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**“Learning Through University-Business Collaboration:
Case Studies from the University of Oxford”**

**Thesis submitted for the award of
Doctor of Philosophy**

This thesis is dedicated to the loving memory of my Mum, June Morris, who passed away during the course of this research; to my younger son Ryan, who is soon to embark on his own university journey; and to my granddaughter Cassie, born during the course of this research, who has a lifetime of learning ahead of her.

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ABSTRACT

In the UK, like other advanced economies, university-business collaborations in research and development (R&D) activities have an increasingly important role to play in driving innovation and providing wider benefits to the economy and society. The future development of university approaches and the policy framework to support further expansion of these activities needs to be informed by a greater understanding of the processes involved. However, given that previous research into the internal dynamics of university-business collaborations is limited, this study adopts a learning perspective to investigate *how* interactions within such collaborations influence their outcomes, drawing on a diverse sample of case studies from the University of Oxford.

The findings demonstrate how the dynamic and highly interactive nature of collaborative learning requires positive and agile relationships to be maintained throughout, particularly when faced with challenges or with opportunities to exploit unforeseen learning. At their core, effective collaborative relationships are shown to rest on the building of partner motivation and trust and through the appropriate use of social power bases. In practice these are mediated by collaborative structures and communication that in turn are shaped by approaches to leadership and management. The resulting learning outcomes are shown to be far wider than are commonly captured, despite systemic constraints on some aspects of academic engagement. Following this analysis, recommendations are made for the development of university approaches with renewed emphasis on collaborative learning.

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LIST OF ABBREVIATIONS

Case Studies and Participants:

- | | | |
|----|--|---|
| 1. | Hum 1
APM
OPM
OS
PC 1/2
PO | Humanities 1
Academic Project Manager
Organisational Project Manager
Organisational Sponsor
Project Contributor 1/2
Project Officer |
| 2. | MPLS 1
GSE
KEF | Mathematical, Physical and Life Sciences 1
Group Scientific Expert
Knowledge Exchange Fellow |
| 3. | MPLS 2
KEF
PO | Mathematical, Physical and Life Sciences 2
Knowledge Exchange Fellow
Project Officer |
| 4. | MPLS 3
KEF
PIN
PM | Mathematical, Physical and Life Sciences 3
Knowledge Exchange Fellow
Project Intern
Programme Manager |
| 5. | MPLS 4
DCEO
PI | Mathematical, Physical and Life Sciences 4
Deputy Chief Executive Officer
Principal Investigator |
| 6. | MPLS 5
CS
PM
PR
RA | Mathematical, Physical and Life Sciences 5
Co-Sponsor
Project Manager
Postdoctoral Researcher
Research Associate |
| 7. | Med 1
DAL 1/1/3
HBF
Res Asst | Medical Sciences 1
Design Agency Lead 1/2/3
Head of Business Function
Research Assistant |
| 8. | Med 2
PI
DRC | Medical Sciences 2
Principal Investigator
Director of Research Coordination |
| 9. | Soc Sc 1
PM
PR 1/2
RD | Social Sciences 1
Project Manager
Postdoctoral Researcher 1/2
Research Director |

	RM	Research Manager
10.	Soc Sc 2	Social Sciences 2
	CI	Co-Investigator
	CPM	Company Programme Manager
	PI	Principal Investigator
	PC	Project Coordinator
	PD	Project Director
	Rap	Rapporteur

General:

IO	International Organisation
NGO	Non Governmental Organisation
Ox	Oxford (University of)
Org	Organisation
PPP	Public Private Partnership
Univ	University

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CHAPTER 1: INTRODUCTION

1.1 The Context

Within the UK, the wide range of interactions between universities and businesses has continued to rise in recent years (see Fig. 1.1). NCUB¹ reported an increase of 44 per cent in the number of agreements between Higher Education Institutions (HEIs) and business over the six years up to 2019 (when its latest report was published), including a nine per cent increase between HEIs and big business (NCUB, 2019, p.6). This is set in the national context of total spending on research and development (R&D) currently at 1.71 per cent (up from 1.67 per cent in 2017) of Gross Domestic Product (GDP), amounting to a Gross Expenditure on Research and Development (GERD) of £37.1 billion (bn)². A breakdown of this figure shows that of this amount, 68 per cent was spent by business on R&D (a 5.8 per cent increase over the previous year to £25bn), 24 per cent by Higher Education, 7 per cent by Government and UK Research and Innovation (this is in addition to the funding it provides for HE and is spent primarily on UK Government research institutes and laboratories,), and two percent by private non-profits (ONS, 2020a, percentages rounded). This underlines the importance of business funding for research and development and, at the same time, the importance of research and development to business, within the UK.

The Government promotes the view that the UK has been so successful in attracting inward investment for R&D³ because of the high quality of its research base

¹ “The National Centre for Universities and Business (NCUB) is an independent and not-for-profit membership organisation that promotes, develops and supports [university-business collaboration](https://www.ncub.co.uk/who-we-are/who-we-are.html) across the UK” (<https://www.ncub.co.uk/who-we-are/who-we-are.html>).

² Office for National Statistics (2020a), using the latest 2018 data.

³ In its flagship *Industrial Strategy* White Paper the Government highlights that only the USA attracts a great amount of inward investment than the UK (BEIS, 2017, p.17).

(which includes four of the world's 20 top-ranked universities⁴) and its associated hubs for emerging technologies and industries, making it "*a location of choice for businesses at the cutting edge of innovation and technology*" (BEIS, 2017, p.17). However, it also recognises in its *Industrial Strategy* White Paper (BEIS, 2017) that domestic public expenditure as a proportion of GDP needs to rise significantly to keep pace with competitor nations, with both developed and rapidly developing economies, and has committed to increase this to 2.4 per cent of GDP within 10 years (by 2027) and to 3.0 per cent thereafter (*ibid*). In the current climate of the COVID-19 pandemic and with the UK's future trading relationship with the EU, and subsequently with much of the rest of the world, yet to be confirmed after formally leaving the EU in early 2020, it is not possible to extrapolate from previous trends with any certainty. The economic outlook for both business and related investment in R&D will rest heavily on future trade agreements and on the ability to rebuild the economy after the COVID-19 shock. Nonetheless, the Government commitment to raising the level of UK investment in R&D remains intact at the time of writing in light of the UK having been overtaken by many other competitor countries when looked at as a percentage of GDP.

Within Europe, the UK expenditure on R&D as a percentage of GDP is ranked⁵ 14th and sits below the EU average (excluding the UK) of 2.19 per cent. Five European countries (Switzerland, Sweden, Austria, Denmark and Germany) spend over 3.0 per cent. However, given the size of the UK economy (particularly when compared to smaller European nations) it is also useful to look at gross expenditure on R&D, which

⁴ The *Times Higher Education World University Rankings 2021* (THE, 2020) place Oxford 1st, Cambridge 6th, Imperial College 11th and UCL 16th. Other ranking organisations use different metrics and algorithms so the rankings change accordingly. For example, the *QS World University Rankings 2021* place all four of these universities in its top ten, although in the same order (QS, 2020).

⁵ This is based on Eurostat (2020) figures for all European countries (including non EU) using 2018 data, except for Switzerland, which only shows 2017 figures (3.29%).

places the UK 8th globally, but behind European competitors Germany (4th) and France (7th) (2018 data, UNESCO Institute for Statistics, 2020). Whilst the UK's universities and research institutes continue to provide high quality research output, these too are facing increased competition, particularly from China. Only recently, the number of highly cited researchers based in China overtook those based in the UK for the first time by 636 to 516, pushing the UK into third place behind the USA (Clarivate Analytics, *News* posted online 19 November 2019)⁶ and its universities also continue to rise with two now in the top 30 of the *THE World University Rankings 2021*⁷. Whilst it is acknowledged that these statistics do not present a complete picture and need to be interpreted with caution, they nonetheless provide some general indicators of the current context and trends in university-business research and development engagement.

There are two key points that arise from this: the first is that the UK Government is clearly committed to playing an active role in driving up the levels of university-business engagement as a core part of its Industrial Strategy (ibid). To this end it is making more funding available to universities but this is increasingly tied to research impact, through its dual support funding model for universities that includes both block funding linked to their recent track record⁸ and competitive funding to

⁶ Web of Science (part of Clarivate Analytics) publishes an annual list of scientists and social scientists that are in the top 1 per cent of citations for their publications in their field in each year. The *News* post can be accessed at: <https://clarivate.com/news/global-highly-cited-researchers-2019-list-reveals-top-talent-in-the-sciences-and-social-sciences/>

⁷ Tsinghua University is placed 20th and Peking University 23rd. In 2015-16 they were placed 47th and 42nd respectively.

⁸ Scrutiny of this continues to increase through further reporting and assessment of performance. The Government currently intends to augment the already established Research Excellence Framework assessment process and the annual HE-BCI survey with the introduction of a Knowledge Exchange Framework in 2020. For the first exercise, over winter 2020-21, pre-existing data will be used (drawn from the HE-BCI Surveys) to provide an evaluation of the way forward for future years (details can be found at <https://re.ukri.org/knowledge-exchange/knowledge-exchange-framework/>).

support high-impact projects in areas of national priority. At the same time, it is providing more direct support to business commercialisation of R&D through grants, schemes and facilities provided by Innovate UK⁹ (an example of one scheme will be looked at in this research).

Secondly, the UK will need to continue the trend of attracting considerably more R&D investment from businesses from both within the UK and from overseas in an increasingly competitive global environment. For its universities, both of these points mean that they need to continue to expand their business engagement activities. They also need to continue to improve their effectiveness in conducting these in order to maximise the benefits to businesses, whilst at the same time furthering their own research and development capabilities. This incentivises both universities and businesses to engage further and so supports further expansion of this activity. The latter point is the underlying driver for this research but before discussing this further it is necessary to provide greater definition to the activity of interest.

1.2 The Activity of Interest

University-business engagement can include a wide range of activities and within the UK these, along with other university interactions, are grouped under the term ‘knowledge exchange’ for policy purposes, under the lead of Research England.¹⁰ The HE-Business and Community Interaction survey (HE-BCI) captures annual returns from

⁹ Innovate UK is the Government’s Innovation Agency and is part of UKRI, as described in footnote 10, below.

¹⁰ Research England has powers to work jointly with the devolved funding bodies in Scotland (Scottish Funding Council), Wales (Higher Education Funding Council for Wales) and Northern Ireland (Department for the Economy). Along with the seven Research Councils and Innovate UK, Research England is part of UK Research and Innovation (UKRI), a Non Departmental Public Body that is sponsored by the Department for Business, Energy & Industrial Strategy. Further details can be found at: <https://royalsociety.org/-/media/policy/Publications/2019/03-10-19-ukri-explainer.pdf>

all HEIs in receipt of Government funding. The returns and related reports currently provide the best overview of knowledge exchange activities (although the survey is under review between 2019-21) and a summary chart showing the broad categories with total income generated by all HEIs over the last five years of available data is reproduced at Figure 1.1 (HESA, 2020). It shows that contract and collaborative research are consistently the highest earning categories by a considerable margin. In this policy context, contract research is defined as research that is entirely privately funded, whereas collaborative research is partially funded by the public sector.

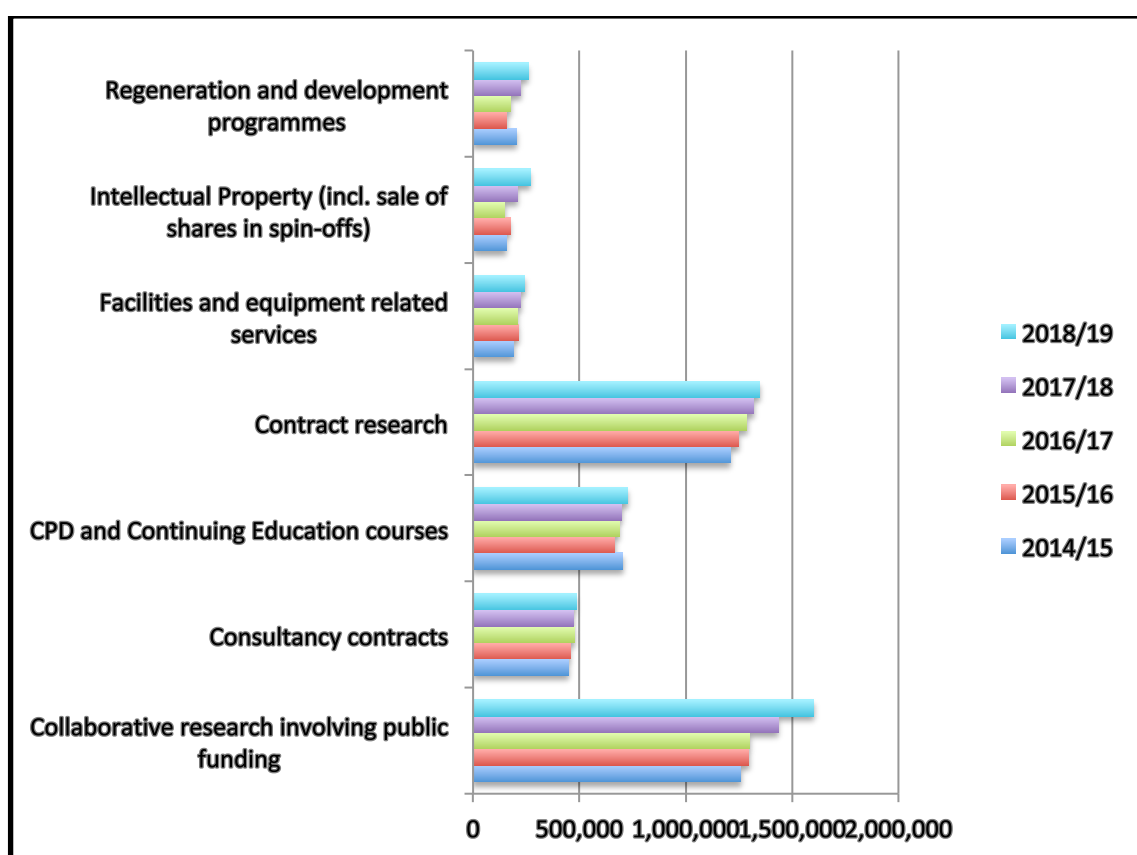


Figure 1.1: UK HEI Income from business and community interactions – Academic years 2014/15 to 2018/19 (£ 000s) (Source: HESA, 2020¹¹)

¹¹ Higher Education Statistical Agency: Business and Community Services. Source: Higher Education– Business and Community Interaction (HE-BCI) Survey. Last updated April 2020. Accessed online 20 September 2020 at <https://www.hesa.ac.uk/data-and-analysis/business-community/services>. The link to the open data licence (CC-BY-4.0) for this data can be found on this web page.

It is clear from the wide range of activities in Figure 1.1 that any research that tried to encapsulate all university-business interactions would have to be very broad and conducted at the macro level, but the research that forms the focus of this thesis is concerned specifically at understanding the nature and conduct of these interactions better at a micro level in order to inform how universities could improve the effectiveness of their approaches to them.

This leads to the conclusion that to achieve this, within the limitations of this study, the scope needs to be narrowed to focus on the level at which universities and businesses engage directly with each other. Such engagements can be divided into two broad groups: the first is concerned with the commercialisation of research-derived Intellectual Property (IP), often referred to more specifically as knowledge transfer¹², which includes the creation of spin-off companies and licensing. The other category concerns university-business collaboration, which is taken here to be wider than the policy definition given above. This is consistent with others (for example, D'Este and Perkmann, 2010; Perkmann *et al* 2012) who feel that, for research purposes, university-business collaboration should encapsulate collaborative research, contract research and consulting activities, as they are all under-pinned by the application of research.

Within this study it would be too broad to consider the whole range of IP-related and collaborative activities, which have clear distinctions between them, as Perkmann *et al* (2012) point out, so it was decided to focus on the more significant university-business collaborations based on contract and collaborative research.

¹² The research literature sometimes uses this term more generally and interchangeably with knowledge exchange, particularly before knowledge exchange gained currency in recent years within the UK. Knowledge transfer is still often used in this more general sense outside of the UK.

Consultancy has not been included within the scope of this study because it was felt that this too was sufficiently distinct an activity to demand separate attention. The focus of this study, therefore, is on collaborative research and contract research.

1.3 Identification of the Issues

Recent years have seen a growing focus of research into university-business collaboration and, unsurprisingly, much of this has been generated in the field of business and management, from which many existing concepts can be readily applied. For example, when looking at the factors that might influence university-business collaborations, widely researched concepts in business collaborations (and commonly accepted methods for investigating them) have been applied in areas such as motivation (for example, D'Este and Perkmann, 2010) and absorptive capacity (Bishop *et al*, 2011). Others have focused more broadly on thematic areas such as the application of open innovation (Striukova and Rayna, 2013) or the barriers to collaboration (Bruneel *et al*, 2010). In terms of scale, university-business collaboration has been studied at all levels, from its place in regional development (Etzkowitz and Zhou, 2018), comparative analyses at all levels (Hemmert *et al*, 2014) through to individual case studies (Smith *et al*, 2010).

Despite the growth of this body of literature on university-business collaboration (augmented by an equally burgeoning grey literature), a systematic review by Ankrah and Al-Tabbaa (2015, p.388) led them to conclude, *“the extant literature is still relatively fragmented and lacks a comprehensive view”*. Part of the problem may be, as Perkman *et al* (2012, p.424) point out, that there have been insufficient efforts to underpin university-business collaboration conceptually, which is then reflected in this piecemeal approach. They contrast this with research on

knowledge transfer, where entrepreneurship theory has been readily applied to IP-related commercialisation processes with successful understanding.

It may also simply be the case that such conceptual development of the process of university-industry collaboration is considerably more challenging than researching specific aspects of it, given the complexities involved. For example, Philbin (2008) proposed a linear five-stage process model for managing university-business collaborations, based on research within his own (technology and science-based) university. Whilst he recognised that 'social capital' (in which he included trust, commitment and integration) was an important factor within this model, he explicitly did not propose how it should be developed or managed, acknowledging instead that it was a complex process. This exemplifies a further key weakness in much of the literature in that it stops short of improving our deeper understanding of the dynamic inter-relatedness of the multiple factors that are at play in the process of university-industry collaboration, particularly in relation to the interactions that take place between participants.

There are a number of other shortcomings of current research that limit our understanding of university-business collaborations. First, many studies take a cross-sectional perspective, often using a survey approach (for example, Bruneel *et al*, 2010). Perkmann *et al* (2012, p.430) went as far as to say that this was the case for all major surveys. Yet collaborations have a life cycle and so research needs to take account of the temporality of factors and how they relate to other prevailing factors to shape collaborations at each stage. A second related point is that research into university-business collaboration is biased towards quantitative analysis, for example in studying motives for engagement, Ankrah *et al* (2012) found that out of 57 previous studies

(mainly conducted post-2000), only 22 were of a purely qualitative nature and many of these used surveys. Whilst quantitative studies have been useful in mapping and providing a fuller understanding of known factors, which in turn have been informed by qualitative surveys, they can provide only a limited insight into how collaborations develop and how this then shapes the outcomes.

More pertinently, despite collaborative processes involving at least two parties, Ankrah *et al* (ibid) found that in 39 of the 57 studies (68.4 per cent) they reviewed, participants were only engaged on one side or the other; more usually the academic side. Even where both sides of collaborations are engaged, surveys are often sent to collaborative leads, as recognised by Bruneel *et al* (ibid), who sought to also engage the second collaborators in an attempt to adjust for this. The difficulty here is that project leads may not always be directly engaged in the core collaborative activity (it is not unusual for the holders of such positions in business to be responsible for multiple collaborations) and so their perspective may not be fully representative of those that are, particularly in larger multi-level partnerships. Ankrah *et al* (ibid) went on to research the motivations of participants on both sides of five partnerships and found that whilst they were similar at a general level (ibid, p.63), they differed in detail, providing an important insight into the need to establish mutual understanding, which clearly could not have been gained from single-group studies (this is discussed further in Chapter 2, Section 2.3.5, pp. 50-51).

A final issue to bring into consideration picks up Vick and Robertson's (2018, p.580) assertion that, based on their extensive literature review, many recent studies of knowledge transfer practices (they use the term in the more general sense here) assume, over simplistically, that the process is uni-directional within university-

business collaborations. They conclude that little is known about knowledge transfer as a bi-directional process and that more research is needed in this area. Whilst I strongly support this assertion, it still underpins the rather positivistic assumption that this is implicitly a transactional process, even if seen as flowing in both directions, as reflected more widely in many quantitative or survey-based studies. However, even when dealing with knowledge that relates to highly codified science or technology, I argue that collaboration still essentially involves individuals interacting with others. Within the environment of university-industry collaboration this is particularly complex because it involves participants from at least two distinctly separate organisations, with which they each interact, engaging also in inter-organisational interactions within the collaborative space. Such processes of interaction develop and shape the knowledge that is generated by working together in collaborations, although the term 'knowledge' does not easily lend itself to being considered in terms of process. It is therefore proposed that 'learning' is a more apt term in that it can be applied to both processes and outcomes and, for this research, offers a more useful conceptualisation with which to tackle the perceived shortfalls in other studies.

I argue that a learning perspective better reflects both the socially constructed nature and the purpose of collaborations (to learn *through* collaboration) and facilitates looking at collaborations in terms of both processes and outcomes together. This enables an exploration of *how* outcomes are achieved, *why* challenges can arise in pursuing them and *how* these can be minimised. Moreover, the examination of learning outcomes as a result of learning processes enables a broader consideration of what is usefully gained from collaborations and how this should shape future approaches to them.

1.4 The Research Intent

In light of the above discussion this study seeks to address the gap in current research by adopting a learning perspective to examine university-business collaborations. Its aim is to better understand how the processes of interaction between participants shape the learning that takes place within them. Whilst this considers the perspectives of both university and business participants, it also seeks to inform the future development of university approaches. Accordingly, the research questions are:

1. How do interactions between individuals and organisations influence learning within university-business collaborations?
2. What underlying factors influence these interactions and how do they do so?
3. What are the challenges in understanding the learning outcomes from university-business collaborations and what are the implications for the future development of university approaches?

The wide variations in the nature of university-business collaborations (discussed fully in Chapter 4) meant that it was highly desirable to look at multiple collaborations to enable themes to be examined in a range of contexts. A case study approach was adopted, based on semi-structured interviews with key participants from both the University of Oxford and its partner organisations. A total of ten case studies were subsequently pursued with the intention of including at least one from each of the four academic divisions; a target that proved challenging but was ultimately achieved. These include a wide range of bilateral and multilateral collaborations of varying size and involving participants drawn from public, private and third sector organisations.

1.5 **Outline Structure of the Thesis**

This section outlines the structure of the thesis by providing a brief synopsis of each chapter.

1.5.1 ***Chapter One: Introduction***

This sets out the broad context of industry-business engagement and the major influence of Government in its development. It then locates the specific activity of interest within this, which is followed by a discussion of the pertinent issues arising from the research into it. This leads to the specification of the research intent, laying down the specific research questions to be pursued in this thesis.

1.5.2 ***Chapter Two: Background to the Research and Literature Review***

This chapter begins by setting out the dynamic policy context within which university-business collaborations take place within the UK. It outlines the increasing emphasis on research assessment of university performance and the trend towards more competitive funding closely tied to impact, whilst considering the effects on academics' propensities to engage in collaborative activities with business.

The chapter then turns to the wide academic and grey literature of relevance to university-business collaboration. The considerations of business in engaging with universities are examined first, drawing attention to the importance of innovation, absorptive (or learning) capacity and open approaches, issues that will be picked up in subsequent chapters. Academic motivations are then considered in more detail, building on the policy implications discussed earlier and highlighting where tensions can arise.

Examination of the broad inter-disciplinary research into universities and business working together draws attention to further important themes including trust

and the need to understand each other's motives. It was noted that the learning outcomes from collaborative activity could be far wider than those outputs typically observed at the end of collaborations. Finally, consideration of areas for future research drew attention to the need for research that focuses on the interpersonal level of collaborative activity and on understanding how collaborations developed, including the factors, processes and interactions that comprise them.

1.5.3 *Chapter Three: Informing a Learning Perspective*

The purpose of this chapter is to develop a deeper understanding of what adopting a learning perspective means for the study of university-business collaboration. It begins by looking at the nature of learning within the realities of a collaborative environment and the implications for the approaches to this research. The literature on learning is then looked at on a number of levels, commencing with individual learning, in which the importance of motivation is made clear. Social theories of learning are considered and it is shown how facets of these, such as the concept of Communities of Practice and the notion of socio-cultural constructs, offer additional perspectives for consideration in analysis.

Whilst it is established that learning takes place at the individual level, perspectives on how this relates to concepts of group, organisational and inter-organisational learning are considered. It is made clear that the conceptual approach taken in this research needs to accommodate the notion that individual learning involves interaction with the environment, drawing on the work of Illeris (2011, 2017). His model of workplace learning (Illeris, 2011) is adapted to reflect the influences of both university and business on learning within the context of the collaborative environment to provide a conceptual framework for this research.

1.5.4 ***Chapter Four: Research Methodology***

This chapter provides the rationale for the methodological approach to this research project. It first sets out the research questions and explains how the conceptual framework is used alongside close consideration of the temporal dimension of collaborative processes to inform the design and analysis of the study. The Chapter establishes the rationale for adopting a qualitative approach and for using semi-structured interviews to constitute a sample of ten wide-ranging case studies of university-business collaborations, drawn from across the University of Oxford.

In setting out the approach to the fieldwork it explains how the gathering and conducting of the case studies required a network of intermediary contacts and project leads to be established to support access to the number and range of collaborations sought. All collaborations were well established or drawing to a close. The structure of the collaborations varied considerably but in all cases both university and business participants were involved in the core collaborative activity so that their interactions and associated effect on learning could be understood.

The chapter then explains how the large data set was reduced, manipulated, and represented, using a range of qualitative techniques, to support both within-case and cross-case analysis. These techniques were selected to support the interpretation of interactive processes and their underlying factors in their dynamic context throughout the course of the collaboration.

1.5.5 ***Chapter Five: Case Study Vignettes***

This chapter introduces each case study through a short vignette. It provides brief context in relation to the initiation of each case study and outlines the role of the participants. Importantly, the organisational positions and relationships between the

participants are mapped out diagrammatically for all of the collaborations. Only a brief discussion of the progress and key points within each case study is included because relevant parts of these will be discussed in the analysis chapters. However, event-state networks¹³ were constructed to aid the analysis of the case studies and these can be used as a supplementary reference to trace the development of the collaborations in more detail (these can be found at Appendix 4). Similarly, the vignettes only outline the key learning outcomes (or progress being made towards them) because these will be discussed in the analysis chapters and they are the specific focus of Chapter 8. The Learning Effects Matrix, at Appendix 5, was constructed to aid the analysis of learning outcomes.

1.5.6 *Chapter Six: The Effect Of Interactions Between Individuals and Organisations on Learning within University-Business Collaborations*

This chapter is based on detailed within-case and cross-case analysis of the data from the ten case studies. It draws on the conceptual framework to understand how individual, organisational and inter-organisational influences interact within three temporal phases of the collaborations: prior engagement, set up/initiation and delivery. The analysis shows clearly that collaborations are highly dynamic, involving complex interactions that constantly affect the learning throughout. Despite the widely differing characteristics of the collaborations, key themes are identified from the analysis.

The pre-engagement stage is given scant attention in the research literature but it is shown how focused activity is important for identifying and developing the potential of new collaborative opportunities. However, it is seen that during the set

¹³ Adapting a technique proposed by Miles, Huberman and Saldana, 2014, as discussed in Chapter 4, Section 4.6.2.

up/initiation phase the critical processes of determining what learning would be pursued and how it should be taken forward were often overlooked or compressed. It is shown that formal pre-determined contractual objectives are often inadequate for these purposes, and that the establishing of common learning goals is needed. This gave the best start to collaborations, whereas a failure to agree common learning goals at the start could lead to challenges later.

In the delivery phase it is shown that learning aspirations frequently changed due to increasing understanding or in response to challenges or new opportunities. This required academics to adopt agile and proactive approaches that were empathetic and responsive to business partners. More generally, the case studies built up a picture of the importance of establishing and maintaining effective relationships throughout the collaborations, in order to achieve positive learning outcomes.

Learning was generated through interactive processes of co-development, although different approaches were adopted across the case studies. Further analysis of these led to the proposal of a typology of modes of co-development and the evidence suggests that not only was it important for parties to agree the most appropriate mode for each collaborative relationship but that the mode could be dynamic, changing in some cases as the collaborations progressed.

1.5.7 Chapter Seven: Factors Underlying the Interactions that Affect Learning within University-Business Collaborations

To begin with, this chapter reflected on Payne *et al*'s (2011) assertion that the individual participants should be seen as nested within multiple levels of influence. Put alongside the pre-existing findings from the research, this leads to the conclusion

that further analysis should focus on the interpersonal level to better understand the factors that influence the interactions. The clear overarching theme to emerge from the preceding analysis is the importance of positive and productive collaborative relationships in the generation of valued learning outcomes. Consequently, understanding the factors underlying the interactions that supported such relationships is the focus of this chapter.

Drawing on further analysis, it is made clear that motivation was of fundamental importance to both learning (as established in Chapter 3) and to collaborative relationships. Closely tied to this was a second factor, trust, but the use of a third factor, power, was also shown to be important in influencing the development of relationships. Together, these are seen as the core factors in influencing the development of collaborative relationships. However, it is also recognised that the way in which these affect collaborative relationships in practice is further mediated by collaborative structures and communications and these, in turn, are shaped by approaches to leadership and management. Together with the effect of any external events, these factors are integrated into a model.

The rest of this chapter presents an in-depth analysis of each of the core factors of motivation, trust and power. Whilst treated individually, the inter-relatedness of the factors is demonstrated. The analysis includes consideration of the relevant socio-psychological literature followed by the use of the case study evidence to develop propositions for how the factors influence university-business collaborations.

1.5.8 *Chapter Eight: Collaborative Practice and the Learning Outcomes Resulting from University-Business Collaborations*

There are two distinct parts to this chapter. In the first, the role of the mediating and shaping factors in determining the development of collaborative relationships in practice is discussed. It is shown that by influencing how and when the core factors are brought to bear they account for much of the variation between the case studies.

The particular demand on leadership within university-business collaborations is considered. The lack of formal authority in much collaboration leads to the proposal that leadership needs to be approached as the effective use of influence to persuade others to work collaboratively towards agreed goals. In addition, the importance of initiative is highlighted. Drawing this section together, a framework is presented to show how academics might apply their available power bases in practice to influence their collaborative relationships effectively.

The discussion of practice leads into the second part of the chapter, which focuses on learning outcomes. To begin with, the general challenges of fully understanding the learning that takes place through collaboration are outlined.

When considering the impact on business it is shown why evaluating the benefits of collaborative activities solely against pre-determined objectives may often prove to be inadequate and lead to the learning outcomes being undervalued. Case study examples show that objectives may not be met where learning informs a change of course. They may also fail to capture more strategic benefits or incidental learning gained in the process of collaborations. In general, it is shown that collaborative learning does not lend itself to being evaluated in transactional terms.

For academics, it is shown how funding, assessment and career management regimes combine to restrict, rather than motivate their engagement in collaborative activities beyond those with a high expectation of yielding direct research outputs. This is seen to apply to academics at all career stages, but particularly early career researchers. Despite this, the research highlights how wider collaborative activities have the potential to create high impact whilst also advancing the ability of academics to engage in further collaboration that more directly supports research outputs. However, it is further noted that there is very little support, in terms of training and development, to academics engaging in collaborative activities.

1.5.9 *Chapter Nine: Discussion of the Implications for the Development of University Approaches, Conclusions and Recommendations*

The final chapter begins by considering the implications of the issues raised in the analysis of learning outcomes presented in the previous chapter. It concludes that in responding to Government pressure to increase collaboration with business, the University presently transfers a disproportionately high degree of the risk associated with conducting these activities to the individual academics engaging in them. It is further pointed out that in this regard the University of Oxford is not dissimilar to many other research-led universities across the UK.

This leads to recommendations that the University should consider in order to better support the ability of its academic staff to engage in collaborative activities with business and to fully exploit their potential. These are intended to further develop its approaches within areas that it has already committed to developing. The recommendations fall into three themes: providing bespoke training and development, developing career management practices, and developing support and

activities to promote a culture that promotes engagement in university-business collaboration.

The thesis is then drawn together by reviewing the contributions of this research, its limitations and areas for further research.

CHAPTER 2: BACKGROUND TO THE RESEARCH AND LITERATURE REVIEW

2.1 Introduction

The interdisciplinary and dynamic context of the study has required a broad review of the literature in a number of relevant fields and a close tracking of developments, particularly in the policy arena. This chapter begins by laying out how policies within the UK have set the context for university-business collaboration. In particular, it focuses on how this has shaped the attitudes and actions of academics themselves in relation to collaboration with business, rather than considering in detail wider university or sectoral impacts, since the focus of this study is on the actual collaborative activities. This is followed by a review of the research into university-business collaborations, in which some key themes will be identified. The broader concepts or theories that underpin these themes will be discussed at the relevant points within the subsequent analysis chapters. The chapter concludes by further substantiating the learning perspective adopted in this research, as outlined in the introduction, and highlights the implications for how this is taken forward.

2.2 The Policy Context

The UK Government's increasing role in driving university-business collaboration was made clear in the previous chapter but this section aims to provide a fuller understanding of how and to what extent the Government exerts influence over university research activity in its attempts to foster greater collaboration with business. This policy environment provides essential context to this research project. Whilst much policy is aimed at the institutional level, the focus here is on how this has influenced the behaviour of the academic community. To understand this fully it is necessary to trace the pattern of government engagement with the research agenda

up to the present.

The extent to which governments should exercise control of the research agenda, for national benefit, has long been an issue. It is now over 100 years since, immediately following the end of the First World War, Lord Haldane set out recommendations for reforms across Government in his *Report on The Machinery of Government* (Haldane, 1918). These included the recommendation that policy-making should be more evidence-based and with specific regard to university research recommended that general research should be conducted under the auspices of advisory councils (UKRI, 2020). However, it was not until 1963 that Quentin Hogg MP (the future Lord Hailsham) referred to this in rebutting an Opposition proposal to increase control of research (ibid). The '*Haldane Principle*', as it subsequently became known, was generally interpreted to mean that it should be for academics to determine specific priorities for research, in accordance with the Government's strategic direction. How this should be enacted in practice, however, continued to be contentious, with successive governments seeking to exert increasing influence over the direction of research. In doing so, governments have applied increasingly nuanced interpretations of the Haldane Principle in support of their policies but, for the first time, this was defined by legislation in the Higher Education and Research Act 2017 as, '*the principle that decisions on individual research proposals are best taken following an evaluation of the quality and likely impact of the proposals (such as a peer review process)*' (Royal Society, 2019). It can be seen that this definition reflects expectations of both the quality and the impact of research (as defined by the Government), a position that has been arrived at through progressive policy development over the last four decades.

O'Regan and Gray (2018, p.536) contend that for the period up to the commencement of the Thatcher Government in 1979, governments had an essentially *"arm's length relationship"* with universities, with their annual grant being funded by the University Grants Committee (UGC). However, drawing on the work of Collini (2012, 2017), Cook (2012) and Warner (2015) they go on to suggest that from that point there began *"a process of near permanent interference"* aimed at reforming higher education that *"were to have a dramatic effect not only on the working lives of academics but also on the nature of academic freedom, the valorization of academic activity, and the very concept of knowledge itself"* (ibid, p.536). It is useful to look more closely at how such *'interference'* or intervention was manifested in successive policy and funding developments and to consider how this has been reflected in the current disposition of academics in relation to university-business collaboration.

2.2.1 *The Development of Research Assessment*

Whilst governments have always overseen overall funding and, to some extent, allocated specific funding for research priorities, the development of research assessment processes have been instrumental in gaining ever tighter control of research activities. However, a brief look at the historical development of research assessment shows that whilst the assessment process has put more pressure on academics and researchers to engage with business, it has also created tensions within this community on a number of levels. Research assessment within the UK began with the introduction of the Research Selectivity Exercise in 1986, with the purpose of enabling the University Grants Committee to be *"more selective in its support for research...to redistribute resources for research between institutions and to encourage redistribution within institutions towards work of special strength or promise"* (Stern,

2016, Appendix B, para 1, quoting Jones and Sizer, 1990). The exercise was repeated in 1989, with more involvement from the universities. Following the establishment of HE Funding Councils for England and Wales in 1992, the first Research Assessment Exercise (RAE) was launched, which sought to assess research quality as well as allocate funding. When the exercise was repeated in 1996 it doubled the number of publications required to be submitted for assessment by 'research-active' staff, from two to four, and academic panels graded these submissions to inform funding allocations. It can thus be seen that over a 10-year period the assessment process developed from the limited involvement of universities at institutional level to a direct and growing engagement of the academics themselves. Further review and subsequent reforms sought to improve the transparency and robustness of the quality assessment process and these were reflected in subsequent iterations, with further RAEs being run in 2001 and 2008. In particular, they attempted to address academics' concerns that this activity placed excessive pressure on staff, and also the challenges of developing valid and representative assessments of quality in relation to the individuals and departments within each institution.

However, in 2005 The Treasury put forward proposals to replace the RAE after the 2008 exercise with a new Research Excellence Framework (REF) that would *"better demonstrate and incentivise the economic and societal contribution, and justify continued investment in, public funding for Science & Research"* (Stern, 2016, Appendix B, para 14). This was the genesis of measuring research impact alongside quality. A consultation exercise made clear that HEIs were keen to retain a system of allocating block research funding that was based primarily on quality, determined through an expert (peer-review) assessment process. This was acknowledged and

reflected in the first REF exercise in 2014 that introduced an impact assessment weighting of 20 per cent, alongside a research environment assessment of 15 per cent, retaining 65 per cent for the assessment of research outputs. It was made clear that the assessment of impact would *“not solely focus on commercialisation but extend to changes and benefits to the economy, society, culture, public policy or services, health, the environment or quality of life”* (ibid, Appendix B, para 18) and would take account of the research environment that researchers operated in, within each HEI.

The 2016 Stern Review was broadly supportive of the REF methodology, affirming the Government’s view that quality alone was not enough (ibid, para 34) but made a number of recommendations to address perceived problems. These included a recommendation that all research-active staff should be included in assessments (but with some flexibility in the number of outputs that individual staff members needed to submit) primarily on the basis that the previous exclusion of some academic staff was seen as demotivating and potentially detrimental to their careers. Just as importantly, however, it was also hoped that this, along with other recommendations, might reduce the potential for HEIs *“gaming”* assessments by taking steps such as buying in researchers with very strong research outputs from other HEIs prior to assessment exercises. It might be considered that these and other such unintended behaviours were the inevitable consequences of an assessment system that had a direct bearing on funding and through the publication of results enabled direct institutional and departmental comparisons.

Of more concern when viewed through the lens of university-business collaboration, Stern also recognised that the assessment process could have unintended effects on researcher choices in that they may be tempted to opt for safe

and short-term projects, effectively discouraging innovation and risk taking, which led him to conclude *“such distortions could be of real significance”* (Stern, 2016, para 37). Furthermore, Stern was concerned that the assessment processes were stifling interdisciplinary approaches and collaboration, noting that *“as universities increasingly commit to addressing complex, intrinsically difficult ‘Grand Challenges’¹⁴ of global importance there is a clear recognition that such issues and problems require a range of different perspectives that interdisciplinarity and collaboration can foster”* (ibid). Stern noted that such approaches were under-represented, in part due to the silos of reporting structures, although they were far better represented in impact case studies. He suggested that this might reflect the wider issue of bias against interdisciplinary work found by Rafols *et al* (2012), who suggested that journal rankings could also suppress interdisciplinary work. As a consequence, Stern recommended that assessment should in future support more institutional-level case studies to encourage and showcase interdisciplinary and collaborative impacts (ibid, para 80). However, such measures simply amplify this fundamental tension for academics whose careers are built upon publication in highly regarded journals that are edited by senior academics that may not subscribe to the academic value of such contributions, in line with the seemingly prevalent view of many of their peers. This tension will be discussed further in the context of academic motivations in Section 2.3.4, p.42).

¹⁴ The Government laid out four ‘Grand Challenges’ as the focus for its Industrial Strategy (BEIS, 2017, p.34): “1. Put the UK at the forefront of the artificial intelligence and data revolution; 2. Maximise the advantages for UK industry from the global shift to clean growth; 3. Become a world leader in shaping the future of mobility; and 4. Harness the power of innovation to help meet the needs of an ageing society”.

In drawing up guidance for the REF 2021 exercise¹⁵, the Government subsequently decided to raise the impact element of assessment to 25 per cent and reduce the outputs weighting to 60 per cent, reflecting its continuing and longer-term drive to tie funding ever closer to demonstrable benefits. It can therefore be concluded that both output (peer assessments of the quality of research outputs) and impact measures of research assessment are now firmly embedded in the higher education sector. Whilst it is debatable to what extent these aspects have now become an integral part of the culture of working in Higher Education (academics with lengthy experience, who have worked through these changes, are likely to have a very different perspective to early career researchers), it is clear that assessment of outputs and impact is now a pre-occupation of both HEIs and individual academics alike.

Further changes to this quality-related (QR) funding since the 2014 REF mean that a research paper rated 4* ('world leading') now attracts four times more than one rated 3* ('internationally excellent') whereas for the 2014 REF the ratio was 3:1. Analysis by Pinar (2020) showed that this change was disproportionately liable to be benefitting 'elite universities' (the top beneficiaries being Oxford, Cambridge, UCL, Imperial College and LSE) at the expense of others, which led him to call for further consultation on the criteria and process. However, beyond the issue of perceived fairness, this illustrates how the current assessment process places further pressure on researchers in all universities to produce highly rated research outputs in line with assessment criteria, given the implications for their institution's funding and the associated rankings that have reputational implications.

¹⁵ As a result of the coronavirus pandemic the decision was made to postpone the next REF exercise. The latest Government guidance (REF 2020/02, dated July 2020) is that this will now take place in 2021 (REF 2021). Submissions from HEIs are now due on 31 Mar 2021, with panel assessments taking place between May 2021 and March 2022, with the results expected in April 2022 (ibid, paragraphs 14-17).

Furthermore, there is evidence that universities' attempts to optimise their REF performance are increasingly reflected in the career management of academic staff. For example, in September 2018 *THE* reported that the University and College Union (UCU) had expressed concern that one Russell Group University had informed early career researchers that they were unlikely to pass their probation unless they produced on average a paper likely to be graded at 3* or above every 18 months (Grove, 2018a). At the other end of the career spectrum, *THE* further reported in December 2018 that the Russell Group¹⁶ of leading UK universities spent 56 per cent more on severance payments of academic staff in 2017-18 than it did in 2016-17 and suggested that this was seen by some as an effort to remove under-performing staff ahead of the next REF (Grove, 2018b). Despite Stern's recommendations, it would appear that the assessment process still generates 'distortions' that affect academic staff and so the impact of these measures is likely to vary across the academic community, depending on factors such as career stage and security of employment. However, whilst this context highlights the potential for assessment policy to create tension between impact and quality, it nonetheless creates greater pressure to engage in collaborations. This research will consider further how policy affects academic behaviour in engaging with and working within collaborations in Chapters 8 and 9.

2.2.2 *Competitive and Innovation Funding*

The quality-related (QR) funding based on the outcomes of the REF assessment exercise discussed above is not the only mechanism through which the Government funds university research. In England, the Government operates a dual funding model in which QR funding of universities (distributed by Research England with an annual

¹⁶ The Russell Group is a self-selecting association of leading research universities within the UK. It currently has 24 Members, including the University of Oxford. <https://russellgroup.ac.uk/>

budget of £2,324m in 2019/20) is set alongside competitively allocated funding distributed through UKRI's seven Research Councils (with allocations totaling £3,851m¹⁷ in 2019/20). The majority of the Research Council allocations come from specific Government funds, notably the Research and Innovation Fund and the National Productivity Investment Fund (which includes the Industrial Strategy Challenge Fund (ISCF) to support the pursuit of the Government's Grand Challenges within its Industrial Strategy outlined earlier). The Research Councils thus provide a second stream of funding focused on research projects in specified areas, often linked to Government priorities but also covering 'blue skies' research, in addition to funding additional initiatives such as doctoral training partnerships and knowledge exchange fellowships (the latter were held by early career academics in a number of case studies in this research).

Whilst this funding stream provides further opportunities for researchers it is perhaps inevitable that a dual funding model also puts greater pressure on researchers to secure research grants and that some are given targets by their departments, anxious to show how well they are performing in terms of generating research income. However, in its Annual Reports and Accounts for 2018/19, UKRI (2019) reported that just 27 per cent of overall grant applications were successful, although the measurement of this had changed from previous years so it is unclear whether this had stemmed the return to the long-term trend of falling success rates reported by the *TES* in November 2018 (Pells, 2018). In this article, Pells noted that the Research Councils

¹⁷ The seven Research Councils, with their 2019/20 allocations (to the nearest £ million) shown in brackets are as follows: Arts and Humanities Research Council (AHRC, £148m), Biotechnology and Biological Sciences Research Council (BBSRC, £452m), Economic and Social Research Council (ESRC, £243m), Engineering and Physical Sciences Research Council (EPSRC, £1,095m), Medical Research Council (MRC, £745m), Natural Environment Research Council (NERC, £432m) and Science and Technology Facilities Council (STFC, £736m). (Figures taken from Royal Society, 2019, Fig. 4).

were offering fewer but larger grants, for which some of the calls were tightly defined, which may have contributed to the decline in success. Pells reported that, in light of the challenges of securing grants, some HEIs were running internal screenings to maximise their overall chances of success. Such practices have been adopted within the University of Oxford. From an academic standpoint this suggests that this is an increasing time burden for many Principal Investigators, who are spending longer in constructing multiple and often larger and more complex bids and assembling research teams to support them. Many early career researchers are heavily dependent for their employment on this or other sources of project-specific funding, creating further pressure on them to produce credible academic as well as project outputs whilst in such roles, in order to work towards securing a permanent contract.

To complete the research-funding picture, brief mention should be made of the third pillar of UKRI funding, which is allocated to Innovate UK (£1,256m for 2019/20), an agency that is focused on helping industry to overcome innovation challenges. Innovate UK supports industry's engagement with universities and research centres through a number of initiatives, including its network of Catapult Centres¹⁸, which provides shared physical space for collaboration between researchers and industry to work on innovation challenges, some of which are located on university campuses. It is also the major sponsor of Knowledge Transfer Partnerships (KTPs)¹⁹, which link universities (or other research organisations) with industry to tackle a specific project

¹⁸ Innovate UK's Catapult Network covers nine key aspects of national capability in which businesses can engage with universities in late stage research and development in over 30 centres. Further details are at <https://catapult.org.uk/>.

¹⁹ Knowledge Transfer Partnerships (KTPs) are part of a UK-wide Government programme. KTPs support industry by linking businesses to an academic or research organisations through a sponsored graduate. Schemes are part sponsored by a number of Government Departments (the business is also expected to contribute) but in this case the sponsor was Innovate UK, the Governments innovation agency. Further details on KTPs can be found at <https://www.gov.uk/guidance/knowledge-transfer-partnerships-what-they-are-and-how-to-apply>.

through sponsored graduates and so taken as a whole, it provides an important stimulus to collaboration. This is reflected in some of the case studies in this research; one was centred on an innovative KTP in the Humanities (case study Hum 1) and in another (case study MPLS 4) a Catapult Centre played an important part in establishing a link with one business (a satellite data provider) that enabled researchers to develop a capability that was vital to the collaboration with another.

In sum, evolving Government policy has increasingly tied funding to the quality and impact of university research, whilst at the same time targeting it more closely to its national priorities (see, for example, the priorities for the Industrial Strategy Challenge Fund²⁰). The intended introduction of the Knowledge Exchange Framework (KEF) in 2020 and the next REF exercise in 2021 are likely to further reinforce this direction of changes that have clearly had the *“dramatic effect on the working lives of academics”* characterised by O’Regan and Gray (2018). However, the aim here has been to understand how these developments impact on current approaches to university-business collaboration. Government policy has been shown to provide increasingly strong incentives for universities and their academics to engage with business, although with some unintended consequences that the Government continues to address. Whilst the Government provides a wide range of funding opportunities in support of impactful research and innovation, these are increasingly in tightly prescribed areas. This has impacted strongly on behaviours at both organisational (university/departmental) and individual (academic) level and whilst it might be claimed that this has resulted in an overall increase in external engagement,

²⁰ These can be found on the UK Research and Innovation website at: <https://www.ukri.org/innovation/industrial-strategy-challenge-fund/>

there are variations across institutions and subject areas (as reflected in funding allocations) and it has also led to considerable 'distortions', as exemplified by Stern (2016). Of particular relevance are the tensions he identified for academics in engaging in collaborative activities that may not provide the academic 'credit' that they require. Whilst he made recommendations to improve the recognition of such activity within the REF, it is likely to remain an issue for some staff; particularly early career researchers who need to build unequivocally strong academic publication profiles.

2.3 University-Business Collaboration

The above understanding of the prevailing influence of Government policy provides a useful context within which to review what we already know about the practice of university-business collaboration. Given the policy context discussed above, it is perhaps no surprise that this area is covered by a considerable amount of grey literature, particularly reviews commissioned by the Government that relate to university-business collaboration, or certain aspects of it. Indeed, Dowling noted that her 2015 *Review of Business-University Research Collaborations* was the 14th such related review or report since 2003 (Dowling, 2015, pp. 10-11), which reflects the urgency of the Government's agenda to find the best ways to leverage its potential.

In Chapter 1, Section 1.2, the scope of the activities that are included in university-business collaboration was explained (essentially collaborative and contract research). It is clear that within the literature these are often included within the scope of broader activities and sometimes terms such as knowledge exchange and knowledge transfer are used interchangeably (Foss *et al*, 2010). It is also the case that when discussing university-business collaborations (or other variations under this

heading), other writers similarly use varying interpretations as to what is included in this and often imply a broader usage. In the context of this research, and in line with these interpretations, it is useful to consider first the literature on the motivations and barriers to collaboration, with regard to both businesses and universities. This will then be followed by a discussion on research pertaining to the actual process of collaboration before concluding with a review of where further research is needed.

2.3.1 ***The Innovation Driver for Business Engagement with Universities***

Recognition of the need for businesses to transform in order to remain competitive is rooted in the era of mass production, building on early ideas such as Schumpeter's (1942, 2010) '*creative destruction*.'²¹ However, the concept of innovation gained real focus with the development of post-war manufacturing and the boost to technological innovation later provided through the growth of Silicon Valley following the refocusing of US defence-related research and industries with the demise of the Cold War (Finegold 1999). The rapid development of digital technologies over recent years, referred to variously as the '*fourth industrial revolution*' (for example, Schwab, 2016) or '*The Second Machine Age*' (Brynjolfsson and McAfee, 2014), has made it even more compelling for businesses to invest in research and development (R&D) to maintain their competitive edge.

The contribution that universities can make in helping organisations to innovate has been well established, particularly with regard to new-to-market (NTM) innovation (for example, Mansfield, 1991; Cohen, Nelson and Walsh, 2002; Laursen

²¹ Schumpeter built on Marx's thinking to develop the idea of the industrial cycle whereby as new industries are created and expand, they destroy the old order of industries in the process. The introduction of disruptive technologies in the current era might be considered a potential catalyst for creative destruction, thereby increasing the need for businesses to keep at the forefront of technological developments within their sectors.

and Salter, 2004). This was reconfirmed by a more recent quantitative study by Hewitt-Dundas *et al* (2017), which showed that those firms engaging with universities were 21 to 24 per cent more likely to produce NTM innovation (ibid, p.23) and suggested that *“university knowledge may provide the impetus for radical product or service development and the associated first mover advantages”* arguing that *“more broadly, our results suggest the potential role of universities in stimulating disruptive innovation, and the associated creative destruction processes...”*. Whilst these perceived benefits would appear to be compelling to businesses, Hewitt-Dundas *et al* (ibid.) found that in practice large and medium firms were more likely to engage than smaller ones, although their study was limited to the manufacturing industry. However, they also found that once firms do engage they are more likely to continue doing so, suggesting that they learn from collaborative experience and that this motivates them to engage further, in contrast to those firms that do not engage at all.

As Government interest in innovation is underpinned by a desire to gain technological leads, attract inward investment and anchor emerging industries in the UK it is unsurprising that there is a strong emphasis on product innovation, and new-to-market innovation in particular. However, innovation is far broader, as reflected in the definition provided by Johnson *et al* (2014, p.296): *“the conversion of new knowledge into a new product, process or service ‘and’ the putting of this new product, process or service into actual use”*. However, even this broader definition may now be outdated. A recent Welsh Government Report into economic transformation suggests that the greater part of future innovation will be achieved by exploiting digital technologies to enable the *recombination* of existing technologies (Welsh Government, 2019, Brown, 2020). This notion is very pertinent to this research

because the recombination or reapplication of existing technologies, knowledge or expertise often provides the basis for university-business collaboration (as will be shown in the case studies, introduced in Chapter 5).

2.3.2 ***Learning or ‘Absorptive’ Capacity***

Cohen and Levinthal (1989, 1990) brought the role of learning in the innovation process to the fore, based on their analysis of Silicon Valley firms. In their 1989 paper, they introduced the term “*learning*” or “*absorptive*” capacity to describe “*the firm’s ability to identify, assimilate and exploit knowledge from the environment*” (p. 21), subsequently preferring the term “*absorptive capacity*”, as used in their 1990 paper and now widely adopted across business and management studies, although some have suggested subsequent modification of the concept. For example, Zahra and George (2002) notably added a *transform* stage, underlining the importance of reframing imported knowledge, which will be discussed further in Chapter 3.

In their first paper Cohen and Levinthal made clear that by increasing its absorptive capacity, a firm was creating the potential to do something quite different from what it could generate through its own internal R&D (1989, p.570). They also found that a firm’s incentive to engage in R&D is affected by the ease and character of learning (ibid, p.593). In their second paper, they took this further to suggest that an organisation’s ability to evaluate and use external knowledge was largely a function of its prior related knowledge. However, whilst they maintained that experience of learning could lead to progressive improvements in their ability to learn from the external environment (“*learning to learn*”), they did make clear that the capacity to create new knowledge also requires additional problem-solving skills. These are particularly important in the latter stages of the innovation process, which in some

cases may lie beyond the limits of formal university-business collaborations. However, this was seen to be an area where university staff sometimes added real value by helping business partners to fully assimilate and transform learning and to develop solutions for its successful exploitation, as will be illustrated in Chapters 5, 6 and 7.

Whilst neither of Cohen and Levinthal's papers focused on the role of universities in the innovation process, the concept has been adopted as an important factor in university-business collaboration and related research (for example, Bishop, D'Este and Neely, 2011; Fogg, 2012; Belderbos, Gilsing and Suzuki, 2016).

Organisations that have low levels of related knowledge (in, for example, a specific field of science or technology) may be subjected to what Cohen and Levinthal (1990) referred to as "lockout" whereby they are unable to keep up with developments to the point where they feel the gap between external and internal knowledge is too large to bridge. In such cases businesses may be vulnerable to competition from new entrants and competitors that have retained or built up a higher absorptive capacity and are thus better able to draw on innovation from external sources: this is Schumpeter's creative destruction in practice (see Section 2.3.1, p.33). It is therefore a logical strategy for businesses, particularly in sectors with fast-moving technologies where NTM innovation is important, to engage in longer-term collaborations with universities to maintain a high level of absorptive capacity. Where this collaboration leads to a breakthrough they will be able to establish a market lead but if the breakthrough is elsewhere they may still be well-placed to be a very close second-to-market.

Conversely, businesses with low absorptive capacity may actually be deterred from engaging with universities, as suggested in the analysis of the knowledge exchange strategies of 97 UK universities by Irwin *et al* (2017, p.14). Low absorptive capacity

was also cited as one of the top 10 barriers to engagement by both businesses and academics in the Dowling Review (Dowling, 2015, Fig. 12, p.27).

Although absorptive capacity is a useful concept, in terms of framing the importance of a firm's learning potential, it is difficult to capture its actual effects on university-business collaborations in practice. Ritala and Hurmelinna-Laukkanen (2012) note that researchers have used a range of proxy measures for absorptive capacity, such as R&D spending, the number of patents, or employee ability and motivation. Whilst quantifiable, none of these measures are entirely satisfactory for such a complex concept and it was interesting to note that in their own study they instead elected to use the subjective assessment of an expert informant. In the context of this research, the absorptive capacity of an organisation could be seen in terms of its ability to learn from engagement in university-business collaborations and yet there has been a lack of research to inform the development of the concept in this direction. This seems to reflect an implicit assumption that the ability of a firm to do so rests purely on its own innate capability. As a consequence, there is limited consideration of how a firm's absorptive (or 'learning') capacity influences and is influenced by the related processes of interaction, at different levels, with university collaborators, and how this affects the learning outcomes. Easterby-Smith *et al* (2008) suggested that the lack of development of the concept of absorptive capacity could be due to the focus on quantitative approaches, which they suggest are more appropriate for testing rather than developing it, and argue for more qualitative case studies.

2.3.3 *Openness and Collaboration*

Cohen and Levinthal's original research was conducted during a period when many firms were operating essentially closed systems of innovation, whereby the pipeline of

research and development was kept within the largely impermeable bounds of the organisation, but it was becoming clear that this was unsustainable. Chesbrough (2003) made this the focus of his own research into the growth of industries within Silicon Valley, which demonstrated that the maintenance of closed approaches was neither realistic nor necessarily advantageous. He described how the heavy prioritising of internal research and development projects in rapidly evolving areas could lead to the rejection of projects with high commercial potential simply because they did not have the best fit with a firm's current business strategy. As a consequence, project leaders were leaving these companies to exploit this potential through the establishment of spillover companies. Many spillovers were complementary and synergistic with the original companies, thus contributing to the growth of the technological ecosystem (Finegold, 1999). In response, some of the original firms developed a deliberate strategy of priming spillover companies and, if successful, buying them and incorporating them back into the original companies. Observing this, Chesbrough thus developed an alternative business model of '*Open Innovation*' that made a virtue of purposefully managing the flows of knowledge across organisational boundaries to support innovation and the development of sectors (ibid, 2003). Chesbrough later defined Open Innovation succinctly (in Chesbrough, 2006, p.1) as "*the use of purposive flows, inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively*". The attraction of this concept from a business perspective is that "*Open innovation means that valuable ideas can come from inside or outside the company and can go to market from inside or outside the company as well*" (ibid, p.43). Chesbrough underlined the importance of developing university-business

collaborations within the open innovation approach and the concept has been influential in shaping strategies adopted by both Governments (at national and regional level) and universities, with the strong encouragement of innovation agencies.

Yet despite the clear benefits of open innovation approaches, there are also perceived barriers and risks that may limit engagement. A NESTA report into Open Innovation (NESTA, 2010, p.5) identified that businesses hesitate to engage in open innovation because of concerns relating to the protection of intellectual property (IP), perceived complexities of engagement, and fear of increased interdependence. Whilst these factors could also impact on their willingness to engage in university-business collaborations, Laursen and Salter (2004), drawing on the UK Innovation Survey, found that companies with open strategies were more likely to engage with universities, suggesting that, for these companies, the strategic benefits outweighed the management challenges and risks of doing so. In order to exploit such growing opportunities, *The Wilson Review* underlined the importance of close engagement pointing out, *"The increasing adoption of open innovation models demands that even greater attention is paid to networking between research academics and business"* (Wilson, 2012, p.55).

Un and Rodríguez (2018) suggest that the way in which businesses seek to learn as part of an open strategy may have a significant impact on how benefits are accrued. They showed that businesses that *learn from* R&D outsourcing (that is, they do not engage in the R&D activity) are likely to have an inverted U-shaped relationship with innovative products because they gain no capability to innovate themselves and they may actually lose their internal capability in becoming reliant on others. Conversely, Un and Rodríguez show that those businesses that *learn by* R&D

outsourcing (that is, where the R&D is co-developed), and in doing so improve their own R&D capability, have a U-shaped relationship with innovation because there is an initial drop during the integration phase but this later results in more innovations. This suggests that businesses that do decide to collaborate with universities need to give further consideration to which approach to learning best supports their business strategy. Nonetheless, following their study of open innovation in UK universities, Striukova and Rayna (2015, p.489) concluded more generally that universities have a central role to play in supporting open innovation by acting as *'trusted intermediaries'* that can bring together several parties in a collaborative environment. They also noted that university-business collaborations provided a much wider range of benefits than those within the boundaries of specific projects, such as recruitment opportunities and access to networks and contacts (ibid, p.474, after Lee, 2000).

