments by an interviewee, but this fell short of directly observing live VR meetings among UN staff. Future research of this kind could offer valuable insights into how collaborative practices unfold in VR and how they differ from face-to-face interaction. Ethnographic approaches have already been applied to virtual communities in other contexts, including VR communities (Section 4.3.2), and adapting them to IO activities appears particularly promising.

A second recommendation is to examine more closely the role of avatars as mediators of identity and behaviour. Although only briefly addressed in this study, avatars constitute a research theme in their own right. Theories such as the Proteus Effect (Section 2.2.3) and homuncular flexibility (Won et al., 2015) suggest that avatar design can significantly shape user behaviour both within and beyond virtual environments. For example, users embodying taller avatars have been shown to act more assertively in negotiations, while users with more attractive avatars display greater social confidence. More broadly, avatars enable modes of interaction that differ fundamentally from both face-to-face and conventional online meetings (Moustafa & Steed, 2018). Applied to the UN system and IOs, this raises a set of important questions: How does the mediation of avatars reshape political and diplomatic interaction? Do avatars empower or constrain particular forms of communication and negotiation? And how might they influence collaboration, trust, peace-making, and decision-making?

[97] The case study chapters occasionally identify further directions for future research beyond the ones described here.

Another important direction for future research is to examine VR in relation to intersecting technologies, particularly AI. During the period of this research (2021–2025), AI tools became increasingly integrated with VR platforms (AIVR), and the co-evolution of these two technologies began to open new questions about distributed and hybrid forms of agency – questions this thesis has only started to address (cf. Section 8.4.1). Scholars have noted that such developments may steer us into novel, unpredictable directions, for example towards algorithmic forms of governance, where technological solutions become embedded in everyday decision-making (Ågerfalk, 2020; Aradau & Blanke, 2018). This thesis has already shown that UN organisations may understand and position AI in diverse ways, as a competitor that diverts attention from VR (ITC-ILO), as well as a complement that could enhance its potential (ILO). Looking ahead, the convergence of VR and AI may bring powerful new tools as well as new risks for diplomacy and governance. Social enhancers such as the 'enhanced smile' (S. Y. Oh et al., 2016) and the 'augmented gaze' (J. Bailenson et al., 2005) could intersect with VR environments, introducing AI into interactions that are typically considered distinctly human, such as sociality, trust, and emotional expression. Negotiation enhancers could simulate possible outcomes, provide real-time shifts in sentiments during debates, or deploy real-time prompts to guide decision-making (Buch et al., 2022). We can also envisage AI-driven conversational agents whose biobehaviours (e.g., gaze patterns, micro-expressions, mimicry and vocal dynamics) are controlled to elicit specific effects on interlocutors – a form of 'avatarised', embodied ChatGPT (Lim et al., 2025). Such scenarios highlight the need for future research to theorise how AI-VR assemblages may reshape IOs' work and global governance more broadly.

In reflecting on conceptual lenses for future studies of VR adoption, three recommendations emerged during the writing of this thesis. The first concerns ANT's limited capacity to articulate power relations (cf. Section 3.4.1) and points to a direction for theoretical

development opened up by this thesis: developing ANT's conceptual tools so that power dynamics can be addressed more explicitly.

As discussed in Chapter 3, ANT enabled a systematic identification of the actants involved in VR adoption, an examination of how their relations formed and shifted, and an account of how new properties emerged from these sociotechnical configurations. This approach made it possible to understand how VR impacted operational practices within the UN organisations studied. This reflects the orientation of ANT, which privileges descriptive analysis: it traces associations and attends to what emerges from them, while refraining from invoking broader social categories – such as gender or race – as explanatory anchors. As a result, ANT provides little conceptual vocabulary for articulating power dynamics directly and explicitly. The empirical material, however, made clear that such dynamics were, in fact, present.

In each case, the emerging properties were not politically neutral. Take, for example, *social presence.* Through *social presence,* VR could facilitate dialogue and collaboration, but it could also distort perceptions of identity through 'manufactured' avatar characteristics or complicate formal exchanges by rendering social cues ambiguous (cf. 5.6.2). These dynamics are not merely technical but power-laden and politically consequential: Who is able to craft or control their avatar identity, and to what extent? How far might VR reshape diplomatic registers by introducing more informal modes of interaction, and whose influence would such shifts amplify or diminish? More broadly, what does social presence reveal about how influence is redistributed within virtual settings?

Embodied influence provides another example: where VR shapes user behaviour and attitudes, as observed in this study, it inevitably raises questions about who determines the

content to which users are exposed. Could VR environments convey experiences that feel real and persuasive yet are misleading or even false? VR technologies themselves also invite broader political scrutiny. In what ways are VR environments political? What forms of exclusion and inclusion do they produce? (Eggeling & Adler-Nissen, 2021) Who designs the platforms, who controls the data, and whose interests are embedded in those virtual spaces? (cf. Section 2.2.1)[98]

I began to address these dynamics in the case study chapters. However, ANT's conceptual tools allowed me to see them only implicitly, offering no explicit language for grouping them, naming them, or examining them systematically. This is where this thesis' suggestion for theory development comes in: incorporating the concept of *actant power* into ANT. Across the thesis, I demonstrated that VR was not a passive instrument but an actant possessing agency, shaping practices in specific and consequential ways. Yet the boundary between agency and power proved difficult to maintain analytically. If agency refers to the capacity to produce effects within a network (cf. 3.3.1), and power to the capacity to shape others' possibilities for action[99], then these two capacities often overlapped in practice. In fact, VR's agency was precisely what revealed its power: by producing certain effects, VR also structured others' possibilities for action.

The notion of *actant power* can thus be a first step towards a refined version of ANT that accounts for power dynamics more directly. ANT could then not only map heterogeneous networks descriptively but also offer a foundation for analysing the political implications of

[98] Exploring these questions also means engaging with wider debates on digital governance, especially the extent to which IOs' reliance on commercial VR platforms could sit uneasily with their stated commitments to neutrality and accountability.

[99] For example, one influential definition in IR conceives power as 'the production, in and through social relations, of effects that *shape the capacities of actors to determine their circumstances and fate*' (Barnett & Duvall, 2005).

technological agency. This is especially salient in the current moment, where the rise of generative AI prompted a rethinking of technologies as 'artificial agents' (Floridi, 2025). ANT is well positioned to engage with this development, given its principle of generalised symmetry. What is needed is to make the power dimension of these technologies more explicit, and *actant power* provides a way to begin doing so, thereby positioning ANT to speak more directly to core IR concerns.

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A second productive avenue relates to the potential of space theory as a direction for future research on VR adoption. A central insight is that, where implemented, VR reconfigures the spatial conditions of UN organisations' and IOs' practices: space is no longer a fixed territorial backdrop but instead becomes embodied, dynamic, and capable of bridging distances, thereby unsettling traditional understandings of geographical space. This transformation compels a reconsideration of how IOs imagine space and conduct their work in global governance – a question that merits further exploration through space theory. Future studies might, for example, draw on Henri Lefebvre's tripartite conceptualisation of space as perceived, conceived, and lived, or on Doreen Massey's view of space as multiple, dynamic, and constituted through interaction, and apply these perspectives to VR, which lends itself to such analysis as an inherently spatial technology. Engaging with these approaches would enable scholars to probe more deeply into VR's spatial dimensions and clarify their implications for IR, where questions of space remain central. More broadly, space theory offers a promising avenue for advancing a posthumanist agenda in IR, given its focus on spatial relations and the decentring of the human.

Finally, another promising conceptual framework for future research lies in media and cultural theory, particularly Baudrillard's concept of simulacra and hyperreality (1981). Simulacra are representations that precede or replace the original, erasing the boundary between reality and its representation. Late-modern societies, Baudrillard argued, increasingly inhabit a state of hyperreality in which simulations no longer reflect reality but constitute it. In this context, VR represents as a hyper-realistic technology, as rather than simply replicating reality, it seeks to control its parameters and, in doing so, augment and transform it. Scholars have begun to analyse VR through this lens. Nash (2018), for example, argues that VR functions as a medium of simulation rather than representation, producing experiences so vivid that the line between true and false dissolves into what she terms 'subjunctive representation' (2018: 125). Similarly, Rospigliosi (2022) warns that under conditions of economic, environmental, and epidemiological stress, VR risks generating simulacra that cultivate artificial intimacies, as seen in the virtual classroom during lockdowns. In this sense, VR provides fertile ground for interrogating the logic of hyperreality, since it generates experiences that feel authentic without necessarily corresponding to an external real. These dynamics raise pressing questions about narrative control, representation, and the ethics of digital storytelling in IOs and global governance. Duffield (2013: 23), for example, cautions against a 'humanitarian simulation' culture in which computer-generated encounters displace lived experience. Likewise, Der Derian (2000; 1990) has shown how technologies of simulation restructure international politics: his work on 'virtuous war' illustrates how digital media and virtual training environments produce hyperreal conflicts that appear bloodless and morally justified, while his 1990 article traced how war games blurred the boundaries between representation and reality, creating what he termed a 'military-industrial-media-entertainment network'. Such perspectives could usefully be extended to the study of VR in IOs.

The directions outlined above only begin to sketch the possibilities, and much remains to be explored. This thesis has shown, through the examination of VR adoption within UN organisations, how technologies actively shape practices and produce tangible effects on the UN's ability to perform its core operational functions. Looking ahead, the future of IOs' work will be inseparable from the sociotechnical processes that constitute it. Approaching technologies not as external tools but as constitutive forces will enable us to better grasp how humans and non-humans together participate in shaping organisational practices, and how these interactions are continuously remaking the futures of IOs in a digitalising international sphere.

10. REFERENCES

Aarvik, P. (2020). Digital Humanitarianism. In A. De Lauri (Ed.), *Humanitarianism: Keywords* (pp. 43–44). Brill. https://doi.org/10.1163/9789004431140_021

Abbott, K. W., Green, J. F., & Keohane, R. O. (2016). Organizational Ecology and Institutional Change in Global Governance. *International Organization*, *70*(2), 247–277. https://doi.org/10.1017/S0020818315000338

Abbott, K. W., & Snidal, D. (1998). Why States Act through Formal International Organizations. *The Journal of Conflict Resolution*, *42*(1), 3–32.

Abushaikha, I., & Schumann-Bölsche, D. (2016). *Mobile Phones: Established Technologies for Innovative Humanitarian Logistics Concepts*. *159*, 191–198. https://doi.org/10.1016/j.proeng.2016.08.157

Acuto, M. (2019). From the Globe to the Germ, and Back. In J. P. Singh, M. Carr, & R. Marlin-Bennett (Eds), *Science, Technology, and Art in International Relations* (pp. 129–137). Routledge.

Acuto, M., Carr, M., & Kaltofen, C. (2019). Conversations on Technology and IR. In C. Kaltofen, M. Carr, & M. Acuto (Eds), *Technologies of International Relations: Continuity and Change* (pp. 1–11). Springer International Publishing. https://doi.org/10.1007/978-3-319-97418-7_1

Acuto, M., & Curtis, S. (2014). Assemblage Thinking and International Relations. In M. Acuto & S. Curtis (Eds), *Reassembling International Theory: Assemblage Thinking and International Relations* (pp. 1–15). Palgrave Macmillan UK. https://doi.org/10.1057/9781137383969_1

Adamczyk, C. L. (2024). United Nations Environment Programme Initiatives for Communicating Environmental Big Data: Considering DEAL and WESR. *Environmental Communication*, *18*(5), 648–655. https://doi.org/10.1080/17524032.2023.2280760

Adler, E., & Bernstein, S. (2004). Knowledge in Power: The Epistemic Construction of Global Governance. In M. Barnett & R. Duvall (Eds), *Power in Global Governance* (pp. 294–318). Cambridge University Press. https://doi.org/10.1017/CBO9780511491207.013

Adler-Nissen, R., & Drieschova, A. (2019a). Track-Change Diplomacy: Technology, Affordances, and the Practice of International Negotiations. *International Studies Quarterly*, *63*(3), 531–545. https://doi.org/10.1093/isq/sqz030

Adler-Nissen, R., & Drieschova, A. (2019b). Track-Change Diplomacy: Technology, Affordances, and the Practice of International Negotiations. *International Studies Quarterly*, *63*(3), 531–545. https://doi.org/10.1093/isq/sqz030

Adler-Nissen, R., & Eggeling, K. A. (2022). Blended Diplomacy: The Entanglement and Contestation of Digital Technologies in Everyday Diplomatic Practice. *European Journal of International Relations*, *28*(3), 640–666. https://doi.org/10.1177/13540661221107837

Ågerfalk, P. J. (2020). Artificial Intelligence as Digital Agency. *European Journal of Information Systems*, *29*(1), 1–8. https://doi.org/10.1080/0960085X.2020.1721947

Ahn, S. J., & Bailenson, J. (2014). Self-Endorsed Advertisements: When the Self Persuades the Self. *Journal of Marketing Theory and Practice*, *22*(2), 135–136. https://doi.org/10.2753/MTP1069-6679220203

Ahn, S. J., Bostick, J., Ogle, E., Nowak, K. L., McGillicuddy, K. T., & Bailenson, J. N. (2016). Experiencing Nature: Embodying Animals in Immersive Virtual Environments Increases

Inclusion of Nature in Self and Involvement With Nature. *Journal of Computer-Mediated Communication*, *21*(6), 399–419. https://doi.org/10.1111/jcc4.12173

Ahn, S. J., Le, A. M. T., & Bailenson, J. (2013). The Effect of Embodied Experiences on Self-Other Merging, Attitude, and Helping Behavior. *Media Psychology*, *16*(1), 7–38. https://doi.org/10.1080/15213269.2012.755877

Ahn, S. J., Nowak, K. L., & Bailenson, J. N. (2022). Unintended Consequences of Spatial Presence on Learning in Virtual Reality. *Computers & Education*, *186*, 104532.

Aka, K. G. (2019). Actor-Network Theory to Understand, Track and Succeed in a Sustainable Innovation Development Process. *Journal of Cleaner Production*, *225*, 524–540. https://doi.org/10.1016/j.jclepro.2019.03.351

Akrich, M. (1992). The De-scription of Technical Objects. In W. E. Bijker & J. Law (Eds), *Shaping Technology/Building Society: Studies in Sociotechnical Change* (pp. 205–224). MIT Press.

Akrich, M., Callon, M., Latour, B., & Monaghan, A. (2002). The Key to Success in Innovation Part I: The Art of Interessement. *International Journal of Innovation Management*, *6*(2), 187–225. https://doi.org/10.1142/S1363919602000550

Alaimo, S. (2020). New Materialisms. In S. Vint, *After the Human: Culture, Theory and Criticism in the 21st Century* (pp. 177–191). University Press.

Allarakia, L. (2022). Case Study Analysis. In R. J. Huddleston, T. Jamieson, & P. James (Eds), *Handbook of Research Methods in International Relations* (pp. 651–667). Edward Elgar Publishing. https://www.elgaronline.com/display/book/9781839101014/book-part-9781839101014-46.xml

Almeman, K., EL Ayeb, F., Berrima, M., Issaoui, B., & Morsy, H. (2025). The Integration of AI and Metaverse in Education: A Systematic Literature Review. *Applied Sciences*, *15*(2), Article 2. https://doi.org/10.3390/app15020863

Alshowair, A., Bail, J., AlSuwailem, F., Mostafa, A., & Abdel-Azeem, A. (2024). Use of Virtual Reality Exercises in Disaster Preparedness Training: A Scoping Review. *SAGE Open Medicine*, *12*, 20503121241241936. https://doi.org/10.1177/20503121241241936

Ambos, T. C., & Tatarinov, K. (2019a). *How International Organizations Shape Innovation*.

Ambos, T. C., & Tatarinov, K. (2019b). *Seed, Scale, Structure: How International Organizations Shape Innovation*. GSEM University of Geneva.

Ambos, T. C., & Tatarinov, K. (2022a). Building Responsible Innovation in International Organizations through Intrapreneurship. *Journal of Management Studies*, *59*(1), 92–125. https://doi.org/10.1111/joms.12738

Ambos, T. C., & Tatarinov, K. (2022b). Building Responsible Innovation in International Organizations through Intrapreneurship. *Journal of Management Studies*, *59*(1), 92–125. https://doi.org/10.1111/joms.12738

Amicelle, A., Aradau, C., & Jeandesboz, J. (2015). Questioning Security Devices: Performativity, Resistance, Politics. *Security Dialogue*, *46*(4), 293–306. https://doi.org/10.1177/0967010615586964

Amoore, L., & Raley, R. (2016). Securing with Algorithms: Knowledge, Decision, Sovereignty. *Security Dialogue*, *48*(1), 3–10.

Amsterdamska, O. (1990). Surely You Are Joking, Monsieur Latour. *Science, Technology, & Human Values*, *15*(4), 495–504.

Ancarani, V. (1995). Globalizing the World: Science and Technology in International Relations. In S. Jasanoff, G. E. Markle, J. C. Peterson, & T. Pinch, *Handbook of Science and Technology Studies* (pp. 652–670). SAGE Publications. https://doi.org/10.4135/9781412990127

Andersson, A., & Hatakka, M. (2023). ICT4D and the Sustainable Development Goals: A Road Well-Traveled. *Information Technology for Development*, *29*(1), 1–8. https://doi.org/10.1080/02681102.2023.2166279

Andrade, A. D., & Urquhart, C. (2010). The Affordances of Actor Network Theory in ICT for Development Research. *Information Technology & People*, *23*(4), 352–374. https://doi.org/10.1108/09593841011087806

Aradau, C. (2010). Security That Matters: Critical Infrastructure and Objects of Protection. *Security Dialogue*, *41*(5), 491–514. https://doi.org/10.1177/0967010610382687

Aradau, C. (2024). The Tangle of Digital Humanitarianism. *London Review of International Law*, *11*(3), 523–534. https://doi.org/10.1093/lril/lrae004

Aradau, C., & Blanke, T. (2018). Governing Others: Anomaly and the Algorithmic Subject of Security. *European Journal of International Security*, *3*(1), 1–21. https://doi.org/10.1017/eis.2017.14

Aradau, C., Hoijtink, M., & Leese, M. (2019). Technology, Agency, Critique: An Interview with Claudia Aradau. In M. Hoijtink & M. Leese, *Technology and Agency in International Relations* (pp. 188–203). Routledge.

Archetti, C. (2012). The Impact of New Media on Diplomatic Practice: An Evolutionary Model of Change. *The Hague Journal of Diplomacy*, *7*(2), 181–206. https://doi.org/10.1163/187119112X625538

Arendt-Cassetta, L. (2021). *From Digital Promise to Frontline Practice: New and Emerging Technologies in Humanitarian Action*. United Nations Office for the Coordination of Humanitarian Affairs (OCHA). https://www.unocha.org/sites/unocha/files/OCHA%20Technology%20Report.pdf

Argyris, C. (1976). Single-Loop and Double-Loop Models in Research on Decision Making. *Administrative Science Quarterly*, *21*(3), 363–375. https://doi.org/10.2307/2391848

Arora, G., & Pousman, B. (Directors). (2015). *Clouds Over Sidra* [VR]. UN Virtual Reality. https://www.youtube.com/watch?v=mUosdCQsMkM

Arthur Digital. (2023). *Arthur: Helping You Meet and Collaborate in VR*. https://www.arthur.digital/

Artificial Intelligence and Virtual Reality (AIVR), IEEE International Conference on. (n.d.). In *Artificial Intelligence and Virtual Reality (AIVR), IEEE International Conference on*. IEEE.

Asdal, K. (2012). Contexts in Action—And the Future of the Past in STS. *Science, Technology, & Human Values*, *37*(4), 379–403. https://doi.org/10.1177/0162243912438271

Ash, E. (2016). Priming or Proteus Effect? Examining the Effects of Avatar Race on In-Game Behavior and Post-Play Aggressive Cognition and Affect in Video Games. *Games and Culture*, *11*(4), 422–440. https://doi.org/10.1177/1555412014568870

Ashbrook, C. C., & Zalba, A. R. (2021). Social Media Influence on Diplomatic Negotiation: Shifting the Shape of the Table. *Negotiation Journal*, *37*(1), 83–96. https://doi.org/10.1111/nejo.12353

Aston, J., Gaudenzi, S., & Rose, M. (2018). *I-Docs: The Evolving Practices of Interactive Documentary*. Columbia University Press.

Ataka, H. (2024). Pluralism, Plurality and Interdisciplinary Relations in IR: Shifting Theoretical Directions. *International Relations*, *38*(1), 91–112. https://doi.org/10.1177/00471178221097228

Atkinson, S. A., & Kennedy, H. W. (2018a). Virtual Humanity: Empathy, Embodiment and Disorientation in Humanitarian VR Experience Design. *Refractory: A Journal of Entertainment Media*, *30*(2018), Article No. 2.

Atkinson, S. A., & Kennedy, H. W. (2018b). Virtual Humanity: Empathy, Embodiment and Disorientation in Humanitarian VR Experience Design. *Refractory: A Journal of Entertainment Media*, *30*(2018), 2.

Aufegger, L., & Elliott-Deflo, N. (2022). Virtual Reality and Productivity in Knowledge Workers. *Frontiers in Virtual Reality*, *3*, 890700. https://doi.org/10.3389/frvir.2022.890700

Aukstakalnis, S. (2016). *Practical Augmented Reality: A Guide to the Technologies, Applications, and Human Factors for AR and VR* (1st ed.). Addison-Wesley Professional. https://learning.oreilly.com/library/view/-/9780134094328/?ar

Australian Government. (2020). *Working from Home: Research Paper* (Productivity Commission). https://www.pc.gov.au/research/completed/working-from-home/working-from-home.pdf

Avgerou, C. (2017). Theoretical Framing of ICT4D Research. In J. Choudrie, M. S. Islam, F. Wahid, J. M. Bass, & J. E. Priyatma (Eds), *Information and Communication Technologies for Development* (pp. 10–23). Springer International Publishing. https://doi.org/10.1007/978-3-319-59111-7_2

Bachmann, J., Bell, C., & Holmqvist, C. (2014). *War, Police and Assemblages of Intervention* (1st edition). Routledge. https://doi.org/10.4324/9781315742946

Bachmann, J., & Schouten, P. (2018). Concrete Approaches to Peace: Infrastructure as Peacebuilding. *International Affairs*, *94*(2), 381–398. https://doi.org/10.1093/ia/iix237

Bagattolli, C. (2021). X-innovation and international organizations narratives. In B. Godin, G. Gaglio, & D. Vinck, *Handbook on Alternative Theories of Innovation* (pp. 252–275). Edward Elgar Publishing. https://www.elgaronline.com/view/edcoll/9781789902297/9781789902297.00027.xml

Bail, C. A., Brown, T. W., & Mann, M. (2017). Channeling Hearts and Minds: Advocacy Organizations, Cognitive-Emotional Currents, and Public Conversation. *American Sociological Review*, *82*(6), 1188–1213. https://doi.org/10.1177/0003122417733673

Bailenson, J. (2018). *Experience on Demand: What Virtual Reality Is, How It Works, and What It Can Do* (1st edition). WWNorton & Company.

Bailenson, J., Beall, A. C., Loomis, J., Blascovich, J., & Turk, M. (2005). Transformed Social Interaction, Augmented Gaze, and Social Influence in Immersive Virtual Environments. *Human Communication Research*, *31*(4), 511–537. https://doi.org/10.1111/j.1468-2958.2005.tb00881.x

Bailenson, J. N. (2018). How to Create Empathy in VR. *Wired UK*. https://www.wired.co.uk/article/empathy-virtual-reality-jeremy-bailenson-stanford

Bailenson, J. N., & Yee, N. (2007). Virtual Interpersonal Touch: Haptic Interaction and Copresence in Collaborative Virtual Environments. *Multimedia Tools and Applications*, *37*(1), 5–14. https://doi.org/10.1007/s11042-007-0171-2

Bailey, J. O., & Bailenson, J. (2017). Considering Virtual Reality in Children's Lives. *Journal of Children and Media*, *11*(1), 107–113. https://doi.org/10.1080/17482798.2016.1268779

Balcerak Jackson, M., & Balcerak Jackson, B. (2024). Immersive Experience and Virtual Reality. *Philosophy & Technology*, *37*(1), 19. https://doi.org/10.1007/s13347-024-00707-1

Ball, M. (2022). *The Metaverse: And How It Will Revolutionize Everything*. Liveright Publishing Corporation.

Banakou, D., Hanumanthu, P. D., & Slater, M. (2016). Virtual Embodiment of White People in a Black Virtual Body Leads to a Sustained Reduction in Their Implicit Racial Bias. *Frontiers in Human Neuroscience*, *10*, Article 601. https://doi.org/10.3389/fnhum.2016.00601

Barad, K. (2003). Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter. *Signs: Journal of Women in Culture and Society*, *28*(3), 801–831. https://doi.org/10.1086/345321

Barbot, B., & Kaufman, J. C. (2020). What Makes Immersive Virtual Reality the Ultimate Empathy Machine? Discerning the Underlying Mechanisms of Change. *Computers in Human Behavior*, *111*, 106431-. https://doi.org/10.1016/j.chb.2020.106431

Bar-Gil, O. (2023). The Dance of Agencies in AI Art–Beyond the Creator-Tool Dichotomy, a Netnographic Analysis of Reddit Forums. *Journal of Posthuman Studies*, *7*(2), 129–149. https://doi.org/10.5325/jpoststud.7.2.0129

Barnes, S. (2016). Understanding Virtual Reality in Marketing: Nature, Implications and Potential. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2909100

Barnett, M., & Coleman, L. (2005). Designing Police: Interpol and the Study of Change in International Organizations. *International Studies Quarterly*, *49*(4), 593–620. https://doi.org/10.1111/j.1468-2478.2005.00380.x

Barnett, M., & Finnemore, M. (1999). The Politics, Power, and Pathologies of International Organizations. *International Organization*, *53*(4), 699–732. https://doi.org/10.1162/002081899551048

Barnett, M., & Finnemore, M. (2004). *Rules for the World: International Organizations in Global Politics*. Cornell University Press.

Barnett, M., & Sikkink, K. (2008). From International Relations to Global Society. In C. Reus-Smit & D. Snidal (Eds), *The Oxford Handbook of International Relations* (pp. 62–83). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199219322.003.0003

Barnum, M. (2022). Dealing with Missing and Incomplete Data. In *Handbook of Research Methods in International Relations* (pp. 425–445). Edward Elgar Publishing. https://doi.org/10.4337/9781839101014.00034

Baron, I. Z. (2014). The Continuing Failure of International Relations and the Challenges of Disciplinary Boundaries. *Millennium*, *43*(1), 224–244. https://doi.org/10.1177/0305829814541834

Barry, A. (2013). The Translation Zone: Between Actor-Network Theory and International Relations. *Millennium*, *41*(3), 413–429. https://doi.org/10.1177/0305829813481007

Barston, R. P. (2019). *Modern Diplomacy* (Fifth edition). Routledge. https://doi.org/10.4324/9781351270090

Battilana, J., Leca, B., & Boxenbaum, E. (2009). How Actors Change Institutions: Towards a Theory of Institutional Entrepreneurship. *The Academy of Management Annals*, *3*(1), 65–107. https://doi.org/10.1080/19416520903053598

Baudrillard, J. (1981). *Simulacres Et Simulation*. Galilée.

Bauer, M. W., & Knill, C. (2007). *Management Reforms in International Organizations*. Nomos Verlagsgesellschaft.

Becker, A., & Freitas, C. M. D. S. (2024). Evaluation of XR Applications: A Tertiary Review. *ACM Computing Surveys*, *56*(5), 1–35. https://doi.org/10.1145/3626517

Beckert, J. (1999). Agency, Entrepreneurs, and Institutional Change. The Role of Strategic Choice and Institutionalized Practices in Organizations. *Organization Studies*, *20*(5), 777–799. https://doi.org/10.1177/0170840699205004

Behm-Morawitz, E., & Schipper, S. (2016). Sexing the Avatar: Gender, Sexualization, and Cyber-Harassment in a Virtual World. *Journal of Media Psychology*, *28*(4), 161–174. https://doi.org/10.1027/1864-1105/a000152

Bekaroo, G. (2024). Extended Reality and the Implementation of the UN Sustainable Development Goals: Opportunities, Challenges and Future Directions. In *Digital Technologies to Implement the UN Sustainable Development Goals* (pp. 215–233). Springer. https://doi.org/10.1007/978-3-031-68427-2_11

Belisle, B., & Roquet, P. (2020). Guest Editors' Introduction: Virtual Reality: Immersion and Empathy. *Journal of Visual Culture*, *19*(1), 3–10. https://doi.org/10.1177/1470412920906258

Bender, S. M., & Broderick, M. (2021). *Virtual Realities: Case Studies in Immersion and Phenomenology*. Springer International Publishing. https://doi.org/10.1007/978-3-030-82547-8

Benford, S., Greenhalgh, C., Rodden, T., & Pycock, J. (2001). Collaborative virtual environments. *Communications of the ACM*, *44*(7), 79–85. https://doi.org/10.1145/379300.379322

Bengtsson, S. (2011). Virtual Nation Branding: The Swedish Embassy in Second Life. *Journal For Virtual Worlds Research*, *4*(2). https://doi.org/10.4101/jvwr.v4i2.2111

Benítez de Gracia, M. J., Pérez-Seijo, S., & Herrera-Damas, S. (2021). Ethics in 360-Degree Immersive Journalism. In *News Media Innovation Reconsidered* (pp. 55–72). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781119706519.ch4

Benítez Rojas, R. V. (2024). *The Future of Digital Communication: The Metaverse* (1st edition). CRC Press.

Bennett, J. (2010). *Vibrant Matter: A Political Ecology of Things*. Duke University Press. https://doi.org/10.1515/9780822391623

Bennett, J., Dalton, P., Goriunova, O., Preece, C., Whittaker, L., Verhulst, I., & Woods, A. (2021). *Audience Insight Report: The Story of Immersive Users*. StoryFutures: National Centre For Immersive Storytelling. https://www.storyfutures.com/uploads/docs/Audience-Insight-Report-Complete-1.2.pdf

Bentley, R., Hughes, J. A., Randall, D., Rodden, T., Sawyer, P., Shapiro, D., & Sommerville, I. (1992). *Ethnographically-Informed Systems Design for Air Traffic Control*. 123–129. https://doi.org/10.1145/143457.143470

Berling, T. V., & Bueger, C. (2015). *Security Expertise: Practice, Power, Responsibility* (1st ed.). Routledge. https://doi.org/10.4324/9781315744797

Bertoldi, S., & Mariotti, S. (2022). *The Past as a Digital Playground: Archaeology, Virtual Reality and Video Games*.

