

INNOVATION HUBS IN AFRICA: ASSEMBLERS OF TECHNOLOGY ENTREPRENEURS

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ABSTRACT

Innovation hub organizations—or ‘hubs’—have become a prevalent form of support for technology entrepreneurship in Africa. About 170 African hubs have been established, most since 2010. Practitioners have argued either that hubs are transformative network infrastructures for Africa’s fledgling digital economy or that they are ineffective business incubators. This thesis steps back from this debate about whether hubs work. Instead, it asks *how African hubs work*, specifically how they shape relationships of technology entrepreneurs. Literature on intermediation and incubation is reviewed to establish a theoretical framework. The thesis then tests and extends the framework based on an extensive, grounded empirical inquiry. In-depth case study data (including 119 interviews with 133 participants) on six hubs were collected during field studies in Kigali, Harare, and Accra from September-December 2014. The thesis finds that the analyzed hub organizations were defined by nested, fluidly bounded entrepreneurial communities. Communities varied by their level of activation: members of active communities had concern for each other and recognized communities as social entities, while inactive community members only shared a loose purpose. The six hubs followed two distinct organizational patterns: the technology hub (depending on active core communities) and the entrepreneurship hub (relying on active peripheral communities). Based on these results, the thesis theorizes hubs as *assemblers of technology entrepreneurs*: hubs assemble previously distant and different actors into entrepreneurial communities. Assembly is unique to hubs: it is related to but different from incubation and most forms of intermediation. Assembly theory addresses important meso-level analytical gaps in prior research on the coordination and organization of entrepreneurship. The thesis underscores limitations in African technology entrepreneurship environments, advising hub practitioners to acknowledge that ‘only what is there can be assembled.’ Ultimately, it highlights that hubs have been critically misunderstood, and clarifies what hubs can and cannot do for technology entrepreneurs.

Table of Contents

Table of Contents	8
List of Figures.....	12
List of Tables.....	13
Chapter 1 Introduction	14
1.1. Technology Entrepreneurship in Africa: Grand Ambitions vs. Sobering Realities ..	14
1.2. African Hubs: A Fast Rise and Far-Reaching Aspirations.....	17
1.3. Research Questions and Analytical Agenda.....	22
1.3.1. Study Goals and Initial Research Questions	22
1.3.2. Literature, Theoretical Framework, and Refined Research Questions	24
1.3.3. Research Design and Empirical Approach.....	25
1.4. Theorizing Hubs as Assemblers of Technology Entrepreneurs	26
1.5. Wider Contributions of Assembly Theory	29
1.5.1. Intermediation and Incubation	30
1.5.2. Organization and Coordination of Entrepreneurship and Innovation	31
1.5.3. Hub Practice	32
1.6. Thesis Overview	34
Chapter 2 Background and Literature Review	36
2.1. Innovation Hubs as an African Phenomenon	36
2.1.1. Vision and Global Spread of Impact Hubs.....	37
2.1.2. iHub Nairobi, the African Role Model Hub.....	42
2.1.3. The Spread of Hubs across Africa.....	47
2.1.4. Network Infrastructures or Incubators? Two Expectations Towards Hubs	51
2.2. Innovation Intermediaries and Intermediation	56
2.2.1. Howells' Framework of Innovation Intermediation.....	56
2.2.2. Extensions and Applications of the Innovation Intermediary Framework	57
2.2.3. Summary, Critique, and Applicability to African Hubs.....	60
2.3. Incubators and Incubation	62
2.3.1. One Immediate Goal but a Wide Range of Definitions	62
2.3.2. Incubator Typologies: From Attributes to Service Portfolios in Use.....	64
2.3.3. How Incubators Work: Theoretical Perspectives on the Incubation Process.....	67
2.3.4. Summary, Critique, and Applicability to African Hubs.....	75
2.4. Theoretical Framework and Refined Research Questions	76
2.4.1. Theoretical Framework	76
2.4.2. Refined Research Questions.....	79
Chapter 3 Research Design and Methodology	83
3.1. Observable Concepts and Scope.....	83
3.2. Micro-Social Interactionism as an Analytical Lens	86
3.3. Comparative Case Study Methodology	91
3.3.1. Rationale for Comparative Case Study Approach	91
3.3.2. Generalization and Theory Building from Cases	92
3.3.3. Case Selection and Working Definition of Hubs	93
3.3.4. Approach to Data Collection.....	97

3.4.	Epistemology and Standards of Rigor	99
3.5.	Fieldwork Preparation	100
3.5.1.	Immersive Review of Reports and Online Media	100
3.5.2.	Field Access, Initial Sampling Strategy, and Interview Guide	101
3.6.	Data Collection during Fieldwork	103
3.6.1.	Continued Theoretical Sampling.....	103
3.6.2.	Style and Settings of Interviews.....	104
3.6.3.	Overview of Conducted Interviews.....	106
3.6.4.	Participant Observation	108
3.6.5.	Field Notes	109
3.6.6.	Exiting the Field	110
3.7.	Analytical Process	110
3.7.1.	Transcription	110
3.7.2.	Coding, Logging, and Summaries.....	111
3.7.3.	Constructing Meta-Information on Engagement with Hubs	114
3.7.4.	Auditing and Feedback.....	114
3.8.	Ethics	115
3.9.	Limitations.....	118
Chapter 4	Empirical Contexts and Case Studies.....	121
4.1.	Kigali (Rwanda)	123
4.1.1.	Technology Entrepreneurship in Kigali	123
4.1.2.	Hub Case Study: kLab.....	127
4.1.3.	Hub Case Study: The Office	136
4.2.	Harare (Zimbabwe).....	143
4.2.1.	Technology Entrepreneurship in Harare	143
4.2.2.	Hub Case Study: Hypercube Hub	148
4.2.3.	Hub Case Study: Muzinda Hub.....	158
4.3.	Accra (Ghana).....	164
4.3.1.	Technology Entrepreneurship in Accra.....	164
4.3.2.	Hub Case Study: iSpace	171
4.3.3.	Hub Case Study: Hub Accra	177
4.4.	Chapter Summary	184
Chapter 5	The Structure of Hubs: Fluidly Bounded Communities.....	189
5.1.	Organizational Action of Hubs.....	190
5.1.1.	Services	191
5.1.2.	Spaces as Social Enclosures and Locational Fix Points.....	192
5.1.3.	Symbolizing a Purpose to Facilitate Participation and Intermediation	193
5.2.	Membership as Self-Selected Degree of Participation	197
5.3.	Three Ways of Entrepreneurial Engagement with Hubs	201
5.3.1.	Vignette 1: Pacifique, a Kernel of the kLab Community.....	202
5.3.2.	Vignette 2: Kizito and Bright, Apprentices at Hub Accra	204
5.3.3.	Vignette 3: Philani, a Networker in Harare	206
5.4.	Nested Hub Communities.....	209
5.4.1.	Core Communities.....	212
5.4.2.	Peripheral Communities	214
5.5.	Fluid Boundaries.....	216
5.6.	Implications: Hubs vs. Incubators and Innovation Brokers	219

Chapter 6	Variance in Hubs: Community Activation and Organizational Patterns.	224
6.1.	Variation in Social Structures Across Hubs	226
6.1.1.	Participating Actor Groups.....	226
6.1.2.	Content of Interactions	230
6.1.3.	Activation of Hub Communities	234
6.1.4.	Community Activation and Perceptions of Hub Success.....	241
6.2.	Variation in Hubs' Organizational Action.....	242
6.2.1.	Services as Unrelated to Variation in Social Structures.....	243
6.2.2.	Hub Spaces and Core Community Activation	244
6.2.3.	Symbolization and Technology Orientation of Peripheral Communities	245
6.3.	Distinguishing Hubs by Organizational Patterns.....	247
6.3.1.	Inadequacy of Models to Categorize Hubs	247
6.3.2.	Organizational Patterns	250
6.4.	Two Observed Patterns: Technology and Entrepreneurship Hubs.....	251
6.5.	Implications: Dynamic and Contingent Patterns vs. Service Models	254
Chapter 7	A Theory of How Hubs Work: The Assembly Process.....	257
7.1.	Outcomes of Effective Assembly: Active Entrepreneurial Communities.....	257
7.2.	From Models to Communities: Three Mechanisms of Assembly	261
7.2.1.	Initial Hub Model and Organizational Action.....	262
7.2.2.	Convening	263
7.2.3.	Interconnecting.....	264
7.2.4.	Activating	265
7.3.	Stability of Hubs: Demands of Different Organizational Patterns	267
7.4.	Fragility, Tensions, and Limitations of Assembly	268
7.4.1.	Low Availability of Constituents	269
7.4.2.	Tensions Between Convening, Interconnecting, and Activating	270
7.4.3.	Social Cohesion Among Diverse Actors.....	271
7.4.4.	Loose Coupling and Coordination Neglect	272
7.5.	Implications: Assembly as an Organizational Process Unique to Hubs.....	274
Chapter 8	Discussion.....	277
8.1.	Summary of Results and Answers to Research Questions	278
8.1.1.	How Technology Entrepreneurs Experience and Engage with African Hubs .	278
8.1.2.	How African Hubs Work	281
8.1.3.	Merit of Network Infrastructure and Incubator Expectations	284
8.1.4.	How Hubs Work Differently from Intermediaries and Incubators	286
8.2.	Implications for Intermediation and Incubation Research	288
8.2.1.	Need of a Theory of Organization for Intermediation Studies.....	288
8.2.2.	Novelty and Diversity of Entrepreneurship Support Organizations	292
8.2.3.	Funding Landscapes and Structural Contingencies	296
8.3.	Contributions of Assembly Theory to Entrepreneurship and Innovation Research	298
8.3.1.	Organizations and Networks of Entrepreneurs	299
8.3.2.	Micro-Geographies of Knowledge and Innovation.....	303
8.3.3.	Entrepreneurial Communities	306
8.3.4.	Alternative Anchor Organizations for Early Days Environments	309
8.4.	Practical Implications	311
8.4.1.	One Can Only Assemble What Is There	312
8.4.2.	Hubs and Development: Infrastructures and Formally Absent Outcomes.....	315

8.4.3.	Diversity and Exclusion in Entrepreneurial Communities.....	318
8.4.4.	Path Dependency and Early Moments in Entrepreneurship Environments	320
Chapter 9	Outlook and Conclusion	323
9.1.	Future Research	323
9.2.	African Hubs as Assemblers: A Promising but Misunderstood Phenomenon	327
Bibliography		331
Annex.....		376
Annex A:	Reports and Media Mentions of African Hubs, 2012-2015.....	376
Annex B:	Comparison of Role Model Hubs and Practitioner Expectations	379
Annex C:	Interview Guide.....	385
Annex D:	Hub Participation Patterns	386
Annex E:	Comparison of Technology and Entrepreneurship Hub.....	395

List of Figures

Figure 1: kLab space in Kigali, Rwanda	19
Figure 2: Groups working in kLab space	19
Figure 3: Event at kLab	20
Figure 4: Impact Hub website displaying hub spaces	40
Figure 5: Technology innovation hubs in Africa mapped by World Bank	49
Figure 6: Number of interview participants by actor group and city	108
Figure 7: Board members discussing furniture choices during kLab's renovation.....	128
Figure 8: kLab's outdoor area, showing large window fronts and foosball table	129
Figure 9: kLab board members listening to a presentation about members' concerns	135
Figure 10: Coworking space with open design and brick walls at The Office, Rwanda	138
Figure 11: Participant provides feedback at Pitch Nights in Harare	147
Figure 12: Zimbabwean businessman giving entrepreneurship advice at Pitch Nights.....	147
Figure 13: Hypercube Hub building with marquee for events	151
Figure 14: Question and answer session with VC4Africa lead at Hypercube	153
Figure 15: Hypercube coworking space during renovation period	158
Figure 16: Muzinda Hub's new facility in Vainona, a suburb of Harare	163
Figure 17: Muzinda's new facilities have been used as a training center for students	163
Figure 18: MEST trainees are educated in a school-like setup	168
Figure 19: MEST's incubator defines itself through its startups	168
Figure 20: Startup taglines on stairs to iSpace facility	173
Figure 21: Coworking and event space at iSpace	173
Figure 22: Hub Accra building in Osu neighborhood.....	178
Figure 23: Hub Accra space during a workshop	179
Figure 24: Hub Accra space before an event	179
Figure 25: Social structure of hub organizations: fluidly bounded arrangement of core and peripheral communities	217

List of Tables

Table 1: Theoretical framework based on incubator/incubation literature	80
Table 2: Country statistics for field work sites	95
Table 3: Number of interview participants per actor group and city	107
Table 4: Events attended for participant observation	109
Table 5: Overview of hub environments and contextual information	185
Table 6: Startup maturity and hub participation scores by hub participation category.....	200
Table 7: Engagement with hubs by four example entrepreneurs	200
Table 8: Differences in boundary features between core and peripheral hub communities ..	211
Table 9: Hub participation patterns for various actor groups.....	227
Table 10: Sociological differences between active / inactive core and peripheral hub communities	238
Table 11: Comparison of activation in core and peripheral communities across hub cases ..	240
Table 12: Hubs' organizational actions and community activation	248
Table 13: Differences between broker-type intermediaries, incubators, and hubs	289
Table 14: Reports discussing African hubs between 2012 and 2015.....	376
Table 15: Blog posts and online articles discussing African hubs between 2012 and 2015..	378
Table 16: Comparison of The Hub London vision, iHub vision, network infrastructure expectation, and incubator expectation of hubs	384
Table 17: Hub participation of interviewed entrepreneurs and startup employees.....	394
Table 18: Technology hub and entrepreneurship hub as organizational patterns	396

Chapter 1 Introduction

1.1. Technology Entrepreneurship in Africa: Grand Ambitions vs. Sobering Realities

I'm starting [my Kenya visit] at a place called iHub, where entrepreneurs can build and prototype their ideas... [A]cross the continent, things are really shifting. Things are moving from a resource-based economy... to [an] entrepreneurial, knowledge-based economy... The thing that is striking is the entrepreneurial energy. I think when you're trying to build something, what matters the most is who wants it the most. This is where the future is going to be built. (Mark Zuckerberg, Facebook founder & CEO, quoted in Shapshak, 2016)

Africa is experiencing a boom in technology entrepreneurship. High hopes have been invested in the continent's home-grown digital economy, envisioned to become an engine of rapid socio-economic development and transformation. African governments are building entire cities for technology entrepreneurs (Saraswati, 2014; Vourlias, 2015), larger and larger amounts of risk capital are invested (Disrupt Africa, 2016; VC4Africa, 2014), and highest-level officials celebrate and seek affiliation with grassroots entrepreneurs (Hersman, 2015a; UN, 2014). Slogans like The Economist's "Africa rising" ("Africa rising," 2011), "The Next Africa" (Bright & Hruby, 2015a), or "Silicon Savannah" (Graham & Mann, 2013) capture the sentiment that Africa is now a continent of economic opportunity and growth, driven by ubiquitous entrepreneurship, a growing middle class of consumers, a well-educated and driven economic elite, and improving Internet infrastructure.

However, it remains true that an entrepreneur seeking to start a technology venture in Africa faces fundamentally different conditions compared to an entrepreneur in Silicon Valley, London, or Berlin. Evidently, investment capital is scarcer, infrastructures are weaker, and skilled knowledge workers command relatively high wages or are completely unavailable. Despite the roll-out of fiber-optic cables across the continent, Internet connections with high bandwidth are mostly available only in large cities, and even there, affordability and reliability issues remain (Deichmann & Mishra, 2016). By most measures, general levels of economic development on the continent continue to be low, as most countries still grapple with stubbornly high

rates of poverty and inequality, often due to structural and ingrained socio-economic and governance challenges (Acemoglu & Robinson, 2010; World Bank, 2014).

The business case for African technology entrepreneurs is thus still unproven. The “mobile phone revolution” that is said to have swept the African continent (Etzo & Collender, 2010) is usually illustrated by means of rising mobile penetration and, at best, usage figures for widely used social networking and communication applications, such as Facebook and WhatsApp. Mobile money applications such as M-Pesa in Kenya represent another popular use case: their widespread adoption has been praised for increasing welfare (Munyegera & Matsumoto, 2016). Yet, these applications are produced and disseminated by mobile operators or Internet corporations from the Global North. The reach of digital software and applications created by individual African software developers, small enterprises, and entrepreneurs appears to be limited in scope and scale (Graham, 2014). Technology entrepreneurs often have to realize that they either cannot access potential customers, or that there is hardly any demand that could translate into a substantial and sustained source of revenue.

Even beyond infrastructure and market constraints, supportive organizations and social structures¹ are not favorable. In most large European and North American cities, a technology entrepreneur has ample opportunity to engage with other entrepreneurs, or to find support channels. Coworking spaces and incubators are abundant in those places, offering work space and access to partners and peers with related interests. Associations and informal groups of professionals organize regular networking events and share information. Universities provide technology transfer services and coordinate extensive alumni networks that reach into the technology industry. Venture capital and angel investors² organize pitching events and demo days.

¹ The choice of these concepts over others (e.g., ‘networks’) and definitions will be discussed in 3.2.

² The term ‘angels’ is usually used to refer to individuals who invest their personal funds in technology ventures to retain an ownership share. They usually invest at an earlier stage than venture capitalists, when the risk of failure is still very high. Angels usually also provide non-financial support in the form of mentorship or contact brokerage.