Whilst open innovation strategies have been shown to encourage businesses to collaborate with universities, there has also been some push from the universities themselves to drive more open approaches to sharing the learning generated from such activities to gain wider benefit and exploitation. This is often pursued under the banner of *"open science"*, which *Universities UK* describes as *"the umbrella term for a global movement to make all aspects of science and knowledge generation publically available to everyone, for free, via the internet"* (Universities UK, 2020²²). It would be easy to see how this might be regarded negatively by businesses that seek to appropriate the benefits of collaboration for their own competitive advantage but the counter argument to this is that by making the new learning more widely available it

²² Open Science, Universities UK website, <https://www.universitiesuk.ac.uk/policy-and-analysis/research-policy/open-science>. Universities UK is a collective organisation that represents the views of (currently) 137 universities in the UK, each represented by their vice-chancellor or principal (executive head).

can be built upon by other researchers and developers and exploited more fully. The original collaborator still retains prime position to exploit this early and can protect any related innovation arising from that phase accordingly. At the same time, making learning more widely available encourages industrial sectors to converge more quickly on the most promising lines of development, which may speed up the rate of innovation and make it easier to agree common standards. In such a system the pre-competitive/competitive threshold is simply pushed further back, as the core of common knowledge grows.

The above logic has been applied in establishing a large public private partnership (PPP) to which the University of Oxford belongs, alongside a number of leading pharmaceutical companies, universities, and public and third sector bodies. It was founded on open science principles that were strictly enforced in the timely publication of scientific outputs from its collaborative projects that supported drug development. In a sector characterised by extremely high R&D costs, long lead times and high failure rates, a number of large and sector-leading businesses and funders have nonetheless been persuaded of the overall merits of this approach and have joined the PPP. This particular example has been captured in one of the case studies in this research project (case study Med 2) outlined in Chapter 5, Section 5.10, p.144. With regard to national policy, UKRI is now giving close consideration to formalising a policy position for open access to the research it supports and ran a consultation exercise in early 2020²³ to inform this.

Importantly, absorptive capacity and open innovation are pertinent constructs in relation to university-business collaborations and particularly in the context of this

²³ Details were accessed on 13 February 2020 at the following link:
<https://www.ukri.org/funding/information-for-award-holders/open-access/open-access-review/>

research because they usefully conceptualise learning-based issues that may underpin not just the motivations of businesses to engage with universities (both positively and negatively) but also the way in which they do so. These in turn will be influenced by university approaches. However, it is less clear how and to what extent absorptive capacity has an influence within collaborations and impacts on their learning outcomes.

A review by Foss *et al* (2010) found that the ‘knowledge-sharing’ literature is heavily biased towards such macro-level constructs that are often at the organisational level, but that little attention is paid to the micro level. This is in line with points raised by Marchington and Vincent (2004) and Tsasis *et al* (2015), discussed later in Chapters 6 (Section 6.1, p.154) and 7 (Section 7.1, pp. 206-7) respectively. Foss *et al* further argue that explanatory mechanisms can only be found by looking at their ‘micro-foundations’ at a lower level (p.457), involving personal actions and interactions concluding that *“correlations between macro variables may well remain; however, the point is that paying attention to the level of individual action and interaction in knowledge sharing explains why such correlations exist”* (p.473). This supports the need to seek a deeper understanding of the interactive processes within collaborations to better inform the development of approaches and supporting policy interventions.

2.3.4. *The Importance of Academic Motivations on University-Business*

Collaborations

In contrast to research on business motivations to collaborate with universities, research into university motivations to engage in university-business collaborations is far more focused on the level of the academic rather than on the institutions. This may in part reflect the greater commonality across academics as a profession than

there is across people working in business (across all sectors) who might engage in collaborations, leading perhaps to researchers feeling it is easier to make generalisations about this population. Moreover, D'Este and Perkmann (2010) suggested that academics' engagement with 'industry' was a discretionary activity and this assumption of greater autonomy also led researchers to focus more on their motivations at the individual level. However, since their paper was published it is likely that many academics feel increased pressure to engage in light of the continued development of the REF and the associated responses of university employers discussed earlier. Nonetheless, this is an important area for consideration since, as Hughes *et al* (2016, p.47) point out, *"in order to create the right incentives for academics to engage with external organisations it is important to understand their motivations"*.

The National Centre for Universities and Business (NCUB) commissioned the most extensive surveys of academic engagement and views on knowledge exchange within the UK, which was conducted in 2008/9 and updated in 2015 (Lawson *et al*, 2016; Hughes *et al*, 2016; Hughes, 2016)²⁴. They found that engagement by academic staff was varied and extensive across all faculties but their findings revealed some points that were particularly pertinent to this research. Most notably, four of the top five motivations for academics engaging with external organisations related to their personal learning: *gain insights into the area of my own research (1st)*, *keep up to date with research in external organisations (3rd)*, *test the practical application of my research (4th)* and *gain knowledge about practical problems useful for teaching (5th)* (Hughes *et al*, 2016, p.37, Exhibit 36). Even the second most important motivation,

²⁴ The 2009 survey was sent to all academics in UK universities, covering activities over the preceding 3-year period (22,000 responded), alongside a sample of 2,500 businesses (Hughes, 2016).

“further my institution’s outreach mission” might be seen as commitment to an institution’s wider social and learning goals, although it may also have been driven by increasing assessment pressures. By contrast, the bottom-rated motivations were *“looking for business opportunities linked to my research”* (9th) and *“source of personal income”* (10th), suggesting that only a minority of academics engaged for financial gain.

These findings were broadly similar to those from a more limited study of academics in mathematics, physical sciences and engineering undertaken by D’Este and Perkmann (2011). They found that three out of the top four motivations related to research: *learning, access to funding, and access to in-kind resources*, with the other motive being *commercialisation*, which suggested that this is more important in these applied subject areas. In addition, they found that academics motivated by learning most frequently engaged in joint research, contract research and consulting (the first two of which were the focus for this study). So when taken together these results suggest that academics see engagement largely as an opportunity to further their own (professional) learning. This is in keeping with the suggestion by Bruneel *et al* (2010) that scientists’²⁵ willingness to work for lower pay (compared to their counterparts in business) was indicative of their intrinsic goals. However, neither survey makes clear to what extent the intrinsic motivations of academics reflect their desire to help businesses to achieve their own goals. This is a significant gap in our understanding since whilst formal goals may often be agreed or set, the motivations of the participants to work towards the achievement of their partner’s goals in addition to their own will clearly affect how collaborations develop and what outcomes arise from them.

²⁵ They refer to scientists as a generic term for the academics working in the science and technology focused institution in which they conducted their study.

Whilst the underlying learning-related motives for academic engagement with businesses are clear, these need to be considered alongside other factors that may affect academic behaviour. In particular, professional recognition and advancement can be regarded as fundamental motives for academics working at all levels and so it is essential that these be brought into consideration when looking at academic engagement in university-industry collaborations. Bruneel *et al* (2010, p.859) recognised the need to appreciate that *“academics often have to engage in ‘status competitions’ with their peers, based on publication records, institutional affiliations and prizes”* (after Becher, 1989). This point was supported by the NCUB data (Hughes *et al*, 2016, p.75, Exhibit 62), which showed that respondents still regarded *research and publications* as by far the most important criteria for promotion. In the second and latest survey around 70 per cent of respondents regarded this as a highly important criterion, compared to around only 11 per cent for *work with business and industry*. This substantiates the fundamental tension identified in Section 2.2.1. Indeed, Dowling acknowledged that *“there is a strong feeling amongst members of the academic community that collaborative research is not valued as part of an academic career with universities”* (Dowling, 2015, p.30, para 46,). This was further reflected in her finding that the top barrier to collaboration from the perspective of university respondents was that *“university metrics, including the REF, prioritise the production of high-quality publications”* (ibid, p.12, Fig. 12). A key recommendation of the Dowling Review was to further incentivise academic engagement through changes to the REF assessment process, suggesting that there should be both an increase in the impact weighting and more consideration given to collaborations in the environment component of the assessment (Dowling, 2016, p.4, Recommendation 2). However, the

above evidence, particularly from Hughes *et al* (ibid), suggested that such incentivisation was poorly targeted unless aligned with commensurate changes not only to how academic careers are managed but also to how academic excellence is regarded more widely. It may have been hoped that assessment changes would have stimulated such top-down systemic changes but to a large extent researchers and their parent institutions operate in a globalised environment with international norms, intense competition and relatively high levels of mobility (this is particularly true of the most research-intensive institutions that seek to attract and retain the best researchers globally) and so both government and institutional levers may be limited in this respect.

Notwithstanding the above, it is clear (for example, see NCUB, 2019) that many academics do manage to construct fruitful and productive collaborations, the learning from which subsequently informs high quality research outputs, whilst at the same time providing substantial benefits to business. However, the realities of engagement with industry may be far more nuanced, as such ‘win-win’ outcomes may not always be the case and where positive outcomes were achieved, they may not always have been immediately apparent (Perkmann and Walsh, 2009). In practice, D’Este and Perkmann (2010, p.332) observed that *“most academic researchers are keen to retain their autonomy by ensuring that collaborative work with industry is conducive to – or at least compatible with – their research activity”*, although Perkmann and Walsh (2009) also show that even non-academic projects can benefit researchers (discussed further in the next section). However, Hughes *et al* (ibid, pp.50-51) found that the most frequently cited constraints on engagement from the perspective of academics were *“a lack of time (53 per cent), bureaucratic hurdles within the university (23 per*

cent), a lack of resources (21 per cent) and insufficient rewards (20 per cent)". These all relate to their own institutional environments, suggesting that universities need to continuously review how, notwithstanding imposed government policies, they can better create the conditions in which academics are able and motivated to engage with businesses. This needs to be further informed by a closer understanding not just of their motivations but also of the challenges that both universities and businesses face in collaborating with each other.

2.3.5 *Working Together in University-Business Collaborations*

Researchers have highlighted a set of broad issues inherent in the relations between universities and businesses when working together, and these build upon the issues and themes analysed above. On one level these relate to challenges arising from different '*institutional logics*' (Colyas, 2007), which Perkmann and Walsh (2007, pp. 1036-7) described as twofold. First, a "*secrecy problem*" (Florida and Cohen, 1999) can arise when businesses want to keep proprietary learning to themselves for their own commercial exploitation, whereas the academic desire is to add to the existing body of knowledge in line with the open science principles discussed earlier. Secondly, a "*complementarity problem*" (Rebne, 1989) may arise in collaborations that are of little value to the academics involved, in terms of academic output, because the outcomes from these are not seen as making a strong enough contribution to knowledge and understanding to merit publication in an academic journal. However, Perkmann and Walsh (ibid) found that in practice the influence of these factors varied with the types of collaborative activity (although they only looked at the activities of engineering academics with a single institution). More 'basic projects', that were often led and conducted by the academics, were more likely to support academic outputs but

provided fewer opportunities for interactive learning. Conversely, whilst more 'applied projects', were often found to be subject to more secrecy and complementarity issues, which limited their direct academic outputs, they provided more indirect benefits that enhanced academic outputs in the longer term. They found that the principal benefit was the enhanced "*learning by interacting*" (ibid, p.1050), which they noted was likely to be supported by "*enduring interaction between partners, trust and long-term orientation*" (Larsson *et al*, 1998). They recognised that access to such learning opportunities would be important to some academics, depending on their motives for engagement (ibid, p.1055), which underlines the need to see collaborative opportunities in terms of wider learning benefits, rather than focus just on the immediate academic outputs.

Taking a different perspective, Bruneel *et al* (2010) divided barriers to university-business collaboration into those that were '*orientation-related*' (reflecting contrasting norms in areas such as the degree of openness of knowledge and expectations of turnaround time) and those that were '*transaction-related*' (covering difficulties relating to areas such as intellectual property rights and university/public funding agency regulations). Drawing on survey data, they analysed the effect of collaborative experience, breadth of interaction and inter-organisational trust in lowering barriers to collaboration. Experience of collaboration was found to reduce orientation-related barriers, whilst breadth of interaction also reduced orientation-related barriers but increased transaction-related ones. However, perhaps their key finding was that:

“Inter-organizational trust is one of the strongest mechanism for lowering barriers between universities and industry. It suggests that the traditional system of informal reciprocity and exchange, which dominated U-I exchanges in the post-war era, should be an important part of attempts to support and build U-I collaborations. Building trust between academics and industrial practitioners requires long-term investigations in interactions, based on mutual understanding about different incentive systems and goals” (Bruneel et al, 2010, p. 867).

The high importance of trust was further underlined in the Dowling Review with *“strong and trusting personal relationships”* being the most frequently cited key success factor for building *“productive, long-term research partnerships between business and academia”* (Dowling, 2015, p.27, Figure 11). Of further note was that the next two most highly rated responses were *“shared vision, goals and objectives defined, setting in place clear expectations”* and *“mutual understanding between partners”*, and so the top three factors are closely inter-related aspects of the overall relationship between the people in university and business positions involved in each collaborative activity. Indeed, Dowling recognised that *“strong personal relationships were found at the heart of any successful collaboration”* (ibid, p.28, para 39).

However, after outlining the key aspects of this, it was somewhat disappointing to find that she felt unable to offer policy recommendations to seek further improvement in this vitally important area, focusing instead on the incentives to encourage engagement (the effectiveness of which was questioned earlier), explaining that, *“It is clearly difficult to make policy recommendations that will directly impact on the success of individual relationships”* (ibid, p.28, para 42). This may have reflected the lack of research into the processes *within* university-business collaborations that would help to inform how such productive relationships can be developed, and supported by policy.

Ankrah *et al* (2013) engaged both university and industry participants in their study of knowledge transfer and found that the majority of the benefits to both were less tangible ‘intermediate outcomes’. They described how these could be *“bits of knowledge, which though could appear insubstantial, could help industry in their R&D efforts...could also be hints clues or ideas for new projects, opportunities or opening up of entire new areas for research”* (ibid, p.62). Importantly, they also described how these could be *‘negative findings’*, which confounded the original expectations or *‘serendipitous outcomes’* that were unexpected. Furthermore, they found that seeking serendipitous opportunities to exploit was a key motive for some businesses engaging in collaborations with universities. These are particularly important from a learning perspective because they force previous assumptions to be revisited²⁶ and while may be challenging to work through to determine a new way forward, potentially they could lead to major advances in new learning. Ankrah *et al* concluded, *“It could well be that evaluating the transfer process by looking for tangible outcomes such as cost effectiveness is looking in the wrong place”* (ibid, p.62). This is very pertinent to the kinds of university-business collaborations that are the subject of this research, as will be made clear in later chapters. Moreover, this presents further questions on how the wider learning from collaborations should be captured, evaluated and shared as much of this may be lost if only those immediate outcomes that meet narrowly defined criteria for success are captured; these are themes that will be returned to in Chapters 8 and 9.

A further point that should be drawn from the discussion in this section is that it is vitally important that both university and business participants in collaborations

²⁶ This is what Argyris (1999) would refer to as ‘double-loop learning’ or what Mezirow (2000, 2009) would call ‘transformational learning’, as will be discussed later in Chapter 3, Section 3.3.

understand each other's motives. Ankrah *et al* (ibid, p.63) suggested that being transparent about motives was an important element in building trust because it made the participants' behaviour more predictable (Mitchell, 1982), which may lead to the collaborating party being more accommodating of them. However, as Oancea (2013) noted, collaborating partners are liable to start to change things such as objectives, funding levels, and timelines during projects (this is particularly true where they are inclined to pursue serendipitous opportunities) and this may require academics to compromise or take some risks, although it may sometimes be hard to accommodate changes that compromise academic rigour. This might become an issue where the solution sought by businesses can seemingly be obtained more directly (to their minds) without the need to adhere to the rigour of academic standards of research, suggesting that academics need to be clear on the extent to which business are prepared to accommodate their research requirements before committing to collaborative activities.

2.3.6 *Issues to be Addressed in Future Research*

A review of the research literature on UK university-business collaboration for knowledge transfer by Vick and Robertson (2018) concluded that *"qualitative studies have tended to focus on formal KT arrangements...there appears to be little or no published qualitative research on KT occurring at the individual/departmental level"* (p.583). This is a significant gap because it is at this lower level that much formal and informal collaboration is generated, as will be illustrated by the case studies in this research.

Whilst the above discussion shows that some key factors influencing the development of positive relationships have been highlighted, such as high levels of

trust and mutual understanding, there has been limited research into how these are developed. Rybníček and Königsgreber (2018, p.236) noted that some studies into university-industry collaborations found that the importance of investigated factors varied over their course of development but, on closer examination, the degree of generalisability that could be drawn from these were very limited. For example, Hong *et al* (2010) were cited as highlighting the importance of regular meetings and frequent communication when collaborations were being initiated but this was based on a study that examined the role of culture in collaborations between multinational companies (MNCs) and Chinese universities, and so this inference needs to be seen in this very specific context since the authors made clear that the role and nature of interpersonal relations were a particularly important aspect of Chinese culture. By contrast, research by Attia (2015) was given as an example to illustrate that some factors may be more important later (in this case the existence of mutual trust) but this was an initial study, using survey data to confirm the importance of broad barriers (based on those identified by Bruneel *et al*, 2010) and drivers (based on a 2011 European Commission Report) to university-business collaboration in Egypt and did not specifically consider temporal aspects.

This generalised approach was typical of that taken by many survey-based studies. Plewa *et al* (2013), on the other hand did set out specifically to understand variations in the importance of four relational factors over three defined stages of development (initiation phase, engagement phase, and continuing engagement phase) for loosely defined 'university-industry linkages'. The study provided useful insights into the variation in the effect of some factors, such as trust, whereas communication was consistently important throughout. However, as this too was based on the

statistical analysis of survey returns, its ability to offer explanation was limited. The authors also acknowledged that there were limits to generalisability (they looked at longer-term linkages between universities and industry in Australia, averaging eight years, that mainly involved senior academics). Whilst they confirmed the important role of individuals, they did make clear the need for a better understanding of the changes in relational success factors as 'linkages' progressed (ibid, p. 373), particularly by managers.

These points underlined that there is far more to be understood about the factors, processes and interactions involved in the development of collaborations. Rybníček and Königsgruber's (2019, p.237) review concluded, *"for most success factors it remains unclear to what extent their impact varies over time. Therefore, future research should investigate the relationship between different factors and different phases of a collaboration project"*. This echoed the earlier recommendation of Bruneel *et al* (2010, p.867) that, *"future research should explore the barriers over time and examine the factors that lower or raise the barriers to collaboration"*.

A particularly interesting recommendation made by Plewa *et al* (ibid, p.374) was that more research should examine areas such as whether 'linkages' were initiated and developed at individual or organisational level (p.374). This implicitly recognises that whilst individual participants themselves may be influential in collaborations, reflecting their personal characteristics, their actions will, to some extent, be influenced by the intentions, norms and expectations of their parent organisations. Arguably, this is a matter of degree, depending on the specific parties involved and the context in which they were acting. Furthermore, when two or more organisations collaborated, these individual and organisational influences may be

mediated by the creation of a unique inter-organisational environment that itself exerts influence on the development of relationships. This means that the factors that shaped university-business collaborations might thus be attributed to individual, organisational or inter-organisational levels. Whilst this adds further to the complexity of how collaborations are conceptualised, it provides greater granularity for analysis, which potentially allows us to better understand the important influences.

However, there is an almost complete absence of research that has considered these different levels of influence. An exception was the recently published study by Bursell and Engeström (2019). This examined the barriers to university-industry collaboration from the perspective of research group leaders within a single HEI in Sweden. Based on their analysis of their interview data they identified six key categories of barrier (competence-related, concept-related, performance-related, resource-related, system-related and value-related) but then sub-divided the key areas within each into individual, intra-organisational and inter-organisational levels. Whilst this was a noteworthy development, this small study (drawn from a sample of just 16 senior academics) had other limitations. It did not involve collaborating partners and the interviews appear to have been based around the interviewees' broad experience rather than their involvement in case studies of specific collaborations and so they did not consider factors in a temporal context, which meant that the findings had limited utility for the purpose of this study.

Despite the growing but fragmented literature, this section underlines the need for further research into university-business collaborations at a more micro-level to seek a better understanding of the factors that drive or hinder their development. When considering these factors, more recent developments point to the need to

consider both the variations in their importance over time and the levels at which they exert influence. Such an analysis can only be conducted on the basis of a qualitative study of particular cases that includes participants directly involved from both the university and the collaborating partners to establish a fuller understanding of how the processes of actions and influences interact to shape the development of the collaborations. In an attempt to overcome the common problems of drawing inferences from very narrow groups, multiple cases from a wide spectrum of university-business collaborations would offer greater generalisability. And finally, it was established in the preceding sections that both business and university academics are driven strongly by learning-related motives and that satisfying them may be indirect or delayed. This provides a strong rationale for seeking to better understand the development of processes and outcomes within university-business collaborations from a learning perspective. The next chapter will therefore explore how learning concepts can be utilised to analyse such activity.

CHAPTER 3: INFORMING A LEARNING PERSPECTIVE

3.1 Introduction

Chapter 1 signaled that this research would approach university-business collaborations from a learning perspective, providing an effective way to seek a better understanding of both the interactive processes within these collaborations and the outcomes arising from them. This requires further explanation of what this means and how it will be used in this project, which is the intention of this chapter, leading into the chapter on research methodology.

To begin with, it is useful to outline what is understood by learning within the context of university-business collaborations. General definitions of learning are inevitably broad, as in that offered by Illeris (2017, p.3), who sees learning as *“any process that in living organisms leads to permanent capacity change and is not solely due to biological maturation or ageing”*. Despite being broad, this definition is useful for this research because it encapsulates the notion of learning as both process and outcome and implies external interaction. Illeris (ibid, p.25) further proposed that learning encapsulates a wide range of elements, including knowledge, skills, understanding, recognition, attitude, behaviour, sociality, and empathy, amongst others. Significantly, this shows that learning involves far more than cognition, as will be discussed. It should also be added that despite having argued for a focus on learning rather than knowledge in Chapter 1 (it better represents the connectedness of process and outcomes), it is accepted that many others have used and continue to use the term knowledge, often in not dissimilar ways. For example, Grant (1996, p.110) declined to add to the many definitions of knowledge (content with *“that which is known”*) but focused instead on underlining that there are different types of

knowledge, referring to Matchlup's (1980), "*elements of knowing: being acquainted with, being familiar with, being aware of, remembering, recollecting, reorganising, distinguishing, understanding, interpreting, being able to explain, being able to demonstrate, being able to talk about, and being able to perform*". This serves to illustrate the clear overlap in the literature between learning and knowledge, and I shall draw on both where it is useful and appropriate to do so.

The adoption of a learning perspective reflects my key assumption that university-business collaboration²⁷ is essentially a learning activity. This is founded on two broad premises. First that university-business collaboration is predicated primarily on the pursuit of learning outcomes. Whilst there may be other reasons for one party or another to collaborate, the key drivers are the search for new learning or '*exploration*', and/or the utilisation of pre-existing or co-developed learning generated through the collaboration, that is, '*exploitation*' (adapted from Curado, 2006, p.34). The second premise is that learning processes take place throughout the course of collaborative activity, leading to these learning outcomes. Consequently, focusing on better understanding and attending to the learning processes that take place within collaborations should improve learning outcomes. It is clear that not all activity that takes place within university-business collaborations contributes to or affects these learning processes and so the adoption of a learning perspective does not mean seeing everything as such. However, it does mean looking critically at university-business collaborations in order to better understand what does affect learning processes and the resulting learning outcomes. This is pursued with the intention of generating both conceptual and practical propositions to inform the further development of practice,

²⁷ As defined within the focus of this study in Chapter 1 (Section 1.2, p.4).

from the perspective of university academics and researchers in Chapters 8 and 9. In order to achieve this, the approach taken, which is laid out in the next chapter, takes account of both the particular contextual factors of learning within university-business collaborations and how relevant parts of the learning literature can support a better understanding of the learning that takes place therein.

3.2 The Learning Context Within University-Business Collaborations

As learning environments, university-business collaborations can vary widely, in terms of scale, longevity, structure, purpose, and the nature of both the activity and the physical space that it takes place in. The implications for methodological approaches are discussed in Chapter 4 but it is useful here to characterise the similarities.

Fundamentally, university-business collaborations involve, as a minimum, representatives from two organisations that are mutually dependent on each other to achieve their learning goals. Consequently, they must establish a relationship through which they will work towards them. Whilst the parties might agree collaborative goals, the personal motivations and goals of individual participants will differ and they may hold differing expectations of how the relationship should develop, reflecting a combination of their aspirations, experience, role and the norms and practices of their parent organisation. As a result, participants are subjected to multiple sources and levels of influence in this complex and dynamic environment.

In view of these inherent tensions, university-business collaborations might be regarded as unstable and risky enterprises, at least to begin with. It is therefore incumbent upon the participants to seek to promote stability by building the relationship needed to pursue their learning goals. Whilst it was suggested in

Chapter 2 (see Section 2.3.5) that trust is an essential component of relationship building (for example, Bruneel *et al*, 2010; Dowling, 2015), there may be limited basis for this at the start, possibly exacerbated by perceived power differences between the participants and the way that power is exercised in these interactions, as will be discussed in Chapter 7. Consequently, the participants in university-business collaborations need to be concerned with creating the conditions in which learning can take place, to a greater extent than in more formal learning environments. In addition, participants in university-business collaborations may need to adopt multiple learning roles at different stages or perhaps sometimes simultaneously, which might include being a provider, receiver, developer or co-developer of learning. A further challenge is that it is the receiving party that judges the value of the learning provided, against its own contextualised expectations or aspirations. This places further emphasis on the provider of learning to understand the environment in which the intended recipient(s) operate.

Whilst, the learning gained from collaborations is likely to be far greater than the explicitly anticipated and agreed learning outcomes, these outcomes should nonetheless be the key driver for activity, at least initially. Consequently, it is useful to consider how they shape the characteristics of the learning outcomes that are sought by each party. First, the learning needs to have sufficient utility to meet the purpose for which it was intended. In a workplace-learning context, Illeris (2011) describes this as developing '*functionality*', where the learner seeks meaning and the ability to use the learning to address a problem, whereas in a business context Cohen and Levinthal (1990) refer to this as '*exploitability*', which they use to describe the final element of absorptive capacity. However, the term functionality will be used here because it

focuses purely on the learning requirements, whereas exploitability may depend on other organisational capabilities such as technological or knowledge management systems.

There are two further characteristics that are really conditions, to meet the requirements of functionality in a collaborative context: *'transferability'* and *'transformability'*. The successful transfer of learning between individuals working in different organisations depends heavily on the extent to which the required learning can be made explicit, that is, codified and communicable in a form that is understood by the learner. Where it is not easily codified or communicated, knowledge is regarded as being implicit or *'tacit'* (Polanyi, 1966). Whilst there is no commonly agreed definition, tacit knowledge is usefully described by Howells (1996, p.92) in a knowledge transfer context as *"non-codified, disembodied knowledge that is acquired via the informal take-up of learned behaviour and procedures"* and adds that *"learning in an unstructured and semi-structured way is a key process within tacit knowledge acquisition and transfer"*. This has received a lot of attention in the literature on organisational and inter-organisational learning and yet the extent to which knowledge is tacit is a matter of debate. Polanyi (ibid) was of the view that all knowledge was tacit or rooted in tacit knowledge, which implies that transfer processes that rely on explicit knowledge alone may be unsuccessful (Nielsen and Cappelen, 2014). Howells, on the other hand, points to evidence that tacit knowledge may be particularly important in relation to complex skills and processes, although he concludes:

“It is likely that those areas of knowledge that are truly ‘tacit’ in nature are smaller than initially thought. More elements of tacit knowledge may in reality be, if not formally liable to codification, at least able to constitute an organizational routine that can be transferred between employees or groups of employees” (Howells, 1996, p.103).

‘Transformability’, in the context of the collaborative environment, relates to the need for learning to be provided in a form that is meaningful for the receiving individuals in their own context. Zara and George (2002) recognised this as a vital part of the learning process and argued that a ‘*transformation*’ dimension needed to be added to the process of building a firm’s absorptive (or ‘learning’) capacity (after Cohen and Levinthal, 1989, 1990). However, by placing this between the ‘*assimilation*’ and ‘*exploitation*’ dimensions,²⁸ they imply that externally sourced learning can be assimilated without first being transformed and also that a firm’s absorptive capacity has to be developed from solely within its own resources. This may not be possible in all university-business collaborations, particularly where a business’s absorptive capacity is below the level at which it could use the learning held by a university in its ‘raw’ form. Moreover, in cases where the key learning deliverable is from university to business, the business is likely to have a strong expectation (implicitly if not explicitly) that the university takes a greater responsibility for ensuring that the learning is contextualised. In order to achieve this, university participants need to gain a detailed understanding of their collaborator’s business environment. Consequently, to enable a business to gain functionality from a collaborative output, a university needs to provide the business with learning that is both appropriate in content (to meet the requirement) and contextualised (in a form they can use). In practice, it follows that the extent to which such learning achieves

²⁸ Cohen and Levinthal (1989, p.569) originally defined absorptive capacity as “*the firm’s ability to identify, assimilate and exploit knowledge from its environment*”.

functionality will depend strongly on the strength of the relationship between the university and business. The key components that businesses require to support their effective learning in university-business collaborations is summarised in Figure 3.1. Some academics have suggested specific approaches to transferring and transforming tacit knowledge, which will be discussed in Section 3.5.

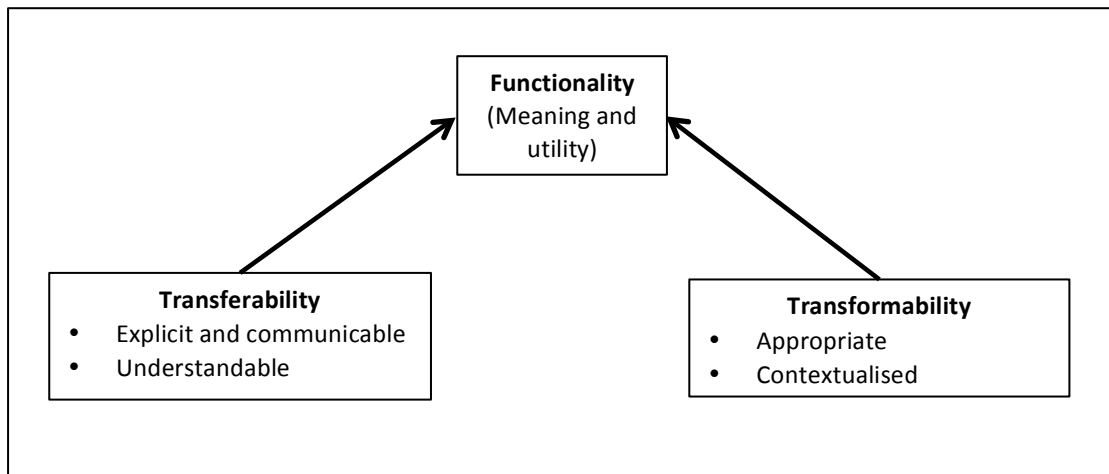


Figure 3.1: Business Requirements for Effective Learning Through University-Business Collaborations

The wider perspectives of university-business collaboration offered in the previous chapter and the more specific contextual considerations discussed above show that it is necessary to consider learning theory on a number of levels. That is, at the individual, organisational and inter-organisational levels. Key conceptual approaches for each are discussed below, leading to a conceptual approach with which to analyse university-business collaborations within the boundaries of this research.

3.3 Perspectives on Individual Learning Concepts

The extensive literature on individual learning falls into two broad areas of work: that relating to the psychological aspects of learning within the individual; and to the social context in which learning takes place. Illeris (for example, 2006, 2009, 2011, 2017) argues persuasively that both are essential elements of all learning and this is the view

adopted in this study; his integrative model provides a useful basis for the development of a conceptual framework for this research and will be returned to at the end of this chapter.

There is general agreement that the psychological process of learning involves an individual forming his or her own abstract mental representations or models of reality. This might be seen as comprising of building blocks, which Piaget (1952) referred to as 'schema' (others use the term 'schemata', see below), which are successively ordered, built upon and organised for retrieval. Maier *et al* (2001, p.20) explain that individuals use their schemata and scripts (special schemata that refer to events) to process new information, meaning that their perception is affected by their experience and previous knowledge. This helps to make sense of Ausabel's (1968, p.vi) point that *"the most important single factor influencing learning is what is already there"* (Illeris, 2007, p.38, 2017, p.21). On this basis, individuals working in university-business collaborations are bound to perceive situations differently, even if they have been trained in the same way, because of their wider learning and differing experiences.

There may often be situations in university-business collaborations when formally-designated 'experts' are engaged in learning activities with non-experts to solve problems in particular contexts, although it may be more accurate to see individuals as having different areas of expertise that may be more prominent (compared to others) in some situations than in others throughout the course of the collaboration. Glaser (2005) offers some useful insights into how experts differ in their cognitive processing. He explains (ibid, p.276) that *"experts...have a great deal of domain-specific information, and this information is highly organized and conceptually*

integrated. This organized knowledge appears to account for the experts' capacities for rapid pattern recognition and categorization". This allows them to deal with information in chunks very quickly, based on their perception of the central underlying properties or meaningful properties of the situation they are confronted with, which may give the appearance of intuition. By contrast, non-experts do not exhibit chunking and are only likely to recognise smaller and more shallow patterns that are far less related to abstract principles. Glaser cautions, however, that expertise is domain-specific and there is no guarantee that expertise in one domain is transferable to another, although he does concede that this may be possible with some types. He notes that another characteristic of experts is their goal orientation, supported by an ability to link relevant pieces of information together into cause-and-effect sequences to solve problems (ibid, pp.277-8). This is perhaps a more generalisable aspect of their cognition that may be useful in collaborative working. Indeed, when dealing with unfamiliar problems, Glaser suggests that whilst experts may resort to general problem-solving skills, like non-experts, they may do so more effectively, perhaps making linkages to their wider learning patterns (ibid, pp.278-9).

Whilst there are differences in precise definitions and meanings, theorists generally recognise two broad types of learning relevant to adults, which Piaget referred to as *"assimilative"* and *"accommodative"* (Piaget, 1952). Essentially, assimilative learning takes place when something is taken in that fits within existing assumptions and patterns of understanding, whereas accommodative learning occurs where something can only be taken in by restructuring assumptions and patterns of understanding (Illeris, 2007, 2009, 2011, 2017). Illeris (2017, pp.38-42) highlights the close parallels here with other models, most notably the *"single-loop learning"* and

“double-loop learning” modes of Argyris’s model of organisational learning (Argyris and Schön, 1974, Argyris, 1999) and with Mezirow’s *“transactional”* and *“transformational”* modes of learning (Mezirow, 2000, 2009, Lawler and Sillitoe, 2013). He describes accommodative and transformative learning separately (2017, pp. 42-46), regarding the latter as requiring a more extreme and fundamental reorganising of all aspects of previous learning, although Mezirow himself suggests that transformations can be sudden significant re-orientations, which he termed *“epochal”* or *“cumulative”*, arising from progressive insights over time (Mezirow, 2009, p.45). Illeris (2017, pp.94-96) goes on to suggest that the levels of activity involved in interactions may be associated with different types of learning, with assimilation tending to be used in more passive interactions and accommodation more likely to be associated with more active forms.

Brookfield (1987) built on Mezirow’s work to emphasise the importance of what he termed *“critical reflection”* in the learning process. He later defined critically reflective practice succinctly as *“a process of inquiry involving practitioners in trying to discover, and research, the assumptions that frame how they work”* (Brookfield, 1998, p.197). Whilst he argues that critical reflection is needed to achieve Mezirow’s transformational learning, he is also clear that critical reflection does not always lead to this since the original understanding of a situation may hold (Brookfield, 2000). However, within a collaborative environment other individuals, perhaps with different levels or areas of expertise might see new associations and linkages through this process that had not previously been considered, opening up the possibility of creativity or novel solutions to problems.

Illeris (2007, 2009, 2011, 2017) describes the things that are learned, such as knowledge, skills and attitudes, as the “*content dimension*” of learning and whilst he recognises that all of an individual’s abilities are developed through this content, he sees that, in addition to this, the acquisition of learning always involves the “*incentive dimension*” of learning. He includes in this motivation, volition and attitudes and argues that the effect of these on learning should be considered as a whole (Illeris, 2017, pp. 83-86). Nonetheless, he makes particular note of the role of motivation in incentive, stating “*it is clear to anyone who deals with learning in one way or the other that motivation plays a key part in this direction*” (ibid, p. 84). Maier *et al* (2001, p.23) support this view, noting that motivation acts as a moderator of individual learning in terms of the frequency and execution of learning behaviours and the general willingness to engage. The incentive dimension of learning is of particular interest to this study, given that this chapter has already highlighted that factors relating to incentive, and its motivation component in particular, appear to be highly important to university-business collaborative relationships. This will become clearer when examining the interactive processes within the case studies in Chapter 6, leading to a focused examination of the role of motivation in learning through university-business collaborations in Chapter 7.

Given the nature of collaborative activity, it is appropriate to turn next to work on the social context of learning but it is again necessary to be selective, with a focus on what may be particularly useful to this study. Social theorists view learning as constructed through social interactions within specific socio-cultural situations. Whilst most social theorists also recognise the psychological processes discussed above, they

differ in their perspectives on how and to what extent such interactions determine learning.

3.4 Perspectives on Social Learning Concepts

Lave and Wenger (1991) described learning as 'situated' within such social contexts. Their influential work (based on a study of a wide range of apprenticeships) emphasised the importance of engagement in *practice*, suggesting that this may be a condition for effective learning. Importantly, they saw that mastery (of the apprentices' craft) resided not in the adept individuals involved in instructing the trainees (the masters) but in the wider organisation of the community of practice, and so participating in that culture of practice was an important way of learning (ibid, pp. 93-94). Furthermore, whilst the motivation of apprentices to gain the knowledge and skills required were clear, Lave and Wenger noted a deeper sense of the value to the learner of becoming part of the community, which relates to the notion of learner identity. They concluded that *"knowing...is located in the relations among practitioners, their practice, the artifacts of that practice, and the social organisation and political economy of communities of practice"* (ibid, p.122). Wenger (1998) further developed the concept of learning within communities of practice to provide a social theory of learning. This centres learning within four *"deeply interconnected and mutually defining"* components. In very brief outline, these are 'practice' (which provides 'learning by doing'), 'community' ('learning as belonging'), 'identity' ('learning as becoming') and 'meaning' ('learning as experience').

In terms of utility, Lave and Wenger's fundamental concepts of learning through practice within an implicitly consensual (and pre-existing) community do not provide a wholly satisfactory perspective for investigating university-business

collaborations when taken alone, given the context discussed earlier. It has already been shown that learning is often likely to be pursued more actively than through practice alone and, given the tensions, the 'community' needs to be constructed through collaborative engagement. However, given the clear importance of building relationships within university-business collaborations, their work provides some useful perspectives of social learning with which to examine them, particularly whether and to what extent individual identities relate to the collaborative activity and the extent to which these could be considered communities of practice. Whilst Illeris (2017, p.92) is clear that all learning is situated in a social context, he draws a further distinction between the immediate social situation in which an individual is in (which might be a workplace or wider organisation) and the more general societal situation, with its own cultural norms. He develops this further in his model of workplace learning, which will be returned to in Section 3.6 since this perspective offers further potential in distinguishing between the normal workplace and the collaborative environment.

Further important perspectives on social learning are provided by cultural-historical activity theorists developed from the early work of Vygotsky (1978) and colleagues, notably Leont'ev (1978, 1981) and Luria (1976). There is not room to go into activity theory in any detail here, but the utility of the approach arising from further development of this work led by Engeström (Engeström *et al*, 1999 gives a comprehensive overview) will be considered briefly, using the five principles he uses to sum up his approach towards '*expansive learning*' (Engeström, 2009, pp. 56-57).

The first "*is that a collective, artifact-mediated and object-orientated seen in its network relations to other systems, is taken as the prime unit of analysis*". The

mediating effect of cultural artefacts (a cornerstone of Vygotskian thinking), drawn from each participant's environment and experience, on the pursuit of their learning goals (the 'object') is an important consideration in collaborative activity, particularly in view of the sometimes stark contrasts between university and business organisations and their cultures. For example, differences in the use of language and terminology or in approaches to decision-making (especially with regard to speed and level of proof needed) could influence the ability to pursue collaborative goals.

A second principle recognises the *"multi-voicedness of activity systems"*, reflecting the different background, cultures, experience and adopted norms (rules and conventions) of participants. This too is important because it recognises differences within as well as between collaborating organisations. Taken together, these principles better capture the nature of activity within university-business relations. However, Engeström's emphasis on analysing the whole system and its relationship to others would not support the closer focus on interpersonal behaviour by those acting within the core of such collaborations that this study seeks.

The third principle of *"historicity"* assumes that *"activity systems develop over long periods of time and so their problems and potential can only be understood against their own history"*. The historical perspective is clearly important in understanding longer-term system development (which seems to be the focus for the application of Engeström's approach) but whilst some university-business collaborations are long-standing, others may be relatively short and dynamic first-time engagements (for example case study MPLS 3 was funded for only four months and case study MPLS 5 for six months, as will be outlined in Chapter 5). Nonetheless, the importance of a temporal dimension that captures the key prior as well as current

developments and seeks to understand future implications from them is fully accepted. However, this needs to be adjusted for differing longevities so for comparative purposes this needs to be seen within successive stages of development (including relevant background prior to engagement).

The fourth principle concerns the *“central role of contradictions (historically accumulating structural tensions within and between activity systems rather than problems and conflicts) as a source of change and development”*, which leads to the fifth principle of *“the possibility of expansive transformations in activity systems”*. So by using multiple sessions with participants, moving between past (historical), current and future practice (Edwards, 2010, pp.160-162) this approach attempts to understand deep-seated sources of ‘contradiction’ in order to inform possibilities for change. In this way, learning with and from participants is used to inform wider system development. This may have merit in some larger and longer established university-business collaborations but it is clear that as a methodological approach its focus on a systems level of analysis and system change does not coincide with those of this research. However, along with Lave and Wenger’s work, Engeström offers some useful socio-cultural constructs to incorporate into methodological approaches and the subsequent analysis of the core interpersonal relationships within the university-business collaborations in this research, as has been highlighted above.

3.5 Perspectives on Organisational and Inter-Organisational Learning

To complete this section, brief consideration is given to the particular nature of organisational and inter-organisational learning. Illeris (2011, 2017) and Grant (1996) share the fundamental stance that ‘learning’ and ‘knowledge creation’ (respectively) takes place at the level of the individual. However, Illeris (2017, p.114) notes that the

term, *“‘collaborative learning’ is employed in connection with approaches where a group of people try to learn and develop something together”*. According to Guzzo and Dickson (1996, pp.308-9), *“a ‘work group’ is made up of individuals who see themselves and who are seen by others as a social entity, who are interdependent because of the tasks they perform as members of a group, are embedded in one or more larger social systems (e.g. community, organization), and who perform tasks that affect others (such as customers or co-workers)”*. There is also a differentiation of roles and duties within the group (Guzzo and Shea, 1992). Whilst university-business collaborations are sometimes too small, informal or ad hoc to be recognised as a work group by others, it is clear from the case studies that they nonetheless operate on this basis.

The greater learning resources of the group enable larger and more complex problems to be tackled, by drawing on multiple and complementary areas of expertise. Maier *et al* (2001, p.25) suggest that the cognitive processes of encoding, storing, retrieving and using information can be seen at group as well as individual level, but emphasise the importance of developing a group culture. This needs to support the sharing of ideas, thoughts and concerns among the group as well as, importantly, the mechanisms for decision-making. However, organisational learning theorists would stress the importance of organisational structures to facilitate this. For example, Lawler and Sillitoe (2013, p.495) argue that organisational learning means, *“the organisation has in place systems and procedures which help it to learn from its work processes, problems and mistakes”* (after Schuler and Jackson, 2007).

Cohen and Levinthal (1990, p. 131-2) addressed the relationship between individual and organisational roles in developing a firm’s absorptive capacity. They explained that whilst an organisation’s absorptive capacity depended on the

absorptive ('learning') capacity of its individual members, it was more than simply the sum of this. It depended also, they emphasised, on the internal transfer of knowledge within and across sub-units. Within a university-business collaboration this transfer also needs to take place across organisational boundaries, as discussed earlier, which is made further challenging when the learning being shared is highly tacit in nature, especially where dependent on combinations of individual skills or collective routines that are hard to disaggregate and therefore to replicate. Nonaka (1994) and later Nonaka and Takeuchi (1995) sought to address this through the development of their SECI²⁹ model of organisational knowledge creation. This involves using their four-stage cycle to first make explicit and then incorporate external tacit knowledge. This is then combined with existing internal knowledge to generate new knowledge that is then internalised (tacitly) within the organisation. The process is predicated on socialisation, although Engeström (2009, p. 69) criticises their assumption that *"this leads to a model in which the first step consists of smooth, conflict-free socializing, the creation of "sympathised knowledge" as Nonaka and Takeuchi call it"*. This assumption would certainly be tested in a collaborative environment, in which activity is likely to be more dynamic, complex and perhaps challenging, particularly when the realities of influencing factors such as motivation, trust and power are considered. Beesley (2004) sees the levels of learning as inter-related, which she represents as a series of concentric rings with individual learning at the centre then successive group, organisational and inter-organisational rings or levels. She argues that learning cannot

²⁹ "SECI" stands for each of the four phases of the model: socialisation, externalisation, combination and internalisation. This sees tacit knowledge being moved through a cycle of first being (tacitly) understood (through close observation and socialisation) then being made explicit for transfer into the receiving team. These then combine it with their existing knowledge and capabilities to create new knowledge, which is then embedded in their routines and procedures, thus making it tacit again.

take place at one level until achieved at the previous level but whilst she recognises that individual learning is the focus, the complexities of transfer and dissemination may be more complex within collaborative environments. Pawlowsky (2003) acknowledged this complexity in proposing a four-stage model of organisational learning (identification, generation, integration and modification) but making clear that these stages may not necessarily be sequential, in contrast to Nonaka and Takeuchi's (1995) model. The more fundamental problem, however, is that many organisational learning models do not focus on *how* learning is generated through inter-organisational collaboration. As Grant (1996, p.113) points out,

"The danger inherent in the concept of organizational knowledge is that, by viewing the organization as the entity which creates, stores and deploys knowledge, the organisational processes through which individuals engage in these activities may be obscured...by defining rules, procedures, conventions, and norms as knowledge fails to direct attention to the mechanisms through which this 'organizational knowledge' is created through the interactions of individuals, and offers little guidance as to how managers can influence these processes" (Grant 1996, p.113).

Grant's perspective underpins the case for research that focuses on the interactions between individuals to better understand how 'learning' is generated. Accordingly, this is where the research in this thesis is focused. Whilst several theoretical models and approaches have been reviewed, it was shown that whilst each usefully contributes to the understanding of learning through university-business collaborations, there are none that satisfactorily integrates all of the dimensions and factors that have been shown to be important. Consequently, there is a need to use a modified conceptual approach, as discuss below.

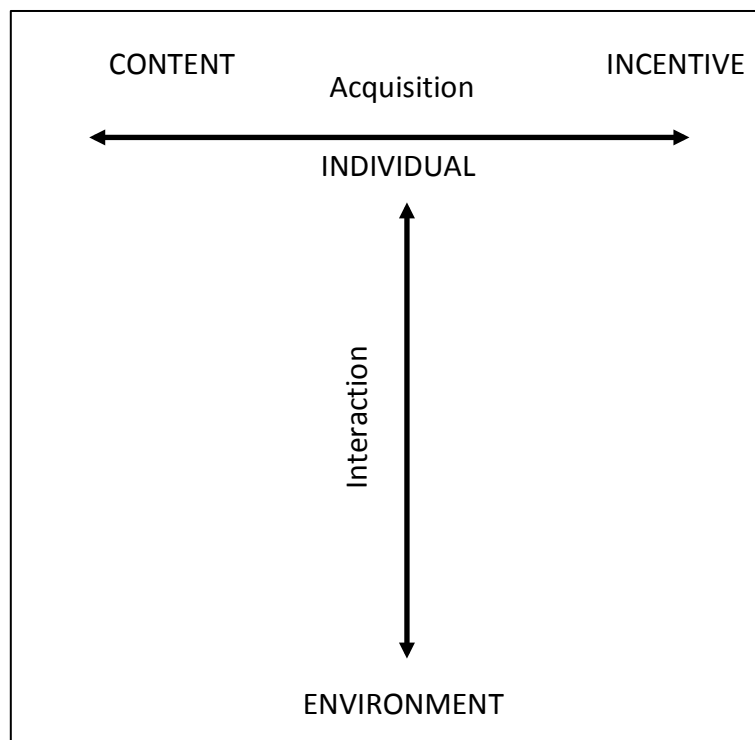
3.6 A Conceptual Approach to Investigating Learning in University-Business

Collaborations

Illeris has written extensively on other theorists (see Illeris, 2009) and has critically appraised their contributions in synthesising their ideas into his own contributions on learning in general (e.g. Illeris, 2017) and, of particular relevance to this research, on learning in the workplace (Illeris, 2011). He has clearly been influenced by many theorists but Piaget (e.g. Piaget, 1952) figures prominently in his discussion of the influences of behavioural psychology, whereas the contributions of Mezirow (e.g. Mezirow, 2000), Jarvis (e.g. Jarvis, 1987), and Lave and Wenger (Lave and Wenger, 1991; Wenger, 1998) are prominent in terms of social and societal influences, although these only serve as exemplars to illustrate the breadth of his considerations. Drawing on this extensive work, Illeris's model of learning was first developed in *The Three Dimensions of Learning* (2002) and subsequently modified slightly in his later work (2007, 2009, 2011 and 2017). His model offers a useful conceptual foundation for this research because it integrates the internal acquisition process of learning with an individual's interaction with the external environment.

His conceptualisation of "the fundamental processes of learning" (Illeris, 2017, p.22, Figure 3.1) shows how the dimensions of *content*, *incentive* and *interaction* are connected through the two processes of acquisition and interaction. This is shown below at Figure 3.2. He postulates that individual learning integrates two processes: one is the process of internal acquisition, involving the interaction between content and incentive dimensions; and the other is the process of interaction between acquisition and the external environment. The content dimension is described as covering areas such as "*knowledge, skills, attitudes and ways of behaviour*", whereas

the incentive dimension refers to aspects such as *“motivation, emotion and volition”*. The interaction dimension covers *“action, communication and cooperation”* (Illeris, 2017, p.28). Illeris (ibid) uses the model as a framework to discuss learning in detail, drawing widely on the contributions of other learning theorists.

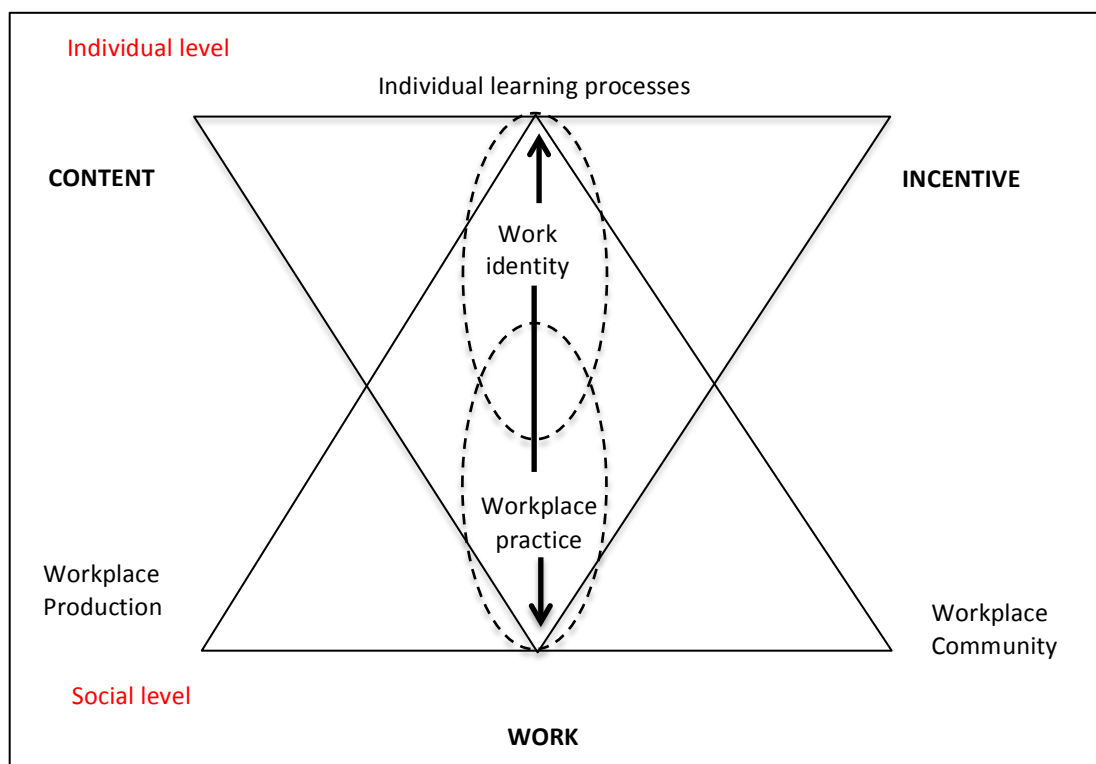


**Figure 3.2: The Fundamental Process of Learning
(After Illeris, 2017, Figure 3.1, p.22³⁰)**

This holistic model provides a useful starting point for a conceptual framework because it incorporates the interaction dimension that is the defining feature of university-business collaborations within a broadly social constructionist framework. It also recognises the importance of incentive alongside content, which was an important factor to be explored in collaborative relationships. Whilst helpful in conceptualising learning processes, the interaction dimension, which is of particular interest, is open to wide interpretation in this general model, which limits its utility.

³⁰ Copyright 2017. From *How We Learn* by K. Illeris. Reproduced by permission of Taylor and Francis Group, LLC, a division of Informa plc.

Illeris built on this conceptual work (Illeris, 2011) to apply his model more specifically to the context of workplace learning. In his “advanced model of workplace learning” (ibid, Figure 4.1, p.43) Illeris sought to show how individual learning interacts with the social side of workplace learning. He divides the latter into two influences: the workplace production setting and the wider workplace community. Thus the work identity that an individual develops through individual learning processes influences, and in turn is influenced by, the workplace practices drawn from the work environment. This is shown below in Figure 3.3. Learning takes place in the area represented by the overlap between work identity and workplace practice.



**Figure 3.3: The Advanced Model of Workplace Learning
(After Illeris, 2011, Fig 4.1, p.43³¹)**

This idea of different environmental contexts is important because it can be developed further to consider how the influence of the different workplace

³¹ Copyright, 2011. From *The Fundamentals of Workplace Learning* by K. Illeris. Reproduced by permission of Taylor and Francis Group, LLC, a division of Informa plc.

communities of universities and businesses interact within the collaborative environment. In the context of collaborations, however, there are obviously two or more university or business organisations, each with their unique production setting and populated by different communities. This requires some adaptation of Illeris's conceptualisation and so I revised the model for more immediate applicability to this research. To explain, the production and community settings are combined and represented as university and business environments, illustrated in Figure 3.4 as a bilateral collaboration. Within this adapted model it is postulated that each collaborator's identity, resulting from his or her learning processes, interacts with the collaborative practices that result from the interplay of influences between the university and business environments. Where these overlap (on the vertical axis) is where individual learning through collaborations takes place.

Whilst these adjustments to Illeris's model appear to be minor, a key implication is that individual learning is not just a result of the interaction of individual and organisational³² processes but it is also influenced by interactions at the *inter-organisational* level. This conceptualisation of personal learning within a collaboration being a product of the interactions of individual, organisational and inter-organisational processes has thus been used as a framework to inform both the research questions and the design of the research itself (see Chapter 4, Sections 4.1.1, 4.2 and 4.3). Conceptualising university-business collaborations in this way, allows for a better understanding of *how* these processes interact to influence learning.

³² The term 'organisational' has been used in the adapted model instead of 'work' as it can be applied more generally to both universities and businesses and also is commonly used as a generic term in management literature (see for example, Pugh, 1997; Johnson *et al*, 2014).

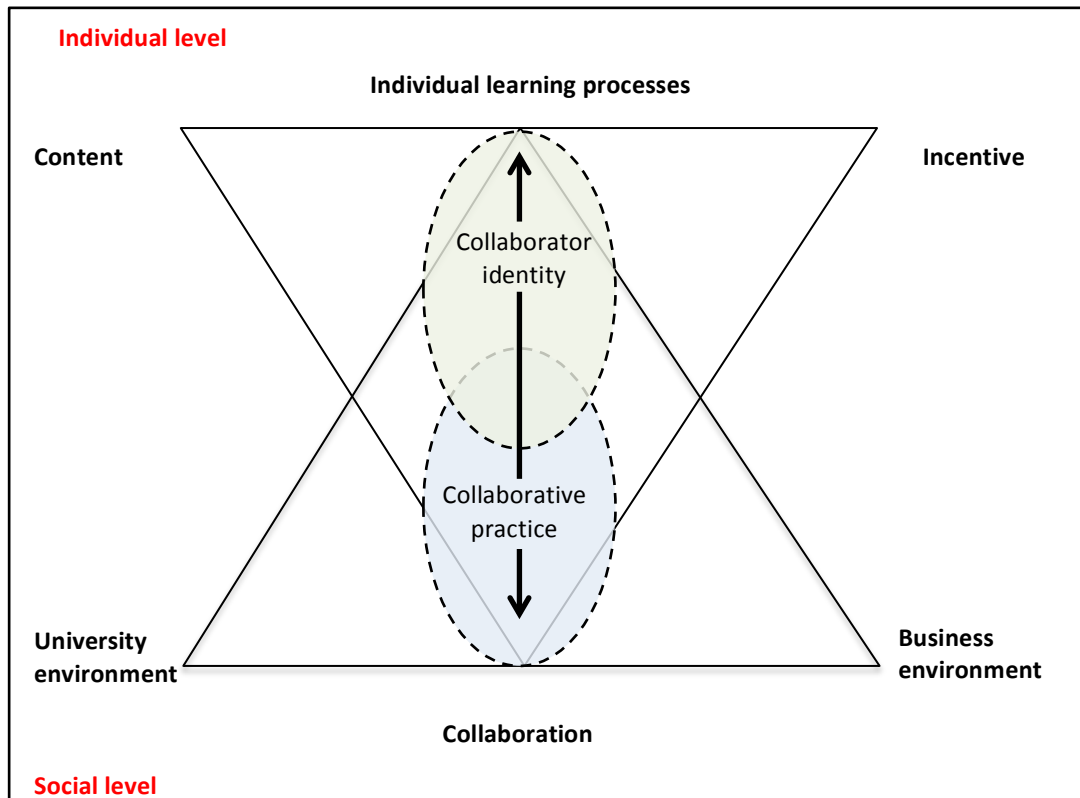


Figure 3.4: A Conceptual Framework for Understanding Learning Through University-Business Collaborations (Adapted from Illeris, 2011, Fig.4.1, p.43³³).

This model lends itself to providing a conceptual framework through which to investigate the interactions and underlying factors at individual, organisational and inter-organisational level that influence the learning process and eventual learning outputs. In addition, the important temporal dimension will be analysed using other methods, alongside the conceptual framework, as will be discussed in the next chapter.

³³ Copyright, 2011. From *The Fundamentals of Workplace Learning* by K. Illeris. Used by permission of Taylor and Francis Group, LLC, a division of Informa plc.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Research Rationale

This research project sought to better understand the processes that affect learning within university-business collaborations. In the context of this research, collaborations are taken to include those relationships between university members and businesses that are engaged in interactions with each other in order to pursue their goals (Chapter 1, Section 1.2, p.4). In approaching the research project two key assumptions are made. First, the nature of such collaborations is viewed as a learning process that leads to learning outcomes. Secondly, it is assumed that those involved construct such collaborations through processes of social interaction and that these shape the learning. These will be discussed further in Section 4.2 but for now it is important to introduce the research questions that drive the study before explaining the use of the conceptual framework, stemming from a social constructivist viewpoint.

4.1.1 Research Questions

In developing the research questions, I sought to follow Agee's advice (Agee, 2009, p. 434) that *"good qualitative questions should invite a process of exploration and discovery"* (after Creswell, 2007). I was also keen to bring in a temporal dimension to the analysis of processes, noting Bennett and Elman's point that *"incorporating time into causal accounts allows theorists to more accurately explain a complex social world"* (Bennett and Elman, 2006, p.463). However, I was careful not to begin with questions that were too narrowly focused, in order to avoid the *"tunnel vision"* that Maxwell (2005, p.67) warns can constrain thinking. Srivastava and Hopwood (2009, p.80) suggest that, in any case, one can expect to refine research questions once engagement with the data has begun. In practice I found that I made slight

adjustments to them during both the fieldwork and analysis stages before eventually settling on the following research questions:

1. How do interactions between individuals and organisations influence learning within university-business collaborations?
2. What underlying factors influence these interactions and how do they do so?
3. What are the challenges in understanding the learning outcomes from university-business collaborations and what are the implications for the future development of university approaches?