Bertram, J., Moskaliuk, J., & Cress, U. (2015). Virtual Training: Making Reality Work? *Computers in Human Behavior*, *43*, 284–292. https://doi.org/10.1016/j.chb.2014.10.032

Berzin, S., Pitt-Catsouphes, M., & Gaitan-Rossi, P. (2016). Innovation and Sustainability: An Exploratory Study of Intrapreneurship Among Human Service Organizations. *Administration in Social Work*, *40*(5), 540–552. https://doi.org/10.1080/23303131.2016.1184207

Best, J., & Walters, W. (2013a). "Actor-Network Theory" and International Relationality: Lost (and Found) in Translation: Introduction. *International Political Sociology*, *7*(3), 332–334. https://doi.org/10.1111/ips.12026_1

Best, J., & Walters, W. (2013b). Translating the Sociology of Translation. *International Political Sociology*, *7*(3), 345–349. https://doi.org/10.1111/ips.12026_5

Bevan, C., Green, D., Farmer, H., Rose, M., Cater, K., Stanton Fraser, D., & Brown, H. (2019). Behind the Curtain of the 'Ultimate Empathy Machine': On the Composition of Virtual Reality Nonfiction Experiences. *Paper No. 506*, 1–12. https://doi.org/10.1145/3290605.3300736

Beyea, D., Ratan, R. (Robby), Lei, Y. (Skylar), Liu, H., Hales, G. E., & Lim, C. (2022). A New Meta-Analysis of the Proteus Effect: Studies in VR Find Stronger Effect Sizes. *Presence: Virtual and Augmented Reality*, *31*, 189–202. https://doi.org/10.1162/pres_a_00392

Bhagavathula, R., Williams, B., Owens, J., & Gibbons, R. (2018). The Reality of Virtual Reality: A Comparison of Pedestrian Behavior in Real and Virtual Environments. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, *62*(1), 2056–2060. https://doi.org/10.1177/1541931218621464

Biermann, F., & Siebenhüner, B. (2009). *Managers of Global Change: The Influence of International Environmental Bureaucracies*. MIT Press.

Bignetti, B., de Souza, A. C. A. A., & Petrini, M. (2023). Actor-Network Theory: Methodological Issues in Practice. *Qualitative Research in Organizations and Management*, *18*(2), 142–162. https://doi.org/10.1108/QROM-05-2022-2337

Bigo, D., & Walker, R. B. J. (2007). International, Political, Sociology. *International Political Sociology*, *1*(1), 1–5. https://doi.org/10.1111/j.1749-5687.2007.00001.x

Bijker, W. E., Hughes, T. P., Pinch, T., & Douglas, D. G. (2012). *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. MIT Press.

Bijker, W. E., & Law, J. (1992). *Shaping Technology/Building Society: Studies in Sociotechnical Change*. MIT Press.

Biocca, F., & Levy, M. R. (1995). *Communication in the Age of Virtual Reality*. Lerlbaum Associates.

Bisconti, P., & Possati, L. (2023). Sociomorphing and an Actor-Network Approach to Social Robotics. In R. Hakli, P. Mäkelä, & J. Seibt (Eds), *Frontiers in Artificial Intelligence and Applications* (pp. 508–517). IOS Press. https://doi.org/10.3233/FAIA220652

Bjola, C. (2022). AI for Development: Implications for Theory and Practice. *Oxford Development Studies*, *50*(1), 78–90. https://doi.org/10.1080/13600818.2021.1960960

Bjola, C. (2023, February 27). One Avatar To Rule Them All? Exploring New Modes of Visual Representation in the Metaverse and Their Implications for Digital Diplomacy. *USC Center on Public Diplomacy*. https://uscpublicdiplomacy.org/blog/exploring-metaverse-and-its-implications-digital-diplomacy

Bjola, C. (2025). International Organizations in the Digital Age: A Critical Review. In M. Louis & B. Reinalda, *Routledge Handbook of International Organization* (pp. 411–423). Routledge.

Bjola, C., & Coplen, M. (2022). *Virtual Venues and International Negotiations: Lessons from the COVID-19 Pandemic*.

Bjola, C., & Holmes, M. (2015). *Digital Diplomacy: Theory and Practice*. Routledge. https://ezproxy-prd.bodleian.ox.ac.uk/login?url=https://www.taylorfrancis.com/books/9781315730844

Bjola, C., & Jiang, L. (2015). Social Media and Public Diplomacy: A Comparative Analysis of the Digital Diplomatic Strategies of the EU, US and Japan in China. In C. Bjola & M. Holmes (Eds), *Digital Diplomacy: Theory and Practice* (pp. 71–88). Routledge.

Bjola, C., & Kļaviņš, D. (2024). The Digital Hybridization of Ministries of Foreign Affairs: The Case of the Nordic and Baltic States. In C. Bjola & I. Manor (Eds), *The Oxford Handbook of Digital*

Diplomacy (pp. 291–310). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780192859198.013.16

Bjola, C., & Kornprobst, M. (Eds). (2023a). *Digital International Relations: Technology, Agency and Order*. Routledge. https://doi.org/10.4324/9781003437963

Bjola, C., & Kornprobst, M. (2023b). Introducing Digital International Relations: Technology, Agency and Order. In C. Bjola & M. Kornprobst (Eds), *Digital International Relations: Technology, Agency and Order* (pp. 1–25). Routledge.

Bjola, C., & Manor, I. (2022a). The Rise of Hybrid Diplomacy: From Digital Adaptation to Digital Adoption. *International Affairs*, *98*(2), 471–491.

Bjola, C., & Manor, I. (2022b). The Rise of Hybrid Diplomacy: From Digital Adaptation to Digital Adoption. *International Affairs*, *98*(2), 471–491. https://doi.org/10.1093/ia/iiac005

Bjola, C., & Manor, I. (2024a). Digital Diplomacy in the Age of Technological Acceleration: Three Impact Scenarios of Generative Artificial Intelligence. *Place Branding and Public Diplomacy*. https://doi.org/10.1057/s41254-023-00323-4

Bjola, C., & Manor, I. (2024b). First Contact: Integrating Generative AI into Digital Diplomatic Intelligence. *Place Branding and Public Diplomacy*. https://doi.org/10.1057/s41254-024-00333-w

Bjola, C., & Zaiotti, R. (2021a). *Digital Diplomacy and International Organisations: Autonomy, Legitimacy and Contestation*. Routledge. https://ezproxy-prd.bodleian.ox.ac.uk/login?url=https://www.taylorfrancis.com/books/9781003032724

Bjola, C., & Zaiotti, R. (2021b). *Digital Diplomacy and International Organisations: Autonomy, Legitimacy and Contestation*. Routledge. https://ezproxy-prd.bodleian.ox.ac.uk/login?url=https://www.taylorfrancis.com/books/9781003032724

Bjola, C., & Zaiotti, R. (2021c). Going Digital: Choices and Challenges for International Organisations. In C. Bjola & R. Zaiotti (Eds), *Digital Diplomacy and International Organisations: Autonomy, Legitimacy and Contestation* (pp. 1–18). Routledge. https://doi.org/10.4324/9781003032724-1

Blackman, T. (2022). Virtual Reality and Videogames: Immersion, Presence, and the Performative Spatiality of 'Being There' in Virtual Worlds. *Social & Cultural Geography*, 1–19. https://doi.org/10.1080/14649365.2022.2157041

Bleiker, R., & Hutchison, E. (2008). Fear No More: Emotions and World Politics. *Review of International Studies*, *34*(1), 115–135. https://doi.org/10.1017/S0260210508007821

Blok, A. (with Jensen, T. E.). (2011). *Bruno Latour: Hybrid Thoughts in a Hybrid World* (1st edition). Routledge. https://doi.org/10.4324/9780203835272

Bloom, L., & Faulkner, R. (2016a). Innovation spaces: Lessons from the United Nations. *Third World Quarterly*, *37*(8), 1371–1387. https://doi.org/10.1080/01436597.2015.1135730

Bloom, L., & Faulkner, R. (2016b). Innovation Spaces: Lessons from the United Nations. *Third World Quarterly*, *37*(8), 1371–1387. https://doi.org/10.1080/01436597.2015.1135730

Bodyswaps. (2024). *Wearable AI and the Future of Learning*. Events. https://bodyswaps.co/events/wearable-ai-webinar

Boeri, N. (2016). Technology and Society as Embedded: An Alternative Framework for Information and Communication Technology and Development. *Media, Culture & Society*, *38*(1), 107–118. https://doi.org/10.1177/0163443715607845

Boletsis, C., Cedergren, J. E., & Kongsvik, S. (2017). *HCI Research in Virtual Reality: A Discussion of Problem-solving*. http://hdl.handle.net/11250/2456626

Bollmer, G. (2017). Empathy Machines. *Media International Australia Incorporating Culture & Policy*, *165*(1), 63–76. https://doi.org/10.1177/1329878X17726794

Botella, C., Fernández-Álvarez, J., Guillén, V., García-Palacios, A., & Baños, R. (2017). Recent Progress in Virtual Reality Exposure Therapy for Phobias: A Systematic Review. *Current Psychiatry Reports*, *19*(7), 42–42. https://doi.org/10.1007/s11920-017-0788-4

Bouchard, C. (2020a). The United Nations in the Digital Age: Harnessing the Power of New Digital Information and Communication Technologies. In C. Bjola & R. Zaiotti, *Digital Diplomacy and International Organisations* (pp. 101–126). Routledge.

Bouchard, C. (2020b). The United Nations in the Digital Age: Harnessing the power of new digital information and communication technologies. In C. Bjola & R. Zaiotti, *Digital Diplomacy and International Organisations*. Routledge.

Bouchard, C. (2024). The Digitalization of Permanent Missions to International Organizations. In C. Bjola & I. Manor (Eds), *The Oxford Handbook of Digital Diplomacy* (pp. 330–347). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780192859198.013.18

Boulanger, P. (2024). *Applications of Augmented Reality: Current State of the Art*. IntechOpen. https://doi.org/10.5772/intechopen.111231

Bourne, M., Johnson, H., & Lisle, D. (2015). Laboratizing the Border: The Production, Translation and Anticipation of Security Technologies. *Security Dialogue*, *46*(4), 307–325. https://doi.org/10.1177/0967010615578399

Bowen, G. A. (2009). Document Analysis as a Qualitative Research Method. *Qualitative Research Journal*, *9*(2), 27–40. https://doi.org/10.3316/QRJ0902027

Bowman, N. D., Ahn, S. J., & Mercer Kollar, L. M. (2020). The Paradox of Interactive Media: The Potential for Video Games and Virtual Reality as Tools for Violence Prevention. *Frontiers in Communication*, *5*, Article 580965. https://doi.org/10.3389/fcomm.2020.580965

Braidotti, R. (2013). *The posthuman*. Polity. https://ebookcentral.proquest.com/lib/londonschoolecons/detail.action?docID=1315633

Bramsen, I., & Hagemann, A. (2021). The Missing Sense of Peace: Diplomatic Approachment and Virtualization During the COVID-19 Lockdown. *International Affairs*, *97*(2), 539–560. https://doi.org/10.1093/ia/iiaa229

Braun, A. (2015). The Politics of International Relations: Building Bridges and the Quest for Relevance. *Studia Politica (Bucuresti)*, *15*(4), 557–566.

Braun, B., Schindler, S., & Wille, T. (2019a). Rethinking Agency in International Relations: Performativity, Performances and Actor-Networks. *Journal of International Relations and Development*, *22*(4), 787–807. https://doi.org/10.1057/s41268-018-0147-z

Braun, B., Schindler, S., & Wille, T. (2019b). *Rethinking Agency in International Relations: Vol. 22 (4)*. http://link.springer.com/10.1057/s41268-018-0147-z

Braun, V., & Clarke, V. (2006). Using Thematic Analysis in Psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Braun, V., & Clarke, V. (2021). *Thematic Analysis: A Practical Guide*. SAGE.

Breu, C. (2014). *Insistence of the Material: Literature in the Age of Biopolitics* (1st ed.). University of Oklahoma Press.

Breuer, H., Bessant, J., & Gudiksen, S. (2022). *Gamification for Innovators and Entrepreneurs: Using Games to Drive Innovation and Facilitate Learning*. De Gruyter. https://doi.org/10.1515/9783110725582

Breves, P. (2020). Bringing People Closer: The Prosocial Effects of Immersive Media on Users' Attitudes and Behavior. *Nonprofit and Voluntary Sector Quarterly*, *49*(5), 1015–1034. https://doi.org/10.1177/0899764020903101

Brey, P. A. (1999). The Ethics of Representation and Action in Virtual Reality. *Ethics and Information Technology*, *1*(1), 5–14. https://doi.org/10.1023/A:1010069907461

Brooks, E. (with Brown, D. J.). (2023). *Virtual Reality Games for Rehabilitation* (1st ed. 2023.). Springer New York. https://doi.org/10.1007/978-1-0716-3371-7

Brown, J., Bailenson, J., & Hancock, J. (2023). Misinformation in Virtual Reality. *Journal of Online Trust and Safety*, *1*(5), 1–30. https://doi.org/10.54501/jots.v1i5.120

Brown, R. (2024). *Oculus Quest 2: Full Specification*. VRcompare. https://vr-compare.com/headset/oculusquest2

Buch, A. M., Eagleman, D. M., & Grosenick, L. (2022). Engineering Diplomacy: How AI and Human Augmentation Could Remake the Art of Foreign Relations. *Science & Diplomacy*. https://www.sciencediplomacy.org/perspective/2022/engineering-diplomacy-how-ai-and-human-augmentation-could-remake-art-foreign

Bucher, B. (2017). Moving Beyond the Substantialist Foundations of the Agency-Structure Dichotomy: Figurational Thinking in International Relations. *Journal of International Relations and Development*, *20*(2), 408–433. https://doi.org/10.1057/jird.2015.12

Bueger, C. (2013). Actor-Network Theory, Methodology, and International Organization. *International Political Sociology*, *7*(3), 338–342. https://doi.org/10.1111/ips.12026_3

Bueger, C. (2015). Making Things Known: Epistemic Practices, the United Nations, and the Translation of Piracy. *International Political Sociology*, *9*(1), 1–18. https://doi.org/10.1111/ips.12073

Bueger, C. (2019). Performing Piracy: A Note on the Multiplicity of Agency. *Journal of International Relations and Development*, *22*(4), 832–852. https://doi.org/10.1057/s41268-017-0122-0

Bueger, C., & Bethke, F. (2014). Actor-Networking the 'Failed State' – an Enquiry into the Life of Concepts. *Journal of International Relations and Development*, *17*(1), 30–60. https://doi.org/10.1057/jird.2012.30

Bueger, C., & Gadinger, F. (2007). Reassembling and Dissecting: International Relations Practice from a Science Studies Perspective. *International Studies Perspectives*, *8*(1), 90–110. https://doi.org/10.1111/j.1528-3585.2007.00271.x

Bueger, C., & Gadinger, F. (2014). Core Approaches in International Practice Theory. In C. Bueger & F. Gadinger (Eds), *International Practice Theory: New Perspectives* (pp. 21–58). Palgrave Macmillan UK. https://doi.org/10.1057/9781137395535_3

Bueger, C., & Gadinger, F. (2018). *International Practice Theory*. Springer International Publishing. https://doi.org/10.1007/978-3-319-73350-0

Bueger, C., & Mireanu, M. (2014). Negotiating Proximity. Participant Observation and Critical Security Studies. In C. Aradau, J. Huysmans, A. Neal, & N. Voelkner (Eds), *Critical Security Methods*. Routledge.

Bueger, C., & Stockbruegger, J. (2017). Actor-Network Theory: Objects and Actants, Networks and Narratives. In D. R. McCarthy (Ed.), *Technology and World Politics: An Introduction*. Routledge.

Bueger, C., & Villumsen, T. (2007). Beyond the Gap: Relevance, Fields of Practice and the Securitizing Consequences of (Democratic Peace) Research. *Journal of International Relations and Development*, *10*(4), 417–448. https://doi.org/10.1057/palgrave.jird.1800136

Bujić, M., Salminen, M., Macey, J., & Hamari, J. (2020). "Empathy Machine": How Virtual Reality Affects Human Rights Attitudes. *Internet Research*. https://doi.org/10.1108/intr-07-2019-0306

Bullock, A. N., Colvin, A. D., & Jackson, M. S. (2021). *Zoom Fatigue in the Age of COVID-19*. https://scholarworks.waldenu.edu/swhs_pubs/24

Burgess, S., & Tatnall, A. (2005). Actor-Network Theory and Adoption of E-Commerce in SMEs. In *Encyclopaedia of Information Science and Technology* (Vol. 1, pp. 38–41). Idea Group Reference.

Burns, R. (2019). New Frontiers of Philanthro-capitalism: Digital Technologies and Humanitarianism. *Antipode*, *51*(4), 1101–1122. https://doi.org/10.1111/anti.12534

Burt, E., & Taylor, J. (2003). New Technologies, Embedded Values, and Strategic Change: Evidence from the U.K. Voluntary Sector. *Nonprofit and Voluntary Sector Quarterly*, *32*(1), 115–127. https://doi.org/10.1177/0899764002250009

Butler, J. (2011). *Bodies That Matter: On the Discursive Limits of 'Sex'* (1st ed.). Routledge. https://doi.org/10.4324/9780203828274

Buzan, B., & Little, R. (2001). Why International Relations has Failed as an Intellectual Project and What to do About it. *Millennium*, *30*(1), 19–39. https://doi.org/10.1177/03058298010300010401

Bye, K. (2019, November 2). *XR Ethics Manifesto* [SlideShare]. https://www.slideshare.net/kentbye/xr-ethics-manifesto-updated-nov-2-2019

Bye, K. (2022, February 1). *Translating UN Reports into Immersive Stories to Brief World Leaders with "State of Global Peace"*. Voices of VR. https://voicesofvr.com/1052-translating-un-reports-into-immersive-stories-to-brief-world-leaders-with-state-of-global-peace/

Bye, K., Hosfelt, D., Chase, S., Miesnieks, M., & Beck, T. (2019). *The Ethical and Privacy Implications of Mixed Reality*. 1–2. https://doi.org/10.1145/3306212.3328138

Bystrom, K., & Mosse, R. (2020). Inside the 'Empathy Machine': Virtual Reality and Humanitarian Campaigning. In A. S. Moore & S. Pinto (Eds), *Writing Beyond the State* (pp. 87–110). Springer International Publishing. https://doi.org/10.1007/978-3-030-34456-6_5

Cai, Y., & Cao, Q. (2021). *When VR Serious Games Meet Special Needs Education: Research, Development and Their Applications* (1st Edition 2021). Springer Singapore Pte. Limited. https://doi.org/10.1007/978-981-33-6942-9

Cai, Y., Joolingen, W. van, Walker, Z., & Asia-Europe Symposium on Simulation and Serious Games. (2019). *VR, Simulations and Serious Games for Education*.

Callon, M. (1984). Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieuc Bay. *The Sociological Review (Keele)*, *32*(1_suppl), 196–233. https://doi.org/10.1111/j.1467-954X.1984.tb00113.x

Callon, M. (1986). The Sociology of an Actor-Network: The Case of the Electric Vehicle. In M. Callon, J. Law, & A. Rip (Eds), *Mapping the Dynamics of Science and Technology: Sociology of Science in the Real World* (pp. 19–34). Palgrave Macmillan UK. https://doi.org/10.1007/978-1-349-07408-2_2

Callon, M. (1990). Techno-economic Networks and Irreversibility. *The Sociological Review*, *38*(1_suppl), 132–161. https://doi.org/10.1111/j.1467-954X.1990.tb03351.x

Callon, M. (1998). An Essay on Framing and Overflowing: Economic Externalities Revisited by Sociology. *The Sociological Review (Keele)*, *46*(1_suppl), 244–269. https://doi.org/10.1111/j.1467-954X.1998.tb03477.x

Callon, M. (2006). *What Does It Mean to Say That Economics Is Performative?* (No. 005; CSI Working Papers Series). Centre de Sociologie de l'Innovation (CSI), Mines ParisTech. https://search.proquest.com/docview/1698333375?pq-origsite=primo

Callon, M., & Law, J. (1982). On Interests and Their Transformation: Enrolment and Counter-Enrolment. *Social Studies of Science*, *12*(4), 615–625. https://doi.org/10.1177/030631282012004006

Callon, M., & Law, J. (1997). After the Individual in Society: Lessons on Collectivity from Science, Technology and Society. *Canadian Journal of Sociology*, *22*(2), 165–182. https://doi.org/10.2307/3341747

Callon, M., Law, J., & Rip, A. (1986). *Mapping the Dynamics of Science and Technology: Sociology of Science in the Real World*. Macmillan.

Calogiuri, G., Keegan, B. J., Birkheim, S. L., Rydgren, T. L., Flaten, O. E., Fröhlich, F., & Litleskare, S. (2022). A Mixed-Methods Exploration of Virtual Reality as a Tool to Promote Green Exercise. *Nature Scientific Reports*, *12*(1), 5715–14. https://doi.org/10.1038/s41598-022-09622-x

Calvo, A. G., Kenney, M., & Zysman, J. (2025). Responding to Platform Firm Power: Differing National Responses. *New Political Economy*, *30*(2), 225–239. https://doi.org/10.1080/13563467.2024.2418075

Campo, E., & Citton, Y. (Eds). (2024). *The Politics of Curiosity: Alternatives to the Attention Economy*. Routledge. https://doi.org/10.4324/9781003401575

Campos-Castillo, C. (2012). Copresence in Virtual Environments. *Sociology Compass*, *6*(5), 425–433. https://doi.org/10.1111/j.1751-9020.2012.00467.x

Carayannis, T., & Weiss, T. G. (2021). *The 'Third' United Nations: How a Knowledge Ecology Helps the UN Think* (1st edn). University Press. https://doi.org/10.1093/oso/9780198855859.001.0001

Carl, E., Stein, A. T., Levihn-Coon, A., Pogue, J. R., Rothbaum, B., Emmelkamp, P., Asmundson, G. J. G., Carlbring, P., & Powers, M. B. (2019). Virtual Reality Exposure Therapy for Anxiety and Related Disorders: A Meta-Analysis of Randomized Controlled Trials. *Journal of Anxiety Disorders*, *61*, 27–36. https://doi.org/10.1016/j.janxdis.2018.08.003

Carlsnaes, W., Risse, T., & Simmons, B. A. (2012). *Handbook of International Relations*. SAGE Publications, Limited. http://ebookcentral.proquest.com/lib/oxford/detail.action?docID=1046504

Carr, M., & Nye, J. (2019). From Nuclear Weapons to Cyber Security: Breaking Boundaries. In C. Kaltofen, M. Carr, & M. Acuto (Eds), *Technologies of International Relations: Continuity and Change* (pp. 87–96). Springer International Publishing. https://doi.org/10.1007/978-3-319-97418-7_9

Casey-Maslen, S., Weizmann, N., Homayounnejad, M., & Stauffer, H. (2018). *Drones and Other Unmanned Weapons Systems under International Law.* (Vol. 53). Brill.

Castells, M. (2000). *The Rise of the Network Society* (2nd edition). Blackwell Publishers.

Cefai, S., & Couldry, N. (2019). Mediating the Presence of Others: Reconceptualising Co-Presence as Mediated Intimacy. *European Journal of Cultural Studies*, *22*(3), 291–308. https://doi.org/10.1177/1367549417743040

Center for Naval Analyses. (2014). *Serious Games with Serious Players: Game Play with International Decision-makers*. https://www.cna.org/archive/CNA_Files/pdf/irm-2014-u-008456-

final.pdf#:~:text=%EF%82%B7%20There%20was%20no%20problem,the%20game%20in%20ways%20that

Cercel, M. O. (2022). Gamification in Diplomacy Studies as an Effective Tool for Knowledge Transfer: Questionnaire Study. *JMIR Serious Games*, *10*(2), e32996. https://doi.org/10.2196/32996

Chambers, P. (2016). Smartphone. In M. B. Salter, *Making Things International 2: Catalysts and Reactions*. University of Minnesota Press.

Chandar, V. (2021). *Investing in the Metaverse: New Opportunities in Virtual Worlds*. Morgan Stanley. https://www.morganstanley.com/articles/metaverse-opportunities-virtual-reality-augmented-reality-technologies

Chaney, S. (2023, June 29). *Why Is VR So Expensive? 4 Reasons Explained*. Make Use Of (MUO). https://www.makeuseof.com/why-is-vr-expensive/

Chang, A. A., Kazemi, E., Esmaeili, V., & Davies, M. S. (2024). The Effectiveness of Virtual Reality Training: A Systematic Review. *Journal of Organizational Behavior Management*, *44*(3), 214–232. https://doi.org/10.1080/01608061.2023.2240767

Chang, V., Gao, G., & Peng, H. (2024). Social VR for Professional Networking: A Spatial Perspective. *ACM Symposium on Spatial User Interaction*, 1–10. https://doi.org/10.1145/3677386.3682094

Chang, W. (2016). Virtual Reality Filmmaking Methodology (Animation Producing). *TECHART: Journal of Arts and Imaging Science*, *3*(3), 23–26. https://doi.org/10.15323/techart.2016.08.3.3.23

Charmaz, K. (2008). Grounded Theory as an Emergent Method. In S. N. Hesse-Biber & P. Leavy, *Handbook of Emergent Methods* (pp. 155–170). The Guilford Press.

Chayka, K. (2021, November 4). We Already Live in Facebook's Metaverse. *The New Yorker*. https://www.newyorker.com/culture/infinite-scroll/we-already-live-in-facebooks-metaverse

Cheesman, M. (2023). Digital Humanitarianism: Interfaces, Infrastructures, and Countercurrents. *London Review of International Law*, *11*(3), 513–522. https://doi.org/10.1093/lril/lrae003

Chen, V. H. H., & Ibasco, G. C. (2023). All It Takes Is Empathy: How Virtual Reality Perspective-Taking Influences Intergroup Attitudes and Stereotypes. *Frontiers in Psychology*, *14*, 1265284. https://doi.org/10.3389/fpsyg.2023.1265284

Chernoff, F., Cornut, J., & James, P. (2020). Analytic Eclecticism and International Relations: Promises and Pitfalls. *International Journal (Toronto)*, *75*(3), 383–391. https://doi.org/10.1177/0020702020959250

Chhina, S., Chadhar, M., Firmin, S., & Tatnall, A. (2023). The Role of Actors in Blockchain Adoption Decisions – An Innovation Translation Perspective. *Australasian Journal of Information Systems*, *27*. https://doi.org/10.3127/ajis.v27i0.4489

Chipidza, W., & Leidner, D. (2019). A Review of the ICT-Enabled Development Literature: Towards a Power Parity Theory of ICT4D. *The Journal of Strategic Information Systems*, *28*(2), 145–174. https://doi.org/10.1016/j.jsis.2019.01.002

Cho, B.-H., Ku, J., Jang, D. P., Kim, S., Lee, Y. H., Kim, I. Y., Lee, J. H., & Kim, S. I. (2002). The Effect of Virtual Reality Cognitive Training for Attention Enhancement. *Cyberpsychology & Behavior*, *5*(2), 129–137. https://doi.org/10.1089/109493102753770516

Cho, S. (2014). An International Organization's Identity Crisis. *Northwestern Journal of International Law & Business*, *34*(3), 359–393.

Chouliaraki, L. (2013). *The Ironic Spectator: Solidarity in the Age of Post-Humanitarianism*. Polity.

Chouliaraki, L., & Vestegaard, A. (Eds). (2021). *Routledge Handbook of Humanitarian Communication*. Routledge.

Chowdhury, J., Haris Abd Wahab, Mohd Rashid Mohd Saad, Roy, P., & Wronka, J. (2022). *Practices, Challenges, and Prospects of Digital Ethnography as a Multidisciplinary Method*. IGI Global Scientific Publishing.

Christenson, S. L., Reschly, A. L., & Wylie, C. (2012). *Handbook of Research on Student Engagement* (1st edition). Springer-Verlag. https://doi.org/10.1007/978-1-4614-2018-7

Chyba, K., Tatarinov, K., & Ambos, T. C. (2023). The United Nations' Innovation Learning Journey (SSIR). *Stanford Social Innovation Review*. https://ssir.org/articles/entry/the_united_nations_innovation_learning_journey

Cieślik, B., Mazurek, J., Rutkowski, S., Kiper, P., Turolla, A., & Szczepańska-Gieracha, J. (2020). Virtual Reality in Psychiatric Disorders: A Systematic Review of Reviews. *Complementary Therapies in Medicine*, *52*, 102480–102480. https://doi.org/10.1016/j.ctim.2020.102480

Çilkoparan, H. (2020, May 23). International Political Sociology Contributions to International Relations. *E-International Relations*. https://www.e-ir.info/2020/05/23/international-political-sociology-contributions-to-international-relations/

Cipresso, P., Giglioli, I. A. C., Raya, M. A., & Riva, G. (2018a). The Past, Present, and Future of Virtual and Augmented Reality Research: A Network and Cluster Analysis of the Literature. *Frontiers in Psychology*, *9*, 2086–2086. https://doi.org/10.3389/fpsyg.2018.02086

Cipresso, P., Giglioli, I. A. C., Raya, M. A., & Riva, G. (2018b). The Past, Present, and Future of Virtual and Augmented Reality Research: A Network and Cluster Analysis of the Literature. *Frontiers in Psychology*, *9*, 2086–2086. https://doi.org/10.3389/fpsyg.2018.02086

Clément, M., & Koschut, S. (2024). Emotions in International Relations. In H. Flam (Ed.), *Research Handbook on the Sociology of Emotion* (pp. 380–399). Edward Elgar Publishing.

Coesel, A. M., Biancardi, B., & Buisine, S. (2024). A Theoretical Review of the Proteus Effect: Understanding the Underlying Processes. *Frontiers in Psychology*, *15*. https://doi.org/10.3389/fpsyg.2024.1379599

Cohen, D., Landau, D. H., Friedman, D., Hasler, B. S., Levit-Binnun, N., & Golland, Y. (2021). Exposure to Social Suffering in Virtual Reality Boosts Compassion and Facial Synchrony. *Computers in Human Behavior*, *122*, 106781-. https://doi.org/10.1016/j.chb.2021.106781

Coicaud, J.-M., & Le Blanc, D. (2016). Information Gathering, Analysis, and Dissemination. In J. Katz Cogan, I. Hurd, & I. Johnstone (Eds), *The Oxford Handbook of International Organizations* (pp. 663–688). Oxford University Press. https://doi.org/10.1093/law/9780199672202.003.0031

Collin, F. (2014). Who Are the Agents? Actor Network Theory, Methodological Individualism, and Reduction. In J. Zahle & F. Collin (Eds), *Rethinking the Individualism-Holism Debate: Essays in the Philosophy of Social Science* (Rethinking the Individualism-Holism Debate: Essays in the Philosophy of Social Science, Vol. 372). Springer International Publishing. https://doi.org/10.1007/978-3-319-05344-8

Collingridge, D. (1982). *Critical Decision Making: A New Theory of Social Choice*. Pinter.