Such support structures have direct consequences for entrepreneurial opportunity. For instance, Silicon Valley's technology industry has been able to simultaneously diversify and specialize (Saxenian, 2006), as qualified and experienced entrepreneurs and professionals constantly network and develop new ideas, moving flexibly between positions or starting new ventures (Barley & Kunda, 2004; Benner, 2008). These structures grow and evolve over years and decades (Saxenian, 1994; Storper, Kemeny, Makarem, & Osman, 2015), harboring complex but often generative interdependencies (Ferrary & Granovetter, 2009). Scholars of economic geography, innovation, and entrepreneurship have convincingly shown that favorable informal and formal social structures greatly enhance the opportunities for technology entrepreneurs in a given geographical context (e.g., Feldman, Francis, & Bercovitz, 2005; Storper et al., 2015; Thornton & Flynn, 2003).

For a technology entrepreneur in Africa, such supportive structures are limited. Many actors are entering the scene with ambitious goals (Avle, 2014; Bright & Hruby, 2015a), but the coordination and organization of their efforts has only just begun, so that there is still little to build on. Multinationals in the digital economy mostly locate creativity-based and knowledge-intensive value creation in economic centers of the Global North (Malecki & Moriset, 2007), while technology industries in African countries usually do not consist of more than a handful of Internet service providers, two or three national mobile operators, and a dozen software and application development companies (Zachary, 2004). Incubators, networking events, and innovation competitions are increasing in numbers in most African capital cities, but, with the exception of vibrant environments such as Nairobi or Lagos, efforts often remain small-scale and ad hoc.

1.2. African Hubs: A Fast Rise and Far-Reaching Aspirations

This thesis examines one particular type of organization that has been introduced as a support structure for African technology entrepreneurs: the technology innovation hub organization, or ‘hub.’ Hubs have become the vessels for, and beneficiaries of, optimism and excitement about technology entrepreneurship in Africa. The number of hubs on African soil increased from about 90 in 2013 through 117 in late 2015 to 173 in June 2016, most of them located in large cities (BongoHive, 2013; Firestone, 2016; Kelly & Firestone, 2016). The GSMA, using a different method, recently counted 314 active African hubs (du Boucher, 2016), even though this figure was quickly contested (Amos, 2016).

Regardless of the precise number, the World Bank was swift to conclude that hubs “drive economic growth in Africa” (Kelly & Firestone, 2016, p. 1). Outgoing UN Secretary General Ban Ki Moon addressed an audience at Nairobi’s iHub, Africa’s role model hub, with these words (Wakoba, 2014):³

I believe I am seeing the future of Kenya. Technology can be used as a great power to change our life. Kenya is a thriving country. Being at the iHub has inspired me. You are the hope of Africa.

More specifically, hubs have been promoted as enablers of opportunity for grassroots technology entrepreneurs, allowing them to forge local clusters of software production. Hubs came to be seen as “[o]ne of the main sources of locally developed [mobile and software] applications,” representing an “African digital renaissance... that... is increasingly home grown” (Kelly, 2015). In this context, the emergence of African hubs has been framed as a direct consequence of the arrival of broadband Internet:

Due to the increase in speed and affordability of connectivity, the sense of possibility the digital world has provided, and interest by investors, tech hubs, business incubators, hacker spaces, and maker spaces are providing places for the continent’s young (and not so young) people to express their innate creativity and ambition, make up for disparity in educational opportunities, allow for the creation of wealth that is more sustainable than

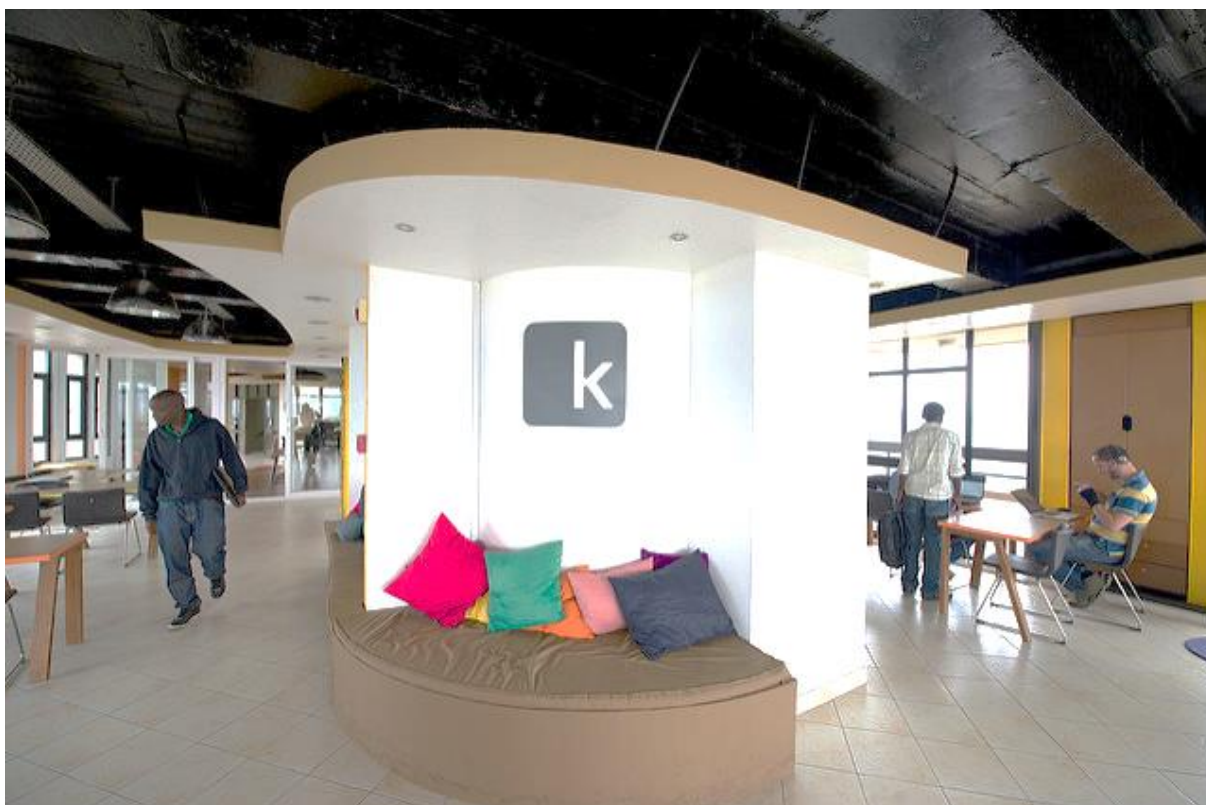
³ The official transcript of Ban Ki Moon’s statements (UN, 2014) does not include the quote in question, but is similar in tone and messaging to the quote cited here.

the resource extraction of the past, and help to produce products and services to address the needs of their communities. (Hopkins, 2015)

Notwithstanding this enthusiasm, in practice, hubs are small organizations with a relatively simple functional setup. Simply put, hubs aim to enable software developers and entrepreneurs to innovate, network, and start businesses. A hub usually consists of a Wi-Fi-connected space with hot desks and meeting rooms, used for laptop-based work or for training and mentorship sessions, networking events, presentations, and small innovation competitions like hackathons (see Figure 1, Figure 2, and Figure 3).

Despite their small size, proponents have developed rather elaborate narratives about how hubs can achieve transformational outcomes, becoming far “more than just a space to work” (e.g., Ofori, 2016). Hubs’ agendas are usually rooted in lofty, far-reaching visions: hubs often (1) aspire to foster ‘collaboration,’ ‘openness,’ ‘community,’ ‘creativity,’ and ‘diversity,’ (2) attempt to improve conditions in ‘tech communities’ or ‘ecosystems’ of entrepreneurship, (3) envision to achieve positive social impact in addition to economic development, and (4) want to be an interface for diverse actors beyond entrepreneurs, including government representatives, investors, experts from the Global North, non-governmental organizations (NGOs), training providers, artists, and many others (Gathege & Moraa, 2013; Kelly & Firestone, 2016; Toivonen & Friederici, 2015). Funders and sponsors of hubs are also varied: they include development organizations, governments, and technology corporations, but also grassroots interest groups and philanthropic foundations (Friederici, 2014b).

In sum, hubs are expected to enable early-stage technology entrepreneurs to make connections with each other and with hub-external actors, such as corporations, investors, or international guests. The ‘hub’ metaphor is based on notions of interpersonal connectivity; hubs are seen as central nodes in wider social structures, letting people interact who would not otherwise do so:



Source: kLab Rwanda.

Figure 1: kLab space in Kigali, Rwanda



Source: kLab Rwanda.

Figure 2: Groups working in kLab space



Source: kLab Rwanda.

Figure 3: Event at kLab

As these spaces become the nerve centres for the tech community, they also become critical international touch-points for those seeking to engage in technology and business in Africa. They are the new points of exchange for long-term expatriates and short-term visitors looking to identify trends, find local talent, and catch the African wave of innovation. (Kalan, 2014)

These visions have coalesced in a sanguine narrative about African hubs, which can be summarized as the *network infrastructure expectation*. Hubs are imagined to effectively and cogently create the kinds of support structures for technology entrepreneurs that are missing in African contexts. By connecting actors with a stake in African technology innovation, hubs are imagined to form the foundation of ‘knowledge economies,’ ‘digital economies,’ or ‘ecosystems:’

Across [Africa] new Silicon Savannahs are in the making and the components of a budding... ecosystem are emerging... iHub-like innovation centers are becoming a mainstay of the continent’s progressing ICT infrastructure... these IT spaces are becoming central connect points for ideas, entrepreneurs, investment, and innovation across the continent. (Bright & Hruby, 2015b)

Not only do [hubs] act as physical infrastructure, providing access to power, pipes (internet), and space, but they also offer network infrastructure, or access to the human, financial and social capital... Our belief is that investing in these spaces will create an innovation infrastructure that will encourage the growth of Africa's knowledge economy by supporting the development of start-ups, technology, and innovation. (AfriLabs, 2015)

Proponents of the network infrastructure expectation have called for patience in evaluating hubs, arguing that impacts are potentially transformative but will take time to materialize, given that effects are systemic and indirect in nature (Douglas, 2013; Oluwagbemi, 2015; Treisman, 2015).

Yet, not everyone has accepted this optimistic view. In particular, hubs have increasingly been compared to or grouped together with business incubators and accelerators (Baird, Bowles, & Lall, 2013; Gathege & Moraa, 2013; Kelly & Firestone, 2016; Tredger, 2013).⁴ Accordingly, the *incubator expectation* sees 'hub' simply as a new label for organizations that support early-stage technology ventures. This practitioner perspective does not so much care about what happens inside of hubs, and instead focuses entirely on outcomes. Following from the analogy with incubators, the expectation concludes that hubs should also be assessed like incubators: by tracking the marginal increase in the performance (survival, revenues, capital raised, etc.) of client companies (Amezcuca, Grimes, Bradley, & Wiklund, 2013; Sherman & Chappell, 1998). However, African hubs have rarely created or developed wildly successful ventures, and consequently, some have considered them an outright failure and hopeless endeavor (Essien, 2015).

All in all, the spread and popularity of African hubs is unquestionable. Yet, following an initial wave of excitement between 2012 and 2014, critical voices have begun to surface, pointing out that startup creation and development have been elusive for hubs. An aspirational

⁴ In this thesis, a business incubator is defined as an "organisation dedicated to the support of emerging ventures" (Bergek & Norrman, 2008, p. 21), "providing tenant firms with a portfolio of new venture support infrastructure" (Mian et al., 2016, p. 2) including office space and business assistance (see 2.3.1. for details). Accelerators also focus on business advice and providing business contacts but additionally, they make small equity investments, provide support only during intensive short periods, and focus on their clients' investment-readiness while deemphasizing the provision of office space (see 2.3.2.).

assumption, expecting hubs to work as network infrastructures, became pitted against a more hardheaded expectation, seeing hubs as nothing else but ineffective incubators which have failed to develop successful technology startups.

1.3. Research Questions and Analytical Agenda

1.3.1. Study Goals and Initial Research Questions

This thesis takes a step back from this debate about *whether hubs work* and instead clarifies *what work hubs do*. It takes issue with the presumption that hubs either work or do not work. Following the fast diffusion of hubs across Africa between 2010 and 2014, a number of development organizations, governments, and technology corporations have taken note of the phenomenon, while no effort has been made to rigorously and clearly discern opportunities and limits. The thesis is thus an attempt at empirically grounding and testing both hopes and criticisms that have been brought forward towards African hubs.

Concretely, the thesis argues that we can neither assess, nor should we assert, whether hubs work as long as we do not understand what hubs do and *how they work*. It acknowledges both the optimistic ‘network infrastructure expectation’ and the dismissive ‘incubator expectation,’ but begins with the premise that it is neither obvious nor trivial how hubs actually operate in a given context. The thesis is attentive to the unique promise of hubs to be powerful connectors within wider social structures, but seeks to examine, in more depth, how this connection function plays out within the complex and challenging realities of African cities as entrepreneurial contexts.

The thesis thus embarks on an open-ended, rigorous, and grounded inquiry into the workings of African hubs, in order to ultimately inspect the merit of expectations towards hubs, and to do away with some of the confusion which has followed an earlier period of hype and excitement. In addition, by studying an apparently new organizational form, the thesis wants to

test if prior theory is equipped to explain how entrepreneurs are coordinated by support organizations, and propose theory extensions wherever gaps become apparent.

Given the newness of and uncertainty around the phenomenon, the thesis starts from deliberately broad and exploratory research questions which are later refined through a review of pertinent academic literature. Initially, it asks two core research questions directed at the experiences of technology entrepreneurs and at the processes that hubs trigger:

1. How are technology entrepreneurs in African cities experiencing hubs and engaging with them?
2. How do African hubs work?

Thus, the primary goal of the thesis is to explain how African hubs work as organizations, seen mainly from the perspective of technology entrepreneurs. More technically, the research questions are geared towards developing explanatory theory on African hubs as organizational actors, which trigger particular processes (“*How do African hubs work?*”) and constitute a particular organizational form (“*How do African hubs work?*”).⁵ In other words, the thesis wants to describe and explain the processes that happen as a result of hub organizations in African cities in as far as they involve locally based technology entrepreneurs.⁶ Focusing on the perspective of technology entrepreneurs is meant to ground the aspirational and dismissive opinions proposed by development organizations, media outlets, and commentators.

⁵ The thesis draws from Ruef (1999) and Puranam, Alexy, and Reitzig (2014) to distinguish between *organizational forms* (categories of organizations constructed by an analyst or an audience) and *forms of organizing* (distinct sets of processes that represent solutions to universal problems of coordination and collective action). Accordingly, two organizations that are part of the same organizational form do not necessarily follow the same organizing processes. For instance, hubs could be defined as part of the organizational form ‘incubator’ but still trigger different processes. See 8.1.4. and 8.2.2. for details.

⁶ The thesis is *not* an impact evaluation or an assessment of effects of hubs. Neither a before-after analysis nor the construction of a counterfactual appeared feasible, so that it seemed impossible to assess the presence/absence or magnitude of effects. Furthermore, the present interview-based approach might miss those effects that entrepreneurs are not aware of, or entrepreneurs might perceive effects as arising from the hub that are epiphenomenal. Thus, the goal in this thesis is different from measuring effects: it is to understand organizational processes triggered by hubs that entrepreneurs are part of. See 7.1. and 8.4.2. for details.

1.3.2. Literature, Theoretical Framework, and Refined Research Questions

In the absence of academic literature on innovation hubs per se, the thesis first examines what practitioners assume that hubs do, showing that African hubs are expected to work either as network infrastructures or as incubators (cf., 1.2.; see 2.1. for details). The thesis then reviews academic literatures on intermediation and incubation (see 2.2. and 2.3.), as these offer appropriate theoretical representations of practitioners' expectations. The literature review thus appraises how the intermediation and incubation process has been theorized, in order to make inferences about how hubs can be expected to work.

The review concludes that intermediation theory appears to be generally applicable to hub processes. The literature broadly suggests that non-firm organizations play an important role in entrepreneurial innovation; yet, they interdepend with client firms and other stakeholders, forming complex systems or networks of innovation. The literature on incubation is much older and phenomenon-driven rather than starting from an analytical concept like 'intermediation.' The review highlights that many elements in the incubation literature seem applicable to hub processes, but also that particular views on incubation are in tension or even in conflict with one another. Namely, one view sees incubator services as shaping the incubation process while another emphasizes that communities of incubatees affect the process as well.

Overlaps and particularities of intermediation and incubation literatures are used to develop a theoretical framework with the potential to explain processes triggered by hubs (2.4.1.). The framework also helps to further specify the initial research questions (2.4.2.). It suggests strong interdependence between the hub organization and entrepreneurs, prompting the refined research questions to focus on this relationship. Both the intermediation and incubation literature point towards the potential importance of relationships that entrepreneurs are enabled to

have with others. Finally, the notion of ‘community’ that some incubation studies use appears applicable and central to an analysis of hub processes.⁷ The refined research questions thus are:

- 1a. How do African hub organizations interact with technology entrepreneurs?
- 1b. How do technology entrepreneurs participate in African hub organizations?
- 2a. How do African hub organizations enable relationships among technology entrepreneurs?
- 2b. How do African hub organizations enable relationships between technology entrepreneurs and non-entrepreneurial partners?
- 2c. Do African hub organizations create or enable entrepreneurial communities, and if so, how?

1.3.3. Research Design and Empirical Approach

The study focuses on technology entrepreneurs: they are the main constituents (members, clients, participants, or beneficiaries) of African hubs, while supporting actors (mentors, investors/sponsors, bloggers, etc.) are likely to play an important but more peripheral role (Gathege & Moraa, 2013; Kelly & Firestone, 2016). The research questions thus yield five interrelated concepts which serve as focus areas for the empirical analysis:

1. African hub organizations,
2. the action of African hubs,
3. the relationships that technology entrepreneurs have with African hubs (as experienced by entrepreneurs),

⁷ Some incubation scholars (Peters, Rice, & Sundararajan, 2004) explicitly draw on the ‘communities of practice’ concept, while others (Bøllingtoft & Ulhøi, 2005; Phan, Siegel, & Wright, 2005) use ‘community’ in a general, intuitive sense. ‘Community of practice’ has been a popular but also a contested concept in organization and innovation studies (Amin & Roberts, 2008; Roberts, 2006). Therefore, the thesis will not pre-suppose whether ‘communities’ in hubs should be characterized as ‘communities of practice.’ Instead, it will inductively derive hub community concepts (see 5.4. and 6.1.3.) and only later reflect these against extant community literatures (see 8.3.3.).