The first two questions are linked closely to the conceptual framework (introduced in Chapter 3, Section 3.6 and discussed further in Section 4.2, below), as suggested by Agee (2009, p.443), whereas the third question seeks to understand the practical implications.

4.2 Conceptual Framework

Baxter and Jack (2008) assert that the conceptual framework helps to “*serve as an anchor for the study*” (p.553). As described in the previous chapter, (Section 3.6 and shown in Figure 3.4), this research will use a conceptual framework based on Illeris’s (2011) model of workplace learning, but adapted to reflect the context of university-business collaboration. This shows how each participant’s learning will be influenced by their interaction with the wider social environment of the collaboration, that is, the interplay between university and business environments. These interpretations and the learning associated with them will, in turn, determine their actions that will collectively, along with those of other participants, shape the development and outcomes of the collaboration. In this way there is a constant interaction between the

individual and the wider social context of the collaboration. This leads to the need to focus the research on understanding the participants' views of the 'situation' (in this case the collaboration) in which they are involved (Creswell, 2013, pp. 24-25), throughout its development.

More specifically, Miles and Huberman (1994, p.18) describe how a conceptual framework helps to identify who will be involved in the research and suggests what relationships may be present. Following on from above, the conceptual framework focuses the selection of participants for the case studies on those that are actively interacting with other participants at the core of the collaborations, as explained in Section 4.3.4, below. Furthermore, the conceptual framework was useful here in guiding the analysis to consider both processes and factors at individual, organisational and inter-organisational levels. I was interested to follow this through to understand how these shaped the final or emerging learning outcomes (generated within the area of overlap in the adapted model at Fig. 3.4), particularly as this informs much of the basis for evaluating³⁴ the success of such collaborations by universities, business and governments alike.

In researching the learning processes in these collaborations, I needed to begin by identifying and describing them. However, I was also keen to understand the key factors that drive these processes and so I sought to move from description to explanation, reasonably quickly, in accordance with the approach advocated by Punch (2014, pp. 19-20). This is reflected in the shifting emphasis of the following chapters from laying out the case studies in Chapter 5, combining further description with

³⁴ It should be emphasised that the intention of this study was not to evaluate the success of the collaborations in each case study *per se* (indeed most were on-going as they were not selected with that intention) but rather to understand the processes that shape learning and understand why the learning outcomes may be different from those originally expected.

temporal analysis in Chapter 6, before moving to deeper analysis in Chapters 7 and 8 and finally application in Chapter 9.

4.3 Research Design

4.3.1 *Methodological Considerations*

Writers on methodology emphasise the importance of methods being determined by what it is that the researcher is trying to find out (for example, Punch, 1998, p.244; Silverman, 2013, p.11). Considering the research questions broadly, they can be seen as trying to understand *‘the causes of effects’* rather than *‘the effects of causes’*, for which qualitative approaches are most appropriate (Bennett and Elman, 2006; Cohen, Manion and Morrison, 2018, p.103). More specifically, they ask ‘how’ and ‘what’ questions that are best pursued through what Snape and Spencer (2003, P.3) describe as an *“interpretative approach concerned with understanding the meanings which people attach to phenomena (actions, decisions, beliefs, values etc.) within their social worlds”* (after Denzil and Lincoln, 2000). The flexible nature of qualitative design is also advantageous, as Ritchie *et al* (2014, p.3) point out, and it was clear from the start that this flexibility was essential in this research context.

I did not set out to make measurements since this research was intended to be exploratory and it would only have been possible to measure known phenomena or variables, which was not the purpose of this inquiry. Moreover, in my initial review of university-business collaborations I found that there is a wide spectrum of activity, reflecting a large number of variables. For example, collaborations can vary according to their commercial or contractual footing (involving combinations of uni-, bi-, and multi-lateral funding, and sometimes involving third party funders) or may even be an unfunded collaborative relationship. They may involve one or more universities

collaborating with businesses from private, public and third sectors, or combinations thereof (which are common in large partnerships). Collaborations most obviously vary according to size, in terms of funding, or the numbers of people 'involved', which is not always clean cut, and the length of time over which they are to or have already run. There are also variations in the nature or purpose of the collaboration and some of these are much more complex than others. In part, this is influenced by the nature of the business and (for private sector businesses) its place within its industrial sector and the current context of that sector. From a university perspective, the nature of collaborations in part reflects also the academic areas that they cover and whether these are narrowly or widely focused.

This brief illustration of the wide range of influencing factors shows why it would not be realistic to seek to produce findings that are *statistically* representative of university-business collaborations in general from this limited study. However, in qualitative research such as this, Silverman (2013, p.146) points out that generalisability is treated differently than in quantitative research, as the aim is to seek theoretical as opposed to statistical generalisations. This will be discussed further below in the context of the specific method chosen. Notwithstanding this, the wide variations in university-business collaborations suggest that researching multiple collaborations would make any propositions arising from them more compelling (Herriott and Firestone, 1983, Yin, 2014). Creswell (2013, p.101) feels that studying multiple cases dilutes the overall analysis because each case is covered in less depth but, whilst accepting this, I decided that a broader base of cases was more important than studying one or two cases in depth because I was keen to explore both commonality and variation across as wide a range as possible. Based on my initial

meetings, I also came to the view that findings resulting from a broader study were likely to be more credible with the wider university community.

In addition, since this study was focused on understanding the processes affecting learning within and between individuals working on specific collaborations, it followed that multiple perspectives needed to be sought. The intention was to focus on those most closely involved in collaborative interactions so that the effects on and of their perspectives and related actions could be captured. In particular, I was keen to compare and contrast the perspectives of co-collaborators in both university and business roles in order to better understand the causes and effects of their interactions and how this shaped learning within the collaboration. To capture the temporal dimension of the collaborations, individual perspectives had to be elicited as opposed to observed. This meant that there was thus a need to gather individual accounts of their perspectives, in relation to the research questions.

A final methodological consideration was the temporal aspect of university-business collaborations. Processes occur and change over time and so it was essential to understand the collaborations in this dynamic context rather than as a static summary or snap shot. However, most university-business collaborations last from several months to several years and in addition may have a long lead-time. This meant that the possibility of following through even one study within my fieldwork window was remote and in any case would have been very time consuming (thereby restricting my ability to look at multiple collaborations) and limiting in terms of the type of collaborations that might fit within it. Consequently, the need to gather the required data through individual accounts in a structured way allowing for the temporal dimension to be constructed and understood was imperative.

An important consideration here relates to whether it was appropriate to look at contemporary or historical collaborations. I feared that individual perspectives would soon be lost or could change after the collaboration finished and so cause the 'dependability' (Lincoln and Guba, 1985) of such accounts to decrease over time. On the other hand, I was keen to look at collaborations in which the processes and relationships were at a mature stage of development to avoid misleading comparisons and to better understand the (final or emergent) learning outcomes. As such, I decided to look only at collaborations that were either well established (in the case of longer-term or on-going collaborations), late stage or very recently completed so that I could engage those involved in the context of their role within the collaboration.

4.3.2 Case Study Approach

The above considerations place a number of methodological demands and constraints on this research and these in turn led me to conclude that using a case study approach best accommodated them. This is well suited to understanding cause and effect (Cohen *et al*, 2011, p.289). As Yin (2014, p.16) points out, the case study affords the researcher the opportunity to *"investigate a contemporary phenomena (the "case") in depth and within its real-world context"*. This was essential in order to understand processes, events and outcomes from the perspective of those directly involved in the collaborations. Purely observational approaches would have been both inadequate and impractical for understanding these perspectives across multiple collaborations. Yin further states that the case study approach is particularly useful *"when the boundaries between the phenomenon and context may not be particularly evident"* (*ibid*). In addition, Punch argues that case studies allow the conceptualisation of

important features for further study; a point that is pertinent to the contribution of this research.

4.3.3 *Generalisability Considerations*

In conducting this research I aimed to make a contribution to the further development of approaches to university-business collaborations (see the third research question in Section 4.1.1), given the growing importance of this activity. By filling the apparent gap in this kind of research in this area, my aim was that the findings would have an impact in terms of informing actual practice and in order to achieve this I needed to seek some level of generalisability.

Whilst there are circumstances where a single case study approach might be more appropriate, such as looking at a deviant case or a particular singular occurrence of a phenomenon in more detail, a multiple case approach offers a stronger basis from which to seek generalisations from this particular research project, given the wide variations outlined above. This is supported by Yin (2014, pp.64-65) who describes how multiple case studies can be used to address criticisms related to the uniqueness of a single case or any other perceived shortcomings. Additionally, Miles, Huberman and Saldana (2014, p.33) suggest that multiple case sampling not only adds confidence but also allows single cases to be better understood by making comparisons.

Some other researchers question whether it is appropriate to draw generalisations from case studies, with critics often favouring positivist approaches that are more aligned to the requirements of scientific and experimental methodologies. For example, Shaughnessy *et al* (2003, pp.290-299) question the ability to draw conclusions from case studies because of their lack of control of variables and the potential for bias. Supporters of qualitative approaches, however,

would contend that it is simply not possible to design and maintain such controls in undertaking inductive research (for example, Maxwell, 2005, p.296). Yin (2014, p.9) goes further, suggesting that the case study is a particularly relevant method to use in situations in which there is a focus on contemporary events over which the researcher has no control. With regard to this research, these counter-arguments are particularly persuasive because not only did I have no control over the collaborations but also the mix of variables means that all collaborations are, to some extent, context specific.

More fundamentally, Hammersley (1992) discusses generalisation in two different contexts: *empirical generalisation* concerns the application of findings to general populations, whereas *theoretical generalisation* is concerned with generating theories or propositions that have wider application. The distinction between the two is an important consideration for this research but Ritchie and Lewis (2003, pp.264-270) feel that the distinction is not consistently applied and therefore offer a further conceptualisation of *representational*, *theoretical* and *inferential generalisation*. They describe *representational generalisation* in broadly the same way as Hammersley's (ibid) empirical generalisation but note that the issues to be addressed in order to meet this are different for qualitative studies. The first is whether the phenomena found in the research sample would be found in the general population, and second whether there are additional phenomena or (important in the context of this study) different attitudes to them, found in the general population. As a stand-alone project, this research could not aspire to establish representational generalisation as such but could nonetheless generate propositions to be tested more widely in further research.

With regard to *theoretical generalisation*, Ritchie and Lewis (2003) hold the view that:

“Qualitative research studies can contribute to social theories where they have something to tell us about the underlying social processes and structures that form part of the context of, and the explanation for, individual behaviours and beliefs” (Ritchie and Lewis, 2003, p.267).

However, this would require the development of assertions that are context-free and so their view is that such assertions generated from a research study would need to be tested further.

In considering *inferential generalisation*, Ritchie and Lewis (2003) are influenced strongly by Lincoln and Guba (1985), aligned with Cronbach (1975), that there will always be factors that make a particular setting unique but that it is still possible to make judgements on the extent to which findings can be transferred to other settings. Lincoln and Guba argue that such transferability depends on the degree of congruence between the context in which the research has been conducted and the context in which its applicability is being considered. Ritchie and Lewis (ibid, pp. 268) point out that this requires the researcher to provide sufficient detail (what Geertz, 1993, would term a *‘thick description’*) to allow others to assess this. My view was that this type of generalisation offered the most appropriate working assumption for taking this multiple case study research forward because the explicitly judgemental process of determination is consistent with the approach that was adopted in both gathering and analysing the data, discussed further in Sections 4.5 and 4.6. I was clear that such inferential generalisations would be in the form of hypotheses or propositions that would require further testing in subsequent studies.

4.3.4 *The Sample and Population Boundaries for the Case Studies*

The inherent flexibility of case studies was a key factor in my decision to use this approach since university-business collaborations are rarely neatly bounded. Instead, they typically have a core of people working on them intensively, with others more peripherally engaged, although sometimes from a position of influence. Both university and business participants often have responsibilities that sit outside of the collaboration, in their wider roles within their parent organisations, so the boundaries between the context and the case are not always obvious. Despite these inherent challenges, Punch (2014, p.122) advocates making the boundaries as clear as possible. This falls into two parts: what bounds a 'case' and what bounds the population from which the cases are drawn, which were defined as follows:

- i. At its simplest, a case was taken to be a collaborative activity between one or more individuals in a university sub-unit (such as a research group, a department or an academic faculty or division) with one or more individuals from a single or multiple external organisations. The collaboration had to require interaction between the two (or more) parties in pursuit of learning outcomes.
- ii. The population for each case was limited to those individuals that were actively interacting with others in pursuit of the learning outcomes and therefore subject to individual, organisational and inter-organisational processes within the context of the same activity. Consequently, participants were tightly bound to those who were closely involved in that core part of the collaboration in which they were mutually engaged and therefore best placed to offer perspectives on how such interactions shape learning.

However, the widely differing structures of the collaborations made it clear that it was inappropriate to further specify the participant roles or organisational positions in advance. Instead, I had to exercise judgement in the selection of participants for each case study, informed by discussion with the lead (University contact) for each collaboration and, of course, through negotiation with potential participants themselves. What this meant in practice, when selecting participants, is discussed in Section 4.4.3, pp.99-103.

In my preliminary explorations within the University of Oxford it became clear that it takes time to build an understanding of the broad context in which university-business collaborations are taking place in terms of what occurs within an institution and developing an adequate network for engagement. Specifically, I realised that identifying suitable collaborations for my case studies and, critically, gaining access to them was going to be challenging. I quickly deduced that I needed the support of key individuals to identify collaborations that might fit my case study requirements and to introduce me to project leads so that I could then follow up with them to explore possibilities further. This led me to conclude that it would be impractical, within the scope of this research, to pursue this at more than one university. Furthermore, it was apparent that there was a high level of wide-ranging collaborative activity within the University of Oxford itself, as would be expected of a leading research-led university. It made sense, therefore, to continue to build on the initial contacts and contextual knowledge gained in my preliminary phase to seek all of my case studies from within the University of Oxford. I reasoned that this would allow more time for pursuing the case study research itself rather than further identifying and gaining access to collaborations within other universities. This decision was in line with Trowler's (2016)

advice that the extra cost, time and effort usually makes sampling from multiple universities too ambitious for doctoral study, unless of course the aim is to conduct a comparative study, which is not the case here.

In addition, I came to the view that focusing my inquiry on a deliberately wide range of collaborative activities across Oxford would provide a useful basis for considering the commonality and variation of issues within a single university. This would enable me to develop more robust propositions with regard to the University of Oxford but in turn this should allow me to make inferences on the extent to which these would be transferable to other universities. Consequently, I decided that I would aim to conduct a total of ten short case studies across the University of Oxford, including at least one from each of the four academic divisions (Humanities; Mathematical, Physical and Life Sciences; Medical Sciences; and Social Sciences).

4.3.5. *Rationale for an Interview-Based Approach to Data Collection*

Yeo *et al* (2014, p.182) underline the value of interviews in “*exploring the ways in which participants experience and construct their lives*”. In the context of my research, I saw this as the most effective way to elicit individual perspectives from multiple participants in each case study. My need to gather individual perspectives (see Section 4.3.1) ruled out the adoption of group approaches such as focus groups, and survey methods would not have enabled me to explore themes nor probe emergent issues to the same extent (Cohen *et al*, 2011, p.412). Critically, the generally poor and unpredictable rate of return for surveys would have meant that some case studies did not capture the spread of participants that I needed. Despite the challenges of gaining access to participants for interviews, I was generally able to determine beforehand the willing participants within a particular collaboration and on that basis make an

informed judgement as to whether they would constitute a worthwhile case study (using the criteria discussed in Section 4.3.4 and the further considerations that will be discussed in Section 4.4.3).

In order to pursue my research questions I wanted to use the interviews to explore the pre-determined themes presented by my conceptual model and some other constructs arising from my review of the literature but I was also keen to ensure that they were open enough to avoid restricting responses to my own pre-determined categories (Silverman, 2013, p.258). Recognising the importance of the temporal dimension, I was able to capture this by structuring the questions loosely around a temporal framework so that the interview could progress through the stages of personal involvement in the project. The generic, semi-structured interview schedule is presented in Appendix 1.

4.3.6 *Ethical Considerations*

Given that this qualitative research is based around surfacing issues relating to interpersonal and organisational relationships, I had to consider the potential for ethical issues to arise at all stages of the study and take steps to safeguard against them. From the outset I had to be clear and open in my preliminary approaches and discussions with intermediaries on the purpose of the research, how it would be conducted and how the data collected would be subsequently used. Developing the case studies through this and all of the following stages (covered in detail in the fieldwork Section 3.4, below) relied on trust and openness such that there was informed consent by all involved. Accordingly, my research proposal was constructed to comply with the British Education Research Association (BERA) Ethical Guidelines for

Educational Research and was independently approved as meeting these through the Central University Research Ethics Committee (CUREC) screening process.

For this research the key issue was confidentiality, which was important at multiple levels. For individuals, loss of confidentiality could have connotations relating to their reputations, organisational positions and relationships with others in the collaboration. It could also have a direct impact on reputations at organisational level (including to both the University departments and collaborating businesses) and for the actual collaborative relationships. Consequently, I ensured that both intermediaries and actual participants were clear on how this would be protected.

I made a point of emphasising confidentiality in discussions with both intermediaries and project leads, in part because I was also clear that this factor would often weigh heavily with them when considering if and to whom further introductions should be made. All participants were provided with a Participant Information Sheet in advance of interviews, which outlined the study and the implications of them participating in it. In relation to confidentiality, this stressed how the data would be stored securely (the transcripts were placed on a secure server) and that it would be anonymised for use in subsequent analysis and presentation. Each participant was asked to sign a consent form to confirm that they had received, understood and agreed to this use of their data as laid down in the information sheet. It was equally important that I maintained confidentiality through my interactions with intermediaries and participants at all stages. In particular, I needed to protect confidentiality when an interviewee chose to make critical remarks and also retain impartiality to avoid any suggestion of agreement or otherwise. A further challenge lay in presenting these remarks in a balanced and neutral way at a later stage, by

phrasing them carefully to capture the points without being directly critical of any particular party, to avoid inadvertent repercussions.

Both individual and organisational names were anonymised. Each participant was allocated a generic title (as shown in the organisational charts accompanying the case study vignettes in Chapter 5) and this was then abbreviated and used for analysis and discussion in the text. Throughout the text, individuals are referred to by these titles and gender-based references to '*he*' or '*she*' were avoided because this would make identification far more obvious in some cases. University participants are all referred to as being part of a '*Department*' or '*Laboratory*' within the University (Univ), whereas all external participants are referred to as being in an '*Organisation*' (Org), '*Company*', '*Charity*' or '*Agency*'. Case studies were given deliberately broad, descriptive titles and number coded within each academic Division. They are commonly referred to by these codes in the text.

4.4 Fieldwork

4.4.1 *Preliminary Investigations: Establishing the Context and Focus*

At the start of this research I undertook a phase of preliminary investigations between February and September 2017, in which I sought to engage with the University of Oxford's extensive knowledge exchange community in order to better understand the current contextual realities. This allowed me to test my assumptions and further develop my initial research themes that up to that point were based largely on a review of the literature and my own prior experience in engaging with universities (from within a public sector organisation; see Section 4.8, p.123 on researcher positionality). I was aware of the inherent limitations of drawing inferences from conversations with a narrow group so I deliberately sought to achieve a degree of

investigator triangulation (Cohen *et al*, 2011, p.196), by widening the sources that informed my considerations. These included discussions with senior administrators that had responsibilities for knowledge exchange and senior academics that were leading major collaborations with industry. In addition, I also attended events that facilitated engagement between the University and business communities where I found the opportunity to hear and engage with business representatives informally. A summary of the key internal engagements during the preliminary investigations stage is shown in Appendix 2. By the end of these preliminary investigations I was able to confirm my research questions and determine the methods that I would use to construct my case studies.

4.4.2 Case Study Selection and Access

I set out to generate ten case studies of university-business collaborations from across the University of Oxford, with at least one taken from each of the four academic 'Divisions': Humanities; Mathematical, Physical and Life Sciences; Medical Sciences; and Social Sciences. My aim in doing so was to improve representativeness (Silverman, 2013, Chapter 15), which required me to incorporate purposive sampling into my approach. In addition, I intended that my samples would represent other aspects of variation, as discussed earlier (Section 4.3.1), particularly with regard to the sectors from which the external partners were drawn, the size, length and complexity of the collaborations, and the commercial footing (for example, contract or collaboratively funded research or a non-contractual relationship). However, rather than attempt to target each of these aspects separately when seeking case studies, I decided that I would use them to inform the selection of cases from projects identified

using snowballing and opportunistic sampling techniques (Miles and Huberman, 1994, p.28).

It was clear that university-business collaborations taking place across the University of Oxford were typically conducted in a 'closed setting' and 'overt' access would be needed (Silverman, 2013, p.214) to seek the participation of University and business members in my case study research. However, the closed setting meant that it was difficult to identify suitable projects that would meet my criteria. From my preliminary investigations I also realised that even where potential projects and their University leads could be identified, direct approaches from a research student, such as myself, from outside of the project lead's own Department were likely to be met with mixed results. So, to better target those projects that were most likely to help to answer my research questions and to improve the chances of a positive response from the project lead, I initially approached the University's knowledge exchange community. This community consisted of a centralised University team and small teams or individuals within each Division to support the development and management of collaborations. Additionally, some individual departments or institutes had their own dedicated knowledge exchange member of staff, responsible for support and coordination, whereas in others the lead for knowledge exchange was simply an additional responsibility for a nominated academic. Some departments also had Knowledge Exchange Fellows in posts filled by early career researchers and these were focused on generating research that fostered external engagement and impact.

My expectation was that they would have a good picture not only of the nature of the collaborations within their areas but also of the individual academics leading them and so would be well placed to advise or assist me. The central team provided

me with some initial introductions and thereafter I developed further contacts through snowballing. In all, I managed to hold meetings with a range of knowledge exchange staff from across the central team, all academic divisions and some departments. In setting up the meetings I sent each an email outlining in advance my research and explained how I was keen to learn more about their area with a specific purpose of them helping me to identify and perhaps introduce me to appropriate project leads.

The subsequent meetings were generally very productive exchanges and in all cases I gathered some useful contextual perspectives on the development of engagement in knowledge exchange across the University. My research interest and how I proposed to pursue it was generally well received, which was reassuring, although the extent to which the knowledge exchange staff felt able to give it their active support varied. All but one suggested potential project leads and in most cases they were willing to provide direct support by writing or speaking to the suggested project leads personally to recommend that they meet with me (I provided supporting summaries for them as required). The others just provided me with recommendations of academics to contact; in one particular case I felt that this might have reflected low confidence that the suggested contacts would be willing to engage and as I was doubtful that their projects matched my requirements I decided not to pursue them.³⁵ The one individual from whom I did not receive recommendations did offer to give this some thought after our meeting but did not get back to me, having expressed some doubts when we met as to whether relationships mattered in an area of cutting edge science, where the exchange was felt to be highly transactional. I eventually secured a case study in this area by another route and was told in no uncertain terms by the

³⁵ They seemed more like examples of knowledge transfer, involving spinout companies, which I had decided not to include in this study (see Section 3.3 on case selection criteria).

project lead that it was highly dependent on relationships. In contrast, where I was introduced to knowledge exchange fellows they readily agreed to engage in my research and offered up their projects as case studies.

Whilst recognising that there were some drawbacks in using intermediaries (such as the additional time and the possibility that they filtered out viable options), on the whole the approach was a successful one and I have no doubt that this enabled me to identify suitable projects that would have been extremely difficult to find otherwise. All of the knowledge exchange specialists were generous with their time when discussing knowledge exchange more generally as well as in the context of my specific request, which provided me with a much broader understanding than I would have gained by just engaging project leads directly. I did reflect that the knowledge exchange specialists were often in challenging roles where they had to carefully manage their own relationships with the academic staff they supported, along with their business partners: in some cases they would make difficult judgements on which of those relationships, if any, I could be introduced to. Hammersley and Atkinson (1983 in Silverman, 2013) underline the importance of trust in securing and maintaining access and whilst I would concur with this, it is clearly more complex when seeking access through intermediaries.

Between January and June 2018 I held 15 separate meetings with knowledge exchange specialists (I met some twice), which led to me being introduced to 23 contacts that were either directly involved in or had a role in coordinating projects. I followed up 21 of these by email as soon as I was introduced, requesting an

exploratory meeting³⁶. In cases where individuals responded positively, I arranged to go and discuss my research requirements and the nature of their collaborative work over one-hour meetings, usually at their department. Some others did not reply and in one case we agreed that their project was at too early a stage; in another a professor who was willing to help had to withdraw shortly before we met because of other commitments. In some cases it transpired from subsequent meetings that the individual contacts were not directly involved in collaborative activities or in one case was new into the position and so they were not in roles that could form the basis for a viable case study. They were nonetheless very helpful in directing me to others that might be better placed to be involved. In a particularly large collaboration I held consecutive meetings with four different academics before identifying the one that was best suited to build a case study around.

4.4.3 *The Importance of Building Rapport and Trust*

The meetings with potential case study leads were as much about building rapport and trust (Fontana and Frey, 1994) as they were about the specifics of their collaboration and my research requirements. I had to establish at an early juncture that both anonymity and any commercial sensitivity would be protected; stressing that as a researcher I was more interested in *how* the collaboration had developed than its specific content. Gaining their trust in this regard was particularly important because I needed the project leads to be prepared to actively assist me in gaining the participation of their collaborating partners or co-workers in each case. The first stage of doing this was to discuss with the project leads the key participants in the

³⁶ Of the two that I did not follow up, one quickly wrote back to the knowledge exchange contact to say he was too busy and in another case we quickly ascertained that the project would not make a viable case study and so I did not pursue it.

collaboration, both internal and external, and to negotiate which ones would be useful to include in the case study.

I was mindful that Miles, Huberman and Saldana (2014, p.33) emphasised that such '*within-case sampling*' should be driven by theoretical considerations and so I was keen to keep participants tightly bound, thus ensuring that I only gathered perspectives from those that were subject to individual, organisational and inter-organisational processes within the context of the same activity (see Section 4.3.4, p.89). I regarded this as far more important than an individual's position in organisational terms, for example where a senior academic or manager had little direct engagement in the actual collaborative activity, I would be unlikely to include them. However, this was considered on an individual basis, and I remained open to the possibility of there being individuals with more peripheral involvement that were nonetheless in a position to make an important contribution. This was the case when I decided to interview the Rapporteur for a theme that cut across several related projects in case study Soc Sc 2 because I wanted to better understand how the intergovernmental organisation (for whom the Rapporteur worked) viewed learning outcomes in this particular area.

For the second stage of developing the case study with the project leads, I then needed them to agree to contact the individuals that we had identified as potential participants (as before, I provided draft outlines for them as required). I was very aware that this was asking a lot of the project leads because they had to be willing to allow me exposure to their collaborative relationships and sometimes these had been strained, as became clear in the interviews. In some cases project leads judged that some individuals would either not participate or were reluctant to ask them and I had

to respect this and take a view on whether to proceed. Most of the time the co-collaborators contacted by the project leads on my behalf agreed to participate, although in one case an external organisation declined to participate and so the academic and I decided to focus on another collaboration instead. In another, the academic I held a discussion with ceased responding to my communications, although this was not entirely surprising because the potential case study we discussed involved a commercially sensitive project, and so it is logical to presume that the business partner was probably unwilling to agree to my access. In one of my most interesting case studies the Principal Investigator (a professor) had declined to participate but my focus was the project officer who conducted the majority of the interaction with the external organisations alone. The project leads for these external organisations all agreed to participate after I briefly introduced my research to them at the lead company's head office and so I decided that I had adequate participation to go ahead. Where I was able to introduce my research to external collaborators beforehand I was invariably successful in gaining their participation in case studies, suggesting that this personal engagement increased their confidence to engage.

Eventually, with the support of eight project leads, I developed 10 viable case studies comprising 36 interviews in total. One knowledge exchange fellow offered three separate projects undertaken during a three-year fellowship, which I was keen to pursue because it afforded me an opportunity to consider how learning was transferred from one project to another. The number of participants varied between two (with just one university and one external participant) and six, reflecting the differing complexities and scope of the collaborations. The key engagement activities involved in gathering the case studies and their participants are summarised in the

flow diagram at Figure 4.1. In summary, the case study and participant selection for this research was lengthy and involved a complex process in itself. However, as a result it was possible to gather 10 very wide-ranging case studies that captured variation across all of the key factors that had been identified. Most importantly, they covered collaborations within all four academic divisions of the University: one from Humanities; five from Mathematical, Physical and Life Sciences; two from Medical Sciences; and two from Social Sciences.

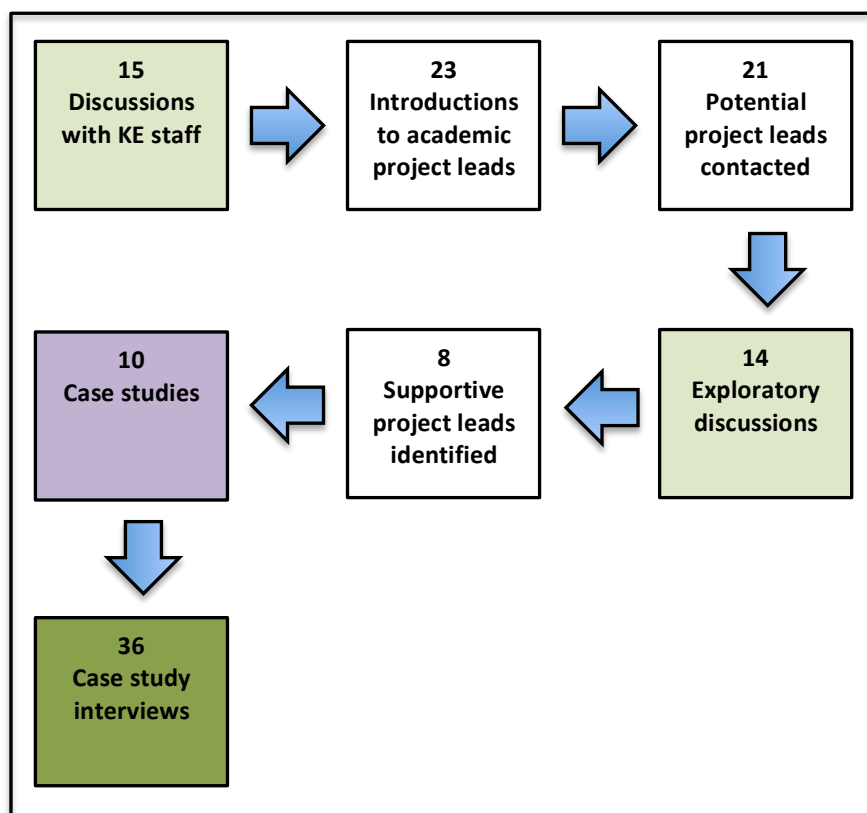


Figure 4.1: The Process Leading to Case Study and Participant Selection

The collaborations that the case studies focused on ranged in size from small bilateral relationships involving very small numbers of people (the smallest had only two active participants) to a major public-private partnership involving several hundred people (on which the case study focused on just one key collaborative relationship within the sub-set of a selected bilateral partnership). The collaborations

were either informal or funded through contract or collaborative funding arrangements. All were either mature or just on the point of completion. The 16 ‘businesses’ engaged over the ten case studies covered private, public and third sector organisations. Private sector organisations ranged from small agencies through to major national or multinational organisations (including three FTSE 100 companies and a Fortune 500 company). The public sector organisations were mainly UK Government agencies but also included a major inter-governmental body, whereas the third sector included both a small and a very large UK charity and a major international organisation. The key summary data for the collaborations is shown at Figure 4.2.

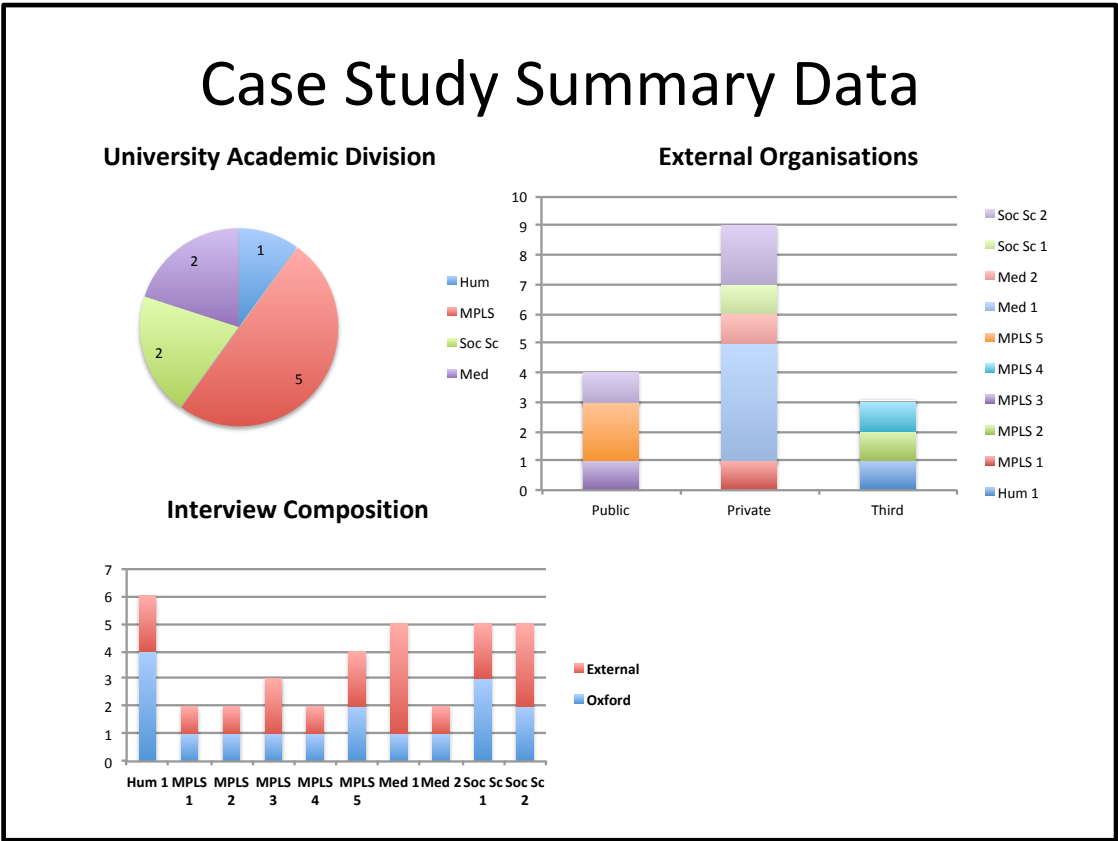


Figure 4.2: Case Study Summary Data

4.5 Data Collection

For the data collection phase of my fieldwork I needed to conduct activities relating to multiple case studies concurrently since the opportunities to do so arose at different times and these were then dependent on finding mutually convenient times to interview each participant. Whilst I preferred to confirm all case study participants in advance prior to starting the interviews this was not always possible, often because of delays in responses. In some instances this risked losing the opportunity to secure the case if I delayed until all participants had agreed because some participants were sometimes preparing to move on as the projects drew to a close. Nonetheless, I always started a case study by first interviewing my lead contact within the University as this best equipped me to discuss the collaboration with the other candidates, particularly those from the external organisations. My intention was to conduct the case studies in as condensed a period as possible so that the accounts I gathered were contemporaneous; however, sometimes delay was inevitable due to participant commitments or late confirmation of a willingness to participate. The organisation of multiple case studies at different stages of progress over this period required careful management. Figure 4.3 shows how the activity was spread for the case studies from the initial pre-meeting with my lead contact to the completion of the last interview.³⁷

³⁷ For case study Med 2, the intermediary was the Chief Scientist for the collaboration, who had offered support when we met as part of my preliminary investigations. Consequently, an email exchange was sufficient to request access and I provided an update on my research when we met to discuss in August, having identified the best case study lead from the four Principal Investigators I was introduced to.

Case Study	2018											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hum 1												
MPLS 1										Meeting with Intermediary		
MPLS 2										Pre-meeting with lead		
MPLS 3										Interviews		
MPLS 4												
MPLS 5												
Med 1												
Med 2						Email only						
Soc Sc 1												
Soc Sc 2												

Figure 4.3: Case Study Data Collection Timelines

To aid the management of the case studies I constructed a number of tabulations to track activities, outstanding actions and overall progress. Most importantly, I kept a comprehensive ‘engagement log’ to maintain a record of all activities, illustrated with an anonymised entry in Figure 4.4³⁸, which I updated after every significant exchange (email, phone call or meeting). This enabled me to capture the immediate outcomes in terms of ‘what had occurred and with whom’ and to add any observations on progress. In the follow up and methodological implications column I recorded follow up actions (for me or others to take) and highlighted these in red until completed or otherwise expired. I also added comments on related methodological implications where relevant, such as decisions on how to proceed in light of the engagement, especially if this meant a change of direction. By the end of

³⁸ Names have been replaced with the titles subsequently given to the participants in case study Soc Sc 1 (these are described in Chapter 5, Section 5.11 and shown in Figure 5.9) to maintain anonymity.

the fieldwork this log was over 8,000 words long but it was invaluable in supporting my management of activities and provided a useful source for my on-going iterative review and analysis as my fieldwork progressed. It also became a very useful document for me to reflect on my own actions and decision-making throughout the fieldwork process.

Date	Engagement	Immediate Outcomes	Follow Up/Methodological Implications
16 May 18	Attend (Case Study Soc Sc 1) Team Meeting at (Dept).	10.00. Invited to attend by (Project Manager - PM). Purpose is to introduce myself to the team and follow up with those that are interested in pursuing a case study. Drop an email to (Organisation Research Manager - ORM) beforehand.	Went well. PM's team appeared positive to my pitch and PM was supportive. Emailed ORM beforehand – could not make the brief but confirmed that is happy to help with the research. My details are now up on their board (and card) and they have been invited to contact me if interested (I was given a card by one of the team as I left - PR1). Also briefly met (Organisation Research Director) and would hope to involve him too. Now treating this as a live project. Write to PM and suggest a date for a first interview?

Figure 4.4: Engagement Log Extract (Anonymised)

In addition to the engagement log, I constructed summary tables that allowed me to maintain an overview of progress. I tabulated live and completed case studies by academic division and used a separate table to record the progress of interviews for each case study. I added names once I had requested an interview and the progression of each was colour coded according to whether they were 'Agreed', 'Scheduled', 'Interviewed' or 'Interview Transcribed'. I started transcribing interviews as soon as possible, whilst other interviews were still being gathered and continued to use the table until all transcriptions were complete.

Close management of the fieldwork process enabled me to maintain a clear view of progress but also allowed me to track outstanding actions, ensuring that I

acted promptly throughout. This maintained momentum and established good working relationships with the University project leads.

4.5.1 ***Pre-Interview Preparatory Work***

In preparing for interviews I sought to gather background information related to the collaboration (if appropriate), the university department or business organisation and the interviewees themselves. This was essential because all of the case studies were in areas that I had limited prior knowledge and understanding of, other than what I had gleaned from the pre-meetings (I also asked the project leads at the end of these meetings if there was anything I could read in preparation for the interviews). My aim was to improve my understanding of the context to each interview, which Smagorinsky (2008, pp.403-5) suggests merits its own attention, reflecting his stated orientation to sociocultural theories. However, he does acknowledge that *“identifying the aspects of a setting that are relevant to the research can be difficult to sort out”* and in this regard I was careful to limit my search to gaining a good non-expert understanding. Other than research publications, the availability of formally published material was limited and so I had to rely heavily on grey literature and less formal ‘grey information’ (Adams *et al*, 2016). Much of this was accessed through the Internet, underlining the importance of this as a resource for qualitative research (Silverman, 2013, pp. 224-225; Markham, 2011). University and organisation websites contained a lot of relevant background information and sometimes the collaborations had their own webpages or social media sites (some collaborations made a deliberate effort to use these to engage stakeholders). It was clear though that these sites presented a very positive view of collaborations as their purpose was to promote both the collaborations and their key partners and so had their limitations as a resource for research purposes.

Whilst not strictly pre-interview, I did attend some events relating to five of my collaborations. These included events, presentations and a workshop relating, in all, to five of the ten case studies. Each provided useful contextual understanding of the collaborations. These supplemented the considerable amount of literature searching that I undertook for each case study, mainly through Internet searches and referring to literature or information on websites in relation to the collaborations (where appropriate), the participating University departments and external organisations and individual profiles. Some of the project leads were helpful in steering me towards specific sites or relevant papers.

4.5.2 *Conducting the Interviews*

The above preparation meant that I was more able to adopt a discussion-based approach to the interview and to make better connections with the interviewee, which helped to build rapport, trust and confidence. Prior to each interview I sent each interviewee my Participant Information Sheet, which outlined the purpose of the research and made clear how the data would be used, ensuring the anonymity of both individuals and their organisations. I also asked all interviewees to sign and return a consent form before the scheduled interview date but also took copies to the face-to-face interviews.

The temporal framework used for the interviews, described in Section 4.3.5, allowed me to introduce questions at relevant points and also lent itself to a less formal conversational style since the questions progressed logically, within a developing narrative of the project. Initially, I considered tailoring questions more closely to participants' roles but it soon transpired that these varied widely and were not always easy to define in generic terms. In fact, in some case studies there were

differing views between participants as to their own or others' roles. As a consequence, I decided to construct a common template of '*Generic Interview Themes*', which provided the basis for all interviews (this is enclosed at Appendix 1). This semi-structured format (Bogdan and Biklen, 1992) allowed for the ebb and flow of conversation and in practice it approximated more to a '*topic guide*' (Arthur and Nazroo, 2003). This had the added advantage of providing a degree of '*replication logic*' (Yin, 2014, pp.57-65) of the interview data collected across case studies and thus a stronger basis for comparative analysis. I set the length of the interview at one hour as I doubted that participants, particularly in businesses, would be willing to commit to anything longer but this did mean that the discussions needed to be managed carefully to work through the key themes in that time. Whilst I always managed the discussions to finish within the hour, some participants informed me during the interview that they were happy to continue beyond the hour, which was sometimes useful to gain their perspectives in more depth.

My strong preference was to interview face-to-face to build rapport more easily and to be able to observe non-verbal cues. This was possible with 23 out of the 36 interviews and unsurprisingly it was far easier for university participants, with 14 out of 17 available in Oxford at the time. By contrast, only nine out of 19 business interviews could be conducted face-to-face, of which seven interviews were conducted in their own work locations, whereas in two cases the interviewees were visiting their collaboration partner in the University and so we managed to meet in Oxford. Of the 10 telephone interviews³⁹ that I conducted with business participants, in six cases they

³⁹ In one telephone interview the Project Director decided to also invite the Project Coordinator to participate: they occupied the same office for the interview and used speakerphone so I conducted the interview with both together.

were located overseas and the others generally had busy schedules and found this more convenient. I generally found the quality of the information gathered from the telephone interviews to be comparable to that gathered face-to-face, although in some instances the interviewee asked at the start of the call if we could complete the interview in less than the intended hour as they had meetings scheduled straight afterwards. This did not present any difficulties except on one occasion in which the interviewee said they had less than 30 minutes, due to an unforeseen commitment, so I rescheduled instead. Sturges and Hanrahan (2004) noted that the literature comparing the results of telephone and face-to-face modes of interviews are mixed but concluded from their own study that telephone interviews can be used successfully in qualitative research without necessarily losing quality but that this needs to be considered in light of the particular research being undertaken. They noted, *“where the researcher’s interest is more narrowly focused and immersion in the area is not necessary...telephone interviews can produce results quite comparable to in-person interviews”* (ibid, p.116). In the context of this research, I would support this view, having found that telephone interviewees were highly engaging and provided very useful contributions to the case studies that would otherwise have been difficult to capture.

4.6 Data Analysis

It became clear, as the fieldwork progressed, that the interviews supporting the 10 case studies would eventually constitute a large, rich and widely varied set of data. This made the requirement for an analytic strategy (Yin, 2014, Chapter 5) all the more imperative. I did consider whether the adoption of a conceptual framework suggested a deductive approach to analysis but was clear that it was not intended to be definitive

and in any case lacked underpinning detail at the outset to focus such an approach. In addition, I expected that the collaborations would, to varying extents, be influenced by specific contingency factors but I would not be able to distinguish these from more fundamental factors until later in my analysis, which was why the questions were framed openly to avoid channeling responses into pre-conceived notions.

Consequently, it was necessary to adopt an inductive approach in the early stages, to let the picture build up without constraint. It followed that it made sense to develop this picture by employing a within-case approach to analysis to begin with. This would provide a more robust basis for later cross-case analysis.

I began by looking at the data openly and simply tried to understand how the collaboration in each case was constructed (formally or informally) and what was going on within it by 'working the data from the ground up' (Yin, 2014, p.136). In this respect, my initial analysis approximated to a grounded theory approach (Corbin and Strauss, 2007; Glaser and Strauss, 2008), although I resisted the temptation to attempt to assign codes to the data at too early a stage, as advised by Silverman, 2013, p.135). Ritchie and Lewis (2003, p.212) show how the analytic hierarchy begins as soon as data is collected and in line with this my first tentative steps towards data analysis began as soon as I started to collect data from my first interview. Despite recording all but one of my interviews, I took comprehensive notes in all interviews to obtain a readily accessible source of data. Whilst these notes were necessarily sketchy, compared to the full transcripts that would follow, they nonetheless enabled me to reflect on the interviews and conduct an on-going preliminary analysis as the interview data grew. The interviewees' points were wide ranging, including actions and events, descriptions, explanations and opinions. As the interviews built up it was possible to triangulate

some of the points that were commonly recognised, particularly actions and events, although it became clear that interpretations of them sometimes differed, especially where there were underlying tensions.

4.6.1 *Data Condensation*

Given the unique nature of each case study it was important to clarify my contextual understanding of the collaborations before proceeding further with the manipulation of my data. Drawing on websites and other information provided by the project leads, I developed a case study summary table, defining the key features of each, at Appendix 3. Most importantly, it was essential to locate all interviewees in relation to both their own organisation and the specific collaboration on which the case study was based. Consequently, I created simplified relational charts, which can be found in the case study vignettes at Chapter 5. Comparison of the ten charts underlines the wide variation in the structure and complexity of the case study collaborations and allowed me to progress further with data condensation. Moreover, as I collected the formal interview data my immediate task was to transcribe each recording. Despite the obvious time penalty in doing so, I decided to fully transcribe each interview myself as this enabled me to listen carefully to and reflect upon the discussions more closely than I was sometimes able to when actively managing the interviews. This undoubtedly gave me a very good 'feel' for each interviewee's perspective and also enabled me to reflect on my own positionality in conducting the interviews. Transcribing was spread over several months, extending throughout and beyond the fieldwork phase but on completion amounted to almost a quarter of a million words (over 247,000) of interview data. Consequently, I needed to start the process of manipulating the data to make extracting meaning and inferences from it more

manageable. In qualitative analysis this next step is commonly referred to as data reduction (e.g. Punch, 2014, pp.171-172) but I much prefer the term *data condensation* used by Miles, Huberman and Saldana (2014, p.12), which, as they point out, more aptly reflects “*the process of selecting, focusing, simplifying, abstracting and/or transforming the data*” in order to make it “*stronger*”.

Miles, Huberman and Saldana (*ibid*) make clear that data condensation continues throughout the analytic process and whilst this is reflected in my subsequent activities, I began the process of data condensation by reading through the transcripts for each case study in turn, to immerse myself in the detail. I then followed Creswell’s advice (*ibid*, p.183) to annotate the transcripts with my own notes in the margins and took a deliberately open approach, using my notes and annotations in a variety of ways. These included summarising points (e.g. “*X could see the mismatch of representatives*”, from case study Hum 1 and “*evidence of wider buy-in*” from case study Med 2), labelling (e.g. “*focus on functionality from the start*”, from case study MPLS 4 and “*very strong culture at X*”, from case study Soc Sc 1) and explaining (e.g. “*deliberately not over-controlled but nonetheless structured*”, from MPLS 5, and “*not possible to capture successful outcomes*” from Med 2). In addition they sometimes captured emotions or values but where they were felt to be pertinent, in terms of contributing to the understanding of the case in the context of the research questions, the actual quotes or longer sections were highlighted for later reference. As well as manipulating the data in these ways I sometimes added my own comments where I wanted to note my interpretation of what was being said or to link a point to other aspects of the collaboration or an underlying construct, for later consideration. In this way I was interpreting and assigning meaning to the data but in so doing I was avoiding

the common problem that Avenir and Thomas (2015) identified of merely paraphrasing the data, into a shortened version.

Once my manuscript annotations were complete for each case study I used these to produce a condensed account for each interview based on the combination of annotations and actual quotes to provide more manageable accounts of the interviews for each case. This involved some further editing, re-ordering and labeling of points under sub-headings (relating to the key interview questions) to provide further clarity and ease of reference. These were written in note form and so were considerably shorter than the original manuscripts but because the question format was retained they were easily cross-referenced so that I could quickly return to the relevant part of the full transcript when needed for more detailed follow-up in subsequent analysis. In acknowledging Smagorinsky's (2008, p.397) point that it is also important to justify what was eliminated through this process, I should add that I did not include background information that did not have a direct bearing on the collaboration. This included some background information and explanations of specific aspects of the research or underpinning subject knowledge. The resulting condensed data from interview transcripts were compiled together for each case study and set to a landscape format to make them more compact for ease of reference.

4.6.2 *Data Manipulation and Representation*

In the next stage of analysis I sought to relate the condensed data (with reference back to the source data where appropriate) more directly to the research questions. As a first step towards this I constructed a partially ordered meta-matrix for each case study (after Miles, Huberman and Saldana, 2014, pp. 135-140), using the template shown at Figure 4.5. This involved identifying those elements of each interviewee's

data that impacted directly on the development of the collaboration and then re-ordering and representing them within the case study. Each interviewee's data were specifically ordered according to two key dimensions: firstly time, and secondly the level within the collaboration to which the issue represented by the data most closely related, in line with the conceptual framework and the first research question. Wherever possible the entries were reduced to shortened points but these were sometimes supported by short quotes.

Interviewee	Prior Experience/ Engagement	Set Up/Initiation	Project Delivery Phase	Outcomes
Person 1 (P1)				
Personal				
Organisational				
Inter- Organisational				
Person 2 (P2)				
Personal				
Organisational				
Inter- Organisational				

Figure 4.5: Partially Ordered Meta-Matrix Template

The completed partially ordered meta-matrices enabled both within-interviewee and cross-interviewee analysis for each case. For each interviewee it was possible to infer when and at what level key “influences and affects” (Saldana, 2003)⁴⁰ were perceived to have occurred in relation to the collaboration. By following an interviewee's engagement within the collaboration it was possible to start to piece together evidence of how influences and affects had shaped both their own actions

⁴⁰ I have adopted the term ‘*influences and affects*’ introduced by Saldana (2003) and discussed in Miles, Huberman and Saldana (2014, p.222) as a more appropriate term for referring to qualitative data than the more positivist ‘*cause and effect*’. I also feel that the preferred term reflects the more individualised and socially constructed process of interpreting events and acts as a useful reminder that much of the data captures the interpretations of the interviewees rather than factual accounts. There are nonetheless specific actions and events than can be taken as relatively objective observations or accounts and these were often confirmed through triangulation with other interviewee data.

and also how they perceived that they shaped those of others within the collaboration. From cross-interviewee analysis it was then possible to draw comparisons and contrasts, which in turn suggested how the course of the collaboration had been shaped through a series of dynamic influences and affects at all three levels: individual, organisational and inter-organisational. However, it was clear that some influences had greater causative affects than others and so I then needed to elevate the level of analysis to make clearer the key occurrences or events and the *processes* influencing or influenced by them over time. This fits broadly with what Yin (2014, pp. 152-154) describes as the construction of complex time series. He explains that these arise where there are multiple variables that can also act differently over time, as was readily apparent in the case studies.

I felt that a more visual representation was needed to show multiple variables and linkages through time and so I decided to construct event-state networks for each case study (after Miles, Huberman and Saldana, 2014, pp. 209-211), which are shown at Appendix 4. To produce these graphical representations I compared and contrasted the entries in the partially ordered meta-matrices to identify the key descriptive and explanatory points that directly characterised relevant developments within the collaboration at each stage. This often meant summarising or grouping points to produce very short entries. Just as importantly, I needed to infer the relationships between each to begin to construct the networks. Key 'events' or 'states' within the collaboration were specific and clearly defined, as labeled in the boxes (as shown in the key to the event-state networks at the front of Appendix 4, and used subsequently for each case study in parts I to X). The influences that were wider ranging and sometimes less clearly bounded, were represented by bubbles and

influenced the collaboration in the direction of the arrows. Each bubble was colour-coded in an effort to attribute its key influence to the individual, organisational or the inter-organisational level, in accordance with the conceptual framework. The event-state network for each case study was laid out in a similar manner, starting at an initiation point shown at the top and then progressing through each of the four time-related phases, culminating with 'outcomes' at the bottom. Whilst a lot of supporting detail was lost in their production, the event-state networks added significantly to earlier representations by suggesting connections between the data and showing how these strengthened or weakened the progress of the collaboration through causative affects. In particular, they provided a basis for understanding the processes that shaped the learning and assisted in identifying the underlying factors that influenced them, as discussed in Chapters 5, 6 and 7. The event-state networks for each case study can be found at Appendix 4⁴¹.

Up until this point the analytical focus had been on condensing, categorising and representing the data in different ways. Elevating the data to successively higher levels of abstraction allowed patterns to emerge but inevitably lost a lot of the underpinning detail and explanatory insights provided by the interviewees. A fuller analysis would need to draw on both and so I made the decision to produce reasonably detailed narrative accounts of the ten case studies (totaling about 30,000 words in all), reflecting a further analytical technique suggested by Yin (*ibid*, p. 139). These were intended to develop some of the themes that were suggested in earlier

⁴¹ The event-state networks have been shown in full because the data is considered to be sufficiently generalised to avoid any risks to the confidentiality of individual interviewees, whereas both the condensed transcripts and partially-ordered meta-matrices contain more personalised content and so on that basis have been omitted. However, I shall draw upon the latter and use their content, as appropriate, in later chapters to support my arguments.

analysis, drawing in key quotes and other supporting detail from the transcripts and earlier analyses. However, this was entirely in line with the iterative approach suggested by several authors on qualitative research, such as Srivastava and Hopwood (2009). In constructing the narratives I used the data relatively freely to support my interpretations, since their prime purpose was to aid my analysis rather than for presentation in this thesis, meaning that they were longer and in some cases more open in the use of data than if they had been constructed for the latter purpose directly. In effect, the extended narratives enabled me to integrate the individual, organisational and inter-organisational processes, based on the conceptual framework and captured in the partially-ordered meta matrices and the event-state networks, to identify the key occurrences that shaped the learning in each collaboration. This laid the basis for the further within-case and cross-case analysis that led to the identification of the emergent themes laid out in Chapter 6.

4.6.3 *Within-Case and Cross-Case Comparisons of Collaborative Learning*

Collectively, these analytical techniques provided a deeper understanding of the processes that had driven the development of the collaborations within each case study but to take the analysis further I needed to refocus on the actual learning that had taken place within them. This required a comparison of the initial learning aspirations for both the University and its collaborating organisations with the actual or emergent learning outcomes. The initial learning aspirations were, to some extent, dependent on the nature of the agreement between the parties, which ranged from a formalised, funded contract for very specific deliverables to a loose and unfunded collaborative relationship, so this context also needed to be made explicit. Similarly,

the learning outcomes needed to be viewed in terms of how far the collaboration had progressed, given that some had just completed whereas others were on going.

I decided to construct a further matrix to capture these aspects, as both the process of doing so and the final product would provide further clarity. In addition, I also captured those elements of process identified in the earlier analysis that I inferred to have had a significant effect on the learning outcomes and reduced these to a short series of bullets to characterise the 'learning approach'. The completed document provided a very useful baseline for explaining within-case changes between learning aspirations and outcomes, approximating to a form of 'effects matrix' (after Miles, Huberman and Saldana, 2014, pp. 228-231. Its potential to assist subsequent explanatory cross-case analysis was clear but limited by the lack of standardisation in the use of phrases. Consequently, I produced a second version of the matrix that condensed the content further by generalising it under common labels (usually short phrases) as far as possible. In effect, this applied a form of limited 'holistic coding' to large units of data (Miles, Huberman and Saldana, *ibid*, p.77) to provide greater utility for cross-case analysis. The two-part Learning Effects Matrix can be found at Appendix 5.

To take the analysis to the next level I then needed to return to the data representations to search for explanatory *themes* (Creswell, 2013, p.186). These had already informed much within-case analysis but extending the analysis to cross-case comparisons enabled broader themes to be developed by synthesising these multiple perspectives. Annotating these on the event-state networks was a useful way to test and edit potential themes, particularly in terms of causation and the subsequent

consideration given to path dependency (Bennett and Coleman, 2006; Mahoney and Schensul, 2006).

4.7 **Validity and Reliability**

Validity and reliability are subject to continuing debate in the field of qualitative research. Creswell (2013, pp.244-250) notes that some would argue for positivist approaches that are closer to those that have traditionally been applied to quantitative data, where the concepts of validity and reliability originated, whereas others have developed alternative approaches and associated terminology that is more adapted to the characteristics of qualitative research. For example, Lincoln and Guba (1985) prefer to use the terms *credibility*, *transferability*, *dependability* and *confirmability* but there were also several other terms used by others. The problem with this, as Lewis and Ritchie pointed out (Ritchie and Lewis, 2003, Chapter 10), is that some of these terms can overlap and related discussions become entangled as a result. Consequently, I decided to work within the terms validity and reliability but have adopted their interpretation of each in the following discussion.

For qualitative data, Ritchie and Lewis suggest that the reliability of the data needs to be considered in terms of whether it has been consistently and rigorously derived (2003, p.271). This can be supported firstly by the way the sample of both cases and interviewees were selected in an unbiased manner. As discussed earlier, I sought representativeness by ensuring I gathered at least one case study from each Division but the actual selection of case studies was negotiated through both intermediaries and project leads and heavily dependent on accessibility so there was very little scope for bias. Similarly, when identifying interviewees for agreed projects I was heavily dependent on the project leads and the willingness of other collaborators

to participate so my influence was largely limited to ensuring adequate representativeness (including at least one University and one external participant). I was not always able to interview the formal project leads in either the University or an external organisation for some collaborations but this was not essential since I was not aiming to conduct a comparison of responses at different levels as this would have assumed that collaborative teams were constituted in similar ways for the University and external organisations, and this was often not the case. As stated in Section 4.4.3, I sought participants that were *“closely involved in that core part of the collaboration in which they were mutually engaged.”* This ensured that I only gathered perspectives from those that were *subject to individual, organisational and inter-organisational processes within the context of the same activity”*. As a consequence, the mix of interviewees in each case was a matter of judgement and I did not regard this as an issue of inconsistency.

The important point in consistency terms was that the interviews were constructed and conducted in very similar ways for all participants across all collaborations, using the same semi-structured interview template. This meant that the interview data was consistently structured and could be subjected to analysis in the same way. Each of the analytical techniques used has been laid out in detail and in doing so this does lend itself to replication, as noted by Seale (1999). Furthermore, the analysis of the data has been comprehensive, approaching it in a number of ways, with wide consideration, to reach interpretations that will be shown in later chapters to be well supported by the evidence.

Lewis and Ritchie (2003, p.275) suggested that, notwithstanding the preference of some qualitative researchers for alternative terms to internal and external

validation, both could be demonstrated through the adoption of appropriate methods. They suggested that internal validity (the research does what it sets out to do) could be strengthened by the constant comparative method proposed by Silverman (Silverman, 2013, pp. 290-291) and through the use of deviant case analysis. Both of these were reflected in my approach to analysis: multiple techniques were used to support the identification of processes and possible underlying factors within each case study and these were closely compared against others, as part of a cross-case analysis. Where outliers were identified these were subjected to further scrutiny and explanations for them sought rather than ignoring or rejecting them. This was an important part of my analysis since it led me to consider wider explanations such as contingency factors and path dependency.

External validation refers generally to the extent to which the findings are applicable to wider populations but I have already made clear in Section 4.3.3 that my intention was to seek inferential generalisations in the form of hypotheses or propositions that would require testing through further study. Nonetheless, Lewis and Ritchie (*ibid*) suggest that different forms of triangulation (after Denzin, 1978) can be used to support external validation. Triangulation of data sources was a specific intention of this research, by gathering the wide stratified sample of 10 cases and by ensuring that they all captured views of participants from both the University and its external partners. The employment of the different techniques discussed can be considered to provide analytical triangulation and a number of explanations were considered, as outlined above, to be in line with theory triangulation. These validation aspects clearly tie in closely with aspects of reliability but when taken together they demonstrate my adoption of a deliberately rigorous approach despite working within a

field that is far from standardised in structure and that required some significant barriers to be overcome to gain credible data. It is this process that underpins the robustness of the findings.