Colomina, C. (2020, September). Techno-Multilateralism: The UN in the Age of Post-Truth Diplomacy. *CIDOB: Barcelona Centre for International Affairs*. http://www.cidob.org/en/articulos/cidob_report/n1_6/techno_multilateralism_the_un_in_the_age_of_post_truth_diplomacy

Compagnon, D., & Bernstein, S. (2017). Nondemarcated Spaces of Knowledge-Informed Policy Making: How Useful Is the Concept of Boundary Organization in IR? *The Review of Policy Research*, *34*(6), 812–826. https://doi.org/10.1111/ropr.12258

Conges, A., Breard, L., Patruno, W., Ouro-Sao, A., Salatge, N., Fertier, A., Lauras, M., Graham, J., & Benaben, F. (2023). Situational Awareness and Decision-Making in a Crisis Situation: A Crisis Management Cell in Virtual Reality. *International Journal of Disaster Risk Reduction*, *97*, 104002-. https://doi.org/10.1016/j.ijdrr.2023.104002

Connolly, W. E. (2013). The 'New Materialism' and the Fragility of Things. *Millennium*, *41*(3), 399–412. https://doi.org/10.1177/0305829813486849

Constantinou, C. M., Dittmer, J., Kuus, M., McConnell, F., Opondo, S. O., & Pouliot, V. (2021). Thinking with Diplomacy: Within and Beyond Practice Theory. *International Political Sociology*, *15*(4), 559–587. https://doi.org/10.1093/ips/olab028

Cooke, T. N. (2016). Cookies. In M. B. Salter, *Making Things International 2: Catalysts and Reactions* (pp. 228–240). University of Minnesota Press.

Coole, D. (2013). Agentic Capacities and Capacious Historical Materialism: Thinking with New Materialisms in the Political Sciences. *Millennium*, *41*(3), 451–469. https://doi.org/10.1177/0305829813481006

Cornut, J. (2015). Analytic Eclecticism in Practice: A Method for Combining International Relations Theories. *International Studies Perspectives*, *16*(1), 50–66. https://doi.org/10.1111/insp.12072

Cornut, J., & Dale, N. (2019). Historical, Practical, and Theoretical Perspectives on the Digitalisation of Diplomacy: An Exploratory Analysis. *Diplomacy and Statecraft*, *30*(4), 829–836. https://doi.org/10.1080/09592296.2019.1673559

Cosgrove, J. (2023). Meta-Regulation: Regulatory Framework for a Virtual World. *Infrastructure*, *62*(3).

Cotton, M. (2021). *Virtual Reality, Empathy and Ethics*. Palgrave Macmillan. https://ezproxy-prd.bodleian.ox.ac.uk/login?url=https://link.springer.com/10.1007/978-3-030-72907-3

Cox, R. W., & Jacobson, H. K. (1973). *The Anatomy of Influence: Decision Making in International Organization*. Yale University Press.

Crawford, C. (2021, July 7). Diplomacy in the Age of Zoom. *Diplomat Magazine*. https://diplomatmagazine.com/diplomacy-in-the-age-of-zoom/

Crawford, N. C. (2000). The Passion of World Politics: Propositions on Emotion and Emotional Relationships. *International Security*, *24*(4), 116–156. https://doi.org/10.1162/016228800560327

Crespo, J. E., García-Lirios, C., Rincón-Rodríguez, I. C., Chaparro-Medina, J. E., Meriño-Córdoba, V. H., Sánchez-Sánchez, A., Quiroz-Campas, C. Y., Molina-González, M. del R., & Sanhueza-Olave, M. (2025). Immersive Learning of the Sustainable Development Goals (SDGs) in Literature from 2020 to 2024. *Periodicals of Engineering and Natural Sciences*, *13*(3), Article 3. https://doi.org/10.21533/pen.v13.i3.478

Cronin, I. (with Scoble, R., & Wozniak, S.). (2025). *The Infinite Retina: Navigate Spatial Computing, Augmented and Mixed Reality, and the Next Tech Revolution* (Second edition.). Packt Publishing.

Crossley, N. (2015). Relational Sociology and Culture: A Preliminary Framework. *International Review of Sociology*, *25*(1), 65–85. https://doi.org/10.1080/03906701.2014.997965

Curtis, S., & Acuto, M. (2014). *Reassembling International Theory Assemblage Thinking and International Relations* (1st edition). Palgrave Macmillan UK. https://doi.org/10.1057/9781137383969

Czarniawska-Joerges, B. (2008). *A theory of organizing*. Edward Elgar.

Damasio, A. (1994). *Descartes' Error: Emotion, Reason, and the Human Brain*. G.P. Putnam Sons.

Damianova, N., & Berrezueta-Guzman, S. (2025). Serious Games Supported by Virtual Reality-Literature Review. *IEEE Access*, *13*, 38548–38561. https://doi.org/10.1109/ACCESS.2025.3544022

Danielson, A., & Hedling, E. (2021). Visual diplomacy in virtual summitry: Status signalling during the coronavirus crisis. *Review of International Studies*, 1–19. https://doi.org/10.1017/S0260210521000607

Day, M. (2022, February 4). *The United Nations Inspires Metaverse Conversations with Actnow VR*. Kiosk. https://kiosk.tm/blog/ideas/the-united-nations-inspires-metaverse-conversations-with-actnow-vr/

De Donà, M. (2023). Is It Only About Science and Policy? The 'Intergovernmental Epistemologies' of Global Environmental Governance. *Journal of International Relations and Development*, *26*(1), 86–110. https://doi.org/10.1057/s41268-022-00276-w

de la Peña, N. (2016, January 21). Kiya. *The New York Times*. https://www.nytimes.com/2016/01/21/opinion/sundance-new-frontiers-virtual-reality.html

De Landa, M. (2019). *A New Philosophy of Society: Assemblage Theory and Social Complexity* (1st edition). Bloomsbury Academic.

Decuypere, M. (2020). Visual Network Analysis: A Qualitative Method for Researching Sociomaterial Practice. *Qualitative Research*, *20*(1), 73–90. https://doi.org/10.1177/1468794118816613

Deighan, M. T., Ayobi, A., & O'Kane, A. A. (2023). Social Virtual Reality as a Mental Health Tool: How People Use VRChat to Support Social Connectedness and Wellbeing. *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*, 1–13. https://doi.org/10.1145/3544548.3581103

Dembski, F., Woessner, U., Letzgus, M., Ruddat, M., & Yamu, C. (2020). Urban Digital Twins for Smart Cities and Citizens: The Case Study of Herrenberg, Germany. *Sustainability (Basel, Switzerland)*, *12*(6), 2307-. https://doi.org/10.3390/su12062307

Denden, M., Tlili, A., Essalmi, F., & Jemni, M. (2017). Educational Gamification Based on Personality. *2017 IEEE/ACS 14th International Conference on Computer Systems and Applications (AICCSA)*, 1399–1405. https://doi.org/10.1109/AICCSA.2017.87

Deniz, K. (2023). Metaverse and New Narrative: Storyliving in the Age of Metaverse. In *The Future of Digital Communication* (pp. 39–55). CRC Press.

Denzin, N. K., & Lincoln, Y. S. (2012). *Strategies of Qualitative Inquiry* (4th edition). SAGE Publications, Inc.

Der Derian, J. (2000). Virtuous War/Virtual Theory. *International Affairs*, *76*(4), 771–788. https://doi.org/10.1111/1468-2346.00164

Derian, J. der. (1990). The (S)pace of International Relations: Simulation, Surveillance, and Speed. *International Studies Quarterly*, *34*(3), 295–310. https://doi.org/10.2307/2600571

Dicheva, D., Dichev, C., Cassel, L., Guy, B., & Irwin, K. (2021). *Exploring the Impact of Non-conventional Gamification Elements on Student Motivation and Engagement*. 1–9. https://doi.org/10.1109/FIE49875.2021.9637199

Dicken, P., Kelly, P. F., Olds, K., & Wai-Chung Yeung, H. (2001). Chains and Networks, Territories and Scales: Towards a Relational Framework for Analysing the Global Economy. *Global Networks*, *1*(2), 89–112. https://doi.org/10.1111/1471-0374.00007

Dimitropoulos, G. (2022). The Use of Blockchain by International Organizations: Effectiveness and Legitimacy. *Policy and Society*, *41*(3), 328–342. https://doi.org/10.1093/polsoc/puab021

Dimitrov, R. (2014). Bringing communication up to agency: UNESCO reforms its visibility. *Public Relations Inquiry*, *3*(3), 293–318. https://doi.org/10.1177/2046147X14544396

Dingel, J. I., & Neiman, B. (2020). *How Many Jobs Can be Done at Home?* (Working Paper No. 26948). National Bureau of Economic Research. https://doi.org/10.3386/w26948

Dittmer, J. (2017). *Diplomatic Material: Affect, Assemblage, and Foreign Policy*. Duke University Press.

Dittmer, J., & McConnell, F. (2016). *Diplomatic Cultures and International Politics: Translations, Spaces and Alternatives* (1st edition). Routledge.

Documentarist Istanbul Documentary Days. (2025). *Documentarist Festival* [Institutional website]. https://www.documentarist.org/en/

Doel, M., & Cooner, T. S. (2002). 'A Virtual Placement': The Creation of an Interactive, Web-Based Program to Prepare Students for 'Live' Placement. *The Journal of Practice Teaching in Social Work and Health*, *4*(1), 71–89.

Donovan, O. (2024). Gendering Zoom Diplomacy: Women's Participation in Digital Diplomacy. *International Studies Perspectives*. https://doi.org/10.1093/isp/ekae008

Dooley, K. (2021). Script and Project Development Practices. In K. Dooley, *Cinematic Virtual Reality: A Critical Study of 21st Century Approaches and Practices* (pp. 79–96). Palgrave Macmillan. https://doi.org/10.1007/978-3-030-72147-3_5

Dorn, A. W. (2011). *Keeping Watch: Monitoring, Technology and Innovation in UN Peace Operations*. United Nations University Press.

Dos Anjos, F. E. V., Martins, A. de O., Rodrigues, G. S., Sellitto, M. A., & Da Silva, D. O. (2024). Boosting Engineering Education with Virtual Reality: An Experiment to Enhance Student Knowledge Retention. *Applied System Innovation*, *7*(3), Article 3. https://doi.org/10.3390/asi7030050

Dougherty, D. (1992). Interpretive Barriers to Successful Product Innovation in Large Firms. *Organization Science*, *3*(2), 179–202.

Douvlou, E. D. (2025). Immersive Virtual Reality as Tool to Promote Sustainable Development Goals. In *Intercultural Competence Through Virtual Exchange* (pp. 163–176). Springer, Cham. https://doi.org/10.1007/978-3-031-76418-9_11

DPPA Innovation (Director). (2022, January 31). *2022 Sundance Film Festival: Cinema House Spotlight / 31 January 2022* [Video recording]. https://vimeo.com/672124404

DreamlandXR. (2024). *ACTNOW VR*. DreamlandXR. https://dreamlandxr.com/actnow-vr

Drezner, D. W. (2019). Technological Change and International Relations. *International Relations*, *33*(2), 286–303. https://doi.org/10.1177/0047117819834629

Duffield, M. (2012). Challenging Environments: Danger, Resilience and the Aid Industry. *Security Dialogue*, *43*(5), 475–492. https://doi.org/10.1177/0967010612457975

Duffield, M. (2014). From Immersion to Simulation: Remote Methodologies and the Decline of Area Studies. *Review of African Political Economy*, *41*(1), 75–94. https://doi.org/10.1080/03056244.2014.976366

Duffield, M. (2016). The resilience of the ruins: Towards a critique of digital humanitarianism. *Resilience: International Policies, Practices And Discourses*, *4*(3), pp147-165. https://doi.org/10.1080/21693293.2016.1153772

Duffield, M. R. (2019). *Post-humanitarianism: Governing precarity in the digital world*. Polity.

Duncombe, C. (2017). Twitter and Transformative Diplomacy: Social Media and Iran–Us Relations. *International Affairs*, *93*(3), 545–562. https://doi.org/10.1093/ia/iix048

Dunne, T., Hansen, L., & Wight, C. (2013). The End of International Relations Theory? *European Journal of International Relations*, *19*(3), 405–425. https://doi.org/10.1177/1354066113495485

Duvall, R. D., & Chowdhury, A. (2011). Practices of Theory. In E. Adler & V. Pouliot (Eds), *International Practices* (pp. 335–354). Cambridge University Press. https://doi.org/10.1017/CBO9780511862373.019

Dvorak, N. (2021, November 10). *4 Hard Truths About Ethics and Compliance Training*. Gallup.Com. https://www.gallup.com/workplace/357113/hard-truths-ethics-compliance-training.aspx

Ecker-Ehrhardt, M. (2017). Self-Legitimation in the Face of Politicization: Why International Organizations Centralized Public Communication. *Review of International Organizations*, *13*(4), 519–546. https://doi.org/10.1007/s11558-017-9287-y

Ecker-Ehrhardt, M. (2019, April 24). *Ios Going Digital? Explaining Social Media Adoption and Use Across Cases*. International Organizations and Digital Diplomacy: The EU, UN and NATO on Social Media, Halifax, Canada.

Ecker-Ehrhardt, M. (2020a). IO Public Communication Going Digital? Understanding Social Media Adoption and Use in Times of Politicization. In *Digital Diplomacy and International Organisations*. Routledge.

Ecker-Ehrhardt, M. (2020b). IO Public Communication Going Digital? Understanding Social Media Adoption and Use in Times of Politicization. In *Digital Diplomacy and International Organisations*. Routledge.

Ecker-Ehrhardt, M. (2024). The Digital Adaptation of International Bureaucracies. In C. Bjola & I. Manor (Eds), *The Oxford Handbook of Digital Diplomacy* (p. 0). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780192859198.013.19

Eckhoff, D., Schnupp, J., Wong, P. C., & Cassinelli, A. (2025). *When Flames Feel Real in Augmented Reality: Effects of Plausibility and Placement of Virtual Flames on the Burning Hand Illusion and Physiological Responses*. 63–71. https://doi.org/10.1109/VR59515.2025.00031

Edgar, B. L., Gorin, V., & Martín-Moruno, D. (2022). *Making Humanitarian Crises: Emotions and Images in History* (1st edition). Springer Nature. https://doi.org/10.1007/978-3-031-00824-5

Edmondson, A. C., & Lei, Z. (2014). Psychological Safety: The History, Renaissance, and Future of an Interpersonal Construct. *Annual Review of Organizational Psychology and Organizational Behavior*, *1*(1), 23–43. https://doi.org/10.1146/annurev-orgpsych-031413-091305

Eggeling, K. A., & Adler-Nissen, R. (2021). *The Synthetic Situation in Diplomacy: Scopic Media and the Digital Mediation of Estrangement*.

Eggeling, K. A., & Versloot, L. (2023). Taking Trust Online: Digitalisation and the Practice of Information Sharing in Diplomatic Negotiations. *Review of International Studies*, *49*(4), 637–656. https://doi.org/10.1017/S0260210522000559

Egliston, B., & Carter, M. (2021). Critical Questions for Facebook's Virtual Reality: Data, Power and the Metaverse. *Internet Policy Review*, *10*(4), 1–23. https://doi.org/%2010.14763/2021.4.1610

El Basbasse, Y., Packheiser, J., Peterburs, J., Maymon, C., Güntürkün, O., Grimshaw, G., & Ocklenburg, S. (2023). Walk the Plank! Using Mobile Electroencephalography to Investigate Emotional Lateralization of Immersive Fear in Virtual Reality. *Royal Society Open Science*, *10*(5), 221239. https://doi.org/10.1098/rsos.221239

Elad, B. (2024, January 28). Virtual Reality Statistics and Facts. *Enterprise Apps Today*. https://www.enterpriseappstoday.com/stats/virtual-reality-statistics.html

Elden, S., Kofman, E., & Lebas, E. (2003). *Henri Lefebvre: Key Writings*. Bloomsbury Publishing Plc.

Emirbayer, M. (1997). Manifesto for a Relational Sociology. *American Journal of Sociology*, *103*(2), 281–317. https://doi.org/10.1086/231209

ENGAGE. (2022, May 12). *The 360 Video Room*. ENGAGE. https://docs.engagevr.io/engage/essential-features/sharing-media/the-360-video-room

English, B., Pike, K., & Koithara Mathew, T. (2023). *Sexual Harassment Prevention in the Global Garment Industry: An Assessment of BetterWork Initiatives in Indonesia, Jordan, Nicaragua, and Vietnam* (Discussion Paper No. 50). International Labour Organisation; International Finance Corporation; BetterWork. https://betterwork.org/wp-content/uploads/Discussion-Paper-50-Sexual-harassment-prevention-in-the-global-garment-industry.pdf

Ertem-Eray, T., & Ki, E.-J. (2024). *Examining Virtual Reality as a New Opportunity for Public Diplomacy Efforts* (SSRN Scholarly Paper No. 5027929). Social Science Research Network. https://doi.org/10.2139/ssrn.5027929

Esguerra, A. (2015). Toward Two Narratives of Knowledge. *Innovation (Abingdon, England)*, *28*(1), 3–10. https://doi.org/10.1080/13511610.2014.943164

EU Digital Facility. (2023, 11). EU and UNDP Give Virtual Reality Tool to Armenian Police [Institutional website]. *EU4Digital*. https://eufordigital.eu/eu-and-undp-give-virtual-reality-tool-to-armenian-police/

Evans, S. K., Pearce, K. E., Vitak, J., & Treem, J. W. (2017). Explicating Affordances: A Conceptual Framework for Understanding Affordances in Communication Research. *Journal of Computer-Mediated Communication*, *22*(1), 35–52. https://doi.org/10.1111/jcc4.12180

Falk, R. A. (2017). The United Nations: Various Systems of Operation. In *The United Nations in International Politics* (pp. 184–230). Princeton University Press. https://doi.org/10.1515/9781400886241-007

Feagin, J. R., Orum, A. M., & Sjoberg, G. (1991). *A Case for the Case Study*. University of North Carolina Press.

Fejerskov, A. M., Clausen, M.-L., & Seddig, S. (2024). Humanitarian Ignorance: Towards a New Paradigm of Non-Knowledge in Digital Humanitarianism. *Disasters*, *48*(2), e12609-n/a. https://doi.org/10.1111/disa.12609

Felt, U., Fouché, R., Miller, C. A., & Smith-Doerr, L. (2016). *Introduction to the Fourth Edition of the Handbook of Science and Technology Studies* (4th ed.). MIT Press.

Ferguson, Y. H. (2015). Diversity in IR Theory: Pluralism as an Opportunity for Understanding Global Politics. *International Studies Perspectives*, *16*(1), 3–12. https://doi.org/10.1111/insp.12092

Ferrando, F. (2013). Posthumanism, Transhumanism, Antihumanism, Metahumanism, and New Materialisms: Differences and Relations. *Existenz*, *82*(2), 26–32.

Finger, M., & Ruchat, B. (2000). *The Transformation of International Public Organizations: The Case of UNCTAD* (Working Paper de l'IDHEAP No. 14/2000; UER: Management Des Entreprises Publiques). Institut de Hautes Etudes en Administration Publique.

https://www.semanticscholar.org/paper/The-Transformation-of-International-Public-The-Case-Finger-Ruchat/70466454c7ac6429aba726f9d879e6c1719fb64d

Firchow, P., Martin-Shields, C., Omer, A., & Ginty, R. M. (2017). PeaceTech: The Liminal Spaces of Digital Technology in Peacebuilding. *International Studies Perspectives*, *18*(1), 4–42. https://doi.org/10.1093/isp/ekw007

Fischer, R., & Bauer, J. (2018). Introducing Lefebvre. In F. Fischer & B. Bauer (Eds), *Perspectives on Henri Lefebvre: Theory, Practices and (Re)Readings* (pp. 1–14). De Gruyter.

Fishel, S. (2015). Microbes. In M. B. Salter, *Making Things International 1: Circuits and Motion*. University of Minnesota Press.

Flanding, J. P., & Grabman, G. M. (2022). *Purpose-Driven Innovation: Lessons from Managing Change in the United Nations*. Emerald Publishing Limited.

Flemming, D., Cress, U., Kimmig, S., Brandt, M., & Kimmerle, J. (2018). Emotionalization in Science Communication: The Impact of Narratives and Visual Representations on Knowledge Gain and Risk Perception. *Frontiers in Communication*, *3*, Article No. 3. https://doi.org/10.3389/fcomm.2018.00003

Flyverbom, M. (2010). Hybrid Networks and the Global Politics of the Digital Revolution – a Practice-Oriented, Relational and Agnostic Approach. *Global Networks*, *10*(3), 424–442. https://doi.org/10.1111/j.1471-0374.2010.00296.x

Fomerand, J. (2017). *Historical Dictionary of the United Nations*. Rowman & Littlefield Publishers, Incorporated. http://ebookcentral.proquest.com/lib/oxford/detail.action?docID=5166089

Foronda, C. L., Alfes, C. M., Dev, P., Kleinheksel, A. J., Nelson, D. A., O'Donnell, J. M., & Samosky, J. T. (2017). Virtually Nursing: Emerging Technologies in Nursing Education. *Nurse Educator*, *42*(1), 14–17. https://doi.org/10.1097/NNE.0000000000000295

Fortune Business Insights. (2021, August). *Virtual Reality (VR) Market Share, Growth | Research Report, 2028*. https://www.fortunebusinessinsights.com/industry-reports/virtual-reality-market-101378

Fortune Business Insights. (2025). *Virtual Reality Market Size, Share & Industry Analysis, Report 2025-2032*. https://www.fortunebusinessinsights.com/industry-reports/virtual-reality-market-101378

Fournier-Tombs, E. (2021). Towards a United Nations Internal Regulation for Artificial Intelligence. *Big Data & Society*, *8*(2), 205395172110394-. https://doi.org/10.1177/20539517211039493

Fox, J., Bailenson, J. N., & Tricase, L. (2013a). The embodiment of sexualized virtual selves: The Proteus effect and experiences of self-objectification via avatars. *Computers in Human Behavior*, *29*(3), 930–938. https://doi.org/10.1016/j.chb.2012.12.027

Fox, J., Bailenson, J., & Tricase, L. (2013b). The Embodiment of Sexualized Virtual Selves: The Proteus Effect and Experiences of Self-Objectification Via Avatars. *Computers in Human Behavior*, *29*(3), 930–938. https://doi.org/10.1016/j.chb.2012.12.027

Franklin, A. (Ed.). (2023). *The Routledge International Handbook of More-than-Human Studies*. Routledge. https://doi.org/10.4324/9781003262619

Fraser, A. D., Branson, I., Hollett, R. C., Speelman, C. P., & Rogers, S. L. (2024). Do Realistic Avatars Make Virtual Reality Better? Examining Human-Like Avatars for Vr Social Interactions. *Computers in Human Behavior: Artificial Humans*, *2*(2), 100082-. https://doi.org/10.1016/j.chbah.2024.100082

Freeman, G., Zamanifard, S., Maloney, D., & Adkins, A. (2020). My Body, My Avatar: How People Perceive Their Avatars in Social Virtual Reality. *Extended Abstracts of the 2020 CHI*

Conference on Human Factors in Computing Systems, 1–8. https://doi.org/10.1145/3334480.3382923

Friedrichs, J., & Kratochwil, F. (2009). On Acting and Knowing: How Pragmatism Can Advance International Relations Research and Methodology. *International Organization*, *63*(4), 701–731.

Fundación UOCRA & ILO. (2023). *Informe Final Proyecto De Realidad Virtual (RV) En Los Centros De Formación Profesional*.

Gad, C., & Bruun Jensen, C. (2010). On the Consequences of Post-ANT. *Science, Technology, & Human Values*, *35*(1), 55–80. https://doi.org/10.1177/0162243908329567

Gallagher, A. G., Ritter, E. M., Champion, H., Higgins, G., Fried, M. P., Moses, G., Smith, C. D., & Satava, R. M. (2005). Virtual Reality Simulation for the Operating Room: Proficiency-Based Training as a Paradigm Shift in Surgical Skills Training. *Annals of Surgery*, *241*(2), 364–372. https://doi.org/10.1097/01.sla.0000151982.85062.80

Gallego Abellán, R., Teruel Piñol, C. T., & Slater, M. (2024). Immersive Documentary Journalism: Exploring the Impact of 360° Virtual Reality Compared with a 2D Screen Display on the Responses of People Toward Undocumented Young Migrants to Spain. *Frontiers in Communication*, *9*, 1474524. https://doi.org/10.3389/fcomm.2024.1474524

Gama, F., & Magistretti, S. (2025). Artificial Intelligence in Innovation Management: A Review of Innovation Capabilities and a Taxonomy of AI Applications. *The Journal of Product Innovation Management*, *42*(1), 76–111. https://doi.org/10.1111/jpim.12698

Garcia, E. V. (2022). Multilateralism and Artificial Intelligence: What Role for the United Nations? In *The Global Politics of Artificial Intelligence*. Chapman and Hall/CRC.

García-Orosa, B., & Pérez-Seijo, S. (2020). The Use of 360° Video by International Humanitarian Aid Organizations to Spread Social Messages and Increase Engagement. *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*, *31*(6), 1311–1329. https://doi.org/10.1007/s11266-020-00280-z

Garrett, B., Taverner, T., Gromala, D., Tao, G., Cordingley, E., & Sun, C. (2018). Virtual Reality Clinical Research: Promises and Challenges. *JMIR Serious Games*, *6*(4), e10839. https://doi.org/10.2196/10839

Gather Presence Inc. (2024). *Gather.town: Virtual HQ for Remote Teams*. https://www.gather.town/

Gazi, S. F. (2025). In Code We Trust: Blockchain's Decentralization Paradox. *Vanderbilt Journal of Entertainment and Technology Law*, *27*(1), 59–128.

Geels, F. W. (2002). *Technological Transitions as Evolutionary Reconfiguration Processes: A Multi-Level Perspective and a Case-Study*. https://doi.org/10.1016/S0048-7333(02)00062-8

Geels, F. W., & Schot, J. (2007). Typology of Sociotechnical Transition Pathways. *Research Policy*, *36*(3), 399–417. https://doi.org/10.1016/j.respol.2007.01.003

Geertz, C. (1973). Thick Description: Toward an Interpretive Theory of Culture. In C. Geertz, *The Interpretation of Cultures: Selected Essays by Clifford Geertz* (pp. 310–323). Basic Books.

Gerring, J. (2017). *Case Study Research: Principles and Practices* (Second edition). University Press.

Gerring, J., & Christenson, D. (2017). *Applied Social Science Methodology: An Introductory Guide* (1st edition). University Press.

Gerry, L. J. (2017). Paint with Me: Stimulating Creativity and Empathy While Painting with a Painter in Virtual Reality. *IEEE Transactions on Visualization and Computer Graphics*, *23*(4), 1418–1426. https://doi.org/10.1109/TVCG.2017.2657239

Gershon, I., & Malitsky, J. (2010). Actor-Network Theory and Documentary Studies. *Studies in Documentary Film*, *4*(1), 65–78. https://doi.org/10.1386/sdf.4.1.65_1

Ghaban, W., & Hendley, R. (2019). Understanding the Effect of Gamification on Learners with Different Personalities: *Proceedings of the 11th International Conference on Computer Supported Education*, 392–400. https://doi.org/10.5220/0007730703920400

Gibson, J. J. (1979). The Theory of Affordances. In J. J. Gibson, *The Ecological Approach to Visual Perception* (1st edn, pp. 127–137). Houghton Mifflin. https://doi.org/10.4324/9781315740218-10

Girasa, R. J., & Scalabrini, G. J. (2022). *Regulation of Innovative Technologies: Blockchain, Artificial Intelligence and Quantum Computing*. Palgrave Macmillan.

Given, L. (2008). Semi-Structured Interview. In *The SAGE Encyclopedia of Qualitative Research Methods*. SAGE Publications, Inc. https://doi.org/10.4135/9781412963909.n420

Glouftsios, G. (2021). *Engineering Digitised Borders: Designing and Managing the Visa Information System*. Springer. https://doi.org/10.1007/978-981-16-3402-4

Godin, B., & Gaglio, G. (2019). How Does Innovation Sustain 'Sustainable Innovation'? *Handbook of Sustainable Innovation*. https://ezproxy-prd.bodleian.ox.ac.uk:3836/view/edcoll/9781788112567/9781788112567.00007.xml

Godin, B., Gaglio, G., Vinck, D., & Edward Elgar Publishing. (2021). *Handbook on Alternative Theories of Innovation*. Edward Elgar Publishing.

Goheer, N. (2020a). Clock, Cloud, and Contestation: The Digital Journey of the Commonwealth Secretariat. In C. Bjola & R. Zaiotti, *Digital Diplomacy and International Organisations* (pp. 127–152). Routledge. https://doi.org/10.4324/9781003032724-8

Goheer, N. (2020b). Clock, Cloud, and Contestation: The Digital Journey of the Commonwealth Secretariat. In C. Bjola & R. Zaiotti, *Digital Diplomacy and International Organisations* (pp. 127–152). Routledge. https://doi.org/10.4324/9781003032724-8

Gonsalves, A. (2015). *Applying Serious Gaming To Humanitarian Security: A Framework For Mixed-Reality Training*. European Interagency Security Forum (EISF). https://reliefweb.int/report/world/applying-serious-gaming-humanitarian-security-framework-mixed-reality-training

Gonsalves, A., & Mallet, C. (2020, March 31). *Safeguarding VR: Case Study*. Humanitarian Leadership Academy. https://www.humanitarianleadershipacademy.org/safeguarding-vr-case-study/

Gonzalez-Liencres, C., Zapata, L. E., Iruretagoyena, G., Seinfeld, S., Perez-Mendez, L., Arroyo-Palacios, J., Borland, D., Slater, M., & Sanchez-Vives, M. V. (2020). Being the Victim of Intimate Partner Violence in Virtual Reality: First- Versus Third-Person Perspective. *Frontiers in Psychology*, *11*, Article 820. https://doi.org/10.3389/fpsyg.2020.00820

Google VR. (2024). *Google Cardboard*. https://arvr.google.com/cardboard/

Goralski, M. A., & Tan, T. K. (2020). Artificial Intelligence and Sustainable Development. *The International Journal of Management Education*, *18*(1), 100330. https://doi.org/10.1016/j.ijme.2019.100330

Gorin, V. (2022). From Empathy to Shame: The Use of Virtual Reality by Humanitarian Organisations. In B. L. Edgar, V. Gorin, & D. Martín-Moruno, *Making Humanitarian Crises: Emotions and Images in History* (1st edition, pp. 147–170). Springer Nature. https://doi.org/10.1007/978-3-031-00824-5

Gray, J. A. (1990). Brain Systems that Mediate both Emotion and Cognition. *Cognition and Emotion*, *4*(3), 269–288. https://doi.org/10.1080/02699939008410799

Grayson, K. (2016). Drones. In M. B. Salter, *Making Things International 2: Catalysts and Reactions* (pp. 326–227). University of Minnesota Press.