4. the relationships that technology entrepreneurs have with each other and with others through the hub, and
5. discernible components of social structure, such as communities.

Furthermore, practitioners' expectations and the theoretical framework suggest that an explanation of hub processes can be developed using an analytical lens that focuses on *individuals' social relations*: through hubs, entrepreneurs interact with other individuals, and entrepreneurs interact with the hub as an organization. I thus opt for a micro-social interactionist lens (Blumer, 1986) to capture relationships from the perspective of individual entrepreneurs (see 3.2.).

The thesis uses process tracing within an embedded comparative case study setup, studying six hubs in three African capital cities: Accra (Ghana), Kigali (Rwanda), and Harare (Zimbabwe). Case studies are particularly appropriate to answer 'how' questions, and to test and extend a theoretical framework (Eisenhardt, 1989; Yin, 2009). The case study data include interviews with 133 participants, roughly half being technology entrepreneurs and half hub staff and other support actors.⁸

1.4. Theorizing Hubs as Assemblers of Technology Entrepreneurs

From the case study analysis, the thesis derives rich empirical findings and results, which are presented in one case study chapter (chapter 4) and two results chapters (chapters 5 and 6). The results chapters use cross-case study comparisons to explicate the social structure of African hubs in general and variation in structures across hubs.

The thesis then applies the theoretical framework derived from intermediation and incubation theory to the empirical findings. It shows that that processes triggered by hubs reflect

⁸ The interview data were also used to infer social structures and interactive processes in hubs. While the data were best suited to identify actor attributes and tie contents, some patterns on the small-group level (such as the existence of communities, working groups, and teams) could also be inferred. This was done in as much and as far as patterns were reported by multiple participants, and as patterns were within the perceptual purview of entrepreneurs. See 3.2. and 3.3.4. for details.

several elements of intermediation and incubation processes, but that hub processes also show distinctive aspects that are not captured in either body of theory. The thesis thus develops a new theory of a process which is unique to hubs, in that it is related to but also substantively different from typical understandings of both intermediation and incubation (see 7.5. and 8.1.4.).

I refer to this process as *assembly*. In this section, assembly is sketched out to preview the theoretical contribution of the thesis, providing the reader with a frame of reference. The section is an abbreviated version of chapter 7 which includes the complete theorization. Detailed empirical evidence and case-based illustrations for the assembly process will be presented in the case study and results chapters (chapters 4-6).

Assembly is theorized as a consequence of the organizational action of hubs: hubs assemble entrepreneurs, just as incubators incubate startups and just as intermediary organizations intermediate between parties in innovation processes. More specifically, assembly is triggered by a combination of organizational features that is associated with hubs but not typically given for incubators or most intermediary organizations (see 3.3.3., 7.5., and 8.1.4.). Assembly is a process of organizing: individuals' actions are coordinated, labor is divided, and individual effort is integrated (Puranam, Alexy, & Reitzig, 2014).

The term 'assembly' is used as it connotes a process of construction and gathering. As assemblers, hubs construct something by gathering available but otherwise dispersed constituents: entrepreneurs and partners (mentors, support organizations, etc.) who are cognitively different or distant (i.e., they lack mutual awareness or have different knowledge and capacities). Yet, only those constituents can be assembled that are available, depending on, for instance, an actor's geographical distance to a hub or the level of their interest in the hub's agenda.

The thesis further theorizes that assembly hinges on three mechanisms rooted in hubs' organizational action, each representing a necessary condition for the assembly process to be *effective* (see 7.2.): First, hubs create an occasion for interactions between certain actor groups,

thereby increasing the chance that relations get established (*convening*). Second, hubs explicitly encourage and facilitate particular relationships that would otherwise be more difficult or costly for members to establish (*interconnecting*). Third, hubs allow entrepreneurs to form communities based on members' mutual concern, sustained interactions, and shared meaning (*activating*). The case studies show that activating is the most difficult mechanism to realize for hubs because it requires collective action and sustained commitment by a sufficient number of entrepreneurs. Together, the three mechanisms generate *active entrepreneurial communities*: supra-individual social entities with a 'life of their own,' recognized by community members and allowing more sophisticated coordinative dynamics to unfold, such as the allocation of roles, status attainment, or the enforcement of mutual commitment (see 6.1.3.).

Communities differ systematically across hub cases, as assembly follows different *organizational patterns*. Organizational patterns of hubs are distinct, intermittently stable and recognizable social structures. Different patterns steer assembly to include different kinds of entrepreneurs having different sorts of interactions, ultimately forming different types of communities (see 6.3., 6.4., and 7.3.). I show that entrepreneurs engage with or disengage from a hub depending on their perception of whether the hub's current organizational pattern suits their interaction requirements. This ongoing engagement or disengagement is made possible by the hub's openness and its *fluid boundaries* (see 5.5.). Hub leaders react to entrepreneurs' (dis)engagement, modifying the hub's model and adjusting managed activities accordingly. Organizational patterns thus emerge from the interplay of hubs' organizational actions and entrepreneurs' participation (see 6.3.).

The thesis illustrates that different organizational patterns of hubs depend on different types and degrees of entrepreneurial participation to stabilize (see 7.3.). Specifically, the *technology hub pattern* requires an active group of entrepreneurs using hub spaces to collaborate and exchange technical knowledge, while the *entrepreneurship hub pattern* depends only on

loose interactions in the hub's periphery (see 6.4.). The thesis thus points out that some organizational patterns of hubs might be easier to stabilize than others, because they require less commitment by entrepreneurs or have fewer inherent tensions.

Assembly according to organizational patterns (e.g., technology vs. entrepreneurship hub) implies that, as a result of hubs, certain configurations of relationships have been made more likely to exist than others. These configurations have attained a greater degree of permanence, stability, and predictability for technology entrepreneurs in a given city. Thereby, they structure future interactions: an entrepreneur seeking to interact with partners in a city where an active entrepreneurial hub community exists has different kinds of relationships with different partners compared to the (hypothetical) same entrepreneur in the same city without this community (see 7.1.). Thereby, hubs do not only reconfigure relationships but also economic opportunities, albeit in subtle and indirect ways and sometimes with inadvertent consequences (see 7.1., 8.4., and 9.1.). In sum, the main contribution of the thesis is the theorization of assembly as the process triggered by African hubs, providing an answer to the question of how hubs work.

1.5. Wider Contributions of Assembly Theory

Beyond immediate answers to the research questions, the thesis highlights that assembly is a specific type of intermediation process that is different from common understandings of incubation. Hubs show that minor changes in organizational features (e.g., the absence of a selection process) can generate fundamentally different support processes for entrepreneurs. If organizational actions are more facilitative than interventionist (like in hubs), technology entrepreneurs *together with* the support organization shape these processes. The capacity and willingness of entrepreneurs in a given geography to participate in organizations like hubs thus determine to a large extent what these organizations can and cannot do.

Based on this foundational insight, the thesis contributes to existing scholarship and hub practice in several ways. Namely, it makes contributions directly to intermediation and incubation literature, to wider debates about the coordination of entrepreneurship and innovation in space, and to concerns of hub leaders and funders. These contributions are previewed here and discussed in detail in chapter 8 (see 8.2.-8.4.).

1.5.1. Intermediation and Incubation

For intermediation theory (8.2.1.), the thesis highlights that prior literature lacks a sufficiently rich theory of organization. Namely, it advocates that the literature should examine intermediation processes within and between supra-individual social entities (such as communities), broadening its scope beyond the dominant focus on the inter-organizational level. Similarly, assembly shows that intermediation studies should question the formal boundedness of organizations, for instance, by considering that clients can become part of processes within intermediary organizations. Finally, assembly suggests that intermediation would benefit from a typology that distinguishes intermediary organizations by the kinds of processes they trigger.

Assembly contributes to the incubation literature (see 8.2.2.) by highlighting that the ambiguity of the incubator concept has diluted our understanding of the incubation process. The thesis shows that hubs could be defined as a kind of incubator, but that process theory developed for hubs (assembly) probably has little bearing on certain types of incubators, such as traditional service/intervention-oriented ones. The thesis argues that incubators should thus be distinguished by which kind of incubation process they trigger (e.g., assembly vs. bottom-up incubation vs. acceleration, etc.) instead of by service models or other easily observable features.

For both intermediation and incubation theory, assembly represents a starting point for a richer environmental contingency theory (see 8.2.3.). Assembly goes beyond assertions that the intermediation/incubation process interdepends with entrepreneurs, and that funder interests

can be in conflict with those of entrepreneurs. It provides an integrated and specific theory of the mechanism through which particular environmental factors shape hub processes. The thesis suggests that intermediation and incubation studies can build on assembly theory, and develop similarly rich understandings of *how* funding landscapes and entrepreneurial engagement affect intermediation/incubation processes rather than merely stating *that* they do.

1.5.2. Organization and Coordination of Entrepreneurship and Innovation

The thesis also makes several contributions to other literatures on the organization and coordination of innovation and entrepreneurship. Most importantly, assembly is an attempt to limit the problematic bifurcation of the entrepreneurship literature, “typically focusing on either individuals or environments but not linking the two” (Thornton & Flynn, 2003, p. 401). Assembly suggests that organizations like hubs can transform and create social structures that individual technology entrepreneurs are embedded in, such as communities (see 8.3.1.). Organization-induced social structures like hub communities represent an analytical ‘layer in between’ individuals or small-group social structures (such as entrepreneurial teams) and macro structures (such as regional networks and systems of entrepreneurship).

Assembly also contributes to literature on micro-geographies of innovation (see 8.3.2.). The theory shows that bounded but variegated social contexts such as communities underlie knowledge creation and exchange, and that knowledge is not ‘in the air’ as some conceptualizations from economic geography (such as ‘buzz’) seem to suggest. At the same time, assembly provides an account of how such social structures can be created outside and independently of firms. Assembly thus shows how, concretely, buzz comes into being.

Related to the two previous contributions, assembly integrates a fragmented literature on learning- or entrepreneurship-oriented communities (see 8.3.3.). The theory illustrates that communities do not just exist in regions or cities, but that they need to be created and activated, through organizational and entrepreneurial action. Moreover, different kinds of communities

serve different types of coordination and learning, and require different levels of commitment from participants. Assembly thus builds on literature on communities of practice, regional learning communities, and localized entrepreneurial communities, amalgamating and extending these concepts to the context of individual entrepreneurs in cities.

Finally, the thesis suggests that hubs can be seen as an effort to establish small-scale and informal anchor organizations where other private and public sector actors have not created them (see 8.3.4.). Building on this proposition, the thesis reflects on the absence of studies in economic geography that compare the roles of similar organizations across (vastly) different socio-economic contexts. Such research is needed as economic geography does not currently offer sufficient tools to explain why hubs, relative to other organizations, receive so much more recognition in Africa compared to the Global North.

1.5.3. Hub Practice

Finally, the thesis discusses practical issues for funders and implementers of African hubs. First, it shows that one can only assemble what is there (see 8.4.1.). This statement is meant to illustrate that, strictly speaking, hubs do not generate any socio-economic impact by themselves. Instead, they allow economic actors to reconfigure their relationships. Assembly thus highlights both the opportunities and limitations of hubs. Hubs are inherently limited by who and what is available in local contexts. A hub without capable entrepreneurs cannot ‘create successful startups’ irrespective of how effective it is at assembly. In turn, if lacking facilitation and coordination is a palpable problem for entrepreneurship in a given city, and if hub-assembled configurations of relationships allow entrepreneurs to collectively create more value, then (but only then) hubs can make a large positive contribution. This insight helps to move away from the somewhat unhelpful attempt to emulate iHub everywhere else in Africa: iHub worked well for Nairobi—a vast city with a large number of keen but fragmented technology entrepreneurs—while it is not a given that the same model works in the same way in other places where

actors are not disassembled to begin with or where there are no / not enough actors to be assembled.

Relatedly, the thesis shows that hub processes are geared towards coordinating actors and activating entrepreneurial communities, but that they lead to outcomes that are ‘formally absent’ (see 8.4.2.). For any given individual entrepreneur, a hub plays only a small role. Measuring, for instance, a change in revenue for startups or the number of people attending an event is inadequate to assess the outcomes of hubs. Any assessment would have to account for hubs’ nature as facilitators of entrepreneurial interaction. The thesis advises funders to continue to employ the ‘infrastructure’ metaphor but also to think through its implications more critically, for instance, with regard to governance and financing issues of hubs.

The thesis further questions hub funders’ and leaders’ normatively loaded assertions that hubs are ‘diverse’ and ‘open’ (see 8.4.3.). It maintains that the dynamics of self-selected organizational membership in organizations like hubs can, in fact, result in *increasing* cultural homogeneity—what hub members like to call ‘like-mindedness.’ Homogenization might revolve around different member attributes for different hubs (e.g., technology interest vs. entrepreneurial motivation), but there is likely to be at least one cognitive aspect which hub members share and according to which they become more similar over time. This means that hubs, by trying to be open and diverse, might in some sense achieve the opposite. Hub funders and leaders have to be vigilant about such inadvertent exclusion effects.

Finally, the thesis highlights that self-reinforcing organizational mechanisms in hubs lead to risks of path dependency and lock-in (see 8.4.4.). It demonstrates that, because of path dependency, hub leaders’ and entrepreneurs’ decisions happening earlier in the assembly process can influence social-structural outcomes of hubs more than later decisions. Through hubs’ role as shapers of social structures, path dependencies can also have consequences for entrepreneurs’ wider interaction opportunities in a given city.

1.6. Thesis Overview

The thesis is structured to present the theoretical and empirical elements required to follow its core argument that African hubs assemble technology entrepreneurs:

- Chapter 1: Technology innovation hubs are a prevalent phenomenon in Africa but despite their fast spread and grand ambitions, it is unclear how they work.
- Chapter 2: Practitioners expect African hubs to work as network infrastructures or incubators, leading to intermediation and incubation literatures as appropriate points of comparison for hub processes.
- Chapter 3: Assembly is derived by inductively building theory from six hub case studies in three cities, using a micro-social interactionist analytical lens.
- Chapter 4: The analyzed hubs show many idiosyncrasies, but the influence of hub models and the important role of entrepreneurial participation for hub processes become apparent in all cases.
- Chapter 5: Hubs have fluid boundaries, which let constituents from a hub's environment enter and leave the hub at their discretion, while simultaneously allowing the construction of communities at nested organizational levels.
- Chapter 6: Variation in hub structures concerns the level of activation in entrepreneurial communities, arising from differences in organizational patterns that hubs adhere to, which in turn are created through the interplay of hub models and entrepreneurs' participation decisions.
- Chapter 7: Hubs assemble distant and different actors into entrepreneurial communities. Assembly is effective when three mechanisms (convening, interconnecting, and activating) are integrated, but it is a fragile process.
- Chapter 8: The assembly process provides an answer to the question how hubs work, and it also has wider theoretical and practical implications.

Chapter 9: Assembly highlights that more research should be done about organizational processes triggered by entrepreneurship support organizations, and that hubs are a fundamentally misunderstood phenomenon.

Chapter 2 Background and Literature Review

This chapter first examines what practitioners assume that African hubs do, showing that they expect hubs to work either as network infrastructures or as incubators (2.1.). It then identifies intermediation and incubation theories as adequate social-scientific representations of the network infrastructure and incubator expectation (2.2. and 2.3.). Drawing from both realms of literature, the chapter develops a theoretical framework with the potential to explain processes triggered by hubs (2.4.).

2.1. Innovation Hubs as an African Phenomenon

In the absence of academic literature that discusses hubs directly, this section gives an overview of the phenomenon of African hubs, and of how hubs are expected to work. It starts from a referential theory about the organizational form ‘innovation hub’ (Ruef, 1999), meaning that it simply examines those organizations which practitioners have referred to as ‘hubs,’ ‘tech hubs,’ or ‘innovation hubs.’

The first organization using the label ‘hub’ was The Hub London founded in 2005 (later rebranded to Impact Hub Islington).⁹ Within Africa, iHub in Nairobi, founded in 2010, was the first widely recognized organization using the ‘hub’ moniker in its name. The Hub London has been emulated around the world leading to the creation of the Impact Hub network, while iHub has been used as a role model by independent organizations across Africa. This section traces back how the leaders of these two organizations envisioned them to work (2.1.1. and 2.1.2.). It then outlines how the ‘hub’ terminology and phenomenon spread across Africa (2.1.3.), and derives two popular expectations that developed about how African hubs work (2.1.4.).

⁹ This is not to say that traditional organizational forms such as incubators and science parks had never before used the term ‘hub’ as brand names. For instance, in Africa, the science and technology parks Botswana Innovation Hub (Gaborone) and The Innovation Hub (Pretoria, South Africa) were both founded in 2002, before The Hub London. Here, however, the goal is to trace back the roots of ‘hubs’ as a *type of* organization which was later recognized as such by practitioners.

The section uses extensive quotes from statements made by commentators and hub leaders (i.e., founders and managers) to give a sense of the typical narratives and imageries which hub practitioners have actually employed and encountered. This effort serves to establish the historic origins of the ‘hub’ organization concept and to crystallize ideal-typical features of a hub as those have been promoted by practitioners. Thereby, the section moves from a referential theory to a combined ideational and relational theory of hubs as an organizational form (Ruef, 1999): it shows how the visions of two archetypical hubs have informed other practitioners’ concepts of how hubs *in general* work or should work.