4.8 Researcher Positionality

Prior to undertaking this research I had spent a long career in adult education and training within the Armed Forces and within this gained much experience in the development and management of collaborations. This experience ranged from junior roles in collaborative activities through to directing the development and management of some very large strategic partnerships with public, private and third sector organisations in later years. On occasions I have also been involved in collaborative activities outside the field of education and underpinning this I have an academic background in both education and management. Consequently, I came to this project with an implicit understanding of collaborations but I have always been keen to better understand how best to develop and maximise the benefits from them and this is what attracted me to this study. However, I was aware from the start that I needed to ensure that this was not reflected in unconscious bias on my behalf, nor that it adversely influenced the responses that participants provided to me in my data collection.

Whilst I was very clear in my engagements with others that in conducting this study I was a researcher, first and foremost, my background was inevitably covered in initial discussions with intermediaries and project leads. Whilst I did not seek to elevate this, it often led to more open discussion of the challenges posed by collaborations, in large part because I was able to recognise and show understanding of these and sometimes build upon them, which helped to establish relationships. At

the interview stage I needed to be more guarded and generally only made passing reference to my background, if it came up at all, since I was keen to avoid the possibility of that in any way shaping the interviewee's responses. Instead, I used my broad understanding to best effect in showing understanding and in focusing questions in response to what the interviewees were saying. However, I did practice frequent reflexivity in reviewing my engagement log and interview notes and when transcribing the interviews.

In conducting my analysis I needed to continue the practice of reflexivity to ensure that bias was not creeping into my approaches to understanding the data. I was very much aware that the people I interviewed had very different backgrounds and experience to my own and my real interest was in understanding their involvement in the collaborations from their perspective not mine. This meant ensuring that I considered the data openly to begin with and kept to a rigorous evidence-based approach to building themes and propositions. It was also particularly important in this study to ensure that my initial analysis of later case studies was not unduly influenced by what I had found in the earlier ones, thereby risking overlooking different or additional points of importance. This again required frequent reflexivity and review at each stage.

4.9 Limitations

This research study was always intended to be exploratory. As a doctoral project it was inevitably resource and time limited and so I had to be realistic in what I could achieve. Nonetheless, the study of 10 case studies provided considerable breadth for comparative purposes. The inevitable trade-off has, of course, been in the depth to which each case could be studied. Whilst each case study was judged to have a viable

number of interviewees before proceeding, some were clearly very small and focused: in some case studies this reflected the fact that there were few people directly involved, such as in MPLS 1, but in some others, especially Med 2, I had to limit the scope to a sub-set of participants within a wider partnership. With more time and resources I would have liked to widen some of these case studies to look at the impact of and on those participants with more peripheral involvement but with significant influence, especially in some of the management roles. Access challenges inevitably meant that it was not always possible to gain the participation of some people who might have added to the case studies but in pursuing 10 of them I sometimes had to make pragmatic judgements as to whether I had sufficient input to inform the answering of the research questions.

Despite these limitations this study did support the production of some inferential generalisations and, as already explained, this should be regarded as only a first step and they now need to be tested further. Whilst I think it was a sound decision to take all cases from within a single university for this project, it would be useful in future research to test these findings in some other settings to generate comparisons. I have no doubt that in doing so this will lead to further development of the concepts and by shining a light on this area I hope that it has provided a catalyst for doing so. In particular, I believe that there is a pressing need for those that work in collaborative and organisational learning to be persuaded to engage further in this field of study alongside those responsible for developing knowledge exchange and the training of researchers.

I engaged the knowledge exchange community extensively in this project but essentially as intermediaries to access the collaborations that were the focus of this

research. However, whilst I became aware of the vital role they play in the development of this area, I sensed that they were not as fully integrated into the university ecosystem as they might be but I believe that this research provides common ground of equal relevance to them. Further research into understanding their role in supporting collaborative learning through the lens of this research would be a useful area to explore and could support the further development of university approaches.

CHAPTER FIVE: CASE STUDY VIGNETTES

5.1 Introduction

This chapter provides an orientation to the collaborations on which the 10 case studies undertaken in this research were based. It provides an overview of each case study and explains the relationships⁴² between the participants in the research. These are represented in the organisation charts under each case study section. The development of the collaborations and the actual or emergent outcomes (at the time of the fieldwork) are only referred to in outline because relevant aspects will be discussed in far greater detail in the subsequent chapters. However, should further detail be required at this stage, the Case Study Event-State Networks at Appendix 4 provide graphical outlines of the key developments within each case study in an accessible format, and can be referred to alongside these vignettes. In addition, the Learning Effects Matrix at Appendix 5 provides further detail of the learning aspirations and outcomes for each case study, and includes summaries of the key approaches taken. The Case Study Summary at Appendix 3 provides a tabulation of the key features of each case study as a useful reference.

5.2 Case Study Hum 1: Informing Heritage

This collaboration was a groundbreaking initiative between the Humanities Division, University of Oxford, and a very large national charity within the heritage sector. It followed extensive groundwork by a member of the Division (who later became the

⁴² The organisation charts deliberately show just enough detail to position the research participants within the contexts of the case studies, with the University elements shown in blue and other organisations shown in red. A single asterisk (*) after a job title indicates that an informal discussion was held with this person whereas a double asterisk (**) indicates that this person participated in an interview. The lines represent the key relationships between the participants, whereas other relationships that are useful to illustrate but not pursued within the case studies are shown as dotted arrows.

'Academic Project Manager') who engaged with a senior manager within the charity (the *'Organisational Sponsor'*). Between them, they gained the support of a core of key staff (including the *'Organisational Project Manager'* from within the charity), within both the charity and the University, and successfully bid for a Knowledge Transfer Partnership (KTP) to be established. This was only the second time that the Government Agency had supported such a scheme within the Arts and Humanities area (its strong focus is on supporting innovation in science and technology) and it was a first for this University Division. The core concept underpinning the KTP was that the University would work with the charity to produce a knowledge bank of authoritative but short and accessible articles that related to the property portfolio of the charity, for display on its website. It was proposed that this would enhance the charity's web presence and support business development by encouraging more visits but more broadly the charity hoped that the initiative would support its wider strategic development and goals. The University Division saw this as an opportunity to learn how to improve its impact by working with the heritage sector.

In common with other KTPs, the partnership was centred on the establishment of a *'Project Officer'*, funded jointly by the charity and the Government Agency, although the incumbent was placed on the Division's staff in an administrative grade and given an office there. The appointee had notable experience of working in some (other) large heritage organisations and was well qualified with a Masters degree gained at Oxford but was not intending to pursue study to doctorate level. This individual was responsible for the day-to-day development of the partnership and worked to a well-defined management structure with a Local Management Committee for support and guidance and a higher-level Board to which progress against laid down

objectives was provided and direction received. The formalised governance structure with joint University, Charity and Sponsor membership is a distinctive feature of this partnership project, as shown in Fig. 5.1. Critically, it had high-level support from both organisations.

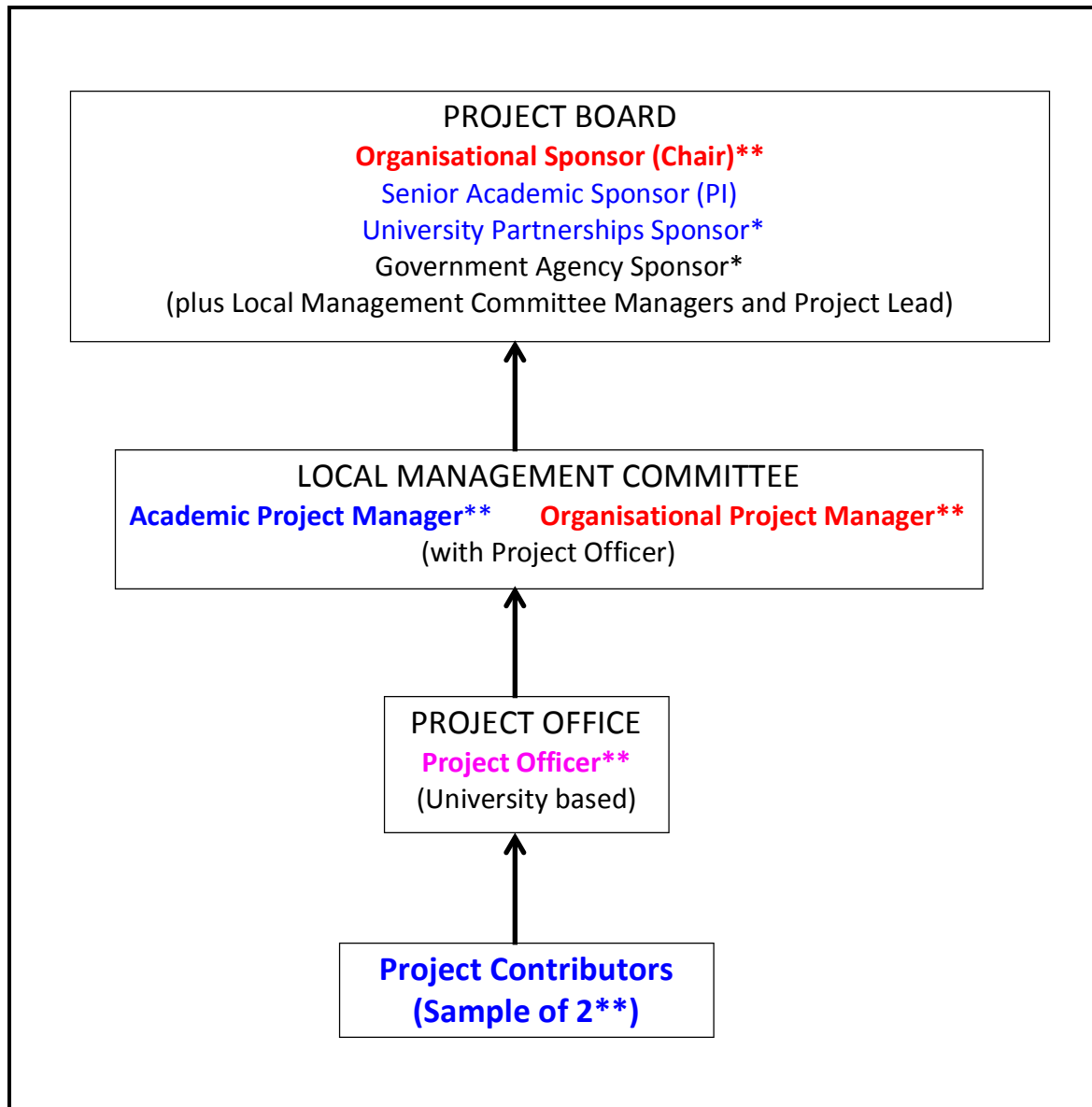


Figure 5.1: Organisation Chart for Case Study Hum 1 – Informing Heritage

Notwithstanding the formal governance structure and pre-determined objectives of this project, the Project Officer was afforded considerable latitude in the development of the relationship, which played to the incumbent's strong ability to take the initiative

and engage across a wide spectrum of actual and potential stakeholders in both organisations and beyond. Such engagements extended beyond those directly associated with the achievement of the specified objectives to the development of wider initiatives that supported the development of a strategic partnership. In relation to the core initiative, two '*Project Contributors*', both doctoral students within the University Faculty, were interviewed. They had both already submitted articles to the Project Officer and these had been placed on the charity's website.

At the time of the interviews the two-year KTP was drawing to a close and the final reports had been submitted; shortly afterwards it was announced that the KTP had been awarded a grade of 'Outstanding' by Innovate UK (the sponsoring Government Agency). In terms of deliverables, the partnership produced fewer articles than anticipated and the charity struggled to prove direct short-term financial benefit but it was clear that the project had made a very strong contribution to its strategic development, which was also recognised by the Government Agency. As a result of this success, the charity committed to funding the establishment of a Partnership Office, located within the University, to further the development of the relationship.

5.3 Introduction to Case Studies MPLS 1, 2 and 3: Conservation and Business

The following three case studies relate to projects that were all undertaken by the same early career researcher as part of a Knowledge Exchange Fellowship, awarded by a research council. The Knowledge Exchange Fellow ('KEF'), placed within a research group in one of the University's science departments, aimed to improve the engagement of business in the application of conservation science to support and maintain biodiversity. To address this broad intent in practical and specific terms the

KEF first engaged directly with industry but subsequently evolved a strategy to collaborate with Government and Non-Governmental Organisations (NGOs) that had stakeholder influence across wider networks of businesses, in order to seek greater impact. The learning carried forward between one project and another provides a useful strand for analysis, as discussed in Chapters 6 and 7. However, beyond this, all three projects provide evidence that support far wider themes for analysis, reflecting their unique characteristics, and so they are presented as separate stand-alone projects in their own right here.

5.4 Case Study MPLS 1: Supporting a Corporate Biodiversity Strategy

This collaboration was between the KEF and a '*Group Scientific Expert*' (GSE) who advised on conservation matters within a multinational oil and gas company. The GSE worked within a team that provided technical advice across the company that can broadly be split between informing senior corporate executives of the latest thinking and issues such as sensitivities and risks and, secondly, providing more specific support and guidance to the operational teams, as shown in Fig. 5.2. The collaboration originated through contact between the GSE and senior members of the University Research Group at a workshop. The GSE subsequently provided a supporting reference for the establishment of the fellowship and this provided the connection for the subsequent introduction to the KEF when first appointed.

Informal discussions almost exclusively between the KE Fellow and the GSE, considered a range of potential collaborative activities. Engagement beyond that bilateral relationship was very limited in both organisations. The possibility of conducting research or providing advice at operating sites was of particular interest to the KEF but for a number of reasons was considered problematic by the GSE and

therefore the focus became more on informing the development of a strategy document that the GSE was preparing for corporate staff. This was an informal collaborative relationship with no underlying agreement of funding involved. The collaboration was thus limited to the KEF providing authoritative input on the latest thinking and research in the field. The KEF had hoped that a field-based project might follow, as had been discussed, but the opportunity to pursue this did not materialise.

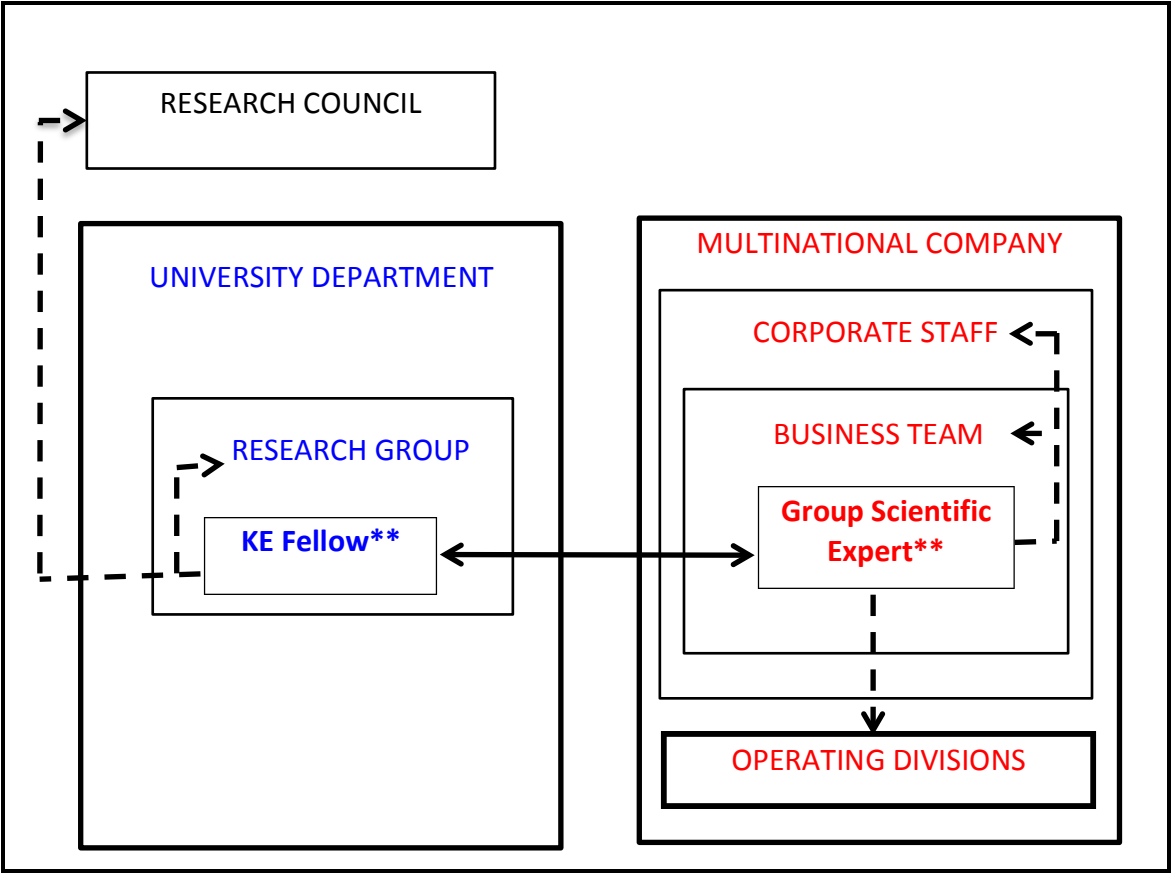


Figure 5.2: Organisation Chart for Case Study MPLS 1 - Supporting a Corporate Biodiversity Strategy

Whilst both parties recognised that the level of collaboration had so far been limited, they nonetheless regarded the collaboration as beneficial, albeit for different reasons. At the time of the interviews the collaboration still had another six months to run and its continuance beyond that was uncertain, in part because from the GSE’s perspective

the collaboration had been exclusively with the KEF, who was expected to move on at that point.

5.5 Case Study MPLS 2: Biodiversity Tools

This case study captured a more indirect approach to engaging businesses in conservation matters through the wider community of conservation NGOs and contractors. Although less direct, the KEF realised that this approach might potentially be more impactful, given that the NGOs had extensive networks with industry and mindful of the difficulties encountered in attempting to engage industry directly. The KE Fellow attended a number of NGO workshops that were meant to help support businesses in measuring, evaluating and reporting on their activities relating to biodiversity. This led to engagement with a representative who worked in the business and biodiversity programme within a large International Organisation (IO) for conservation (this person later became the *'Project Officer'*) and they entered into dialogue. At subsequent meetings the Deputy Director of this programme joined them and over several months the three of them exchanged knowledge and ideas and worked up a project proposal.

They agreed that a joint project should focus on understanding the needs of business in the biodiversity area and attempt to classify them in a taxonomy that could then be used to recommend the most appropriate pre-existing tool. Consideration would only be given to the development of further tools if areas were identified that could not be met by pre-existing ones. For this work they made good use of the IO's extensive pre-existing network of NGOs and business contacts, to provide feedback. Whilst funding was tight, the IO managed to cover some time for the small (two person) project team, whilst the KE Fellow was supported solely by the Fellowship

funding. However, at the KE's insistence, they did draw up a Memorandum of Understanding to formalise their respective commitments.

The KEF worked closely with a Project Officer and they both worked to the Deputy Director, as the project lead, as shown in Fig. 5.3. The KE Officer was also introduced to the wider team and had occasional engagement with the Programme Director. Whilst the KE Officer worked for the most part remotely from the continental Europe-based IO, communication was frequent and a close working relationship was achieved

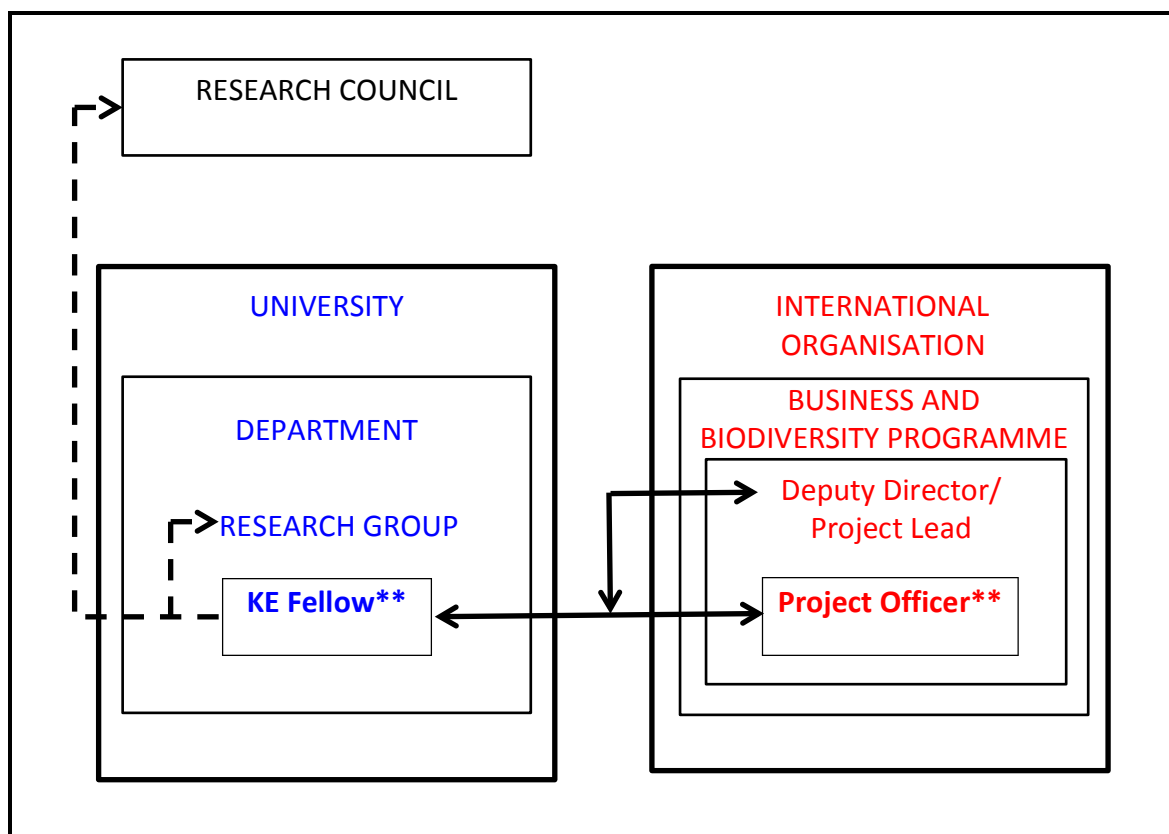


Figure 5.3: Organisation Chart for Case Study MPLS 2 - Biodiversity Tools

At the time of the interviews, the project had been running around four to five months so it had time to bed in but the team was still working towards the agreed deliverables. However, both the KEF and the PO were very positive about the collaboration in terms of feeling that it was focused on useful outcomes and that the

relationship was working very well. Moreover, the NGO and business communities had engaged positively and a workshop was planned to engage stakeholders directly, so the project was making good progress. The project work was raising the KEF's profile considerably and as a result the KEF had been invited onto the Advisory Board of two major projects.

5.6 Case Study MPLS 3: Promoting Industry Engagement in Conservation

Like case study MPLS 2, this case study involved an initiative by the KEF to engage industry in conservation activities indirectly but this time working with a Government Agency to support a project funded by a Government Research Programme.

Following on from MPLS 2, although the KE Fellow felt that the development of biodiversity indicators that allowed businesses to assess their impact was important, a further challenge was that businesses often did not know what they wanted to achieve in this area. The KEF had previously attempted to tackle this by taking international biodiversity goals (developed by the Convention for Biological Diversity) and showing how they were relevant to business in a draft document. The work needed further development and for case studies to be added but the KEF lacked the capacity to complete this and so was keen to find a partner organisation to enter into a funded collaboration to undertake it. In another engagement the KEF had met the '*Programme Manager*' (PM) of a conservation-related Government Agency who was also interested in this work as it fitted within the Agency's strategic direction, but similarly lacked funding to undertake it. However, the KEF saw an opportunity to take the work forward through a Government Research Programme and they agreed to submit a joint bid, which was successful. As a result, the Government Research Programme funded an intern post to support the project for four months and a late

stage doctoral student (who was part of KEF's network of contacts) was selected to fill it. The KEF and PM agreed that the 'Project Intern" (PIN) should be located in the Agency's offices, where the PM provided a full induction for both the PIN and the KEF. The organisational relationships are represented in Fig. 5.4.

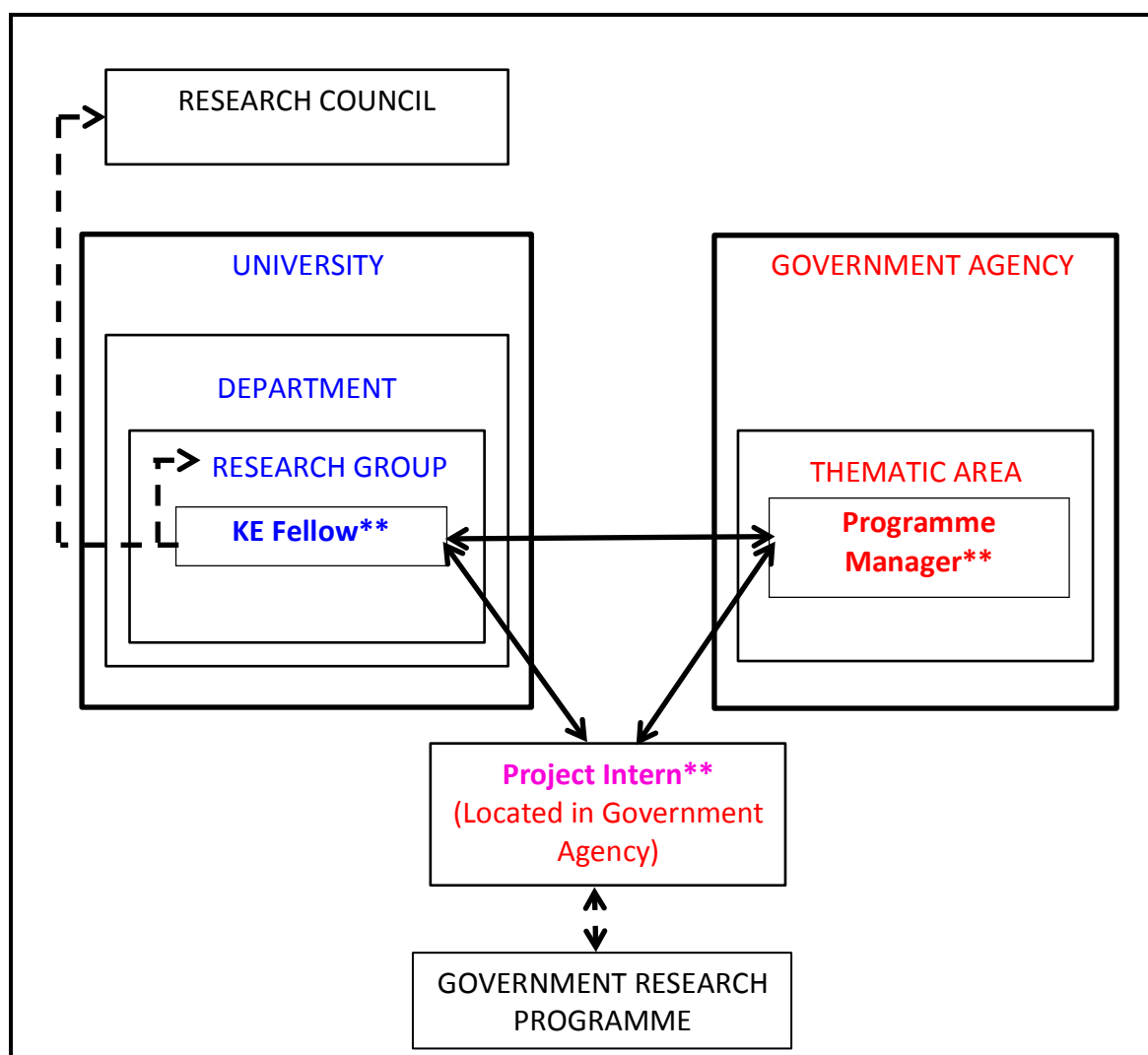


Figure 5.4: Organisation Chart for Case Study MPLS 3 - Promoting Industry Engagement in Conservation

After discussion, the three-person project team decided that the deliverable would be a policy document that shows the relevance of international biodiversity targets to the private sector, supported by relevant business case studies to illustrate the range of actions that were already being undertaken. It was agreed that the report was to be

published by the Government Agency and used subsequently by the Project Manager in engaging industry. Furthermore, they intended to present it back to the Conference of Parties to the Convention for Biological Diversity at the end of the year.

In terms of responsibilities, the PIN gathered the case studies and developed the linkages to the biodiversity goals that were largely developed by the KEF. The KEF also undertook the project manager role (essentially guiding and quality assuring PIN's work) whereas the Agency's Programme Manager provided assurance in terms of its utility to engage the target audience and presentational aspects, since it would be an Agency document. As the work developed they engaged stakeholders through a number of presentations, which extended their networks and platforms for future engagement. Whilst the team worked very well together they encountered increasing time pressure and realised that they would not complete the work within the tight four-month timeframe. Nonetheless, they responded positively and although the project team formally disbanded they successfully completed the work between them some weeks later. The Agency Report was published with due acknowledgements, along with a practice note.

5.7 Case Study MPLS 4: Global Data Analytics

This case study captured a developing collaboration between a University team in an applied mathematical and engineering science research group and a charity working in the field of disaster management. The Principal Researcher ('PI') and charity representatives first met as participants in a third party-run research programme that included a project on the use of crowdsourcing⁴³ for the analysis of

⁴³ Crowdsourcing involves using large numbers of people over the Internet to process complex tasks by breaking them into small parts and distributing them to participants. In the context of using satellite imagery for disaster management, each member would be given an area of the image to analyse

satellite imagery in disaster management scenarios. The researchers were developing the technology using data science techniques to process the crowd sourced data analysis into useful applications such as ‘heat maps’ that showed zones of disaster related criteria, whereas the charity personnel were acting as advisers on the practicalities of disaster management.

In other related developments, the PI had formed a close working relationship with the leads of the crowdsourcing platform that supported high volume data interpretation for problems such as disaster management imagery. Additionally, a Government Agency had supported the PI in developing contacts within the satellite industry, which enabled access to satellite data and led to a project with one such company to develop a tool to support the interpretation of its data. The researchers were developing the technology to bring these elements together, using data science techniques to integrate the data in order to display relevant features for end users such as the charity. However, they needed detailed feedback from such users in order to develop the underpinning algorithms that would improve its effectiveness in doing so. The relationship between these elements is shown in Fig. 5.5.

In pursuing this research the PI worked further with the charity on some specific projects, including an operational exercise, but at that stage the relationship remained functional and the PI lacked the essential feedback needed to improve the technology. However, the PI persuaded the CEO of the charity to work more closely with them when an opportunity arose to trial the technology in a real-time disaster immediately after the 2016 Nepal earthquake. With better feedback the researchers

according to given criteria to identify key information. The resulting data is then fed back to the crowdsourcing organisation. The data scientists were developing algorithms to collate and represent the total ‘picture’ in ways that would be useful to end users (such as the charity in this case study).

were able to quickly develop the technology to display vital information that assisted the relief operation on the ground. This proved to be a tipping point in the relationship, which led to further collaboration although the relationship developed slowly until the Deputy Chief Executive Officer (*'DCEO'*) took over as the main point of contact with the University team, when much closer cooperation followed. Then when the Caribbean hurricane season began in 2017, the charity asked the PI to operationalise the capability again; the research project team responded positively, providing the charity with timely and close operational support for both Hurricane IRMA and Hurricane MARIA.

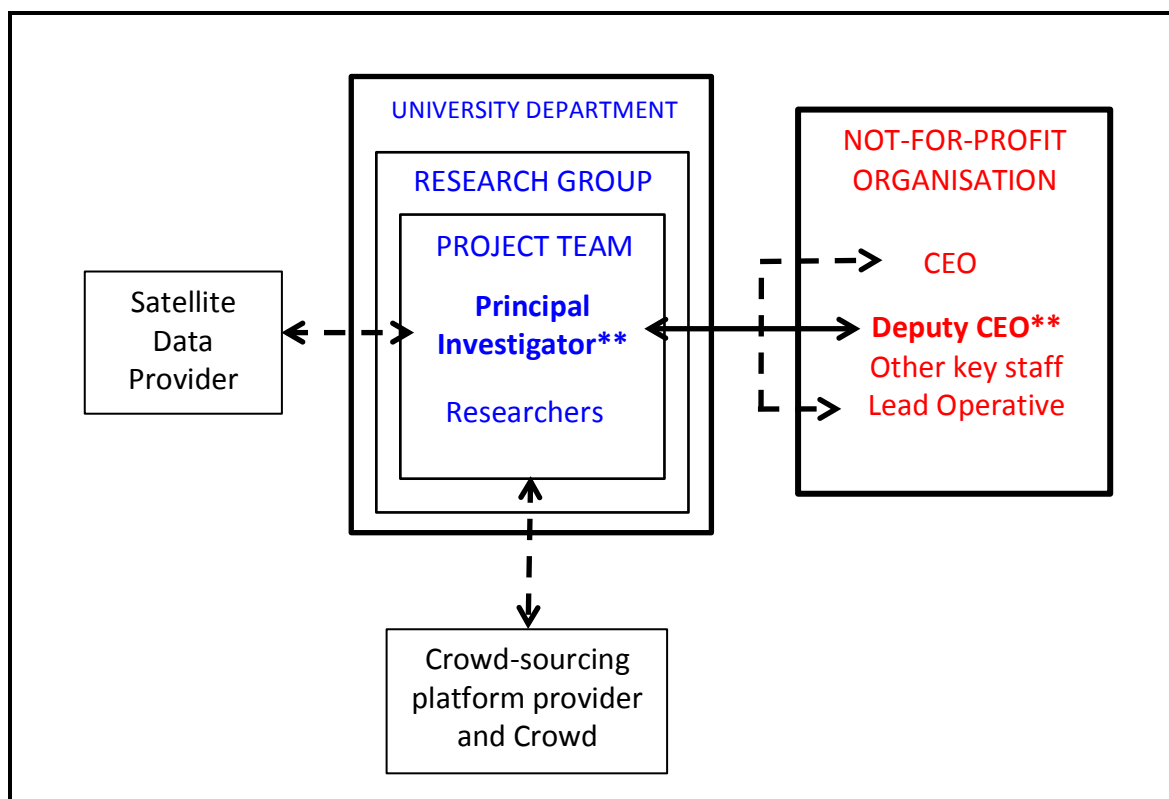


Figure 5.5: Organisation Chart for Case Study MPLS 4: Global Data Analytics

Throughout these more recent collaborations increasingly close working led to more responsive feedback that allowed the capability to be improved even further, thus informing the research whilst at the same time increasing the impact on the

ground. The collaboration was informal and sometimes ad hoc, picking up when particular opportunities came along. However, both parties were strongly committed to continuing to work closely together and at the time of the interviews were keen to discuss how this successful collaboration could be taken forward.

5.8 Case Study MPLS 5: Flood Management Tool

This case study centred on a piece of contract research but its co-development nature, involving a number of parties, makes it particularly interesting. Essentially, two Government Agencies with responsibilities for the environment co-sponsored a project to develop a flood management tool. This would allow them to test whether an alternative market mechanism would lead to better value for money in the public funding of flood management measures. The mechanism was based on an auction process that allowed landowners to provide input to which natural flood defence measures should be undertaken on their land to achieve the environmental outcomes that the Agencies wanted.

The contract for the development of the tool was awarded jointly to the University and a small environmental charity that it had partnered with. The University/charity project team was co-managed by a *'Research Associate'* (whose employment was split between the University and the charity) and an early career *'Postdoctoral Researcher'*, both located within the same research group of a Science Department and who had worked together previously on similar projects. A software development expert within the environmental charity undertook the technical build of the tool. Whilst the Government Agencies recognised the strong academic, technical and experience profiles of the University/Environmental Charity team, they were very keen to be closely involved with the development of the tool, to ensure that it met

their particular requirements. Furthermore, the requirement was for the developers to provide a dummy run (a simulation run in a workshop) and then the Agencies, assisted by a landowner's association, would conduct a live field trial, with landowners in the host area. Consequently, one of the Government Agencies provided a '*Project Manager*', who coordinated input and requests from staff across both Agencies and held regular conference calls between staff from the Agencies and the two lead developers. The project leads in each Agency (one acted as Project Director and the other as the '*Co-Sponsor*') maintained close dialogue throughout the project. These inter-relationships are shown in Fig. 5.6.

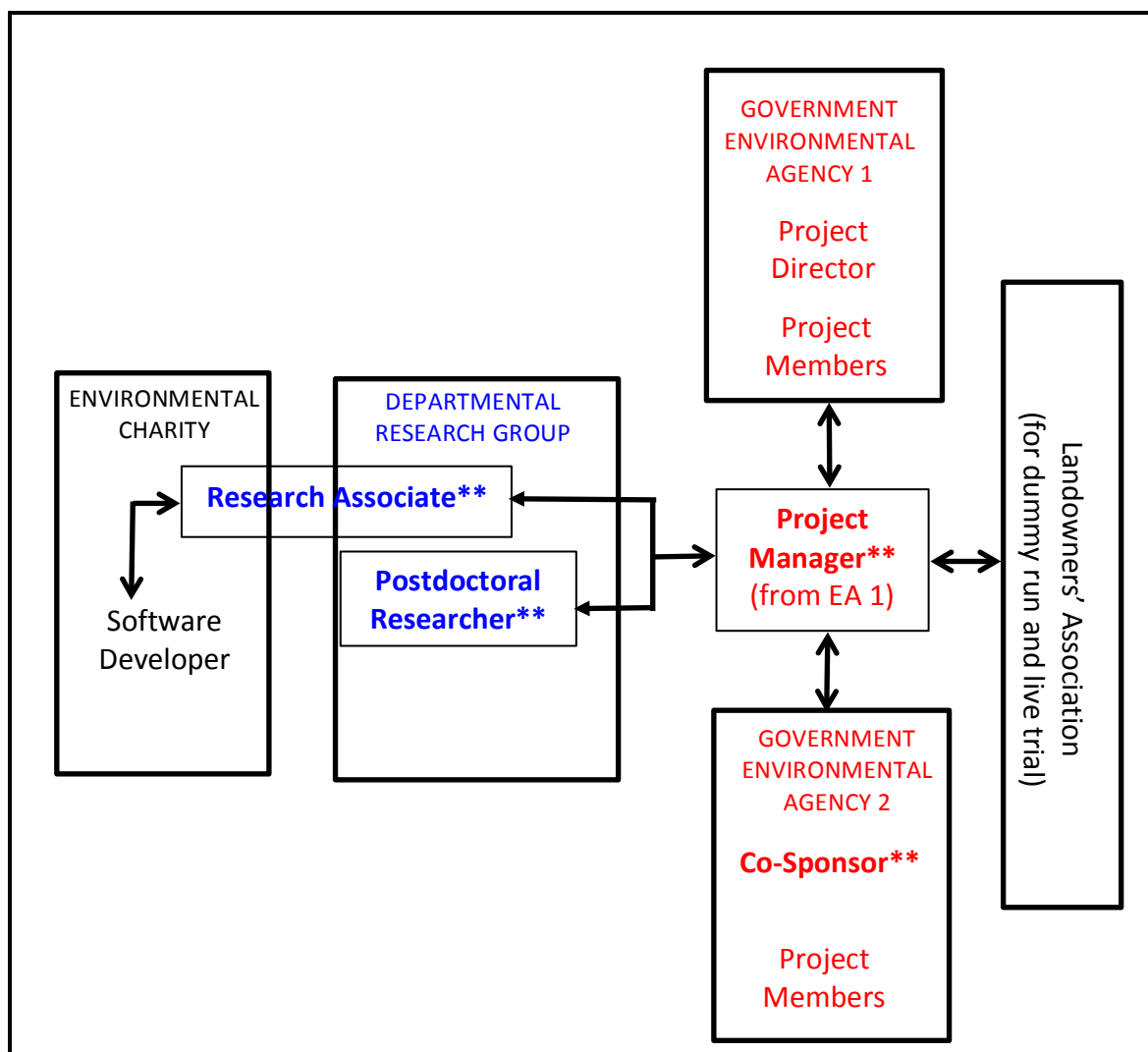


Figure 5.6: Organisation Chart for Case Study MPLS 5: Flood Management Tool

The project was on a tight schedule as it was limited to six months in length. Beyond this, assuming that the tool worked satisfactorily, the Agencies would move onto a more extensive evaluation phase of their wider programme, during which it was agreed that the University/charity team would just provide technical support as required. I engaged in this project just before the dummy run, and was subsequently invited to observe this at a workshop held in the University. Interviews were then held just as the project was concluding, with the majority held shortly before the field trial and one just afterwards. It was clear from both the workshop and the interviews that very effective working relations between all parties had been established quickly and all pulled together to ensure that the project was successfully and very satisfactorily completed on time. Possibilities for further collaboration had already started to be discussed.

5.9 Case Study Med 1: Product Packaging Design

This case study centres on a collaboration between a large (FTSE 100) Fast Moving Consumer Goods Company and a small project team within the Medical Sciences Division (Psychology). Discussions between a Company Director and the Principal Investigator (PI) identified a common interest in research to underpin the design of packaging for consumer products. Following discussions, a two-year contracted research project was set up, which funded a full-time '*Research Assistant*' (Res Asst), an early career researcher to work directly with the Company, under the supervision of the PI. At the time of the interviews the project was at the mid-point of its second year and so by that stage was well established and positive consideration was already being given to next steps.

The Company outsourced the design work for its product packaging to three different design companies that focused on different product lines. The '*Design Agency Leads*' (DALs) from each met with the Company's '*Head of Business Function*' (HBF) at weekly design meetings where new requirements were introduced and the design proposals from the design companies were reviewed, to approve or redirect them. Production teams were also represented since lead times were often short and there was a constant need for the design process to be fast and responsive. The process entailed the lead design agency for a particular task presenting proposals that were then critiqued by the wider group, leading to a decision. This relied heavily on professional judgement, based on the creative expertise (the company head also had a design background) and the deep industry knowledge of the designers, who worked in a very collegiate manner. It is within this context that the research was conducted. This entailed setting up an on-line survey of the proposed designs, using techniques drawn from research in neuroscience and psychology. Designs or features of designs would be 'tested' using these survey tools and the statistical analysis of the results would be used to either validate or raise questions on the design proposals.

The Research Assistant decided to attend all of the weekly design meetings in person to present the analysis and play an active role in the design process, as shown in Fig. 5.7. It was clear that the design team quickly came to value the researcher's input (the HBF and all three DALs were interviewed) and saw it as complementing the designers' input rather than posing a threat to it. Over the course of the project the research became an embedded part of the design process, which was adjusted so that it could be used in a more targeted manner. The company was keen to explore further extension to the collaboration, whilst at the same time the University team were

planning to use the huge amount of data it had generated for further academic analysis.

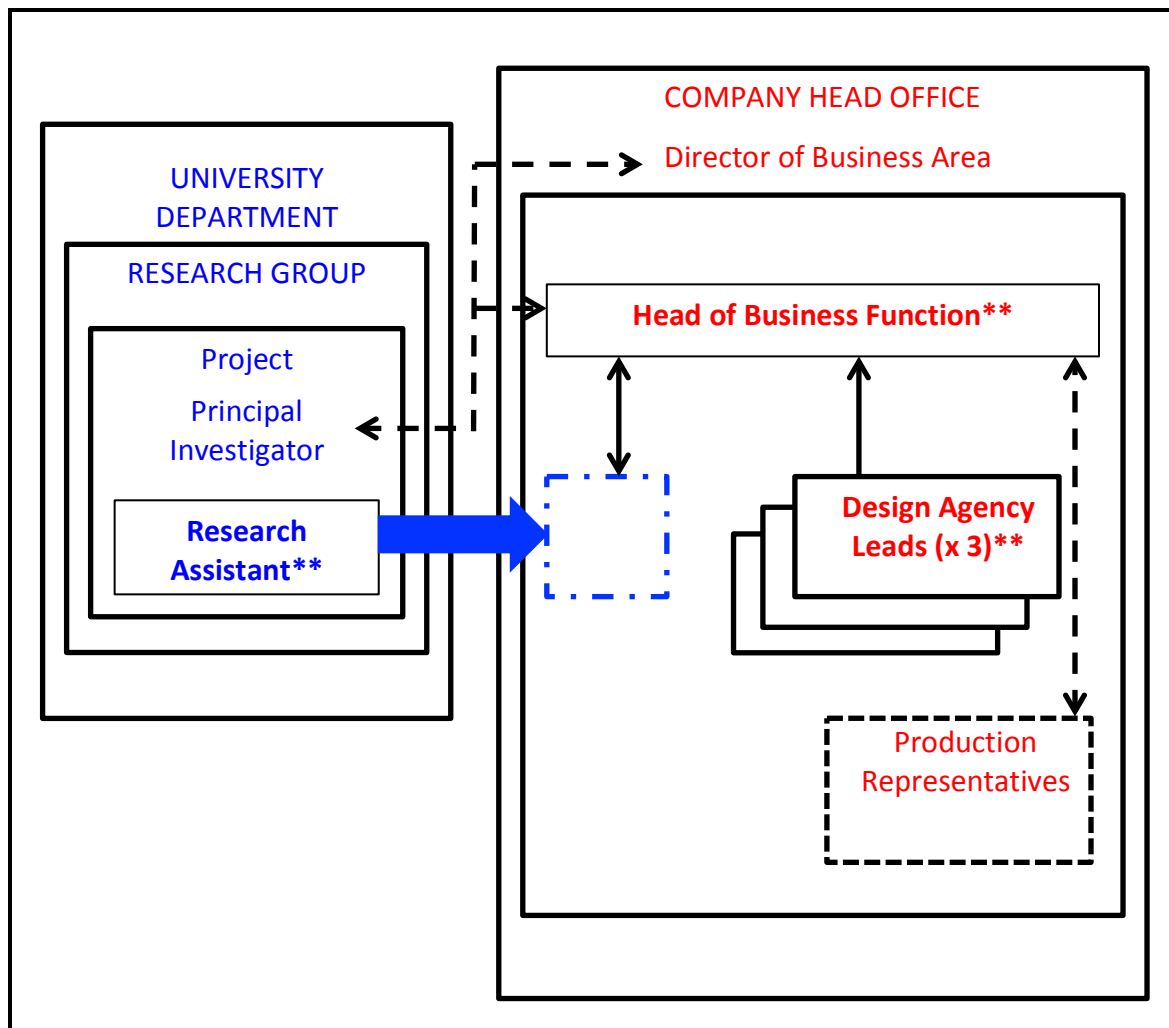


Figure 5.7: Organisation Chart for Case Study Med 1: Product Packaging Design

5.10 Case Study Med 2: Drug Development

This case study provided an insight into a very large (international) public-private partnership in which the University Laboratory plays a leading role. The partnership aimed to increase the discovery and speed of development of new drugs by harnessing the unique capabilities of university research centres with pharmaceutical (pharma) companies and other funding partners, augmented by a large number of collaborations with other bodies outside the partnership. At the heart of the

partnership model was the principle of '*open science*' in that the results of the early stage research achieved through the partnership (primarily university centres working with pharma companies) were published so that there was completely open access to findings. The thinking behind this was that it pushed back the competitive barrier to later in the process, meaning that all would benefit from both positive and negative results: positive results could be worked on further by others and better understood whereas negative results would save time and resources that others could otherwise have spent reaching the same dead end.

For pharma companies, entering into such an agreement in a highly competitive industry in which drug development is historically highly secretive, long-term and expensive, was a very deliberate calculation but one that increasing numbers of companies concluded had clear net benefits, as reflected in the growing number of partners. In return for funding, partners could specify a defined number of research targets that they wished to work on (which in turn determined which particular university they collaborated with for each, reflecting their areas of expertise) and would be given a seat on the Board to influence the strategic direction of the partnership.

Within such a large collaboration the interrelationships were complex, working with multiple partners at a number of levels simultaneously and therefore any attempt to capture this fully would be beyond the scope of this research. However, I was keen to explore the nature of such relationships and the extent to which they were important in the achievement of productive partnerships in an area that dealt exclusively in 'hard science'. Exploratory meetings with the Chief Scientist and a number of the researchers led to the establishment of an illustrative case study

drawing on a very experienced ‘*Principal Investigator*’ (PI) and a ‘*Director of Research Coordination*’ (DRC) within a partner pharma company. The relationship between the PI and the DRC within the context of the international public-private partnership is represented in Fig. 5.8.

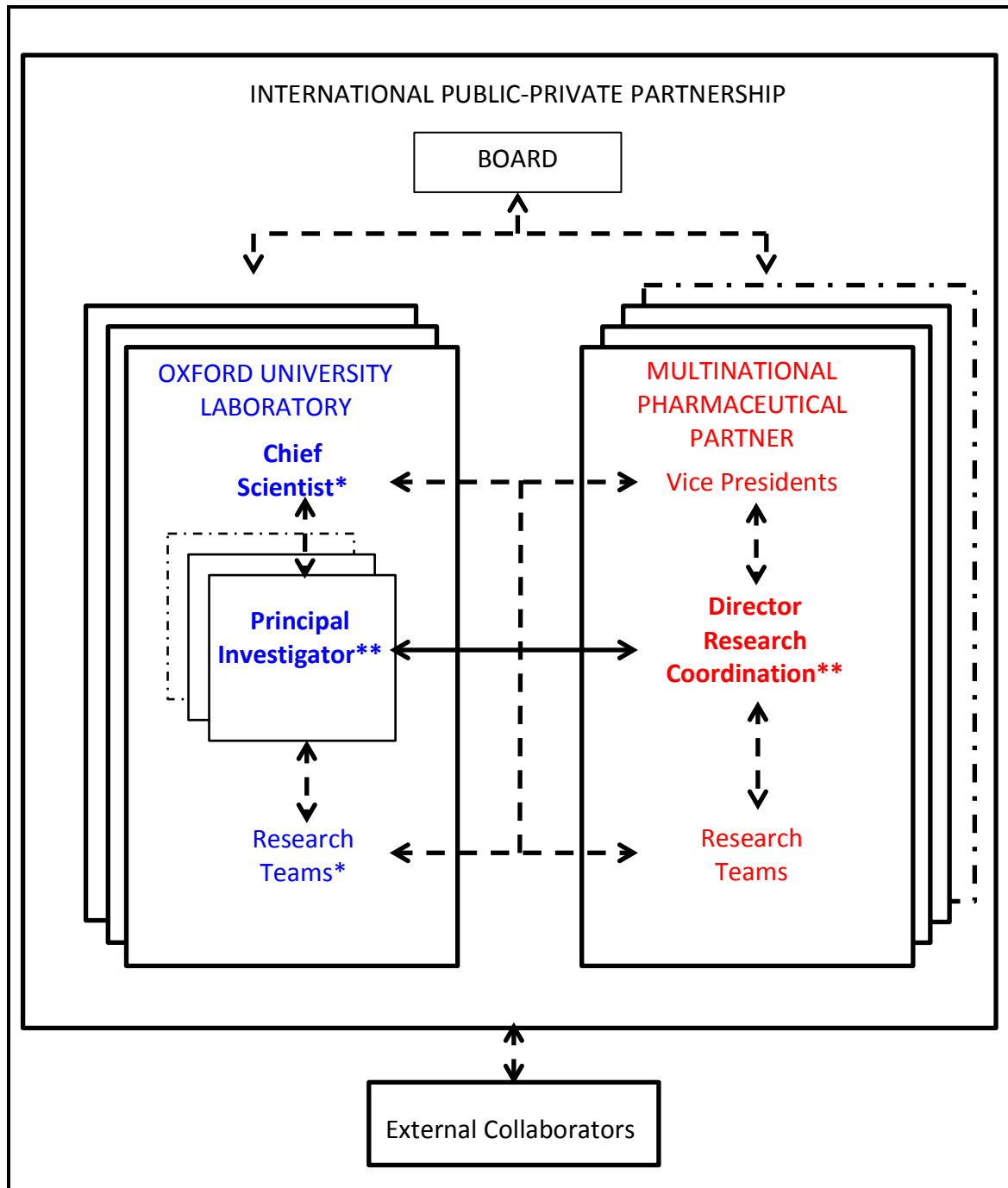


Figure 5.8: Organisation Chart for Case Study Med 2: Drug Development

As well as heading up a research group, the PI also had a wider role in developing and supporting the relationships with partner companies at all levels and so offered a very rich perspective for the purposes of this research. The DRC in the partner company had a research scientist background but had moved into a position of coordinating relationships between the company and multiple partners, including the University team, which included engagement with the PI. Interviews with these two experienced research coordinators thus provided a very useful insight into collaborative relationships within this partnership.

In conducting this case study it became very clear that relationship management was vitally important in attracting and retaining partners within the partnership. The PI was acutely aware of this and illustrated how the Laboratory team went to great lengths to nurture and maintain partnerships over the longer term. It was also clear from discussion with the DRC that from the perspective of this particular pharma company, it did so very effectively. The processes involved in this and the particular challenges of gauging the success of the collaboration to the pharma companies are discussed extensively in subsequent chapters.

5.11 Case Study Soc Sc 1: Developing an Economic Model for Business

This case study looked at a contracted partnership between a large multinational company and the University, centred on a Department within the Social Sciences Division. More specifically, the University's partnership was with the Company's Think Tank, which had been set up to challenge the business's thinking, supported by active experimentation. The Think Tank had been working on the development of an alternative economic model for business for some years in the belief that this could provide additional value to the company, wider stakeholders, and other businesses

alike. A key aspiration in approaching the University, therefore, was to develop this thinking into a more robust concept or theory, through research backed up with case studies to demonstrate its effectiveness. In tandem with this it also aimed to promote this thinking through its inclusion on University-hosted educational programmes and business forums. The main focus of the case study was on the research strand.

The think tank's Managing Director and a very senior Principal Investigator (PI) from within the Department had been instrumental in setting up the five-year partnership and at the time of the interviews it was in its fourth year. Whilst the PI headed up the project within the Department, a '*Project Manager*' (PM), a senior postdoctoral researcher, led the day-to-day running of the University team. These were all early career '*Postdoctoral Researchers*' (two of whom were interviewed), although some also worked in partnership with senior academics located more widely within or outside the University. In addition, a '*Research Manager*' from the Think Tank was placed within the project team in the University. The Think Tank's Managing Director and its '*Research Director*' were both based overseas (the latter was interviewed when on a liaison visit to the Department), as were their research staff, but both played an active part in the partnership and maintained close links with the University-based project team, particularly the PI and PM. These relationships are shown in Fig. 5.9.

Overall, the partnership continued to produce positive outputs but the development of the research stream had presented collaborative challenges for both parties. These are captured in the event-state network, but in outline the Think Tank found difficulty initially in collaborating with senior academics and so a change of approach was agreed to reflect the structure found at the time of the interviews. This

consisted of a number of agreed work strands in which a postdoctoral researcher (in some cases working with a more senior academic) was paired with a Think Tank researcher. This too had presented challenges in some areas, leading to the agreed partial separation of some activities. Partly as a result, but also because the focus of interest of the Think Tank became clearer over time, it decided to reduce the workstreams to those that it saw as providing most utility (this change was pending at the time of the interviews). The educational course and business forum strands, on the other hand, were developed very successfully and relatively easily.

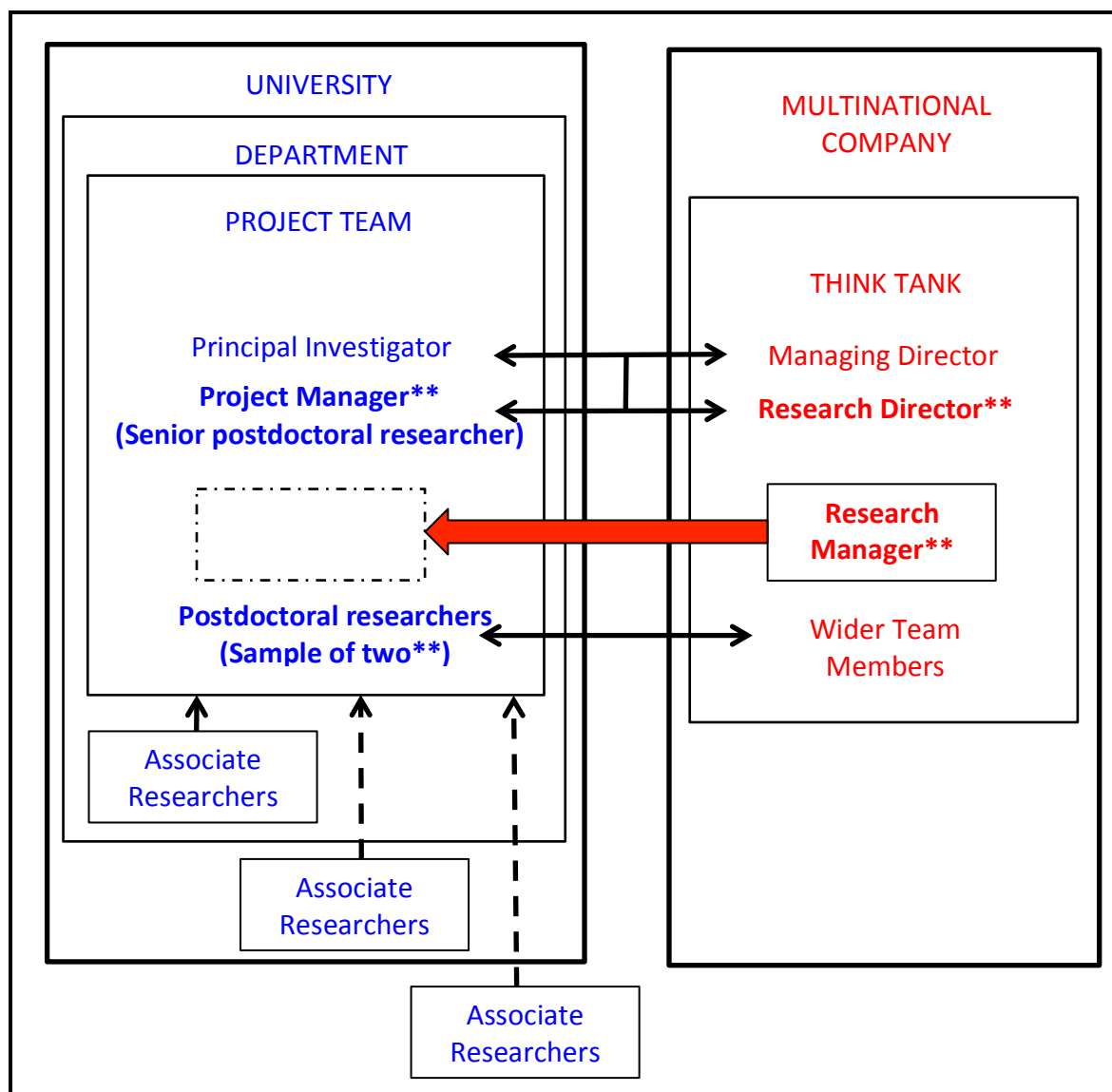


Figure 5.9: Case Study Soc Sc 1: Developing an Economic Model for Business

A full evaluation and review would be expected towards the end of the five-year contract but the challenges presented in developing the research strand of this collaboration provide some interesting issues for analysis.

5.12 Case Study Soc Sc 2: Evaluating Smart Energy Applications

This case study focused on a University team's involvement in a large publicly funded programme that supported the development of more efficient energy use through a number of projects. The University team worked within one such project, which was intended to demonstrate the potential for smarter energy usage enabled by new technology incorporated into heating systems.

The project aimed to install and trial the innovative heating technology system in homes across three participating European countries. Whilst the project reported to the Project Officer within the large inter-governmental executive body (the funding organisation), it was industry-led with participant companies from across manufacturing, energy and technology sectors in each country. It also involved a number of other European universities that offered particular expertise in other aspects of the project. The small University research team, led by the '*Principal Investigator*' (PI), and supported by a '*Co-Investigator*' (CI), was tasked to conduct a Customer Impact Study (CIS) to inform the evaluation of the project. This required very close collaboration with other participants since the data (usage data, customer surveys and interviews) had to be collected through the energy companies and the lead equipment manufacturer provided the project management. For the purposes of this case study, the focus was largely centred on activity in one particular country, for which the '*Company Programme Manager*' of the Energy Company was interviewed,

as well as the '*Project Director*' and '*Project Coordinator*' from the lead equipment manufacturer. Although not directly involved in the project, the '*Rapporteur*' who looked at customer engagement issues across the wider Inter-Governmental Executive Body's programme, added a very useful strategic perspective. The complexities of the relationships can be seen in Fig 5.10.