Greber, H., Aaldering, L., & Lecheler, S. (2025). The Worthwhileness of Immersive Journalism-Taking on an Audience Perspective. *Journalism Practice*, *19*(1), 20–38. https://doi.org/10.1080/17512786.2023.2177711

Greber, H., Lecheler, S., Aaldering, L., De Haan, Y., Kruikemeier, S., Goutier, N., & De Bruin, K. (2023). *Feeling the News? The Differential Effects of Immersive Journalism on Emotional Response*. Routledge, Taylor & Francis Group.

Green, C. S. (2018). Video Games and Cognitive Skills. In N. D. Bowman (Ed.), *Video Games: A Medium That Demands Our Attention* (1st edition, pp. 25–43). Routledge. https://doi.org/10.4324/9781351235266-2

Green, D. P., Rose, M., Bevan, C., Farmer, H., Cater, K., & Fraser, D. S. (2021). 'You Wouldn't Get That from Watching TV!': Exploring Audience Responses to Virtual Reality Non-Fiction in the Home. *Convergence (London, England)*, *27*(3), 805–829. https://doi.org/10.1177/1354856520979966

Greenstein, C., & Mosley, L. (2020). When Talk Isn't Cheap: Opportunities and Challenges in Interview Research. In L. Curini & R. Franzese, *The SAGE Handbook of Research Methods in Political Science and International Relations* (pp. 1167–1189). SAGE Publications Ltd. https://doi.org/10.4135/9781526486387.n64

Gregory, J. A. (2020). Virtual Reality and the Future of Peacemaking. *Diplo Policy Papers and Briefs*, *14*, 8.

Gregory, S. (2016, August 2). Immersive Witnessing: From Empathy and Outrage to Action. *WITNESS Blog*. https://blog.witness.org/2016/08/immersive-witnessing-from-empathy-and-outrage-to-action/

Gruenewald, T., & Witteborn, S. (2020). Feeling Good: Humanitarian Virtual Reality Film, Emotional Style and Global Citizenship. *Cultural Studies*, *36*(1), 141–161. https://doi.org/10.1080/09502386.2020.1761415

Gryech, I., Vinogradov, E., Saboor, A., Bithas, P. S., Mathiopoulos, P. T., & Pollin, S. (2024). A Systematic Literature Review on the Role of UAV-Enabled Communications in Advancing the UN's Sustainable Development Goals. *Frontiers in Communications and Networks*, *5*, 1286073. https://doi.org/10.3389/frcmn.2024.1286073

Guillaume, X., & Bilgin, P. (2016). Introduction. In X. Guillaume & P. Bilgin (Eds), *Routledge Handbook of International Political Sociology* (1st ed., pp. 1–14). Routledge.

Gunshin, M., Doi, K., & Morimura, N. (2020). Use of High-Fidelity Simulation Technology in Disasters: An Integrative Literature Review. *Acute Medicine & Surgery*, *7*(1), e596. https://doi.org/10.1002/ams2.596

Guzzini, S. (2017). Afterword: International Political Sociology, or the Social Ontology and Power Politics of Process. In *Routledge Handbook of International Political Sociology* (1st edn, pp. 368–377). Routledge. https://doi.org/10.4324/9781315446486-36

Haas, E. B. (1990). *When Knowledge Is Power: Three Models of Change in International Organizations*. University of California Press.

Haas, M. (2017). A Plea for Bridge Building in International Relations. In *Contending Approaches to International Politics* (pp. 158–176). University Press. https://doi.org/10.1515/9781400886005-010

Haas, P. M. (1992). Introduction: Epistemic Communities and International Policy Coordination. *International Organization*, *46*(1), 1–35.

Haftel, Y. Z., & Thompson, A. (2006). The Independence of International Organizations: Concept and Applications. *The Journal of Conflict Resolution*, *50*(2), 253–275. https://doi.org/10.1177/0022002705285288

Halik, Ł. (2018). Challenges in Converting the Polish Topographic Database of Built-Up Areas into 3D Virtual Reality Geovisualization. *Cartographic Journal*, *55*(4), 391–399. https://doi.org/10.1080/00087041.2018.1541204

Hall, R. B. (2009). Intersubjective Expectations and Performativity in Global Financial Governance. *International Political Sociology*, *3*(4), 453–457. https://doi.org/10.1111/j.1749-5687.2009.00086_3.x

Hall, T. H. (2015). *Emotional Diplomacy: Official Emotion on the International Stage*. Cornell University Press.

Hammler, K., Spanellis, A., & Rentizelas, A. (2022). Using Gamification in Development Interventions: Evidence from a Multidimensional Poverty Alleviation Initiative in Rural Paraguay. *Local Development & Society*, *6*(2), 213–228. https://doi.org/10.1080/26883597.2022.2092769

Han, E., DeVeaux, C., Hancock, J. T., Ram, N., Harari, G. M., & Bailenson, J. N. (2024). The Influence of Spatial Dimensions of Virtual Environments on Attitudes and Nonverbal Behaviors During Social Interactions. *Journal of Environmental Psychology*, *95*, 102269-. https://doi.org/10.1016/j.jenvp.2024.102269

Hannan, M. T., & Freeman, J. (1984). Structural Inertia and Organizational Change. *American Sociological Review*, *49*(2), 149–164. https://doi.org/10.2307/2095567

Haraway, D. (1988). Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective. *Feminist Studies*, *14*(3), 575–599. https://doi.org/10.2307/3178066

Harknett, R. J. (2023). The Distribution of Power, Security and Interconnectedness: The Structure of Digital International Relations. In C. Bjola & M. Kornprobst (Eds), *Digital International Relations* (pp. 29–50). Routledge.

Harp, S. F., & Mayer, R. E. (1997). The Role of Interest in Learning from Scientific Text and Illustrations: On the Distinction Between Emotional Interest and Cognitive Interest. *Journal of Educational Psychology*, *89*(1), 92–102. https://doi.org/10.1037/0022-0663.89.1.92

Hart, W., & Harvey, K. (2014). *United Nations Global Pulse Initiative and Big Data* (Vol. 3, pp. 1300–1302). SAGE Publications, Inc. https://doi.org/10.4135/9781452244723.n551

Harty, C. (2008). Implementing Innovation in Construction: Contexts, Relative Boundedness and Actor-Network Theory. *Construction Management and Economics*, *26*(10), 1029–1041. https://doi.org/10.1080/01446190802298413

Harvey, P., & Knox, H. (2012). The Enchantments of Infrastructure. *Mobilities*, *7*(4), 521–536. https://doi.org/10.1080/17450101.2012.718935

Hasler, B. S., H. Landau, D., Hasson, Y., Schori-Eyal, N., Giron, J., Levy, J., Halperin, E., & Friedman, D. (2021). Virtual Reality-Based Conflict Resolution: The Impact of Immersive 360° Video on Changing View Points and Moral Judgment in the Context of Violent Intergroup Conflict. *New Media & Society*, *23*(8), 2255–2278. https://doi.org/10.1177/1461444821993133

Hasler, B. S., Hirschberger, G., Shani-Sherman, T., & Friedman, D. A. (2014). Virtual Peacemakers: Mimicry Increases Empathy in Simulated Contact with Virtual Outgroup Members. *Cyberpsychology, Behavior and Social Networking*, *17*(12), 766–771. https://doi.org/10.1089/cyber.2014.0213

Hasler, B. S., Spanlang, B., & Slater, M. (2017). Virtual Race Transformation Reverses Racial in-Group Bias. *PloS One*, *12*(4), e0174965. https://doi.org/10.1371/journal.pone.0174965

Hassan, R. (2020). Digitality, Virtual Reality and the 'Empathy Machine'. *Digital Journalism*, *8*(2), 195–212. https://doi.org/10.1080/21670811.2018.1517604

Hassapopoulou, M. (2018). Playing with History: Collective Memory, National Trauma, and Dark Tourism in Virtual Reality Docugames. *New Review of Film and Television Studies*, *16*(4), 365–392. https://doi.org/10.1080/17400309.2018.1519207

Hasson, Y., Schori-Eyal, N., Landau, D., Hasler, B. S., Levy, J., Friedman, D., & Halperin, E. (2019). The Enemy's Gaze: Immersive Virtual Environments Enhance Peace Promoting Attitudes and Emotions in Violent Intergroup Conflicts. *PLOS ONE*, *14*(9), e0222342. https://doi.org/10.1371/journal.pone.0222342

Hawkins, D. G. (2006). *Delegation and Agency in International Organizations*. Cambridge University Press.

Hayles, N. K. (c1999). *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*. The University of Chicago Press.

Heath, R. (2020, April 16). *For Global Diplomats, Zoom Is Not Like Being in the Room*. POLITICO. https://www.politico.com/news/2020/04/16/zoom-diplomacy-coronavirus-188811

Heath, S., Fuller, A., & Johnston, B. (2009). Chasing Shadows: Defining Network Boundaries in Qualitative Social Network Analysis. *Qualitative Research*, *9*(5), 645–661. https://doi.org/10.1177/1468794109343631

Hedling, E. (2024). Virtual Diplomatic Summitry. In C. Bjola & I. Manor (Eds), *The Oxford Handbook of Digital Diplomacy* (pp. 367–382). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780192859198.013.20

Hedling, E., & Bremberg, N. (2021). Practice Approaches to the Digital Transformations of Diplomacy: Toward a New Research Agenda. *International Studies Review*, *23*(4), 1595–1618. https://doi.org/10.1093/isr/viab027

Heeks, R. (2020a). ICT4D 3.0? Part 1: The Components of an Emerging "Digital-for-Development" Paradigm. *Electronic Journal of Information Systems in Developing Countries*, e12124. https://doi.org/10.1002/isd2.12124

Heeks, R. (2020b). Ict4d 3.0? Part 2–the Patterns of an Emerging "Digital-for-Development" Paradigm. *The Electronic Journal of Information Systems in Developing Countries*, *86*(3), e12123. https://doi.org/10.1002/isd2.12123

Heeks, R., & Stanforth, C. (2015). Technological Change in Developing Countries: Opening the Black Box of Process Using Actor–Network Theory. *Development Studies Research*, *2*(1), 33–50. https://doi.org/10.1080/21665095.2015.1026610

Helfer, L. R. (2006a). Understanding Change in International Organizations: Globalization and Innovation in the ILO. *Vanderbilt Law Review*, *59*(3), 647–726.

Helfer, L. R. (2006b). Understanding Change in International Organizations: Globalization and Innovation in the ILO. *Vanderbilt Law Review*, *59*(3), 647–726.

Heller, B., & Bar-Zeev, A. (2021). The Problems with Immersive Advertising: In AR/VR, Nobody Knows You Are an Ad. *Journal of Online Trust & Safety*, *1*(1), 1–14. https://doi.org/10.54501/jots.v1i1.21

Henriksen, L. F. (2013). Performativity and the Politics of Equipping for Calculation: Constructing a Global Market for Microfinance. *International Political Sociology*, *7*(4), 406–425. https://doi.org/10.1111/ips.12031

Herrera, F., Bailenson, J., Weisz, E., Ogle, E., & Zaki, J. (2018). Building Long-Term Empathy: A Large-Scale Comparison of Traditional and Virtual Reality Perspective-Taking. *PloS One*, *13*(10), e0204494. https://doi.org/10.1371/journal.pone.0204494

Herrera, G. L. (2006). *Technology and International Transformation: The Railroad, the Atom Bomb, and the Politics of Technological Change*. State University of New York Press.

Hirata, Y. (2023). Do Avatar-Assisted Virtual Classrooms Work for Students with Low Speaking Confidence?: A Qualitative Study. *Interactive Technology and Smart Education*, *20*(3), 335–349. https://doi.org/10.1108/ITSE-10-2022-0142

Hirblinger, A. T., Hansen, J. M., Hoelscher, K., Kolås, Å., Lidén, K., & Martins, B. O. (2023). Digital Peacebuilding: A Framework for Critical–Reflexive Engagement. *International Studies Perspectives*, *24*(3), 265–284. https://doi.org/10.1093/isp/ekac015

Hjorth, L., Horst, H. A., Galloway, A., & Bell, G. (2019). *The Routledge Companion to Digital Ethnography*. Routledge.

Hochschild, F. (2018, December). The Secretary-General's Strategy on New Technologies. *UN Chronicles*, *Vol. LV, 'New Technologies: Where To?'* https://www.un.org/en/un-chronicle/secretary-general%E2%80%99s-strategy-new-technologies-0

Hofferberth, M. (2019, April 24). *Tweeting to Save Succeeding Generations from the Scourge of War? The UN, Twitter and Communicative Action*. International Organizations and Digital Diplomacy: The EU, UN and NATO on Social Media, Halifax, Canada.

Hoffman, F. G. (2007). *Conflict in the 21st Century: The Rise of Hybrid Wars*. Potomac Institute for Policy Studies. https://www.potomacinstitute.org/images/stories/publications/potomac_hybridwar_0108.pdf

Hogenhout, L. (2021). *A Framework for Ethical AI at the United Nations*. United Nations Office of Information and Communications Techology. https://unite.un.org/sites/unite.un.org/files/unite_paper_-_ethical_ai_at_the_un.pdf

Hoijtink, M., & Leese, M. (2019). *Technology and Agency in International Relations* (1st edition). Routledge. https://doi.org/10.4324/9780429463143

Holmes, A. G. D. (2020). Researcher Positionality: A Consideration of Its Influence and Place in Qualitative Research. A New Researcher Guide. *Shanlax International Journal of Education*, *8*(4), 1–10.

Holmes, M., & Wheeler, N. J. (2020). Social Bonding in Diplomacy. *International Theory*, *12*(1), 133–161. https://doi.org/10.1017/S1752971919000162

Holmqvist, C. (2013). Undoing War: War Ontologies and the Materiality of Drone Warfare. *Millennium*, *41*(3), 535–552. https://doi.org/10.1177/0305829813483350

Holý, L., & Stuchlik, M. (1983). *Actions, Norms and Representations: Foundations of Anthropological Inquiry*. University Press.

Holzer, A., Kocher, B., Bendahan, S., Vonèche Cardia, I., Mazuze, J., & Gillet, D. (2020). *Gamifying Knowledge Sharing in Humanitarian Organisations: A Design Science Journey*. Palgrave Macmillan.

Höne, K. E. (2020). *The Future of (Multilateral) Diplomacy? Changes in Response to Covid-19 and Beyond* [Diplo Resource]. DiploFoundation. https://www.diplomacy.edu/resource/the-future-of-multilateral-diplomacy-changes-in-response-to-covid-19-and-beyond/

Hönke, J., & Cuesta-Fernandez, I. (2017). A Topolographical Approach to Infrastructure: Political Topography, Topology and the Port of Dar Es Salaam. *Environment and Planning D: Society and Space*, *35*(6), 1076–1095. https://doi.org/10.1177/0263775817707762

Hooi, R., & Cho, H. (2014). Avatar-Driven Self-Disclosure: The Virtual Me Is the Actual Me. *Computers in Human Behavior*, *39*, 20–28. https://doi.org/10.1016/j.chb.2014.06.019

Hopf, T. (2010). The Logic of Habit in International Relations. *European Journal of International Relations*, *16*(4), 539–561. https://doi.org/10.1177/1354066110363502

Howard, M. C., Gutworth, M. B., & Jacobs, R. R. (2021). A Meta-Analysis of Virtual Reality Training Programs. *Computers in Human Behavior*, *121*, 106808. https://doi.org/10.1016/j.chb.2021.106808

Hsu, E. B., Li, Y., Bayram, J. D., Levinson, D., Yang, S., & Monahan, C. (2013). State of Virtual Reality Based Disaster Preparedness and Response Training. *PloS Currents*, *5*. https://doi.org/10.1371/currents.dis.1ea2b2e71237d5337fa53982a38b2aff

Hu-Au, E., & Lee, J. J. (2017). Virtual Reality in Education: A Tool for Learning in the Experience Age. *International Journal Of Innovation In Education*, *4*(4), 215–226.

Hughes, T. P. (1987). The Evolution of Large Technological Systems. In W. E. Bijker, T. P. Hughes, & T. Pinch (Eds), *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology* (pp. 52–82).

Hunt, M., Pringle, J., Christen, M., Eckenwiler, L., Schwartz, L., & Davé, A. (2016). Ethics of Emergent Information and Communication Technology Applications in Humanitarian Medical Assistance. *International Health*, *8*(4), 239–245. https://doi.org/10.1093/inthealth/ihw028

Hutchison, E. (2016). *Affective Communities in World Politics: Collective Emotions after Trauma*. Cambridge University Press. https://doi.org/10.1017/CBO9781316154670

Huttar, C. M., & Brintzenhofe-Szoc, K. (2020). Virtual Reality and Computer Simulation in Social Work Education: A Systematic Review. *Journal of Social Work Education*, *56*(1), 131–141. https://doi.org/10.1080/10437797.2019.1648221

Iacono, S., Scaramuzzino, M., Martini, L., Panelli, C., Zolezzi, D., Perotti, M., Traverso, A., & Vercelli, G. V. (2024). Virtual Reality in Cultural Heritage: A Setup for Balzi Rossi Museum. *Applied Sciences*, *14*(9), Article 9. https://doi.org/10.3390/app14093562

Iazzolino, G. (2021). Infrastructure of Compassionate Repression: Making Sense of Biometrics in Kakuma Refugee Camp. *Information Technology for Development*, *27*(1), 111–128. https://doi.org/10.1080/02681102.2020.1816881

ICRC Innovation Unit. (2020a). *Review Article: The Current State of Virtual Reality on Behavior Change*. https://blogs.icrc.org/inspired/wp-content/uploads/sites/107/2019/10/Article-Review-VR-and-Behavior-Change.pdf

ICRC Innovation Unit. (2020b). Using Virtual Reality to Drive Public Engagement. *Inspired (ICRC Blog)*. https://blogs.icrc.org/inspired/2020/10/28/using-virtual-reality-to-drive-public-engagement/

IEEE Computer Society. (2023). *2024 IEEE International Conference on Artificial Intelligence and eXtended and Virtual Reality (AIxVR)*.

Ikebuchi, S. (2023). Accessing Education: Equity, Diversity, and Inclusion in Online Learning. *Canadian Journal of Learning and Technology*, *49*(1), Article 1. https://doi.org/10.21432/cjlt28349

Illouz, E. (2007). *Cold Intimacies: The Making of Emotional Capitalism* (1st edition). Polity Press.

Illouz, E. (2008). *Saving the Modern Soul: Therapy, Emotions, and the Culture of Self-Help* (1st edition). University of California Press.

ILO. (2019a). C190 Violence and Harassment Convention. *108th ILC Session*. Convention Concerning the Elimination of Violence and Harassment in the World of Work., Geneva. https://normlex.ilo.org/dyn/nrmlx_en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C190

ILO. (2019b). *ILO Centenary Declaration for the Future of Work*. ILO. https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed_norm/@relconf/documents/meetingdocument/wcms_711674.pdf

ILO. (2019c). *Work for a Brighter Future: ILO Global Commission on the Future of Work*. ILO. https://digitallibrary.un.org/record/3827525

ILO. (2020). *Broadening the Virtual World in Vocational Training: The Potential of Blockchain Technology in Skills Certification* [ILO/Cinterfor Notes No. 9]. https://www.cinterfor.org/sites/default/files/file_publicacion/Note9_eng_1.pdf

ILO. (2022). *End of Project Workshop: Decent Work in Garment Supply Chains Asia* [Experience and Knowledge sharing from the ILO- Sida project (2019-22)]. ILO Regional Office for Asia and the Pacific. https://www.ilo.org/resource/end-project-workshop-decent-work-garment-supply-chains-asia-experience-and

ILO. (2023a). *ILO Strategy on Knowledge and Innovation* (Governing Body Document No. GB.347/PFA/4). https://www.ilo.org/resource/gb/347/ilo-strategy-knowledge-and-innovation

ILO. (2023b, May 24). *Digitalization for Circular Economy and Green Jobs for Youth*. ILO News. https://www.ilo.org/resource/news/digitalization-circular-economy-and-green-jobs-youth

ILO. (2024a). *High-Level Evaluation of the ILO's Strategies and Approaches for the Development and Use of Labour Statistics for Promoting Decent Work and Social Justice, 2018-23*. ILO. https://www.ilo.org/sites/default/files/2024-10/HLE_Labour%20statistics_WEB%202024.pdf

ILO. (2024b, April 23). *Global Skills Forum*. https://www.ilo.org/meetings-and-events/global-skills-forum-1

ILO. (2024c, July 2). *Observatory on AI and Work in the Digital Economy*. https://www.ilo.org/artificial-intelligence-and-work-digital-economy

ILO and IFC. (2024). BetterWork. *Better Work*. https://betterwork.org/governance/

Inglis, D., & Thorpe, C. (2019). *An Invitation to Social Theory* (2nd edition). Polity.

International Committee of the Red Cross. (2023, April 27). The Mirror World: Step Inside the ICRC's Digital Twin [ICRC Blog. Data and Digitalizations.]. *Inspired: Innovation to Save Lifes and Defend Dignity*. https://blogs.icrc.org/inspired/2023/04/27/mirror-world-step-inside-icrc-digital-twin/

International Labour Organisation. (2020, February 13). 3D Learning with Virtual Reality. *Future of Work*. https://www.itcilo.org/innovation-day

Irom, B. (2018). Virtual Reality and the Syrian Refugee Camps: Humanitarian Communication and the Politics of Empathy. *International Journal of Communication*, *12*, 4269–4291.

Irom, B. (2021). Virtual Reality and Celebrity Humanitarianism: Rashida Jones in Lebanon. *Media, Culture & Society*, *44*(1), 88–104. https://doi.org/10.1177/01634437211022725

ITC-ILO. (2018). *Strategic Plan of the ITCILO for 2018-21: Capacity Development for the World of Work* [Strategic Plan]. ITC-ILO. https://www.itcilo.org/sites/default/files/inline-files/Strategic%20Plan_ENG_Final.pdf

ITC-ILO. (2020a). 3D Learning with Virtual Reality. *ITC-ILO Virtual Reality Projects*. https://appserver-d29569f7-nginx-7aae42dde6d241f0b1ed7f80b52bad80:11594/3d-learning-with-virtual-reality/

ITC-ILO. (2020b). Get Involved – ITC ILO VIRTUAL REALITY. *ITC-ILO Virtual Reality Projects*. https://virtualreality.itcilo.org/get-involved/

ITC-ILO. (2021a). *Programme and Budget Proposals of the ITCILO for 2022-23* [Programme and Budget (P&B) document]. ITC-ILO. https://www.itcilo.org/sites/default/files/inline-files/P%26B%20proposals%202022-23_EN-web.pdf

ITC-ILO. (2021b). Teleported from Your Chair. *ITC-ILO Stories*. https://www.itcilo.org/stories/teleported-from-your-chair

ITC-ILO. (2021c). *XR Expo 2021*. XR Expo 2021. https://readymag.website/3205486/

ITC-ILO (Director). (2021d, April 13). *TALLER VR UOCRA ILO sub* [Video recording]. https://vimeo.com/536312647/a0914e62b1

ITC-ILO. (2021e, April 13). The Power of VR for Adult Learning. *ITC-ILO Stories*. https://www.itcilo.org/stories/power-vr-adult-learning

ITC-ILO. (2021f, April 13). The Power of VR for Adult Learning. *Vocational Training*. https://www.itcilo.org/stories/power-vr-adult-learning

ITC-ILO. (2022, September 21). *Qatar and ILO Launch Virtual Reality Training Course for Labour Inspectors*. https://appserver-5d3b455f-nginx-c5cdac7f39a64b6cbb66fb3a6716d65e:15659/qatar-and-ilo-launch-virtual-reality-training-course-for-labour-inspectors/

ITC-ILO. (2023). *Programme and Budget proposals for 2024-25 International Training Centre of the International Labour Organization* [Programme and Budget (P&B) document]. ITC-ILO. https://www.itcilo.org/sites/default/files/inline-files/Programme%20%26%20Budget%202024-25_EN_web%20NEW.pdf

ITC-ILO. (2024a). *Innovation Lab*. https://www.itcilo.org/about/innovation-lab

ITC-ILO. (2024b). *Overview | ITCILO*. https://www.itcilo.org/about

ITC-ILO. (2024c). *Sustainable Learning and Knowledge Sharing Solutions: Digital Collaboration*.

ITC-ILO & Arthur Digital. (2023). *ITCILO x Arthur Technologies: VR for Immersive Learning & Training*.

ITU. (2024a). *ITU Focus Group on Metaverse (fg-mv)*. ITU. https://www.itu.int:443/en/ITU-T/focusgroups/mv/Pages/default.aspx

ITU. (2024b). *UN Virtual Worlds Day – Exhibition – Metaverse*. https://www.itu.int/metaverse/un-virtual-worlds-day/exhibition/

ITU. (2024c). *UN Virtual Worlds Day – Think-a-thon – Metaverse*. https://www.itu.int/metaverse/un-virtual-worlds-day/thinkathon/

ITU. (2024d). *UN Virtual Worlds Day – UN Projects – Metaverse*. https://www.itu.int/metaverse/un-virtual-worlds-day/un-projects/

ITU Standardization Sector. (2025). *Recommendation ITU-T F.740.9: Requirements for Enabling Virtual Reality Services Based on Internet Protocol Television Architecture* (SERIES F: Non-Telephone Telecommunication Services. Multimedia Services).

Ivanovitch, A. (2017a, October). Virtual Reality: The Frontier of Peacemaking. *Center for Empathy in International Affairs*.

Ivanovitch, A. (2017b, October). Virtual Reality: The Frontier of Peacemaking. *Center for Empathy in International Affairs*. https://www.centerforempathy.org/wp-content/uploads/2017/10/CEIA-Virtual-Reality-The-Frontier-of-Peacemaking.pdf

Jackson, E. L. (2016). Benches. In M. B. Salter, *Making Things International 2: Catalysts and Reactions* (pp. 79–91). University of Minnesota Press.

Jackson, P. T., & Nexon, D. H. (1999). Relations Before States: Substance, Process and the Study of World Politics. *European Journal of International Relations*, *5*(3), 291–332. https://doi.org/10.1177/1354066199005003002

Jacobsen, K. L. (2015a). Experimentation in Humanitarian Locations: UNHCR and Biometric Registration of Afghan Refugees. *Security Dialogue*, *46*(2), 144–164. https://doi.org/10.1177/0967010614552545

Jacobsen, K. L. (2015b). *The Politics of Humanitarian Technology: Good Intentions, Unintended Consequences and Insecurity*. Routledge.

Jacobsen, K. L., & Monsees, L. (2019). Co-Production: The Study of Productive Processes at the Level of Materiality and Discourse. In *Technology and Agency in International Relations* (1st edn, pp. 24–41). Routledge. https://doi.org/10.4324/9780429463143-2

Jamieson, M. K., Govaart, G. H., & Pownall, M. (2023). Reflexivity in Quantitative Research: A Rationale and Beginner's Guide. *Social and Personality Psychology Compass*, *17*(4), e12735. https://doi.org/10.1111/spc3.12735

Jammermann, M., & Tunc, B. E. (2022). The Potential of Gamification for Humanitarian Organizations to Support Integration in Migration Contexts. In *Handbook of Research on Cross-Disciplinary Uses of Gamification in Organizations* (pp. 381–397). IGI Global Scientific Publishing. https://doi.org/10.4018/978-1-7998-9223-6.ch018

Jasanoff, S. (2004). *States of Knowledge: The Co-Production of Science and Social Order*. Routledge. https://doi.org/10.4324/9780203413845

Jasanoff, S., & Kim, S.-H. (2009). Containing the Atom: Sociotechnical Imaginaries and Nuclear Power in the United States and South Korea. *Minerva*, *47*(2), 119. https://doi.org/10.1007/s11024-009-9124-4

Javaherirenani, R., Mortazavi, S. S., Shalbafan, M., Ashouri, A., & Farani, A. R. (2022). Virtual Reality Exposure and Response Prevention in the Treatment of Obsessive-Compulsive Disorder in Patients with Contamination Subtype in Comparison with in Vivo Exposure Therapy: A Randomized Clinical Controlled Trial. *BMC Psychiatry*, *22*(1), 740. https://doi.org/10.1186/s12888-022-04402-3

Jensen, L., & Konradsen, F. (2018). A Review of the Use of Virtual Reality Head-Mounted Displays in Education and Training. *Education and Information Technologies*, *23*(4), 1515–1529. https://doi.org/10.1007/s10639-017-9676-0

Johns, F. (2023). *#HELP: Digital Humanitarianism and the Remaking of International Order*. Oxford University Press.

Johnson, R. (2018). Hybrid War and Its Countermeasures: A Critique of the Literature. *Small Wars & Insurgencies*, *29*(1), 141–163. https://doi.org/10.1080/09592318.2018.1404770

Jonas, M., & Littig, B. (2017). International Practice Theories. In *Praxeological Political Analysis* (pp. 99–118). Routledge. https://doi.org/10.4324/9781315628479-13

Jones, P., & Osborne, T. (2022). *Virtual Reality Methods: A Guide for Researchers in the Social Sciences and Humanities.* (1st edition). Policy Press. https://doi.org/10.56687/9781447360773

Jones, P., Osborne, T., Sullivan-Drage, C., Keen, N., & Gadsby, E. (2022). Working with Social Vr. In *Virtual Reality Methods* (pp. 75–97). Policy Press. https://doi.org/10.51952/9781447360773.ch004

Jones, S., Dawkins, S., & McDougall, J. (2022). *Understanding Virtual Reality: Challenging Perspectives for Media Literacy and Education*. Routledge. https://doi.org/10.4324/9780367337032

Jönsson, C., & Hall, M. (2003). Communication: An Essential Aspect of Diplomacy. *International Studies Perspectives*, *4*(2), 195–210. https://doi.org/10.1111/1528-3577.402009

Jony, A. I., & Hamim, S. A. (2024). Empowering Virtual Collaboration: Harnessing AI for Enhanced Teamwork in Higher Education. *Educational Technology Quarterly*, *2024*(3), 337–359. https://doi.org/10.55056/etq.746

Jouriles, E. N., McDonald, R., Kullowatz, A., Rosenfield, D., Gomez, G. S., & Cuevas, A. (2009). Can Virtual Reality Increase the Realism of Role Plays Used to Teach College Women Sexual Coercion and Rape-Resistance Skills? *Behavior Therapy*, *40*(4), 337–345. https://doi.org/10.1016/j.beth.2008.09.002

Jouriles, E. N., Simpson Rowe, L., McDonald, R., Platt, C. G., & Gomez, G. S. (2011). Assessing Women's Responses to Sexual Threat: Validity of a Virtual Role-Play Procedure. *Behavior Therapy*, *42*(3), 475–484. https://doi.org/10.1016/j.beth.2010.11.005

Juma, C. (2005). *Innovation: Applying Knowledge in Development*. Earthscan.