It is important to note that this section deals with ideals and visions. These are related but not identical to on-the-ground realities or lived experiences of hub participants, which will be discussed in the results chapters. The purpose of this section is to gather typical *expectations* about hub organizations, which will serve as a reference point to identify existing theories that fit with these expectations.

The section will highlight two typical expectations about African hubs: that they serve as a *network infrastructure* within a wider digital economy or ‘ecosystem,’ and that they are *incubators*. Thereby, the section sets the stage for the following sections which introduce inter-mediation theory (2.2.) and incubation theory (2.3.).

2.1.1. Vision and Global Spread of Impact Hubs

Usage of the term ‘hub’ to describe a particular kind of organization goes back to The Hub London, founded in 2005 in Islington, London. The organization was developed to connect like-minded individuals across the city who wanted to work on solutions to societal problems (Bachmann, 2014). One of the co-founders, Jonathan Robinson, outlines The Hub’s original vision to be a convener:

Everyone has ideas for making the world a better place... But where does one go to make them happen? ... We discovered a whole set of people trying to realize good ideas from their bedrooms—lonely, cut off from the world. So it dawned on us: What if these people

could come together in the same physical space and have a place to connect? (Bachmann, 2014, p. 22)

Shortly after The Hub London's founding, its vision started to resonate with others attempting to replicate the effort in their home cities, leading to the founding of twelve additional Hubs until 2010 (Avelino, Wittmayer, & Afonso, 2015). Coordination between Hubs was informal at first, leaving room for local founders "who were building roughly similar Hub communities... to develop their own version of the Hub model" (Bachmann, 2014, p. 24). From 2009, the Hubs intensified and formalized their exchanges, changed their shared name to "Impact Hub," and ultimately formed a global association and company to manage the network (Avelino et al., 2015; Bachmann, 2014). As of July 2016, there were 81 member Impact Hubs (four in London alone) and 17 more that had started the application process (Impact Hub, 2016). The Impact Hub network has gained wide recognition and become a symbol for how social innovation can be organized, with the Impact Hub network serving as a combination between a "franchise" and a "movement" (Bachmann, 2014; Thorpe, 2013; Watson, 2015).

While the original idea to connect individuals might sound simple, Impact Hubs did not fit neatly into any known organizational form. Through an iterative and contested process, The Hub London "emerged as a cross between a business incubator, a learning lab, and a professional membership community" (Bachmann, 2014). Eleven years after The Hub London was founded, the Impact Hub website (Impact Hub, 2016) still prominently features the question "What is Impact Hub," and responds that it is:

An innovation lab. A business Incubator. A social enterprise community center. Impact Hub offers you a unique ecosystem of resources, inspiration, and collaboration opportunities to grow the positive impact of your work... We set out to create spaces that borrow from the best—a prototyping lab, a start-up incubator, an inspiring office, a learning space and a think tank—to create a unique ecosystem for social innovation.

One Impact Hub makes an even more explicit case that it is different from other entrepreneurship support organizations (cf., 2.3.2.):

We are not a 16-week program focused on Start-ups (ACCELERATOR) nor is space the end goal for us (COWORKING)... Impact Hub King's Cross shares many things in common with incubators and co-working spaces, but also thinktanks, cafe's [sic] and community centers. (Impact Hub Los Angeles, 2016)

These accounts illustrate that an Impact Hub—at least in the eyes of its leaders—is a unique and novel kind of organization that combines elements from a variety of known types without being equivalent to any particular one of them.

Underlying is a distinct mental model that Impact Hub leaders have of the ways in which a hub facilitates connections between individuals. First, Impact Hubs are seen to focus on connections that serve the *creation or development of innovation or enterprise*. Impact Hubs are meant to be “[s]paces with all the tools and trimmings needed to grow and develop new ventures for sustainable impact by providing access to the right experience, knowledge, networks, finance and markets” (Impact Hub, 2016).

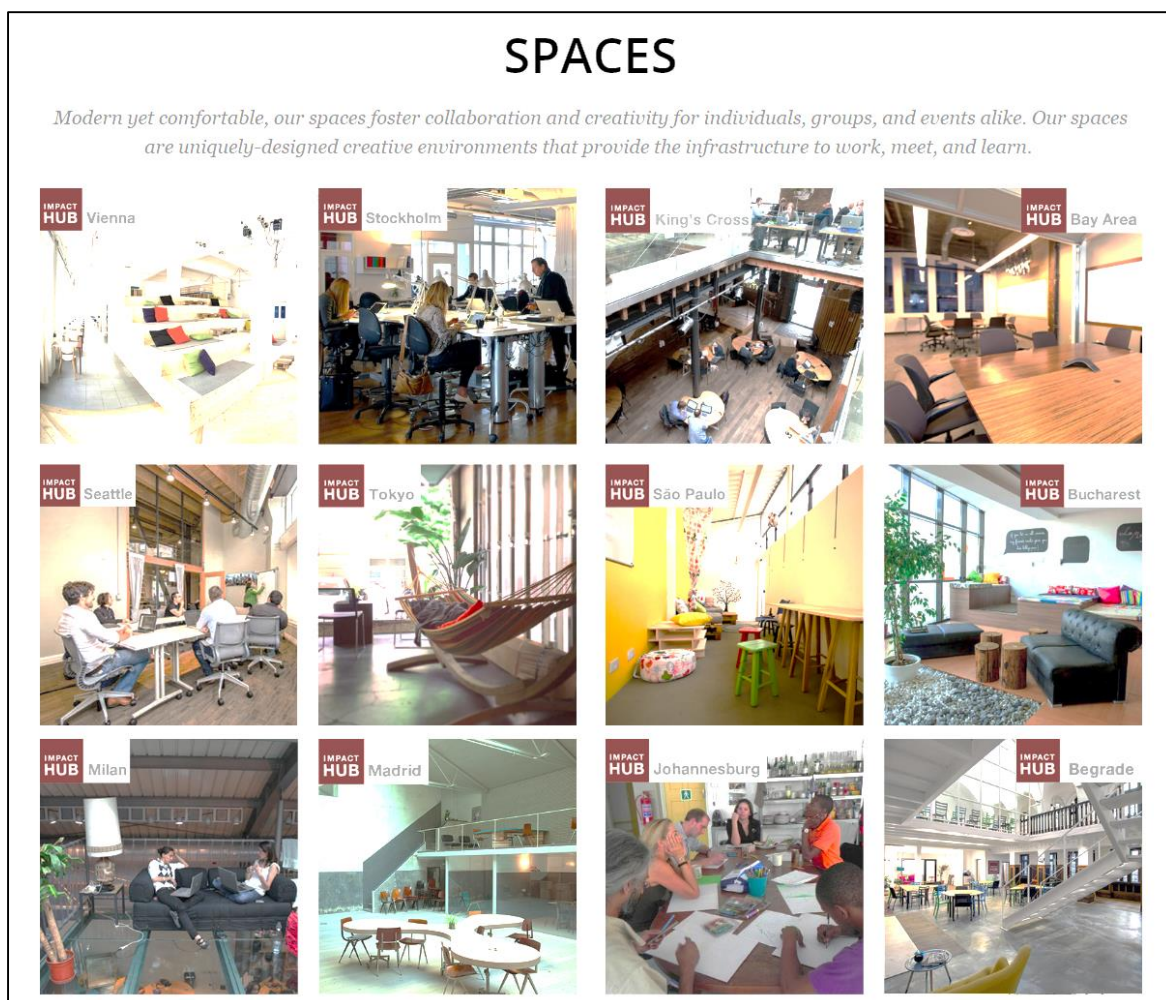
Second, Impact Hubs subscribe to elements of *community* and *grassroots* entrepreneurship (Bachmann, 2014; Impact Hub, 2016). Impact Hubs emphasize that, without their community, they would be nothing. In more formal terms, members have equal rights and responsibilities, they maintain a high degree of independence towards the hub, and it is the members who are defining and shaping the organization (rather than a manager). Accordingly, Impact Hubs see themselves as coming into being as organizations only through the coming together of their members, or their “communities.” For example, the director of Impact Hub Vienna describes his hub as “a self-generating community of makers and doers and entrepreneurs who want to get together and join a support ecosystem that helps them to utilize their ideas” (Watson, 2015). Similarly, the Impact Hub website (Impact Hub, 2016) declares that “[a]n Impact Hub... is a vibrant community of passionate and entrepreneurial people [Emphasis added].”

In other words, Impact Hubs' managed activities and its space merely form venues within which members take action. Impact Hubs use the metaphor of “hosting” to capture their facilitative rather than intervening role. As the Impact Hub website explains:

The magic happens... through the art of hosting... At Impact Hub, we don't have traditional receptionists who greet you when you arrive. We believe that in order to really make someone feel at home, we need to host people in the same way that we would in our own homes. That's why we have hosts at every location who help connect you to other people and catalyze meaningful interactions.

Particular spatial designs (see Figure 4) are further meant to enable self-guided work and the initiation of collaborative interactions:

Everything [in The Hub London] was built from scratch, and the space was designed to provide a collaborative environment in which people could work, meet, and learn within a modular structure... It featured leaf-shaped tables that allowed for flexible co-working, a semi-open meeting room where users could hold workshops, a secluded library for quiet thinking, and a community kitchen where people could hold small meetings over lunch or coffee. There were no assigned work stations, so users would sit next to a different fellow user every time they visited the Hub. (Bachmann, 2014, p. 22)



Source: Screenshot of www.impacthub.net/inside-impact-hub/ taken by author on July 13, 2016.

Figure 4: Impact Hub website displaying hub spaces

Together, the goal to enable innovation / entrepreneurship outcomes and community orientation are what differentiates Impact Hubs from coworking spaces and commercial shared

or temporary office space providers (such as WeWork or Regus). Office space providers do not emphasize ‘community’ or any other notion of collectivity and collaboration among space users (Moriset, 2014). While coworking spaces often emphasize the importance of “collaborative community,” at their core, they are a way for freelancers and creative or knowledge workers to compensate for not being part of a stable organization (Gandini, 2015; Merkel, 2015). More specifically, coworking concerns the temporary “reterritorialization” of nomadic and virtual workers, allowing for ad hoc interactions and professional networking (Gandini, 2015). The difference to Impact Hub is thus that coworking spaces are not inherently about ‘community,’ ‘innovation,’ or ‘impact,’ while these principles or goals are part and parcel of Impact Hubs.

As a third defining feature of Impact Hubs, *like-mindedness* is envisaged to spawn ‘community.’ Impact Hub members are projected to share visions that revolve around social innovation or social development at large. A community is thus not just any group of people: members have a sense of belonging to the hub. This often translates into a higher mental activation (inspiration, motivation) around the shared common cause (“impact”). Members are referred to as “change agents,” “innovators,” and “social entrepreneurs.” An owner of Impact Hub Bay Area outlines that “[w]e built the Impact Hub as a place where visionaries and doers could meet and make magic together” (Thorpe, 2013). Similarly, a staff member of Impact Hub San Francisco talks about “the passion of the entrepreneurs who work in the Hubs as sharing a common ‘intentionality’ for making a difference” (Thorpe, 2013).

Fourth, Impact Hubs are meant to create occasions for *diverse* individuals to meet who would not otherwise meet. Such meetings are expected to happen “serendipitously,” and ultimately help members develop ideas and insights that they could not have developed on their own. For instance, the “[t]he main idea [of The Hub London] was to create a place where unlikely allies would meet by serendipity” (Bachmann, 2014, p. 23), and the current Impact Hub

website promises that “[j]oining our diverse community of members and collaborators will inspire, connect, and enable you to develop your best work every step of the way.” In short, Impact Hubs are supposed to be “above all, spaces for meaningful encounters, exchange and inspiration, full of diverse people doing amazing things” (Impact Hub, 2016).

To summarize, leaders promote Impact Hubs as a system or context enabling individuals to connect with each other and collectively attain innovation or entrepreneurship outcomes. Practitioner language that captures the system/context aspect includes words like “ecosystem,” “environment,” and “space;” the collective and relational nature of action is captured in terms like “networks,” “community,” “like-mindedness,” “diversity,” “coming together,” and “collaboration;” and outcomes are expected to consist of “impact,” “innovation,” “ventures,” “making ideas happen,” “meaning,” or “inspiration.”

2.1.2. iHub Nairobi, the African Role Model Hub

What The Hub London has become for social innovation around the world, iHub Nairobi¹⁰ is for technology entrepreneurship in Africa. Several visions proposed by iHub’s founders and managers are strikingly similar to the visions outlined for Impact Hubs. First, iHub was also intended to connect individuals scattered across a city to allow them to collectively develop and implement ideas (cf., Robinson quote in Bachmann, 2014, p. 22):

“There was a clear gap in the market,” [Erik] Hersman [the main founder of iHub] remembers... While Nairobi did have a growing tech community, it was virtual. They needed a physical space to interact, collaborate, and gain more respect and attention from the outside world. The move... was all about bringing Kenya’s collection of bloggers, coders, and budding entrepreneurs together, according to Hersman. “It all started with the idea of getting cool people into a cool place with the goal of having something cool happen.” (Sanderson, 2015, p. 5)

Hersman (2009) was influenced by coworking spaces he had visited in the United States and the United Kingdom. He knew of The Hub London but had not been when iHub was founded, and he maintains that the use of the term ‘hub’ was not directly inspired by it:

¹⁰ The official brand name of the organization is “*iHub_,” as a play on social media and coding culture. For the sake of simplicity, the thesis will use the common spelling without asterisk and underscore.

Names are interesting, because once you name something it becomes real... Why “Hub”? Because it was supposed to be a hub of activity, something where people could dip in/out of and be the real nerve centre for the tech community in Nairobi... We actually didn’t like the name “iHub” which was just short for Innovation Hub, because it sounded too boring. But after a week, and not being able to come up with a better name, we just went with it. (Hersman, personal communication, July 14, 2016)

Second, iHub, like The Hub London, wanted to be different from existing forms such as coworking spaces and incubators while combining known elements:

We realized we needed something that was more of a hybrid than just the hot desking and paid space operations in [the UK and the US]. In our case we needed something that was part co-working, but also part community centre (like you would find in a university). (Hersman, personal communication, July 14, 2016)

Already in the initial launch announcement, iHub was thus called “part open community workspace (co-working), part investor and VC [venture capital] hub and part incubator” (Hersman, 2010).

Third, iHub also envisions connections to lead to entrepreneurship and innovation outcomes. This process is seen to be indirect, and iHub acknowledges that the lion share of affiliated startups have existed before (Moraa & Mwangi, 2012). Thus, iHub leaders and media use language that indicates a facilitative role of the hub, saying that startups “emerge from” iHub (Moraa & Mwangi, 2012), or that iHub “gives rise to” ventures (Hersman, 2012b).

Fourth, ‘community’ is a core concept for iHub as it is for Impact Hub. Here as well, community indicates that members are not controlled by the hub management, that they share values, but also that they are responsible to shape the organization:

The iHub is what we as a tech community make it. It is a blank canvas... that needs some input from people within the community to design, and create a culture around. (Hersman, 2010)

We were looking for techies who were doers and not talkers. (First iHub manager, cited in (Moraa & Mwangi, 2012, p. 7).

Similar to Impact Hub, actions taken by iHub staff are meant to be only facilitative in nature, and ultimately connections are made “serendipitously” by individual members:

One of [the unique things about iHub] for sure is that we engineer serendipity. We do not push people in a certain direction; we allow them to try, fail, learn and revise their ideas, connect with others and explore their limitless potential. By putting a lot of smart people

in one room, we have seen great innovations emerge. (iHub PR & Communications manager cited in Wangari, 2015)

However, iHub's vision is also distinct from the one of Impact Hub: iHub focuses explicitly on technology and on its geographical location in Kenya and Africa. To begin with, individual entrepreneurs and software developers in Nairobi and other African cities operate under very *different infrastructural and economic conditions* compared to London. Traffic conditions and poor public transport during work hours inhibit on-time meetings and events. Fast Internet connections and office space are either entirely unavailable or prohibitively expensive, and homes without a generator regularly go without electricity for hours and sometimes days. Entrepreneurs also have very limited personal financial resources; venture projects are often started with a few hundred rather than tens of thousands of pounds or dollars. For many, "iHub is [thus] an oasis of modern order in the otherwise so chaotic Kenyan capital Nairobi" (Lindijer, 2013). It is envisioned to offer working conditions for technology entrepreneurs that are comparable to standards in the Global North, within a context that is not.

This ambition is fueled by an aspiration that Kenya and other African countries, following the arrival of broadband connectivity in 2010, can catch up with and become more closely connected to the Global North and the West: Nairobi is re-imagined as a "Silicon Savannah" (Graham & Mann, 2013). iHub becomes the symbolic center of this transformation:

Africa always lagged behind; we always heard that we needed technological help from outside. But in the digital age, we are at par with other parts of the world... Before, we always heard that Africa had not gone through the industrialization age. I tell you, Africa skips the industrial revolution. We jump straight into the digital age. (iHub director quoted in Lindijer, 2013).

Focusing on Africa and technology also has consequences for the types of innovations that are envisioned to come out of iHub (locally adapted ones), and for who is meant to create them (young Kenyan grassroots entrepreneurs):

Africa's innovative ideas are based on local needs, many of them stemming from budgetary constraints, others from cultural idiosyncrasies. People from the West often can't

imagine or create the solutions needed in emerging markets, as they don't have the context and do not understand the "mobile [technology] first" paradigm. (Hersman, 2012a, p. 67)

iHub leaders claim that the hub is a uniquely suitable answer to challenges of young African innovators. The hub's community is said to facilitate *knowledge sharing* and mentorship, thereby raising the skill levels of members, particularly university graduates (Moraa, 2012; Moraa & Mwangi, 2012).