At the start of the project the industry participants were very focused on the technology, particularly as there were teething problems in getting the systems into operation, and customer details were poorly recorded as they were enrolled onto the pilot schemes. The researchers found it difficult to gain the support they needed to generate robust customer survey and interview data, and the long delay in making the system operational meant that there was only a very limited run of customer usage data available. Realising that the customer data alone would be inadequate the PI and CI persuaded the companies to support them in extending the study to 'middle and senior actors' such as installers and managers, having by this stage developed stronger relationships with them. This gave a much fuller picture of the challenges of introducing innovation in the area of the human-technology interface (requiring consideration of the whole socio-technical system).

In view of the delay in getting the system running, with its attendant customer challenges, the PD and industrial participants came to realise that this should be the key deliverable and so the production of the report latterly became the focus of the project. Consequently, the PD and industrial partners were keen to ensure that it was presented as positively as possible to show how it supported the set objectives but also avoided any criticism that could create reputational damage.

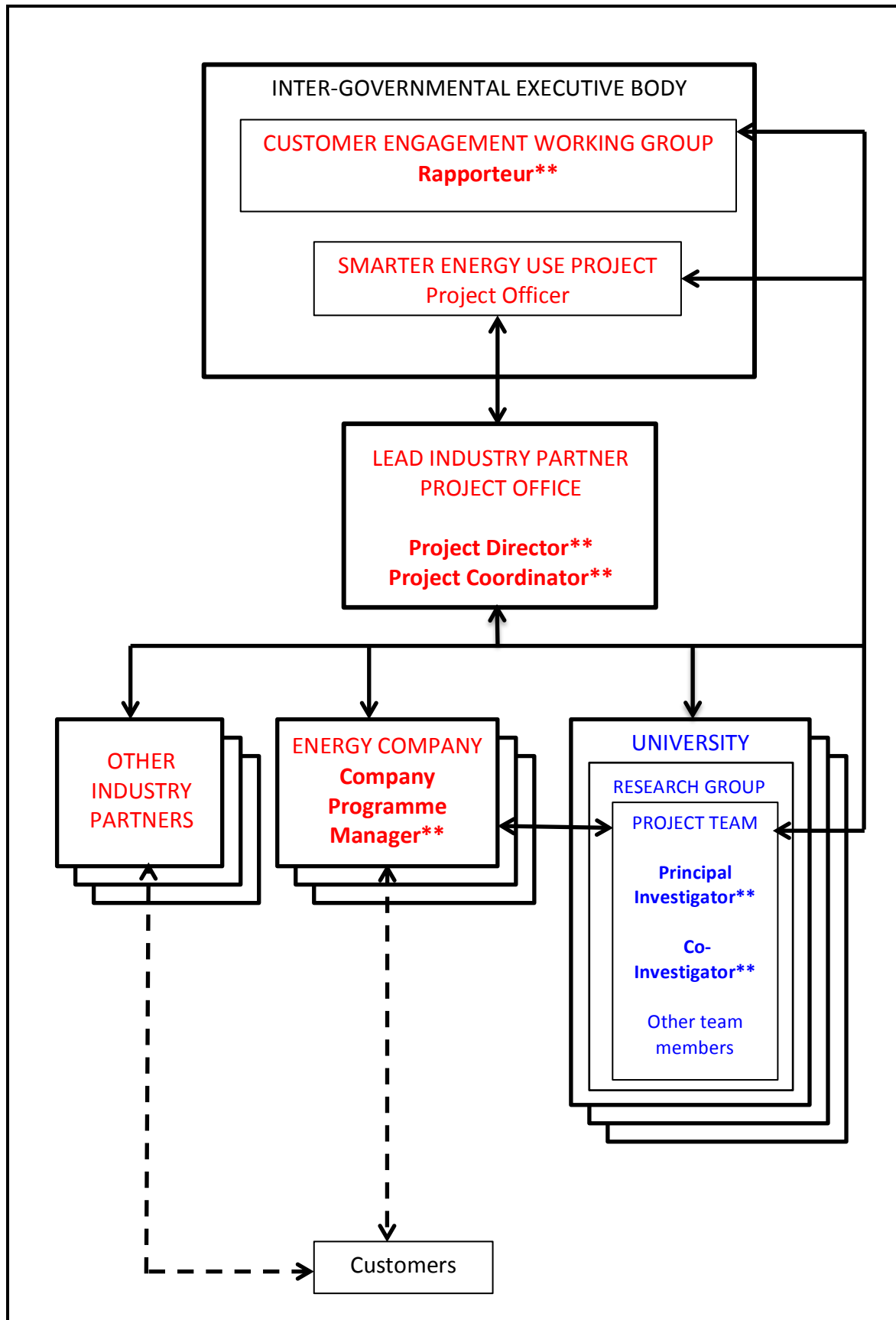


Figure 5.10: Organisation Chart for Case Study Soc Sc 2: Evaluating Smart Energy Applications

The belated focus of the business partners on the report meant that the University participants were constrained in what could be included in its content and they were concerned that some valuable lessons could be lost but in the event it was very well received by the Inter-Governmental Executive Body's Project Officer. They decided that they would instead capture some of the wider methodological lessons in a separate publication.

These brief case study vignettes and their accompanying organisation charts provide the necessary orientation for the progressively deeper analysis that will follow in the subsequent chapters. These chapters present a combination of deeper within-case analysis with cross-case analysis to support the arguments made in answering the research questions. To begin with, the next chapter sets out an analysis of the key interactions, presented in a temporal format according to successive stages of collaborative development.

CHAPTER 6: THE EFFECT OF INTERACTIONS BETWEEN INDIVIDUALS AND ORGANISATIONS ON LEARNING WITHIN UNIVERSITY-BUSINESS COLLABORATIONS

6.1 Introduction

Marchington and Vincent (2004) were critical of the way that much of the earlier literature on inter-organisational relationships treated organisations as discrete and homogenous entities, assuming that they were clearly bounded and that their higher-level management strategies were reflected at all levels. This, they suggested, was inevitable given the preponderance of methodological approaches that use single-point survey sampling to illicit data from organisations. They argued that the reality is far more complex and yet within the literature *“there is virtually no discussion of the processes that characterize interpersonal relations within and between organizations”* (ibid, p.1034). Moreover, they emphasised the importance of linkages formed at lower levels and in particular their role in building trust with partners through demonstrating commitment to the agreement entered into at a higher level.

Marchington and Vincent (ibid) also underline the important role of boundary spanners in forging linkages across the organisations, thereby making organisational boundaries far more porous than is implied in some research, concluding that *“patterns of inter-organizational relations can only be properly understood if account is taken of the ways in which institutional, organizational and interpersonal forces (re)shape them over time”* (pp.1037-8). This can be broken down to highlight two important features of inter-organisational relationships. The first is that the forces shaping the inter-organisational activities are driven from multiple levels, including, it should be added, from the external environment. The second is that these may vary and interact over time (shaping and reshaping), thus creating dynamic changes to the

relationship. Both of these features have been reflected in the methodological approach to this project, as discussed in Chapter 4, and will be further reflected in the method of analysis adopted in this chapter.

This research deliberately sought the perspectives of both university and business stakeholders to inform a better understanding of learning through university-business collaborations. The extensive data that was collected has been subjected to multiple manipulations and analytical techniques described in the methodology chapter (Chapter 4, Section 4.6) to enable a comprehensive understanding of each case study, as summarised in the short vignettes in Chapter 5 and the accompanying event-state networks at Appendix 4. Within-case and cross-case analyses have been used to identify the key interactive processes that appear to affect learning and these are set out in this chapter. The focus here is to draw on the data itself to highlight a number of significant inter-relationships that will lead to some preliminary propositions. The next chapter will then draw more heavily on theory to analyse and test these in order to provide deeper understanding.

The 10 case studies are extremely varied (see Sections 4.4.2 and 4.4.3 and Figure 4.2) and so it was necessary to both construct and dissect each according to common variables that help to inform how the learning has been shaped, and at the same time provide a useful basis for comparability. These variables were time and the level within the collaboration (individual, organisational and inter-organisational) at which influences were acting. In examining how processes interacted between levels, this chapter is structured according to the three time-related phases used: *prior engagement*, *set up/initiation* and *delivery* phases. The fourth phase, *outcomes*, will

be discussed more specifically in subsequent chapters and will provide the focus for Chapter 8.

6.2 Prior Engagement Processes

Whilst prior engagement activities varied across the case studies, it was possible to identify some fundamental processes that had a major influence on the ability of university staff to engage external organisations effectively, leading to collaborative relationships. Some of these may seem obvious but they are in need of re-framing in terms of how they can set the basis for establishing realistic learning aspirations to the satisfaction of all parties.

6.2.1 *Purposeful Networking*

Perhaps the most commonly used methods of networking for many academics are attending events such as conferences, meetings and workshops. Such activities serve a number of purposes but the case study evidence suggests that where individuals attend with the specific intention of identifying collaborative opportunities, a more purposeful approach can be taken to support this. This was well illustrated by the Knowledge Exchange Fellow (KEF) in case studies MPLS 1, 2 and 3, whilst undertaking a three-year fellowship aimed at increasing business engagement in conservation science. For the KEF, these events were seen as an opportunity to understand the real-world context (events targeted had a mix of attendees) and, specifically, the position of other stakeholders.

By actively analysing the current environment through such meetings, the KEF was able to identify a problem (or learning opportunity) of relevance to external stakeholders: in this instance the current science was not being applied effectively in efforts to engage or assist businesses in conducting conservation activities. At

subsequent events the KEF began to actively highlight and raise awareness of this, whilst at the same time making clear a willingness to work with others to tackle it. This approach raised the KEF's profile within this community and provided a more focused and directly influential basis for engaging the other attendees, leading to a number of bilateral discussions. Specifically, it led to a series of purposeful exchanges with the Project Officer from an International Organisation in MPLS 2, which later drew in the Project Manager's Deputy Director, leading to the three of them developing a successful collaboration.

Another case study demonstrated that the benefits of purposeful networking might not always be immediate. In this, the KEF had a similar encounter with a Project Manager (PM) from within a Government conservation agency. They discussed which areas they were working in and *"where the crossover was, where the distinctions are, so we've had that from Day One, that was our outset conversation really. So I've always been very confident in [KEF's] ability..."* (PM, MPLS 3). This established a good network relationship based on mutual understanding and shared motivations. It followed that when the KEF saw an opportunity to bid for funding for an intern placement in business, to work on a specific conservation project, the KEF contacted the PM and they agreed to work up a joint proposal, which they were able to produce quickly. Furthermore, the KEF was also able to readily identify a strong candidate to fill the project intern post: a late stage doctoral student who had been introduced to KEF by a senior academic after they met at a conference. Soon after, the KEF had taken the trouble to follow up and discuss their respective interests and areas of expertise and they had agreed to keep in touch. It was only by cultivating these networked contacts, through purposeful exchanges, that the KEF was able to respond so quickly in

pulling a small team together to construct a successful bid that then developed into a successful collaboration.

Networking, therefore, has to be regarded as an essential preparatory activity for entering into collaborations; academics need to ensure that their networking extends to events and activities where wider stakeholders (other than just other academics) are engaged. A proactive approach can be seen to greatly increase the ability to initiate engagements or respond to opportunities and that can be increased even further through capacity building, as discussed below.

6.2.2 *Capability Building*

It might be considered that developing a network of contacts should be seen more appropriately as developing a network of potential collaborators. More complex or larger collaborations needed a range of capabilities or entailed a volume of work that required teams rather than individuals to meet business needs and so the ability to respond to collaborative opportunities depended on the ability to pull together a team with the relevant expertise quickly. Whilst these capabilities could be based around research groups or departments, they often needed to be augmented, as was found in case study Med 2. Here the research group occasionally reached out for support to colleagues across the wider Medical Sciences Division if a pharmaceutical partner had queries beyond its immediate expertise. In other cases wider capabilities could only be achieved in conjunction with close partners. For example, in case study MPLS 5, a software development expert who worked in the partner charity with one of the two academics (the Research Associate) complemented their scientific expertise. This enabled them to offer the specific capabilities for a successful contract research bid that they would otherwise have been unable to deliver. Taking this further, it was

clear that the very specific technology offered by the research team in case study MPLS 4 ('heat maps' of satellite imagery showing specific disaster-related criteria) was entirely dependent on the support of its external partners: the company that provided the satellite imagery and the crowd-sourcing organisation that analysed the images in detail. The successful management of these bilateral relationships was thus critical to the research group's ability to develop the collaboration with the charity.

Whether it is at individual or organisational level, these brief examples show that the creation or successful development of collaborations often depends on the ability to draw in resources when needed. It is also clear that these additional capabilities were based on relationships established in advance of when needed, rather than on a purely responsive basis. This suggests that the development and maintenance of this network of potential co-workers in future collaborations should be regarded as a continuous process, informed by analysis of the changing context of the environments in which collaborations are sought. This is particularly important in areas where academics are considering bids for large grants, such as those that support major Government initiatives like the Industrial Strategy Challenge Fund.⁴⁴

6.2.3 *Demonstrating Capabilities*

A number of case studies showed that it was sometimes necessary to undertake prolonged engagement with an organisation before it decided to commit to collaborative activity. In two particular cases the tipping point was when the University was able to demonstrate the practical utility of their capabilities to the organisation it was engaged with. In the first, case study MPLS 4, the Principal Investigator (PI) of the research group had been working alongside the Charity (that

⁴⁴ Further details can be found at <https://www.gov.uk/government/collections/industrial-strategy-challenge-fund-joint-research-and-innovation>

eventually became the collaborating partner in this case study) in a number of activities run by third parties. The technology that the PI was trying to develop (using machine learning to support disaster management applications) was limited by a lack of feedback from ground operatives, which meant that the underpinning algorithms were too crude. The Charity's personnel were also involved in these activities to feed in an operative perspective but there was little direct collaboration between the two parties: the PI suspected that the charity doubted the technology had practical potential at that stage. However, when the researchers were invited to trial the technology in a real-time disaster (in support of the UN) the PI asked the Charity CEO to collaborate. The initial response was that *"now is not the time for science"* but the PI laid out the key capabilities they could provide, such as detection of floods, settlements and damaged buildings. The CEO was eventually persuaded to collaborate directly and in so doing provided the feedback that was needed. This enabled the researchers to very quickly improve the effectiveness of the technology, which was used for a number of useful tasks but a notable success was the identification of a village that could not be detected by other means, leading to an operational response on the ground (the village was found to need assistance). This demonstrated its utility directly to the Charity and built sufficient confidence and trust with the CEO to continue their close collaboration.

In the second example, a member of the Humanities Division (who later became the *'Academic Project Manager'*, APM, in case study Hum 1) first encountered the senior representative of the organisation that later entered into a formal collaboration (this person became the *'Organisational Sponsor'*, OS) when running a regional heritage initiative. The OS could see some potential in the initiative but felt

that it did not provide sufficient utility to the Organisation and so engaged in discussions with APM to develop a more bespoke initiative that might be of more use. The resulting interventions by a team of historians brought in by APM to tackle an interpretative issue at a historic property were seen as a great success by the OS and senior managers within the Organisation:

“It was brilliant, it freed the shackles of thinking because our curator didn’t have the knowledge that the academics did”. (Organisational Sponsor, Heritage Charity, case study Hum 1)

This provided the impetus to both the Organisation and the University to develop further collaborative options, resulting in the formal Knowledge Transfer Partnership, in case study Hum 1.

These examples show how the University sometimes needed to persist in building relationships with organisations over several months or longer, to reach the point at which they were willing to commit. A practical demonstration of the University’s ability to provide utility or add value to a potential partner was shown to be highly influential in gaining commitment, although it is recognised that this may not always be appropriate or practicable.

6.2.4 *Building a Mutual Understanding of Capabilities and Motivations*

Leading on from the points discussed so far, it became increasingly clear that the extent to which University staff developed a mutual understanding with their prospective collaborator (at both organisational and individual level) prior to commencing the collaboration, could have a significant influence on how it subsequently developed. This seemed to be particularly important where new collaborations were being jointly constructed. Opportunities to pursue this in other circumstances could be more restricted, in terms of timeframe or access, such as when

bidding for contract research, but in these cases it seemed important nonetheless to pursue this at the set up and initiation stage.

Whilst a practical demonstration of capabilities was not a viable option for the KEF in case study MPLS 2, an extended period of building collaborative understanding between the partners was seen to have clear benefits. The KEF had discussions with the eventual collaborators over several months (these included a visit to their offices in mainland Europe), during which they identified areas of mutual interest, shared perspectives and exchanged knowledge to frame their collective understanding of them:

“We had to work for a couple of weeks on a concept note together and it was real good to do that: what’s the context, why is this a problem, what are our objectives and what will the key concepts be?” (Knowledge Exchange Fellow, case study MPLS 2)

This enabled them to converge on an issue that both parties felt needed to be addressed through a project that would result in high impact and thereby further their own goals. In addition, these exchanges allowed each party to gain an understanding of the other’s prior learning and experience and how that would shape how they worked together. During this process it also became clear that neither had the ability to tackle the project alone but that by combining their complementary capabilities (KEF’s scientific knowledge and the International Organisation’s large networks of businesses and Non-Governmental Organisations) they could take it forward. As a result, they not only established agreed goals but also gained a clear understanding of each other’s capabilities and wider learning aspirations. Moreover, they established close personal as well as professional relationships and were confident that they would work well together as a team towards their agreed goals. Both participants in

this case study emphasised how important this was in generating their enthusiasm and strong commitment to the project.

6.2.5 *Developing Empathy with Partner Positions*

During the fieldwork interviews, each participant's explanation of the nature of their business and their position and role within it was always extremely useful in providing context for the subsequent discussion on the development of the collaboration.

Whilst these aspects could be seen to have a direct bearing on their approach, it became apparent that this had not always been fully appreciated by one or other partner from the outset, suggesting that in such cases there was a lack of empathy with partner positions. This sometimes led to unrealistic expectations and misunderstandings that then had to be addressed later. For example, in case studies Soc Sc 1 and Soc Sc 2 tensions arose when the University teams wanted to publish aspects of research conducted during the collaborations that reported critical findings, which cast the organisations to which their collaborating partners belonged in a negative light. Whilst the researchers regarded this as impartial critical analysis, in accordance with good research practice, the collaborating partners objected strongly to this. In both cases the collaborating partners saw such actions as threats that could have a negative impact on their businesses' reputation, potentially with commercial implications. Furthermore, any negative connotations could reflect badly on themselves within their parent companies, as collaborative participants or leads.

For the researchers this then raised issues relating to research ethics and academic freedom and so there were tensions on both sides. In some cases researchers were aware that their reports were unlikely to be well received and saw this as an issue to be tackled later but this was only ever going to make the issue

harder to resolve to the satisfaction of all parties, once the work had been undertaken. This suggests that entering into collaborative activities without resolving an agreed way forward on the scope and nature of report findings risks losing trust and so undermining the effectiveness of collaborative relationships at a later stage.

It could be argued that academics have an ethical responsibility to empathise with business collaborators in considering the impact of their work on them before deciding on the content and form of publication of written outputs in relation to the collaboration. On the other hand, Perkmann *et al* (2012) point out that businesses need to be equally adept at initiating and maintaining collaborations with universities and should be aware of the “distinct challenges” this brings. They go on to suggest *“particularly when collaborating with the best researchers, firms need to take into account that these academics will under most circumstances only work with them if there is some academic benefit to be derived”* (p.433). However, the examples that will be discussed throughout this chapter show that there can be considerable flexibility in how academic benefits are sought and this point will be developed further in Chapter 8 when considering learning outcomes. Nonetheless, empathy with partners, at both individual and organisational level, is required to understand where such flexibility may be needed.

Whilst some key facets have been identified here, many participants referred more generally to the importance of *relationship* building. For example, in case study Med 2 it was particularly important for the Laboratory, as part of a large public-private partnership, to build relationships with senior staff in prospective partner organisations. The PI described this as *“critical because the collaboration can’t start until the relationship is very firm”*. However, it was also clear that the process of

building collaborative understanding and an empathy with partners needed to continue throughout the collaboration itself and further aspects of this will be discussed in the following sections.

6.2.6 *The Influence of Reputation*

Closely connected to the previous section, the influence of reputation was widely apparent across a number of case studies, although it varied as to how and when. In the prior engagement phase the issue was most commonly related to the influence of the University's reputation on business behaviour rather than *vice versa*. Given the University of Oxford's world-class reputation⁴⁵ as an academic institution this might seem unsurprising where businesses were seeking an academic partner but the reality was more nuanced. In some cases it was clear that organisations were interested in working with the University because of its reputation, while the focus for that reputational attraction ranged from the institutional down to the individual. For example, in case study Soc Sc 1 the collaborating organisation was keen to leverage the University's reputation to enhance the credibility of the conceptual model it wished to co-develop and to take advantage of the University's convening power in using it as a platform to promote this through courses and business conferences. By contrast, in case study Med 2 access to the University's pool of knowledge and expertise among high quality researchers and clinicians, in addition to extensive facilities and resources (such as tissue samples) across the Medical Sciences represented a major attraction to its partners. So whilst there were strong

⁴⁵ At the time of writing the *Times Higher Educational Supplement* had recently placed the University of Oxford first in its World University Rankings (2021) for the fifth year in a row (see https://www.timeshighereducation.com/world-university-rankings/2021/world-ranking#!/page/0/length/25/sort_by/rank/sort_order/asc/cols/stats).

reputational influences at both University and Partnership levels, the University could also be seen as a very high calibre learning resource. Notwithstanding the influence of the University's reputation, in some cases individual academics were engaged by businesses because of their personal reputation in a field of particular interest, such as the Principal Investigators in case studies Med 1 and Soc Sc 2.

It was also very clear, however, that reputation was very much in the eye of the beholder, rather than universal. For some organisations or individuals the highly academic reputation could have more negative connotations, such as an expectation of a lack of practicality like the PI encountered in case study MPLS 4 (discussed in Section 5.2.3). Fortunately, this view changed quickly when the practical application of the technology was demonstrated. Moreover, the Co-Sponsor of the project in case study MPLS 5 provided a more balanced assessment of the value of reputation when discussing Oxford's tender bid:

"Of course you have to assume they are capable because of that irrefutable academic background. If it had been an organisation, a charity or someone that didn't have that backstory then it would be harder to be as assured about the ability to follow through and to deliver and to bring that expertise..."

However, this was qualified,

"If (the Postdoctoral Researcher, PR) had put (PR's) CV forward and there had been nothing of relevance there it wouldn't have mattered a jot whether (PR) was from Oxford University or wherever, so clearly (PR) had the expertise, they both did. And that's what scored highly; I think the affiliation with Oxford University was nice to have on the edge but actually they didn't need to"
(Co-Sponsor, Government Agency, case study MPLS 5).

The Government Agencies that tendered the contract for this work had a very specific requirement that needed to be met within a tight timeframe and so it was clear why the University's reputation was regarded as very much secondary to proven expertise and experience. In this respect, the reputation of the research team was recognised

only in as far as they were invited to bid, but it was the quality of their comprehensive bid, laying out exactly how they proposed to utilise their expertise and experience to tackle the project that won them the contract.

As the PI in case study Med 2 pointed out, any reputational advantage with a business could quickly evaporate with a change of key personnel and it was explained that this was particularly the case at the senior (Vice President) level. This might be because an incoming individual had negative views of the operating model (in the Med 2 case not everyone in the pharmaceutical sector supported the partnership's abiding '*open science*' principle of publishing findings) or may simply have had a less positive experience of the partnership in another company. Consequently, the University Laboratory had to be acutely attuned to such changes of key personnel, even in the prior engagement phase, which could be lengthy. When key changes did occur the senior team from the University Laboratory team would seek to engage with the new incumbent as soon as possible and brief them on the on-going success and future potential of the partnership.

These illustrations show how the influence of reputation on the formation of collaborative relationships is variable and transient. This suggests it would certainly be ill advised for University staff to make broad assumptions of its affect and instead seek to understand its impact on a case-by-case basis and respond accordingly.

6.3 Set Up and Initiation Phase

Once the decision to collaborate has been reached there are some major considerations to be addressed. It was clear from the case studies that the extent to which this was achieved had a very strong bearing on the subsequent development of the collaborations and so they merit close attention but in practice time pressures or

an overwhelming desire to 'get on with it' sometimes meant that this was not always the case. These are again dealt with thematically, drawing on evidence from the case studies as appropriate.

6.3.1 *Agreeing Common Learning Goals*

Agreeing common learning goals that accommodated the learning aspirations of each partner at the set up and initiation stage put collaborations on the best footing for development, even if these goals subsequently changed during the course of implementation. This may seem obvious but it was often not achieved and this created problems later. A possible reason for not giving this aspect adequate attention may have been that where formal agreements were put in place they were assumed to be sufficient in themselves. Out of the 10 collaborations in this study, eight were subject to formal agreements drawn up between the parties or with a third party sponsor in case studies Hum 1, MPLS 3 and Soc Sc 2. All but one of these involved funding transactions and so they were contractual in nature, whereas in case study MPLS 2 the two parties simply formalised their mutual commitment through a Memorandum of Understanding. Only in case studies MPLS 1 and MPLS 4 were there no such agreements.

Contractual agreements were clearly a necessity where the commitment of funds is involved and when other aspects need to be formally agreed, such as confidentiality or intellectual property rights. They typically capture the agreed deliverables between the parties and are therefore explicit, bounded, and time limited, normally with an emphasis on the benefits to the contracting organisation. However, it was apparent that on their own these were often not adequate to ensure that the learning aspirations of all parties (and at all levels) were compatible or

mutually supported and in some cases they were seen to actually constrain the learning outcomes. This was illustrated in case study Soc Sc 1 where, despite the umbrella of a formal five-year partnership agreement, tensions arising from the differing learning aspirations of the University and business participants persisted into Year 4 of a five-year partnership. On the one hand, the business organisation was very keen to reinforce its conceptual model through co-developed research, in part by making use of the data it had already gathered and then wished to co-author the resulting publications with the academics. The (mainly early career) academics, on the other hand, were keen to protect their academic freedoms in terms of conducting independent research that would meet the rigorous academic requirements of leading peer-reviewed journals and being able to challenge the business's conceptual proposals, if supported by the findings. This was far from what the business envisaged and led to subsequent changes in approach, as shown in this case study's event-state network at Appendix 4. However, if these fundamentally different perspectives had been brought to the surface and worked through at the start it might have been possible to agree common learning goals that met the aspirations of both parties, perhaps through a mixed portfolio of activities which included both co-developed and independently researched activities. This is where the partnership eventually moved to, but only after working through prolonged challenges.

By contrast, Case Study Hum 1 shows how contractual agreements that only cover learning aspirations to a limited extent do not have to be problematic, as long as the wider aspirations of the partner organisations are closely aligned. The specific objectives of the Knowledge Transfer Partnership, whilst jointly drawn up and genuinely desirable, were seen by both parties as simply a catalyst for more strategic

learning aspirations; the Organisation hoped that they would support a culture change towards greater emphasis on research and education in support of cultural and historical understanding. As the Organisational Project Manager (OPM) put it, they “*set out, by doing something locally, to show what good looked like*”. On the University side, the Humanities Division wanted to learn how to develop collaborative relationships within the heritage sector, so these learning aspirations were broadly aligned. Moreover, the recruiting of an industrious and proactive Project Officer with strong experience of working in the heritage sector and a commitment to collaborative work ensured that this key individual was also closely aligned to these wider aspirations. Others directly involved in the project (from both the University and the Organisation) were similarly highly committed to these wider aspirations and so there was strong alignment at individual as well as organisational level. Consequently, both parties pursued agreed learning goals from the start and this was reflected in how the project was subsequently designed and managed.

6.3.2 *Negotiating Different Cultures and Priorities*

Even when contractual agreements included objectives that appeared to cover key learning aspirations this did not always mean that partners wholeheartedly supported them. This was evident in case study Soc Sc 2 where the University team encountered significant difficulties in initiating the data collection for the Customer Impact Study that it was specifically tasked to conduct as part of a wider project to demonstrate the viability of a new energy system. In the early stages, the commercial partners were strongly focused on the technical system and making it work, whilst their support to the University’s part of the project was poor, leading to delays, inadequate capture of customer data, and the provision of poor quality survey data that was of limited value

to the academics, as shown in the corresponding event-state network at Appendix 4, Part X. It was only later in the project, when the commercial partners realised the importance of the customer impact study that they stepped up their support to the University team.

This project was unusual and particularly challenging in that it was a multi partner project with a commercial lead and the University team was acting in a precarious supporting role but one that was ultimately very important (not least because they drafted the final report) as the other partners ultimately came to realise. The Energy Company's Project Manager (CPM) conceded that the amount of resource and time needed to support the University's objectives had been underestimated and that it was challenging to address these once the project had begun. On the other hand, the Project Director (from another commercial company) reflected that the University staff needed to have adopted a more assertive approach that was culturally more attuned to commercial practices than academic ones, to have ensured that their objectives were more fully supported from the start. This illustrates how partners may have very differing interpretations of objectives and of how they should be pursued, underlining that if common learning goals are not agreed at the set up and initiation stage they can quickly diverge. More generally, top-down multi-partner projects appear to be especially vulnerable to this. In such cases it is particularly important that a phase is managed into the start of the project where the main requirements of each party are identified and made clear to all, including the support needed from others to achieve their goals.

Despite the challenges of relying on contractual objectives experienced in the above case, other case studies showed that they could be made to work through close

engagement. As a tendered contract from a Government Agency, the collaboration in case study MPLS 5 was based on contractual objectives, as is standard practice in the public sector. However, the joint University-Charity tender provided a very clear and detailed proposal of how these should be interpreted and pursued, as outlined by the University's Research Associate (RA):

"I provided 20 PowerPoint slides in the tender document of how I thought the auction would look, to set out what the user experience would be, both in terms of what the (user) would see in the auction platform and also the dashboard for the (Co-Sponsoring Government Agency)...and also, beyond the PowerPoint slides we wrote out 57 requirement specifications, saying exactly, in text, how we would build the website and how it would function"(Research Associate, case study MPLS 5).

In addition, the University team offered four phases of increasingly sophisticated provision in discrete chunks of work. Each phase was priced and given an estimated completion time accordingly so the Agencies had clear options of what they wanted to commit to from the start. The Agencies went for phase two. By pursuing this approach the RA had effectively agreed the learning goals with the Government Agencies by negotiating a common interpretation of the contractual objectives in advance of starting the project. In doing so, the RA reduced the potential for different interpretations later on in the delivery phase.

In some projects one partner or another had the lead for drafting the formal agreement but it clearly helped to achieve alignment, as well as building trust and confidence, where other collaborators were given the opportunity to shape it. This was seen in case study Med 1 in which the Research Assistant (Res Asst) was tasked by the Principal Investigator to draw up the draft contractual agreement between the University and the business. Despite the business funding the project, the drafting was University led because it was based on the scientific methods and techniques to be

used in the study. Nonetheless, the Research Assistant (Res Asst) ensured that the Head of the Business Function (HBF), who would lead the project within the business, was given the opportunity to hone the objectives in a particular direction. In return, the company was helpful in sending the Res Asst copies of previous action research proposals as an aide to drafting the agreement so a collaborative approach was taken from the start and an agreement that met the aspirations of both partners was arrived at.

Going further, two case studies stand out as examples of where the University participants acted in the best interests of their business partners when shaping the common learning goals that were incorporated into formal agreements. In case study MPLS 3 the KEF signaled at an early stage that working towards the report that would be published by the Government Agency should take priority over any academic outputs (recognising that these could follow afterwards, particularly if the project was a success). This approach recognised that time was very short and that it was best for all to focus effort on achieving impact through one key output. In case study Med 2 the PI explained that the Laboratory encouraged and assisted pharma partners to develop a 'balanced portfolio' of projects according to different degrees of 'difficulty' or 'tractability' (they preferred these terms to 'riskiness', given its more negative connotations). This meant that it was likely that the teams within the pharma companies would be more likely to be able to report some successes to their Boards but at the same time attempt some more significant challenges, with potentially greater returns. These two examples illustrate how a deeper understanding of each partner's culture enabled the University to accommodate the partner effectively and so get the collaborations off to a positive start.

Whilst it is clear from the examples given in this and the previous section that it is important to agree learning goals in addition to contractual objectives, it is useful to consider whether there is a need to formalise learning goals where a formal agreement does not already exist, such as when there is no payment from one partner to another. Following through the Knowledge Exchange Fellow's (KEF's) experience over three case studies provided some useful lessons with regard to this. In case study MPLS 1, the first one undertaken by the KEF, exploratory discussions began with a multinational oil and gas company's Group Scientific Expert (GSE) to identify potential areas of collaboration and this culminated in the KEF producing a range of options for the GSE to take back for internal consideration. The KEF's primary aspirations lay in conducting some on-site conservation work at one of the sites being developed by the multinational, preferably in the form of new research or at least in an advisory capacity. This was in the hope that new learning could be captured in publications that might have wider utility across the company and possibly beyond. However, after consulting colleagues, the GSE responded that the company would instead welcome assistance in informing the GSE's development of its biodiversity strategy by providing a report and advice on the latest scientific thinking. KEF agreed albeit reluctantly because this approach felt uncomfortably close to consultancy (although there was no payment involved) and on the tacit understanding that this might lead to more favorable opportunities afterwards, although none of this was captured in an agreement.

The report and advice were very well received but further opportunities did not materialise (see the case study MPLS 1 event-state network at Appendix 4). As a consequence, the KEF determined to ensure that in future collaborations an

agreement would be drawn up, regardless of whether funding was involved. It followed that in case study MPLS 2, once both parties had agreed a way forward after lengthy engagement (and again with no payment involved), KEF suggested that they drew up a collaborative agreement to formalise what they each had committed to and this was readily agreed to by the International Organisation.

For MPLS 3, the KEF, the Government Agency's Programme Manager (PM), and the Project Intern (PIN) agreed broad objectives in advance of applying for the PIN's sponsorship funding from a Government Research Agency. Nonetheless, at the start of the four-month project the KEF joined the PM and PIN at the Agency's offices for two days and they spent part of that time collectively thinking through what they could realistically achieve within the project's limited duration. As a result they agreed the common learning goals they would pursue to support the broad objectives.

It can be seen, therefore, how the KEF learned from the first collaboration (MPLS 1) that it was wise to agree and formalise learning objectives to provide clarity and to signal the commitment of both parties, as was the approach adopted in the second collaboration (MPLS 2). In the third (MPLS 3), where broad objectives already existed, agreeing specific learning goals ensured that all interpreted them in the same way. This also provided a basis for managing the progress of the collaborations in the delivery phase.

The range of case study examples discussed in this section illustrate that, regardless of whether formal contractual objectives are set or not, partners need to give close attention to each other's learning aspirations, as well as ensuring that their own are fully understood, in order to agree common learning goals. Proactive and accommodating approaches to this were seen to be successful whereas making

presumptions or otherwise giving a lack of consideration to this opened up the potential for tensions to arise. In practice, it appeared that the extent to which common learning goals could be established to the satisfaction of each party depended on the degree of alignment, as shown in Figure 6.1. It can be seen that it is in the area where learning aspirations overlap that common learning goals can be established. This accords with D’Este and Perkmann’s assertion that *“collaboration is fruitful when it facilitates or contributes to both industry applications and academic research”* (D’Este and Perkmann, 2010, pp. 332-333).

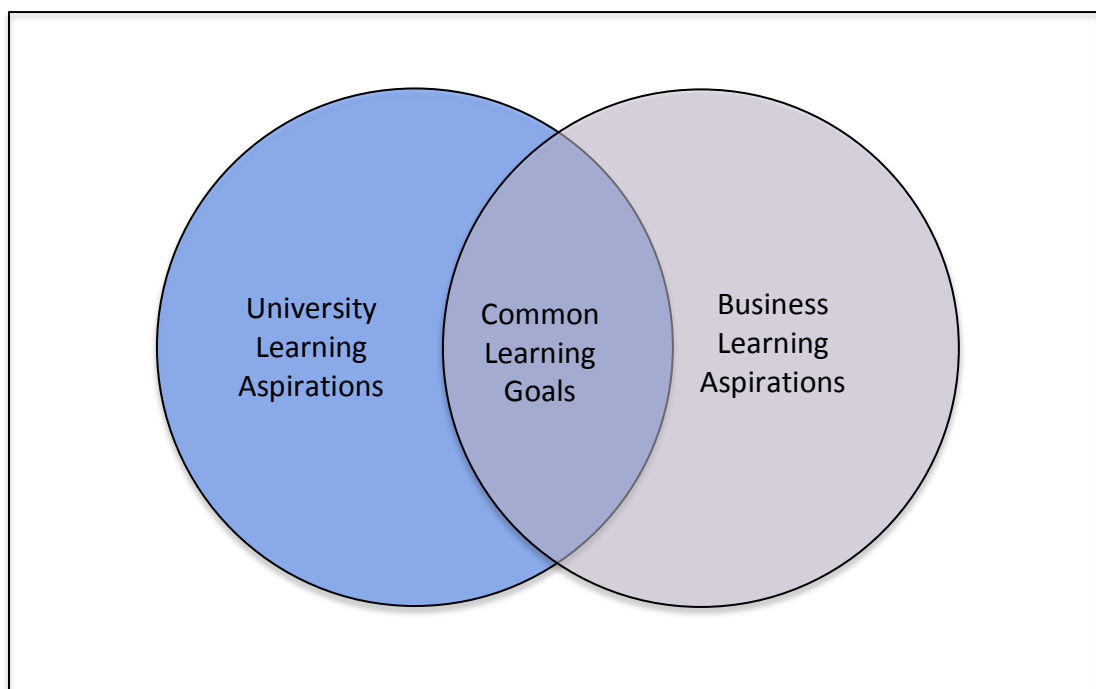


Figure 6.1: The Zone of Common Learning Goals

With engagement and negotiation it may be possible to move aspirations (the circles) closer together by persuading the University or business teams to accommodate wider aims of particular interest to the other, such as agreeing to an academic paper being based on a case study or analysis of data from the collaboration. Where learning aspirations are not covered by common learning goals it may be possible to pursue them outside of the collaboration or after it has ended, as was seen in some cases and

such options will be discussed further in Chapter 8. However, tensions could be created when one partner or another pursues independent aspirations outside of the zone of common learning goals during the collaboration itself, if these are seen to impact on those goals common to both. This suggests that accommodating partner aspirations where possible, even if they are only of direct benefit to that partner, will provide the best basis for taking collaborations forward because it builds the trust and motivation to take the collaboration as a whole forward. These are key factors that will be discussed in detail in the next two chapters.

6.3.3 *Designing the Collaboration*

The case study examples in the previous section make clear that the achievement of learning aspirations is dependent not just on establishing and agreeing common learning goals with collaborating partners but also on agreeing *how* they are to be achieved. The majority of collaborations involved geographically dispersed teams that only occasionally met face-to-face and so it follows that establishing structures and processes to support project management and communication was important. Consequently, many of the collaborations put regular conference calls and other project management protocols in place but the processes developed in case study MPLS 5 were amongst the most tightly run.

Case study MPLS 5 was a complex multi-partner collaboration that was geographically dispersed and the key participants in the two main Government Agencies had not previously worked together either. Wisely, the co-sponsors and key participants from the two Agencies consulted beforehand and one was persuaded to scale down aspirations so that a single project requirement could be agreed beforehand. One of the Agencies provided a Project Manager (PM) who decided to act

as the sole conduit for routine communication to the University academics so that requests and responses from the Government Agencies were consistent and all were copied in to keep them updated on developments. In addition, conference calls were held at regular intervals, when the wider team could engage directly with the academics. The University worked hard to support this close project management by responding quickly to requests and queries sent from the PM. At the same time, the senior co-sponsors in each Agency maintained regular communication with each other and so close alignment and a coherent approach were maintained throughout.

Maintaining coherence between business partners is clearly just as important as university-business coherence, particularly when working towards a single and very specific outcome, as was the case in case study MPLS 5. In larger partnerships with multiple programmes this can be more challenging but the Principal Investigator (PI) in case study Med 2 describes how the relationship with the pharma company had become a particularly good *“organic”* relationship. The PI described how this was reflected in strong relationships and communication not only at each level but also between levels, which can mean less control by project managers but is *“a wonderful problem to have”*.

Whilst establishing an effective project management framework was important for many of the collaborations, particularly those that were tightly time-bounded such as MPLS 5 above, there were other aspects of deciding how to work together that also had a strong bearing on how the collaborations developed. For example, in case study Hum 1 a standard project management hierarchy was established, which supported both the daily management and the higher level review and directing of the project (this is shown in the organisation chart at Figure 5.1 on p.129). However, whilst

working within this framework, the academic and organisational project managers (APM and OPM) decided to adopt a light-touch approach to managing the highly capable Project Officer (PO). The PO was given a comprehensive induction package and then afforded wide access across both the University and the Charity, which allowed the PO to engage where it was felt most useful and to follow up leads. As a result, the PO felt trusted to work to a “*grand narrative*” rather than being tightly controlled and suggested that this also reflected a recognition that:

“Being in the middle meant that I was often the only one who could see particular opportunities and pursue them, rather than try and control them when they couldn’t see them themselves...and the importance of your University and Company supervisors to trust that you are in a different position to them and to acknowledge that, because you are not in the same role”
(Project Officer, case study Hum 1).

The importance of trust is again underlined here in enabling the PO, effectively, to adopt a boundary-spanning role. This way of working laid the basis for the PO being able to test alternative delivery models and to develop a wide range of initiatives that all supported the wider aspirations of both partners.

Moreover, there were a variety of strategies that were adopted when dealing with multiple collaborations. For example, case study Med 2 underlined the need to develop the best way of working with each partner. In keeping with the approach taken across the public-private partnership, the University Laboratory ensured that all pharmaceutical company partners had agreements as similar as possible to ensure a ‘level playing field’ in this highly competitive sector. Nonetheless, as the PI explained, that did not mean that they assumed that each company wished to work in the same way and they sought to establish what worked best for them on an individual basis:

“The best collaborations tend to be with those pharma partners who ask up front ‘how does it work with other pharma partners?’ because you can then say what has worked with others. Having the one-to-one meetings, in person, at the very beginning of these collaborations is critical to be able to ride this really rocky turbulent river. It’s about trust! I mean my role at the beginning of these discussions is not only to sell the (PPP) but also to have my opposite number or the senior person that I am dealing with feel that if they ask something of me that I will try to go above and beyond to try and find a way to make it possible for them. And usually, most people, if they can see that you’ve tried really hard, they appreciate it because they have worked with enough other academics where that doesn’t always happen” (Principal Investigator, University Laboratory, case study Med 2).

Where businesses made explicit that they sought ‘co-development’ as a particular way of working (as in case studies Soc Sc 1 and MPLS 5) they were making clear that they wanted to be explicitly involved in shaping the outcomes of the collaboration.

However, whether explicit or otherwise, all of the 10 case studies were selected because they involved the active participation of both the University and business partners and so it could be argued that they were all involved in co-development. This enabled an understanding of the differing ways in which co-development was taken forward across all of the case studies and as a result it became clear that whilst they combined their capabilities (knowledge, skills and expertise) in different ways, these could be divided into a typology with three broad modes of collaborative working or co-development: adding, combining and augmenting. These are described further as follows:

- a. **Adding.** In the first, the university worked separately, using its unique capabilities to develop an output that was then *added* to the business’s existing capabilities and used accordingly. This involved successive rounds of feedback from the business to the University, based on trial usage or testing, to drive incremental improvements to its utility to the business. This was typically the case

where the University utilised highly specialised capabilities that the business was unable to engage directly with such as in case studies MPLS 4 and 5 where sophisticated technological capabilities, underpinned by deep scientific knowledge, did not have parallels in the user (business) organisations. Such a way of working seemed to be used to tackle existing problems that the business was unable to solve alone.

b. **Combining.** In the second category the University and businesses *combined* their capabilities to work on problems jointly and develop solutions together. This allowed the fuller spectrum of capabilities of both parties to be utilised to tackle new problems that they would otherwise have been unable to individually. This was particularly useful for tackling some new problems or for developing new approaches, such as in MPLS 2 and 3.

c. **Augmenting.** In the third category the University *augmented* the capabilities of the business by feeding into and strengthening its current operating processes. In this approach the University undertook some specialist tasks separately but then worked closely with the business, that would then shape how it was developed further to fit the operating context. This was seen in case study Med 1, where the on-line psychological testing of customer preferences was integrated into the pre-existing product packaging design process. In case study Med 2 the early stage science conducted by the University Laboratory on targets selected by the pharma companies was used to inform their own downstream processes of drug development. In these cases, this way of collaborating led to process innovation or provided additional learning that could be fed into existing processes to improve the outcomes.

This typology is summarised in Table 6.1. It is worth noting two issues that arise from using this conceptualisation of collaborative working. First, there was some evidence that collaborations could transition through different modes of co-development as they progressed (the example of case study MPLS 4 is discussed in Section 6.4.3). Secondly, it was clear that tensions arose where the University and businesses had different expectations of which mode should be adopted (as in case study Soc Sc 1).

Mode	Key Features	Application
1. Adding	University develops solution separately, utilising specialist capabilities. Process involves feedback from business to inform development; possibly after testing or trials. The business adds the solution to its capabilities to solve the problem.	Often used to solve existing problems (which may be presented by a new requirement beyond the business's existing capabilities).
2. Combining	University and business work together on tasks to develop a joint solution or innovation. They combine their capabilities to enable them to tackle problems or produce innovation that they could not achieve independently.	Can be used to tackle new problems or develop new innovation (which may be presented by business aspirations). Will require adaptation for the business to utilise the output.
3. Augmenting	University uses specialist capability to develop innovation (or repurpose, for example, existing technology) as a first step but then this is used to augment inputs into current business operating processes. Business drives the university's further development as the innovation is integrated into its processes.	Can be used to provide process innovation or to improve the outcomes of existing processes. In both cases the business improves its operational effectiveness.

Table 6.1: Modes of Co-development for University-Business Collaborations

This underlines how vital it is to jointly identify, adopt and maintain the most effective mode of co-development throughout the collaboration, recognising the need to take account of the expectations of partners within this dynamic process. It should be added that in large partnerships, such as in case study Med 2, it is possible that more than one mode is utilised across multiple initiatives. For example, the University sometimes worked on solving how to do particular tasks for the pharma company,

that, if successful, were then *added* to its own capability, whereas the drug targets were worked on together in a *combined* approach.

6.4 **Delivery Phase**

The preceding sections have argued strongly for University collaborators to develop deep mutual understanding with partners during the prior engagement and the set up and initiation stages. This lays the foundation for agreeing common learning goals and for establishing the effective modes of co-development necessary to achieve them. In the delivery phase, it will be shown how University collaborators nonetheless needed to subject their assumptions to frequent critical reflection (Brookfield, 1987) in order to interact with partners both responsively and proactively to build and maintain a positive collaborative relationship.

6.4.1 ***Showing Early Commitment to Supporting Business Aspirations***

There was clear evidence from the case studies that the best starts to collaborations were achieved where the University demonstrated an early commitment to supporting the aspirations of the business. In case study Med 2 the PI explained how they actively pursued this even before a formal contract was signed with a pharma company. Once the pharma company had identified which areas it was interested in, the Laboratory provided them with all the relevant information that it had already generated from its research. In doing so it did not expect the pharma company to reciprocate, aware that it could not until the formal contract began. In addition, the Laboratory started to focus work on the pharma company's areas of interest so that early progress could be made. Whilst progress was being made towards the final agreement with the VP and other senior company personnel, the PI and others in the University team also started to engage the more junior staff that would be working on the projects, making them

aware of the Laboratory's capabilities and building relationships at that working level. The Director of Research Coordination (DRC) within the Pharma Company commented upon the success of this approach:

"We find Oxford highly flexible in what they are willing to work on with us...my sense for the way Oxford and (the company) scientists work is there is a lot of back and forth and a lot of mutual trust, which then leads to a lot of flexibility on both sides...and so my observation has been that it's really a two-way flow of information..." (Director of Research Coordination, Pharma Company).

In some case studies the University needed to overcome initial skepticism by its partner(s) as to whether its involvement was of actual utility to the business, as opposed to largely of research interest to the University. There may be greater risk of this when a collaborative arrangement is agreed at higher level but then involves staff at a subordinate level. This was the case in case study Med 1 when the intention was to introduce psychological testing of customer preferences in packing design to validate the choices made by the current design team. This team had a core of very experienced Design Agency Leads (DALs) from three different companies that worked for the large employing company's Head of Business Function (HBF, who also had a design background). The process entailed one design company taking the lead for the design work for each product requirement (each design company had the lead for different product lines), and the proposals would then be peer reviewed by the design team as a whole, working collegiately to make the right choices for the company. This review was conducted at the weekly design meetings, when they got together to discuss both the proposed designs and new requirements. The HBF intended to use the testing conducted by the University's Research Assistant (Res Asst) to validate the

decision-making process, in effect scrutinising the professional judgement of the design team (of which HBF was the lead). This presented a potentially challenging context in which to introduce scientific input to a hitherto creative process. However, the Res Asst took positive steps to gain the confidence and cooperation of the design team by first attending all of the weekly design meetings in person, engaging constructively in the wider process and quickly becoming part of the team. The design team responded very positively to this approach:

“I’ve seen projects with universities before where people are hardly here, they haven’t really integrated; everyone knows who (the Research Assistant) is, all the product developers...” (Head of Business Function, FMCG Company, case study Med 1)

“I think (the Research Assistant) is a really vital part of the (weekly design meeting)...I have worked with researchers in the past and they tend to be quite reactive but I think (the Research Assistant)’s quite reactive and proactive...will offer an opinion or suggest we do something or give us a little fact or nugget that might make us think differently through the process: beginning, middle, end”. (Design Agency Lead 1, case study Med 1)

As the Res Asst was able to run the full testing from the start, it was equally important how the HBF integrated the Res Asst’s input into the process. This was brought in at the end of the process so that it provided additional evidence to augment the final decision-making. The Res Asst would explain the findings, in lay terms, then these would be discussed and debated, particularly on the minority of occasions (as it turned out) when these challenged the designers’ preferred options and encouraged reflection. This often resulted in them reconsidering their preferences but, importantly, they still retained the final say. In this way, the design team came to see the University input as genuinely useful and less as a threat. As DAL 2 put it:

“It could be a test project almost because it’s a university and it wasn’t about a serious professional thing...but I think immediately we realised it was a proper asset rather than something that was just being played with”. (Design Agency Lead 2, case study Med 1)

DAL 1 further described how it added rigour to their decision-making process that had previously relied heavily on their intuition:

“So we will all have thought that one way is the best way to go and surprisingly sometimes research will turn it on its head. A lot of the time it aligns with what we think already, so it’s more about substantiating what we are thinking and giving us a stronger voice...it really helps to formulate clarity”. (Design Agency Lead 1, case study Med 1)

It is also clear that had the Res Asst provided input with limited or no interaction, effectively adopting an *adding* rather than *augmenting* mode, it would undoubtedly have been understood and applied less effectively by the design team. As a result it is unlikely that it would have been absorbed into their processes to the extent it eventually was, which shows how decisions on the mode of co-development can be critical in determining whether collaborations achieve their learning goals. It is worth noting that the importance of making an early and tangible impact (for example in case study MPLS 4) was also driven by fast-paced operational activity.

6.4.2 Responding to Changing Learning Aspirations

It is almost inevitable that once collaboration commences, learning aspirations and opportunities are liable to change. In better delineating a problem, early (or later) collaborative work might question initial assumptions or present new challenges or opportunities. Ensuing re-evaluation may lead one or more partners to conclude that the original goals need to be adjusted accordingly. Where formal agreements are in place this may mean that the original objectives might need to be reinterpreted or

even change where that is both possible and agreeable. These changes were responded to in different ways, as shown in the case study examples below.

Where the objectives were agreed with a higher-level sponsor, they were seen to be inflexible but generally sufficiently broad and strategic to enable re-interpretation. In case study Soc Sc 2 the objectives were set by the sponsoring Inter-Governmental Body (IGB) well in advance of the project commencing and funding was tied closely to their achievement. The formal amendment process was lengthy and therefore impractical within a tight project timeline. This presented a potential challenge when the demonstration of the technology took much longer than anticipated to become fully operational, meaning that the project would yield less hard data than expected. However, the Project Director was able to shift the emphasis of the project to the socio-technical issues that had become the focus of the University's research and its Customer Impact Study became the key output. As the Project Director explained, there was a four to five year time lag between the initial proposal and the submission of the final report so some flexibility was essential to ensure that an output that was fit for purpose could be delivered but ultimately this rested on the interpretation of the IGB's Project Officer. In the event, the report was well received by the IGB, which was very interested in better understanding the customer aspects raised by the report. The IGB's Rapporteur recognised that such heavy reliance on fixed objectives was problematic since many projects are not allowed to fail and project teams will undertake a lot of work to prove that they did not, but this approach inhibits the ability to learn from failures and problems. This is an issue that shall be returned to in Chapter 8.

By contrast, the Knowledge Transfer Partnership in case study Hum 1 did not produce the target number of articles for the charity's knowledge bank nor was it able to prove that the initiative led directly to financial benefits in the short-term, as set out in the formal objectives. However, the sponsoring Government Agency's project officer adopted a much wider interpretation of the far wider-ranging initiatives and effects of the project than the more limited sub-set covered by the original objectives. The sponsoring project officer therefore judged that the initiatives to develop the wider partnership, which the KTP acted as a catalyst for, should be supported accordingly. This entirely reflected the view of the project sponsors and managers within both organisations as to the perceived strategic benefits of the initiative. The grade of 'Outstanding' awarded to this KTP by Innovate UK, shows how initial objectives can be superseded by astute judgement and by a re-framing and re-evaluation of the benefits gained from collaborations, where the system supports such flexibility.

Changing aspirations were dealt with differently in direct collaborative relationships that did not involve a sponsoring organisation. Two examples illustrated how this could be responded to positively. In case study Med 1, as the new capability introduced by the Res Asst started to be better understood the HBF and the design team were prompted to ask additional questions of the research that was outside of the original remit agreed in the contract. Such was the strength of the working relationship developed between the University team (the PI and Res Asst) and the HBF, both parties were content to treat the contract loosely and agreed informal amendments between themselves. The Res Asst was highly responsive in supporting additional requests around the core research and also undertook additional research

proactively, even if of no academic value, to assist the team (and on at least one occasion an individual design company directly) with particular problems or to pursue issues of (secondary) interest. This added value provided by the Res Asst undoubtedly strengthened the relationship further but also supported the adoption of the initiative within the design team. In many respects this may typify the behaviour that a business partner needs from a University collaborator; where the academic is both responsive and proactive in generating further opportunities (within time and resource constraints). It will be seen in the next chapter that this relates to the building of trust (Section 7.3) and 'equity' (a form of legitimacy power, Section 7.4).

In case study MPLS 5 a more balanced approach was taken to keep the project within agreed resources and the very tight time window. Here the Government Agency had already opted for Level 2 of four possible options of provision offered by the University/charity team, as mentioned earlier, and this was used skillfully by the Research Associate (RA) to keep the project on track, drawing on previous experience of 'specification creep'. As the RA explained, the aim was to *"try to achieve the most superior thing you can"*, but when one particular individual started pushing for more it was dealt with robustly by pointing out that it was 'out of scope' for the agreed level of provision. The Agency partners accepted this as good project management but it also helped that this was balanced by the University team's readiness to be flexible and accommodating where possible, as the RA describes:

"There are a few things that were over and above what we originally set out to do but we could do some things in good faith, which makes sense if it isn't a massive thing to do that doesn't have a significant impact on the quality of the product" (Research Associate, case study MPLS 5).

However, it was only possible to strike this balance once a high level of trust was established between the partners:

“All the people we dealt with entered into it in the right spirit and if we can do something or can’t do something I think they are quite happy to take that on board and I think they knew from the start we were trying to do everything we could to make it a success...there was a good spirit of collaboration throughout the project”. (Research Associate, case study MPLS 5)

The Agency partners evidently supported this view of such a strong relationship and they commented on how this felt far more flexible than a contractual relationship with commercial contractors:

“Every now and again the guys at (the charity) and Oxford said we can’t do that, that’s going to cost too much or it’s going to take us six more months and that was a good way of keeping us all honest really and keeping us on track...I think it was fair, to me anyway, it felt that if there was a new requirement that popped up that people considered that fairly and either said, you know what, that’s not too difficult or actually that’s a lot of extra work and it comes back to that good communication and honesty”. (Co-Sponsor, Government Agency, case study MPLS 5)

It was notable that the Agencies were willing to accept some regulation of the collaborative activity by the University team, once it had demonstrated an ability to be responsive and its strong commitment to achieving the task. The underpinning factors that contributed to this positive relationship will be explored further in the next chapter.

6.4.3 *Overcoming Differences in Base Knowledge and Understanding to Enable Effective Learning*

Across the case studies, the businesses’ prior knowledge and understanding of the learning used or generated by the University in the collaboration varied considerably.

In case studies Med 2 and MPLS 1 the University participants were collaborating with business participants with similar academic backgrounds and working in closely related

fields, although applying their expertise in different contexts. In such cases there appeared to be only limited challenges in exchanging knowledge and learning in their collaborative activity. In others, such as case studies MPLS 4 and Med 1 the business participants had academic backgrounds and expertise very different from those of their University collaborators and had limited prior knowledge and understanding of the learning that underpinned the collaboration. It was therefore appropriate to consider whether this presented issues of 'absorptive capacity' (or 'learning capacity', after Cohen and Levinthal, 1989, 1990), as discussed in Chapter 2, Section 2.3.2, pp.35-37 and Chapter 3, Section 3.2, pp.61-62. More specifically, consideration was given to how this impacted on the ability of the University and businesses to engage in co-development, in order to achieve their learning goals.

Unsurprisingly, where University expertise was being applied to new areas there was usually little prior related knowledge among the business participants. However, this did not appear to present as significant a challenge as Cohen and Levinthal (ibid) suggest it might have, for two main reasons. First, such collaborations were built around the application of University-generated *outputs* to business. This meant that the learning requirements for business were limited, at least initially, to how these outputs could be used to address problems and to provide feedback to contribute to further development. However, it was apparent that as business understanding of the underpinning application increased over time, the participants were able to engage more deeply, with commensurate changes in the mode of co-development (see Section 6.3.3 and Table 6.1, pp.180-183). For example, in case study MPLS 4, the collaboration was initially driven by the charity simply providing the operational feedback needed by the University team to enable it to improve the

algorithms needed to feed into their technological solution. However, as the PI explained, once they understood the technology better the charity also fed in new problems that it recognised the technology might be able to help solve and they discussed together how this could be achieved. A good example was the locating of downed power and communication lines, which was a very difficult task for teams on the ground because the lines ran across open country. Going even further, the DCEO mentioned that they had raised the possibility of capturing feedback direct from the ground teams and would also be keen to explore the possibility of incorporating predictive capabilities and of harnessing information from people on the ground such as through social media. In terms of the typology introduced in Table 6.1 (p.182), it can be seen that as the charity came to understand the technology better, the collaboration moved from *adding* to *combining* modes and further options to *augment* the charity's capabilities in future were being considered. This demonstrates how modes of co-development can be dynamic and change as the collaboration progresses.

The second reason that differences in base knowledge and understanding were less of an issue was that the University participants were very adept at communicating knowledge and learning in ways that were highly usable by their collaborating partners. The PI in case study MPLS 4 perhaps best summed up the importance of this:

"Delivering actionable information has been critical. And that is one of my principles now: when engaging with someone it's not good enough to say you are excited about Machine Learning, who cares? It's actually giving them something that they can use, that makes a difference to their job, day-to-day activity, otherwise they don't care..." (Principal Investigator, case study MPLS 4)

A similar translation challenge was posed in case study Med 1 where the Res Asst had to give the statistics-based results of psychological testing some tangible

utility for a team of designers, who consistently described themselves as ‘visual’ people, which meant that they developed designs “*from an aesthetic point of view and with lots of experience in the field*” (DAL 1). The Res Asst responded by presenting the findings in graphical form, ensuring that the presentations were of a very high standard, to accord with their visual orientation. This proved to be effective, as DAL 1 confirmed in explaining that whilst they may see the Research Asst’s “*nuts and bolts*” (that is, the data and statistics), “*we get it in a way we understand*”. DAL 3 went so far as to say, “*I was really interested in it. I love the infographics*”.

In case study MPLS 5, the Postgraduate Researcher (PR) summed up the importance of this translational role when describing how they needed to discuss how scientific aspects might influence the model they were building for the Government Agencies: “*I think (RA) and I on these types of projects are like ‘babel fish’!*”⁴⁶

Commenting on communication more generally, PR observed how each individual in the project had to be good at explaining their specialist area to what was in effect almost a lay audience, “*So it’s all about communication across different expertise groups*”. The RA took the approach of using diagrams or figures very effectively to support explanations and, as PR noted:

“I’m sure we got there quicker when (PI) would disappear off for an hour or two and come back with a picture of something and everything was crystal clear after that” (Postgraduate Researcher, case study MPLS 5).