Kaghan, W. N., & Bowker, G. C. (2001). Out of Machine Age? Complexity, Sociotechnical Systems and Actor Network Theory. *Journal of Engineering and Technology Management*, *18*(3), 253–269. https://doi.org/10.1016/S0923-4748(01)00037-6

Kaiser, R., Spiegel, P. B., Henderson, A. K., & Gerber, M. L. (2003). The Application of Geographic Information Systems and Global Positioning Systems in Humanitarian Emergencies: Lessons Learned, Programme Implications and Future Research. *Disasters*, *27*(2), 127–140. https://doi.org/10.1111/1467-7717.00224

Kalpokas, I., & Kalpokienė, J. (2023). *Regulating the Metaverse: A Critical Assessment* (First edition). Routledge.

Kaltofen, C. (2018a). : International relations in dialogue with the posthuman – a human account. In *Posthuman Dialogues in International Relations*. Routledge.

Kaltofen, C. (2018b). With a Posthuman Touch: International Relations in Dialogue with the Posthuman – a Human Account. In E. Cudworth, E. Kavalski, & S. Hobden (Eds), *Posthuman Dialogues in International Relations* (1st edition, pp. 32–51). Routledge. https://doi.org/10.4324/9781315613475-3

Kaltofen, C., & Acuto, M. (2018a). Rebalancing the Encounter between Science Diplomacy and International Relations Theory. *Global Policy*, *9*(3), 15–22. https://doi.org/10.1111/1758-5899.12620

Kaltofen, C., & Acuto, M. (2018b). Science Diplomacy: Introduction to a Boundary Problem. *Global Policy*, *9*(S3), 8–14. https://doi.org/10.1111/1758-5899.12621

Kaneva, N., Dolea, A., & Manor, I. (2023). Public Diplomacy and Nation Branding in the Wake of the Russia–Ukraine War. *Place Branding and Public Diplomacy*, *19*(2), 185–189. https://doi.org/10.1057/s41254-022-00293-z

Kaniadakis, A. (2012). ERP Implementation as a Broad Socio-Economic Phenomenon: The Agora of Techno-Organisational Change. *Information Technology & People (West Linn, Or.)*, *25*(3), 259–280. https://doi.org/10.1108/09593841211254321

Kapur, D. (2002). Processes of Change in International Organizations. In D. Nayyar, *Governing Globalization: Issues and Institutions* (pp. 334–355). Oxford University Press.

Kardong-Edgren, S., Farra, S. L., Alinier, G., & Young, H. M. (2019). A Call to Unify Definitions of Virtual Reality. *Clinical Simulation in Nursing*, *31*, 28–34. https://doi.org/10.1016/j.ecns.2019.02.006

Karlsrud, J., & Rosén, F. (2013). In the Eye of the Beholder? The UN and the Use of Drones to Protect Civilians. *Stability: International Journal of Security and Development*, *2*(2), Art. 27. https://doi.org/10.5334/sta.bo

Kattel, R., Drechsler, W., & Karo, E. (2019). *Innovation Bureaucracies: How Agile Stability Creates the Entrepreneurial State* (Working Paper Series: IIPP WP 2019-12). UCL Institute for Innovation and Public Purpose. https://discovery.ucl.ac.uk/id/eprint/10195937

Katz Cogan, J., Hurd, I., & Johnstone, I. (with Hurd, I., Johnstone, I., & Katz Cogan, J.). (2016). *The Oxford Handbook of International Organizations* (1st edn). University Press. https://doi.org/10.1093/law/9780199672202.001.0001

Keating, V. C., & Ruzicka, J. (2014). Trusting Relationships in International Politics: No Need to Hedge. *Review of International Studies*, *40*(4), 753–770. https://doi.org/10.1017/S0260210514000059

Kelle, U. (2007). The Development of Categories: Different Approaches in Grounded Theory. In K. Charmaz & A. Bryant, *The SAGE Handbook of Grounded Theory*. SAGE Publications Ltd. https://doi.org/10.4135/9781848607941

Kello, L. (2013). The Meaning of the Cyber Revolution: Perils to Theory and Statecraft. *International Security*, *38*(2), 7–40.

Kello, L. (2023). The State in the Digital Era: Supreme or in Decline? In C. Bjola & M. Kornprobst, *Digital International Relations* (pp. 51–72). Routledge.

Kelman, S. (2021). *Bureaucracies as Innovative Organizations* (SSRN Scholarly Paper No. 3859719). Social Science Research Network. https://doi.org/10.2139/ssrn.3859719

Kemp, R., Schot, J., & Hoogma, R. (1998). Regime Shifts to Sustainability Through Processes of Niche Formation: The Approach of Strategic Niche Management. *Technology Analysis & Strategic Management*, *10*(2), 175–198. https://doi.org/10.1080/09537329808524310

Kendall, G. (2004). Global Networks, International Networks, Actor Networks. In W. Larner & W. Walters (Eds), *Global Governmentality: Governing International Spaces* (pp. 59–75). Routledge. http://www.routledge.com/9780415406802

Kendall, G., & Wickham, G. (1999). *Using Foucault's Methods*. SAGE Publications Ltd. https://doi.org/10.4135/9780857020239

Kenwright, B. (2019, January 14). Virtual Reality: Ethical Challenges and Dangers. *IEEE SSIT Technology and Society*. https://technologyandsociety.org/virtual-reality-ethical-challenges-and-dangers/

Keohane, R. O., & Nye, J. S. (1977). *Power and Interdependence*. Little, Brown and Company.

Kessler, O. (2011). Beyond Sectors, Before the World: Finance, Security and Risk. *Security Dialogue*, *42*(2), 197–215. https://doi.org/10.1177/0967010611400775

Khanna, J., Lee, A. S., & Kalantari, S. (2025). The Mediating Role of Technology Affordances in Virtual Reality Perspective-Taking: A Systematic Literature Review. *Virtual Reality: The Journal of the Virtual Reality Society*, *29*(2), Article no. 66. https://doi.org/10.1007/s10055-024-01095-9

Khelifa, K. B. (Director). (2017). *The Enemy* [I-documentary; VR]. Lucid Realities Studio.

Kim, D., & Jo, D. (2022). Effects on Co-Presence of a Virtual Human: A Comparison of Display and Interaction Types. *Electronics (Basel)*, *11*(3). https://doi.org/10.3390/electronics11030367

Ki-moon, B. (2016). *One Humanity, Shared Responsibility: Report of the Secretary-General for the World Humanitarian Summit* (No. A/70/709). UN General Assembly. https://sgreport.worldhumanitariansummit.org/

Kitchin, R. (2017). Thinking Critically About and Researching Algorithms. *Information, Communication & Society*, *20*(1), 14–29. https://doi.org/10.1080/1369118X.2016.1154087

Kitchin, R., & Dodge, M. (2011). *Code/Space: Software and Everyday Life* (1st edition). MIT Press.

Klemens, B. (2022, January 6). I Spent Hundreds of Hours Working in VR. Here's What I Learned. *Wired*. https://www.wired.com/story/hours-working-vr-tips/

Knorr-Cetina, K. (2009). The Synthetic Situation: Interactionism for a Global World. *Symbolic Interaction*, *32*(1), 61–87. https://doi.org/10.1525/si.2009.32.1.61

Koch, G. (2022). Cities, Regions, and Landscapes as Augmented Realities: Refiguration of Space(s) Through Digital Information Technologies. In G. B. Christmann, H. Knoblauch, & M. Löw, *Communicative Constructions and the Refiguration of Spaces: Theoretical Approaches and Empirical Studies* (pp. 76–88). Taylor & Francis. https://doi.org/10.4324/9780367817183

Koddenbrock, K. J. (2015). Strategies of Critique in International Relations: From Foucault and Latour Towards Marx. *European Journal of International Relations*, *21*(2), 243–266. https://doi.org/10.1177/1354066114538854

Kohler, P. M. (2020). *Science Advice and Global Environmental Governance: Expert Institutions and the Implementation of International Environmental Treaties*. Anthem Press.

Kool, H. (2016). The Ethics of Immersive Journalism: A Rhetorical Analysis of News Storytelling with Virtual Reality Technology. *Intersect: The Stanford Journal of Science, Technology, and Society*, *9*(3), Article 3. https://ojs.stanford.edu/ojs/index.php/intersect/article/view/871

Kostakos, P., Alavesa, P., Oppenlaender, J., & Hosio, S. (2019). *VR Ethnography: A Pilot Study on the Use of Virtual Reality 'Go-Along' Interviews in Google Street View*. *Article No. 53*, 1–5. https://doi.org/10.1145/3365610.3368422

Kourtesis, P., Collina, S., Doumas, L. A. A., & MacPherson, S. E. (2019). Validation of the Virtual Reality Neuroscience Questionnaire: Maximum Duration of Immersive Virtual Reality Sessions Without the Presence of Pertinent Adverse Symptomatology. *Frontiers in Human Neuroscience*, *13*, Article 417. https://doi.org/10.3389/fnhum.2019.00417

Kozinets, R. V. (2015). *Netnography: Redefined* (Second edition). SAGE.

Krokos, E., Plaisant, C., & Varshney, A. (2019). Virtual Memory Palaces: Immersion Aids Recall. *Virtual Reality: The Journal of the Virtual Reality Society*, *23*(1), 1–15. https://doi.org/10.1007/s10055-018-0346-3

Kulkov, I., Kulkova, J., Rohrbeck, R., Menvielle, L., Kaartemo, V., & Makkonen, H. (2024). Artificial Intelligence-driven Sustainable Development: Examining Organizational, Technical, and

Processing Approaches to Achieving Global Goals. *Sustainable Development*, *32*(3), 2253–2267. https://doi.org/10.1002/sd.2773

Kunitake, Y. (2023, May). *The Potential of Virtual Reality for the SDGs: Infrastructure Development through Content and Cultural Policies*. 8th United Nations Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals (STI Forum 2023).

Kustermans, J. (2016). Parsing the Practice Turn: Practice, Practical Knowledge, Practices. *Millennium*, *44*(2), 175–196. https://doi.org/10.1177/0305829815613045

Kyrlitsias, C., & Michael-Grigoriou, D. (2022). Social Interaction With Agents and Avatars in Immersive Virtual Environments: A Survey. *Frontiers in Virtual Reality*, *2*, 786665. https://doi.org/10.3389/frvir.2021.786665

Labadze, L., Grigolia, M., & Machaidze, L. (2023). Role of AI Chatbots in Education: Systematic Literature Review. *International Journal of Educational Technology in Higher Education*, *20*(1), Article No. 56. https://doi.org/10.1186/s41239-023-00426-1

Lanham, R. A. (2006). *The Economics of Attention: Style and Substance in the Age of Information*. University of Chicago Press.

Latour, B. (1987). *Science in Action: How to Follow Scientists and Engineers Through Society*. Harvard University Press.

Latour, B. (1988). *The Pasteurization of France*. Harvard University Press.

Latour, B. (1990). Technology is Society Made Durable. *The Sociological Review (Keele)*, *38*(1_suppl), 103–131. https://doi.org/10.1111/j.1467-954X.1990.tb03350.x

Latour, B. (1992). Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts. In W. E. Bijker & J. Law, *Shaping Technology/Building Society: Studies in Sociotechnical Change* (pp. 151–180). MIT Press.

Latour, B. (1996a). *Aramis, or, the Love of Technology*. Harvard University Press.

Latour, B. (1996b). On Actor-Network Theory: A Few Clarifications. *Soziale Welt*, *47*(4), 369–381.

Latour, B. (1999). On Recalling ANT. *The Sociological Review (Keele)*, *47*(1_suppl), 15–25. https://doi.org/10.1111/j.1467-954X.1999.tb03480.x

Latour, B. (2005). *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford University Press.

Latour, B. (with Porter, C.). (2011). *We Have Never Been Modern*. Harvard University Press.

Latour, B., & Woolgar, S. (1986). *Laboratory Life: The Construction of Scientific Facts*. Princeton University Press.

Law, J. (1991). *A Sociology of Monsters: Essays on Power, Technology and Domination*. Routledge.

Law, J. (1992). Notes on the Theory of the Actor-Network: Ordering, Strategy, and Heterogeneity. *Systems Practice*, *5*(4), 379–393. https://doi.org/10.1007/BF01059830

Law, J. (1994). *Organizing Modernity*. Blackwell.

Law, J. (2004). *After Method: Mess in Social Science Research*. Routledge.

Law, J. (2006). Disaster in Agriculture: Or Foot and Mouth Mobilities. *Environment and Planning. A*, *38*(2), 227–239. https://doi.org/10.1068/a37273

Law, J. (2008). Actor Network Theory and Material Semiotics. In *The New Blackwell Companion to Social Theory* (pp. 141–158). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781444304992.ch7

Law, J. (2017). STS as Method. In U. Felt, R. Fouché, C. A. Miller, & L. Smith-Doerr (Eds), *The Handbook of Science and Technology Studies* (pp. 31–58). MIT Press. http://heterogeneities.net/publications/Law2015STSAsMethod.pdf

Law, J., & Callon, M. (1992). The Life and Death of an Aircraft: A Network Analysis of Technical Change. In W. E. Bijker & J. Law, *Shaping Technology/Building Society: Studies in Sociotechnical Change* (pp. 21–52). MIT Press.

Law, J., & Hassard, J. (1999). *Actor Network Theory and After*. Blackwell.

Law, J., & Mol, A. (2001). Situating Technoscience: An Inquiry into Spatialities. *Environment and Planning D: Society & Space*, *19*(5), 609–621. https://doi.org/10.1068/d243t

Law, J., & Singleton, V. (2013). ANT and Politics: Working in and on the World. *Qualitative Sociology*, *36*(4), 485–502. https://doi.org/10.1007/s11133-013-9263-7

Leander, A. (2018). International Relations Expertise at the Interstices of Fields and Assemblages. In A. Gofas, I. Hamati-Ataya, & N. Onuf (Eds), *The SAGE Handbook of the History, Philosophy and Sociology of International Relations* (pp. 386–398). SAGE Publications.

Leder, J., Horlitz, T., Puschmann, P., Wittstock, V., & Schuetz, A. (2018). Comparing Immersive Virtual Reality and PowerPoint as Methods for Delivering Safety Training: Impacts on Risk Perception, Learning, and Decision Making. *Safety Science*, *111*, 271–286. https://doi.org/10.1016/j.ssci.2018.07.021

Lee, J. J., & Elliot, H.-A. (2021). E3XR: An Analytical Framework for Ethical, Educational and Eudaimonic XR Design. *Frontiers in Virtual Reality*, *2*, 697667. https://doi.org/10.3389/frvir.2021.697667

Lehikko, A., Nykänen, M., & Ruokamo, H. (2025). Previous VR Experience Increases Embodiment in Immersive VR Safety Training: An Exploratory Mixed-Methods Study. *Virtual Reality*, *29*(3), 1–21. https://doi.org/10.1007/s10055-025-01196-z

Leser, J., Bareither, C., & Macdonald, S. (2024). Populist Truth-Making: A Conceptual Approach to Populism in the Context of European Museums. *International Journal of Heritage Studies*, *31*(0), 487–499. https://doi.org/10.1080/13527258.2024.2443900

Li, O., Pan, Z., Qiu, H., & Qian, D. (2024). How Virtual Reality Can Increase Effectiveness of Prosocial Advertising: Put Yourself in the Donee's Shoes: The Effect of Virtual Reality on Charitable Donations. *Journal of Advertising Research*, *64*(2), 229–244. https://doi.org/10.2501/JAR-2024-011

Li, X., Yi, W., Chi, H.-L., Wang, X., & Chan, A. P. C. (2018). A Critical Review of Virtual and Augmented Reality (AR/VR) Applications in Construction Safety. *Automation in Construction*, *86*, 150–162. https://doi.org/10.1016/j.autcon.2017.11.003

Lidskog, R., & Sundqvist, G. (2002). The Role of Science in Environmental Regimes: The Case of LRTAP. *European Journal of International Relations*, *8*(1), 77–101. https://doi.org/10.1177/1354066102008001003

Lidskog, R., & Sundqvist, G. (2015). When Does Science Matter? International Relations Meets Science and Technology Studies. *Global Environmental Politics*, *15*(1), 1–20. https://doi.org/10.1162/GLEP_a_00269

Lim, S., Schmälzle, R., & Bente, G. (2025). Artificial Social Influence Via Human-Embodied AI Agent Interaction in Immersive Virtual Reality (VR): Effects of Similarity-Matching During Health Conversations. *Computers in Human Behavior: Artificial Humans*, *5*, 100172. https://doi.org/10.1016/j.chbah.2025.100172

Linden Lab. (2003). *Second Life*. Linden Lab. https://lindenlab.com/

Lindgren, R., & Johnson-Glenberg, M. (2013). Emboldened by Embodiment: Six Precepts for Research on Embodied Learning and Mixed Reality. *Educational Researcher*, *42*(8), 445–452. https://doi.org/10.3102/0013189X13511661

Lisle, D. (2016). The Yellow Car. In M. B. Salter, *Making Things International 2: Catalysts and Reactions* (pp. 181–194). University of Minnesota Press.

Littenberg-Tobias, J., & Reich, J. (2020). Evaluating Access, Quality, and Equity in Online Learning: A Case Study of a MOOC-Based Blended Professional Degree Program. *The Internet and Higher Education*, *47*, 100759. https://doi.org/10.1016/j.iheduc.2020.100759

Littoz-Monnet, A. (2017). *The Politics of Expertise in International Organizations: How International Bureaucracies Produce and Mobilize Knowledge* (1st ed.). Routledge. https://doi.org/10.4324/9781315542386

Liu, Q., Wang, Y., Tang, Q., & Liu, Z. (2020). Do You Feel the Same as I Do? Differences in Virtual Reality Technology Experience and Acceptance Between Elderly Adults and College Students. *Frontiers in Psychology*, *11*, Article 573673. https://doi.org/10.3389/fpsyg.2020.573673

Liu, X. (2018). Interviewing Elites: Methodological Issues Confronting a Novice. *International Journal of Qualitative Methods*, *17*(1), 1609406918770323. https://doi.org/10.1177/1609406918770323

Lombard, M., Biocca, F., Freeman, J., IJsselsteijn, W. A., & Schaevitz, R. J. (2015). *Immersed in Media: Telepresence Theory, Measurement & Technology*. Springer.

Lombard, M., & Ditton, T. (1997). At the Heart of It All: The Concept of Presence. *Journal of Computer-Mediated Communication*, *3*(2), JCMC321. https://doi.org/10.1111/j.1083-6101.1997.tb00072.x

Louie, A. K., Coverdale, J. H., Balon, R., Beresin, E. V., Brenner, A. M., Guerrero, A. P. S., & Roberts, L. W. (2018). Enhancing Empathy: A Role for Virtual Reality? *Academic Psychiatry*, *42*(6), 747–752. https://doi.org/10.1007/s40596-018-0995-2

Lovell, H. (2022). Networks. In L. Lovell, *Understanding Energy Innovation: Learning from Smart Grid Experiments* (pp. 17–36). Palgrave Macmillan, Singapore. https://doi.org/10.1007/978-981-16-6253-9_2

Lucas, G. M., Gratch, J., King, A., & Morency, L.-P. (2014). It's Only a Computer: Virtual Humans Increase Willingness to Disclose. *Computers in Human Behavior*, *37*, 94–100. https://doi.org/10.1016/j.chb.2014.04.043

Mabrook, R. (2019). *Virtual Reality and Journalistic Culture: An Actor-Network Theory Approach* [Unpublished Doctoral thesis]. City, University of London.

Mabrook, R., & Singer, J. B. (2019). Virtual Reality, 360° Video, and Journalism Studies: Conceptual Approaches to Immersive Technologies. *Journalism Studies (London, England)*, *20*(14), 2096–2112. https://doi.org/10.1080/1461670X.2019.1568203

Mac Ginty, R. (2017). A Material Turn in International Relations: The 4x4, Intervention and Resistance. *Review of International Studies*, *43*(5), 855–874. https://doi.org/10.1017/S0260210517000146

Madary, M., & Metzinger, T. K. (2016a). Real Virtuality: A Code of Ethical Conduct. Recommendations for Good Scientific Practice and the Consumers of VR-Technology. *Frontiers in Robotics and AI*, *3*. https://doi.org/10.3389/frobt.2016.00003

Madary, M., & Metzinger, T. K. (2016b). Real Virtuality: A Code of Ethical Conduct. Recommendations for Good Scientific Practice and the Consumers of VR-Technology. *Frontiers in Robotics and AI*, *3*, Article No. 3. https://doi.org/10.3389/frobt.2016.00003

Madianou, M. (2019). Technocolonialism: Digital Innovation and Data Practices in the Humanitarian Response to Refugee Crises. *Social Media + Society*, *5*(3). https://doi.org/10.1177/2056305119863146

Mado, M., Herrera, F., Nowak, K., & Bailenson, J. (2021). Effect of Virtual Reality Perspective-Taking on Related and Unrelated Contexts. *Cyberpsychology, Behavior and Social Networking*, *24*(12), 839–845. https://doi.org/10.1089/cyber.2020.0802

Madonik, B. G. (2001). *I Hear What You Say, but What Are You Telling Me?: The Strategic Use of Nonverbal Communication in Mediation*. Jossey-Bass.

Mager, A. (2009). Mediated Health: Sociotechnical Practices of Providing and Using Online Health Information. *New Media & Society*, *11*(7), 1123–1142. https://doi.org/10.1177/1461444809341700

Maister, L., Slater, M., Sanchez-Vives, M. V., & Tsakiris, M. (2014). Changing Bodies Changes Minds: Owning Another Body Affects Social Cognition. *Trends in Cognitive Sciences*, *19*(1), 6–12. https://doi.org/10.1016/j.tics.2014.11.001

Majumdar, P., Biswas, A., & Sahu, S. (2020). Covid-19 Pandemic and Lockdown: Cause of Sleep Disruption, Depression, Somatic Pain, and Increased Screen Exposure of Office Workers and Students of India. *Chronobiology International*, *37*(8), 1191–1200. https://doi.org/10.1080/07420528.2020.1786107

Makransky, G., Borre-Gude, S., & Mayer, R. E. (2019). Motivational and Cognitive Benefits of Training in Immersive Virtual Reality Based on Multiple Assessments. *Journal of Computer Assisted Learning*, *35*(6), 691–707. https://doi.org/10.1111/jcal.12375

Makransky, G., & Petersen, G. B. (2021). The Cognitive Affective Model of Immersive Learning (CAMIL): A Theoretical Research-Based Model of Learning in Immersive Virtual Reality. *Educational Psychology Review*, *33*(3), 937–958. https://doi.org/10.1007/s10648-020-09586-2

Malik, R. (with Sharma, A., & Chaudhary, P.). (2024). *Transforming Education with Virtual Reality* (1st ed.). John Wiley & Sons. https://doi.org/10.1002/9781394200498

Maloney, D., & Freeman, G. (2020). Falling Asleep Together: What Makes Activities in Social Virtual Reality Meaningful to Users. *Proceedings of the Annual Symposium on Computer-Human Interaction in Play*, 510–521. https://doi.org/10.1145/3410404.3414266

Mandela, S. (2024). Virtual Reality as a Tool for Immersive Journalism. *Journal of Communication*, *5*(3), Article 3. https://doi.org/10.47941/jcomm.1982

Mangla, S. K., Kazancoglu, Y., Ekinci, E., Liu, M., Özbiltekin, M., & Sezer, M. D. (2021). Using System Dynamics to Analyze the Societal Impacts of Blockchain Technology in Milk Supply Chainsrefer. *Transportation Research Part E: Logistics and Transportation Review*, *149*, 102289. https://doi.org/10.1016/j.tre.2021.102289

Manor, I. (2020). Reconceptualising and Measuring Online Prestige in IOs: Towards a Theory of Prestige Mobility. In *Digital Diplomacy and International Organisations*. Routledge.

Manovich, L. (2013). *Software Takes Command: Extending the Language of New Media*. Bloomsbury. https://doi.org/10.5040/9781472544988

Mantelli, A. (2021a). Learning Japanese through VR Technology. The Case of *Altspace VR*. *Annali Di Ca' Foscari. Serie Orientale*, *1*, JournalArticle_5503. https://doi.org/10.30687/AnnOr/2385-3042/2021/01/024

Mantelli, A. (2021b). Learning Japanese through VR Technology. The Case of *Altspace VR*. *Annali Di Ca' Foscari. Serie Orientale*, *1*, JournalArticle_5503. https://doi.org/10.30687/AnnOr/2385-3042/2021/01/024

Mark Duffield. (2013). *Disaster-Resilience in the Network Age Access-Denial and the Rise of Cyber-Humanitarianism*. Danish Institute for International Studies. https://www.jstor.org/stable/resrep13344?pq-origsite=summon

Market.us, & Pangarkar, T. (2025, January 13). Virtual Reality Statistics and Facts (2025). *Market.Us Scoop*. https://scoop.market.us/virtual-reality-statistics/

Markowitz, D. M., Laha, R., Perone, B. P., Pea, R. D., & Bailenson, J. N. (2018). Immersive Virtual Reality Field Trips Facilitate Learning About Climate Change. *Frontiers in Psychology*, *9*, 2364–2364. https://doi.org/10.3389/fpsyg.2018.02364

Marres, N. (2017). *Digital Sociology: The Reinvention of Social Research*. Polity Press.

Martey, R. M., Kenski, K., Folkestad, J., Feldman, L., Gordis, E., Shaw, A., Stromer-Galley, J., Clegg, B., Zhang, H., Kaufman, N., Rabkin, A. N., Shaikh, S., & Strzalkowski, T. (2014). Measuring Game Engagement: Multiple Methods and Construct Complexity. *Simulation & Gaming*, *45*(4–5), 528–547. https://doi.org/10.1177/1046878114553575

Martínez-Cano, F.-J., Lachman, R., & Canet, F. (2023). VR Content and Its Prosocial Impact: Predictors, Moderators, and Mediators of Media Effects. A Systematic Literature Review. *Frontiers in Communication*, *8*, 1203242. https://doi.org/10.3389/fcomm.2023.1203242

Maru, Y. T., Sparrow, A., Butler, J. R. A., Banerjee, O., Ison, R., Hall, A., & Carberry, P. (2018). Towards Appropriate Mainstreaming of "Theory of Change" Approaches into Agricultural Research for Development: Challenges and Opportunities. *Agricultural Systems*, *165*, 344–353. https://doi.org/10.1016/j.agsy.2018.04.010

Maschio, T. (2017). *Storyliving: An Ethnographic Study of How Audiences Experience VR and What That Means for Journalists* (Google News Lab). Google. https://newslab.withgoogle.com/assets/docs/storyliving-a-study-of-vr-in-journalism.pdf

Maselli, A., & Slater, M. (2013). The Building Blocks of the Full Body Ownership Illusion. *Frontiers in Human Neuroscience*, *7*, 83–83. https://doi.org/10.3389/fnhum.2013.00083

Mason, J. (2002). *Qualitative Researching* (2nd ed.). Sage.

Mateer, J. (2017). Directing for Cinematic Virtual Reality: How the traditional film director's craft applies to immersive environments and notions of presence. *Journal of Media Practice*, *18*(1), 14–25. https://doi.org/10.1080/14682753.2017.1305838

Mathysen, D., & Glorieux, I. (2021). Integrating Virtual Reality in Qualitative Research Methods: Making a Case for the VR-Assisted Interview. *Methodological Innovations*, *14*(2), 20597991211030778. https://doi.org/10.1177/20597991211030778

Maupain, F. (2013). *The Future of the International Labour Organization in the Global Economy*. Bloomsbury Publishing.

Mayer, M. (2012). Chaotic Climate Change and Security. *International Political Sociology*, *6*(2), 165–185. https://doi.org/10.1111/j.1749-5687.2012.00157.x

Mayer, M. (2019). IR'S Constitutive Absence and the Promise of STAIR. In J. P. Singh, M. Carr, & R. Marlin-Bennett (Eds), *Science, Technology, and Art in International Relations*. Routledge.

Mayer, M., & Acuto, M. (2015). The Global Governance of Large Technical Systems. *Millennium*, *43*(2), 660–683. https://doi.org/10.1177/0305829814561540

Mazzucato, M. (2013). *The Entrepreneurial State: Debunking Public Vs. Private Sector Myths*. Anthem Press.

Mazzucato, M., & Kattel, R. (2018). Mission-Orientated Innovation Policy and Dynamic Capabilities in the Public Sector. *Industrial and Corporate Change*, *27*(5). https://doi.org/10.1093/icc/dty032

McBride, N. (2003). Actor-Network Theory and the Adoption of Mobile Communications. *Geography*, *88*(4), 266–276.

McCarthy, D. R. (2017). *Technology and World Politics: An Introduction* (1st edition). Routledge.