The iHub's focus on technology also means that 'diversity' is defined differently compared to Impact Hub. While the hub considers itself as 'open,' only those connections to external partners are deemed relevant that could further capacity building or business development for Kenyan technologists and technology startups. The idea is that, "[t]hrough iHub, the technology community, industry, academia, investors and venture capitalists can meet, share ideas and collaborate [and thus] transform their ideas into actions" (Moraa, 2012, p. 9). The iHub "brand" is meant to provide "exposure" for innovators by pooling and providing access to opportunities, such as jobs, freelancer group contracts, or trainings (Moraa & Mwangi, 2012). More broadly, iHub is meant to be a place that experienced local technology businesspeople and representatives of international technology corporations visit, to allow young Kenyan innovators who regularly occupy the hub to make connections that they could not make otherwise (Hersman, 2012a).

This technology- and entrepreneurship-specific notion of relevant connections goes hand in hand with an understanding of 'ecosystems' that is reminiscent of the Impact Hubs' notion of the term, but also differs from it. iHub itself is understood to be an ecosystem, similar to narratives about Impact Hubs (cf., 2.1.1.); yet, at the same time, it is also framed as *embedded within a wider ecosystem*:

You can think of iHub as an attempt at creating an innovation ecosystem in a box. The facility... is run by the local startup community... The iHub organizers look for gaps in the local business ecosystem and try to fill them. (IBM, 2013, p. 3)

The wider “business ecosystem” or “tech ecosystem” is conceived of as the immediately relevant environment of the hub. The quality of the ecosystem is imagined to depend on the quality and coherence of connections:

One grouping [within a tech ecosystem] is star[t]ups, another is investors, another is large tech companies, and yet another is researchers. There are bloggers, digital creatives, visiting techies, SME [small and medium enterprise] leaders who’ve learned their lessons, and freelancers moonlighting from their day jobs. It’s a big mixed bag and we all together form an ecosystem... [A] healthy tech ecosystem is where the different parties are able to and want to work together. (Hersman, 2015b)

Thus, for iHub unlike for Impact Hub, there is no sharp distinction between a hub-internal and a hub-external sphere. The “community” of iHub is imagined to blend in with the “Kenyan tech community,” “tech ecosystem,” “tech scene,” or broadly the “tech environment.” It is acknowledged that “the right growth environment for tech... is nuanced, organic, and grows over time through the aggregated acts of individuals” (Hersman, 2012a, p. 61). Yet, through the conceptual blending of connections made within the hub and connections existing in its environment, iHub is envisioned to have positive effects on the local, national, and regional level (Hersman, 2012a):

The iHub catalyses the growth of the Kenyan tech community by connecting people, supporting startups, and surfacing information. (iHub, 2016)

Your ideas and drive will make the iHub into the space to be in all of East Africa for tech-related activities. (Hersman, 2010)

The argument that iHub builds skills that are relevant for technology entrepreneurship together with assertions about its far-flung influence are ultimately used to contend that iHub contributes to economic development in Kenya (Moraa, 2012; Moraa & Mwangi, 2012).

In sum, the mental model of iHub founders and leaders of how their hub works is similar to the Impact Hub model: iHub is meant to facilitate connections between likeminded, driven and independent yet interdependent individuals in a city, leading to the formation of a community, which enables a collective entrepreneurial process that generates innovations. Differences can be traced back to iHub’s focus on Kenyan innovators and on locally adapted technological

innovations. Based on the notion that iHub facilitates connections within a broader technology ecosystem, the hub is argued to “catalyze” the development of technology startups and ultimately make a significant contribution to local economic development.

This vision proved hugely appealing for a range of actors seeking technology-driven local economic development in Africa, and the iHub quickly won prominence and acclaim. For instance, Fast Company (2014) named iHub as Africa’s most innovative company in 2014, and the list of dignitaries and technology celebrities who have visited iHub has grown to include Uhuru Kenyatta (Kenya’s president), Ban Ki Moon (outgoing UN General Secretary), Mark Zuckerberg (CEO and founder of Facebook), Eric Schmidt (former Google CEO), and Vint Cerf (one of the ‘fathers’ or inventors of the Internet).

2.1.3. The Spread of Hubs across Africa

The confluence of several events and dynamics allowed the spread of organizations similar to iHub across Africa, resulting in at least a partial and temporary recognition of ‘hubs’ as a distinct organizational form. iHub’s so widely perceived success played an important role in that it broadened the appeal of hubs beyond African technologists to reach development institutions as well as technology companies.

Yet, iHub was not a unique pioneer in the same way of The Hub London. Hersman (2009) had already called on the “emergent, yet disconnected, technology community,” which he felt was “growing in many of the major African cities,” to establish “tech coworking spaces” in 2009, one year before iHub opened. He used the term “hub” already at this point to convey the envisioned organizations’ interconnection function, while referring to “coworking spaces” in the title of his blog post and when pointing out example organizations from the US and the UK (including The Hub London).

In fact, a number of organizations following similar visions were founded shortly after iHub, in 2010 and 2011. This group includes Active Spaces (Cameroon), kLab (Rwanda),

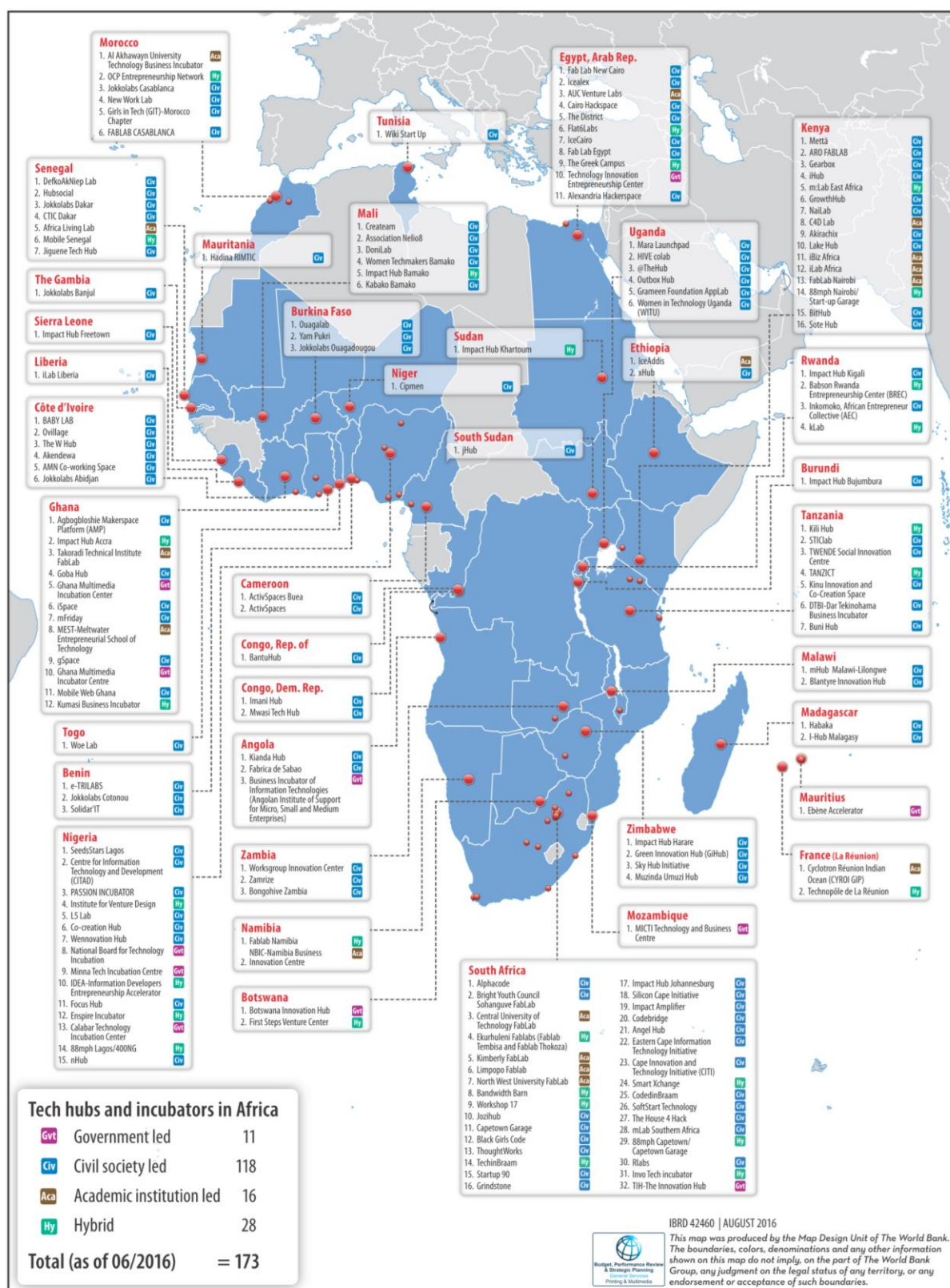
KINU (Tanzania), Hive Colab (Uganda), BongoHive (Zambia), Nailab (Kenya), Banta Labs (Senegal), and the Co-Creation Hub or CC Hub (Nigeria).

Several of them formed AfriLabs, a “network of tech innovation hubs in Africa” with the mission to “build the capacity of hubs, which support the growth of tech communities around them” (AfriLabs, 2016). This effort was again promoted, if not led, by Hersman, with support from other bloggers and technologists from across Africa (Hersman, 2011). The similarities between AfriLabs and the Impact Hub network are apparent; yet AfriLabs members did not adopt a franchise approach, so that AfriLabs is more akin to a traditional association with otherwise independent member organizations. “Hub” became the agreed upon terminology to refer to the class of organizations, even though “lab” features in the association’s and some of its members’ names (e.g., kLab in Rwanda).

A further milestone in instituting ‘hubs’ as an organizational form recognized by practitioners was a study funded by British NGO Indigo Trust and conducted by iHub Research, the iHub’s think-tank-like research branch (Gathege & Moraa, 2013). The study helped establish “hubs” as a common label, variously using the terms “ICT Hubs,” “Innovation Hubs,” or just “hubs.” It claimed that there was...

growing evidence that the ideals of openness and collaboration are often in-built in the architecture of these hubs through their events and activities. The African Innovation hubs studied provide open working spaces... for knowledge exchange and community building. Innovation hubs can be most effective when they harness openness and community-driven approaches. (Gathege & Moraa, 2013, p. 6)

Finally, hubs were affirmed as an important, Africa-wide phenomenon through two widely noted stocktaking exercises. First, a crowdsourcing campaign by BongoHive (2013) provided a map and count of hubs. Two World Bank specialists then built on BongoHive’s work and the iHub Research study (Gathege & Moraa, 2013) to publish curated maps in 2014, 2015, and 2016 (Firestone, 2016; Kelly, 2015). The most recent map included 173 hubs (see Figure 5).



Source: Firestone (2016). Reprinted with kind permission of the author.

Figure 5: Technology innovation hubs in Africa mapped by World Bank

The following years were marked by intensifying and broadening interest in African hubs. Annex A highlights reports and online articles published between 2012 and 2015, illustrating the attention paid by actors ranging from technology bloggers through mainstream business media (including the BBC and The Economist) to large development organizations (like the German Corporation for International Cooperation (GIZ) and the World Bank). Most of the articles refer to the BongoHive or World Bank maps. With funding from GIZ, AfriLabs conducted three meetings of African hub leaders at the annual re:publica conference in Berlin from 2013 to 2015. The social development organizations Hivos, Indigo Trust, and DEON initiated a fund for African hubs in 2014 (Treisman, 2014).

It was in this context of increasing attention from media and development organizations that iHub's vision to be a positive contributor to local economic development became attributed to African hubs in general. For instance, the mentioned World Bank blog post (Kelly, 2015) described hubs as “[o]ne of the main sources of locally developed [mobile and software] applications,” representing an “African digital renaissance [...] that [...] is increasingly home grown.” The same policy specialist later proclaimed that hubs “drive economic growth” in Africa (Kelly & Firestone, 2016).

The notion was quickly adopted by other development agencies, including the International Telecommunications Union (Lamanauskas, 2015). Christine Lagarde, head of the International Monetary Fund, following her tour of kLab in Rwanda, tweeted that “[i]nnovative technology projects like kLab are vital to Rwanda's future” (Lagarde, 2015). Outgoing UN Secretary General Ban Ki Moon addressed an audience at iHub with the following words (Wakoba, 2014):

I believe I am seeing the future of Kenya. Technology can be used as a great power to change our life. Kenya is a thriving country. Being at the iHub has inspired me. You are the hope of Africa.

2.1.4. Network Infrastructures or Incubators? Two Expectations Towards Hubs

This background helps to understand popular expectations about how African hubs work as an organizational form. While the ‘hub’ terminology was widely adopted in Africa after 2012, it also lost some of the specific meaning that The Hub London and iHub founders had attached to it. Actors other than the immediate founders of the first generation of African hubs tended to rely on simpler, more heuristic mental representations of hubs, seemingly without fully recognizing the elaborate mental model of community-centric facilitation of connections that had originally been developed.

When examining published material on African hubs between 2012 and 2015 (see references above and Annex A), it becomes apparent that several palpable features of hubs have been uncontested. This mainly concerns their physical layout and services. Hubs are consistently described and imagined to consist of a Wi-Fi-connected space with hot desks and meeting rooms, allowing for laptop-based work. Activities are seen to include events, presentations, small innovation competitions (like hackathons or pitching contests), group meetings on topics of interest, ad hoc trainings (for instance, on coding), and mentorship sessions. It is also uncontested that hubs are generally meant to contribute to innovation and entrepreneurship processes, and that they allow entrepreneurs to network with each other and with hub-external partner organizations.

Yet, expectations and assumptions about how hubs work also diverge in important ways. Specifically, there are two common expectations. The more optimistic of the two can be summed up as the *network infrastructure expectation*. It maintains much of iHub’s and The Hub London’s original visions: hubs are assumed to be open, hosting and supporting diverse actors with a stake in technology entrepreneurship (see Annex B for an explicit comparison). Specifically, locally based technology-oriented entrepreneurs are allowed to make connections

with each other and other actors, such as technology corporations, investors, and international visitors. Hubs are seen to be new and unlike other known forms of organizations.

The network infrastructure expectation is held by representatives of African hubs (leaders, funders, and AfriLabs) and some journalists, who argue that hubs have an appeal as an organizational form that enables innovation and entrepreneurship in Africa in unique and timely ways. Key expressions proponents of this assumption employ are “networking,” “openness,” “knowledge sharing,” and “collaboration.”

Not only do [hubs] act as physical infrastructure, providing access to power, pipes (internet), and space, but they also offer network infrastructure, or access to the human, financial and social capital. (AfriLabs, 2015)

These meeting places act as a bridge between technology start-ups, investors and academics, nurturing collaborations. Entrepreneurs experiment together and learn from one another, supported by the hubs’ ICT infrastructure and mentoring programmes. (Oxford & Jeffries, 2013)

Yet, while this expectation maintains the idea that hubs facilitate connections in a general sense, it also tends to be more abstracted from some of the specific visions pictured originally by founders of iHub and The Hub London. The role of a hub-internal and hub-shaping community is now emphasized less, or it is less elaborate. ‘Community’ is still used as a concept but it is often missing the original notion that community members are the ones owning and shaping the hub. It is now the hub that “creates” or “nurtures” community, and not the other way around:

But the secret of [hubs’] success lies in the collaborative environment and close-knit communities that they create. These nurturing conditions promote a rapid exchange of ideas, skills sharing and problem solving which allows serendipity to happen. (Treisman, 2015)

In other accounts, ‘community’ is now used exclusively in a wider sense, referring to the ‘tech community’ of a city. The notion of a blended hub-internal and external community that was essential for iHub’s vision is absent in the network infrastructure expectation, and instead the hub’s facilitative function towards its environment is emphasized more (for instance, expressed as the “enabling environment” or “ecosystem”):

The opportunity is that hubs serve as *infrastructure* to support tech, entrepreneurship and innovation. This is because there are so many gaps in the enabling environment to be filled, or to be filled better, cheaper, or more easily. (Emphasis in the original, (Akinyemi, 2015))

International connections to the Global North are heavily emphasized, as they are imagined to bring expertise and capital (Heuler, 2015; Kalan, 2014). AfriLabs goes so far as to argue that hubs have thereby become an infrastructure which embeds local entrepreneurship and innovation within a supra-national or global “knowledge economy” or “digital economy” (AfriLabs, 2015, 2016) (see also the book cover of Bright and Hruby (2015a) for a visualization of this image). As continent-wide “innovation infrastructures,” hubs are depicted as complementary to physical Internet and ICT infrastructure:

Across [Africa] new Silicon Savannahs are in the making and the components of a budding... ecosystem are emerging... iHub-like innovation centers are becoming a mainstay of the continent’s progressing ICT infrastructure... these IT spaces are becoming central connect points for ideas, entrepreneurs, investment, and innovation across the continent. (Bright & Hruby, 2015b)

Due to the increase in speed and affordability of connectivity, the sense of possibility the digital world has provided, and interest by investors, tech hubs, business incubators, hacker spaces, and maker spaces are providing places for the continent’s young (and not so young) people to express their innate creativity and ambition, make up for disparity in educational opportunities, allow for the creation of wealth that is more sustainable than the resource extraction of the past, and help to produce products and services to address the needs of their communities. (Hopkins, 2015)

In short, according to the network infrastructure expectation, hubs work as interconnection nodes in geographically dispersed networks of people and organizations, connecting technology entrepreneurs in a given African city with each other, with important partners located in the city (such as mentors, investors, etc.), and with important partners normally located abroad, often in the Global North. While the network infrastructure expectation implies that entrepreneurs gain cognitive and financial resources through hubs (e.g., knowledge, skills, or financial capital), it assumed that entrepreneurs attain these gains entirely through connections with others. The expectation is thus fundamentally relational in nature.