Case study MPLS 2 showed that even though the KEF and International Organisation (IO) collaborators had very different areas of expertise, they could still work closely together from the start, combining their capabilities to develop the project. However, the IO’s Project Officer (PO) made clear that this was only possible because the KEF

⁴⁶ This is a reference to the fictional creature that performed instant translations in Douglas Adams’s *The Hitchhiker’s Guide to the Galaxy*.

was patient and consistent in sharing the scientific knowledge that they were using. The PO added that this was beneficial because it *“helps us to assimilate and reinforce it and helps us to do that with others as well”*. In this project it was far more important that the IO collaborators understood the underpinning science since they would have to advise others on its implementation, but the latter point was also particularly important because the IO was a membership body and so it needed to engage them in the project. To support this the team set up an online blog (web log) for the project to generate wider interest and engagement. The KEF similarly encouraged a wider communication strategy in case study MPLS 3 because this project also supported the aim of changing stakeholder behaviours. In this case there was considerable effort spent on engaging business, Government and international organisations through presentations at conferences. These were particularly effective because the Project Intern (PIN) had spent considerable effort producing high quality infographics to support them and these provided a stimulus for stakeholder engagement.

These examples illustrate how, with the right approaches, differences in base knowledge and understanding does not have to create barriers to learning through university-business collaborations. In addition, it is sometimes necessary to extend these approaches to wider stakeholders, in order to gain their active engagement in the learning process, as projects develop. There was also little evidence that the knowledge and understanding held by the academics was of such a tacit nature⁴⁷ that it presented a barrier to collaboration. This supports the position furthered by Howells (1996, p.103) discussed in Chapter 3, Section 3.2 (pp.60-61).

⁴⁷ Howells (1996) describes tacit knowledge as that which is “difficult to codify, standardize and transfer” (p. 103).

6.4.4. ***Collaborating Within the Business Environment***

Several examples have already been given of where the University has collaborated with a business within its live operating environment. When doing so, an appreciation of the demands on the collaborating individuals, teams or organisation operating within that environment was sometimes of critical importance.

The most frequently mentioned issue in relation to this was the need to be able to work at the industry's pace in order to provide timely input. At its most acute, in case study MPLS 4 the University team was supporting the charity in disaster situations when response times were critical to providing timely support on the ground. When asked for urgent support to the relief effort after the 2017 Caribbean hurricanes the University team responded by 'operationalising' its support, as the charity's DCEO described it, *"so they honestly worked around the clock for three or four weeks, so a huge effort..."*. Moreover, this was seen as indicative of their strong commitment to supporting the disaster relief, rather than just using the collaboration to develop their research:

"(PI) is really passionate about this type of work and kinds of applications, so as well as this is interesting academically and theoretically, (PI) also very strongly believes in the importance of this on a humanitarian level...you have to have a personal motivation to be prepared to work that hard. Yes, I'm sure they are interested in how academic theory can be applied in practice but they were working as hard as we all were". (Deputy CEO, charity, case study MPLS 4).

In case study Med 1 the Res Asst similarly had to work within very short response times but in this case it was because of the tight commercial production schedules between confirming product packaging designs and producing them. Because University input was sought at the end of the design process it had to be done as quickly as possible, normally in two weeks or less. This was the reality of working in a

fast moving consumer goods environment but the Res Asst responded by working very hard to ensure that deadlines were met. Such commitment was noted by the HBF, who also tried to be supportive in return, describing the Res Asst as:

“Incredibly supportive and reactive on projects that need to be done quickly. But in the same vein, I will always ask the team if we’ve got a bit more time to give (the Research Assistant) a bit more breathing space. But I do worry that (the Research Assistant) works too much, I do worry” (Head of Business Function, Fast Moving Consumer Goods Company, case study Med 1).

It was not just in operationally driven collaborative environments where keeping pace with industry was important. This was illustrated in case study Med 2, where the University’s PI saw this as equally applicable to an R&D setting:

“Now what (the Laboratory) can do is we can work in that academic area with the blue sky thinking but we hope we are able to work at a level of parity with industry in terms of how quickly we can turn round data, turn round discussions, move projects forward. So they are not always waiting for us”. (PI, University Laboratory, case study Med 2)

A consequence of the Laboratory working at this tempo meant that academic publications could get pushed down the priorities, which the PI recognised as particularly problematic for postdoctoral researchers and technicians, who needed the papers to move on with their careers. Maintaining the throughput of talent was also important to the Laboratory and although a steady output of academic papers was achieved it did present a constant challenge that needed to be managed.

Whilst the above examples make clear the importance of responding to the business’s time imperatives, the last example shows how this may sometimes create tension with academic needs, aspirations, and the performance management systems that govern individual academics’ career prospects. This was also seen in other aspects of collaborations such as the different standards of data collection that University and business personnel would accept to support decision-making, as

already discussed in case study Soc Sc 1. However, it was clear that such tensions needed to be resolved prior to the delivery phase commencing (see Section 6.3.1, pp.168-170).

6.4.5 ***Responding to Learning Challenges***

Further challenges to the pursuit of learning goals were seen to arise from internal resistance to the collaboration within the wider University or business organisations themselves. In Section 6.4.1 (pp.184-186) it was shown how in case study Med 1 the designers, who were clearly key stakeholders, quickly moved towards giving the initiative their positive support. In this case they were directly engaged and able to help shape its introduction; however this is not always the case, particularly in large organisations where personnel working in different areas (geographically and functionally) may find that a collaborative initiative with which they have not been involved nonetheless has an impact on them. Unless there are obvious benefits, this may prompt defensive reactions, as were encountered in case study Hum 1 in several instances. The most direct challenge came from the marketing and communications area, particularly those running the website, who feared that the initiative was challenging what they were doing. At one point a senior marketing director told the Project Officer (PO) to stop the project as '*nobody was interested in history*', although the Organisational Project Manager felt this was more a reflection of the project being interpreted as not supporting brand guidelines. However, with the help of the OPM, the PO overcame this by:

“...shifting the narrative to show how it supported their marketing ambitions...it supported a lot of the work streams that these people were having to deliver against, we were demonstrating that this project was actually helping them with that and that we could create the content for them, which would be beneficial for the work they were doing. Very quickly it turned around and now it’s been embedded”. (Project Officer, case study Hum 1)

As the OPM reflected, the marketing team came to see that the initiative not only supported their messaging but also enabled them to demonstrate engagement with a wider organisational review. In this respect the project became an important lever in the Organisation’s efforts to change its culture. The PO experienced quite different defensiveness in other quarters, where people felt threatened by Oxford’s involvement, which was reflected in comments such as *‘there are other universities you know’*. Recognising that a more inclusive response was needed, the PO tackled this by actively engaging other universities in the initiative. As OPM noted, this helped to reinvigorate some of the Organisation’s prior relationships as well as to make new ones. These extended far beyond Oxford and supported university linkages with properties at a local level in other parts of the country. For the Organisation this prompted a review of its strategy for how it approaches research more broadly. These two examples from case study Hum 1 illustrate the importance of internal stakeholder management when introducing innovation through collaborations but also show how this can be used to strategic advantage if approached in a responsive and agile manner. It is also useful to note how widening engagement may sometimes be a useful way to dissipate specific challenges.

Less confrontational but equally problematic challenges can arise where collaborating partners lose their focus on the project work and so risk not putting the time and effort into making it a success. In case study Med 2, the PI stressed that this

is why relationships are important because if the scientists in the pharma companies get pressed to undertake other work or show a lack of engagement in generating new proposals then the achievement of agreed targets is put at risk. On arrival in post, the Pharma Company's Director of Research Coordination found that only a small part of the Company was actively engaging with the partnership and so worked hard to raise awareness in the belief that collaborations work well when there is a willingness to put resources in:

"We really have to have some 'skin in the game'...doing something passively just doesn't work. So I think the parts of our relationship with (the partnership) that have worked most successfully are when we have research scientists that are very engaged and committed to working with (the partnership) and making the collaboration a success". (Director of Research Coordination, Pharmaceutical Company)

Furthermore, DRC felt that the key to engagement was making it a priority within their full-time job rather than an additional responsibility but noted that it works even better when they are *"excited about it"*. This demonstrates how important it is to generate and maintain motivation at all levels throughout all stages of collaboration.

In case study MPLS 3, the project came under increasing time pressure to the extent that the team was unable to complete the work within the period of the Project Intern's (PIN's) four-month contract period, although it was successfully concluded later. Whilst the KEF suggested they may have been over-ambitious and there were a number of reasons for the delay (the event-state network at Appendix 4, Part IV captures the key issues), it is relevant to note here that both the PM and KEF found it increasingly difficult to commit to scheduled project meetings as they became pressed by other commitments. This meant that communication and project management became looser and so significant adjustments were needed to the report at a later

stage. This underlines the particular need for those with project management responsibilities to remain consistently engaged throughout, despite them almost always carrying wider tasks and responsibilities.

In the same case study, the Government Agency's Project Manager (PM) raised a further point observing that academics often sought a higher degree of confidence (and therefore took longer) than business needed to run with. This depended on the context, of course, but the PM acknowledged that as providers of evidence rather than decision-makers, academics placed a stronger emphasis on ensuring that it was robust and defensible. However, the point was that business was generally used to making decisions on less robust evidence, as it is more able to manage the consequences as they unfold. The Rapporteur in case study Soc Sc 2 recognised that these differing orientations caused tensions in some projects but sees these in a broader context:

“At the end of the project, despite all the troubles, despite all the tensions that might have been there during the project, at the end you can say that both sides learned a lot and next time we would probably go about this differently...but we probably need these understandings, these discussions, taken in the very early stages of the project: what are the expectations from the different partners and how could we help each other to accomplish all those during the time of the project?” (Rapporteur, case study Soc Sc 2)

This may require academics to reconsider their own methodologies to better align with the business propensity for implementation, which might sometimes mean adopting more action research oriented methodologies (e.g. Cohen *et al*, 2011, pp.344-61), where the context supports it.

6.4.6 *Exploiting Unplanned and Unexpected Learning Opportunities*

As collaborations unfolded they frequently presented opportunities for unplanned and unexpected learning, several examples of which have already been outlined, notably in case studies Hum 1, MPLS 4 and Med 1, as was reflected in the development of

additional innovations. However, time and resource constraints and the need to achieve tight objectives or specific outcomes meant that the opportunity to exploit such opportunities could sometimes be limited (this theme will be returned to in Chapter 8). In case study MPLS 5, where there were both time and resource constraints (and a very specific outcome required in the form of a fully functional software application ready for scheduled field trials) it was nonetheless still possible to make incremental improvements to the originally intended functionality of the software application:

“I think (the University/charity) were fantastic actually in iterating, adapting and building bits of functionality as it became apparent that it was required...I think the relationship with the developers, with Oxford University, with (the charity), was terrifically open...” (Co-Sponsor, Government Agency, case study MPLS 5).

Whilst there was little scope beyond this for further initiative within the existing project, options for further collaboration were being discussed, opening up the possibility of further development.

By contrast, the light-touch and supportive management, open access and broad objectives afforded to the PO in case study Hum 1 allowed for broad-ranging initiatives to be undertaken from the start, as captured in the event-state network. In engaging a wider range of stakeholders, the collaboration had much greater impact than if it had been narrowly confined to the original objectives, despite the challenges that sometimes had to be overcome. Whilst the approach to managing the project created the conditions for further innovation, it needed the proactivity and initiative of the PO to identify opportunities and drive them forward so personal factors were clearly important in this collaboration. However, when the range of initiatives that the PO generated are looked at (these are outlined under “Outcomes” at the bottom

of the Hum 1 event-state matrix) it is also clear that the PO was effective in identifying initiatives that were not only relevant to developing a wider partnership between the University and the charity but also of strong appeal to those specific stakeholders that were engaged in them. This was also the case for the core initiative, where the PO engaged postgraduate students within a research centre that supported those with a particular interest in applying their expertise outside of academic environments.

Developing collaborative initiatives that appealed to the motivations of key stakeholder groups in this way proved an effective means of generating momentum.

This was seen again in case study Med 1, where the Res Asst started to do some early analysis of products at the start of the process, rather than at the end of it, as was initially intended. The design team immediately saw the utility of this in providing additional insights to inform the design process rather than act as a form of validation of it. Consequently, this was adopted as an option within the design process and used when further insight was desirable. These examples also illustrated how some opportunities for new learning can only be seen from within the collaborations, once the delivery phase has been reached.

A very different perspective on exploiting unplanned and unexpected learning opportunities was adopted in case study Med 2, where the need to actively seek and exploit such opportunities was regarded as vital in order to engage and retain partners over the long term. The PI was very clear that to maintain their commitment they needed to over-deliver by providing new ideas, new science and new ways of producing things to help their partners move forward:

“We are working on what’s on the contract but if we only achieve that we’ve failed” (PI, University Laboratory, case study Med 2).

This meant that the need to meet the changing needs of its partners to persuade them to keep re-contracting into the partnership drove the team to continuously seek innovation:

“So we never sit still, every four or five years we have to think of something different”. (PI, University Laboratory, case study Med 2)

This underlines the need for the continuous generation of new learning in longer-term collaborations. In case study Med 2 this required researchers to adapt an innovative mindset and for some, including the PI, this was highly motivating and encouraged them to stay.

6.5. Summary

This chapter has introduced the initial findings from this research by combining within-case and cross-case analysis from the ten case studies. It has provided clear evidence that interaction between individuals and organisations influence learning at each stage of collaborative development, across all case studies. Whilst the conceptual model was useful in drawing out consideration of influences at individual, organisational and inter-organisational level, the interactions were shown to be both complex and dynamic rather than simple transactional processes. Nonetheless, despite the very different contexts of this diverse range of collaborations, it was possible to identify themes relating to how they influenced learning at each stage.

The adoption of a temporal approach to analysis added value and whilst there was much to learn from the main delivery phase of collaborations, both the prior engagement and the set up and initiation phases were worthy of closer examination. These were easily overlooked or compressed in reality but it was clear that there were processes in these stages that can have a critical effect on the successful nurturing and

initiation of collaborations. Most importantly, *what* learning would be pursued and *how* this would be undertaken through collaborative co-development, at least initially, was set in these early phases. Critically, it was shown that this needed to be based on a close mutual understanding of learning aspirations and capabilities coupled with a willingness to accommodate these as much as possible. Continuing into the delivery phase, it was shown that collaborations demanded proactive and agile approaches that were empathetic and responsive to the needs of partnering individuals and organisations. In this respect university-business collaborations, like other kinds of collaboration, require what Vangen and Huxham (2003, p.6) describe as “*a continuous process of nurturing*”. Furthermore, it was shown that there is a dynamic interplay between collaborative processes and the wider operational or external context and how this was responded to could have a significant impact on learning.

Drawing on the case study evidence, collaborative learning could be seen as very much a two-way interactive process and a typology was proposed to better understand how different modes of co-development could be adopted to achieve this. Examples showed how the mode of co-development could transition as the collaborations progressed, underlining the dynamic nature of learning processes. Importantly, learning was seen to take place throughout the course of the collaborations, frequently leading to changes in the aspirations of business partners in response to perceived opportunities or challenges. This could present challenges for University participants in relation to time, resources and the achievement of their own aspirations but the way in which they responded was often seen as critical to how the collaborations developed and the subsequent learning outcomes. Further

consideration will be given to the learning outcomes resulting from these processes in Chapter 8.

The themes identified in this chapter from the analysis of collaborative interactions might be more generally regarded as aspects of forming and maintaining close and effective collaborative *relationships*, as many of the participants in this research saw it. It was clear that such relationships were essential for the achievement of learning through collaborations, regardless of its nature or subject matter. As such, the next chapter will seek to understand the key factors that underlie these interactions and how these affect learning and will take an iterative approach to further examine the issues highlighted by the case studies in light of each. This will provide both a deeper understanding of the themes that have been constructed here and lay the basis for a conceptual approach for academic engagement in university-business collaborations that will be discussed in the final chapter.

CHAPTER 7: FACTORS UNDERLYING THE INTERACTIONS THAT AFFECT LEARNING

WITHIN UNIVERSITY-BUSINESS COLLABORATIONS

7.1 Introduction

The previous chapter drew heavily on the analysis of the data gathered from the 10 wide-ranging case studies identifying important themes relating in most cases to specific stages of collaborative development. In some cases, themes such as reputation (Section 6.2.6) were seen to apply more generally than the specific juncture at which they were introduced. This structure builds on limited earlier attempts to capture the dynamic inter-relationships within university-business collaborations, such as that by Plewa *et al* (2013), and provides a response to the call (see, for example, Rybníček and Königsguber, 2018, p.237) for more research to investigate these inter-relationships further, as discussed in Section 2.3.6 (pp.51-55).

Through this analysis it became clearer how interactions at all stages of development between individuals and organisations shaped the learning that takes place within university-business collaborations. Whilst data collection was centred on interviews with individuals involved in the core collaborative activities from each of the main partners, the questions used within the semi-structured approach were intended to gain perspectives on influences at individual, organisational and inter-organisational level. At this point, it is useful to refer to a point made by Tsasis *et al* (2015), who noted:

“Much of the emphasis has been on a single level of analysis (individual, team, organizational or interorganizational) despite the fact that individual and collective behaviors occur within nested levels of social organization, thus rendering multi-level analyses important” (Tsasis *et al*, 2015, p.145, after Payne *et al*, 2011)

Payne *et al*'s notion of '*nested levels of social organisation*' conceptualises how levels of social organisation are not separate but rather individuals operate within multiple levels at the same time. Each level generates influences that both shape and are shaped by individual and collective actions. Whilst these multiple levels of collaborations makes them complex, Tsasis *et al* (ibid) note Granovetter's (1982) view that "*it is through interpersonal relations that small-scale interactions become translated into large-scale patterns and thus into interorganizational relations*" (ibid, p.545).

This underscores the need for the approach taken in this study, which focuses analysis on the interpersonal level but at the same time seeks to understand how these interactions influence, and are influenced by, interactions with successively higher levels of organisation. However, the '*nesting*' of successive levels of social organisation explains why it can be difficult to attribute any particular interaction or influence to one level or another with any certainty when looking at the micro-level. This became readily apparent when developing the event-state networks for each case study, shown at Appendix 4 and explained in Chapter 4, Section 4.6.2, pp.116-117. After each event-state network was constructed, an attempt was made to colour code the level of influence of the 'events' in each bubble according to whether they were at the individual, organisational (university and business influences were also coloured differently) or inter-organisational level. However, this required the application of judgement as to the predominant influence rather than simply identifying the sole definitive one since an event may reflect multiple nested levels of influence at that point in time. For example, some decisions taken by business partners were coded at the organisational level whilst they could actually have been more of a personal

decision (or vice versa) but this was not always clear from the interview data (particularly where an action taken by one party was only mentioned by another), and so this coding needs to be viewed with some caution and was not intended to be definitive.

Nonetheless, the coding process was an extremely useful analytic exercise that brought consideration of levels of influence on the key events to the fore and helped to inform the analysis of the dynamics of the relationships. More generally, this illustrates why, in reality, the deeper understanding of collaborative relationships at lower levels requires broad qualitative analysis of the data, using judgement where necessary to generate inferences, as is the approach taken here.

With the above considerations in mind, the clear overarching theme to emerge from the analysis up to this point is the importance of developing and maintaining positive and productive relationships to generate valued learning outcomes. This was readily apparent throughout all of the case studies, regardless of their very different contexts, as reflected in the themes developed in the previous chapter. Comments from two senior researchers in very contrasting subject areas bring this back into focus. The first, the PI (working in an applied mathematics and engineering research group) in case study MPLS 4, acknowledged:

“All this stuff that’s needed before you even start doing the science, the knowledge exchange, it’s actually creating that relationship in the first place”.
(Principal Investigator, case study MPLS 4).

Similarly, the PI (working in an applied social sciences research group) in case study Soc Sc 2 noted:

“I’ve learned how important it is to spend plenty of time relationship building right at the beginning and try to understand where people are coming from”.
(Principal Investigator, case study Soc Sc 2).

The realities of relationship building, however, can be challenging from a business as well as an academic perspective, as the Energy Company Programme Manager (CPM) in the same case study noted:

“It’s also quite challenging as well in getting lots of people to work together too, across different jurisdictions and different cultures. It takes time so you can’t necessarily build these relationships over night. So we are all quite close now after three years but it certainly took, in my opinion, maybe a year for us to effectively work together”. (Company Programme Manager, Utility Company, case study Soc Sc 2).

Whilst this is consistent with the findings of the Dowling Review (2015), as discussed in Section 2.3.5, the previous chapter goes further in using the case study evidence to characterise the key interactions that constitute the building and maintaining of positive collaborative relationships at each stage. However, in this chapter the intention is to deepen our understanding by discussing the key factors that influence the development of these relationships and the learning arising from them. Whilst the analysis will consider the perspectives of university and business participants, the implications will focus on the former, consistent with the research questions.

Further analysis of the case study data and the themes identified so far pointed first and foremost to the importance of motivation throughout collaborative learning relationships. The discussion of learning theory in Chapter 3 (Section 3.3) drew close attention to the fundamental importance of motivation in learning (for example, Illeris 2017, Maier *et al*, 2001, at p.66) and this was shown to be a distinct focus for Illeris, who included motivation as a major component of the *“incentive dimension”* of his *“three dimensions of learning”*. Significantly, he also showed that interaction has an important influence on an individual’s motivation to learn (as discussed in Sections 3.3 and 3.6 and shown in Figure 3.2). More specifically, the review of research into

university-business collaboration in Chapter 2, Section 2.3, showed that motivation is recognised as an important factor in this activity (see, for example, Ankrah *et al*, 2013, p.50, Bruneel *et al*, 2010, p.44, D'Este and Perkmann, 2010, p.43, and Hughes, *et al*, 2016, pp.43-44). How motivation affects learning through university-business collaborations will therefore be discussed in more depth in this chapter but it also became clear that other socio-psychological processes are important alongside motivation. In particular, the case studies further highlighted the high importance of trust. This featured strongly in participant interviews and in several cases was mentioned directly. The importance of trust is widely recognised in the research literature into business collaboration and organisational relationships (see, for example, Huxham and Vangen, 2005, Chapter 9, and Adobor, 2006) and so it is unsurprising that trust is similarly recognised as a key factor in the literature on university-business collaboration (especially as many of the researchers into university-business collaboration are based in business schools), as discussed in Chapter 2, Section 2.3 (for example Perkmann and Walsh, 2007, pp.47-48, Bruneel *et al*, 2010, p.49, Dowling 2016, p.49). However, the extent to which the latter helps to further our understanding of how trust is built and maintained within these collaborative relationships is limited.

During the early stages of analysing the case study data, the importance of motivation and trust in collaborative relationships became readily apparent but it also became clear that these alone could not adequately explain the inter-relationships, even when contextual factors are taken account of. This led to the identification of a third socio-psychological factor, the use of social power, which was found to offer a very useful addition to the explanation of the dynamics of collaborative relationships

between university and business. Like trust, power is well recognised as a factor in wider inter-organisational relationships (see, for example, Oliver, 1990, Huxham and Vangen, 2005, Chapter 10), although it is most frequently applied to the senior management level. There appears to be an absence of research that investigates the use of power in university-business collaborations, in part reflecting the lack of studies that focus on the internal dynamics of such relationships.

When taken together, motivation, trust and power were found to offer a very useful combination of socio-psychological factors to explain how behaviour is influenced within university-business collaborations and how this, in turn, shapes the learning taking place. Each factor will be discussed separately but the inter-relatedness between them in affecting collaborative relationships will be made clear. Whilst it is argued that these comprise the core socio-psychological factors influencing collaborative learning relationships, interactions take place within particular contextual environments that can vary enormously (they certainly did across the case studies) and so it is important to consider which aspects of these are sufficiently crosscutting to be regarded as generalisable. Following analysis, these were reduced to those factors that mediated the influence of the core factors (motivation, trust and power) and those that shaped the way in which the core factors were utilised. It is also recognised that university-business collaborations themselves take place within a wider environment in which events generated in the participating organisations (such as personnel changes) or their external operating environment (such as the disaster events in case study MPLS 4) can have a significant impact on them. The relationship between these factors and collaborative learning is summarised in Figure 7.1, below.

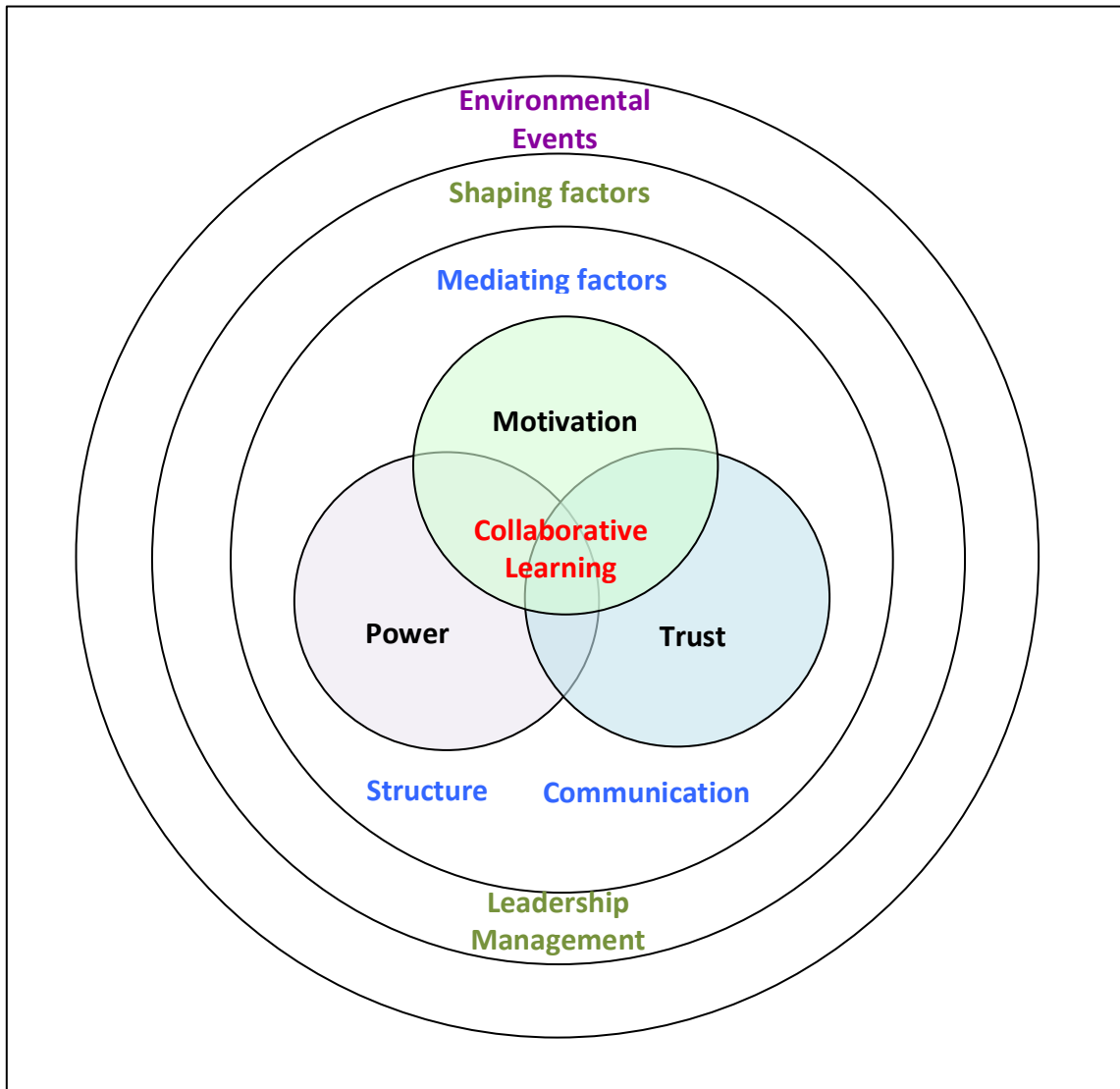


Figure 7.1: Interactive Factors Influencing Collaborative Learning

The determination of key '*mediating factors*' drew on some of the conceptual ideas in activity theory (Engeström *et al*, 1999, Engeström, 1999, Edwards, 2010) as discussed in Chapter 3, Section 3.4 (pp.68-70), to identify '*structure*' (which is taken to include space) and '*communication*' (which includes the use of language). '*Leadership*' and '*management*' were recognised as important '*shaping factors*', although these will only be considered in outline, as these major subject areas are not the intended focus of this study. However, taken together the mediating and shaping factors have an

important role in influencing how and when the core socio-psychological factors of motivation, trust and power are brought to bear on the development of learning within collaborations. In this way they have a bearing on the specific development of learning outcomes. Consequently, the influence of both mediating and shaping factors will be considered in the first part of the next chapter, prior to a discussion on learning outcomes.

This deeper analysis will begin by considering the three core socio-psychological factors, turning first to motivation.

7.2 The Importance of Motivation in University-Business Collaborative Relationships

Research on motivation in university-business collaborations has most often focused on the motives of academics and business to engage in these activities, although in doing so usually treats them separately, as was discussed in Chapter 2 (for example Dowling 2015; Hughes *et al*, 2016 and Lawson *et al*, 2016). The study into university-business collaborations by Ankrah *et al* (2013) attempted to address this by comparing motivations across both university and business participants in five Faraday Partnerships.⁴⁸ An interesting finding was that ‘*stability*’ was the most frequently cited motive⁴⁹ by both university and business groups, which may appear to be paradoxical but perhaps reflects a desire to reduce uncertainty and to control future direction by staying at the forefront of developments. This is probably a strong reflection of the science and technology basis of these collaborations. However, the contrasts in how

⁴⁸ The Faraday Partnership was a UK Government-sponsored initiative to encourage long-term collaborations between the science, technology and engineering research base and industry.

⁴⁹ The study ranked the six key motivations for businesses to collaborate identified by Oliver (1990): necessity, asymmetry, reciprocity, efficiency, stability and legitimacy. It was notable that several related to aspects of power, as will become clearer when this is discussed in Section 6.4, underlining the close but often overlooked link between these factors.

each group ranked Oliver's other determinants illustrated the complex nature of motivation and some clear differences in perspectives. For example, the university group ranked legitimacy as the second most important determinant (whereas businesses ranked this fifth equal out of six) and necessity and efficiency as third equal. By contrast, the business group ranked efficiency second and necessity and reciprocity as third equal (ibid, p.61).

Such studies, whilst useful, tend to focus on rational business factors (that are relatively easy to define) but in so doing fail to take account of the importance of the relationship building that may have been pivotal in bringing the organisations to the point of entering into collaborations. Relationship building was shown in Chapter 5 to be a particularly important factor in a number of cases studies, especially Hum 1, MPLS 2 and MPLS 3 (see Chapter 5, Sections 5.2.2, 5.2.5 and 5.2.6). Furthermore, when the focus of analysis is then moved to within the collaborations, it becomes clear that this factor continues to be a strong determinant of individual actions, affecting and affected by the interactions and interrelationships at all levels, as was clearly illustrated in Chapter 6, Section 6.4 (including its sub-sections, pp.183-205). To gain a deeper understanding of these mechanisms, it is necessary to consider motivation itself more closely.

Whilst definitions of motivation vary, Ryan and Deci's was useful for the purpose of this study because it illustrated the key reasons why motivation is particularly important in university-business collaborations. They state that, *"motivation concerns energy, direction, persistence and equifinality"⁵⁰ – all aspects of*

⁵⁰ *"Equifinality is the concept of multiple paths to a common end state"* (Jacobs, D.C. and Jacobs, M. in Mills *et al*, 2012, p.336). This can be applied to the field of psychology in which different experiences can result in the same outcome.

activation and intention” and go on to say, “*motivation is highly valued because of its consequences: motivation produces*” (Ryan and Deci, 2000a, p.69). Given that the university-business collaborations are undertaken to ‘produce’ desirable outcomes, in terms of learning or other intended benefits, it is clear why this factor is so vitally important.

Taking the key elements of Ryan and Deci’s (2000a) definition in turn, the need for ‘*persistence*’ within collaborations was amply demonstrated in several of the case studies, most notably in Soc Sc 2 (see Chapter 5, Section 5.12, pp.150-153 and Chapter 6, Section 6.4.2, p.187, for an outline of the complex challenges in this project). In this case study the university team’s task to produce a Consumer Impact Study was treated as a very low priority by the other partners in the early stages of the project, as their pressing focus was elsewhere. However, persistent relationship building by the academics, despite facing challenges, eventually enabled useful additional data to be gathered. This paid off as the other partners later became convinced of its importance to the project, which led to the report becoming the main focus and key output.

Given that it is impossible to predict and fully control the multiple interactions and events within collaborations, the concept of ‘*equifinality*’ is useful to apply to motivation within this context. This shifts the focus from control to attending to the underlying factors that affect its level of ‘*energy*’ and its ‘*direction*’. These two factors are of particular importance in this context, as shown below.

Mobilising mental ‘*energy*’ has already been shown to be of critical importance when pursuing learning (see, for example, Illeris, 2017). Moreover, the challenges of

creating new learning through collaborations and in ensuring that it has the ‘functionality’ needed (see Chapter 3, Section 3.2 and Figure 3.1, pp.59-62) will sometimes demand more challenging “*accommodative*”, as opposed to “*assimilative*”, learning (after Piaget, 1952, discussed in Chapter 3, Section 3.3, p.64), which requires higher levels of mental energy to be mobilised (Illeris, 2017, p.41). Importantly, it should be recognised that the learning demands on university and business participants may differ. For example, there may be collaborations in which the learning for researchers is mainly assimilative if, for example, they are largely applying pre-existing learning to a new business problem, but this may require accommodative learning for partners in the business organisation.

Enabling businesses to overcome such challenges in order to achieve the required level of functionality and successful exchange of knowledge places significantly greater learning demands on the academics, requiring commensurately higher levels of motivational energy. For example, in case study Med 1, the Research Assistant (Res Asst) applied established methodologies used in psychology and neuroscience to the analysis of packing designs, requiring limited adaptations in approach. The business partner’s design team, on the other hand, had always relied on their own professional (but subjective) judgements so for them the introduction of this statistical input to their considerations demanded very significant accommodative learning. It was nonetheless highly successful because the Res Asst personally presented the results to the designers and interpreted them in ways they could understand and that fitted within their existing weekly design process. This motivated them to engage and participate in what for them involved challenging accommodative learning (at least initially). For the Res Asst, this clearly entailed mobilising significantly

more energy than simply running the tests and providing the results, which would quite likely have been insufficient to make the collaboration a success. In many respects this was not unlike a teacher selecting an appropriate pedagogical approach to match the needs of a particular set of learners.

'Direction' is perhaps where motivation within collaborations differs most significantly from motivation within a single organisation, as can be seen from the above example. The key difference in collaborative environments is that each individual's motivation must be looked at not just in terms of their motivations as they relate to their own individual goals (to pursue a combination of their personal and their employing organisation's goals) but also in terms of their willingness to become motivated to pursue the goals of their collaborating partners. This principle is the foundation of effective university-business collaborations and underpins the need for partners to establish and embrace common learning goals, as was discussed in Chapter 6 (Section 6.3.1, pp.168-170, Section 6.3.2, pp.175-177, and illustrated in Figure 6.1). Each individual must therefore balance their motivation towards meeting both their own and their partner's goals, within the set parameters (such as funding, personnel availability and time) of the collaboration. It follows that this should be a strong determinant of the success of university-business collaborations but it is necessary to clarify what this means in practice and to examine the extent to which this is supported by the case study evidence. This first requires some further recourse to some theoretical considerations, as discussed below.

7.2.1 *Conceptual Perspectives on Motivation*

Whilst there are many different theories of motivation,⁵¹ their use as explanatory tools to show how motivation affects behaviour in complex collaborative environments is limited. However, relatively recent work developed within the socio-psychological literature that builds on the concept that motivation can be divided into two broad types, intrinsic and extrinsic, was found to offer more potential, as discussed below.

Much of the related literature regards intrinsic and extrinsic motivation as distinct but general categories. For example, motivation is regarded as intrinsic *“if an activity is undertaken for one’s immediate need satisfaction”* (Osterloh and Frey, 2000, p.539) or *“if the activity is valued for its own sake and appears to be self-sustained”* (Calder and Straw, 1975, p.599, after Young, 1961, p.171). By contrast, Osterloh and Frey (ibid) regard employees as extrinsically motivated, *“if they are able to satisfy their needs indirectly, especially through monetary compensation”*. More broadly, Ryan and Deci (2000a, p.71) state, *“extrinsic motivation refers to the performance of an activity in order to attain some separable outcome and, thus, contrasts with intrinsic motivation”*. These interpretations illustrate the broad distinction between the two types of motivation but the issue here is how these affect behaviour within collaborations.

Most fundamentally, intrinsic motivation is needed to support personal learning, as a self-sustained process. Ryan and Deci (2000a, p.70) explain that intrinsic

⁵¹ These originated mainly from pioneering work in the mid-twentieth century, such as Maslow’s ‘Hierarchy of Needs’ (Maslow, 1954), Herzberg’s ‘Motivation-Hygiene Theory’ (Herzberg *et al*, 1959), Vroom’s ‘Expectancy Theory’ (Vroom, 1964) and McGregor’s ‘Theory X and Theory Y’ (McGregor, 1960), with Ouchi’s ‘Theory Z’ (Ouchi, 1981) following later. Such theories have continued to have a strong influence on management and business education, notwithstanding some generally recognised limitations, as a basis for considering the motivation of the individual and the implications for their management within organisations.

motivation is innate to all individuals, describing it as, “*the inherent tendency to seek out novelty and challenges, to extend one’s capacities, to explore, and to learn*”. This linking of intrinsic motivation to personal learning is consistent with Illeris’s (2017) model of learning (see Chapter 3, Figure 3.2, p.75), although with his important caveat that this will be influenced by external interactions. In addition, Osterloh and Frey (2000, p.540) argue that intrinsic motivation is needed for creativity and that it is also an important enabler for the transfer of tacit knowledge. These relate to the requirements for accommodative learning and to the transferring and transforming of learning needed to provide functionality for business partners, as discussed in the previous section. Osterloh and Frey (ibid, p.540) also suggest that intrinsic motivation can overcome what they call the “*multiple task problem*”, where contracts cannot anticipate nor cover all relevant behaviours needed, which is pertinent for those university-business collaborations that have a formal contractual basis (as was the case in eight out of the ten case studies⁵²). It certainly appeared from the case studies that high levels of motivation were needed to generate the discretionary effort needed to develop new collaborations and overcome their inherent challenges, such as displayed by the Project Officer in case study Hum 1 or the Research Assistant in case study Med 1. In both cases it would have been extremely challenging to anticipate their highly motivated actions in advance and reflected these behaviours in their respective contracts accordingly.

This suggests strongly that intrinsic motivation is needed to drive the behaviours required to engage effectively within collaborations. However, as Ryan and Deci (2000a, p.71) point out, “*people will be intrinsically motivated only for*

⁵² Only case studies MPLS 1 and MPLS 4 did not have any form of written agreement in the form of a contract or a memorandum of understanding.

activities that hold intrinsic interest for them, activities that have the appeal of novelty, challenge or aesthetic value". In a collaborative context, those activities that deliver some wider outcome that is of value to the individual should also be added, as will be illustrated in the next section. They argue that much of what people do is driven not by intrinsic motivation but by social pressures to assume new responsibilities (Ryan and Deci, 2000a, p.71). This fits with the situation that some academics now find themselves in, to greater and lesser extents, with regard to the pressure to engage in impact-related collaborations, as discussed in Chapter 2, Section 2.2.1. As a result, some academics might see engaging in a particular project as a necessary means to an end (particularly some postdoctoral researchers facing limited opportunities to develop their research output), whereas others may be more strongly committed to the activity itself. In both cases though, whilst their motivations are broadly academic (Lawson *et al*, 2016, Hughes *et al*, 2016 and D'Este and Perkmann, 2011, discussed in Chapter 2, Section 2.3.4), they are still underpinned by the expected outcomes (see Perkmann *et al*, 2012, p.433, quoted in Chapter 6, Section 6.2.5). On this basis they are therefore largely extrinsic in nature because in most cases these are separable from the activity itself (a key element of Ryan and Deci's definition of extrinsic motivation given above). It is only in instances where that motivation to collaborate first and foremost is driven by the engagement in the activity itself that it could be regarded as truly intrinsic.

The conclusion drawn from the above is that if the motivations for academics to engage in collaborations are extrinsically driven then extrinsic motivation needs to embrace a very wide range of dispositions towards the collaborative activity itself. Ryan and Deci (*ibid*) pursued this issue in their development of Self Determination

Theory (Ryan and Deci, 2000a). In this they depart from the general view of motivation being either intrinsic or extrinsic and propose that the range of motivations sit instead on a spectrum, according to how much they are self-determined. They see this as a function of the extent to which the regulation of the required behaviour or value is internalised or *“taken in”* and integrated, *“where there is further transformation such that the regulation becomes their own”* (ibid, p.71).

Consequently, Ryan and Deci (ibid) sub-divide extrinsic motivation into a number of categories and in addition to extrinsic and intrinsic motivation they added *amotivation*, where an activity is not valued and individuals may therefore just go through the motions in a *non-regulation* (and non self-determined) context.

Their four categories of extrinsic motivation vary according to the balance between external and intrinsic regulation with increasing levels of self-determination. *External regulation* is their most extreme form of extrinsic motivation, which relies entirely on the imposition of external controls through rewards and penalties, with the subject having very little self-determination. *Introjected regulation* is seen as where the individual accepts the external regulation (and it is therefore more self-determined), with associated rewards and punishments, but it is not fully recognised as his or her own. They suggest that this may exist where individuals are motivated to demonstrate their ability or to avoid failure in the eyes of others and so depends heavily on ego. Even more self-determined, Ryan and Deci (ibid) define *identified regulation* as where an individual personally identifies with the activity or behaviour, which is valued and accepted as important. Their final category of extrinsic motivation is *integrated regulation*, where an individual fully identifies with and assimilates the regulation, when it is congruent with their needs or values (and is thus highly self-

determined). It is distinguishable from *intrinsic regulation* (fully self-determined), however, because the outcomes are separable. Finally, they see *intrinsic motivation* itself as where an individual undertakes an activity for its inherent satisfactions and acts highly autonomously in doing so. In this way, Ryan and Deci propose that motivation sits on a sliding scale of self-determination from amotivation (least self-determined), through four progressive levels of extrinsic motivation (external, introjected, identified and integrated regulation) to intrinsic motivation, which is fully self-determined (Ryan and Deci, 2000a, pp. 72-73).

7.2.2 *Interpreting the Influence of Motivations within University-Business*

Collaborations

The concepts in the previous section help to provide more granularity in understanding how motivations influence actions both when engaging with and working within collaborations. Many of the researchers that played leading roles in brokering the collaborations were clearly highly motivated to engage the partner organisations and demonstrated strong identification or integration with their values and goals, alongside their own. A number of these participants had previous experience of working in the sector that their business partner was in, such as the Research Assistant in Med 1 and the Principal Investigator in Med 2, and were very keen to apply academic expertise to familiar issues in a sector that they still very strongly identified with. This was also true of the Project Officer appointed in Hum 1. This could also apply in reverse, for example the Organisational Sponsor in Hum 1 had an academic background and was keen to exploit the university's potential within the charitable organisation. In other cases the academics were highly motivated to apply their expertise to solving real world problems and quickly demonstrated a willingness

to integrate their motives with those of the partnering organisations. These were mostly working in their fields of expertise, such as the Academic Project Manager in Hum 1 and the academics working in the conservation-related case studies (MPLS 1, 2, 3 and 5). The Research Associate in case study MPLS 5 was also a practitioner in a conservation-related area, whereas the PI in case study MPLS 4 (Global Data Analytics) was driven to apply deep technical expertise to a completely novel area. In all cases, they displayed strong motivation that Ryan and Deci (2000a) would characterise as highly self-determined.

It can thus be seen how the observations by the Organisational Project Manager (OPM, part of the charity's core project team) in case study Hum 1 reflected the highly 'identified' or 'integrated' extrinsic motivations⁵³ of the Academic Project Manager (APM), which had a positive influence on the charity's decision to collaborate with the university:

"We had a series of meetings where (APM) would throw out provocative ideas, which was really helpful in showing us that there were opportunities and getting us to think through what problems we could solve through this potential partnership...(APM) was articulating it in terms of what's in it for us and what's in it for you so you could explore those win-win situations...(APM) came up with lots of ideas that made that co-creative process really easy for us"
(Organisational Project Manager, charity).

The sliding scale of self-determination that forms the basis of Ryan and Deci's continuum (2000a) is essentially a scale of autonomy. This is highly relevant to this context as a preparedness to accept some loss of autonomy is the basis for successful collaborative activity, whether it is applied to decision-making on what activities should be undertaken or to how they should be conducted. This raises the question of

⁵³ The terms identified by Ryan and Deci's Self Determination Continuum (2000a) are useful but it is important to recognise that as part of a continuum the category boundaries are not precisely defined. Consequently, it is not always possible to attribute behaviours to specific categories with any certainty.

how individuals can be motivated to engage positively in collaborative activity whilst at the same time willingly giving up some autonomy. This partly depends on how expectations are framed, as explained below.

Within university-business collaborations, the scope for autonomy is dependent on the mode of co-development (see Chapter 6, Section 6.3.3 and Table 6.1, pp.180-183), which could be either pre-determined or emergent during the early stages of collaboration. The expectations of autonomy should be adjusted to different modes of working, for example a university participant might expect to work relatively independently in '*adding mode*', where the development work is undertaken separately but within an iterative cycle of updating the partner on progress and then responding to feedback. By contrast, in '*combining mode*' a university participant could expect to work more jointly, often as part of a team, with relatively fewer opportunities to work autonomously. '*Augmenting mode*' entails elements of both. Consequently, motivations within university-business collaborations may be more specifically linked to the ability to influence the mode of co-development to a level that the participant finds acceptable, which I shall term "*relative autonomy*". It will be shown in Section 7.4 that such ability to influence forms the basis of social power (French and Raven, 1959), which underlines how closely inter-connected these factors are in collaborative activity.

Whilst this provides a more realistic view of autonomy within the context of university-business collaborations, each party may interpret what constitutes acceptable levels of autonomy for both themselves and their partners differently and seek to influence this accordingly. This can become problematic where a participant is not prepared to concede aspects of their own autonomy or agree to desired levels of

autonomy of their partners, to the detriment of them achieving their intended goals. These are critical aspects for university and business partners to reach agreement on but they may not always be fully addressed or subsequently adhered to. Different expectations of autonomy can be seen to relate to both the conduct of collaborative activities and the determination of outputs from them in case studies Soc Sc 1 and Soc Sc 2⁵⁴ and these shall be returned to later in this chapter.

To avoid issues relating to autonomy, participants need to agree mutually acceptable levels of influence but also to actively facilitate opportunities for their partner to exercise them. A good example of this was found in case study MPLS 5 in which the co-sponsors (Government Agencies) made clear from the start that they wanted to be able to influence the development of the software tool that they had contracted the Oxford team to undertake. The researchers responded by working closely with the co-sponsors, providing regular updates on conference calls and being very responsive to both the queries and the feedback they received. In effect, this was an 'adding' mode of working (as dictated by the nature of the technical build) but executed in such a way that the business partners felt fully able to influence the Oxford team's technical development of the software tool. This was further enhanced in the latter stages when a full dummy run of the tool was laid on for the business partners. The team hosted this event at Oxford, when all stakeholders (including some representatives of the end users) were able to input dummy data to try out its

⁵⁴ These issues have already been outlined in Chapter 6 but the Event State Networks for each of these case studies at Appendix 4, Parts IX and X provide an outline of how these case studies experienced tensions between university and business participants. The short case study vignettes in Chapter 5, Sections 5.11 and 5.12 provide further context. It should be added that whilst these tensions provide a useful focus for analysis in this research, they should be seen in the context of wider developments in these collaborations. In both cases these supported positive and valuable learning outcomes, even though these were not entirely in line with initial expectations. There are useful lessons to be drawn from this, as will be discussed in the next chapter.

functionality and provide feedback. This was received very well, building on the positive relationship that had already been established:

“There was that sense that actually it was more of a joint effort, it was more of an ‘in it together’, there was that sort of trust and that was great. The trip up to Oxford was good, we had a good shout and we got a lot of stuff done...it wasn’t too formal; it wasn’t too line-by-line, agenda-by agenda item; it was far more open and probably effective because of it” (Co-Sponsor, Government Agency, case study MPLS 5).

The positive working relationship was similarly recognised by the Oxford team, as reflected in the Postgraduate Researcher’s (PR’s) comment:

“The fact that all of the individuals involved were easy to work with; warm, smart, quick, adaptable, the types of things that you need from a project group, meant that we were able to get on quickly and get things done...with all this knowledge exchange it is about mechanisms and things but often it is about individuals and personalities” (Postgraduate Researcher, MPLS 5).

It can be seen here that both parties were willing to accept some regulation of their activity by the other. That is, a loss of some autonomy, in order to ensure that the partner could gain relative autonomy. This resulted in high levels of motivation on both sides that supported positive working relationships, leading to effective learning through co-development.

This supports Ryan and Deci’s (2000a, p.73) assertion that a feeling of ‘autonomy’ is important for the internalisation of motivations. However, within the context of university-business collaborations this needs to be understood in terms of the ability to apply an acceptable level of influence to attain relative autonomy. In addition, they further assert that two other variables are important in this regard; ‘relatedness’ and ‘competence’ and both of these were also evident in case study MPLS 5. *Relatedness* is where an individual is motivated to undertake an activity or adopt behaviour because business partners value it. This, they say, may be an

important initial reason for accepting extrinsic regulation and it underlines the need to build personal relationships first (as was shown to be the case here in Chapter 6, Section 6.4.2). This is consistent with a similar point made by Osterloh and Frey (2000, p.540), who noted that strong personal relationships could raise intrinsic motivation. Secondly, increasing internalisation depends on the perceived *competence* the individual feels in relation to the activities of the group. This will often arise from positive feedback and support in collaborative settings. A comment from the Project Officer (PO) of the international organisation in case study MPLS 2 illustrated the positive influence of both of these variables on motivation and showed how this increased motivation supported exchange that led to further learning:

“I think in the first instance it’s been fun and enjoyable and that’s partly to do with the characters...it was having the space to exchange on an informal level...I think we are personable people who can work well in teams and we are interested to explore and develop the relationship on both sides...without that I don’t think we’d have gone much further. Then there’s something we brought around complimentary insights together and it was motivating to exchange on those complimentary insights and so there was definitely a respect”. (Project Officer, International Organisation, case study MPLS 2).

Across the case studies, there was some evidence to suggest that for some university participants continued highly positive engagement within collaborations could lead to the integration of the values inherent in conducting the activity itself to the extent that the motivation to do so became intrinsic. This is not to say that the separable goals of academic or other project outputs were no longer important but for these individuals the value of doing the activity itself became the primary driver; derived in part from the ‘relatedness’ to the people with whom an individual is working closely with, particularly where they support strong feelings of ‘competence’. More fundamentally, the learning motivations that an individual gains from engagement in a collaborative

activity may become very *'situated'* in the practice itself (after Lave and Wenger, 1991, discussed in Chapter 3, Section 3.4, pp.67-68). Where there is shared participation in and strong commitment to the learning activities within the collaboration, as seen, for example, in case studies Hum 1 and Med 1, it does seem that this becomes a *'community of practice'* (Wenger, 1998) that an individual is motivated to become part of and, importantly, to apply new learning within. This is supported by the reflections on changing motivations by the Project Officer (PO) in case study Hum 1:

"When I began it was far more about what I would gain from the project rather than what I could give to the project...whereas by the end of the project I realised it was far more about sharing the knowledge I had gained in this collaboration, which was interesting because when I began I never expected to get to where I got to by the end of the project. I felt very junior but very quickly I felt it was mine and I owned it, very quickly. You see my main motivation was an opportunity to learn and making an opportunity to learn rather than actually I have the knowledge and skills to share" (Project Officer, case study Hum 1).

A further example that supports the argument that positive engagement may lead to the development of high intrinsic motivation is provided by the Principal Investigator (PI) in case study MPLS 4:

"...to see it working in the real world and doing something good is just amazing. And for me it was actually the Nepal exercise, where I could see it going beyond papers and demos and...actually having an impact on the world made all the difference for me. So now when it gets tough and I think why am I doing this, well there's the answer". (Principal Investigator, case study MPLS 4).

The importance of developing intrinsic motivation in the collaborative goals is twofold.

First, it clearly raised the individual's own focus and commitment to the particular learning challenges within the collaboration but by demonstrating this the collaborating individuals were also likely to have a positive effect on the collaborating partners. There were several cases across the case studies where business partners noted and were clearly encouraged by such displays of high motivation and associated

commitment to the collaborative (as opposed to their own) goals. Continuing to follow through the case study MPLS 4 example, this was illustrated by a point made by the Deputy CEO (DCEO) of the charity:

“(PI) is really passionate about this type of work and kinds of applications, so as well as this is interesting academically and theoretically, (PI) also very strongly believes in the importance of this on a humanitarian level...you have to have a personal motivation to be prepared to work that hard. Yes, I’m sure they are interested in how academic theory can be applied in practice but they were working as hard as we all were” (Deputy CEO, Relief Charity, case study MPLS 4).

The DCEO saw the high degree of motivation on both sides as a critical success factor, which reinforces the importance of this, particularly when it is considered that the charity’s CEO was initially reluctant to engage, seeing little motivation to do so in the circumstances. This high motivation to engage led to close co-operation and interpersonal discussions that in turn led to a greater understanding of each other’s capabilities. The PI pointed out the importance of this, explaining that they needed the charity to understand the machine learning (in general terms) so that they do not just *“come out with random stuff”*. As this understanding increased, the DCEO started to suggest new areas to focus further development on, such as incorporating predictive elements and utilising data captured from people on the ground through social media. In effect, learning within the collaboration enabled the DCEO to identify new areas of learning for the university research team to pursue and so this was directly supporting the goals of both the Charity and the University. This general pattern of development was similar to that seen in other successful case studies, particularly Med 1 and MPLS 2 (which was on-going) seemed to be progressing in the same direction.

This section has sought to illustrate how and explain why motivation is so

critical in university-business collaborations. It has sought a deeper explanation of motivations drawing particularly on the notions of intrinsic and extrinsic motivation and the related work of Ryan and Deci (2000a and 2000b). This was used to show the importance of the contextualised concept of relative autonomy (acceptable levels of influence) within collaborative relationships and how, where these are supported to mutually acceptable levels, high levels of motivation can result. Most importantly, it was shown how this directly supported more effective co-development and learning. In the next section, trust shall be turned to, with a focus on its relationship to motivation.

7.3 The Importance of Trust in University-Business Collaborative Relationships

Trust is a widely used term, often quite loosely, so to begin with it is useful to clarify what is understood by this term in the academic literature, after which some useful concepts are taken from trust research to aid the analysis of trust influences within the case studies. This then provides a basis for examining the implications for trust within university-business collaborations.

7.3.1 Understanding Trust in the Context of University-Business Collaborations:

Definitions and Concepts

At the inter-organisational level, Huxham and Vangen (2005) examine the role of trust within a general business context and take the view that:

“Trust is about the expectations that partners have about their collaboration and about their partners’ future behaviours in relation to meeting those expectations (Gulati, 1995). Trust is the anticipation that something will be forthcoming in return for the efforts that are put into the collaboration – a faith in the partners will and ability to help materialise the sought after competitive advantage” (Huxham and Vangen, 2005, p.154).

This reflects the logical perspective that businesses are extrinsically motivated to

collaborate in order to gain a competitive advantage but, importantly, it emphasises the expectations of the partner's behaviour in relation to that needed in order to achieve it. Bachmann and Inkpen (2011) examined the importance of the institutional level in trust formation. They helpfully distinguish between trust in institutions and institutionally based trust, which they see as *"the phenomenon that individual or collective actors develop 'in the face of' specific institutional arrangements in the business environment"* (ibid, p. 284). In the early stages, they suggest that contracts and other institutional safeguards may encourage relationship building since they allow managers to focus less on self-protection and more on task performance. Whilst they conclude that institutions may produce a form of trust weaker than trust that is interaction-based, it can *"shape and channel actors' expectations so as to allow for trust building in many situations where otherwise there would be none"*. This supports the notion developed in the introduction to this chapter that within collaborations specific factors may derive influence from multiple levels but ultimately they impact on the individuals.

Adobor (2006, p.274) describes trust similarly as *"the belief that partners will act in good faith and not do anything harmful to their counterpart"* and underlines the importance of interpersonal relationships in its development. Behaviourally, he suggests that this resides at this interpersonal level since organisations cannot trust directly (ibid, p.477), noting the assertion made by Child that *"any trust that exists between organizations comes down to the quality of mutual trust that exists between individuals, what he calls 'trust guardians'"* (Child, 2005, p.38).

This leads to a focus on the socio-psychological framing of trust at the

individual level. Whilst such definitions abound, the conceptualisation of trust proposed by Mayer, Davis and Schoorman appears to have been influential in the literature:

“The willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular transaction important to the trustor, irrespective of the ability to monitor or control that other party” (Mayer, Davis and Schoorman, 1995, p.712).

The above conceptualisation formed the basis for the frequently cited definition (for example, Dunning and Fetchenhauer, 2010, p.148, Jarratt and Ceric, 2015, p.3) provided by Rousseau, Sitkin, Burt and Camerer:

“Trust is a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another” (Rousseau, Sitkin, Burt and Camerer, 1998, p.394).

As at the inter-organisational level, inter-personal trust is founded on each party's expectations of the other. It is therefore vital that all parties involved in university-business collaborations reflect on this not just in terms of what their expectations are of the other party but also in terms of trying to fully understand what their partner's expectations are of them. The key to understanding the importance of this is the reference to vulnerability in the definition offered by Rousseau *et al* (ibid). This relates to the potential for collaborating parties to suffer loss, as well as gain, if their partners act opportunistically in a way that exploits them or undermines their position in some other way. In view of this, a willingness to enter into and to work within a collaborative relationship involves a degree of risk. For organisations there are clearly commercial and reputational risks but there is also the risk at the interpersonal level that individuals themselves will be exploited, which Yamagishi, Cook and Watabe (1998, p.170) refer to as *“social uncertainty”*. Adobor (2006, p.474) also describes

“relational risk” as “the probability that the partner will not co-operate fully” and suggests that such risks can be reduced by strong personal relationships. He adds that contracts alone cannot fully mitigate them because they cannot cover every possible contingency.

A key advantage of developing networks and pre-collaborative relationships (see Chapter 6, Sections 6.2.1, pp.156-158 and 6.2.4, pp.161-163) is that it may lower the perceived risk of entering into collaborative activities. A good example of this was seen in case study MPLS 3, where the Knowledge Exchange Fellow was able to quickly partner up with the Project Manager (PM) within a Government Agency to support a bid for funding to support a joint project bid (Chapter 6, Section 6.2.1) since a trusting relationship had already been established. In case studies such as Hum 1 and MPLS 2, trust was developed over periods of extended pre-engagement, whereas case studies Med 2 and Soc Sc 1 were good examples of where reputational influences also seemed to be part of the trust calculation (in both of these cases the businesses routinely contracted with universities or individual academics, which may account for some of this).

The above examples show how, in most cases, university and businesses partners would have made an assessment, consciously or subconsciously, of the degree of risk concerning how their prospective university partner would be liable to act before entering into the collaborative relationship. Beyond its initial formation, trust was seen to remain a live factor throughout subsequent engagement in collaborative activities so this needs to be understood further. This initial assessment and then continuing re-evaluation of trust has been captured in process models to show the key stages and variable influences involved. The model of trust developed by

Mayer *et al* (1995) provided a useful basis for explanation because the activities within university-business collaborations could be related closely to the model's components.

Mayer *et al* (1995) proposed a process model of trust that considers the characteristics of both the 'trustor' and the 'trustee' in relation to the willingness to take risk. This is useful in relation to this study, given that it has sought to understand both academic and business perspectives. In much of the literature relating to trust in university-business collaborations, if it examines the nature of trust at all (beyond noting where it appears to be important) the pre-existing disposition of the trustor is commonly overlooked. Mayer *et al* (ibid) asserted that individuals have different propensities to trust others, based on previous experience but also reflecting differences in personality and culture (ibid, p.715). When considering the business participants as trustors, it was noted within the case studies that whilst most were positively pre-disposed to working with academics (as would be expected in a sample of participants engaged in collaborations), some business participants commented on how their prior experiences of working with academics had been less positive, such as the Head of Business Function (HBF) and some of the Design Agency leads in case study Med 1 (see Chapter 6, Section 6.4.1, p.185). In case study MPLS 2, the approach taken by the Knowledge Exchange Fellow (KEF) contrasted with the Project Officer's more negative experiences of working with academics in the past and was well received accordingly:

"I have worked with some academics before and they can be so opinionated and arrogant and just make you feel stupid and are so condescending but I have never had that impression with (KEF). So it was more like we were able to share our various perspectives". (Project Officer, International Organisation, case study MPLS 2).