McGreal, C. (2015, September 7). 70 Years and Half a Trillion Dollars Later: What Has the Un Achieved? *The Guardian*. https://www.theguardian.com/world/2015/sep/07/what-has-the-un-achieved-united-nations

McKenna, K. Y. A., & Bargh, J. A. (2000). Plan 9 From Cyberspace: The Implications of the Internet for Personality and Social Psychology. *Personality and Social Psychology Review*, *4*(1), 57–75. https://doi.org/10.1207/S15327957PSPR0401_6

McKibbin, W. J., & Fernando, R. (2020). *The Global Macroeconomic Impacts of COVID-19: Seven Scenarios* (SSRN Scholarly Paper No. 3547729). https://doi.org/10.2139/ssrn.3547729

McMaster, T., Vidgen, R. T., & Wastell, D. G. (1997). Technology Transfer: Diffusion or Translation? In T. McMaster, E. Mumford, E. B. Swanson, B. Warboys, & D. Wastell (Eds), *Facilitating Technology Transfer Through Partnership: Learning from Practice and Research* (pp. 64–75). Springer US. https://doi.org/10.1007/978-0-387-35092-9_4

McVeigh-Schultz, J., & Isbister, K. (2021a). The Case for 'Weird Social' in VR/XR: A Vision of Social Superpowers Beyond Meatspace. In *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems* (pp. 1–10). Association for Computing Machinery. https://doi.org/10.1145/3411763.3450377

McVeigh-Schultz, J., & Isbister, K. (2021b). The Case for 'Weird Social' in VR/XR: A Vision of Social Superpowers Beyond Meatspace. In *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems* (pp. 1–10). Association for Computing Machinery. https://doi.org/10.1145/3411763.3450377

McVeigh-Schultz, J., Kolesnichenko, A., & Isbister, K. (2019). Shaping Pro-Social Interaction in VR: An Emerging Design Framework. *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*, 1–12. https://doi.org/10.1145/3290605.3300794

McVeigh-Schultz, J., Márquez Segura, E., Merrill, N., & Isbister, K. (2018). *What's It Mean to 'Be Social' in VR?: Mapping the Social VR Design Ecology*. 289–294. https://doi.org/10.1145/3197391.3205451

Mehdiyev, N. (2025). Virtual Reality and International Diplomacy. *Baltic Journal of Legal and Social Sciences*, *2*, Article 2. https://doi.org/10.30525/2592-8813-2025-2-25

Meier, P. (2015). *Digital Humanitarians: How Big Data Is Changing the Face of Humanitarian Response* (1st edition). CRC Press. https://doi.org/10.1201/b18023

Meng, K., & Xiao, J. J. (2023). Digital Finance and Happiness: Evidence from China. *Information Technology for Development*, *29*(1), 151–169. https://doi.org/10.1080/02681102.2022.2097622

Mercer, J. (2005). Rationality and Psychology in International Politics. *International Organization*, *59*(1), 77–106. https://doi.org/10.1017/S0020818305050058

Mercer, J. (2010). Emotional Beliefs. *International Organization*, *64*(1), 1–31. https://doi.org/10.1017/S0020818309990221

Meta. (2024a). *Meta Quest 2 Controllers*. https://www.meta.com/it/en/quest/accessories/quest-2-controllers/

Meta. (2024b). *Meta Quest VR Headsets, Accessories and Equipment*. Meta. https://www.meta.com/it/en/quest/

Meta. (2024c). *What Is Spatial Audio?* [Work Portfolio Blog]. Meta for Work. https://forwork.meta.com/it/en/blog/spatial-audio/

Meyer, J. W., Boli, J., Thomas, G. M., & Ramirez, F. O. (1997). World Society and the Nation-State. *American Journal of Sociology*, *103*(1), 144–181. https://doi.org/10.1086/231174

Michael, M. (2017). *Actor-Network Theory: Trials, Trails and Translations* (1st edition). SAGE Publications Ltd.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2020). *Qualitative Data Analysis: A Methods Sourcebook* (4th edition). SAGE.

Milk, C. (Director). (2015). *How Virtual Reality Can Create the Ultimate Empathy Machine* [Video recording]. https://www.ted.com/talks/chris_milk_how_virtual_reality_can_create_the_ultimate_empathy_machine

Millennium Art. (2022, February 1). *Thousands Unite from Around the World for the Launch of #ActNowVR in the Metaverse*. EIN News Presswire. https://www.einnews.com/pr_news/561963109/thousands-unite-from-around-the-world-for-the-launch-of-actnowvr-in-the-metaverse

Miller, M. R., Herrera, F., Jun, H., Landay, J. A., & Bailenson, J. (2020). Personal Identifiability of User Tracking Data During Observation of 360-Degree VR Video. *Scientific Reports*, *10*(1), 17404. https://doi.org/10.1038/s41598-020-74486-y

Mills, J., Bonner, A., & Francis, K. (2006). The Development of Constructivist Grounded Theory. *International Journal of Qualitative Methods*, *5*(1), 25–35. https://doi.org/10.1177/160940690600500103

Miremadi, T. (2016). *A Model for Science and Technology Diplomacy: How to Align the Rationales of Foreign Policy and Science* (SSRN Scholarly Paper No. 2737347). https://doi.org/10.2139/ssrn.2737347

Mitchell, T. (2013). *Carbon Democracy: Political Power in the Age of Oil* (Revised 2nd edition). Verso.

Mol, A. (2002). *The Body Multiple: Ontology in Medical Practice*. Duke University Press.

Moody, P. (2017). An ‘Amuse-Bouche at Best: 360° VR Storytelling in Full Perspective. *International Journal of E-Politics*, *8*(3), 42–50. https://doi.org/10.4018/IJEP.2017070104

Moore-Kaplan, J. (2012). Kony 2012: Encouraging Social Change or Oversimplifying a Crisis? *Harvard University Health and Human Rights Journal*. https://www.hhrjournal.org/2012/03/21/kony-2012-encouraging-social-change-or-oversimplifying-a-crisis/

Moreno, J. L. (1953). *Who Shall Survive? Foundations of Sociometry, Group Psychotherapy and Sociodrama*. Beacon House. https://hdl.handle.net/2027/mdp.39015009041065

Morse, J. C., & Keohane, R. O. (2014). Contested Multilateralism. *Review of International Organizations*, *9*(4), 385–412. https://doi.org/10.1007/s11558-014-9188-2

Moser, I., & Law, J. (2006). Fluids or Flows? Information and Qualculation in Medical Practice. *Information Technology & People*, *19*(1), 55–73. https://doi.org/10.1108/09593840610649961

Mosley, L. (2013). *Interview Research in Political Science*. https://doi.org/10.7591/9780801467974

Mosse, D. (2013). The Anthropology of International Development. *Annual Review of Anthropology*, *42*(1), 227–246. https://doi.org/10.1146/annurev-anthro-092412-155553

Moustafa, F., & Steed, A. (2018). A Longitudinal Study of Small Group Interaction in Social Virtual Reality. *Proceedings of the 24th ACM Symposium on Virtual Reality Software and Technology*, 1–10. https://doi.org/10.1145/3281505.3281527

Mueller, M. (2016). Communications and the Internet. In J. Katz Cogan, I. Hurd, & I. Johnstone (Eds), *The Oxford Handbook of International Organizations* (pp. 535–556). Oxford University Press. https://doi.org/10.1093/law/9780199672202.003.0025

Mulcahy, D., & Perillo, S. (2011). Thinking Management and Leadership Within Colleges and Schools Somewhat Differently: A Practice-Based, Actor-Network Theory Perspective. *Educational Management, Administration & Leadership*, *39*(1), 122–145. https://doi.org/10.1177/1741143210383895

Mutlu, C. E., & Salter, M. B. (2019). Curiosity, Criticality and Materiality. In C. Kaltofen, M. Carr, & M. Acuto (Eds), *Technologies of International Relations: Continuity and Change* (pp. 45–53). Springer International Publishing. https://doi.org/10.1007/978-3-319-97418-7_5

Mystakidis, S. (2022). Metaverse. *Encyclopedia*, *2*(1), Article 1. https://doi.org/10.3390/encyclopedia2010031

Nabil, R. (2023). Global AI Governance and the United Nations. *Yale Journal of International Affairs*, *19*(1), 1-.

Nakamitsu, I. (2018, December). Responsible Innovation for a New Era in Science and Technology. *UN Chronicles*, *Vol. LV, 'New Technologies: Where To?'* https://www.un.org/en/un-chronicle/responsible-innovation-new-era-science-and-technology

Nash, K. (2018a). Virtual Reality Witness: Exploring the Ethics of Mediated Presence. *Studies in Documentary Film*, *12*(2), 119–131. https://doi.org/10.1080/17503280.2017.1340796

Nash, K. (2018b). Virtually Real: Exploring VR Documentary. *Studies in Documentary Film*, *12*(2), 97–100. https://doi.org/10.1080/17503280.2018.1484992

Nassar, A. K., Al-Manaseer, F., Knowlton, L. M., & Tuma, F. (2021). Virtual Reality (VR) as a Simulation Modality for Technical Skills Acquisition. *Annals of Medicine and Surgery*, *71*, 102945. https://doi.org/10.1016/j.amsu.2021.102945

Ness, G. D., & Brechin, S. R. (1988). Bridging the Gap: International Organizations as Organizations. *International Organization*, *42*(2), 245–273.

Neumann, I. B. (2012). *At Home with the Diplomats: Inside a European Foreign Ministry* (1st edition). Cornell University Press. https://doi.org/10.7591/9780801462993

Neumann, I. B. (2014). *Diplomatic Sites: A Critical Enquiry*. Oxford University Press.

Neumann, I. B. (2016). Sited Diplomacy. In J. Dittmer & F. McConnell (Eds), *Diplomatic Cultures and International Politics: Translations, Spaces and Alternatives* (1st edition, pp. 79–92). Routledge.

Nexon, D. H., & Pouliot, V. (2013). "Things of Networks": Situating ANT in International Relations. *International Political Sociology*, *7*(3), 342–345. https://doi.org/10.1111/ips.12026_4

Ngodup Massally, K., Ng, S., & Fukagawa, K. (2022, July 19). Traversing the Metaverse Whilst Managing Risks with Opportunities. *UNDP Blog*. https://www.undp.org/blog/traversing-metaverse-whilst-managing-risks-opportunities

Nicolini, D. (2009). Zooming In and Out: Studying Practices by Switching Theoretical Lenses and Trailing Connections. *Organization Studies*, *30*(12), 1391–1418. https://doi.org/10.1177/0170840609349875

Nicoll, B. (2015). Game Studies, Aesthetics, and Active Objects: An Interview with Graeme Kirkpatrick. *Platform*, *6*(2), Article 2.

Nikolaou, A., Schwabe, A., & Boomgaarden, H. (2022). Changing Social Attitudes with Virtual Reality: A Systematic Review and Meta-Analysis. *Annals of the International Communication Association*, *46*(1), 30–61. https://doi.org/10.1080/23808985.2022.2064324

Nilsson, N., Weissmann, M., Palmertz, B., Thunholm, P., & Häggström, H. (2021). Security Challenges in the Grey Zone: Hybrid Threats and Hybrid Warfare. In M. Weissmann, N. Nilsson, B. Palmertz, & P. Thunholm, *Hybrid Warfare: Security and Asymmetric Conflict in International Relations* (pp. 1–18). I.B. Tauris. https://doi.org/10.5040/9781788317795

Nowak, G. J., Evans, N. J., Wojdynski, B. W., Ahn, S. J., Len-Rios, M. E., Carera, K., Hale, S., & McFalls, D. (2020). Using Immersive Virtual Reality to Improve the Beliefs and Intentions of Influenza Vaccine Avoidant 18-to-49-Year-Olds: Considerations, Effects, and Lessons Learned. *Vaccine*, *38*(5), 1225–1233. https://doi.org/10.1016/j.vaccine.2019.11.009

Nucci, E. D., & Sio, F. S. de. (2016). *Drones and Responsibility: Legal, Philosophical and Socio-Technical Perspectives on Remotely Controlled Weapons* (1st ed.). Routledge. https://doi.org/10.4324/9781315578187

Nunes, T. A., & Lee, H. (2019). Humanitarian Documentary: A Comparison Study between VR and Non-VR Productions. *Journal of Multimedia Information System*, *6*(4), 309–316. https://doi.org/10.33851/JMIS.2019.6.4.309

O'Brolcháin, F., Jacquemard, T., Monaghan, D., O'Connor, N., Novitzky, P., & Gordijn, B. (2015). The Convergence of Virtual Reality and Social Networks: Threats to Privacy and Autonomy. *Science and Engineering Ethics*, *22*(1), 1–29. https://doi.org/10.1007/s11948-014-9621-1

O'Connell, B., Ciccotosto, S., & De Lange, P. (2014, July 8). *Understanding the Application of Actor-Network Theory in the Process of Accounting Change*. Critical Perspectives on Accounting Conference, Toronto, Canada. https://researchonline.jcu.edu.au/34366/

Oh, C. S., Bailenson, J., & Welch, G. F. (2018). A Systematic Review of Social Presence: Definition, Antecedents, and Implications. *Frontiers in Robotics and AI*, *5*, 1–35. https://doi.org/10.3389/frobt.2018.00114

Oh, S. Y., Bailenson, J., Krämer, N., & Li, B. (2016). Let the Avatar Brighten Your Smile: Effects of Enhancing Facial Expressions in Virtual Environments. *PloS One*, *11*(9), e0161794–e0161794. https://doi.org/10.1371/journal.pone.0161794

Olcott, E. (2021). Facebook Is Building for the Metaverse, but at What Cost? *FT.Com*. https://search.proquest.com/docview/2603387761?pq-origsite=primo

Ong, A., & Collier, S. J. (2005). *Global Assemblages: Technology, Politics, and Ethics as Anthropological Problems*. Blackwell.

Onofrei, V. (2020). International Labor Organization: The Main Player in the International Arena. *Journal of Danubian Studies and Research*, *10*(2), 289–296.

Orgad, S., & Seu, B. I. (2014). 'Intimacy at a Distance' in Humanitarian Communication. *Media, Culture & Society*, *36*(7), 916–934. https://doi.org/10.1177/0163443714536077

Orsini, A., Louafi, S., & Morin, J.-F. (2017). Boundary Concepts for Boundary Work Between Science and Technology Studies and International Relations: Special Issue Introduction. *The Review of Policy Research*, *34*(6), 734–743. https://doi.org/10.1111/ropr.12273

Ouyang, H. (2022, April 26). Can Virtual Reality Help Ease Chronic Pain? *The New York Times*. https://www.nytimes.com/2022/04/26/magazine/virtual-reality-chronic-pain.html

Owen, T. (2016). *Disruptive Power: The Crisis of the State in the Digital Age*. Oxford University Press.

Pallavicini, F., Argenton, L., Toniazzi, N., Aceti, L., & Mantovani, F. (2016). Virtual Reality Applications for Stress Management Training in the Military. *Aerospace Medicine and Human Performance*, *87*(12), 1021–1030. https://doi.org/10.3357/AMHP.4596.2016

Palma Stade, T., Schofield, G., & Moore, G. (2023). Narrative Perspectives and Embodiment in Cinematic Virtual Reality. In *Extended Reality* (Vol. 14218, pp. 232–252). Springer. https://doi.org/10.1007/978-3-031-43401-3_16

Pan, X., & Hamilton, A. F. de C. (2018). Why and How to Use Virtual Reality to Study Human Social Interaction: The Challenges of Exploring a New Research Landscape. *The British Journal of Psychology*, *109*(3), 395–417. https://doi.org/10.1111/bjop.12290

Papacharissi, Z. (2014). *Affective Publics: Sentiment, Technology, and Politics* (1st edn). Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199999736.001.0001

Park, S.-M., & Kim, Y.-G. (2022). A Metaverse: Taxonomy, Components, Applications, and Open Challenges. *IEEE Access*, *10*, 4209–4251. IEEE Access. https://doi.org/10.1109/ACCESS.2021.3140175

Parong, J., & Mayer, R. E. (2018). Learning Science in Immersive Virtual Reality. *Journal of Educational Psychology*, *110*(6), 785–797. https://doi.org/10.1037/edu0000241

Parsons, T. (2019). Video Games, Video Gamers, and the Ethics of Video Game Design. *Ethical Challenges in Digital Psychology and Cyberpsychology*. https://doi.org/10.1017/9781108553384.014

Parsons, T. D. (2015). Virtual Reality for Enhanced Ecological Validity and Experimental Control in the Clinical, Affective and Social Neurosciences. *Frontiers in Human Neuroscience*, *9*, Article No. 660. https://doi.org/10.3389/fnhum.2015.00660

Parsons, T. D., & Rizzo, A. A. (2008). Affective Outcomes of Virtual Reality Exposure Therapy for Anxiety and Specific Phobias: A Meta-Analysis. *Journal of Behavior Therapy and Experimental Psychiatry*, *39*(3), 250–261. https://doi.org/10.1016/j.jbtep.2007.07.007

Passoth, J.-H., & Rowland, N. J. (2015). Who Is Acting in International Relations? In *Human Beings in International Relations* (pp. 286–304). Cambridge University Press. https://doi.org/10.1017/CBO9781316337042.015

Patiño-Valencia, B., Villalba-Morales, M. L., Acosta-Amaya, M., Villegas-Arboleda, C., & Calderón-Sanín, E. (2022). Towards the Conceptual Understanding of Social Innovation and Inclusive Innovation: A Literature Review. *Innovation and Development*, *12*(3), 437–458. https://doi.org/10.1080/2157930X.2020.1859215

Pavic, K., Chaby, L., Gricourt, T., & Vergilino-Perez, D. (2023). Feeling Virtually Present Makes Me Happier: The Influence of Immersion, Sense of Presence, and Video Contents on Positive Emotion Induction. *Cyberpsychology, Behavior and Social Networking*, *26*(4), 238–245. https://doi.org/10.1089/cyber.2022.0245

Pavlik, J. V. (2019). *Journalism in the Age of Virtual Reality: How Experiential Media Are Transforming News*. Columbia University Press.

Paxton, P. (2020). What Influences Charitable Giving? In P. Bromley & W. W. Powell (Eds), *The Nonprofit Sector: A Research Handbook* (3rd edition, pp. 543–557). Stanford University Press. https://doi.org/10.1515/9781503611085-032

Paxton, P., Velasco, K., & Ressler, R. W. (2020). Does Use of Emotion Increase Donations and Volunteers for Nonprofits? *American Sociological Review*, *85*(6), 1051–1083. https://doi.org/10.1177/0003122420960104

Payne, L. (2017). Visualization in Analysis: Developing ANT Analysis Diagrams (AADS). *Qualitative Research*, *17*(1), 118–133. https://doi.org/10.1177/1468794116661229

Peck, T. C., Seinfeld, S., Aglioti, S. M., & Slater, M. (2013). Putting Yourself in the Skin of a Black Avatar Reduces Implicit Racial Bias Consciousness and Cognition. *Consciousness and Cognition*, *22*(3), 779–787.

Peckmann, C., Kannen, K., Pensel, M. C., Lux, S., Philipsen, A., & Braun, N. (2022). Virtual Reality Induces Symptoms of Depersonalization and Derealization: A Longitudinal Randomised Control Trial. *Computers in Human Behavior*, *131*, 107233. https://doi.org/10.1016/j.chb.2022.107233

Pellas, N., Dengel, A., & Christopoulos, A. (2020). A Scoping Review of Immersive Virtual Reality in STEM Education. *IEEE Transactions on Learning Technologies*, *13*(4), 748–761. https://doi.org/10.1109/TLT.2020.3019405

Pelletier, P., & Drozda-Senkowska, E. (2020). Virtual Reality as a Tool for Deradicalizing the Terrorist Mind: Conceptual and Methodological Insights from Intergroup Conflict Resolution and Perspective-Taking Research. *Peace and Conflict: Journal of Peace Psychology*, *26*(4), 449–459. https://doi.org/10.1037/pac0000442

Peng, Z., & Wan, Y. (2025). Human Vs. Ai: What Makes Students Prefer to Self-Disclosure to Ai Teaching Assistant? The Effect of Psychological Safety and Relationship Norms. *Education and Information Technologies*, 1–28. https://doi.org/10.1007/s10639-025-13586-6

Peris-Ortiz, M., Teulon, F., & Bonet-Fernandez, D. (2017). *Social Entrepreneurship in Non-Profit and Profit Sectors: Theoretical and Empirical Perspectives* (Vol. 36). Springer Science and Business Media.

Pike, K., & Koithara Mathew, T. (2023). *Reflecting Reality: An Evaluation of the Sexual Harassment Virtual Reality Pilot Training in Indonesia* (Discussion Paper No. 51). International Labour Organisation; International Finance Corporation; BetterWork. https://betterwork.org/wp-content/uploads/Discussion-paper-51-Reflecting-reality-An-evaluation-of-the-sexual-harassment-virtual-reality-pilot-training-in-Indonesia.pdf

Pinch, T., & Bijker, W. E. (2012). The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other. In W. E. Bijker, T. P. Hughes, T. Pinch, & D. G. Douglas, *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology* (pp. 17–50). MIT Press.

Piscione, D. P., & Drean, J. (2023, May 12). Yes, the Metaverse Is Still Happening. *Harvard Business Review*. https://hbr.org/2023/05/yes-the-metaverse-is-still-happening

Plesner, U. (2009). An Actor-Network Perspective on Changing Work Practices: Communication Technologies as Actants in Newswork. *Journalism*, *10*(5), 604–626. https://doi.org/10.1177/1464884909106535

Polcumpally, A. T. (2023). Making sense of AI-influenced geopolitics using STS theories. In S. Lindgren (Ed.), *Handbook of Critical Studies of Artificial Intelligence* (pp. 187–197). Edward Elgar Publishing. https://doi.org/10.4337/9781803928562.00021

Poleac, G. (2023). Rethinking the Proteus Effect – Can Our Digital Personas Influence Our Offline Selves? *Technium Social Sciences Journal*, *51*, 150–162. https://doi.org/10.47577/tssj.v50i1.9767

Ponti, M. (2012). Uncovering Causality in Narratives of Collaboration: Actor-Network Theory and Event Structure Analysis. *Forum, Qualitative Social Research*, *13*(1).

Poole, M. S., & Van de Ven, A. H. (2021). Theories of Organizational Change as Assemblages. In M. S. Poole & A. H. Van de Ven (Eds), *The Oxford Handbook of Organizational Change and Innovation* (p. 0). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780198845973.013.31

Porter, T. (2012). Making Serious Measures: Numerical Indices, Peer Review, and Transnational Actor-Networks. *Journal of International Relations and Development*, *15*(4), 532–557. https://doi.org/10.1057/jird.2011.15

Porumboiu, D. (2021, October 14). *What Is Intrapreneurship and How Can It Support Corporate Innovation?* Hype Innovation. https://www.viima.com/blog/intrapreneurship

Pouliot, V. (2010a). *International Security in Practice: The Politics of Nato-Russia Diplomacy*. Cambridge University Press.

Pouliot, V. (2010b). The Materials of Practice: Nuclear Warheads, Rhetorical Commonplaces and Committee Meetings in Russian–Atlantic Relations. *Cooperation and Conflict*, *45*(3), 294–311. https://doi.org/10.1177/0010836710377487

Pouliot, V., & Cornut, J. (2015). Practice Theory and the Study of Diplomacy: A Research Agenda. *Cooperation and Conflict*, *50*(3), 297–315. https://doi.org/10.1177/0010836715574913

Powers, M. B., Briceno, N. F., Gresham, R., Jouriles, E. N., Emmelkamp, P. M., & Smits, J. A. (2013). Do Conversations with Virtual Avatars Increase Feelings of Social Anxiety? *Journal of Anxiety Disorders*, *27*(4), 398–403. https://doi.org/10.1016/j.janxdis.2013.03.003

Prandi, C., Nisi, V., Ceccarini, C., & Nunes, N. (2021). Augmenting Emerging Hospitality Services: A Playful Immersive Experience to Foster Interactions among Locals and Visitors. *International Journal of Human–Computer Interaction*, 1–15. https://doi.org/10.1080/10447318.2021.2012382

Pressgrove, G., & Bowman, N. D. (2021). From Immersion to Intention? Exploring Advances in Prosocial Storytelling. *Journal of Philanthropy and Marketing*, *26*(2), e1689. https://doi.org/10.1002/nvsm.1689

Prugl, E. (2005). The International Labor Organization (ILO). In M. Griffiths, *Encyclopedia of International Relations and Global Politics* (pp. 422–425). Taylor & Francis. http://ebookcentral.proquest.com/lib/oxford/detail.action?docID=1573334

PwC. (2020). *The Effectiveness of Virtual Reality Soft Skills Training in the Enterprise: A Study*. PwC. https://www.pwc.com/us/en/services/consulting/technology/emerging-technology/assets/pwc-understanding-the-effectiveness-of-soft-skills-training-in-the-enterprise-a-study.pdf

PwC. (2022, September 15). *What Does Virtual Reality and the Metaverse Mean for Training?* PwC. https://www.pwc.com/us/en/tech-effect/emerging-tech/virtual-reality-study.html

Pyram, S. (2024). Future Directions for Context in ICT4D: A Systematic Literature Review. *Information Development*, 02666669241248149. https://doi.org/10.1177/02666669241248149

Qureshi, S. (2006). Why Is the Information Society Important to Us? The World Summit on the Information Society in Tunis. *Information Technology for Development*, *12*(1), 1–5. https://doi.org/10.1002/itdj.20035

Rabitz, F. (2023). *Transformative Novel Technologies and Global Environmental Governance* (1st edn). Cambridge University Press. https://doi.org/10.1017/9781009352635

Radianti, J., Majchrzak, T. A., Fromm, J., & Wohlgenannt, I. (2020). A Systematic Review of Immersive Virtual Reality Applications for Higher Education: Design Elements, Lessons Learned, and Research Agenda. *Computers and Education*, *147*, 103778-. https://doi.org/10.1016/j.compedu.2019.103778

Raja, P. (2022, July 14). What Is Social Intrapreneurship in the Public Sector and Why Is It Crucial? *World Economic Forum. Social Innovation.* https://www.weforum.org/stories/2022/07/what-is-social-intrapreneurship-in-the-public-sector/

Raja, U. S., & Al-Baghli, R. (2025). Ethical Concerns in Contemporary Virtual Reality and Frameworks for Pursuing Responsible Use. *Frontiers in Virtual Reality*, *6*, 1451273. https://doi.org/10.3389/frvir.2025.1451273

Ramadani, L., Kurnia, S., & Breidbach, C. F. (2018). In Search for Holistic ICT4D Research: A Systematic Literature Review. *Proceedings of the 51st Hawaii International Conference on System Sciences*.

Ramirez, E. J. (2021). Exploring Strange New Worlds. In *The Ethics of Virtual and Augmented Reality* (pp. 1–13). Routledge.

Ramos, J. M., & Fisk, K. (2016). *Preventive Force: Drones, Targeted Killing, and the Transformation of Contemporary Warfare* (1st ed.). New York University Press. https://doi.org/10.18574/9781479880997

Rantakari, A., & Vaara, E. (2017). Narratives and processuality. In *Sage Handbook of Process Organisation Studies* (pp. 271–285). SAGE Publications. https://research.aalto.fi/en/publications/narratives-and-processuality

Ratan, R., Lin, Q., Lim, C., Park, R., Lover, A., Han, E., Jang, D., Leith, A. P., & Bailenson, J. N. (2025). Time Matters in VR: Students Benefit from Longer VR Class Duration, but Certain Outcomes Decline After 45 Minutes, with Large Individual Variance. *Computers and Education*, *235*, 105328-. https://doi.org/10.1016/j.compedu.2025.105328

Ratan, R., & Sah, Y. J. (2015). Leveling up on Stereotype Threat: The Role of Avatar Customization and Avatar Embodiment. *Computers in Human Behavior*, *50*, 367–374. https://doi.org/10.1016/j.chb.2015.04.010

Rawski, S. L., Foster, J. R., & Bailenson, J. (2022). Sexual Harassment Bystander Training Effectiveness: Experimentally Comparing 2D Video to Virtual Reality Practice. *Technology, Mind, and Behavior*, *3*(2). https://doi.org/10.1037/tmb0000074

Reckwitz, A. (2002). Toward a Theory of Social Practices: A Development in Culturalist Theorizing. *European Journal of Social Theory*, *5*(2), 243–263. https://doi.org/10.1177/13684310222225432

Redaelli, R. (2024). Intentionality Gap and Preter-Intentionality in Generative Artificial Intelligence. *AI & Society*, 1–8. https://doi.org/10.1007/s00146-024-02007-w

Reus-Smit, C., & Snidal, D. (2008). *The Oxford Handbook of International Relations*. University Press.

Richards, D., & Taylor, M. (2015). A Comparison of Learning Gains When Using a 2D Simulation Tool Versus a 3D Virtual World: An Experiment to Find the Right Representation Involving

the Marginal Value Theorem. *Computers and Education*, *86*, 157–171. https://doi.org/10.1016/j.compedu.2015.03.009

Richmond, O. P. (2020). Peace in Analogue/ Digital International Relations. *Global Change, Peace & Security*, *32*(3), 317–336. https://doi.org/10.1080/14781158.2020.1825370

Riva, G., Mantovani, F., Capideville, C. S., Preziosa, A., Morganti, F., Villani, D., Gaggioli, A., Botella, C., & Alcañiz, M. (2007). Affective Interactions Using Virtual Reality: The Link between Presence and Emotions. *Cyberpsychology & Behavior*, *10*(1), 45–56. https://doi.org/10.1089/cpb.2006.9993

Riva, G., Waterworth, J., & Murray, D. (2014). *Interacting with Presence: HCI and the Sense of Presence in Computer-mediated Environments*. De Gruyter. https://ezproxy-prd.bodleian.ox.ac.uk/login?url=http://ebookcentral.proquest.com/lib/oxford/detail.action?docID=1787235

Rivera, G., & Cox, A. M. (2016). An Actor-Network Theory Perspective to Study the Non-Adoption of a Collaborative Technology Intended to Support Online Community Participation. *Academia Revista Latinoamericana de Administración*, *29*(3), 347–365. https://doi.org/10.1108/ARLA-02-2015-0039

Robertson, A. (2020, August 19). *Facebook Is Making Oculus' Worst Feature Unavoidable*. The Verge. https://www.theverge.com/2020/8/19/21375118/oculus-facebook-account-login-data-privacy-controversy-developers-competition

Robertson, J. (2020, October 21). Diplomacy After Covid: No Looking Back. *The Interpreter*. https://www.lowyinstitute.org/the-interpreter/diplomacy-after-covid-no-looking-back

Robin, W. user. (2013, June 14). The Global is Local At All Points: Latour on Globalization. *Public Diplomacy, Networks and Influence*. https://pdnetworks.wordpress.com/2013/06/14/the-global-is-local-at-all-points-latour-on-globalization/

Robinson, M., Jones, K., & Janicke, H. (2015). Cyber Warfare: Issues and Challenges. *Computers & Security*, *49*, 70–94. https://doi.org/10.1016/j.cose.2014.11.007

Rocha, J. B., & Prada, R. (2025). Procedural Content Generation for Cooperative Games—A Systematic Review. *IEEE Transactions on Games*, 1–14. https://doi.org/10.1109/TG.2025.3530419

Roehl, B. (2019). Building a Social VR App. In W. R. Sherman (Ed.), *VR Developer Gems* (1st edition, pp. 289–320). A K Peters/CRC Press. https://doi.org/10.1201/b21598-16

Rogers, E. M. (2003). *Diffusion of Innovations* (5th edition). Free Press.