The second common assumption about how hubs work is much more simply structured and more pessimistic about hubs. It can be called the *incubator expectation*. This assumption is

held mainly by actors who do not discern between incubators and hubs, and dismiss hubs as a fad in development circles.

The ‘lumping together’ of organizations under the ‘hub’ label appears to have been a consequence of the quickly rising interest in hubs following 2012. As the hub term became popular, the rich originally envisioned meaning got lost to the point where organizations were included in accounts about hubs (e.g., maps, lists, blog posts) that evidently differed from iHub. This development began with iHub Research’s comparative study on hubs (Gathege & Moraa, 2013) which included the Meltwater School of Technology (MEST), even though MEST explicitly follows a traditional training and incubation approach (MEST, 2016; see 4.4.1. for details). It continued when BongoHive and the World Bank included several existing incubators and technology parks in maps of hubs in Africa.

Ironically, the terminological ambiguity that was introduced allowed others to do the opposite: understand ‘hubs’ as ‘incubators.’ Accounts from 2014 and 2015 began to refer to “hubs, accelerators, and incubators,” or simply to “incubators” when discussing organizations which self-identified as hubs (see Annex A). In other words, many observers began to simply subsume hubs under the wider organizational form ‘business incubator.’

Consequently, observers applied pre-existing notions about incubators to hubs, allowing the incubator expectation to develop. The perceived traditional goal of business incubators—increasing the survival and performance of young companies (see 2.3.1.)—was assumed to also be the goal of hubs. Implicitly, the incubator expectation is thus based on the rationale that the only essential innovation and entrepreneurship outcome for an incubator is the number and performance of startups that it produces, which is then transferred to hubs. For instance, Bright and Hruby (2015a, p. 177) estimate that 3,500 technology startups have been “forming out of [Africa’s] innovation hubs,” implying that hubs, like incubators, create or develop startups.

This reasoning, however, has opened hubs up for criticism. For instance, known Nigerian technology entrepreneur Mark Essien (2015), in a widely noted blog post, makes critical statements generally about incubators, but refers to a well-known (self-pronounced) hub to illustrate his argument:

Of the 9 biggest software startups in Nigeria, none was built by an incubator... Of the 15 next biggest software startups... only one used to operate from CcHub. Incubators just don't work, otherwise they would have produced more successful startups in Nigeria. Even Kenya and Ghana that have a stronger incubator scene have produced nothing of note.

Similarly skeptical views have been reflected in African technology media (African Tech Roundup, 2015) and in interviews conducted for this thesis (see 4.2.2.2., and 4.3.1.2.). In some cases, hub leaders themselves began to revert to the incubator terminology (Mubaiwa, 2015; Oluwagbemi, 2015). For instance, in a response to Essien's provocative post, Michael Oluwagbemi (2015) defends his organization Wennovation Hub, outlining its goal to "build the ecosystem" rather than support few individual startups, but still refers to "incubators" throughout his account, even when referring to Wennovation Hub.

In sum, the incubator expectation does not retain much from iHub and The Hub London as hub ideal types. Specifically, hubs are not seen to be new or different kinds of organizations. Here, 'hub' is simply a new label for organizations that support early-stage technology entrepreneurs. Because such organizations have traditionally been referred to as 'incubators,' the newly prevalent label 'hub' is either abandoned or used synonymously with 'incubator.' The incubator expectation understands hubs as black boxes, and is only concerned with their outcomes. Accordingly, hubs are measured against their results in terms of technology startup creation or development.

The network infrastructure and incubator expectation are not entirely contradictory. What distinguishes them is their level of optimism about hubs, and the degree to which they retain elements from the more elaborate hub visions that iHub and The Hub London had established (see Annex B for details). While the network infrastructure expectation assumes that

startups are created within wider ‘ecosystems’ which the hub facilitates, the incubator expectation presumes hubs to create ventures directly.

For the remainder of the thesis, the two expectations serve as markers for the kinds of assumptions about hubs which practitioners harbor. These observations allow the thesis to identify suitable academic literature to compare hubs against (see 2.3 and 2.3.) and later to examine the merit of practitioners’ expectations based on the grounded empirical findings (see 8.1.3.).

2.2. Innovation Intermediaries and Intermediation

The previous section established that practitioners commonly understand hubs either as network infrastructures or as incubators. This section and the following one review academic literature that speaks to these expectations, so that ultimately a theoretical framework can be developed (see 2.4.). The goal is to identify concepts or theories that reflect practitioners’ expectations in theoretically meaningful terms; that is, in a way that explanations or predictions about how hubs work can be made based on the concept or theory.

To reflect the network infrastructure expectation, at the minimum, the identified theory/concept needs to capture the notion that hubs are organizations facilitating connections between individuals to enable innovation and entrepreneurship outcomes. Ideally, the identified theory/concept would also discuss more fine-grained elements within the network infrastructure expectation, such as the assumption that hubs connect local and international actors as well as different stakeholder groups (cf., 2.1.4 and Annex B). For the incubator expectation, a theory/concept needs to capture that hubs support the entrepreneurial process with the specific goal to create or develop ventures. Preferably, the theory/concept would also discuss the dynamics of entrepreneur selection or self-selection (cf., 2.1.4 and Annex B).

2.2.1. Howells’ Framework of Innovation Intermediation

The concept of innovation intermediation (Howells, 2006a) provides a suitable framework to capture at least the network infrastructure expectation and potentially the incubator

expectation. Howells (2006a) defines an innovation intermediary very broadly, as “an organization or body that acts as an agent or broker in any aspect of the innovation process between two or more parties” (p. 720). He mentions several examples for intermediation such as the provision of information about collaborators, brokerage of transactions, mediation, and supporting firms when they try to identify advice or funding.

At its core, the innovation intermediation framework makes a forceful case that there are many organizations other than firms that matter in innovation processes, and that they affect processes in many different ways. Analyzing member organizations of a UK association, Howells finds that prior literature had been narrowly focused, and thus underspecified or missed several roles that intermediaries play.

Howells (2006a) highlights that different notions of intermediary organizations exist in literatures on innovation diffusion and technology transfer, innovation management, innovation systems and networks, and service organizations (such as business consultancies). Intermediation serves as an overarching concept for previously suggested concepts such as technology brokers (Hargadon & Sutton, 1997), bridging institutions (Stankiewicz, 1995), and boundary organizations (Guston, 2001). The main contribution of the innovation intermediation framework is thus that it integrates previous perspectives and then explicates intermediation roles (or “functions”) along the innovation process, providing a detailed elaboration from “foresight and diagnostics” at the beginning of the process to “evaluation of outcomes” at the end. Howells (2006a, p. 724) extrapolates these findings towards the innovation systems level, arguing that:

the de facto assumption in much of the discussion and analysis of intermediaries is that they operate in a simple triadic ‘one-to-one-to-one’ basis... However... intermediaries are increasingly involved in more complex relationships..., forming both vertical and horizontal relationships in increasingly distributed innovation networks.

2.2.2. Extensions and Applications of the Innovation Intermediary Framework

Other authors built on the innovation intermediation framework, developing a body of literature around core concepts such as intermediation, brokerage, and bridging. Much of this

literature has empirically examined the functions that intermediary organizations fulfill for firms, confirming Howells' claim that these are many and diverse (Batterink, Wubben, Klerkx, & Omta, 2010; Gassmann, Daiber, & Enkel, 2011; Kilelu, Klerkx, Leeuwis, & Hall, 2011).

More specifically, intermediaries have been theorized as essential counterparts for firms within ever more complex, distributed multi-actor configurations of innovation and value creation (Howells, 2006b). Intricate interdependencies exist between (1) client firms' demands and capacities, (2) the innovation process stage at which the intermediary intervenes, (3) the intermediary organization's goals, governance, and funding, and (4) the intermediary's evolving internal capabilities (Katzy, Turgut, Holzmann, & Sailer, 2013; Tran, Hsuan, & Mahnke, 2011; Winch & Courtney, 2007; Zhang & Li, 2010). For instance, Tether and Tajar (2008) find that private research institutes and consultants can be valuable sources of specialized knowledge that complement internal capacities of firms, but this process depends on the firms' openness, their absorptive capacity, networking capabilities, and commitment to innovation.

Such contingencies can lead to tensions and ambiguity for intermediary organizations' strategies. Several studies observe that intermediaries find it hard to clearly identify and assess their unique contribution, and thus struggle to communicate their value towards clients and funders (Boon, Moors, Kuhlmann, & Smits, 2011; Howells, Ramlogan, & Cheng, 2012; Klerkx & Leeuwis, 2008, 2009).

Another part of the intermediation literature examined Howells' suggestion that intermediation happens within wider innovation systems. Some of this literature conceives of innovation systems as networks in a formal-structural sense: firms and intermediary organizations (nodes) have relationships with each other (edges), where relationships represent channels of influence, resources, knowledge, etc. These works often prefer the notion of 'brokerage' over 'intermediation,' using the network-analytical understanding of brokers as entities that affect

network structure by enabling new relationships between two or more other actors (Gould & Fernandez, 1989).

The central contention of the systems- and network-oriented literature is that firms are able to “plug into” the networks of intermediary organizations, thus gaining access to actors that they would not otherwise be able to connect with (Zhang & Li, 2010). Brokers are found to enable connections between firms and *diverse and distant others*, where ‘diversity’ and ‘distance’ are variously operationalized as differences in knowledge (Parjanen, Melkas, & Uotila, 2011), firm size (Lee, Park, Yoon, & Park, 2010), public vs. private sector affiliation (Bakici, Almirall, & Wareham, 2013), cultural backgrounds (Batterink et al., 2010), or literal geographic distance (Kauffeld-Monz & Fritsch, 2013). Intermediaries were also found to not actually change the structure of the innovation system, but rather help actors navigate it (Klerkx, Álvarez, & Campusano, 2015).

A third group of authors following Howells (2006a) has attempted to bridge levels of analysis, examining how internal dynamics or attributes of intermediary organizations interdepend with wider innovation systems. For instance, organizational design choices were found to be essential for intermediaries operating at the intersection of sectoral innovation systems, especially concerning the selection of client entrepreneurs and of experts who evaluate and broker connections for entrepreneurs (Sapsed, Grantham, & DeFillippi, 2007). In turn, internal learning and adaptation processes can make it problematic for intermediaries to maintain a consistent positioning towards other actors in the system (Boon et al., 2011). Klerkx and Leeuwis (2008, 2009) confirm that it is difficult for intermediaries to identify a clear mandate and to remain impartial towards their many potential partners. These authors argue that such issues arise from intermediaries’ need to be “embedded” (that is, seamlessly integrated) in innovation systems at multiple levels. Other studies have focused on the personal networks and attributes of individuals within intermediary organizations, showing that an intermediary organization’s brokerage

behavior will depend on managers' and staff's prior affiliations, experience, and competences (Boari & Riboldazzi, 2014; Kirkels & Duysters, 2010).

Finally, a small number of studies have examined how intermediaries can have effects for actors other than their immediate clients; these intermediaries have been called "open system intermediaries" (Dutt et al., 2016). For instance, due to their non-competitive relationship with firms, intermediaries are uniquely positioned to validate ideas (Winch & Courtney, 2007), build absorptive capacity at the inter-organizational level (Spithoven, Clarysse, & Knockaert, 2011), or develop market infrastructure (Dutt et al., 2016).

2.2.3. Summary, Critique, and Applicability to African Hubs

In sum, literature on innovation intermediaries has established that organizations other than firms matter in innovation processes, and that these intermediary organizations are intertwined with their client firms and other actors in innovation systems or networks. Internal dynamics of intermediaries can reverberate across the wider innovation system or network.

The network infrastructure expectation is reflected in intermediation theory in several ways. Generally, intermediation captures the function of hubs to facilitate connections. Specifically, it speaks to the network infrastructure expectation's assumptions that hubs (1) connect geographically and cognitively distant or diverse actors, (2) enable knowledge exchanges, (3) link multiple stakeholder groups, and (4) embed individual and small-scale networks within wider structures (cf., 2.1.4., 2.2.2., and Annex B). Even though few authors have discussed intermediary organizations explicitly as 'infrastructures,' this metaphor resonates with Howells' original conceptualization, which was derived from "institutional infrastructure" (Carlsson & Stankiewicz, 1991; Stankiewicz, 1995) and "superstructure" (Lynn, Reddy, & Aram, 1996). The collective-good character of infrastructure and superstructure (Lynn et al., 1996) has also continued to show through in more recent studies on intermediaries (e.g., Dutt et al., 2016). The

only key element within the network infrastructure expectation which is not reflected in intermediation studies is the assumption that hubs can create or nurture communities.

In turn, the intermediation framework appears to have little to say about the incubator expectation of hubs. Intermediation studies have discussed incubators only implicitly, considering them as one kind of intermediary organization among many equivalent others (e.g., Dutt et al., 2016; Katzy et al., 2013; Klerkx et al., 2015; Suvinen, Konttinen, & Nieminen, 2010). The incubator expectation's focus on startup creation and development (cf., 2.1.4 and Annex B) is not a primary concern for intermediation studies, which consider a much wider array of innovation outcomes.

Thus, intermediation theory might not have much to offer for as a theoretical framework to inspect the incubator expectation, but it does appear well-suited as a frame to examine the proposition that African innovation hubs work as network infrastructures. Therefore, the main tenets of intermediation studies will be included in the theoretical framework (see 2.4.).

Given its broadness, the innovation intermediation framework requires some adaptation and specification to fit the present study context. Critically, innovation intermediation studies have mostly ignored entrepreneurship as a particular innovation process. In turn, the entrepreneurship literature has acknowledged the importance of organizations like incubators, technology transfer offices, or angel investor groups (Aldrich & Martinez, 2010; Bøllingtoft & Ulhøi, 2005; Thornton & Flynn, 2003) but it has not developed an overarching theory or analytical frame for them. This gap points to the persistence of the “bifurcated history” of entrepreneurship research, “typically focusing on either individuals or environments but not linking the two” (Thornton & Flynn, 2003, p. 401) (see 8.3.1. and 9.1. for details).

The thesis will thus adapt the innovation intermediation framework to entrepreneurship as a specific type of innovation process (see 3.1. for details). Accordingly, in the following, ‘intermediary’ or ‘intermediary organization’ will refer to “an organization or body that acts as

an agent or broker in any aspect of the [entrepreneurial] innovation process between two or more parties” (cf., Howells, 2006a, p. 720; see 3.1. for definition of “entrepreneurial innovation”).

2.3. Incubators and Incubation

The last section concluded that intermediation is useful to capture the core tenets of the network infrastructure expectation about hubs. The incubator expectation about African hubs is much less elaborate (cf., 2.1.4. and Annex B), and the choice of a theory or concept to examine this expectation is more straightforward, given that a rich academic literature on incubators exists.

This section thus reviews the incubator literature to establish how incubators, as a specific organizational form, have been found to work. It does not aim to duplicate the many existing literature reviews (Bergek & Norrman, 2008; Bruneel, Ratinho, Clarysse, & Groen, 2012; Hackett & Dilts, 2004b; Mian, Lamine, & Fayolle, 2016; Phan, Siegel, & Wright, 2005), but rather develop an understanding of what it means if hubs are understood as incubators, focusing on definitional issues, goals, and processes. In addition, the section also reviews in what ways the incubation literature overlaps with intermediation literature and if it might also speak to the network infrastructure expectation.

2.3.1. One Immediate Goal but a Wide Range of Definitions

At their core, incubators have always had the immediate goal to increase the chances of young and small ventures to survive, scale up, and grow (Allen & Rahman, 1985; Hackett & Dilts, 2004b; Mian et al., 2016). Motivating the setup of incubators is to support entrepreneurial innovation as a particularly effective driver of growth and value creation (Block, Fisch, & Praag, 2016). Nonetheless, different funders have different agendas as to which ultimate goals venture success contributes to, such as economic development, employment, entrepreneurial

training, technology commercialization, product development, or social impact (Aernoudt, 2004; Bergek & Norrman, 2008; Hackett & Dilts, 2004b).

Despite the consistency of incubators' immediate goal, the literature has not found a consistent definition of incubators as an organizational form. In one of the first significant works, Cooper (1985, p. 76) defines them very broadly as "the organizations where entrepreneurs work before they start their own firms," while admitting that this means that "every organization might be viewed as a potential incubator." Others even do away with defining incubators as self-contained organizations, and include any "support environment for start-up and fledgling companies" (Peters, Rice, & Sundararajan, 2004, p. 86). Accordingly, incubators have sometimes been seen as equivalent to science parks (Phan et al., 2005).

At the narrow extreme, an incubator has been defined as a "shared office space facility that seeks to provide its incubatees... with a strategic, value-adding intervention system of monitoring and business assistance" (Hackett & Dilts, 2004b, p. 57). Specific service offerings have been suggested to be defining of incubators, especially "(1) shared office space..., (2) a pool of shared support services..., (3) professional business support or advice ('coaching') and (4) network provision, internal and/or external" (Bergek & Norrman, 2008, p. 21).

It has also been proposed that incubation as a process is different from incubators as organizations (Hackett & Dilts, 2004b). Accordingly, incubation can be defined independently of any particular organization as "an interactive development process where the aim is to encourage people to start their own business and to support start-up companies in the development of innovative products" (Aernoudt, 2004, p. 127). Vanderstraeten and Matthyssens (2012) thus describe incubator organizations as only one part of a wider incubation market that also includes logistics support, advice providers, and investors.