It is clear that as a consequence of mixed previous experience, illustrated here,

or perhaps other factors (there were some examples of general scepticism or defensiveness), attitudes across the business community to working with academics can vary and so trust may be harder to gain with some than others. This underlines the inherent dangers of academics making generalisations and assumptions in their early engagement. It also underlines the danger of relying on notions of reputation, as discussed in Chapter 6, Section 6.2.6, p.166).

Considering academics as the '*trustors*', it was readily apparent that levels of experience varied from those with extensive work or collaborative experience with business to those with little or none. As previously discussed, those in the former category were generally highly motivated to engage, although their experience also informed more realistic expectations of how businesses would behave and some took steps to address these accordingly even before the collaboration began (see, for example, Chapter 6 Section 6.3.2, p.172, for the actions taken by the Research Associate in case study MPLS 5 and Section 6.3.3, pp.179-180, for those taken by the Principal Investigator in case study Med 2). Those lacking that experience sometimes did not anticipate the challenges to pursuing their own goals. As a consequence, their prior expectations appeared to be high in relation to how business partners might actually behave in relation to supporting their academic needs but this reflected their lack of experience (in the case of some early career researchers) rather than an innate tendency towards overly high levels of trust. However, the point here is that this lack of experience (or the absence of any training or development to compensate for it, as will be discussed in Chapters 8 and 9) meant that the academics concerned found themselves facing challenges that they were unprepared for and found difficult to respond to.

In considering the trustee, Mayer *et al* (1995) proposed that three factors were important in the trustor's assessment of their 'trustworthiness'; ability, benevolence and integrity. Ability, *"that group of skills, competencies and characteristics that enable a party to have influence within some specific domain"* (ibid, p.717) is clearly of particularly high importance in university-business collaborations. However, in the context of university-business collaborations, business actors will judge that in terms of whether the academics have the ability to help them to develop 'functional' solutions (see Chapter 3, Section 3.2, pp.59-62). That is, apply their knowledge and skills successfully within the business context. The university teams' demonstrations of their ability to do this in case studies Hum 1 and MPLS 4 (in Chapter 6, Section 6.2.3, pp.159-161) were effective because they engendered trust in their ability. By contrast, in case study MPLS 5 (Chapter 6, Section 6.3.2, p.172), it was the detailed bid from the Oxford team (for the contract research project) that demonstrated their ability, thus providing the initial basis for trust. Mayer *et al* (1995) state that such ability is domain specific but demonstrations like these also illustrate wider collaborative skills that contribute more strongly to trustworthiness. However, it was also clear that based on their previous experience, some business participants saw the ability of academics to apply their abilities effectively in the work context as a risk. In this regard the comment by the Company's Group Scientific Expert (GSE) in case study MPLS 1 shows how the KEF's willingness to seek to understand the business environment helped to build trust:

"So I didn't see (the KEF) as a strict academic, coming out with very academic ideas or concepts. (The KEF) was very open to how companies work in the first place, which probably helps". (Group Scientific Expert, multinational company, case study MPLS 1).

Benevolence relates to the extent to which trustees are believed to want to help the trustor, other than in pursuit of their own personal or organisational goals (ibid, p.718). The importance of this has already been highlighted as it links closely to the trustee's willingness to internalise the trustor's goals into their own motivations (see Section 7.2.1), which emphasises the close inter-relatedness of these factors. However, across the case studies benevolence was most directly demonstrated by specific actions that signalled this commitment. From this perspective, benevolence was perhaps most clearly demonstrated at the start of collaborations when the academics indicated strongly that achieving the business partner's goals were a priority. A good example is where the Knowledge Exchange Fellow made clear to the Programme Manager (a civil servant) in case study MPLS 3 that the production of a Government Report was the key output to work towards (Chapter 6, Section 6.3.2, p.173). Another clear example, from case study Med 2, was the willingness of the University's Laboratory team to give all relevant research information to the pharma company and to start work on their areas of interest even before the formal contract was signed (Chapter 6, Section 6.4.1, p.183).

The third factor identified by Mayer *et al* (1995, pp. 719-20) relates to the extent to which the trustee adheres to a set of principles that the trustor finds acceptable (ibid, p. 719). They explain that these may also relate to the cultural values and norms of the organisation to which an individual belongs. Mayer *et al* choose to label this factor 'Integrity' but it can be argued that this is inappropriate because it can be interpreted too narrowly as moral integrity, which may be misinterpreted in collaborative contexts to suggest that one party has greater or lesser integrity than another rather than simply different values (which are broader in scope). So it is

preferable to use the term '*Values*' instead, as a more encompassing and neutral term. Values are certainly a key consideration when brokering university-business collaborations as such differences in values, especially in relation to academic and business ethics, culture and working practices may put strain on trust when university and business parties are unable to reconcile these. This underpins the importance of developing a collaborative understanding and empathy with partners, as discussed in Chapter 6, Sections 6.2.4 and 6.2.5.

Mayer *et al* (1995) argue that the three factors together inform a view of the perceived '*trustworthiness*' of the trustee. When combined with the propensity of the trustor to trust, this determines a level of trust that the trustor then considers against the perceived risk of doing so (within that specific context) and then acts accordingly. However, they see this as a dynamic process in which the positive or negative outcomes of the risk taken provide feedback. This then leads to a reassessment of the level of trust and commensurate adjustment of the level of risk that the individual is prepared to take in the future relationship. Before looking at how this relates to behaviour within case studies, however, it is necessary to consider some further perspectives.

Dunning and Fetchenhauer (2010, p.153) would describe the above model as a '*rational*' approach, which assumes that the decision to trust is a deliberate and conscious process based largely on the expectations of an individual or group. Notwithstanding the logic of the rational approach to explaining trust, Dunning and Fetchenhauer (*ibid*) point to a large body of research that suggests that the decision to trust may also be based on emotion. This, they say, is much quicker and arrived at automatically with little or no conscious calculation. Becker (1996) contrasts these as

'cognitive' and *'non-cognitive'* approaches (Dunning and Fetchenhauer, 2010, p.155).

Dunning and Fetchenhauer (ibid, pp.162-3) suggest that the situational context may be important in determining which approach to making trust decisions is used, with individuals more likely to use a more rational cognitive approach in formal relationships, where there is no personal connection. Such formal relationships without personal connections are unlikely within the types of university-business collaboration examined in this research but it is possible that those on the periphery of university-business collaborations, such as senior managers, adopt more rational approaches. Whilst this was not a focus for this research, there were several examples in which university or business participants referred to the more rational approaches taken by their bosses, where they were generally far less engaged in the direct relationships.

Nonetheless, the case study evidence suggested that those involved in close collaborative interactions were more likely to adopt non-cognitive approaches at an inter-personal level, where their relationships developed positively, as illustrated in Hum 1, MPLS 2, MPLS 3 and Med 1. This is generally supported by the literature. Jarratt and Ceric (2015) describe how the general premise of much trust research is that the initial stages of collaborations are generally founded on cognitive (or rational) trust, supported by contractual procedures. Subsequent positive experiences and outcomes may lead to a loosening of procedures, more informal arrangements and an increased emphasis on *'affective trust'* (ibid, p.4), similar to the non-cognitive or emotional trust discussed above, based on relationship building. However, they point out that trust research often fails to take account of external trust behaviours outside of their direct relationship, which they argued could have an influence on trust within

the collaboration itself. They further propose that rather than trust being a controlled and linear progression, it is emergent from the multiple interactions and inter-relationships involved in the collaboration. This does not mean that the general premise is not useful but rather that reality is far more complex, which was borne out by the case studies. However, taken as a whole, these concepts are useful for understanding how trust influences and, in turn, how trust is influenced by the interactions and inter-relationships within the case studies in the next sub-section.

7.3.2 *Interpreting the Influence of Trust within University-Business Collaborations*

Drawing on the case study evidence, this final sub-section on trust will focus on some key interpretations of its influence within university-business collaborations. The pervasive importance of trust was reflected in a comment made by the Director of Research Coordination of the pharma company in case study Med 2:

“I think the biggest learning for me, the science has been great, but apart from the science is the idea of mutual trust and respect. And it definitely works best when both sides talk and share openly with each other, within the confines of the collaboration” (Director of Research Collaboration, Pharma Company).

However, the intention here is not to dissect the development of trust within the case studies in detail but rather to show how it exerts an influence both directly and, through its interaction and inter-relationship with other factors, on learning. Perhaps most importantly, trust impacts on the willingness of the participants to take risks with regard to working with their partners. This was seen to impact on both motivations and learning outcomes.

Where there is an aversion to risk then learning outcomes can be significantly curtailed, as will be discussed in the next chapter, but case study Hum 1 can be used to illustrate how a willingness to take risk can lead to positive outcomes. At an early

stage of the project the demonstrable competence and initiative taken by the Project Officer (PO) became clear to the joint management team (the Academic Project Manager, APM, and the Organisational Project Manager, OPM) who decided to risk affording the PO a high degree of autonomy in developing a sustainable delivery model but also in pursuing wider activities in addition to the core requirement. Despite this project having very specific objectives (as required of a Knowledge Transfer Partnership) they trusted the PO to work towards the broader strategic intent of both the University and Organisation (with the backing of the Project Board). As a consequence, the PO was highly motivated to develop the expanded portfolio and was confident to take risks in driving these new initiatives forward, assured that the OPM and APM would provide robust support when resistance was encountered, as sometimes proved to be the case. This was very much a two-way trusting relationship between the PO and the PMs. The PO established a robust and scalable business model to meet the deliverables and even though the project under-delivered on the target throughput, the impact of the wider range of initiatives taken as a whole were judged (by the Government Agency and both participating organisations) to have far exceeded what was originally envisaged and so this trust was clearly well placed.

It can thus be seen that a willingness to take risks supports the conditions to develop new initiatives that lead to positive and sometimes enhanced learning outcomes, as case study Hum 1 illustrates here. Several other examples of a willingness to take risk, in different ways, have been described in other case studies, such as Med 1, MPLS 3, and MPLS 4 but invariably this was based on close relationships having first been established, suggesting that this may have been based on non-cognitive trust.

The previous chapter identified three particularly important ways in which university participants built trust with their business partners and it is worth briefly highlighting their relevance in this context. First, in Chapter 6, Section 6.4.1, it was shown how some university participants actively took steps to show their commitment to supporting business aspirations from the start (examples majored on case studies Med 2 and Med 1), which built trust by demonstrating both benevolence and ability. This is of fundamental importance as it reduces the perceived relational risk (Adobor, 2006, p.474). Secondly, the ways in which university participants responded positively to changing or additional learning needs that emerged as the collaborations progressed, illustrated in case studies Med 1 and MPLS 5 (see Section 6.4.2, pp.188-190) built trust but also enabled them to exert more influence on the development of the projects as a result. This appeared to reflect business partners becoming correspondingly more willing to accept some regulation of their activity. Whilst this links to the motivational factors discussed in Section 7.2.1, it can also be interpreted in terms of increased social power, which will be discussed in the next section. The third aspect relates to where the academics show both a willingness and ability to respond to business imperatives, particularly in working at their pace, as seen in case studies Med 1 and Med 2, or in responding to urgent contingencies, as was the case in MPLS 4. Whilst such behaviour could be attributed to benevolence or values, to the business organisations it was probably seen as the key assessment of the university partners' abilities since timeliness and responsiveness were a critical part of functionality from their perspective. These three ways of trust building should be taken as general principles that are incorporated into university approaches.

The case studies showed that the ability of collaborative partnerships to

overcome internal or external challenges could often be a critical factor in their success. There was some evidence that high levels of trust were important in this regard. In many cases mutual trust between the core university and business participants was built up cumulatively and was clearly underpinned by strong inter-personal relationships in as far as the individuals regarded each other as trusted members of the same team, working towards common learning goals. This meant that the level of personal trust between individuals appeared to be deeply held to the extent that when challenges arose there was seen to be a collective and mutually supporting response. In other words, the development of affective trust appeared to make relationships more resilient and therefore more able to tackle challenges effectively rather than seeking to place blame internally. A good example of this was seen in case study MPLS 3 when it became clear that the Project Intern (PIN) would not be able to complete the project report by the end of the funded period but the collective team response was positive, as discussed in Chapter 6, Section 6.4.5. The critical success factor described by the Project Manager reflects the high level of affective trust they established:

“Having an open team where you can talk, where even if things go wrong there is no blame” (Project Manager, Government Agency).

However, in some collaborative relationships the levels of trust could be altered where there were changes of key personnel or responsibilities, as highlighted by the Principal Investigator in case study Med 2 (see Chapter 6, Section 6.2.6, p.167), where new personnel have different values, benevolence or even ability, compared to their predecessors. However, such changes can be both positive and negative. In case study MPLS 4 the DCEO taking over the lead for managing the relationship with the

University team was a very positive turning point, leading to much closer collaboration, which benefitted both parties.

Nonetheless, there were inevitably periods in some collaborations when it was challenging to establish or to maintain high levels of trust. In case study MPLS 1, the Knowledge Exchange Fellow (KEF) had limited motivation to undertake the task of providing a paper on the current state of conservation science to inform the GSE's drafting of the company's conservation strategy and somewhat reluctantly agreed to do so, thereby accepting a degree of 'introjected regulation' (after Ryan and Deci, 2000a, see Section 7.2.1). However, the KSE's trust in doing this work for the GSE was based upon the expectation that this could subsequently lead to field opportunities to conduct original research or apply advice directly at an operational site, which could support academic outputs. By the time of the interviews the paper was largely complete but the KEF had grown frustrated at the lack of such opportunities materialising and so trust in the Company to support this expectation was falling:

"I thought that I would be able to, you know, this initial project with (the Company) was just meant to be an ice-breaker really but this may be it for them. I imagined that I would be able to go in and present a short report, like I've done with (the Company), then entice them to select case studies, specific business case studies, where they are wondering how they can improve their accountability for their environmental impacts" (Knowledge Exchange Fellow, case study MPLS 1).

With further reflection though, the KEF came to appreciate why the GSE was in a difficult position to facilitate this. It appeared that the GSE lacked sufficient support for the idea within the business team and even if convinced, such proposals would have to be agreed with operational sites, which entailed long lead times even if supported. Moreover, there was also a realisation that it risked undermining GSE's own position within the Company to push the proposal further. As a consequence, the

KEF focused attention on demonstrating how the task that had been undertaken with the GSE had provided a potentially new collaborative pathway to impact by helping the GSE to secure corporate biodiversity commitments within a major multinational company. This demonstrated how trust might be challenged when expectations are not met but as the difficulties in taking the proposal forward only emerged later, this could not be anticipated. Consequently, the sponsors of academics in such roles must be prepared for this to happen, since trust involves a degree of risk, as has been discussed. Nonetheless, the agility shown by the KEF in switching to a more achievable outcome demonstrated how positive learning outcomes could still be achieved from challenging collaborations.

Case study Soc Sc 2 illustrated how there can be particular challenges for academics in forming trust in multi-partner collaborations, potentially to the detriment of achieving their goals. Here the university team had not formed a direct partnership with the business parties but had instead been co-opted onto a large project team, funded by the Inter-Governmental Body (IGB). The diverse range of commercial and academic partner organisations were contracted to work together on the three-year project under an appointed commercial lead but reporting to the IGB. This meant that the project partners only came together at the start of the project, many with limited or no prior engagement and so trust building had to be initiated within the project itself as they started to work together. However, it seemed that some commercial partners were then selective in deciding which other parties they needed to build trust with to achieve their own aims that were initially focused on the technological aspects of the innovation. Consequently, some did not see the university team, and its associated customer-related objectives, as a high priority to begin with. This

accounted for many of the initial challenges the university team faced in gaining practical support for their own task since they were faced with trying to establish trusting relationships with partners who saw little motivation to do so. Some of the business partners were clearly not sufficiently invested in the importance of understanding the socio-technological interface at the start of the project, which highlights how a failure to establish common learning goals can lead to challenges later. However, continued engagement and relationship building by the University's Principal Investigator, (PI) and Co-Investigator (CI) did eventually establish sufficient trust with the business participants. In turn, they granted wider access and support in gathering additional data, which later proved to be essential to delivering the final report.

It appears that differences in values between academic and business participants have the potential to create tension within collaborative relationships. In case studies Soc Sc 1 and Soc Sc 2 trust between the University and business partners was at some points limited by fundamental differences that emerged regarding values and associated expectations in how the research should be conducted and how critical the resulting reports could or should be. However, this does highlight the important point that the functionality of academics' outputs, and associated trust in their ability, are judged by businesses in terms of what works for them. This means that academics need to consider when and for what purposes academic standards need to apply and to make these clear to business partners. This was accepted by the Organisation in case study Soc Sc 1 in respect to the academics' proposal to run a Randomised Control Trial since the requirement to follow a rigorous academic methodology for the outcomes to be valid was clear. However, on other tasks it sought more flexible and

targetted approaches that produced relatively quick results. It was in some of these work strands that there was contention and an associated lowering of trust on both sides. As a result, more assertive use of power appeared to ensue in an attempt to restore expectations and this will be discussed further in Section 7.4.2. However, such power bases were seen to have an important role to play in all of the case studies and this now needs to be considered more fully.

7.4 The Importance of Power in University-Business Collaborative Relationships

The business and management literature makes some useful contributions to the broader understanding of how power affects relationships at the macro level. For example, Huxham and Vangen (2005, p. 178, Table 7.1) summarised the potential macro-level sources of power in inter-organisational collaborations, drawing on multiple sources of prior research, and identified three key considerations. First, whether one partner has something that the other(s) need, such as resources, skills or the control of information, which may give them heightened 'bargaining power'. Secondly, whether the relationship is more important to one partner than the other. They suggest that this may change during the course of the collaboration, as knowledge is transferred. Finally, it should be considered whether one partner has a structurally stronger position, derived from aspects such as their formal authority, network centrality or discursive power. In university-business collaborations the balance of funding between partners should also be added. These points are useful in providing preliminary contextual considerations when looking at power influences within collaborations and illustrate why it would be naïve to assume that university-business collaborations start off as balanced relationships. However, to understand how power influences relationships and therefore learning within collaborations it is

necessary to again return to the literature in order to seek a clearer conceptualisation that is appropriate to this research. This is the focus for the next sub-section, before moving on to look at the evidence for its application within university-business collaborations.

7.4.1 *Understanding Power in the Context of University-Business Collaborations:*

Definitions And Concepts

This chapter began with an early analysis of the data collected for this project leading to the realisation that power was an important factor in the development of the case studies and that it would be necessary to seek appropriate constructs that could be used to aid further analysis of its influence. The broad literature on power includes major philosophical contributions that have sometimes been alluded to by researchers into inter-organisational relationships, particularly the work of Foucault⁵⁵, such as by Lawrence *et al*, 2005. In addition, there have been important theoretical contributions on power by social theorists such as Luhmann (1979). However, whilst the importance of such thinking is acknowledged, for this research constructs were sought that could be directly and consistently applied to help to differentiate and compare actions and developments within and between multiple university-business collaborations. For this, as for motivation and trust, applied socio-psychological and business research was turned to.

It is useful to begin by considering the meaning of the word power as it might be used in this context. Luhmann (1979, p.107) was of the view that “*power involves causing outcomes despite possible resistance, or, in other words, is causality in*

⁵⁵ Foucault set out his main theses on power in *Discipline and Punish: the Birth of the Prison* (1977) and *The History of Sexuality Volume 1: An Introduction* (1979) but he also subsequently discussed and refined his ideas in numerous essays and lectures, such as Foucault’s essay on *The Subject and Power* (1982).

unfavourable circumstances”, which is similar to a more contemporary definition by Johnson *et al* (2014) which states that “*power is the ability of individuals or groups to persuade, induce or coerce others into following certain courses of action*”. Both of these definitions suggest that power involves deliberate acts but earlier work by French and Raven (1959) that considered the bases of social power at the inter-personal level, and that has remained very influential (see, for example, Elias, 2008, to support this) took a broader view. They, instead, saw power as the ‘*potential to influence*’, without necessarily having to act directly. As Raven (2008, p.1) later summarised when reflecting on the development of his original work with French (French and Raven, 1959): “*we first defined social influence as a change in the belief, attitude, or behaviour of a person (the target of influence), which results from the action of another person (an influencing agent). Social power was defined as the ‘potential’ for such influence, the ability of the agent or power figure to bring about such change, using resources available to him or her*”. This is an important distinction in the context of university-business collaborations because, as pointed out in Section 7.4, above, there may be a perceived or actual imbalance of power in many cases. However, this does not mean that the sources of power are necessarily used since a party may apply discretion in doing so in the interests of establishing effective collaborative relationships with high levels of trust and motivation. The definition offered by French and Raven (1959) allows for that discretion.

French and Raven (1959) developed this thinking to identify five main bases of social power: ‘*reward, coercion, legitimate, referent and expert*’, although they acknowledged that there were more possibilities. Raven (1993) later added a sixth base of social power, ‘*informational*’, and further sub-divided the categories to

produce a total of 14 different categories. This holds the possibility of capturing some of the more subtle behaviours in collaborative activity and as such merits further attention. The full breakdown of possible bases of social power is represented in Table 7.1.

French and Raven (1959) originally derived the bases of power from empirical research at the interpersonal level (between academic supervisors and their student supervisees), and emphasised that they offered a useful concept only in relatively stable social structures rather than individual interactions. However, as relationships develop or have cause to change, this taxonomy has the potential to inform analysis. This becomes clearer when the bases are outlined, as below.

Basis of power	Sub-categories
Pressure* (Coercion)	Impersonal pressure* (coercion) Personal pressure* (coercion)
Reward	Impersonal reward Personal reward
Legitimacy	Formal Reciprocity Equity (Dependence - powerless)
Expert	Positive Negative
Reference	Positive referent Negative referent
Informational	Direct information Indirect information

**Table 7.1 Further Differentiating the Bases of Social Power
(After Raven, 1993, Table 2, p.235⁵⁶)**

(* The author has adopted the term Pressure to replace Raven's use of Coercion)

In its impersonal form, coercion power is based on an individual's perception that he or she would be subject to some scale of punishment if not complying with the influential attempt from the other party. However, Raven (1993, p.234) added the

⁵⁶ Copyright 1993 The Society for the Psychological Study of Social Issues. From: The Bases of Power: Origins and Recent Developments by Bertram H. Raven. Reproduced by permission of John Wiley and Sons.

personal form to cover aspects such as rejection or disapproval from someone liked. Whilst this is helpful, the use of the term coercion seems too open to being misinterpreted negatively and so to avoid constant qualification when doing so in this study the term '*pressure*' is used, as it is more facilitating of the analysis⁵⁷. Formal reward power applies where an individual perceives a party has the ability to reward their compliance, Raven also believed that personal approval (from someone liked) is a more personal but nonetheless powerful form of reward power. French and Raven (1959, p.265) originally saw legitimate power stemming from position (and so this '*formal*' legitimate power is sometimes referred to simply as '*position power*') according to cultural norms, acceptance of social structures (such as that of a group or organisation) or through delegation (such as where someone is given a role or responsibility for a particular task from a recognised superior). Raven later thought that this needed further sub-division to recognise more subtle aspects of legitimate power. Consequently, he added '*reciprocity*', which captures the expectation that an act by one party should be returned in kind by the other, as distinct from '*equity*', which relates to the more general accumulation of positive acts in support of the other party building up to a perceived right to ask for something in return (Raven, 1993, p.234-5). An example of reciprocity was seen in case study Med 1 in which both partners engaging in additional activities outside the contract in support of the other. The University PI presented at the Corporate Away Day, which was very well received,

⁵⁷ The term coercion can be widely interpreted to include suggestions of the use of intimidation, bullying or personally threatening behaviour (even though that is not what Raven's explanation of the term implies) but it is expressly not the intention to imply such behaviour here. To shift the use of the power base onto less contentious grounds, the author has instead adopted the term '*pressure*'. It should be stressed that in this context it is used to refer to the direct application of psychological pressure to act in a particular way using legitimate means. It is argued that this allows this important power base to be discussed far more freely both here and more widely.

and the Company's Head of Business Function (HBF) visited Oxford to support a parallel research group that was conducting research into a drink product.

His fourth category of legitimate power is '*dependence*', which is the power drawn by an individual who is incapable of doing something themselves and is reliant on the help of the other party. This builds on the social norm of a sense of obligation to help others in such circumstances (ibid, p.235). Expert power relates to the ability of an individual to draw on particular knowledge and expertise but French and Raven (1959, p.267) point out that the strength of this needs to be seen in comparison to that held by the other party, not just in absolute terms. Whilst this can clearly be used positively, Raven saw that it could also be seen negatively if not used in the way the other party desires, leading potentially to mistrust. Referent power relates to the strength of identification with another party. This is sometimes referred to as 'likeability', in terms of the desire to be closely associated with them (French and Raven, 1959, p.266) and Raven (ibid) asserted that this too could be both positive and negative. Finally, Raven (1993, pp.235-6) introduced informational power, as distinct from the broader concept of expert power. It relates to the use of specific information and how it is presented to the target of influence. Indirect information and associated approaches included using third parties rather than direct approaches to exert informational influence. He suggested that this might be particularly useful when someone in a lower position seeks to use information to influence someone in a higher position. For example in case study MPLS 1, despite initial reservations, the Knowledge Exchange Officer (KEF) probably achieved greater influence over the development of the multinational's corporate biodiversity policy by channelling the scientific input through the Group Scientific Expert than attempting to engage the

senior management directly.

Raven then went on to set out a process model (his “Power/Interaction Model”, *ibid*, pp. 239-241) to show how an individual might select, apply, evaluate and then, through feedback, possibly adjust the type of power bases to be used in a particular context (not dissimilar in structure to the model of trust developed by Mayer *et al*, 1995). It is worth noting that the process starts by considering the ‘motivation to influence’. However, the focus here is to understand how power influences the collaborative relationships between university and business participants, particularly in terms of its relationship to trust and motivation, and the implications for learning.

It should be noted that there has been very little work done into how power influences trust and motivation in collaborative relationships. A recent study by Håvold and Håvold (2018) sought to understand how different kinds of power (they used the original French and Raven taxonomy) influenced trust and motivation in a number of Scandinavian hospitals, using quantitative methods. Whilst their detailed findings were interesting (for example, that expert power had a direct effect on motivation but not trust) this was not a collaborative context, and was set within a very distinct cultural group. Whilst concluding that power, trust and motivation have an important impact on organisational efficiency, behaviour and culture, Håvold and Håvold (2018) called for further empirical research, including in other organisational settings such as universities. Consequently, Raven’s bases of social power will thus be used to interpret the influence of power in such relationships in the next sub-section.

7.4.2 *Interpreting The Influence Of Power Within University-Business*

Collaborations

When university-business collaborations are considered in light of French and Raven's (1959) assertion that power is the 'potential' to influence, it becomes clear that the selection and timely application of the most appropriate power bases could be critical. This is because they were seen to influence both trust and motivation but in doing so could have positive and negative effects on collaborative relationships and their associated learning, depending on how they were used.

Pressure and reward are perhaps the most direct power bases from which to seek to influence collaborating partners and so their utility in university-business collaborations is considered here first. In discussing relationships in case study Soc Sc 2, the Project Director (from a commercial company) pointed out that industry is used to a faster pace and to tackling issues such as delay more directly than academics, which might suggest that they are more liable to use pressure in doing so. In business relationships, impersonal coercive power is most commonly based on the actual or threatened use of financial control measures such as payment, future funding and purchases or the contracting of goods and services. In the case of university-business collaborations, businesses are usually the contracting party or major funder of collaborative research and so, notwithstanding the constraints of contractual agreements, may be tempted to apply pressure to influence collaborative activity in their favour. However, in this context the actual or threatened use of any pressure has to be considered in terms of its effect at the personal level, since this is where it affects trust and motivation, with subsequent effects on learning.

Case study Soc Sc 1 illustrates how the use of pressure to influence

collaborative partners can be fraught with problems and unintended consequences. By the time of the interviews (the project was coming towards the end of Year 4 of an initial 5-year partnership) the management team of the Organisation (part of a multinational company) had made various attempts to refocus the university researchers' activities in ways that met its increasingly focused goals (see the Event-State Network at Appendix 4) and applied some pressure to achieve the changes. Generally, the university researchers felt strongly that these actions challenged their values and motivations (to produce rigorous and independent research) and so rather than achieve a positive response, it actually resulted in tension and some loss of trust on both sides. The motivation of some researchers at the time of the interviews seemed to be limited to 'introjected regulation' (Ryan and Deci, 2000a, see Section 7.2.1), even though some were more pragmatic in their response than others. In response, the University's project management team eventually applied its own pressure for the Organisation to accept academic control of the research projects, which it reluctantly accepted. However, this led to a further loss of trust and motivation by the Organisation, as the Project Manager (from the University team) pointed out to colleagues when they expressed disappointment that the Organisation had decided to reduce the work strands in the programme:

"Yes the programme is working better this year because we have built in all these barriers, we are getting more work done, we are happier, have fewer meetings and we are much more productive, we are using external data sets but as soon as control from (the Organisation) side went down, their interest went down too: it wasn't their project any more and they maybe became much more like a conventional funder, which is never what they wanted" (Project Manager, case study Soc Sc 1).

This example shows how the application of pressure (by any party) is likely to be met negatively where the collaborating partner is unprepared to accept it because

it undermines their basis for trust and motivation and unbalances the relationship.

This then presents challenges to collaborative relationships and the ability to generate learning from them. As was also seen in case study Soc Sc 2, the use of pressure arose where parties felt that partners were taking divergent approaches that threatened the achievement of their goals or undermined their position. Whilst this again underlined the need to agree both common learning goals and the way they will be achieved from the start, this may not stop unanticipated differences emerging as collaborations develop, thus prompting the use of pressure in an attempt to correct the issue. What is clear from the case studies, however, is that if pressure is used, it may be to the detriment of collaborative relationships, with commensurate effects on learning (particularly new learning that might support creative or innovative solutions since this requires higher levels of motivation, supported by a trusting relationship). In such cases it would be important to quickly find ways to restore that trust and motivation to reset the relationship needed to take the learning forward. This was implied in a comment from the Organisation Research Manager (ORD) in case study Soc Sc 1:

“A sign of the health of a partnership is not whether we argue or fight, it’s how we fight and how we resolve and how we feel after” (Organisation Research Manager, Company Think Tank, case study Soc Sc 1).

However, it has also been shown that stronger collaborative relationships are more resilient in dealing with both internal and external challenges (see case studies Hum 1 and MPLS 3 in Section 6.4.5, pp.197-198 and 199-200 respectively, as examples), underlining the need to build these as a priority.

Turning next to Raven’s (1993) reward power base, whilst the benefits of using this may seem straightforward and positive, this too demands closer consideration. A large body of research evidence (such as the meta analysis conducted by Deci,

Koestner and Ryan, 1999) suggested that attempts to stimulate external motivation through rewards could work against an individual's intrinsic motivation to conduct interesting tasks over time (see Benabou and Tirole, *ibid*, p.490 and Ryan and Deci, 2000a, p.69). Osterloh and Frey (2000, p.542) describe this as a 'crowding effect', where the crowding in of extrinsic motivation crowds out intrinsic motivation, resulting in increasing dependence on external motivators (such as rewards and sanctions) to achieve desired behaviours and actions. This suggests that caution should be applied in the use of rewards in university-business collaborations, particularly given the importance of intrinsic motivation made clear in Section 7.2.1. More specifically, academic motivations to collaborate have been shown by Lawson *et al* (2016) and Hughes *et al* (2016), among others, to be driven strongly by their own research interests rather than extrinsic rewards such as financial gain (see Chapter 2, Section 2.3.4, pp.43-44), suggesting the latter would contribute little in terms of achieving collaborative goals. No examples of extrinsic rewards were reported in the case studies but personal 'approval' or 'reward' (a form of personal reward, see Section 7.4.1, above) was frequently reflected in participants' comments that implied feelings of relatedness (Ryan and Deci, 2000a, see Section 7.2.2) and tacit approval for their actions. Often this was wrapped up in expressions of a more generally rewarding experience within the collaboration, such as captured in the comment by the Knowledge Exchange Fellow in case study MPLS 3:

"We just got along, we all trusted each other and to me it's important to have people that will communicate openly and respond to emails when I write to them. And then there's a little bit of just being able to joke around and getting on, on a personal level, not just a professional level" (Knowledge Exchange Fellow, case study MPLS 3).

It can be seen how personal reward ties in very closely with developing trust and

motivation in close collaborative inter-relationships. In this respect, it added little to distinguish it from those aspects already covered in terms of how this can be achieved but recognising it as a power base that one should seek to use to build trust and motivation in partners, reinforced the attitude with which university-business collaborations needed to be approached. However, the remaining power bases, whilst less direct, added some more specific ways of influencing collaborative partners

Expert power might appear to be the obvious power base available to academics but it should be clear from earlier discussion that it is the effective application of expertise *within the context of the collaboration* that is critical (see Chapter 3, Section 3.2, pp.58-62). Whilst recognition of academic reputation might be a factor in a business's decision to collaborate (but to varying extents, as shown in Chapter 6, Section 6.2.6), and in such cases contributed to 'referent power', this is quickly overtaken by expectations that their goals would be met, once collaborations begin. Moreover, the mode of co-development (see Chapter 6, Section 6.3.3 and Table 6.1, pp.180-183) would, to greater or lesser extents, involve working collaboratively with partners to produce new learning. This means that rather than simply providing expertise, the effective application of expert power within university-business collaborations depended on the ability of academics to successfully combine their innate expertise with that of partners, to help them to fulfil their goals. With regard to academics' own goals, evidence from the case studies suggested that the pursuit of these generally works best when they are not seen to impede the pursuit of partner goals, in most circumstances (that is, where the focus is on 'benevolence', after Mayer *et al*, 1995, see Section 7.3.1, p.237). If business partners thought the pursuit of academic goals conflicted with their own goals or undermined their position

then that would amount to the negative use of expert power (discussed above). The underlying point is that academics cannot always presume to have expert power from the start of collaborations but must instead realise that this is often hard won through a demonstrable willingness and ability to engage positively in the ways described above, once the collaboration commences. However, where done so effectively it is undoubtedly a source of strong influence, such as was shown, for example, in case studies MPLS 4, MPLS 5 and Med 1.

An important part of the collaborative challenge for academics is to quickly establish and maintain the 'legitimacy' of their position and, importantly, their role within the collaboration. Ideally they should be seen as equal partners but, as was commented on in Section 7.4, p.247, in relation to the points offered by Huxham and Vangen (2005), they may not start from that position. This power balance is vitally important and perhaps less obvious but without a strong position of legitimacy academic partners will find it difficult to contribute optimally to the learning process, to the detriment of both themselves and their partners. It is useful, therefore, to consider the applicability of the four bases of legitimacy power offered by Raven (1993).

Formal power relies on partners recognising the position of the academic or academic team and any related role or responsibilities that they have. This needs to be recognised and respected at the personal as well as the organisational level, otherwise it would be far more challenging to negotiate and pursue goals effectively. These roles and responsibilities need to be clarified and asserted from the outset, to avoid problems later.

Just as importantly, it requires partners to recognise their responsibilities to the

academic(s), in their collaborative role. This is where contractual agreements have some utility but business participants may nonetheless drift away from these (especially if 'signed off' at higher level) unless there is a comprehensive system of performance review. In addition, the inability of contracts to cover every contingency (Osterloh and Frey, 2000, p.540) was highlighted in Section 7.2.1, p.219. A lack of a formal power base sometimes seemed to leave junior academics particularly exposed to the possibility that the business party would not be as supportive in the achievement of their goals than they might otherwise have been if they were held more closely to what they had agreed. Senior academics have an important role to play in this regard as their involvement can bolster support for more junior staff and help to maintain both trust and motivation on both sides. The Knowledge Exchange Fellow felt that negotiating projects in case study MPLS 1 would have been helped by the involvement of the senior academic and it should be added that the Company's Group Scientific Expert would also have welcomed this level of engagement. Such involvement was formalised in management structures in other larger collaborations, such as in case studies Med 2 and Soc Sc 2. It follows that dependence power has to be regarded as a weak option because it rests on the assumption that the business partner will fully recognise the role and goals of the academic and attach the level of importance to them that they need to collaborate fully. The case studies showed clearly that this could not be assumed.

By contrast, reciprocity and equity power bases are available to all and offer academics constructive ways to gain greater legitimacy for their position and role, whilst at the same time building positive relationships with their partners. Reciprocity rests on the idea of mutual exchange, which is in any case the basis of collaboration.

In this context, therefore, reciprocity might be more usefully seen as acts that are undertaken for the direct benefit of collaborating partners and are often beyond what has been agreed with them, either tacitly or formally through a contract. These include responding favourably to requests for additional tasks but also extend to aspects of flexibility. Acts of reciprocity build trust because they demonstrate both benevolence and values (after Mayer *et al*, 1995, see Section 7.3.1, pp.237-238) that are liable to be viewed very positively by receiving parties. Such acts may not be repaid in kind or immediately, if at all, but in the latter case would nonetheless constitute the building of equity. A number of examples of both equity and reciprocity have been captured in the previous two chapters. For example Chapter 6, Section 6.4.2 (pp.188-190) illustrated how the University participants in case studies Med 1 and MPLS 5 were prepared to be flexible in taking on additional tasks (within reason), where requirements changed. This was particularly influential because as the Project Manager (from a Government Agency) in case study MPLS 5 pointed out, such behaviour is not typical of private sector contractors, which often makes contracted projects much harder to manage. Flexibility encourages similar behaviour to be reciprocated, as was reflected in the comment by the Director of Research Coordination of the pharma company in case study Med 2 (Chapter 6, Section 6.4.1, p.184). Responsiveness to contingent requirements, demonstrated in case studies MPLS 4 (following natural disasters) and Med 1 (pressing production schedules) were also very effective ways of building equity. All of these examples showed they had a positive effect on both the trust and motivation of the business partners.

Brief mention should be made of informational power. This can be distinguished from expert power by focusing on how information is presented to the

business partner. Clearly, expertise counts for little if it is not translated effectively and there were several instances of this being done extremely effectively in, for example, case studies Med 1 and MPLS 5, where it was important to share specialist technical or scientific information in ways that the business partner could actively engage with. Even when dealing with highly scientific business partners in case study Med 2, the Principal Investigator emphasised how they took great care *“to ensure that the data is sharable, depositable, minable and, even before that, findable”*.

Finally, consideration is given to reference power or ‘likeability’. Although reputation enhanced this power base, as a source of influence, the potential pitfalls of relying on this alone have already been discussed (Section 6.2.6, p.165-167).

Consequently, it seems more of a cumulative influence gained through engagement and in using other sources of influence positively to build trust and motivation and therefore a strong collaborative relationship. This does, however, need to be underpinned by tangible progress towards meeting partner goals as soon as possible. This was achieved very successfully in case studies MPLS 4 and Med 1, where early achievements boosted partner trust and motivation but this was not always possible in other collaborations. However, the achievement of interim outcomes, such as the successful presentations given to influential organisations in case study MPLS 3, built confidence and therefore appeared to boost reference power. In several cases, the establishment of social relationships seemed to add considerably to reference power. For example, in case studies MPLS 2, Med 1 and Soc Sc 2 it was noted how efforts to socialise outside of collaborative work tasks by the academics had contributed positively to relationship building. Reference power, therefore, might be seen as building a positive reputation within the context of the collaboration.

This sub-section has shown that the use of power bases offers a useful perspective through which to further understand collaborative relationships. Drawing on the case study evidence, it is clear how the use of the range of power bases influenced the trust and motivation of collaborative partners. These can be used to inform approaches and, just as importantly, help to understand and inform responses to partner behaviour, in order to build and maintain positive relationships. From the perspective of academics engaging in collaborative activity, it can be deduced from the above discussion that it is particularly important to establish effective expert power within collaborations and it is essential that it is understood how this differs from purely academic expertise and what behaviours are needed to bridge the gap between them. However, the selective use of legitimacy power and informational power has also been shown to provide important ways of underpinning this.

This chapter began by drawing together evidence from earlier analysis of the case studies to establish the importance of developing and maintaining strong collaborative relationships that support learning through university-business collaborations. The chapter then went on to identify motivation, trust and power as the core factors underlying such relationships. Drawing together both theoretical perspectives from the socio-psychological literature and further analysis of the case studies, propositions were developed for how these factors influence the interactions that affect learning in the context of the university-business collaborations. However, as explained in the introduction to this chapter, both mediating and shaping factors influence how and when these socio-psychological factors are brought to bear. As a consequence, mediating and shaping factors can have a significant impact on the development of collaborations and the on the resulting learning outcomes. The next

chapter, therefore, will briefly consider their role in university-business collaborations before moving on to consider the resulting learning outcomes and the challenges they present for their subsequent exploitation.

CHAPTER 8: COLLABORATIVE PRACTICE AND THE LEARNING OUTCOMES RESULTING FROM UNIVERSITY-BUSINESS COLLABORATIONS

8.1 Introduction

Chapter 6 focused on the case study evidence, which identified the key ways in which interactions affect learning within university-business collaborations. A temporal approach was taken to presenting the development of collaborative activity through the pre-engagement, set-up and initiation, and delivery stages. This laid the basis for deriving the underlying factors that influenced learning in university-business collaborations in Chapter 7 (summarised in Figure 7.1, p.212). The chapter then preceded to explore the core factors of motivation, trust and power showing how these affected learning within the context of university-business collaborations. Following on from these chapters, this chapter will begin by considering the role of the mediating and shaping factors that impact upon the core factors that influenced learning. These mediating and shaping factors influenced how and when the core factors come to bear by affecting how collaborations are constructed and conducted, and how individuals engaged within them. They thus accounted for much of the variation in the development of collaborations in practice and, more pertinently, their learning outcomes.

Discussion of mediating and shaping factors will lead to a closer examination of learning outcomes. This will set out the challenges in understanding the full extent of learning outcomes from university-business collaborations. In doing so it will draw on the case study evidence to show how these learning outcomes could be both undervalued and under exploited. In concluding, the chapter will return to the UK's current regime of funding, assessment and career management (discussed in

Chapter 2) and discuss how, in light of the preceding findings, they impacted on academic engagement in collaborative activities.

8.2 The Role Of Mediating Factors: Structure And Communication

The organisation charts constructed to show the key relationships between the participants in each case study (Chapter 5, figures 5.1 to 5.10) clearly illustrated how the organisational design of the case studies varied enormously in their configuration and complexity. Although deliberately simplified, these show how they are all embedded in larger organisational hierarchies and wider inter-relationships with other stakeholders, underlining that few were clearly bounded (Marchington and Vincent, 2004, made a similar point). However, the key consideration here is how structural and communication aspects affected the collaborative relationships and the ability to learn through them, as discussed below.

Some collaborations were notably more hierarchical than others, in part reflecting their size. For example, it was essential that in case study Med 2, which was part of a very large public private partnership (PPP), there were multiple levels of meetings from senior board level down to team meetings for specific bilateral projects. Publicly funded projects tended to have fixed bureaucratic structures with specified roles, such as in case studies Soc Sc 2 (dictated by the Inter-Governmental Body) and Hum 1 (dictated by the Government Agency). These did not seem to present inherent problems, other than the challenges of using fixed objectives, highlighted in Chapter 6, Sections 6.3.1 and 6.3.2. However, case study Soc Sc 1 showed how interpretations of structure could be more problematic. Whilst it was clear that participants from both the University and the business partner had different levels of responsibility for the collaboration within their own organisations, in a number of interviews there was a

lack of consistency in who they described as their partner equivalent (without being prompted to do so, suggesting that this was important to them). Such differences in perceptions of status and related formal power may have contributed to tensions in this relationship. By contrast, in collaborations that developed very strong relationships the relative status of the participants, despite clear hierarchies, seemed far less important than a strong team ethos and mutually supporting cultures as seen, for example, in case studies Hum 1, MPLS 2, MPLS 5 and Med 1. This underlines the importance of the way in which individuals exercise discretion in the use of the power bases that their collaborative (inter-organisational) position affords them, in order to influence other participants positively. This will be returned to in relation to leadership in the next section.

A key structural determinant of how participants interacted was their physical proximity. In most case studies, participants worked in their own University or business workspace for the majority of the time. In some cases the geographical separation was considerable, for example in case studies MPLS 2, Med 2, Soc Sc 1 and Soc Sc 2 most of the business participants were based in other countries. However, to put this in context, most business participants did not, in any case, work on the collaborations full-time. The Organisation Research Manager in case study Soc Sc 1 was unusual in being embedded with the University team but still had other things to work on. This contrasted with the involvement of some of the University participants as it was common for more junior staff to be employed solely on a particular project role for the (fixed) duration, as was seen, for example, in case studies Hum 1, Med 1, Soc Sc 1 and Soc Sc 2. The involvement of senior academics was generally more variable, in line with their wider University responsibilities. This paucity of shared

physical workspaces meant that the other constructs that facilitated collaborative interactions between participants were important.

In most case studies, communication was through both formal and informal engagements. Formal engagements included project meetings or management reviews (smaller collaborations combined them) between participants that were usually scheduled on a regular basis. These formed the cornerstone of many of the collaborations, particularly those underpinned by contracts and funding, and were put in place from the start, such as in case studies Hum 1, MPLS 5, Med 2 and Soc Sc 1 and 2. Only informal or emergent collaborations such as case studies MPLS 1 and MPLS 4 lacked a formal structure. However, the DCEO of the charity in case study MPLS 4 felt they were approaching the stage where the relationship would benefit from being put on a more formal footing.

In some cases, such as case studies Hum 1 and Soc Sc 2, participants attended scheduled project meetings in person (the meetings for Soc Sc 2 were rotated around different participant locations), whereas in others, such as case studies MPLS 5 and MPLS 3, these were all conducted through conference calls. As the latter cases proved, interacting through teleconferencing did not restrict the ability to build strong collaborative relationships (for example, see the trust-building measures undertaken in case study MPLS 5, outlined in Chapter 6, Section 6.4.2). However, the lack of personal contact seemed to increase demands for a consistently high degree of engagement and responsiveness and it was seen that when other commitments made it difficult for the Project Manager and Knowledge Exchange Fellow to keep up the weekly meetings in case study MPLS 3, the management of the project slackened and the work over-ran the planned completion date. Similarly, the Principal Investigator in case study Med 2

made clear the risks of losing the proactive engagement of partners, as highlighted in Chapter 6, Section 6.4.5 (pp.198-199), and emphasised the need to maintain strong linkages at all levels to mitigate this.

It was apparent that a key benefit of attending project meetings in person (where they were run as such) was the opportunity to build (or strengthen) personal as well as professional relationships with partners. This was particularly important in case study Soc Sc 2 because the University team did not have the opportunity to establish a relationship with the multiple partners before the project commenced. In case study Med 2, the Director of Research Coordination of the pharma company (based in the company offices in mainland Europe) recognised the importance of face-to-face interaction when describing how they tried to achieve this every 12 to 18 months, in addition to teleconferences, about every six weeks. These may not seem particularly frequent but needs to be seen in terms of the nature and timescales of the deep scientific research activity within a long-term collaboration⁵⁸. Where personal relationships had already been established through extensive pre-engagement (such as in MPLS 2) or supplemented with a face-to-face induction phase to launch a project (such as in MPLS 3) this seemed less important.

Informal interactions, whether remote or face-to-face, appeared at least as important as formal interactions in many case studies and formed the basis for day-to-day collaborative learning. For example, the Principal Investigator (PI) in case study MPLS 4 described how the lead operative for the charity would sometimes drop in for a chat when they would discuss in detail how the ground teams operated and the

⁵⁸ This collaboration was open-ended, dependent on the pharma company deciding to re-fund (that is, continue membership of the public-private partnership) periodically (every five years), as discussed in Chapter 6, Section 6.4.6.

problems they faced, and explored possible solutions. This was critical to the PI's further development of the technology. Even in formal (and remote) collaborations such as case study Med 2, the PI of the Laboratory emphasised the benefits of a good 'organic' relationship in which linkages were extended between levels rather than just within them (see Chapter 6, Section 6.3.3, p.178), across the organisations. These facilitated the wider sharing of knowledge, understanding, and ideas that supported new learning.

The extent to which University participants gained inter-organisational penetration⁵⁹ varied considerably and it was seen that this aspect of wider collaborative communication could have an important influence on the learning outcomes. Academic penetration into the business organisations was greatest in case studies Med 1 and Hum 1 and undoubtedly enhanced the learning outcomes considerably as a result. As discussed earlier, it is unlikely that the Research Assistant in case study Med 1 could have achieved the same outcomes by other means (see Chapter 6, Section 6.4.1, pp.185-186) but a weekly presence in the company's Head Office also enabled positive influence with the other important stakeholders for the Head of Business Function's initiative, such as production managers, the Brand Director and other senior staff. In the same way, the Project Officer was able to influence wider stakeholders, such as property and marketing staff, directly and so build acceptance and then support for the initiative. By gaining strong contextual awareness, the Res Asst (Med 1) and the PO (Hum 1) were able to develop further initiatives that aided implementation of the project and were also able to identify

⁵⁹ The term inter-organisational penetration is used here to describe the extent to which the relationship extended beyond the core participants to other members of the organisation. These might include senior managers or members of other functional teams.

potential topics of research interest.

By contrast, the very limited penetration into the wider Head Office team by the Knowledge Exchange Fellow (KEF) in case study MPLS 1 constrained the ability to influence the collaboration more widely, which may have hindered gaining acceptance of the wider research options that the Knowledge Exchange Fellow originally sought. This was recognised by the Group Scientific Expert, who reflected on the importance of building personal relationships and saw a period of attachment as an alternative way forward in future. In case studies MPLS 2 and 3 the KEF enjoyed wider access to managers and other staff and stakeholders (including other business contacts) and in both cases support for the projects remained unquestioned throughout. The evidence, therefore, points to there being significant benefits in academics spending at least some time in the business environment during the course of collaborations. This is not least because they can act as change agents, identifying and responding to challenges as well as finding ways to further exploit successful implementation, thus generating new learning.

Finally, the importance of academics communicating to their business partners in common language and the effectiveness of using visual representations to aid understanding, as demonstrated in case studies Med 1, MPLS 3, MPLS 4 and MPLS 5 (see Chapter 6, Section 6.4.3, pp.190-194), is worth re-emphasising. Such steps seemed to help overcome the potential challenges of absorptive capacity (after Cohen and Levinthal, 1989, 1990) through successful transformation of the learning. This supports Howells' (1996) view (see Chapter 3, Section 3.2, p.61) that the challenges of tacit knowledge were limited where effective communication was embedded in collaborative routines. Moreover, the effort that academics made in transforming

learning so that it could be understood and utilised by business partners demonstrated both ability and benevolence to them and so was an effective way of building trust.

These brief examples served to illustrate that many aspects of structure and communication are closely linked and taken together these factors can have an important influence on learning outcomes.

8.3 The Role Of Shaping Factors: Leadership And Management

Whilst the intended focus of this research was not the leadership and management of university-business collaborations (and therefore it was not constructed to support a full analysis of these aspects), it is nonetheless important to consider the ways in which they shaped the actions of and interactions between participants. Many of the events and actions illustrated in the examples drawn from the case studies could be re-examined in the light of the influence of leadership and management but the focus here has instead been on understanding the specific behaviours and how they affect learning.

Aspects of management at multiple levels within the case studies have already been examined extensively over the last three chapters. The case study narratives in Chapter 5 provided an overview of the management of the collaborations and further detail on significant management actions were included in the event state networks at Appendix 4. In addition, pertinent management issues relating to the collaborations were discussed in Chapters 6 and 7 and many of the structural and communication issues covered in the previous section were implicitly shaped by management approaches. Consequently, it is not necessary to further substantiate the role of management here.

More generally, however, when considering the effect of management within

university-business collaborations it is useful to distinguish between the utility of adopting particular management practices (often reflecting organisational or institutional norms) and their application in the setting of university-business collaborations. For example, imported performance management practices, focused on keeping the projects on track towards pre-determined targets, appeared to provide a useful forum for monitoring, review and evaluation, where used consensually and constructively. In some cases though, they were seemingly used as mechanisms through which to exert power in ways that could be counter-productive to collaborative relationships, as discussed in the previous chapter. Arguably, the general challenge of applying management practices positively lay in ensuring that they were adapted to support collaborative learning rather than other forms of business transactions. It has been shown that this required the application of more consensual approaches that support positive collaborative relationships but that are also flexible enough to exploit unforeseen learning opportunities, where that supports the broader aims of the collaboration. Such approaches may be counter-intuitive to some used to contrasting work environments but they should be regarded as necessary adaptations by both university and business participants, in order to manage effectively in this context.

Adaptations to the management of the learning outcomes from university-business collaborations will be given further attention in the following sections but the remainder of this section will focus on the role of leadership as it is argued that organisational approaches to leadership also needed to be adapted to meet the specific context of university-business collaborations.

Assessing the influence of leadership in a collaborative university-business

context is challenging because of the joint nature of these activities. Indeed, at the chosen level of analysis many of the case studies did not really have a single formal leader, as such, even though the discrete elements of the University or the businesses that were involved in the collaborations clearly did. Some collaborations, as in case studies MPLS 5 and Soc Sc 2 had appointed project managers but their role was more intended to manage the coordination of the projects within specified parameters, such as objectives and time. Case study Hum 1 did have a Project Board that included all major sponsors, with an appointed Chair (from the Charity) but nonetheless, like in other collaborations, the provision of direction rested heavily on influence and negotiation, underpinned by consensual decision-making, rather than on formal authority.

Moreover, it was very clear from an early stage of this research that leadership could be exercised by participants at all levels in collaborations, regardless of their role or position in the management hierarchies that existed in some cases. The numerous examples of interactions and events across all of the case studies provided evidence of where significant influence was gained by the actions of individuals (within both the University and businesses) at all levels and in all directions from the position they occupied within their collaboration. This was obtained in many different ways but fundamentally through the selection and adept application of appropriate influencing strategies that built trust and supported partner (or colleague) motivation to engage in collaborative learning in the ways that have been covered comprehensively in Chapters 6 and 7. It follows, therefore, that within the context of university-business collaborations, leadership could be seen as the effective use of influence to persuade others to work collaboratively towards agreed goals.

Different approaches to achieving effective influence in university-business collaborations were evaluated in the light of the case study evidence, using Raven's (1993) power bases as a conceptual approach, as discussed in Chapter 7, Section 7.4.2. It is, therefore, possible to propose a framework for academics to use to inform their approaches to developing effective influence in university-business collaborations, as shown in Figure 8.1.

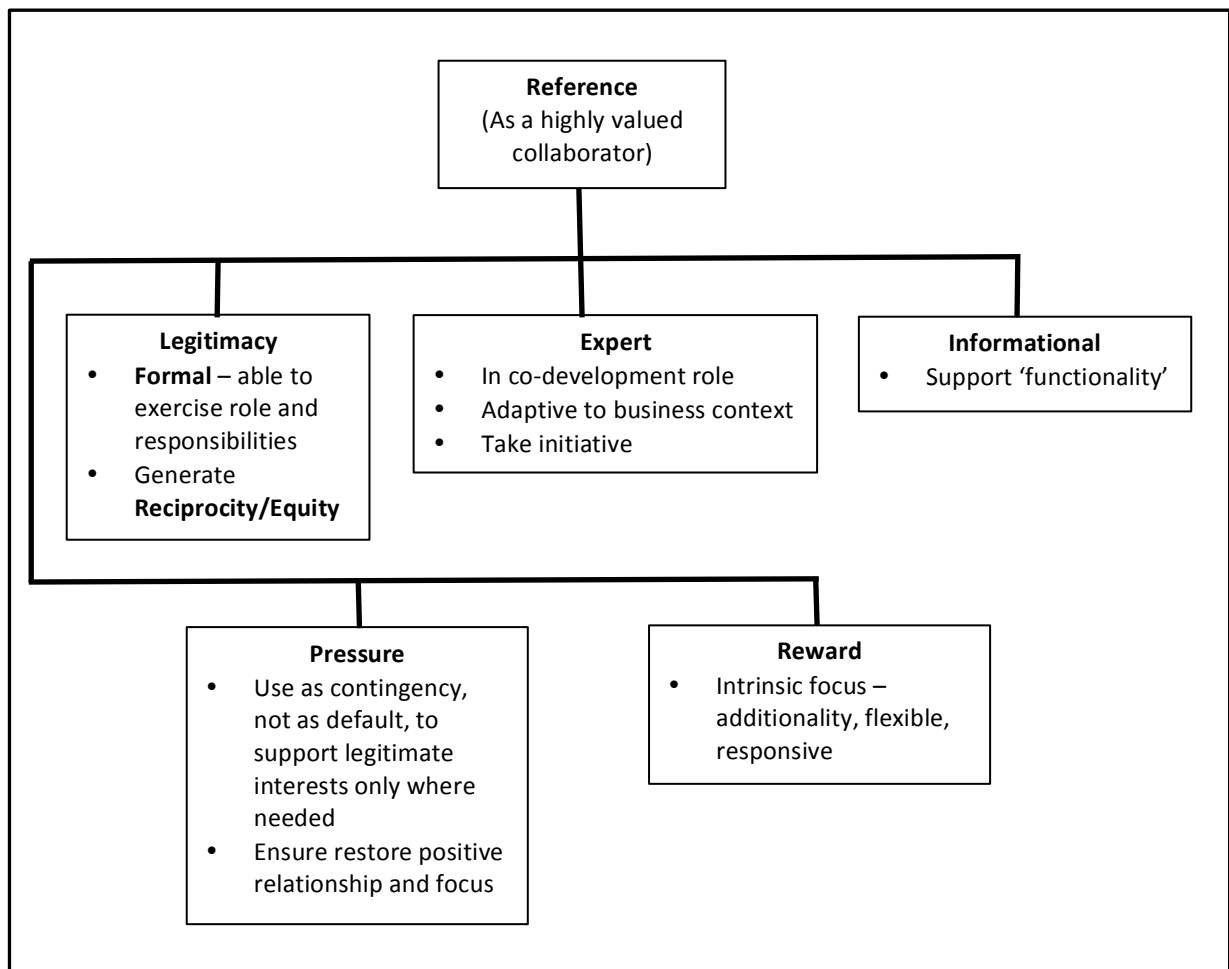


Figure 8.1: Framework of Academic Power Bases to Support Effective Influence in University-Business Collaboration

The model makes the assumption that effective influence is achieved through building a strong base of reference power within the collaboration so that an individual is highly valued as a collaborator by colleagues and partners alike. This is built

cumulatively through the selective and effective use of the other supporting power bases. Legitimacy, expert and informational power bases are shown immediately below referent power as these need to be applied consistently to build motivation and trust, whereas pressure and reward are more liable to be used in a contingent manner, as required.

Whilst it is not intended to offer a comprehensive list of leadership traits that are appropriate to this context (again, a different analytical focus would have been needed to support this) it does seem that one particular trait stands out, and that should be added to the approaches described above, which is initiative. To explain, the factors discussed above and in the previous chapter all relate to supporting collaborative learning but it is the taking of initiative to try out new approaches that often acted as the catalyst for further collaborative learning, whether in an exploitative or explorative context (after Curado, 2006, see Chapter 3, Section 3.1, p.57). This was more than just the development of new ideas but extended to a willingness to act on them, even if this was not recognised as being within the current lines of development. In this respect, such initiatives were potentially disruptive and risky but they were often seen to be the basis for important advances in collaborative learning.

Examples of initiative being taken included the University team in case study Soc Sc 2 expanding the scope of their study to other key stakeholders mid-project, which laid the basis for a very credible final project report that otherwise would not have been achievable; the Project Officer in Hum 1 initiating a series of wider initiatives which led to far greater strategic impact than the original remit; and the Research Assistant in Med 1 taking the initiative to use the psychological testing to inform pre-design decisions for new products rather than post-design, which led to a

major process innovation. There were many other examples but the point is that they started with someone taking the initiative to act. It nonetheless remains for colleagues and partners to judge how much risk should be tolerated (accepting risk as such means accepting that sometimes initiatives will fail), which will depend heavily on the contextual factors such as implications for time, resources and the likely consequences of failure.

The previous two sections have demonstrated the ways in which mediating and shaping factors can exert influence on collaborative activity and in doing so these will clearly impact on the development of learning that leads to the learning outcomes. In adopting a learning perspective, as has been argued in this thesis, the key purpose of university-business collaborations is the generation of useful learning outcomes. It is these learning outcomes arising from the collaborative interactions discussed so far that now need to be turned to.