Rohila, A. K., Yadav, K., & Ghanghas, B. S. (2017). Role of Information and Communication Technology (ICT) in Agriculture and Extension. *Journal of Applied and Natural Science*, *9*(2), 1097–1100. https://doi.org/10.31018/jans.v9i2.1328

Rose, M. (2018). The Immersive Turn: Hype and Hope in the Emergence of Virtual Reality as a Nonfiction Platform. *Studies in Documentary Film*, *12*(2), 132–149. https://doi.org/10.1080/17503280.2018.1496055

Rosenberg, R. S., Baughman, S. L., & Bailenson, J. (2013). Virtual Superheroes: Using Superpowers in Virtual Reality to Encourage Prosocial Behavior. *PloS One*, *8*(1), e55003. https://doi.org/10.1371/journal.pone.0055003

Rospigliosi, P. 'asher'. (2022). Metaverse or Simulacra? Roblox, Minecraft, Meta and the turn to virtual reality for education, socialisation and work. *Interactive Learning Environments*, *30*(1), 1–3. https://doi.org/10.1080/10494820.2022.2022899

Rothe, D. (2024). When the World is an Object: On the Governmental Promise of a Digital Twin Earth. *International Political Sociology*, *18*(3). https://doi.org/10.1093/ips/olae022

Rothe, F.-F., Van Audenhove, L., & Loisen, J. (2023). Digital Development, Inequalities, and the Sustainable Development Goals: What Does 'Leave No-One Behind' Mean for ICT4D? *Information Technology for Development*, *29*(1), 9–26. https://doi.org/10.1080/02681102.2022.2076640

Rothe, S., Buschek, D., & Hußmann, H. (2019). Guidance in Cinematic Virtual Reality-Taxonomy, Research Status and Challenges. *Multimodal Technologies and Interaction*, *3*(1), Article 1. https://doi.org/10.3390/mti3010019

Roussou, M., Oliver, M., & Slater, M. (2006). The Virtual Playground: An Educational Virtual Reality Environment for Evaluating Interactivity and Conceptual Learning. *Virtual Reality: The Journal of the Virtual Reality Society*, *10*(3–4), 227–240. https://doi.org/10.1007/s10055-006-0035-5

Rueda, J., & Lara, F. (2020). Virtual Reality and Empathy Enhancement: Ethical Aspects. *Frontiers in Robotics and AI*, *7*, 506984. https://doi.org/10.3389/frobt.2020.506984

Ruffa, C. (2020). Case Study Methods: Case Selection and Case Analysis. In L. Curini & R. Franzese, *The SAGE Handbook of Research Methods in Political Science and International Relations* (1st edition, Vol. 2, pp. 1133–1147). SAGE Publications. https://doi.org/10.4135/9781526486387

Ruffini, P.-B. (2020). Introduction to the Forum on Science Diplomacy. *The Hague Journal of Diplomacy*, *15*(3), 355–358. https://doi.org/10.1163/1871191X-BJA10033

Russell, S. (1986). The Social Construction of Artefacts: A Response to Pinch and Bijker. *Social Studies of Science*, *16*(2), 331–346. https://doi.org/10.1177/030631278601600200 8

Sadeh-Sharvit, S., Giron, J., Fridman, S., Hanrieder, M., Goldstein, S., Friedman, D., & Brokman, S. (2021). Virtual Reality in Sexual Harassment Prevention: Proof-of-Concept Study. *Proceedings of the 21st ACM International Conference on Intelligent Virtual Agents*, 87–89. https://doi.org/10.1145/3472306.3478356

Salmanowitz, N. (2018). The Impact of Virtual Reality on Implicit Racial Bias and Mock Legal Decisions. *Journal of Law and the Biosciences*, *5*(1), 174–203. https://doi.org/10.1093/jlb/lsy005

Salter, M. B. (2015). *Making Things International 1: Circuits and Motion*. University of Minnesota Press.

Salter, M. B. (2016). *Making Things International 2: Catalysts and Reactions*. University of Minnesota Press.

Salter, M. B., & Walters, W. (2016). Bruno Latour Encounters International Relations: An Interview. *Millennium*, *44*(3), 524–546. https://doi.org/10.1177/0305829816641497

Sánchez Laws, A. L. (Ed.). (2023). *Insights on Immersive Journalism*. Routledge. https://doi.org/10.4324/9781003217008

Sánchez Laws, A. L., & Utne, T. (2019). Ethics Guidelines for Immersive Journalism. *Frontiers in Robotics and AI*, *6*, Article No. 28. https://doi.org/10.3389/frobt.2019.00028

Sandvik, K. B. (2016). The Humanitarian Cyberspace: Shrinking Space or an Expanding Frontier? *Third World Quarterly*, *37*(1), 17–32. https://doi.org/10.1080/01436597.2015.1043992

Sandvik, K. B., & Jacobsen, K. L. (2016). *Unhcr and the Struggle for Accountability: Technology, Law and Results-Based Management*. Routledge.

Sarosa, S. (2012). Adoption of Social Media Networks by Indonesian SME: A Case Study. *Procedia Economics and Finance*, *4*, 244–254. https://doi.org/10.1016/S2212-5671(12)00339-5

Sassen, S. (2002). Towards a Sociology of Information Technology. *Current Sociology*, *50*(3), 365–388. https://doi.org/10.1177/0011392102050003005

Sassen, S. (2006). *Territory, Authority, Rights from Medieval to Global Assemblages* (Updated edition). Princeton University Press. https://doi.org/10.1515/9781400828593

Save the Children. (2020). *Serious Games: Humanitarian User Research*. Save the Children. https://paxsims.wordpress.com/wp-content/uploads/2020/05/save-the-children-uk-serious-games-humanitarian-user-research_interactive-screen-display-.pdf

Sayadi, N., Co, S., & Gomez-Zara, D. (2025). *'Feeling that I was Collaborating with Them:' A 20-year Systematic Literature Review of Social Virtual Reality Leveraging Collaboration* (No. arXiv:2412.20266). arXiv. https://doi.org/10.48550/arXiv.2412.20266

Sayes, E. (2014). Actor-Network Theory and Methodology: Just What Does It Mean to Say That Nonhumans Have Agency? *Social Studies of Science*, *44*(1), 134–149. https://doi.org/10.1177/0306312713511867

Schatzki, T. (2001). Introduction. In T. Schatzki, K. Knorr-Cetina, & E. Savigny, *The Practice Turn in Contemporary Theory* (1st ed., pp. 10–23). Routledge.

Schatzki, T. (2005). Peripheral Vision: The Sites of Organizations. *Organization Studies*, *26*(3), 465–484. https://doi.org/10.1177/0170840605050876

Schatzki, T. (2019). *Social Change in a Material World: How Activity and Material Processes Dynamize Practices*. Routledge.

Scheermesser, M. (2022). The Pivotal Function of Non-human Actors in the Acceptability of the Body Technology, Actibelt®: A Reconstruction Based on Actor-Network-Theory. *Nanoethics*, *16*(1), 81–93. https://doi.org/10.1007/s11569-022-00415-0

Schillmeier, J.-H. P., Birgit Peuker, Michael (Ed.). (2012). *Agency without Actors?: New Approaches to Collective Action*. Routledge. https://doi.org/10.4324/9780203834695

Schimmack, U. (2005). Attentional Interference Effects of Emotional Pictures: Threat, Negativity, or Arousal? *Emotion*, *5*(1), 55–66. https://doi.org/10.1037/1528-3542.5.1.55

Schlegel, F. (2017). Science for Global Understanding. *Science.Org*, *358*(6364), 699–699. https://doi.org/10.1126/science.aar3789

Schlembach, R., & Clewer, N. (2021). 'Forced Empathy': Manipulation, Trauma and Affect in Virtual Reality Film. *International Journal of Cultural Studies*, *24*(5), 827–843. https://doi.org/10.1177/13678779211007863

Schmid, C. (2008). Henri Lefebvre's Theory of the Production of Space: Towards a Three-Dimensional Dialectic. In K. Goonewardena, S. Kipfer, R. Milgrom, & C. Schmid (Eds), *Space, Difference, Everyday Life* (1st edition, pp. 27–45). Routledge.

Schmidt, B. (2008). International Relations Theory: Hegemony or Pluralism? *Millennium*, *36*(2), 295–304. https://doi.org/10.1177/03058298080360020601

Schoch, K. (2020). Case Study Research. In G. J. Burkholder, K. A. Cox, L. M. Crawford, & J. Hitchcock, *Research design and methods: An applied guide for the scholar-practitioner*. SAGE Publications, Inc.

Schön-Quinlivan, E. (2008). Implementing Organizational Change—The Case of the Kinnock Reforms. *Journal of European Public Policy*, *15*(5), 726–742. https://doi.org/10.1080/13501760802133229

Schot, J., & Geels, F. W. (2008). Strategic Niche Management and Sustainable Innovation Journeys: Theory, Findings, Research Agenda, and Policy. *Technology Analysis & Strategic Management*, *20*(5), 537–554. https://doi.org/10.1080/09537320802292651

Schouten, P. (2014). Security as Controversy: Reassembling Security at Amsterdam Airport. *Security Dialogue*, *45*(1), 23–42. https://doi.org/10.1177/0967010613515014

Schouten, P., & Bachmann, J. (2022). Infrastructural Frontiers: Terrains of Resistance at the Material Edge of the State. *Geoforum*, *136*, 219–224. https://doi.org/10.1016/j.geoforum.2022.06.002

Schroeder, R. (2008). Defining Virtual Worlds and Virtual Environments. *Journal For Virtual Worlds Research*, *1*(1), Article 1. https://doi.org/10.4101/jvwr.v1i1.294

Schroeder, R. (2011). *Being There Together: Social Interaction in Virtual Environments*. Oxford University Press.

Schroeder, R. (2012). *The Social Life of Avatars: Presence and Interaction in Shared Virtual Environments*. Springer Science & Business Media.

Schroeder, R., & Axelsson, A.-S. (2006). *Avatars at Work and Play: Collaboration and Interaction in Shared Virtual Environments* (Vol. 34). Springer.

Schultze, U. (2010). Embodiment and Presence in Virtual Worlds: A Review. *Journal of Information Technology*, *25*(4), 434–449. https://doi.org/10.1057/jit.2010.25

Schulz, R. (2024). *Comprehensive List of Social VR/AR Platforms and Virtual Worlds*. Ryan Schultz. https://ryanschultz.com/list-of-social-vr-virtual-worlds/

Scott-Smith, T. (2016). Humanitarian Neophilia: The 'Innovation Turn' and Its Implications. *Third World Quarterly*, *37*(12), 2229–2251. https://doi.org/10.1080/01436597.2016.1176856

SDG Knowledge Hub. (2013). UN Secretary-General Reflects on Science, Technology, Innovation in Sustainable Development. *International Institute for Sustainable Development*. https://sdg.iisd.org/news/un-secretary-general-reflects-on-science-technology-innovation-in-sustainable-development/

Seib, P. (2012). *Real-Time Diplomacy Politics and Power in the Social Media Era*. Palgrave Macmillan US. https://doi.org/10.1057/9781137010902

Seoul Metropolitan Government. (2021, August 11). *Seoul, First Local Government to Start New-Concept Public Service with 'Metaverse Platform'* [Government Website. Mayor's News.]. https://english.seoul.go.kr/seoul-first-local-govt-to-start-new-concept-public-service-with-metaverse-platform/

Servais, J.-M., & Goethem, V. V. (2016). *International Labour Organization* (2nd edition). Wolters Kluwer.

Seu, I. B., & Orgad, S. (2017). *Caring in Crisis? Humanitarianism, the Public and NGOs*. Springer International Publishing. https://doi.org/10.1007/978-3-319-50259-5

Shaw, M. (2025, May 3). *The Osaka Virtual Expo 2025 Is A Fully Playable Video Game*. Forbes. https://www.forbes.com/sites/mattshaw/2025/05/03/the-osaka-virtual-expo-2025-is-a-fully-playable-video-game/

Shen, B., Tan, W., Guo, J., Zhao, L., & Qin, P. (2021). How to Promote User Purchase in Metaverse? A Systematic Literature Review on Consumer Behavior Research and Virtual Commerce Application Design. *Applied Sciences*, *11*(23), 11087-. https://doi.org/10.3390/app112311087

Sherrick, B., Hoewe, J., & Waddell, T. F. (2014). The Role of Stereotypical Beliefs in Gender-Based Activation of the Proteus Effect. *Computers in Human Behavior*, *38*, 17–24. https://doi.org/10.1016/j.chb.2014.05.010

Shin, D. (2022). The Actualization of Meta Affordances: Conceptualizing Affordance Actualization in the Metaverse Games. *Computers in Human Behavior*, *133*, 107292-. https://doi.org/10.1016/j.chb.2022.107292

Shoshani, A. (2023). From Virtual to Prosocial Reality: The Effects of Prosocial Virtual Reality Games on Preschool Children's Prosocial Tendencies in Real Life Environments. *Computers in Human Behavior*, *139*, 107546-. https://doi.org/10.1016/j.chb.2022.107546

Shriram, K., & Schwartz, R. (2017). *All Are Welcome: Using VR Ethnography to Explore Harassment Behavior In Immersive*. 2.

Shrivastav, S. K., & Bag, S. (2024). Humanitarian Supply Chain Management in the Digital Age: A Hybrid Review Using Published Literature and Social Media Data. *Benchmarking: An International Journal*, *31*(7), 2267–2301. https://doi.org/10.1108/BIJ-04-2023-0273

Shwedeh, F. (2024). Harnessing Digital Issue in Adopting Metaverse Technology in Higher Education Institutions: Evidence from the United Arab Emirates. *International Journal of Data and Network Science*, *8*(1), 489–504. https://doi.org/10.5267/j.ijdns.2023.9.007

Silvis, E., & Alexander, P. M. (2014). A Study Using a Graphical Syntax for Actor-Network Theory. *Information Technology & People (West Linn, Or.)*, *27*(2), 110–128. https://doi.org/10.1108/ITP-06-2013-0101

Simoni, A. (2023). *Breaking Barriers: Virtual Reality as a Catalyst for Human Rights Education*. Università degli Studi di Padova.

Simpson, J. E., Haider, S., & Giddings, L. (2023). Development of a Virtual Reality Simulation for Practitioners. *Social Work Education: The International Journal*, 1–14. https://doi.org/10.1080/02615479.2023.2258136

Singh, J. P. (2019). Science, Technology, and Art in International Relations: Origins and Prospects. In *Science, Technology, and Art in International Relations* (1st edition, pp. 1–8). Routledge. https://doi.org/10.4324/9781315618371-1

Singh, J. P., Carr, M., & Marlin-Bennett, R. (Eds). (2019). *Science, Technology, and Art in International Relations*. Routledge. https://doi.org/10.4324/9781315618371

Singh, J., Steele, K., & Singh, L. (2021). Combining the Best of Online and Face-to-Face Learning: Hybrid and Blended Learning Approach for COVID-19, Post Vaccine, & Post-Pandemic World. *Journal of Educational Technology Systems*, *50*(2), 140–171. https://doi.org/10.1177/00472395211047865

Sisse Siggaard Jensen. (2009). Actors and Their Use of Avatars as Personal Mediators: An empirical study of avatar-based sense-makings and communication practices in the virtual worlds of EverQuest and Second Life. *MedieKultur*, *25*(47). https://doi.org/10.7146/mediekultur.v25i47.1403

Skinnerup, T. H. (2024). *The Role of Accounting in Governing Public Organizations: The Case of the Danish University Sector* [PhD Thesis. PhD Series No. 27.2024, Copenhagen Business School]. https://research-api.cbs.dk/ws/portalfiles/portal/107306659/thomas_holde_skinnerup_phd_series_27_2024.pdf

Skolnikoff, E. B. (1977). Science, Technology, and the International System. In D. J. de S. Price, I. Spiegel-Rösing, & International Council for Science Policy Studies, *Science, Technology and Society: A Cross-Disciplinary Perspective* (pp. 507–533). SAGE Publications.

Slater, M. (2009). Place Illusion and Plausibility Can Lead to Realistic Behaviour in Immersive Virtual Environments. *Philosophical Transactions. Biological Sciences*, *364*(1535), 3549–3557. https://doi.org/10.1098/rstb.2009.0138

Slater, M. (2017). Implicit Learning Through Embodiment in Immersive Virtual Reality. In D. Liu, C. Dede, R. Huang, & J. Richards (Eds), *Virtual, Augmented, and Mixed Realities in Education* (pp. 19–33). Springer Singapore. https://doi.org/10.1007/978-981-10-5490-7_2

Slater, M., & Banakou, D. (2021). *The Golden Rule as a Paradigm for Fostering Prosocial Behavior With Virtual Reality*. Sage.

Slater, M., Gonzalez-Liencres, C., Haggard, P., Vinkers, C., Gregory-Clarke, R., Jelley, S., Watson, Z., Breen, G., Schwarz, R., Steptoe, W., Szostak, D., Halan, S., Fox, D., & Silver, J. (2020). The Ethics of Realism in Virtual and Augmented Reality. *Frontiers in Virtual Reality*, *1*, 1. https://doi.org/10.3389/frvir.2020.00001

Slater, M., & Sanchez-Vives, M. V. (2005). From Presence to Consciousness Through Virtual Reality. *Nature Reviews. Neuroscience*, *6*(4), 332–339. https://doi.org/10.1038/nrn1651

Slater, M., & Sanchez-Vives, M. V. (2016). Enhancing Our Lives with Immersive Virtual Reality. *Frontiers in Robotics and AI*, *3*, Article 74. https://doi.org/10.3389/frobt.2016.00074

Slocum, T., McMaster, R., Kessler, F., & Howard, H. (2009). Thematic Cartography and Geographic Visualization. In *Pearson Prentice Hall*.

Smith, D. E., & Turner, S. M. (2018). *Incorporating Texts into Institutional Ethnographies*. University of Toronto Press. https://doi.org/10.3138/9781442667082

Smith, S. (2008). Debating Schmidt: Theoretical Pluralism in IR. *Millennium*, *36*(2), 305–310. https://doi.org/10.1177/03058298080360020701

Snidal, D. (1994). The Politics of Scope: Endogenous Actors, Heterogeneity and Institutions. *Journal of Theoretical Politics*, *6*(4), 449–472. https://doi.org/10.1177/0951692894006004003

Social Dialogue | International Labour Organization. (2019, November 29). https://www.ilo.org/resource/social-dialogue-0

Sociotube (Director). (2023, June 28). *Untangling Society with Actor-Network Theory* [Video recording]. https://www.youtube.com/watch?v=Tw2YOgz1eXo

Sontag, S. (1990). *On Photography*. Picador.

Sorrell, S. (2018). Explaining Sociotechnical Transitions: A Critical Realist Perspective. *Research Policy*, *47*(7), 1267–1282. https://doi.org/10.1016/j.respol.2018.04.008

Speicher, M., Hall, B. D., & Nebeling, M. (2019). What is Mixed Reality? *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*, 1–15. https://doi.org/10.1145/3290605.3300767

Spiegel, J. S. (2017). The Ethics of Virtual Reality Technology: Social Hazards and Public Policy Recommendations. *Science and Engineering Ethics*, *24*(5), 1537–1550. https://doi.org/10.1007/s11948-017-9979-y

Spijkerboer, R. C., Turhan, E., Roos, A., Billi, M., Vargas-Payera, S., Opazo, J., & Armiero, M. (2022). Out of Steam? A Social Science and Humanities Research Agenda for Geothermal Energy. *Energy Research & Social Science*, *92*, 102801. https://doi.org/10.1016/j.erss.2022.102801

Squire, V. (2015). Reshaping Critical Geopolitics? The Materialist Challenge. *Review of International Studies*, *41*(1), 139–159.

Srivastava, S. (2013). Assembling International Organizations. *Journal of International Organization Studies*.

Sriwimon, L., & Zilli, P. J. (2017). Applying Critical Discourse Analysis as a Conceptual Framework for Investigating Gender Stereotypes in Political Media Discourse. *Kasetsart Journal of Social Sciences*, *38*(2), 136–142. https://doi.org/10.1016/j.kjss.2016.04.004

Srnicek, N. (2017). New Materialism and Posthumanism: Bodies, Brains, and Complex Causality. In D. R. McCarthy (Ed.), *Technology and World Politics* (1st edition, pp. 84–99). Routledge.

Srnicek, N., Fotou, M., & Arghand, E. (2013). Introduction: Materialism and World Politics. *Millennium*, *41*(3), 397. https://doi.org/10.1177/0305829813493064

Stanforth, C. (2006). Analysing eGovernment Implementation in Developing Countries Using Actor-Network Theory. *Information Technologies and International Development*, *3*(3), 35–60.

Stanney, K., Fidopiastis, C., & Foster, L. (2020). Virtual Reality Is Sexist: But It Does Not Have to Be. *Frontiers in Robotics and AI*, *7*. https://doi.org/10.3389/frobt.2020.00004

Stavroulia, K.-E., Emmanouil, M., & Lanitis, A. (2025). Co-designing Virtual Reality-Based Solutions to Promote the United Nations Sustainable Development Goals. *Information Systems*, 207–220. https://doi.org/10.1007/978-3-031-81322-1_15

Steinicke, F., Lehmann-Willenbrock, N., & Meinecke, A. L. (2020). A First Pilot Study to Compare Virtual Group Meetings using Video Conferences and (Immersive) Virtual Reality. *Symposium on Spatial User Interaction*, 1–2. https://doi.org/10.1145/3385959.3422699

Stevens, T. (2015). Security and Surveillance in Virtual Worlds: Who Is Watching the Warlocks and Why? *International Political Sociology*, *9*(3), 230–247. https://doi.org/10.1111/ips.12094

Stiles Associates Inc. (2007). *A Review of UNESCO's Capacity-Building Function* (Evaluation No. IOS/EVS/PI/71). UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000149993#:~:text=A%20Review%20of%20UNESCO%27s%20capacity,technical%20assistance%20and%20policy%20development

Stockholm Environment Institute, Klein, R., Harris, K., Bakhtaoui, I., Lindblom, A., & Carson, M. (2021a). *Building Climate Diplomacy Back Better: Imagining the UNFCCC Meetings of Tomorrow*. Stockholm Environment Institute. https://doi.org/10.51414/sei2021.019

Stockholm Environment Institute, Klein, R., Harris, K., Bakhtaoui, I., Lindblom, A., & Carson, M. (2021b). *Building Climate Diplomacy Back Better: Imagining the UNFCCC Meetings of Tomorrow*. Stockholm Environment Institute. https://doi.org/10.51414/sei2021.019

Strathern, M. (1996). Cutting the Network. *The Journal of the Royal Anthropological Institute*, *2*(3), 517–535. https://doi.org/10.2307/3034901

Strathern, M. (2002). Externalities in Comparative Guise. *Economy and Society*, *31*(2), 250–267. https://doi.org/10.1080/03085140220123153

Stromberga, Z., Phelps, C., Smith, J., & Moro, C. (2021). Teaching with Disruptive Technology: The Use of Augmented, Virtual, and Mixed Reality (HoloLens) for Disease Education. *Advances in Experimental Medicine and Biology*, *1317*, 147–162. https://doi.org/10.1007/978-3-030-61125-5_8

Studt, E. (2021). Virtual Reality Documentaries and the Illusion of Presence. *Studies in Documentary Film*, *15*(2), 175–185. https://doi.org/10.1080/17503280.2021.1923147

Subburaj, K. (2024). *Smart VR/AR/MR Systems for Professionals* (1st edition). CRC Press.

Suh, A., Wagner, C., & Liu, L. (2018). Enhancing User Engagement through Gamification. *The Journal of Computer Information Systems*, *58*(3), 204–213. https://doi.org/10.1080/08874417.2016.1229143

Sujon, H., Uzzaman, M. N., Banu, S., Islam, M. R., Asaduzzaman, M., Ahmed, A., Uddin, A., & Sarker, M. H. R. (2022). Professional Development of Health Researchers During the COVID-

19 Pandemic: Challenges and Prospects of Synchronous Online Learning. *Journal of Continuing Education in the Health Professions*, *42*(1), e1. https://doi.org/10.1097/CEH.0000000000000407

Suler, J. (2004). The Online Disinhibition Effect. *Cyberpsychology & Behavior: The Impact of the Internet, Multimedia and Virtual Reality on Behavior and Society*, *7*(3), 321–326. https://doi.org/10.1089/1094931041291295

Superbright. (2022, July 8). *Why International Diplomacy Is Looking to the Metaverse to Help Build Peace*. Little Black Book. https://lbbonline.com/news/why-international-diplomacy-is-looking-to-the-metaverse-to-help-build-peace

Susen, S. (2020). The Place of Space in Social and Cultural Theory. In A. Elliott (Ed.), *Routledge Handbook of Social and Cultural Theory* (2nd edition, pp. 341–366). Routledge.

Suzuki, M. (2022). The Limits of Humanisation: 'Ideal' Figures of the Refugee and Depoliticisation of Displacement in Virtual Reality Film Clouds Over Sidra. *European Journal of Cultural Studies*, *25*(5), 1266–1285. https://doi.org/10.1177/13675494221076542

Svenson, N. A. (2016). *The United Nations as a Knowledge System*. Routledge.

Swallow, M., & Zulu, S. (2024). Enhancing Collaboration and Engagement Using Virtual Reality Within Site Safety Planning. *Proceedings of the Institution of Civil Engineers - Management, Procurement and Law*, 1–9. https://doi.org/10.1680/jmapl.23.00105

Swann, P. G. M., & Watts, T. P. (2023). Visualization Needs Vision: The Pre-Paradigmatic Character of Virtual Reality. In S. Woolgar, *Virtual Society?: Technology, Cyberbole, Reality* (1st ed.). Oxford University Press. https://doi.org/10.1093/oso/9780199248759.001.0001

Sykownik, P., Graf, L., Zils, C., & Masuch, M. (2021). The Most Social Platform Ever? A Survey about Activities & Motives of Social VR Users. *2021 IEEE Virtual Reality and 3D User Interfaces (VR)*, 546–554. https://doi.org/10.1109/VR50410.2021.00079

Tatarinov, K., & Ambos, T. C. (2022). Innovation for Impact: An International Business Perspective on Transforming the United Nations. *A I B Insights*, *22*(2), 1–6. https://doi.org/10.46697/001c.31014

Tatarinov, K., Ambos, T. C., & Tschang, F. T. (2023). Scaling Digital Solutions for Wicked Problems: Ecosystem Versatility. *Journal of International Business Studies*, *54*(4), 631–656. https://doi.org/10.1057/s41267-022-00526-6

Tatnall, A. D. (2010). Using Actor-Network Theory to Understand the Process of Information Systems Curriculum Innovation. *Education and Information Technologies*, *15*(4), 239–254. https://doi.org/10.1007/s10639-010-9137-5

Tatnall, A., & Lepa, J. (2003). The Internet, E-Commerce and Older People: An Actor-Network Approach to Researching Reasons for Adoption and Use. *Logistics Information Management*, *16*(1), 56–63. https://doi.org/10.1108/09576050310453741

Taylor, S. E. (2011). Social Support: A Review. In H. S. Friedman (Ed.), *The Oxford Handbook of Health Psychology* (pp. 190–214). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780195342819.013.0009

Technical Education and Skills Development Authority (TESDA). (2023, September 8). *Tesda Launches Use of XR Tech in TVET*. TESDA Philippines. https://www.tesda.gov.ph/Gallery/Details/12386

Tellidis, I., & Kappler, S. (2016). Information and Communication Technologies in Peacebuilding: Implications, Opportunities and Challenges. *Cooperation and Conflict*, *51*(1), 75–93. https://doi.org/10.1177/0010836715603752

Thapa, D. (2011). The Role of ICT Actors and Networks in Development: The Case Study of a Wireless Project in Nepal. *The Electronic Journal of Information Systems in Developing Countries*, *49*(1), 1–16. https://doi.org/10.1002/j.1681-4835.2011.tb00345.x

The Economist. (2020). Zoom Diplomacy. *The Economist Intelligence Unit N.A., Incorporated*, *435*(9189), 28–28.

The power of VR for adult learning | ITCILO. (n.d.). Retrieved 2 August 2023, from https://www.itcilo.org/stories/power-vr-adult-learning

Thrift, N. (2007). *Non-Representational Theory: Space, Politics, Affect*. Taylor & Francis Group.

Timcke, S. (2021). *Algorithms and the End of Politics: How Technology Shapes 21st Century American Life* (1st edition). University Press.

Todupunuri, A. (2024). Artificial Intelligence Ethics: Investigating Ethical Frameworks, Bias Mitigation, and Transparency in AI Systems to Ensure Responsible Deployment and Use of AI Technologies. *International Journal of Innovative Research in Science, Engineering and Technology*, *13*(9), 1–14. https://doi.org/10.15680/IJIRSET.2024.1309002

Toshkov, D. (2016a). *Research design in political science*. Palgrave.

Toshkov, D. (2016b). *Research Design in Political Science*. Palgrave.

Triberti, S., Sapone, C., & Riva, G. (2025). Being There but Where? Sense of Presence Theory for Virtual Reality Applications. *Humanities and Social Sciences Communications*, *12*(1), 79. https://doi.org/10.1057/s41599-025-04380-3

Turkle, S. (1994). Constructions and Reconstructions of Self in Virtual Reality: Playing in the Muds. *Mind, Culture, and Activity*, *1*(3), 158–167. https://doi.org/10.1080/10749039409524667

Umar, A. (2022). *Metaverse for UN SDGs – An Exploratory Study*.

UN Department of Operational Support. (2022). *What is Unite XR Programme?* United Nations Global Service Centre (UNGSC). https://www.ungsc.org/in_focus_4

UN DPPA Innovation Cell (Director). (2022). *The State of Global Peace* [VR].

UN DPPA Innovation Cell and Gusano Films (Director). (2021, December). *Pathways to Columbia* [VR]. UN DPPA Innovation Cell. https://vimeo.com/667798221

UN DPPA Innovation Cell and UNITAMS (Director). (2021). *Sudan Now* [VR].