Given this confusion, Aernoudt (2004, p. 127) criticizes that "completely different approaches tend to be associated with the incubator concept, which hence becomes more of an

umbrella concept.” Maybe the only consistent feature of incubator definitions has been that incubators support the early stages of entrepreneurship. Yet, “early stage” is itself an unclear term, sometimes seen as a period in the entrepreneurial process where “ideas have not yet been fully developed” (Bergek & Norrman, 2008, p. 21), or some point in time before a venture is founded (Cooper, 1985), or recently founded firms (Hackett & Dilts, 2004b, p. 57). What remains is that incubators support entrepreneurs somewhere around the time of venture founding. The underlying rationale is that young and small ventures are disproportionately affected by market failures, imperfections, or gaps which the incubator attempts to alleviate (Aernoudt, 2004; Bøllingtoft & Ulhøi, 2005; Phan et al., 2005).

In the following, this thesis takes a middle ground that is common in the literature, adopting the definition of incubators as “organisations dedicated to the support of emerging ventures” (Bergek & Norrman, 2008, p. 21), “providing tenant [teams or] firms with a portfolio of new venture support infrastructure” (Mian et al., 2016, p. 2) that includes but is not limited to office space and business assistance. At the same time, the broad and narrow definitions outlined earlier will be used when hub processes need to be distinguished from incubation (see 8.1.4.).

2.3.2. Incubator Typologies: From Attributes to Service Portfolios in Use

Acknowledging that ‘incubator’ is a loose concept, the literature has introduced a variety of typologies. Distinctions between incubators have usually been made based on attributes that are intuitively relevant and easy to observe, such as profit vs. not-for-profit, types of funders, lists of services, or stated goals (Aernoudt, 2004; e.g., Allen & McCluskey, 1990; Grimaldi & Grandi, 2005; Mian, 1994; Rice, 2002). Arguably, such distinctions can help to evaluate incubators appropriately (Aernoudt, 2004; Barbero, Casillas, Ramos, & Guitar, 2012); yet, incubation outcomes have rarely been found to be related to such simple taxonomies (Hackett & Dilts, 2004b; Mian, 1994; Peters et al., 2004).

In response, several typology papers have attempted to amalgamate incubator attributes into coherent ‘models’ or ‘design themes’ (Bøllingtoft & Ulhøi, 2005; Bruneel et al., 2012; Grimaldi & Grandi, 2005; Pauwels, Clarysse, Wright, & Van Hove, 2016). Most commonly, these studies discern between service portfolios (instead of individual services).

Such service models have been shown to change over time. Since incubators started to spread in the US through the 1980s and 1990s (Hackett & Dilts, 2004b), they have adapted to the needs of client startups, shifting towards intangible assets with the arrival of the Internet and associated economic transformations (Grimaldi & Grandi, 2005). Accordingly, Bruneel et al. (2012) suggest a sequence of three incubator generations, with a new service dimension being added in each period:

1. Incubators founded in the 1980s followed a real estate model, offering office space and some technical facilities. The value addition for ventures was meant to result from economies of scale and scope generated from the shared use of resources.
2. Incubators founded during the 1990s emphasized business advice and the development of intangible resources. Value addition was envisioned to occur through startups’ routine-based, experiential, historically contextualized, and target-oriented organizational learning (Levitt & March, 1988).
3. Finally, incubators established in the 2000s aimed to allow ventures to tap into the incubator’s network of external partners, especially venture capital investors (see 2.3.3.3. for details). Value addition was envisioned to come from preferential access to resources, specialized learning, and professionalization. This generation has also been referred to as the “networked business incubator” (Bøllingtoft & Ulhøi, 2005; Hansen, Chesbrough, Nohria, & Sull, 2000).

Recently, accelerators have been added as a fourth generation incubator model (Pauwels et al., 2016). Like second and third generation business incubators, accelerators focus on business advice and networks. However, accelerators differ from older incubators as they tend to make small equity investments, provide support only during intensive short periods, emphasize company valuation and investment-readiness instead of revenue or job creation, and de-emphasize or abandon the provision of office space.

Academic research has not explicitly categorized hubs as a type of incubator; however, one paper by Nicolopoulou et al. (2016) uses The Hub London (cf., 2.1.1.) as a single case study to develop the concept of a “social incubator.” This contribution thus does not discuss hubs as their own organizational form. The authors instead make an argument that, because The Hub London focuses on social innovation, its incubation process differs from traditional incubators. For example, Nicolopoulou et al. contend that social capital and ad hoc integration of many different stakeholder groups is more important for social innovation, leading The Hub London to adopt its open and facilitative model (cf., 2.1.1.). Yet, the authors admit that additional research is needed to substantiate their comparison between “social” and “traditional” incubators (Nicolopoulou et al., 2016, p. 14).

Interestingly, Bruneel et al. (2012) in their study on the evolution of incubators also find that older incubators can be stuck in the regime of their founding time even when they add newer-generation services. For instance, entrepreneurs tended to only benefit from and actively use networking and collaboration services in newer incubators but not in older ones, even when older ones offered the same services.

This finding points to an important insight: offered services alone are not indicative of how incubators work. Instead, service portfolios only become a differentiating feature of incubators inasmuch as they are *in use* by entrepreneurs. Accordingly, incubator categorizations taking entrepreneurs into account have been more fruitful. For example, Schwartz & Hornych

(2008) find that specialization on certain services can increase an incubator's service quality as perceived by entrepreneurs. Similarly, Vanderstraeten and Matthyssens (2012) outline how incubators follow service-based differentiation strategies, some aiming for specialization while others for generalism, depending on what client enterprises prefer.

2.3.3. How Incubators Work: Theoretical Perspectives on the Incubation Process

Similar to the incubator typology literature, studies discussing incubation have moved from a service-focused to a more interactive perspective. Theory explaining the incubation process—that is, theory on how incubators work—started to be developed in earnest following a widely noted literature review by Hackett and Dilts (2004b). Yet, the ensuing literature has not yielded a unified theory (Mian et al., 2016), which might be unsurprising if one considers that the incubator literature is inherently phenomenon-driven. The following gives a brief grouping of the main theoretical perspectives, drawing loosely on Mian et al. (2016).

2.3.3.1. *New Venture Creation, Real Options, Resource, and Agglomeration Perspectives*

A first set of perspectives focuses on the incubator organization's services (i.e., managed activities or interventions in the entrepreneurial process). Three theoretical perspectives are consonant: new venture creation, real options, and resource-based views suggest that incubator organizations select a support strategy to allocate scarce resources to client ventures which would otherwise not exist, fail, or be less successful (Bergek & Norrman, 2008; Hackett & Dilts, 2004a; McAdam & McAdam, 2008). Agglomeration and scale economies are generated by pooling and sharing resources (incl. knowledge and connections), increasing the effectiveness and efficiency of resource provision (Bruneel et al., 2012; Hackett & Dilts, 2004b). Despite nuanced differences in focus, these perspectives will be summarized as one, referred to as the venture creation view. The venture creation view follows directly from incubators' key goal (cf., 2.3.1.), and it was implicit already in the earliest incubator studies (e.g., Smilor & Gill,

1986). The view continues to be dominant in the literature, reflected for example in current work on service provision, implementation models, or design (e.g., Pauwels et al., 2016).

In the venture creation view, incubation is considered to be a linear and bounded process: a startup is selected from among a group of potential incubatees, undergoes an intervention inside the incubator, and leaves the incubator as an incubated startup with improved performance or survival chances (cf., process flow chart in Hackett & Dilts, 2004b, p. 57). Intangible resources are conferred directly from the incubator to the startup through services such as business advice, while agglomeration and scale economies are passed on to client startups as “passive interventions” (Bergek & Norrman, 2008).

Incubatee selection is particularly important. Early incubator studies state that selection happens from “local communities” that exist around the incubator (Allen, 1988; Sherman & Chappell, 1998). This concept is not clearly defined but authors appear to refer to a business community consisting of early-stage and fledgling enterprises and their partners or supporters which operate in a geographical location near the incubator. Hackett & Dilts (2004b) further specify selection criteria and suggest that medium-risk and local companies, but not high-growth firms, are typically the domain of incubators. They argue that:

Ideally, only those firms that are “weak-but-promising” (weak due to a lack of resources, but promising in the sense that they have built a compelling business case) should be considered incubation candidates. (Hackett & Dilts, 2004b, p. 62)

However, isolating the value addition of incubators from the performance that ventures would have achieved without the incubator’s support is methodologically very difficult, because it is near-impossible to establish a counterfactual that incubated companies could be compared against (Amezcuca et al., 2013). As a result, incubators can be inclined to “pick the winners,” that is, those companies that would be successes even without going through the incubation process (Bearse, 1998; Bergek & Norrman, 2008). Indeed, studies have confirmed that

incubators rarely select incubatees in a way that would maximize additional business development, for instance, hosting established ventures instead of emerging ones (Aerts, Matthyssens, & Vandenbempt, 2007; Bruneel et al., 2012).

2.3.3.2. *Dyadic and Entrepreneurial Agency Perspectives*

Dyadic and entrepreneurial agency perspectives on the incubation process (Bøllingtoft & Ulhøi, 2005; Peters et al., 2004; Rice, 2002) offer a competing view to the venture creation view. They start from the position of the entrepreneur, highlighting that an incubator's activities only affect a small segment of the entrepreneurial process. According to a dyadic perspective, the incubation process is thus best understood, not as a pre-defined intervention that is passively endured by an entrepreneur, but as the dynamic interplay between an active entrepreneur and an incubator organization (Peters et al., 2004).

Rice (2002) first expresses this idea, labelling it as “co-production.” Yet, he does not truly embrace the notion of users as co-producers of value (Ramírez, 1999), and rather models a market mechanism where supply (“production” of incubator services) dynamically interdepends with demand (“consumption” of services). Still, the study represents the first acknowledgment that client entrepreneurs define the incubation process together with the incubator organization and its staff. For instance, Rice shows that incubation outcomes depend on the integration of the incubator manager's effort dedicated towards the entrepreneur and the readiness of the entrepreneur to engage. He also highlights that incubatee selection might not be based entirely on a venture's business development potential, but rather on the entrepreneurs' capacity to engage with the services offered by the particular incubator.

The dyadic view is also implicit in several studies finding that the usefulness of incubator services and the intensity with which entrepreneurs engage varies for startups at different stages of the entrepreneurial process (Bøllingtoft, 2012; Chan & Lau, 2005; McAdam & McAdam, 2008). Moreover, an incubator's activities have been found to change over time as

incubator staff learn about and adapt to client ventures (Allen, 1988; Elfring & Hulsink, 2007; Rice, 2002). Bruneel et al. (2012) show that the incubation process can play out quite differently in incubators from different generations even if they offer the same services, in large part because they host different kinds of incubatees.

Bøllingtoft and Ulhøi (2005) move, in some sense, beyond a dyadic view, and render the incubator organization as passive, arguing that incubators “leverage entrepreneurial agency” rather than create companies. In their view, incubators merely “seek to maximize the potential of entrepreneurial agency by providing entrepreneurial actors with services and support that complement their existing talents and resources” (Bøllingtoft & Ulhøi, 2005, p. 269). Entrepreneurs engage in relations with each other, and also in “the construction of the incubator, and with it, the social environment” (Bøllingtoft & Ulhøi, 2005, p. 281).

2.3.3.3. *External Brokerage Perspective*

A third perspective, which can be called the external brokerage view, sees incubation as a process that transforms client entrepreneurs’ relationships. This perspective is complementary rather than alternative to venture creation and dyadic perspectives.

Enabling entrepreneurs to ‘network’ (establishing ties with others) became widely acknowledged as an important value addition of incubators in the early 2000s (Bruneel et al., 2012). Analysts initially focused on potential benefits that client ventures derive from gaining access to external networks of the incubator which they could not otherwise access (Peters et al., 2004)—an idea that was termed the “networked incubator” (Hansen et al., 2000). This stream within the networks literature is mute on how active the entrepreneur is during the brokerage process vs. the incubator; thus it fits with both venture creation and dyadic views

The incubator, in this image, works as a focal point in a wider network of innovation stakeholders (including investors, mentors, partner organizations, etc.), which implies that it is sensible for the incubator to house a portfolio of companies with similar or complementary

external networking needs. Extensive networks of incubator managers and board members thus gain a particular role (Hackett & Dilts, 2004b). Others extrapolate this insight and argue that incubators are an interconnection point between ventures and wider networks, for instance, innovation systems (Bergek & Norrman, 2008; Tsai, Hsieh, Fang, & Lin, 2009); the “triple helix” of governments, industry, and university (Etzkowitz, 2002; Etzkowitz, de Mello, & Almeida, 2005; Smilor & Gill, 1986); or more generally, global vs. local and face-to-face vs. virtual networks (Carayannis & von Zedtwitz, 2005).¹¹ In empirical studies, incubatees indeed had more generic business-related contacts (e.g., consultants, lawyers) in their networks compared to non-incubatees, but there was no difference for technology or industry-specific contacts (Elfring & Hulsink, 2007; Honig & Karlsson, 2010).

2.3.3.4. *Peer Networks and Communities Perspectives*

A fourth stream in the incubation literature noted that incubatees form networks also with each other (Bergek & Norrman, 2008; Soetanto & Jack, 2011). In this stream, incubatee entrepreneurs and their relationships with each other thus become central for the incubation process, so that these studies are more in line with dyadic view (cf., 2.3.3.2.) rather than the venture creation view (cf., 2.3.3.1.).

Network perspectives were acclaimed to capture the incubation process spanning across internal and external spheres of an incubator (Hackett & Dilts, 2004b). The analytical goal becomes to unpack the overlap between entrepreneurs’ internal and external networks with the incubator organization’s networks (Ebberts, 2014). Notably, entrepreneurial networks are often informal and rarely managed directly by the incubator, while the organization might still play an essential facilitative role “by bringing the entrepreneurs together” (Bøllingtoft, 2012, p. 307). An incubator manager introduces incubatees to external parties, but relationships among co-

¹¹ There are apparent parallels between the networked incubator literature and the network infrastructure expectation (see 2.1.4.) and the innovation brokerage literature (see 2.2.2.).

located peers can also yield business opportunities without any direct intervention (Bøllingtoft, 2012; Ebberts, 2014).

In turn, Phan et al. (2005) caution that the blurring of regular levels of analysis (internal vs. external) can lead to confusion. They argue that incubators are still bounded organizations, and that individuals' networks are different, if not entirely detached, from the organization as such:

An incubator is a self-contained organization with an identity, set of routines, and a strategic core. It has an administrative center, a distinct mission, and interacts with the external environment as a unified entity... On the other hand, a true network has relatively more porous boundaries, is more informally organized, and is potentially more embedded than an incubator. In short, the level of analysis question has to be asked first. (Phan et al., 2005, p. 175)

To capture networking in the context of the incubator organizations, Bøllingtoft and Ulhøi (2005; Bøllingtoft, 2012) develop a sociological understanding about incubatee relationships. They argue that incubators should not be seen strictly as brokers towards external parties but as entities that “institutionalize,” “embed,” or “anchor” entrepreneurial networks. Internally, the incubator organization creates an environment of trust where peers share a “mutual recognition of the value of cooperation and networking” (Bøllingtoft, 2012, p. 305), providing each other with knowledge inputs and resources but also with psychological support.

While this view stops short of seeing incubatees as shapers of incubator strategy, it argues that an incubator's “non-hierarchical, bottom-up nature [can be] crucial and... make all tenants want to contribute to the success of the incubator” (Bøllingtoft & Ulhøi, 2005, p. 282). Physical proximity plays an important role, as it allows entrepreneurs to interact frequently, establish social bonds, and sustain common values. Incubators are thus seen to enable social cohesion (Coleman, 1988), thereby generating social capital (Bøllingtoft & Ulhøi, 2005; Honig & Karlsson, 2010; Nicolopoulou et al., 2016). In short, an incubator in this view creates a “‘community’ of peers” (Bøllingtoft & Ulhøi, 2005, p. 284), a “microcommunit[y] of firms and

individuals” (Phan et al., 2005, p. 174), or a “community of practice [which] facilitate[s] shared meaning and learning among their tenants” (Peters et al., 2004, p. 83).¹²

Entrepreneurs are theorized to benefit from community membership in several ways. Based on trusted relationships, entrepreneurs and ventures access each other’s contact networks in addition to the incubator’s network, and sometimes combine productive activities (Bøllingtoft, 2012; Bøllingtoft & Ulhøi, 2005). Incubatees become familiar with entrepreneurial practices (T. H. Rubin, Aas, & Stead, 2015) and improve their “strategic reflexivity” (Hackett & Dilts, 2004b; Scherer & McDonald, 1988). Accordingly, incubatees with a common specialization might particularly benefit from joint external networking, while the advantages of internal networking appear to be equal for co-specialized and diverse incubatee portfolios (Schwartz & Hornyk, 2008; Vanderstraeten & Matthyssens, 2012).

2.3.3.5. *Principal-Agent and Boundary Organization Perspectives*

A final perspective on incubation examines how incubator funders affect the process. Phan et al. (2005) explicitly theorize funder influence as a principal-agent problem, but the view surfaces in a number of empirical studies as well (Bruneel et al., 2012; Grimaldi & Grandi, 2005; Pauwels et al., 2016; Rice, 2002; Vanderstraeten & Matthyssens, 2012). Principals are usually funders who have influence, for instance, over the specific goals of an incubator, the provided services, or venture selection. Yet, entrepreneurs can be seen as a second group of principals (Phan et al., 2005). The principal-agent perspective thus addresses the question of control over the incubation process, and how incubator managers negotiate the interests and objectives of funders and entrepreneurs. This perspective is not well-developed in incubation research and complementary rather than competing towards all other perspectives.

¹² Here, these ideas of ‘community’ are simply reproduced as they were suggested in prior literature, while substantive differences between community concepts will be discussed in detail later in the thesis (see 5.4., 6.1.3., and 8.3.3.).