8.4 The Challenges in Understanding the Learning Outcomes from

University-Business Collaborations

Whilst the focus of this section is on learning outcomes, previous chapters have illustrated that through the dynamic and complex interactions, core participants were constantly learning from and with each other throughout their involvement in the collaborations. These interactions were shown to take place between individuals or as part of groups or teams, bilaterally or multilaterally. Such learning through collaborative interactions prompted actions by individuals or groups that generated further learning and responses and this process continued along the trajectories for the collaborations captured in the Event State Networks at Appendix 4. These display key influences, actions, events and states (key waypoints) from the 'prior engagement'

stage and progressing through 'set-up and initiation', and 'delivery' stages towards 'outcomes' (at the point of the interviews, if not at the end of the collaborations). However, these representations could not possibly capture all of the learning gained through these interactions and the outcomes represent only a brief summary of the key themes that follow on from the developments illustrated in earlier stages.

To assist with the further understanding of learning outcomes, the Learning Effects Matrix at Appendix 5 was constructed to summarise the key components of learning in a standardised format for each case study. In Part One, the short entries for each case study enabled a more detailed comparison of initial learning aspirations (as expressed by the participants) with the learning outcomes for each case study. The more generalised summaries in Part Two enable broader comparisons to be made on both a within case and cross case basis. These generally capture the aspirations and outcomes at the organisational (university or business) level, other than in cases in which engagement was by a single academic from the University (the Knowledge Exchange Fellow in case studies MPLS 1 to 3), where they reflect the individual level, accordingly. Drawing on all of these data representations, it becomes clear that the learning gained from collaborations is considerable in both scope and complexity but also that the resulting learning outcomes are not all readily apparent, nor easy to assign a value to. There are a number of facets to this that should be addressed in this section before looking more specifically at the business and university perspectives in subsequent sections.

First, as highlighted at the start of this section, learning takes place throughout university-business collaborations, rather than just as a culminating point at the end of the process, important though this may be. Such instances of intermediate learning

may or may not contribute to the achievement of specified learning goals. Where they do not, such learning spin-offs may nonetheless be of significant value or potential in areas outside of the collaboration or its specific goals. This was recognised by Chesbrough (2003) and provided the basis for his concept of Open Innovation (introduced in Chapter 2, Section 2.3.3, pp.37-39) in which company staff formed spinout companies to exploit such useful learning in the development of further innovations. Where successful, mutual benefits and synergistic relationships supported the development of a wider sectoral ecosystem. Going further, his research found that some innovations were later brought back into the business from which the learning originated. The focus for Chesbrough (ibid) though was the commercialisation of wider innovations from within-firm R&D. In the context of university-business collaborations, it was noted in Chapter 2, Section 2.3.3, pp.40-41, how similar Open Science approaches are increasingly being adopted, such as in the Public Private Partnership supporting drug development described in case study Med 2 (Chapter 5, Section 5.10). These approaches share findings openly with the intention of maximising the potential for further exploitation of the learning generated in the collaboration. In this way, university-business collaborations may contribute to a wider pool of learning from which its subsequent exploitation may be difficult to track, presenting commensurate challenges in understanding the cumulative value of the learning from the original collaboration. It should nonetheless be recognised, however, that in this way open approaches to collaborative learning have the potential to provide greater learning outcomes for universities and businesses alike.

Secondly, whilst it was established in Chapter 3, Section 3.5 (pp.70-73), that the focus for learning within organisations should be at the level of individual members

(albeit sometimes as part of a group or team), the outcomes from university-business collaborations are often described in relation to explicit organisational or inter-organisational goals. This means that those learning outcomes that relate to personal as opposed to organisational development, especially if they are of a more tacit nature, may be overlooked or undervalued, despite being critical to building collaborative competences and contributing towards organisational capabilities. This was most clearly demonstrated in the collaborations undertaken by the Knowledge Exchange Fellow, where the lessons learned from an initial collaboration (case study MPLS 1) were reflected in modified approaches to subsequent collaborations (case studies MPLS 2 and MPLS 3) that proved to be highly productive in terms of publications and other useful outcomes such as invitations to advise influential bodies.

Thirdly, some of the benefits of collaborative learning may not be immediately apparent because they are only realisable, at an organisational level, some time after the collaborative activity from which it was derived. This may be the case where strategic benefits or improved capabilities as a result of collaborative learning take time to come to fruition. In part, this may depend on the internal ability of organisations to subsequently exploit them, which Cohen and Levinthal (1989, 1990) regard as a key component of absorptive capacity (discussed in Chapter 2, Section 2.3.2 and Chapter 3, Section 3.2). Even when an organisation's absorptive capacity is high, it may not be able to exploit new learning without further internal development, as would often be the case for the Pharma Company in case study Med 2. Sometimes, where the collaborative learning provides input to just a limited part of a developmental pipeline, further development may involve collaboration with other partners who may add to or modify this learning. For example, the software

application developed to support flood management in case study MPLS 5 was expected to undergo field trials, evaluation and further development with other organisations before any roll out. In other cases, exploitation of the learning may have to await an opportunity to apply it in the external environment. For example, enhancements to the machine learning-generated disaster maps developed by the University team might not be implemented until the next real-time disaster struck, when the charity next deployed and had need of them.

Such tangible learning benefits may be realised in due course but there are also significant intangible benefits accrued from collaborative learning such as widened networks. For example, the opportunity to gain better intelligence of developments in the sector was a factor influencing the decision of the pharma company to join the partnership in case study Med 2, in addition to the direct benefits expected from the research collaborations. Wider networks resulting from engagement in collaborations are also of clear benefit to academics, such as the business networks that the Knowledge Exchange Fellow gained access to through case studies MPLS 2 and MPLS 3, which also enabled more influence within sectors and provided enhanced reputational benefits that may not be as easily recognised.

These points highlight the challenges inherent in fully understanding the complex and multi-faceted learning outcomes from collaborations. It is nonetheless important to seek to do so because policy makers, businesses and universities alike may otherwise undervalue such activities, to their detriment. In addition, a more fundamental concern is that useful learning is overlooked and is not fully exploited as a result, which is the fundamental purpose of collaborating in the first instance.

In light of the above discussion, the next sub-sections move on to consider further the wider learning outcomes of university-business collaborations beyond those anticipated at the outset, as specified formally in contractual objectives or agreed as common learning goals. The complexities of the wider learning outcomes will be considered for businesses and universities separately to establish a fuller understanding of their value.

8.4.1 *The Complexities of Learning Outcomes from University-Business*

Collaborations for Businesses

Where businesses commit funding to collaborative activities they would invariably expect to seek the achievement of specific objectives, subject to negotiation with the University, as a return on their investment. Whilst this is common management practice in business-to-business transactions, it can be more problematic when applied to university-business collaborations because of the dynamic, uncertain and complex nature of learning. This means that it will often be challenging to capture business aspirations fully in pre-determined objectives and they may subsequently prove inadequate for the purpose of valuing the learning outcomes gained from the collaborations. Nonetheless, it is recognised that there are cases where clearly articulated business requirements might fully encapsulate learning aspirations where they are explicit and immediately realisable. For example, in case study MPLS 5 the contractual requirement for the University to develop a functional flood management tool within a fixed timeframe fully captured the expected learning outcomes of the contracting Government Agencies. However, whilst the overall requirement remained constant, the detailed specifications changed (within limits agreed with the University

team) as a result of collaborative learning leading to the identification of better solutions, as discussed in Chapter 6, Section 6.4.2.

In other cases, the relationship between specified learning requirements and the actual learning aspirations of businesses was not always as tight as in case study MPLS 5. For example, in case study Hum 1, the requirement for the University to contribute a stated number of articles to a knowledge bank for the heritage charity was a similarly specific and immediately realisable expectation of learning outcomes. However, as discussed in Chapter 6, Section 6.3.1 (pp.169-170), the wider learning outcomes that the charity aspired to were far more strategic in terms of a shift in organisational culture to place more emphasis on supporting a deeper understanding of the history and culture relating to its properties. So the specific objectives, whilst directly supporting a desirable outcome, were used as a means to focus engagement with the University in the hope that this would support the changed attitudes and behaviours needed to achieve strategic development. The broader range of activities that grew out of the core initiative, although unspecified in the requirement, became an important part of fulfilling these wider learning aspirations. As the collaboration broadened in scope, achievement of the target number of article contributions for the core initiative (as specified in the Knowledge Transfer Partnership Agreement) became less consequential because of the greater strategic impact achieved overall through these collective learning outcomes.

Businesses could also gain emergent strategic benefits from collaborations despite not anticipating them at the outset, as was found in case study MPLS 2. In this case the International Organisation's (IO) team and the Knowledge Exchange Fellow (KEF) had together identified a key issue that stakeholder organisations were not

making best use of existing biodiversity tools and produced a project plan to develop products that they could use to improve this. The expected learning outcomes were thus very specific. However, once the collaboration got underway the IO team realised that it provided a model for greater strategic influence by involving multiple stakeholders in broader initiatives rather than by engaging their stakeholders bilaterally on particular issues, as had been their usual approach. Similarly, in case study Soc Sc 2 the business participants anticipated that the key learning outcomes of the demonstration project in which they participated would be related to implementing the technical aspects of the new innovation but, whilst these were clearly important, they came to recognise, through the efforts of the University team, that attending to the socio-technical interface (specifically, the adoption and use of the new heating system by customers) would need to be a key part of any future roll out strategy. These examples illustrated how collaborations delivered learning outcomes at the strategic level, both anticipated and unanticipated, in excess of those specified in formal learning objectives.

Not all additional learning benefits were at the strategic level but were important nonetheless. For example, the infographics developed to engage business stakeholders generated high impact when used in conferences in case study MPLS 3. The Programme Manager of the Government Agency has since adopted these for use in subsequent presentations and engagements, who also noted that the collaboration had opened up some new channels of engagement. These very positive learning outcomes were in addition to the production of the report that was the key project deliverable.

A further complexity to understanding the value of learning outcomes is added when a business uses learning outcomes for more than one purpose, as was seen in case study Med 1. The Head of the Business Function (HBF) was very clear that the purpose of the collaboration was to validate the internal design process by testing whether the product packing designs were having the intended impact on the customer. At the same time, the HBF was keen to provide more objective evidence of the validity of the design process to guard against internal criticism when products failed to meet expectations:

“Effectively, we wanted to understand if the design was having the impact we wanted it to. Design in particular is very subjective, so people like colour, don’t like colour. Everybody thinks they are an expert in design but they are not...so the reason for our partnership was for us to test our designs, to make sure that they were having the impact on the shelf or online to our customers. But also with the happy benefit of removing the subjectivity so every man and his dog in here can’t say well it’s because the design didn’t work” (Head of Business Function, Fast Moving Consumer Goods Company, case study Med 1).

In the event, the close collaborative relationship between the Research Assistant and the design team enabled them to progress beyond validation to improvement by using the data analysis to augment the design process, as described in Chapter 6, Section 6.4.1. This led to measurable increases in sales of products with packaging designs that had been subjected to the new process, with an associated increase in profits, and so although the project had not completed, it seemed to have exceeded both aspirations. However, the value of the learning outcomes would most likely be seen in a more limited way by senior management than it would by the design team so the perceived value is likely to differ between stakeholders within businesses (particularly between those directly involved in the collaborations and more senior management), even when formal objectives are used.

More generally, it was found that the learning aspirations of business partners in all case studies were liable to change, albeit to varying extents, during the course of collaborations (discussed extensively in Chapters 6 and 7). This was an inevitable consequence of collaborative learning that changed their understanding of problems or presented better solutions to them during the delivery phase. Broad high-level objectives allowed reinterpretation to accommodate such changes in case study Soc Sc 2, whereas in case studies MPLS 5 and Med 1 changes were agreed by negotiation, to the extent that time and resources allowed. Such responsiveness enabled positive learning outcomes to be achieved by both parties. However, in explorative collaborations, concerned with discovery or the development of new innovation, progressive learning could lead businesses to re-evaluate the potential of their collaborative research strands. When such points were reached the business could come to regard the original learning objectives as sub-optimal to the extent that they had little motivation to pursue them further. For the Company in case study Soc Sc 2 this meant refocusing effort on those research strands that showed most potential and abandoning others. In case study Med 2, however, the issues were more complex. A key challenge was that the University Laboratory's pharma partners decided to '*de-prioritise*' specific projects (a euphemism that seemed to be in common usage as this was common practice within the partnership) and ceased working on them. This particular case is discussed further below because it presented some noteworthy points in relation to learning outcomes.

As the Director of Research Coordination in the case study Pharma Company put it, the work on describing a particular protein structure or chemical probe (such compounds were key aspects of their collaborative work) may ultimately have been

successful but for strategic reasons the Company decided to stop working on it. The PI explained that this might have been because the Company had by then done sufficient work on it to evaluate its potential: if considered low then it would save time, effort and money by abandoning it. Alternatively, it may have found better compounds that the University Laboratory had tested for it in one of the side branches of the project but the University would not know which one, nor whether that was even the case. It could also be the case that the pharma company realised that a project had high potential and then decided to take its further work into the company's proprietary programme of development, which neither the University nor other partners would be appraised of since this would be a highly confidential and sensitive R&D decision with commercial ramifications.

When a project was de-prioritised, the Principal Investigator (PI) explained that if the Laboratory could not persuade the company to complete the project so that the findings could be published, it might seek, with their permission, to do so itself or with other partners. Whilst in all of these scenarios the University Laboratory viewed this as a positive development for the Company, and hoped that it would lead to positive outcomes for it, this strategy presented difficulties in measuring the success of the relationship on the basis of deliverables. It should be added that other pharma companies in the partnership replicated this strategy, so this case simply illustrated a broader issue. The nature of the challenge was succinctly summarised by the PI:

“The thing is, we can’t codify what will make a pharma company happy because that would require them to expose information they cannot do” (Principal Investigator, University Laboratory, case study Med 2).

This meant that specific output metrics alone did not capture the full value of the relationship and the Laboratory instead gauged the satisfaction of its partners on the basis of high level, but necessarily vague, feedback at senior level, as the PI explained:

“We have to work on the basis that that our pharma partners are tacitly very happy with us: they can’t tell us why necessarily, all the time. It’s enough when we come round five years later that they say ‘well that was X projects that fired off as a consequence, so that was worth this much so whatever we paid (the partnership) was peanuts in comparison, that’s a no-brainer, we should do it again” (Principal Investigator, University Laboratory, case study Med 2).

This final example presents a stark illustration of the problem of using objectives as a reference point for assessing the value of the learning outcomes gained from university-business collaborations. Importantly, it shows how seemingly negative outcomes (in this case learning that a particular avenue of research holds no further potential) is actually a very positive outcome both economically and in terms of focusing further development into other areas of greater potential. It is clear, however, that despite the complexities, businesses are nonetheless capable of making their own judgements as to the worth of such collaborations and act accordingly; it is the way in which these judgements are arrived at that will vary considerably between businesses. For universities, it is essential that the evaluation of the impact that universities generate takes account of the fuller range of outcomes described here. It is clear from the examples given that the impact over and above the achievement of any pre-determined objectives (typically evaluated at the end of projects) could be considerable. This suggests strongly that funding bodies need to apply careful judgement when evaluating the impact that universities generate through their collaborations with business and should be cautious in the use of metrics that are only likely to capture this in part.

Before leaving this section, the importance of businesses learning how to collaborate better with universities should also be highlighted as an important outcome from university-business collaborations. Even though most of the business participants in the case studies professed to having worked with academics before, they had sometimes done so in different types of relationships (not always collaborations) or when acting in different capacities and clearly in different contexts. For example, in case study Soc Sc 1 the Company's Organisational Research Director (ORD) recognised that some of the perceived difficulties faced in pursuing the research strands were part of the challenges of developing an institutional partnership (from the top down), which were not encountered in previous collaborations with academics engaged in direct bilateral relationships. The shifts in the Company's approach during the partnership up to the point of the interviews (towards the end of the fourth year of a five year partnership) reflected how the management team continued to learn from experience how best to collaborate at this institutional level. More generally, this underlines the unique learning opportunities presented to business participants by engagement in university-business collaborations, regardless of their prior experience.

It is clear why understanding the value of the learning outcomes that businesses gain from their collaborations with universities is challenging. The examples from the case studies have illustrated why the evaluation of learning outcomes against initial learning objectives, whilst commonly used in contractual collaborations, is fraught with difficulty. Such a transactional approach fails to recognise the nature of collaborative learning. More encouragingly, however, this section also showed that the learning outcomes are often far wider and provide greater benefit to organisations than might be immediately apparent and this needed

to be fully recognised by those driving university-business collaboration in Government, business and universities. The next section will move on to considering the challenges and opportunities that the learning outcomes present to universities.

8.4.2 *The Learning Outcomes from University-Business Collaborations for*

Universities: Challenges and Opportunities

Chapters 5, 6 and 7 have shown in detail how and why pursuing academic goals alongside business goals can be very challenging. Learning through collaboration is demanding of both university and business partners and this, combined with the uncertainties of external factors, means that there is often risk involved in achieving pre-determined academic outputs through a process in which academics have only partial control. It is unsurprising, therefore, that few of the case study collaborations might be regarded as having proceeded steadily towards learning outcomes that fed directly into pre-determined academic outputs. An example would be the generation of statistical data through the psychological testing of consumers on aspects of packaging designs in case study Med 1, which the University team intended to use for research purposes. Here the planned collection of data was drawn from bespoke online testing conducted independently by the Research Assistant (in agreement with the Company), who was unimpeded in building up a bank of response data over the course of the project. Importantly, once the Research Assistant had subjected the data to further analysis it was immediately fed in to the design team meetings as the key project input, to augment their decision-making process. Consequently, the data generated by the testing supported the learning outcomes for both parties, even though used in different ways and so there were no tensions in its collection, other than time pressures, but this was certainly not the norm.

It was seen that independent control of data collection did not in itself ensure the achievement of desirable academic outcomes, where further co-operation from business partners was required to inform its further manipulation, analysis and use. For example, in case study MPLS 4 the University team gathered satellite data independently from a third party but relied on the charity to help them to identify and refine the parameters needed to develop the algorithms that had both research and practical applications. This was ultimately successful but only because of a protracted process of relationship building and engagement (Chapter 6, Section 6.2.3). It should be added that in this case the academic outcomes were far from clear in advance as this was more akin to exploratory research, from an academic perspective.

In collaborations in which academics had less control of data collection, issues could arise where the business partners had differing views on how the data should be collected or subsequently used, such as in case study Soc Sc 2 (the Event State Network at Appendix 4, Part X, shows the specific challenges in data collection). In other case studies, further challenges arose in data collection when business partners wanted to change direction. For example, a Postgraduate Researcher in case study Soc Sc 1 described how it was necessary to keep reminding the Company's members that their shifting ideas on the plan for one particular project would cause data inconsistencies for the longitudinal study they were already jointly working on.

Even with co-operative business partners, it could sometimes prove challenging to keep the achievement of academic outputs on track because internal organisational pressures on the business participants had a knock-on effect on their inputs, such as was noted in case studies MPLS 2 and MPLS 3 (in both cases other work commitments were sometimes more pressing). By contrast, in case studies MPLS 1 (Chapter 7,

Section 7.3.2), Soc Sc 1 (Chapter 6, Section 6.3.1) and Soc Sc 2 (Chapter 6, Section 6.3.2), gaining co-operation that supported the achievement of the original research aspirations proved more challenging and they had to be adjusted as a result. The most challenging situations were those in which business partners decided to cut specific projects within collaborative programmes, as in case studies Med 2 and Soc Sc 1, discussed in the previous section. Moreover, gathering robust data to support formal academic outputs such as research papers is often challenging, even in longer-term and established programmes, as well as in new collaborations. This is the risk that was mentioned at the start of this section. However, notwithstanding the importance of research outputs, it would be narrow to judge the value to both universities (at institutional, departmental or group level) and to individual academics on this criterion alone as the benefits of engaging in collaboration are far greater (as supported by Lawson *et al* 2016 and Hughes *et al*, 2016, discussed in Chapter 2, Section 2.3.4) and these are discussed further below.

In collaborating with business, the aim of the University staff in the case studies was not always to achieve learning outcomes that would feed directly into academic publications, or at least not as an immediate outcome. In case study Hum 1 the University faculty engaging with the heritage charity was more concerned with learning how to develop partnerships and create impact within this sector. Consequently, there was no internal requirement for either the Academic Project Manager or the Project Officer to seek such outcomes from the two-year project. However, the success of this project led to the establishment of a partnership between the University and heritage charity that now supports a wide range of useful research benefits, including a number of doctoral studentships. The original case study

collaboration can thus be seen as the University having made a strategic commitment that yielded research outcomes in the longer term. It would seem that in this case the objectives agreed by both the University and the heritage charity were a proxy for the more strategic aspirations of both parties.

In a different context, the project in case study MPLS 5 did not yield direct research-related outcomes but did allow the University (and charity) team to further improve their own understanding and capabilities in relation to the development of applications that supported conservation and flood management. The resulting innovation was put to immediate use by the government agencies and so provided direct impact (the scale of which depended on the outcome of the subsequent field trials and potential roll out). In addition to the successful innovation, the strong relations and positive reputation gained from the collaboration opened up possibilities of engaging in later stage collaborations that involved field applications, which offered the potential for generating research outputs. The lead Government Agency had already raised the possibility of further collaboration in respect to this. In this way the initial collaboration provided the University team with useful and funded development that could potentially lead to opportunities for applied research.

Other collaborations also provided stepping-stones towards further engagements that could yield research outputs. This was true of all three collaborations developed by the Knowledge Exchange Fellow (KEF) in case studies MPLS 1, 2 and 3. The contributions to a corporate strategy (case study MPS 1) and the co-authorship of two reports (one from each of case studies MPLS 2 and MPLS 3 were

produced at the end of these projects⁶⁰) relating to how business can better engage in conservation measures were all regarded very positively by partners in the collaborating organisations, despite these having more modest value in academic terms (the positive emerging or final outcomes are captured in the Event State Networks at Appendix 4, Parts II, III and IV). Moreover, the close relationships formed with the collaborating partners, the greatly expanded networks of business organisations engaged through the projects⁶¹, and the subsequent engagement in advisory roles in major projects (as a result of this work) collectively provided the KEF with a very good platform from which to develop future research-focused collaborations.

These examples, drawn from case studies Hum 1, MPLS 1, 2, 3 and 5 underlined the importance of collaborations that further developed the ability to engage in particular business areas effectively at faculty/departmental, group and individual level. Although they may have limited potential to yield direct research outputs, they act as a stepping-stone for researchers to move from academic to applied work. Arguably, such projects are essential for many academics that need to build an understanding of the realities and related issues in business sectors or communities, and to learn how best to engage with them. Most obviously this might apply to early career researchers with limited experience in collaborative activities but might equally apply to experienced researchers that want to learn about how their research might apply in new sectors or to learn about new developments in familiar ones. For example, the Principal Investigator in case study Soc Sc 2 commented on how the

⁶⁰ These were confirmed in KEF's Research Group presentation to mark the end of the three-year Fellowship.

⁶¹ In the presentation to mark the end of the three-year Fellowship, the KEF noted that over 300 businesses and NGOs had been engaged over the course of the three collaborative projects.

project provided a better idea of the viability of this kind of energy system and had since discussed this with a Government Department. This demonstrated how involvement in the project supported the maintenance of the PI's expertise in a field of applied study, which fed directly into an advisory role, thereby generating further impact.

In addition to any research outputs pursued during individual collaborations, it was clear from the case studies that university-business collaborations often supported a wider range of research outputs over time. This was regardless of whether initial expectations were met or not. For example, where collaborations experienced challenges or where research within the collaborations produced negative findings or results, they nonetheless provided a rich source of analysis that added to current understanding and further informed future approaches. Whilst there may be significant barriers to relating such challenges or negative findings directly to the collaboration, where these undermined the expectations of business partners or sponsoring organisations (as has been discussed at length in relation to case studies Soc Sc 1 and Soc Sc 2 in chapters 6 and 7), it may be possible to use these findings more generally, to avoid compromising relationships and positions. For example, some of the methodological lessons gained by the researchers in case study Soc Sc 2 were later written up for a book chapter on methodology. It might also be possible to synthesise evidence from multiple collaborations to support other pieces of research. In this way even smaller projects, that might not have provided an adequate basis for academic papers alone, could be useful sources of field evidence. Whilst specific examples were not raised through the case studies, it is clear that such an approach could support the development of thematic generalisations or propositions at a macro

level, such as might have been possible in drawing on the three projects undertaken by the Knowledge Exchange Fellow (case studies MPLS 1, 2 and 3) concerning the engagement of business in conservation, had the additional time to do so been funded. All of this would, of course, have to be conducted ethically and within the bounds of agreements with participants, but the intention here was simply to highlight that in many cases there should be other ways in which engagements in collaborative activities can be leveraged to support wider research outcomes beyond the confines of the actual collaborations.

These options to re-purpose the information gained from collaborations, either individually or in combination, to pursue further research will not be new to those experienced in applied research. However, the pressures of funding, assessment and career management make these options increasingly difficult, as discussed in Chapter 2 (Sections 2.2.1, 2.2.2 and 2.3.4). With research posts increasingly tied to research income from specific projects many early career researchers are often forced to seek credible research outputs from each individual project they are funded for, as were the Project Manager and Postgraduate Researchers in case study Soc Sc 1. However, the case studies have shown that there is risk in achieving direct research outputs in all university-business collaborations because of the uncertainties inherent in collaborative learning and the dependency on positive relationships with business partners, neither of which will be entirely within the control of individual researchers. Whilst it has been shown that there are potentially other valuable learning outcomes even where the delivery of immediate research outputs are not achieved, these are of little recompense to early career researchers because whilst such outcomes may

develop their ability to engage effectively in future collaborations, they may find it harder to secure funding for them without the research outputs.

Only those whose terms of employment extend beyond specific projects are likely to be able to engage in projects that are riskier or that support limited research outputs, such as those holding Fellowships (this included the Academic Project Manager in case study Hum 1, the Knowledge Exchange Fellow in case studies MPLS 1, 2 and 3, and the Postgraduate Researcher in MPLS 5) or permanent positions. However, that does not mean that they will be motivated to do so when career advancement is so heavily dependent on a researcher's publication profile. Re-purposing and synthesising of information from previous research may also prove to be difficult for permanent staff where time to do so is at a premium because of the pressure to seek further income-generating projects. It can thus be seen that in all career stages there are pressures facing researchers that may limit the university-business collaborations they are willing and able to enter into.

This discussion of learning outcomes has shown why there is a fundamental tension between, on the one hand, funding, assessment and career management regimes that reinforce an academic culture resting heavily on direct research outputs (largely on the basis of formal publications), and on the other the Government's aspiration to gain greater impact from the research potential of universities. To summarise the arguments presented in this chapter, there are two key aspects to this tension. The first is that the funding, assessment and career management regimes combine to restrict, rather than motivate, academics at all career stages, but particularly ECRs, in engaging in collaborative activities beyond those with a high expectation of yielding direct research outputs. This research has highlighted how

such wider activities have the potential to create high impact whilst also advancing the ability of academics to engage in further collaborative activities that more directly support research outputs. Moreover, it is possible that much of the learning, expertise and personal contacts gained from collaborative activities by ECRs are taken with them when they leave at the end of their contracts and so this is lost to the institution.

The second aspect is that there seems to be a low appreciation of the processes that lead to positive learning outcomes in university-business collaborations. As a consequence, there appears to be a lack of focus on the training and development that researchers need to prepare them to engage in collaborations effectively. ECRs receive little or no support and more senior academics seem to rely on experience, both of which are sub-optimal and this shortfall puts both the individual academics and the outcomes at risk, as will be discussed further in the next chapter.

The implications for the development of university approaches of the issues raised by these inherent tensions will now be considered in more detail in the next chapter. This will lead into some specific recommendations, after which the chapter will then close by drawing together the conclusions from this research.

CHAPTER 9: DISCUSSION OF THE IMPLICATIONS FOR THE DEVELOPMENT OF UNIVERSITY APPROACHES, RECOMMENDATIONS AND CONCLUSIONS

9.1 Introduction.

This final chapter will begin by extending the analysis of learning outcomes presented in the last chapter to consider the implications for the further development of university approaches. Whilst continuing to use the University of Oxford as the focus of this study, the discussion is broad enough to allow generalisation of some of the points raised. Recommendations on how the implications should be addressed in the University's future development of its approaches to university-business collaboration will follow. In concluding, the thesis will draw together the key contributions to knowledge of this research, highlighting the limitations of this study and the areas for future research.

9.2 Discussion of the Implications of this Research for the Development of University Approaches

This thesis has developed a detailed understanding of how the interactions between the individuals and organisations involved in the core of university business collaborations affect the learning that takes place within them. Chapter 8 drew the underlying factors together to show how they are incorporated into practice, culminating in the wide-ranging learning outcomes. The challenges in understanding and fully evaluating the value of these learning outcomes to business show why there are associated risks of undervaluing the impact of university contributions through collaborative activities. Moreover, it was clear that university academics could face significant challenges in being able to engage across the range of collaborative activities that would enable their research potential to be fully exploited.

In part, the challenges academics face in undertaking collaborations with business are a reflection of Government policies that combined with a prevailing academic culture and career management practices across academic institutions (including the University of Oxford) favour high quality journal publications as key indicators of research quality. This is widely recognised and has for some time been a matter of debate in higher education policy circles. For example, the review into the use of metrics to inform research assessment and management by Wilsdon *et al* (2015) advised caution in the use of Journal Impact Factors⁶² and citation counts to gauge the quality of research (p. viii). The findings of Wilsdon *et al* (ibid) were subsequently acknowledged in the Stern Review (2016), which recommended that the primacy of peer review (expert judgement) should be retained for assessing research outputs, with metrics used only in support, where appropriate (p.21), which was subsequently accepted by Government. In addition, the REF Guidance (REF 2019) adopts ‘equity’ as one of its three general principles for assessment (alongside ‘equality’ and ‘transparency’), which states, “All types of research and all forms of research output across all disciplines shall be assessed on a fair and equal basis” (para 20.a, p.5).

Despite this recognition of the need to assess academic outputs in a more nuanced way within the REF process, it appears that this is not reflected in the current University culture and practice since pressure to publish in highly regarded academic journals was frequently raised in interviews as the prevalent view, particularly by early career researchers (ECRs). This position was readily apparent to one senior business

⁶² Journal Impact Factors are commonly used to assess the importance of journals and may be used to promote particular journals by publishers. The Journal Impact Factor is calculated by dividing the total number of citations of the journal’s articles over a two-year period by the total number of citable articles published in the same period.

partner who described ECRs as being in the unenviable position of “*publish or perish mode*”. However, the analysis in the previous chapter showed that the potential for this to be problematic was higher where the expectations of research outputs were tied directly to the duration of a single project. Case study Soc Sc 1 showed that in some cases this could lead to inflexibility in pursuing those outputs, potentially at the expense of partner goals or the wider collaborative relationships needed to support their achievement. Consequently, more flexible career management practices may go some way towards alleviating this issue, as will be discussed in the next section.

Importantly, the preceding analysis of the ten case studies across all stages of development in Chapters 5, 6 and 7 examined how the interactions between participants affected the learning that took place. The achievement of desirable learning outcomes was heavily dependent on establishing effective collaborative relationships in which they were able to exert positive influence (see Chapter 8). However, many of the academics, across all career stages, found this very challenging. The comments from the experienced Principal Investigators in case studies MPLS 4 and Soc Sc 2 at the start of Section 7.1 underline the importance of relationships but also reflect that the best ways of building them seem to have been realised and responded to only through hard won experience within their respective collaborative engagements. The previous chapters have illustrated how academics working on several other collaborations similarly had to rely on learning from experience, such as the Knowledge Exchange Fellow in case studies MPLS 1, 2 and 3.

A number of the junior University participants bemoaned the paucity of bespoke training and development that would have given them a better understanding of how to approach collaboration better. Only two participants mentioned receiving

any kind of training and development opportunities in relation to their collaborative role. The Knowledge Exchange Fellow (case studies MPLS 1, 2 and 3) and Project Officer (case study Hum 1) resorted to establishing an informal network for those involved in collaborative activities to share experiences and provide mutual support. In part, the limited support that some case study academics found within their own management structures reflected a lack of experience in collaborative activity at that level within the University. As a consequence, learning how to work within collaborations was sometimes more dependent on the support offered by business colleagues (although it was clear that this support was far from universal), as the Academic Project Manager in case study Hum 1 explained:

“For me, I’ve learned a huge amount from (Organisational Project Manager) and (Organisational Sponsor) because there’s actually a level of line management, leadership and decision making that doesn’t exist in the University. My occasional frustration is that I don’t have anyone to look up to on how to do this, I’ve been laying the track in front of me” (Academic Project Manager, case study Hum 1).

It thus appears that, despite the increasing career management pressures on academics at all stages to collaborate with business, and the challenges inherent in doing so, the institutional support to improve their ability to engage more effectively is limited and sometimes almost entirely absent. This leaves individual academics more exposed to the risks of encountering problems in their collaborative engagements, particularly when undertaking unfamiliar activities such as developing new partnerships, engaging in novel or innovative applications, and undertaking explorative activities with business partners. The case studies have shown how these activities put demand on their knowledge, skills and abilities beyond those expected of an academic working and learning within a purely academic institutional context. As a

consequence, the risks carried by the academics threaten the achievement of favourable outcomes for both themselves and their business partners. Beyond impacting directly on the careers of individual academics, this risk ultimately extends to the University in terms of its ability to generate high quality research and impact. This clearly links to the formal assessment of the University, through the REF process, and its reputation among current and potential business partners, both of which have implications for future funding.

In light of the above discussion, it is argued that in responding to Government pressure to increase collaboration with business, the University presently transfers a disproportionately high degree of the risk associated with conducting these activities to the individual academics engaging in them. It should be acknowledged at this point that such Government pressure is applied nationally to all of the public universities under its control and that the career management practices described here and in the previous chapter are not unique to the University of Oxford. As a consequence, this transfer of a high degree of risk to the academics engaged in collaborative activities is highly likely to be more widespread, albeit with some variation reflecting specific career management and developmental approaches. However, as this research has been based on case studies from the University of Oxford, it will continue to be used as the focus for considering the issues this raises.

It became very clear from preliminary investigations for this research (detailed in Appendix 2) that whilst much work is already being taken forward in this area of University development at all levels, the complexities of governance and structure within Oxford means that these translate into different practices between and within the Academic Divisions. Consequently, it would be beyond the scope of this study to

propose specific measures for the University of Oxford to take forward as this would require a detailed analysis of its current policies and practices. The intention instead is to extrapolate from the preceding chapters potential areas for development that the University should consider in the further development of its approaches. In doing so, this level of generalisation means that the areas identified may also be of wider value in informing the approaches of other research-led UK universities.

9.3 **Recommendations: Areas for Development**

The preceding discussion has drawn on the findings of this research to establish the case for addressing the developmental needs of academics, underpinned by more accommodating career management practices that better support their ability to engage in university-business collaborations. It has been argued that this will enable academics to exploit the learning outcomes gained from collaborative activities more fully, potentially leading to greater research outputs. However, in developing a more strategic approach, these measures need to be accompanied by further steps by the University to develop a culture that constantly learns from the continuing engagements of its academics to update, inform, and disseminate how university-business collaborations are best approached and supported.

Notwithstanding the point made in the previous section that the recommendations offered here are not intended to be specific, they have nonetheless been checked for their general fit within the University's strategic direction and therefore of their potential utility. They were all found to sit within the commitments or priorities relating to the key pillars of *Research* and *People*, whereas the more general commitment to collaborative engagement is covered under *Engagements and*

Partnerships within the University's Strategic Plan 2018-23⁶³ (University of Oxford, 2018). In this respect, the following recommendations can be regarded as informing further development across a number of areas that the University is already committed to addressing. However, the multiple areas that these recommendations extend across also illustrates the crosscutting nature of developing a collaborative capability and so these separate strands need to be drawn together to take forward an integrated approach. The recommendations have been grouped into three key themes as follows:

a. ***Provide bespoke training and development for academic staff to support engagement in collaborative activities.***

Support to improve the ability and confidence of academic staff to engage in collaborative activities should be offered through a comprehensive strategy of training and development that combines a programme of blended learning with continuing individual support. This should develop academics' understanding of the process of collaboration, using the learning perspective developed in this research to bring into focus the nature of collaborative learning (Chapter 3) and how this is affected by the collaborative relationships formed and developed through the interactions at all stages of engagement (Chapters 6 and 7). Building on this understanding there is a need to develop an appreciation that successful collaboration involves selecting appropriate ways to act, both proactively and responsively, that enables them to exert

⁶³ The University of Oxford's Strategic Plan 2018-23 sets the top level framework to take forward its commitments and priorities over the five year period. It is an open access document that can be found online at: https://www.ox.ac.uk/sites/files/oxford/field/field_document/Strategic%20Plan%202018-23.pdf

more informed and positive influence throughout their engagements (see Chapter 8, Section 8.3). Underpinning this, there needs to be a clear focus on considering the perspectives of business partners throughout all stages of collaboration, starting with the agreement of common learning goals and modes of co-development (discussed in Chapter 6, Sections 6.3.2 and 6.3.3), and being prepared to be flexible and agile in response to their changing aspirations thereafter.

Training and development approaches need to go beyond imparting this knowledge and understanding in order to develop their practical application. There is a range of approaches that could be incorporated into group training sessions to support this. These include the use of case study analysis, simulation exercises involving decision-making or role-play, and discussions with experienced practitioners drawn from a range of different collaborations (tailored to the needs of particular cohorts) and in different roles (such as Principal Investigator, Co-Investigator and Research Assistant). In addition, it would also be very useful to introduce the business perspective, perhaps through presentations involving previous or current partners and plenary sessions that support questions and discussion.

Once academics are engaged in collaborative activities, line managers have a crucial supporting role in providing guidance and support on the development of the collaboration in addition to research direction. The case study evidence suggested this support is patchy at present and so it is important that more senior academics (Principal Investigators) also receive some training and development support, tailored more to their role. This

would not only prepare them to provide closer support but it would also ensure that complementary approaches and common expectations are developed within academic project teams. Such developmental opportunities could also prove useful for engaging those senior academics that have had little or no involvement in collaborative activities to date.

Academic staff may not always feel that it is appropriate to take issues to their line managers so support for peer groups and allocating mentors (experienced practitioners working in other areas) should also be considered. The existing knowledge exchange or business engagement teams might have a useful role to play here in bringing their experience of wider engagements to bear.

b. ***Develop career management practices to support engagement in collaborative activities.***

Career management practices need to attract, develop and support academics that are capable of generating both high quality research and impact through collaboration with business. This means that in addition to providing the training and development interventions outlined above, career management needs to ensure that academic staff are motivated to engage and prepared to take the inherent risks in doing so in the confidence that the University will support them. There are a number of key elements needed to support this, as outlined below.

The career management of academics engaged in collaboration (particularly those that are business facing) should begin with selecting staff that are highly motivated to pursue collaborative activities and have the

personal characteristics and abilities needed to do so successfully. Those involved in recruiting should consider looking for evidence of applying interpersonal skills and abilities in a range of circumstances such as: taking the initiative, motivating and persuading others, negotiating, dealing with conflict, and showing empathy and support to others. Heads of Departments and Research Groups will be aware of the specific tasks required in those posts involving engagement but the implication of these findings is that these underlying abilities should be given careful consideration and due weight in selection processes. This may require a shift of emphasis from purely academic abilities for some that are involved in recruitment. For more senior posts, evidence could be sought from previous collaborative activities, whereas in less experienced staff it may be necessary to draw evidence from their wider activities (such as working or leading in groups or teams), on the basis that many of the abilities and underpinning qualities will be transferable to collaborative environments.

Secondly, it has been shown above (Section 9.1) and in the previous chapter (Section 8.4.2) that early career researchers (ECRs) are placed at particular risk in collaborative work because of their restrictive terms of employment, often limited to a fixed term that is linked to a specific project. As such they are often employed from the start of the project (or later stage in longer collaborations), with little or no opportunity to engage partners beforehand or to follow up afterwards. This research shows that pre-engagement activities were extremely useful in raising general business awareness, understanding issues and opportunities and establishing mutual

understanding (Chapter 6, Section 6.2). This would be particularly helpful where the ECRs are employed to work in sectors or with organisations that they have little or no experience in, such as was seen in, for example, case study Soc Sc 1. Pre-engagement might thus be regarded as de-risking the potential for individual academics (and, by extension, the collaborations more generally) to run into problems later. This supports the view that providing some protected time and funding for ECRs to engage with business partners and perhaps other stakeholders prior to commencing work on collaborative projects would be beneficial even where they are moving into predetermined project roles. This could be built into project proposals by Principal Investigators or added to the front-end as a short induction phase but in either case would require additional funding. There will not be a single solution that suits all circumstances but PIs should be empowered to assess this requirement and bid for appropriate funding on a case-by-case basis. Such activities should be regarded as an integral part of the cost of collaborative projects and funded accordingly.

More broadly, it was clear that those ECRs employed on longer (typically three year) fellowships were better placed to: undertake pre-engagement activities, to gain useful experience of wider impact-focused collaborations, and to subsequently exploit research outputs. An expansion of this mode of employment, supported by the Research Councils or through direct University funding, would provide a significant enhancement to the career opportunities available to more ECRs (with a strong interest and potential in collaborative research) and reduce some of the risks associated

with single project contracts. However, these fellowships could be better structured to provide more progressive development and exposure. In addition to training and development and the close support of line managers throughout, this could begin with engagement on a pre-determined project of up to a year in a supporting role and under supervision. This could then be followed by funded and supported pre-engagement activities to identify and develop a new collaboration, with the possibility of conducting a follow up project (using a stepping-stone approach) to attain more credible research outputs, where required. Such opportunities should be managed flexibly to develop collaborative abilities whilst adding to an ECR's research profile of publications.

More senior academics engaged in collaborative research would also benefit from being supported more flexibly so that they too have time and funding made available, where justified. Whilst it is usual practice to construct bids for pre-determined projects alongside other routine commitments, the ability to pursue and develop new collaborative proposals from a range of potential pre-engagement activities requires dedicated time and funding. Case studies Hum 1, MPLS 2 and MPLS 4 showed how this can be a lengthy and involved process, perhaps involving short demonstration projects to gain partner commitment. In many cases senior academics are far more appropriately positioned and able to lead new areas of development, such as was demonstrated by the Principal Investigator in case study MPLS 4 and their formal position power is essential when brokering major partnerships such as in case study Soc Sc 1. Similarly, the time to fully exploit findings from

collaborative activities needs to be supported, particularly where analysis extends across multiple projects.

Where senior academics develop collaborative activities that show the potential to support longer-term research outputs but require a longer-term and more flexible strategy, this needs to be evaluated and managed accordingly. Whilst there are inherent risks and challenges in supporting and managing longer lines of collaborative development there are also potential rewards in opening up new areas of research that would otherwise be unattainable through tightly bounded projects. Whilst it may sometimes be possible to link successive projects together, this research has shown that the ability to co-develop a collaborative strategy with partners that is responsive to emerging learning and other opportunities often requires more flexibility. Case study Hum 1 demonstrated how the commitment to this could be supported and managed flexibly⁶⁴ with a view to developing longer-term potential.

In the case of ECRs and more senior academics it is clear that these career management recommendations to better support their collaborative activities requires additional funding. However, it is argued that a more strategic approach (rather than the more tactical use of academics on short-term funding for specific projects) would support fuller engagement and exploitation that, if well managed, could provide better returns in terms of both impact and research.

⁶⁴ The current REF guidance (REF 2019/01, para 207, p.49) requires an average of 2.5 submissions per full time equivalent member of staff to be submitted by institutions but individual contributions can vary between 1 and 5, which provides scope to manage periods where academics are engaged in collaborative development into the full range of research activities across a Department, if a strategic approach is adopted.

c. ***Support activities and practices that promote a culture that values engagement in university-business collaboration.***

The recommendations discussed so far are unlikely to be successful unless there is a reinforcement of a culture that values learning through collaboration and the impact that it achieves through its application. As a form of research it has to be supported as legitimate, rigorous and vitally important in ways that change attitudes and challenge perceptions where necessary. It should be celebrated where it does make a difference and the challenges that researchers overcome in doing so respected alongside other routes to academic achievement. It was clear from this research that the central University administration continues to put much effort into supporting this at the top level but it is useful here to focus on the departmental level at which academics are directly supported.

Most fundamentally, the fuller range of outputs from collaborative activities needs to be better recognised and promoted. For example, given the risks involved, academics working in collaborations may sometimes judge that methodological lessons and insights into the application of theory gained from them hold more research potential than the actual research outputs and so choose to make them the focus of publications. This should be seen as an integral part of developing collaborative activity and actively encouraged both to promote wider learning and to encourage greater engagement in these activities. Similarly, co-authored reports and publications with business (including Government Agencies and other non-commercial organisations) should be highly valued for their functionality and commensurate impact in

reaching a far wider audience of end users than would be possible through most academic journals. These wider outputs do not challenge the core value of high-quality research outputs but it should be recognised that academics engaged in collaboration will develop a wider portfolio of valuable outputs. Senior academics need to reflect this in recruitment and in pressing the case in relation to the internal and external assessment of Departmental outputs.

To gain wider commitment, it is important to create a relatively open and inclusive approach to collaborative activities (whilst respecting commercial confidentiality) within and between departments. Comprehensive programmes of presentations on both on-going and completed collaborations would provide important learning, and possibly research, opportunities whilst signalling commitment to these activities. Presenters should be encouraged to be as open as possible about challenges and setbacks, as well as successes because an important aim of these sessions should be to share lessons learned, although how these are subsequently captured and shared more widely across the University also needs to be addressed separately. Wide attendance from academics across and between departments should be encouraged to support the cross-fertilisation of perspectives and ideas for further development and in overcoming challenges. This is particularly important in partnership development, as was seen in case study Hum 1: a presentation on the project just after its completion (with speakers and attendees from both organisations) illustrated how the Humanities Division had drawn in wider expertise from other Departments, including Botany, Geology and the Business School to

tackle specific challenges or issues of wider interest to the Heritage Charity partner.

The recommendations suggested here would require sustained effort over an extended period with the visible leadership of senior staff at Division, Departmental and Research Group levels. When taken together, it is argued that they would not only enhance support to university-business collaboration but also support diversity, proactivity, responsiveness and collegiality in approaches to research more generally. In this way they would strengthen the communities of practice across the University.

9.4 Wider Implications for Policy and Practice

The recommendations in the previous section are deliberately focused on measures that might be taken within the University to strengthen the motivation and ability of academics to engage in collaborative activities. However, it has been made clear in this thesis that the issues that the recommendations aim to address are symptomatic of wider policies and practices that are prevalent across the UK's higher education landscape. It is useful, therefore, to consider briefly the wider implications for policy and practice at national level.

Whilst training and development provision to support academic engagement in collaborations will require some local tailoring, there would be advantages in developing commonality in core elements within and between institutions, to support wider collaborative activities. Linking this to a new or existing professional body that is able to award levels of institutional and personal recognition of commitment to collaborative activities could incentivise both levels, as well as provide businesses with greater assurance. On an individual level, recognition of both training and experience might support better employability for those that choose to engage in collaborative

research and development activities. Importantly, such standardisation would provide a clearer basis for funding.

The funding changes needed to support the pre and post collaborative activities and engagement in wider collaborations (that may provide benefit but not lead, at least initially, to high quality academic outputs) requires a more fundamental rethink of policy. Over recent years funding has become increasingly linked to tighter requirements in an effort to ensure outcomes that provide value for money. Whilst this has a clear logic with regard to the use of public funding, it does little to incentivise academics to engage in these exploratory and wider activities that have the potential to provide significant benefits to both businesses and universities alike when viewed more broadly, as was shown in Chapter 8 (Section 8.4). This supports the case for the Government rebalancing funding to allocate a proportion to these activities. Whilst outcomes would be far less assured, this allocation would nonetheless incentivise academic engagement, whilst providing impact to businesses and through exploratory developments create the potential to open up new and unexpected lines of development. The most promising would then become candidates for fuller project funding further downstream.

Finally, recognition of wider academic outcomes from collaborative activities needs to be addressed. Government should ensure that assessment under the Research Excellence Framework is appropriately balanced, in terms of research quality, impact and environment, such that the activities described above are recognised and supported appropriately in terms of the assessment criteria. Moreover, it would be essential for assessment panels to interpret and apply these as intended, regardless of their own perspectives, as it is only in this way that change could be achieved. Closely

associated with this point is the need for academics to promote the value of wider academic outcomes from collaborative work in other extra-university activities or roles. Most pertinently this applies to those with editorial responsibilities for academic publications, as it is here that broader interpretations of what is worthy of publication could have a major impact on fostering more positive attitudes towards collaborative work across the academic community over time. This could be reinforced by similar shifts in approach by those selecting papers for conferences and in the actions of senior academics in representational or advisory roles.

9.5 The Contribution to Knowledge of this Research

This research has addressed a gap in the research literature by providing a better understanding of how learning through university-business collaboration is influenced by the interactions between individuals and organisations that take place within them. It has deliberately sought a functional approach that informs the development of university approaches at practitioner and institutional levels.

As an appropriate conceptual framework was not available, Illeris's Model of Workplace Learning (Illeris, 2011) was adapted to provide an initial approach (Figure 3.4). This suggested that collaborative learning took place at the confluence of individual, organisational (both university and businesses) and inter-organisational influences but in practice the research supported Payne's (2011) view that these influences were nested within individuals, who operated within multiple levels at the same time. This led to a focus of analysis on the interpersonal level, to better understand the actions and reactions of individuals and groups working within collaborative teams.

The construction of event state networks (after Miles, Huberman and Saldana, 2014) was shown to be particularly useful in seeking to understand the important temporal dimension in these collaborative interactions, from the pre-engagement phase through to delivery. Across the diverse set of case studies, the evidence underlined the importance of collaborative relationships in supporting the achievement of positive learning outcomes for both university and business parties. This is why the often-overlooked pre-engagement stage was seen to be important in establishing deeper mutual understanding from the outset.

Analysis of the case studies showed how the establishment of common learning goals among participants (at a level beneath any contractual objectives) was important in establishing trust and commitment between partners but moreover that it was equally important to ensure that all parties had common expectations of the way in which learning was to be pursued collaboratively, referred to as the mode of co-development. A typology of three modes of co-development between university and business participants was proposed: adding, combining and augmenting. It was shown how these were suited to different collaborative tasks but also that it was equally important that both parties were content to use the same mode and pursued it accordingly.

Where collaborative relationships successfully supported learning, it was shown how modes of learning could transition from adding to combining or augmenting as business partners became able to play a greater role in co-development. This and the demonstrable ability of academics to accommodate collaborative engagement by the way in which they engaged and presented new learning challenged the notion that a business's ability to learn through collaboration

was limited by, or even definable in terms of, a pre-determined absorptive capacity (Cohen and Levinthal, 1989, 1990). Instead the initial absorptive capacity influenced the mode of collaborative learning that was adopted but this capacity was shown to develop during the collaborative process itself, as partner learning progressed. Similarly, rather than collaborations being transactional processes whereby learning was moved from the university to business partners, the learning was shown to be highly interactive and responsive such that it could deviate from expected courses significantly, resulting in different outcomes from those expected beforehand.

Throughout the course of university-business collaborations it was shown that the dynamic interplay of interactions between individuals and groups presented both challenges and opportunities that had the potential to change the relationship between partners and this had a direct impact on the development of learning. A deeper analysis of collaborative relationships identified that they were underpinned by three core socio-psychological factors that were closely inter-related: motivation, trust and the use of social power.

Motivation was shown to be the critical factor since, as Illeris (e.g. Illeris, 2007 and 2017) and others have shown, motivation is a critical component of the psychological process of individual learning. The concepts of intrinsic and extrinsic motivation were useful in understanding how motivations varied in collaborative relationships. Whilst it was determined that the motivations of individual academics to engage in specific collaborations tended towards being extrinsic, at least to begin with, it was more useful to view these on a continuum between extrinsic and intrinsic motivation, rather than make a binary distinction. This drew on the work of Ryan and Deci (2000a), which underlined the importance of self-determination, or autonomy, in

determining motivations. Given that total autonomy is, by definition, not possible within the context of overall collaborative relationships, there were nonetheless periods during which academics could have more autonomy than in others, when the use of their specialist skills and knowledge had primacy. It was shown that it was important, therefore, to establish a level of relative autonomy in which all partners felt they could influence the development of collaborative learning to levels, and in ways, that were acceptable to them. Accommodating this was a key factor in determining the success of collaborative learning. For collaborations in which very high levels of motivation and commitment to the activities themselves developed, it was likely that motivation subsequently became intrinsic.

The importance of trust has been well documented in the literature on collaborations but this research has shown more specifically how it affects the learning that is generated within university-business collaborations. It was shown how trust rested on the expectation of positive outcomes (Rousseau, Sitkin, Burt and Camerer, 1998, p.394) and that in collaborative relationships the level of trust influenced the degree of risk that both university and business partners were prepared to take in relation to the direction and specific activities undertaken. This could be critical in determining the learning outcomes generated within collaborations. The research combined case study evidence with the concepts underpinning the process model developed by Mayer *et al* (1995) to suggest how trust was formed, built upon or undermined by collaborative behaviours. Prior experience and perceptions were shown to be important in initial trust formation and it was shown that these could be highly variable across business communities, which meant that academics needed to have a clear focus on building and maintaining trust within the collaborative activities.

Building on the model, three key behaviours were identified that supported this: ability (to apply academic expertise effectively within the collaborative context), benevolence (towards meeting business goals through both proactive and responsive acts of support) and the application of appropriate values (acceptable to the business participants).

High levels of trust linked closely to high levels of motivation and supported the ability to overcome challenges, thereby underpinning resilience in collaborative relationships. Furthermore, high levels of trust supported more explorative or novel (and therefore riskier) approaches that could lead to new learning or more effective ways of solving problems and achieving goals and also meant that partners were more likely to accommodate each other's goals in their collaborative approaches.

The third factor, the use of power, is rarely mentioned in the literature on university-business collaborations but was drawn into this research because it contributed to a much fuller understanding of how behaviours influenced motivation and trust in practice. The work of French and Raven (1959) and Raven (1993) on the use of social power bases was taken as a basis for analysis because of its practical orientation. Their key power bases were analysed in terms of their applicability in the context of university-business collaborations, on the basis of the case study evidence. This showed that the ways in which influence should be sought (through the use of social power) in the context of university-business collaborations is different in some important ways from how it might be applied within the context of a single institution. In particular, it was clear that care should be taken in the use of pressure because of the risk of undermining the trust and motivation of the partners whose commitment is relied upon to achieve collaborative goals (and over whom there may be limited

formal authority). In addition, expert power needed to be seen as the application of expertise within the context of the collaboration rather than simply academic ability and the implication was that academics should strive to establish this at an early stage. Finally, it should be highlighted that it was important for academics to establish legitimacy as a basis for influencing collaborative learning effectively from the outset.

Whilst motivation, trust and power were seen to be core factors influencing collaborative learning, it was shown how their inter-relationships and effect on learning was mediated by the effects of collaborative structures and communication and how these in turn were shaped by leadership and management approaches. This was drawn together into a model to show the interactive factors affecting collaborative learning (Figure 7.1), which, supported by the detailed evidence of this research, provided a comprehensive framework for better understanding the internal dynamics of university—business collaborations. This should now supplant the original conceptual framework (Figure 3.4) constructed as a starting point for this research.

It was argued that leadership needed to be exercised at all levels within university-business collaborations because formal inter-organisational lines of authority are often weak and so there is a heightened dependence on influence. Leadership in this context was thus defined as the effective use of influence to persuade others to work collaboratively towards agreed goals. In this regard, initiative was identified as an important attribute alongside the appropriate application of social bases to generate the high levels of trust and motivation needed to support collaborative learning. A further framework to inform approaches to the use of social power bases in university-business collaborations was presented in Figure 8.1.

Together, Figures 7.1 and 8.1 provide a basis for the training and development interventions outlined in the recommendations in Section 9.3.a.

Following the detailed analysis of learning processes, it was important to understand how these related to learning outcomes. The learning outcomes were far more extensive than were commonly captured, sometimes reflecting their relatively intangible and longer-term nature but also because outputs were often measured against a relatively narrow and pre-determined set of objectives that did not adequately reflect the nature of collaborative learning. However, the case study evidence supported the view that the learning outcomes generated from university-business collaborations are often more extensive and of greater strategic benefit to business than might immediately be apparent.

From a research perspective, it was shown that the current pressure to seek high quality outputs from individual collaborations and the restrictions of career management (in part driven by assessment and funding pressures) constrained the ability of academics to exploit the full potential of these activities. Engagement in university-business collaboration could frequently be demanding; even for experienced academics, yet little was provided by way of formal preparation. The key implication of this current context was that academics carry a disproportionate degree of risk in engaging in university-business collaboration: particularly early career researchers, who depended heavily on generating research outputs from them and had limited experience to draw upon. Consequently, it was proposed (see Section 9.3) that the University should provide focused support in three key aspects as part of an integrated approach to improve the confidence and ability of academics to engage in and fully exploit collaborative activities with business. These aspects pertained to the

provision of training and development, more flexible and supportive career management practices, and the further development of a supportive culture.

9.6 Limitations

This research has focused attention on the need to better understand the processes within university-business collaborations and how they relate to the outcomes as a basis for improving the effectiveness of university approaches. It deliberately adopted a learning perspective as the best way to link process to outcomes and although this worked well it is accepted that not all outcomes and processes can be cast in a learning mould, such as economic and financial aspects. However, it was made clear that this was not the intention, although it has been shown that even in adopting this perspective it was necessary to draw in academic work from much wider fields, including sociology, psychology, business and management. The perspectives offered by this research should thus be seen as adding breadth to the existing literature.

As a preliminary study it aimed to capture breadth across cases, at the expense of depth within them. Consequently, some were very small and, whilst useful, could have been illuminated by the inclusion of further participants at multiple levels, to build up a fuller picture of the dynamic inter-relationships. However, the time, resources and, in particular, the challenges of gaining access and participation in a study of this nature all acted as constraints. Such constraints meant that a reliance on single semi-structured interviews with participants was the best option but longitudinal studies that captured the perceptions of participants at progressive stages of collaborative development would have provided more detailed insights into the learning challenges and opportunities as they unfolded.

In terms of the population for this study, the cases were all confined to the University of Oxford. It could be considered that its general reputation, cohort of academic staff and level of resources, at the top end of the UK spectrum, limits the generalisability of the findings. However, contrary to this view it is argued that whilst reputation may have favourably supported engagement in some (but certainly not all) of the business partnerships, the research demonstrated that the impact of reputation was variable and, once engaged, it was the performance within collaborations that was all-important. In this regard the academics seemed to be in no different a position than other similarly equipped academics involved in collaborations from other research-led universities and so it is expected that the propositions and supporting models provided by this research would have a high degree of generalisability.

Within the University of Oxford, as at other universities, there are now business development and knowledge exchange teams as well as a growing number of singleton posts and there is an increasing focus on these intermediary roles. These were engaged extensively in the preliminary investigations but primarily to gain access to collaborations rather than to examine their roles. The recommendations set out earlier in this chapter (Section 9.3) seek to enable academics to engage directly in collaborative activities but this would clearly need to be aligned with the roles of these other important facilitating and enabling participants in the University's ecosystem. Similarly, it is acknowledged that this research has paid scant attention to the importance of knowledge management to support wider organisational learning across the University. This is an important area to address otherwise the gains from the development of approaches would be lost. However, both issues would have widened the research considerably and raised the level of focus away from the detailed

examination of inter-relationships within the core of collaborations. Consequently, whilst recognising their importance at the organisational level, it was decided that these were beyond the scope of this study.

9.7 Further Work

This research has proposed a comprehensive framework for understanding the interactive factors that affect collaborative learning (Figure 7.1). The propositions contained within it now need to be tested further across a wider range of university-business collaborations and across other research-led universities. The sampling of the case studies was deliberately wide-ranging and whilst this was important in establishing that collaborative relationships were important in all, further work may reveal important distinctions between types of collaborative activity, however defined by others. More extensive studies would enable the dynamics of participants between organisations and in relation to their roles to be better understood. In particular, more focused research into the mediating and shaping factors would be useful as it was only possible to give them limited attention in this study.

Finally, this research has been deliberately practitioner focused and has provided recommendations that now need to be evaluated through implementation. An action learning approach that gathers and uses feedback to inform further refinement would support continuous development. Funding would be needed to prime some initiatives but careful evaluation, that took account of the wider learning outcomes discussed, might generate a case for more progressive implementation.

At its core, this research supports the need for universities to strengthen the case for a renewed emphasis on learning in its collaborative engagement with business. This is, after all, their core activity and a rebalancing of the value generated

in terms of learning rather than purely economic value would be to the benefit of universities, businesses and society alike.

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