UN DPPA Innovation Cell, Phoria and Government of Japan. (Director). (2023). *Sea of Islands* [VR]. futuringpeace.org/VR/SeaOfIslands/

UN DPPA Innovation Cell, UN Country Team in Chad, & Qualium Systems (Directors). (2023). *Solidarity for Chad* [VR]. UN DPPA Innovation Cell. https://vimeo.com/667798221

UN DPPA Innovation Cell, UNSCOL, & Qualium Systems (Directors). (2023). *Dreaming of Lebanon* [VR]. UN DPPA Innovation Cell. https://vimeo.com/667798221

UN Futures Lab Network. (2023). *UN Futures Lab UN Strategic Foresight Guide*. United Nations and Ministry of Foreign Affairs of Finland. https://drive.google.com/file/d/1PII4XslOfhRFXm-r-6QdIFkWFOzkVwDQ/view?usp=drive_link&usp=embed_facebook

UN Futures Lab Network. (2024). *UN Futures Lab*. UN Futures Lab. https://un-futureslab.org/

UN Global Digital Compact. (2025). *AI Panel and Dialogue*. Global Digital Compact; Global Digital Compact. https://www.un.org/global-digital-compact/en/ai

UN High-Level Panel on Digital Cooperation. (2019). *The Age of Digital Interdependence: Report of the UN Secretary-General's High-Level Panel on Digital Cooperation*. United Nations. https://digitallibrary.un.org/record/3865925

UN Innovation Network (Director). (2020a, April 17). *TechLearnTalk—An Introduction to Virtual Reality* [Video recording]. https://www.youtube.com/watch?v=a-voWs7Beuc

UN Innovation Network (Director). (2020b, April 20). *Virtual Reality—Case Study—VR for training (IAEA)* [Video recording]. https://www.youtube.com/watch?v=NgkBzOG92nM

UN Innovation Network (Director). (2023a). *Virtual Reality—Case Study—VR for Security Council Briefings (UN DPPA)* [Video recording]. https://www.youtube.com/watch?v=nfJAr6MnnTQ

UN Innovation Network (Director). (2023b, September 7). *Building Institutional Capabilities on Emerging Technologies and Novel Approaches* [Video recording]. https://www.youtube.com/watch?v=UXiqZ8Jyw2g

UN Innovation Network. (2024a). *UN Innovation Network*. https://www.uninnovation.network/

UN Innovation Network. (2024b). *Welcome to the UN Innovation Network*. https://www.uninnovation.network/

UN Office on Drugs and Crime (UNODC). (2018, June 1). *Blended Learning in UNODC Capacity Development*. https://www.unodc.org/elearning/en/news.html

UN SDG Action Campaign [@SDGaction]. (2018, June 5). *Check out @UnitedNationsVR selections for #EDD18!* [Tweet]. Twitter. https://x.com/SDGaction/status/1003939399795724289

UN Secretary General. (2020, June). *Report of the Secretary-General Roadmap for Digital Cooperation*. https://www.un.org/en/content/digital-cooperation-roadmap/assets/pdf/Roadmap_for_Digital_Cooperation_EN.pdf

UN Trade and Development. (2025). Training and Capacity Building. *UNCTAD*. https://unctad.org/topic/training-and-capacity-building#:~:text=%23%20We%20provide%20capacity,and%20skills%20for%20sustainable%20development

UNAI. (2021). UNAI Digital Dialogue Series: Future of Diplomacy after COVID-19. *United Nations Academic Impact*. https://www.un.org/en/academic-impact/unai-digital-dialogue-series-future-diplomacy-after-covid-19

UNDP. (2012, December 10). *Project Document. Focusing on Results: Regional Support Facility for Improving the Capacity to Make Real Progress on Roma Inclusion. Version 4.*

UNDP. (2018a). *UNDP Strategic Plan 2018-2021*. UNDP. https://popp.undp.org/document/4086/download

UNDP. (2018b, October 10). *Robot Sophia, UN's First Innovation Champion, Visited Armenia | United Nations Development Programme* [UNDP]. https://www.undp.org/armenia/news/robot-sophia-uns-first-innovation-champion-visited-armenia

UNDP. (2019). *UNDP Digital Strategy: Future Forward*. UNDP. https://digitalstrategy.undp.org/documents/UNDP-digital-strategy-2019.pdf

UNDP. (2022). *UNDP Digital Strategy 2022-2025*. UNDP. https://digitalstrategy.undp.org/documents/Digital-Strategy-2022-2025-Full-Document_ENG_Interactive.pdf

UNDP. (2025a). *Service offerings: Expertise*. UNDP Institutional Website. https://www.undp.org/expertise

UNDP. (2025b). *UNDP: About Us* [Institutional website]. UNDP. https://www.undp.org/about-us

UNDP Europe and Central Asia. (2025). *Development Impact: Innovation* [Institutional website]. UNDP. https://www.undp.org/eurasia/our-focus/development-impact/innovation

UNDP in Europe and Central Asia. (2018, April 11). *'I Am Fatmira' Premieres at European Parliament*. Facebook. https://www.facebook.com/watch/?v=10155557412503174

UNDP Innovation Facility. (2018). *Moon Shots and Puddle Jumps* [2017-2018 Year in Review]. UNDP. https://www.undp.org/publications/undp-innovation-facility-year-review

UNDP IRH. (2018). *Request For Quotations (RFQ) (Goods & Services)*. https://procurement-notices.undp.org/view_file.cfm?doc_id=139593

UNDP Kazakhstan. (2023, July 17). UNDP and Kazakhstan Mark Successful Partnership at the UN High-Level Political Forum on Sustainable Development [Institutional website]. *UNDP*. https://www.undp.org/kazakhstan/press-releases/undp-and-kazakhstan-mark-successful-partnership-un-high-level-political-forum-sustainable-development

UNDP LaoPDR (Director). (2016). *The Bombs Below—English Version* [Video recording]. https://www.youtube.com/watch?v=mzkPvIrzyqk

UNDP Serbia. (2025, January 13). Innovations in the Serbian Healthcare with HoloLens Technology [Institutional website]. *UNDP*. https://www.undp.org/serbia/stories/innovations-serbian-healthcare-hololens-technology

UNDPPA. (2022). *Futuring Peace: Immersive Witnessing and the Future of Briefings*. DPPA Innovation. https://www.futuringpeace.org

UNEP (Director). (2020). *Meet Your Carbon Footprint* [VR]. United Nations Environment Programme (UNEP).

UNEP. (2023). *Greening the Blue Report: The UN System's Environmental Footprint and Efforts to Reduce It*. https://doi.org/10.59117/20.500.11822/44485

UNESCO Core Data Portal. (2025). *Project: Virtual Museum of Stolen Cultural Objects Details*. https://core.unesco.org/en/project/505GLO4000

UNGSC-TTDU Technology Training Development Unit (Director). (2021a, February 9). *Unite XR Programme* [Video recording]. https://www.youtube.com/watch?v=L1andTFwRHs

UNGSC-TTDU Technology Training Development Unit (Director). (2021b, February 9). *Unite XR Programme* [Video recording]. https://www.youtube.com/watch?v=L1andTFwRHs

UNHCR. (2022). *UNHCR and the European Union launch 360-degree interactive film on Venezuelan displacement in Ecuador*. UNHCR Global Website. https://www.unhcr.org/news/announcements/unhcr-and-european-union-launch-360-degree-interactive-film-venezuelan

UNIN. (2022). *Virtual Reality Airtable*. Airtable. https://airtable.com/appITwkdR0WC3n87R/shrkLqoeo33dDkDga/tbloViZY03ESVbryX

UNIN. (2023). *UN Innovation Toolkit* [Data set].

United Nations. (2018a). *UN Secretary-General's Strategy on New Technologies*. https://www.un.org/en/newtechnologies/

United Nations (Director). (2018b, July 12). *Launch of a High-level Panel on Digital Cooperation* [Video recording]. https://www.youtube.com/watch?v=_OXGVk0Veww

United Nations. (2020a). *The Impact of Digital Technologies* (UN75: 2020 and Beyond). United Nations. https://www.un.org/sites/un2.un.org/files/2019/10/un75_new_technologies.pdf

United Nations. (2020b). *The State of Global Peace and Security in Line with the Central Mandates Contained in the Charter of the United Nations.* [Secretary General Report]. United Nations.

United Nations. (2021). *Our Common Agenda. Report of the Secretary-General*. https://www.un.org/en/content/common-agenda-report/assets/pdf/Common_Agenda_Report_English.pdf

United Nations. (2022). *General Assembly, Proposed Programme Budget for 2022, Part VII Global Communications, Section 28* (No. A/76/6). United Nations.

United Nations. (2023a). *A Global Digital Compact — an Open, Free and Secure Digital Future for All: Our Common Agenda Policy Brief 5* (UN Executive Office of the Secretary-General (EOSG) Policy Briefs and Papers Nos 23–07759; UN Executive Office of the Secretary-General (EOSG) Policy Briefs and Papers). https://doi.org/10.18356/27082245-28

United Nations. (2023b). *UN 2.0 Homepage*. UN 2.0. https://un-two-zero.network/

United Nations. (2024a). *Office of the Secretary-General's Envoy on Technology*. United Nations. https://www.un.org/techenvoy/

United Nations. (2024b). *UN 2.0. Evolving for Impact: Skills and Culture for Tomorrow.* https://www.un.org/two-zero/en

United Nations. (2024c). *Un Executive Briefing on Unlocking the Potential of Virtual Worlds and the Metaverse for the Sustainable Development Goals*. ITU, World Bank, UNECE, ITCILO, UN Futures Lab Network, WMO, UNICC, WIPO, UNICEF, UN Tourism, UNU, UNDPPA, UNIN, United Nations Guatemala, FAO, UNESCWA, UNFCCC and its interagency initiative Resilience Frontiers and UNRISD. https://www.itu.int/net/epub/TSB/2024-UN-Executive-Briefing-on-unlocking-potential/index.html

United Nations. (2025). *United to Reform*. UN Resources. https://reform.un.org/content/resources

United Nations AI Advisory Body. (2024). *Govering AI for Humanity: Final Report*. United Nations.

United Nations Human Settlements Programme (UN Habitat), & Vasko, V. (2021). *Guide to Deliver Capacity-Building Using Digital Tools* (No. HS/050/21E). https://unhabitat.org/sites/default/files/2022/02/un-habitat_guide_to_deliver_capacity-building_using_digital_tools_2021.pdf

United Nations Mission in South Sudan (UNMISS) (Director). (2024). *Frontlines of Peace* [VR]. https://www.youtube.com/watch?v=NqiDOv6VBqw&ab_channel=UnitedNations

United Nations Office at Geneva. (2023). *Review of Expanded Meeting Modalities at the United Nations Office at Geneva*. https://www.ungeneva.org/sites/default/files/2024-01/Report-expanded-meeting-modalities-final.pdf

United Nations Peacekeeping. (2021). *Strategy for the Digital Transformation of UN Peacekeeping*. United Nations Peacekeeping. https://peacekeeping.un.org/en/strategy-digital-transformation-of-un-peacekeeping

United Nations Secretariat. (2018, September). *UN Secretary-General's Strategy on New Technologies*. https://www.un.org/en/newtechnologies/

United Nations System Staff College, & Duman, P. (2022, November 30). *Driving Sustainable Development and Climate Action Through Virtual Reality and Interactive 360-Degree Videos*. https://www.unssc.org/news-and-insights/blog/driving-sustainable-development-and-climate-action-through-virtual-reality

United Nations System Staff College (UNSSC), & Duman, P. (2022, November 30). *Driving Sustainable Development and Climate Action Through Virtual Reality and Interactive 360-Degree Videos*. https://www.unssc.org/news-and-insights/blog/driving-sustainable-development-and-climate-action-through-virtual-reality

Unnithan, C., & Tatnall, A. (2014). Actor-Network Theory (ANT) Based Visualisation of Socio-Technical Facets of RFID Technology Translation: An Australian Hospital Scenario. *International Journal of Actor-Network Theory and Technological Innovation*, *6*(1), 31–53. https://doi.org/10.4018/ijantti.2014010103

UNVR. (2019). *VR Films*. http://unvr.sdgactioncampaign.org/vr-films/

Unwin, T. (2009). *ICT4D: Information and Communication Technology for Development*. University Press.

Unwin, T. (2017). A Critical Reflection on ICTs and 'Development'. In T. Unwin (Ed.), *Reclaiming Information and Communication Technologies for Development* (pp. 1–30). Oxford University Press. https://doi.org/10.1093/oso/9780198795292.003.0001

U.S. Department of Veterans Affairs. (2024). *Virtual Reality for Prevention of Sexual Harassment Training*. VA Diffusion Marketplace. https://marketplace.va.gov/innovations/virtual-reality-for-prevention-of-sexual-harassment-training

Uskali, T., Gynnild, A., Jones, S., & Sirkkunen, E. (2020). *Immersive Journalism As Storytelling: Ethics, Production, and Design*. Taylor & Francis Group.

Valbjørn, M. (2017). Dialoguing about Dialogues: On the Purpose, Procedure and Product of Dialogues in Inter-National Relations Theory. *International Studies Review*, *19*(2), 291–296.

Valmorisco, S., Raya, L., & Sanchez, A. (2024). Enabling Personalized VR Experiences: A Framework for Real-Time Adaptation and Recommendations in VR Environments. *Virtual Reality*, *28*(3), 1–19. https://doi.org/10.1007/s10055-024-01020-0

van Brakel, V., Barreda-Angeles, M., & Hartmann, T. (2021). Successful Knowledge Exchange in Virtual Teams-How Important Is Social Presence? *Zeitschrift für Arbeitswissenschaft*, *75*(4), 424–437. https://doi.org/10.1007/s41449-021-00280-9

Van Daele, J. (2008). The International Labour Organization (ILO) in Past and Present Research. *International Review of Social History*, *53*(3), 485–511. https://doi.org/10.1017/S0020859008003568

Van Damme, K., All, A., De Marez, L., & Van Leuven, S. (2019). 360° Video Journalism: Experimental Study on the Effect of Immersion on News Experience and Distant Suffering. *Journalism Studies (London, England)*, *20*(14), 2053–2076. https://doi.org/10.1080/1461670X.2018.1561208

van den Berg, M., Masthoff, J., & van Nimwegen, C. (2020). *The Role of Task Complexity and Personality in the Effect of Co-Presence*. Presence 2020: Presence During and After the Pandemic, Online. http://matthewlombard.com/ISPR/Proceedings/2020/P2020_van-den-Berg.pdf

van der Veer, R., & Meibauer, G. (2024). Technocracy, Populism, and the (de)Legitimation of International Organizations. *European Journal of International Relations*, *30*(4), 946–971. https://doi.org/10.1177/13540661241278208

Van Loon, A., Bailenson, J., Zaki, J., Bostick, J., & Willer, R. (2018a). Virtual Reality Perspective-Taking Increases Cognitive Empathy for Specific Others. *PloS One*, *13*(8), e0202442. https://doi.org/10.1371/journal.pone.0202442

Van Loon, A., Bailenson, J., Zaki, J., Bostick, J., & Willer, R. (2018b). Virtual Reality Perspective-Taking Increases Cognitive Empathy for Specific Others. *PloS One*, *13*(8), e0202442–e0202442. https://doi.org/10.1371/journal.pone.0202442

Vasarainen, M., Paavola, S., & Vetoshkina, L. (2021a). A Systematic Literature Review on Extended Reality: Virtual, Augmented and Mixed Reality in Working Life. *International Journal of Virtual Reality*, *21*(2), Article 2. https://doi.org/10.20870/IJVR.2021.21.2.4620

Vasarainen, M., Paavola, S., & Vetoshkina, L. (2021b). A Systematic Literature Review on Extended Reality: Virtual, Augmented and Mixed Reality in Working Life. *International Journal of Virtual Reality*, *21*(2), Article 2. https://doi.org/10.20870/IJVR.2021.21.2.4620

Vaubel, R. (2006). Principal-Agent Problems in International Organizations. *Review of International Organizations*, *1*(2), 125–138. https://doi.org/10.1007/s11558-006-8340-z

Veen, M. van der. (2025). *Augmented Reality: Für eine Kunstgeschichte der Kollision von Bild und Umgebung* (1st ed.). Verlag Ferdinand Schöningh.

Ventura, S., Cardenas, G., Miragall, M., Riva, G., & Baños, R. (2021). How Does It Feel to Be a Woman Victim of Sexual Harassment? The Effect of 360°-Video-Based Virtual Reality on Empathy and Related Variables. *Cyberpsychology, Behavior, and Social Networking*, *24*(4), 258–266. https://doi.org/10.1089/cyber.2020.0209

Venturini, T., Bounegru, L., Jacomy, M., & Gray, J. (2017). How to Tell Stories with Networks Exploring the Narrative Affordances of Graphs with the Iliad: Studying Culture through Data. In *The Datafied Society* (pp. 155–170). https://doi.org/10.1515/9789048531011-014

Verma, P. (2022, April 19). Your Next Sexual Harassment Training Could Be in Virtual Reality. *The Washington Post*.

Vilhalva de Campos, L. (2021, February 23). *Exploring the Challenges of Digital Media for Humanitarian Activism in the Western World » Relações Internacionais*. https://relacoesexteriores.com.br/challenges-digital-media-humanitarian-activism/

Vlachopoulos, D., & Makri, A. (2017). The Effect of Games and Simulations on Higher Education: A Systematic Literature Review. *International Journal of Educational Technology in Higher Education*, *14*(1), 1–33. https://doi.org/10.1186/s41239-017-0062-1

Vohra, M. (2025). *Introduction to Extended Reality (XR) Technologies.* (1st ed.). John Wiley & Sons, Incorporated. https://doi.org/10.1002/9781119857716

Volkoff, O., Strong, D. M., & Elmes, M. B. (2007). Technological Embeddedness and Organizational Change. *Organization Science (Providence, R.I.)*, *18*(5), 832–848. https://doi.org/10.1287/orsc.1070.0288

Vuorela, T. (2005). Laughing Matters: A Case Study of Humor in Multicultural Business Negotiations. *Negotiation Journal*, *21*(1), 105–130. https://doi.org/10.1111/j.1571-9979.2005.00049.x

Wagler, A., & Hanus, M. D. (2018). Comparing Virtual Reality Tourism to Real-Life Experience: Effects of Presence and Engagement on Attitude and Enjoyment. *Communication Research Reports*, *35*(5), 456–464. https://doi.org/10.1080/08824096.2018.1525350

Wajcman, J. (2000). Reflections on Gender and Technology Studies: In What State Is the Art? *Social Studies of Science*, *30*(3), 447–464. https://doi.org/10.1177/0306312700030003005

Walewijns, D., Heirman, W., & Daneels, R. (2023). To Give or Not to Give: Examining the Prosocial Effects of a 360° Video Endorsing a Clean Water Charity. *Computers In Human Behavior*, *145*(C), 107758.

Walk, M., Cart-Turner, L., Peterson, E., & Klippel, A. (2024). Organizational Change in the Nonprofit Context: A Scoping Review of the Literature. *Nonprofit and Voluntary Sector Quarterly*. https://doi.org/10.1177/08997640241285369

Walsham, G. (1997). Actor-Network Theory and IS Research: Current Status and Future Prospects. In A. S. Lee, J. Liebenau, & J. I. DeGross (Eds), *Information Systems and Qualitative Research: Proceedings of the IFIP TC8 WG 8.2 International Conference on Information Systems and Qualitative Research, 31st May–3rd June 1997, Philadelphia, Pennsylvania, USA* (pp. 466–480). Springer US. https://doi.org/10.1007/978-0-387-35309-8_23

Walsham, G. (2017). Ict4d Research: Reflections on History and Future Agenda. *Information Technology for Development*, *23*(1), 18–41. https://doi.org/10.1080/02681102.2016.1246406

Walshe, R., Casey, K., Kernan, J., & Fitzpatrick, D. (2020). AI and Big Data Standardization: Contributing to United Nations Sustainable Development Goals. *Journal of ICT Standardization*, *8*(2), 77-. https://doi.org/10.13052/jicts2245-800X.821

Walters, W. (2002). The Power of Inscription: Beyond Social Construction and Deconstruction in European Integration Studies. *Millennium*, *31*(1), 83–108. https://doi.org/10.1177/03058298020310010501

Walters, W. (2014). Drone Strikes, Dingpolitik and Beyond: Furthering the Debate on Materiality and Security. *Security Dialogue*, *45*(2), 101–118. https://doi.org/10.1177/0967010613519162

Wang, Y., & Fesenmaier, D. R. (1998). Assessing Motivation of Contribution in Online Communities: An Empirical Investigation of an Online Travel Community. *Electronic Markets*, *8*. https://doi.org/10.1080/1019678032000052934

Weber, W., Dingerkus, F., Fabrikant, S. I., Zampa, M., West, M., & Yildirim, O. (2022). Virtual Reality as a Tool for Political Decision-Making? An Empirical Study on the Power of Immersive Images on Voting Behavior. *Frontiers in Communication*, *7*, 842186. https://doi.org/10.3389/fcomm.2022.842186

Wechsler, T. F., Kümpers, F., & Mühlberger, A. (2019). Inferiority or Even Superiority of Virtual Reality Exposure Therapy in Phobias? A Systematic Review and Quantitative Meta-Analysis on Randomized Controlled Trials Specifically Comparing the Efficacy of Virtual Reality Exposure to Gold Standard in vivo Exposure in Agoraphobia, Specific Phobia, and Social Phobia. *Frontiers in Psychology*, *10*, Article No. 1758. https://doi.org/10.3389/fpsyg.2019.01758

Weinhardt, C. (2015). Relational Trust in International Cooperation: The Case of North-South Trade Negotiations. *Journal of Trust Research*, *5*(1), 27–54. https://doi.org/10.1080/21515581.2015.1007460

Weiss, C. (2005). Science, Technology and International Relations. *Technology in Society*, *27*(3), 295–313. https://doi.org/10.1016/j.techsoc.2005.04.004

Weiss, C. (2015). How Do Science and Technology Affect International Affairs? *Minerva*, *53*(4), 411–430. https://doi.org/10.1007/s11024-015-9286-1

Weiss, T. G., Carayannis, T., & Jolly, R. (2009). The 'Third' United Nations. *Global Governance*, *15*(1), 123–142.

Weiss, T. G., & Wilkinson, R. (2014). Rethinking Global Governance? Complexity, Authority, Power, Change. *International Studies Quarterly*, *58*(1), 207–215.

Weitzberg, K. (2025). Keeping People Out of Camps: Biometric Technologies, Contested Sovereignty, and Border Practices Within Humanitarian Spaces. *Journal of Ethnic and Migration Studies*, *51*(14), 3590–3609. https://doi.org/10.1080/1369183X.2025.2513155

Wendt, A. E. (1987). The Agent-Structure Problem in International Relations Theory. *International Organization*, *41*(3), 335–370. https://doi.org/10.1017/S002081830002751X

Werbach, K. (with Hunter, D.). (2020). *For the Win: The Power of Gamification and Game Thinking in Business, Education, Government, and Social Impact* (Revised and updated edition). Wharton School Press. https://doi.org/10.9783/9781613631041

Werthes, S. (2022). The United Nations: In Between International and Global Governance. In J. Rüland & A. Carrapatoso, *Handbook on Global Governance and Regionalism* (pp. 118–136). Edward Elgar Publishing.

Western Governors University. (2021, July 31). VR Simulation Gives Students Fail-Safe Practice. *Western Governors University*. https://www.wgu.edu/blog/tclc/human-led-avatars-provide-practice-teaching2108.html

Westley, F., & Antadze, N. (2010). Making a Difference: Strategies for Scaling Social Innovation for Greater Impact. *The Innovation Journal*, *15*(2).

WFP Global Logistics Cluster. (2021, April 21). Exploring the New Frontiers of Virtual Reality: The First Emergency Logistics Full-Scale Simulation Training. *Logistics Cluster*. https://appserver-5d3b455f-nginx-c5cdac7f39a64b6cbb66fb3a6716d65e:15659/exploring-the-new-frontiers-of-virtual-reality/

Wheeler, N. J. (2018). *Trusting Enemies: Interpersonal Relationships in International Conflict* (1st edition). University Press.

White, M. A. (2015). Virus. In M. B. Salter, *Making Things International 1: Circuits and Motion* (pp. 141–155). University of Minnesota Press.

Wienrich, C., Döllinger, N., & Hein, R. (2021). Behavioral Framework of Immersive Technologies (BehaveFIT): How and Why Virtual Reality can Support Behavioral Change Processes. *Frontiers in Virtual Reality*, *2*. https://doi.org/10.3389/frvir.2021.627194

Wille, T. (2016). Diplomatic Cable. In M. B. Salter, *Making Things International 2: Catalysts and Reactions* (pp. 166–178). University of Minnesota Press.

Williams, I. (2020a). Contemporary Application of ANT: An Introduction. In I. Williams (Ed.), *Contemporary Applications of Actor Network Theory* (pp. 1–13). Springer Nature. https://doi.org/10.1007/978-981-15-7066-7_1

Williams, I. (2020b). The Robots Are Here. In I. Williams (Ed.), *Contemporary Applications of Actor Network Theory* (pp. 51–75). Springer Nature. https://doi.org/10.1007/978-981-15-7066-7_4

Williamson, I. (2023, November 19). The Nations Preparing for the Immersive Digital Future. *Consulum Government Advisory*. https://consulum.com/our-thinking/the-nations-preparing-for-the-immersive-digital-future/

Winner, L. (1980). Do Artifacts Have Politics? *Daedalus*, *109*(1), 121–136.

Winther, F., Ravindran, L., Svendsen, K. P., & Feuchtner, T. (2020). *Design and Evaluation of a VR Training Simulation for Pump Maintenance Based on a Use Case at Grundfos*. 9. https://doi.org/10.1109/VR46266.2020.1580939036664

Wobcke, W., Compton, C., Johns, F., Lamchek, J., & Mariyah, S. (2023). Nowcasting for Hunger Relief: A Study of Promise and Perils. *Information Technology for Development*, *29*(1), 27–47. https://doi.org/10.1080/02681102.2022.2092438

Won, A. S., Bailenson, J., Lee, J., & Lanier, J. (2015). Homuncular Flexibility in Virtual Reality. *Journal of Computer-Mediated Communication*, *20*(3), 241–259. https://doi.org/10.1111/jcc4.12107

Wong, C. M. L., & Lockie, S. (2018). Sociology, Risk and the Environment: A Material-Semiotic Approach. *Journal of Risk Research*, *21*(9), 1077–1092. https://doi.org/10.1080/13669877.2017.1422783

Wong, S. S. (2020). Mapping the Repertoire of Emotions and Their Communicative Functions in Face-to-face Diplomacy. *International Studies Review*, *22*(1), 77–97. https://doi.org/10.1093/isr/viy079

World Economic Forum. (2024). *Global Collaboration Village*. https://www.globalcollaborationvillage.org/home

World Economic Forum, & Wyman, O. (2016). *Social Innovation: A Guide to Achieving Corporate and Societal Value*. https://www3.weforum.org/docs/WEF_Social_Innovation_Guide.pdf

World Food Programme. (2024). *Logistics Cluster*. https://www.wfp.org/logistics-cluster

Wright, S. (2015). Exploring Actor-Network Theory and CAQDAS: Provisional Principles and Practices for Coding, Connecting and Describing Data Using Atlas.ti. *Qualitative Data Analysis and Beyond*. ATLAS.Ti User Conference 2015.

Xie, B., Liu, H., Alghofaili, R., Zhang, Y., Jiang, Y., Lobo, F. D., Li, C., Li, W., Huang, H., Akdere, M., Mousas, C., & Yu, L.-F. (2021). A Review on Virtual Reality Skill Training Applications. *Frontiers in Virtual Reality*, *2*, Article No. 645153. https://doi.org/10.3389/frvir.2021.645153

Yang, Y., Asaad, Y., & Dwivedi, Y. (2017). Examining the impact of gamification on intention of engagement and brand attitude in the marketing context. *Computers in Human Behavior*, *73*, 459–469. https://doi.org/10.1016/j.chb.2017.03.066

Yee, N., & Bailenson, J. (2007a). The Proteus Effect: The Effect of Transformed Self-Representation on Behavior. *Human Communication Research*, *33*(3), 271–290. https://doi.org/10.1111/j.1468-2958.2007.00299.x

Yee, N., & Bailenson, J. (2007b). The Proteus Effect: The Effect of Transformed Self-Representation on Behavior. *Human Communication Research*, *33*(3), 271–290. https://doi.org/10.1111/j.1468-2958.2007.00299.x

Yee, N., Bailenson, J. N., & Ducheneaut, N. (2009). The Proteus Effect: Implications of Transformed Digital Self-Representation on Online and Offline Behavior. *Communication Research*, *36*(2), 285–312. https://doi.org/10.1177/0093650208330254

Yildirim, C. (2021). *An Immersive Model of User Trust in Conversational Agents in Virtual Reality*. 17–18. https://doi.org/10.1109/TransAI51903.2021.00011

Yin, R. K. (2018a). *Case Study Research and Applications: Design and Methods* (Sixth edition.). Sage.

Yin, R. K. (2018b). *Case Study Research and Applications: Design and Methods* (6th edition). Sage.

Yin, Z. H., & Choi, C. H. (2023). Does Digitalization Contribute to Lesser Income Inequality? Evidence from G20 Countries. *Information Technology for Development*, *29*(1), 61–82. https://doi.org/10.1080/02681102.2022.2123443

Yoo, S.-C., & Drumwright, M. (2018a). Nonprofit Fundraising with Virtual Reality. *Nonprofit Management & Leadership*, *29*(1), 11–27. https://doi.org/10.1002/nml.21315

Yoo, S.-C., & Drumwright, M. (2018b). Nonprofit Fundraising with Virtual Reality. *Nonprofit Management & Leadership*, *29*(1), 11–27. https://doi.org/10.1002/nml.21315

Young, G. W., O'Dwyer, N., & Smolic, A. (2021). Exploring Virtual Reality for Quality Immersive Empathy Building Experiences. *Behaviour & Information Technology*, *41*(16), 3415–3431. https://doi.org/10.1080/0144929X.2021.1993336

Young, O. R. (2017). The United Nations and the International System. In *The United Nations in International Politics* (pp. 10–59). Princeton University Press. https://doi.org/10.1515/9781400886241-002

Zaalberg, R., & Midden, C. J. H. (2013). Living Behind Dikes: Mimicking Flooding Experiences. *Risk Analysis*, *33*(5), 866–876. https://doi.org/10.1111/j.1539-6924.2012.01868.x

Zajonc, R. B. (1980). Feeling and Thinking: Preferences Need No Inferences. *The American Psychologist*, *35*(2), 151–175. https://doi.org/10.1037/0003-066X.35.2.151

Zamanifard, S., & Freeman, G. (2019). 'The Togetherness that We Crave': Experiencing Social VR in Long Distance Relationships. *Conference Companion Publication of the 2019*, 438–442. https://doi.org/10.1145/3311957.3359453

Zamanifard, S., & Robb, A. (2023). Social Virtual Reality Is My Therapist: Overcoming Social Anxiety Disorder Through Using Social Virtual Reality. *Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems*, 1–6. https://doi.org/10.1145/3544549.3585888

Zarka, O. M., & Shah, Z. J. (2016). Virtual Reality Cinema: A Study. *IJRAR- International Journal of Research and Analytical Reviews*, *3*(2).

Zhang, G., Cao, J., Liu, D., & Qi, J. (2022). Popularity of the Metaverse: Embodied Social Presence Theory Perspective. *Frontiers in Psychology*, *13*. https://www.frontiersin.org/articles/10.3389/fpsyg.2022.997751

Zhao, Y., Li, Y., Dai, T., Sedini, C., Wu, X., Jiang, W., Li, J., Zhu, K., Zhai, B., Li, M., & Lc, R. (2025). Virtual Reality in Heritage Education for Enhanced Learning Experience: A Mini-Review and Design Considerations. *Frontiers in Virtual Reality*, *6*. https://doi.org/10.3389/frvir.2025.1560594

Zhenmin, L. (2018, December). Frontier Technologies: A Window of Opportunity for Leapfrogging! *UN Chronicles*, *Vol. LV: New Technologies: Where To?* https://www.un.org/en/un-chronicle/frontier-technologies-window-opportunity-leapfrogging

Zhuk, A. (2024). Ethical Implications of AI in the Metaverse. *AI and Ethics*, 1–12. https://doi.org/10.1007/s43681-024-00450-5