Principal-agent theory is particularly relevant for incubators as most around the globe are publicly funded (Abetti, 2004) despite widespread normative claims that they should be run as businesses (Hackett & Dilts, 2004b). This has consequences for the incubation process. For instance, ventures might want to maximize shareholder value and employ as few employees as necessary while incubator funders prefer to maximize the number of jobs associated with incubated companies (Hackett & Dilts, 2004b, p. 60). Moreover, incubator managers can be forced to spend time on fundraising and interacting with funders rather than with entrepreneurs, thus losing the entrepreneurs' commitment and respect (Aernoudt, 2004; Rice, 2002). In other cases, different principals might display conflicting, opportunistic behavior (Phan et al., 2005), or funders might pressure an incubator manager to re-orientate the organization towards priority sectors that are not in line with current incubatees interests or the manager's experience (Bruneel et al., 2012; Vanderstraeten & Matthyssens, 2012). Principal-agent dynamics occur in privately funded incubators as well, usually in the form of shareholder influence exerted by investors (Grimaldi & Grandi, 2005; Pauwels et al., 2016).

"Bottom-up incubators" (Bøllingtoft, 2012), which are funded and run by entrepreneurs themselves, represent an exception with a single, relatively homogeneous set of principals. "Social incubators" have been suggested as another exception, because the creation of impactful solutions to societal problems provides can provide a unifying goal framework (Nicolopoulou et al., 2016): in a sense, the incubator's overall purpose is proposed to turn multiple groups of principals into one group with the same interests.

These studies ultimately suggest that effectiveness of incubators risks to decrease when funders (principals) exercise influence on incubator managers (agents), who also have to align with incubatees (principals) to provide them with value. This conception of alignment or misalignment between two sets of principals closely resembles a conception of incubators as boundary organizations (Guston, 2001).

2.3.4. Summary, Critique, and Applicability to African Hubs

In summary, research on the phenomenon of incubators has shed light on several aspects of incubator organizations and the incubation process, which can help examining both the incubator and network infrastructure expectation of hubs. The rich literature highlighted twelve aspects of the incubation process, out of which crystallized as universal features of incubation while five were contested between competing views.

Universal features that the literature suggests include: (1) firms/ventures and not individual entrepreneurs as clients, (2) venture creation or development as a goal, (3) the presence of an incubator-led selection process, (4) client-service provider relationship between startup and incubator, (5) offered services include office space and business assistance, (6) brokerage of connections between startups and external partners by the incubator (or its manager), and (7) potentially diverging interests between funders and entrepreneurs. Contested aspects were: (8) standardized vs. idiosyncratic process for different clients, (9) unidirectional vs. interactive relationship between incubator staff and startups, (10) incubatees independent from each other vs. community of incubatees, (11) only incubator staff determines the incubation process vs. incubatees shape the incubation process together with incubator staff, and (12) formally bounded vs. porously bounded towards external world.

The five contested aspects can be seen as dimensions with extreme end points. At one end, the dimensions combine into a perspective that sees incubation as a one-sided intervention into the entrepreneurial process, consonant with the new venture creation view (see 2.3.3.1.). At the other end, the dimensions combine into a perspective that emphasizes the role of the entrepreneur in shaping the incubation process, seeing incubatees as interdependent, in line with the dyadic view (see 2.3.3.2.) and community view (see 2.3.3.3.). External brokerage and principal-agent perspectives (cf., 2.3.3.3. and 2.3.3.5.) ignore one or more of the five contested dimensions, or fall somewhere between the extremes.

These observations clarify that practitioners' incubator expectation in fact does not imply a single coherent notion of how incubation works. The incubator expectation is concerned with the outcome of incubation: startup development or creation. The existence of two opposing views in the literature then suggests that practitioners' incubator expectation is also not a single coherent position (cf., 2.1.4. for Essien and Oluwagbemi quotes, reflecting the two opposing sides). Moreover, community and dyadic perspectives appear to resonate well with many elements of the network infrastructure expectation, such as the creation of a community (cf., 2.1.4. and Annex B). Several tenets of the incubation literature will thus be included in the theoretical framework.

2.4. Theoretical Framework and Refined Research Questions

2.4.1. Theoretical Framework

The previous two sections established that many tenets of intermediation and incubation literature speak to practitioners' expectations about hubs. The reviewed literature can now be distilled into a theoretical framework. The framework thus codifies the expectations that one might have about how hubs work based on prior literature. If processes triggered by hubs are equivalent to intermediation/incubation, then the following theoretical framework should be a reasonably accurate representation of what can be empirically observed about African hubs.

It should be noted that the framework is mainly concerned with the intermediation/incubation process, not with intermediaries/incubators as organizations. This is important because the original research question is concerned with the process of how hubs work (cf., 1.3.1.), and because the literature review showed that definitions of intermediaries and incubators are very broad and can be somewhat arbitrary (cf., 2.2.1. and 2.3.1.). The answer to the question of whether a hub is an intermediary organization or an incubator is therefore just that: a matter of definition. The thesis will thus avoid conceptualizing hubs as intermediaries/incubators, and instead define hubs through concretely observable features which are commonly associated

with hubs (see 3.3.3. for details), leaving it open whether these features make hubs (as organizations) different from intermediaries or incubators. Analytical comparisons with extant literatures will rather be made based on process differences, as these are more substantively relevant with regard to the question *how entrepreneurs are affected by or involved in* intermediation/incubation/hub processes (see 8.1.4.).

To make sense of the comparative analyses that will be conducted throughout the thesis (see 5.6., 6.3., 6.5., 7.5., 8.1.4., and 8.2.), it is also useful to remember that the intermediation and incubation literatures have evolved from fundamentally different starting points. Intermediation is a theoretical construct to capture influences of non-firm organizations on innovation processes (cf., 2.2.1.). The incubator literature, however, has emerged to understand a particular long-standing phenomenon and policy intervention. This means that an intermediation framework is not mutually exclusive towards the incubation literature: incubators can be understood as a one specific type of intermediary organization. Accordingly, the intermediation literature has implicitly discussed incubators, considering them to represent one kind of intermediary organization among many others (e.g., Dutt et al., 2016; Katzy et al., 2013; Klerkx et al., 2015; Suvinen et al., 2010).

However, there are also a range of more concrete expectations that both literatures suggest (explicitly or implicitly). To establish the theoretical framework, the remainder of this section first examines overlaps between intermediation and incubation literature before highlighting differences. Namely, there are ten palpable *overlaps in predictions* about the intermediation/incubation process (cf., 2.2.2. and 2.3.3.):

1. The supported entrepreneurial actor is a firm, specifically a venture/startup or small enterprise.
2. The venture and intermediary/incubator have a service provider-client relationship.

3. The relationship between client venture and intermediary/incubator is typically formally specified (e.g., through a service provision contract).
4. The intermediary/incubator brokers between client venture and third parties.
5. Third parties are external to the intermediary/incubator organization.
6. Client venture capacities interdepend with intermediation/incubation effectiveness.
7. Client venture capacities interdepend with intermediation/incubation service offerings.
8. Client ventures' openness or attitudes towards intermediation/incubation affect the effectiveness of the process.
9. Goals and influences of intermediary/incubator funders can be in conflict with those of client ventures.
10. Client venture selection affects intermediation/incubation effectiveness.

There were also several findings in the intermediation literature which were not to be found in incubation research. Seemingly, several of these expectations resulted from a given empirical study discussing a particular kind of intermediary organization (e.g., multi-stakeholder intermediaries), or from a focus on a narrow notion of intermediation, such as brokerage within wider innovation networks (cf., 2.2.2.). Namely, the intermediation literature found that:

- Intermediation systematically varies by the innovation process stage that client firms are involved with.
- Intermediary organizations' internal adaptations can lead to external positioning problems.
- Multi-faceted contact networks of intermediaries can lead to misaligned interests between different intermediation stakeholders, and make it challenging for the intermediary to remain impartial towards all actors.

- Prior affiliations, experience, heterogeneity, and competences of intermediary staff members and managers affect the intermediation process.
- Brokerage consists of connecting clients and third parties who are distant to or different from each other, for instance,
 - clients can “plug into” intermediaries’ networks to extend their own;
 - clients get connected to others with different knowledge;
 - clients get connected to other firms that are larger;
 - the third party is a public/government agency;
 - clients get connected to third parties with different cultures; or
 - clients get connected to geographically distant others.

Unsurprisingly, the incubation literature covered several aspects that were specific to incubator organizations and thus not highlighted in the intermediation literature, such as social dynamics within an incubator (cf., 2.3.3.4.). When analyzing the incubation process as a whole, the incubation literature thus suggested that micro-level / intra-organizational relations need to be considered in conjunction with brokerage to third party organizations (cf., 2.3.3.4.).

Moreover, within the incubation literature, there are different or even contradictory explanations of the incubation process (cf., 2.3.4.). Empirically observed processes in hubs can thus be categorized as (1) falling outside of any incumbent understanding, (2) fitting with the venture creation view, or (3) fitting with the dyadic / community view (see Table 1, cf., 2.3.4.).

2.4.2. Refined Research Questions

Based on the theoretical framework, the original research questions can now be refined and revised. The original research questions were:

1. How are technology entrepreneurs in African cities experiencing hubs and engaging with them?
2. How do African hubs work?

Organization or process feature	Incubator / incubation	
Goal	Venture creation or development is immediate goal	
Supported entrepreneurial actor	Ventures, small enterprises	
Distinction of internal/external actors	Binary (in / out), stable: incubatee ventures are internal, third parties are external	
Entry of entrepreneurs in process	Selection from among applicant ventures conducted by the incubator	
Means to determine entrepreneur status	Formal agreement (e.g., service provision contract)	
Facilitation of interactions with non-entrepreneurial support actors	Directed brokerage (creation of a link between venture and external partners by incubator/staff)	
Services	Office/work space, business assistance, networking / brokerage of connections between startups and external partners by the incubator (or its manager)	
Organization or process feature	Venture creation view	Dyadic / community view
Process differentiation by entrepreneurs	Standardized staff-guided process	Staff-guided process adapted to incubatee (e.g., maturity stage)
Relationship between organization's staff and entrepreneur	Unidirectional relationship from incubator staff to venture	Interactive relationship between incubator staff and venture
Relationships among entrepreneurs	Incubatees independent from each other	Community of incubatees
Control over process	Incubator staff determine incubation	Incubatees shape incubation together with incubator staff
Boundary towards environment	Formally bounded towards external business community	Networks of incubatees reach across boundary of the incubator

Table 1: Theoretical framework based on incubator/incubation literature

Overlaps and differences in the expectations set by the intermediation and incubation literature further sensitize the inquiry into hub processes. Specifically, both literatures suggest an intricate interdependency between the intermediary/incubator/hub organization and the entrepreneur. However, a clear distinction between what it is that the intermediary/incubator does as an organization vs. what entrepreneurs/ventures do in the intermediation/incubation process appears to be contested or missing. Similarly, the framework only sets a murky expectation about boundaries in hubs: the intermediation literature usually implies that clients are external to the intermediary organization while the incubation literature implies the opposite: incubatees are seen to be internal to the organization, while only third parties are external.

There are also some apparent shortcomings of the theoretical framework in its capacity to capture elements in The Hub London's and iHub's visions and in the network infrastructure

expectation (cf., 2.1. and Annex B). For example, neither the intermediation nor the incubation literature appear to consider individual entrepreneurs as clients or beneficiaries, and the incubation literature assumes that an incubator-led selection process determines which ventures enter the incubation process. Also, the notion of ‘community’ appears only in the dyadic / community view on incubation, but not otherwise.

The research questions are thus refined to sharpen the analysis, focusing it on potentially unique and non-trivial elements in hub processes. The first research question regarding entrepreneurs’ perceptions of hubs can be reformulated to reflect that both entrepreneurs and hubs are actors, and to more clearly understand how entrepreneurs enter a relationship with hubs:

- 1a. How do African hub organizations interact with technology entrepreneurs?¹³
- 1b. How do technology entrepreneurs participate in African hub organizations?

The second research question can be refocused on the facilitation of relationships for entrepreneurs, which both the intermediation and the incubation literature emphasize. Yet, differences between the literatures suggest that relations among supported entrepreneurs should be analytically distinguished from relations with external non-entrepreneurial actors (i.e., third parties in brokerage processes). A separate research question is devoted to the question of ‘communities’ in hubs, which intermediation and incubation literatures left mostly undiscussed:

- 2a. How do African hub organizations enable relationships among technology entrepreneurs?
- 2b. How do African hub organizations enable relationships between technology entrepreneurs and non-entrepreneurial partners?
- 2c. Do African hub organizations create or enable entrepreneurial communities, and if so, how?

¹³ The actions and visions of funders and leaders of hubs will be considered inasmuch as they find expression in hubs’ organizational action (see 5.1. for details).

The theoretical framework together with the refined research questions sets the foundation for the empirical part of this thesis. The goal is to build theory in as far as this is necessary to extend the theoretical framework and answer the refined research questions (see 3.3.2. for details). The next chapter will explain, in particular, how the research questions translate into concepts that can be empirically observed and analyzed (see 3.1.), and how these will be elicited through case studies of hubs (see 3.3.).

Chapter 3 Research Design and Methodology

This chapter provides an account of the research design and methodological choices underlying the empirical part of the thesis. It starts by discussing the observable concepts and the empirical scope that follow from the refined research questions (3.1.), and then outlines why the thesis uses a micro-social interactionist lens to derive answers (3.2.). Based on these reflections, the chapter explains the choice of a comparative case study methodology and data collection strategies (3.3.) and delineates the epistemology and standards of rigor for the present thesis (3.4.). The consequent sections outline the empirical process, following the chronological order of four steps: fieldwork preparation (3.5.), data collection mainly through interviews in three African cities (3.6.), and the analytical process (3.7.). Finally, the chapter reviews ethical concerns (3.8.) and limitations that are inherent to the chosen methodology (3.9.).

The chapter thus outlines the methodological choices I have made and the research process as it unfolded, thereby making visible how the thesis arrives at its findings and conclusions. This includes reflexive and self-critical accounts, detailing the contexts for some of my decisions, acknowledging potential biases and constraints that affected the research process. By laying open the chain of events and my role in the research process, the chapter aims to increase the transparency and accountability of the research, thereby making the study more compelling and convincing (Lincoln & Guba, 1985; Seale, 1999; Tracy, 2010).¹⁴

3.1. Observable Concepts and Scope

Initial scoping and data reduction was conducted based on the research questions and the preliminary theoretical framework (Eisenhardt, 1989; Huberman & Miles, 1983, 1994). The refined research questions are concerned with five related concepts that are empirically observable (*observable concepts*): (1) the existence of African hub organizations, (2) the action of

¹⁴ Accordingly, some sections of the chapter will use active voice (e.g., “I did,” “my decision,” etc.) to highlight subjective choices that were made during the research process.

African hubs, (3) the relationships that technology entrepreneurs have with African hubs (as experienced by entrepreneurs), (4) the relationships that technology entrepreneurs have with each other and with others through the hub, and (5) recurrent and discernible components of social structures, such as communities. The actions and visions of hub leaders (i.e., managers, employed staff, board members) and funders will thus be analyzed only in as far as they are expressed in how hub organizations came into being (e.g., founding processes, goal setting, etc., see chapter 4 and 7.2.1.) and in how hubs act (e.g., service provision or external communication by hub leaders, see 3.2. and 5.1.).

The boundaries of the empirical inquiry thus needed to be set in a way that at least the five observable concepts could be examined through the collected data. Based on practitioner accounts about hubs (cf., 2.1.) and prior descriptive work (Friederici, 2014b, 2015), I made the decision to focus on individual entrepreneurs and their relations: hubs appeared to interact mainly with individuals and small groups (such as teams) who are in the process of forming ventures, rather than with already formed ventures. This level of analysis differs from most intermediation research and parts of incubation studies, studying the inter-organizational level (cf., 2.2.2. and 2.3.3.3.).

Accordingly, the theoretical framework required some careful adaptation to become applicable to the present study context. Innovation intermediation was adapted to entrepreneurship as a specific type of innovation process (cf., 2.2.3.). Accordingly, non-entrepreneurial innovation, such as research and development within established organizations or universities, was excluded. ‘Innovation’ was defined as the introduction of any product or service to a given target market (Alexy & Salter, 2014). Entrepreneurship (or entrepreneurial innovation) was defined as any market-oriented “micro-level behavior” leading to “novel initiatives,” including but not limited to “the start-up of new, independent ventures” (Davidsson, 2005, pp. 5–6). At face value, hubs seemed to be directed mainly at entrepreneurs somewhere before or around the

time of venture founding, similar to incubators (cf., 2.3.1.). Further, in line with the visions and expectations towards African hubs (cf., 2.1.2.-2.1.4.), the focus was on *technology* entrepreneurship, or more specifically, on digital entrepreneurship, that is, the creation of ventures and novel initiatives to market products and services where value creation is tied to software, mobile applications, or digital content. The empirical inquiry was thus concerned only with founding-stage digital entrepreneurs.

It was implied in the research questions that Africa would be the initial geographical scope. This scope appeared to guarantee some degree of phenomenological coherence: while the ‘hub’ term had been used for the Impact Hub network outside of Africa (cf., 2.1.1.) and was later adopted more broadly as well (open movement°, 2016), African hubs had a particular history and were often understood as a consistent type of organization (cf., 2.1.2.-2.1.4.). Beyond the research questions, studying Africa as an “unconventional context” also represented an opportunity to speak to ongoing debates in entrepreneurship and organizational research (Bamberger & Pratt, 2010; G. George, Corbishley, Khayesi, Haas, & Tihanyi, 2016). Finally, Africa as a scope offered some pragmatic advantages: databases and maps of African hubs had already been created (BongoHive, 2013; Kelly, 2015) and the small scale of technology entrepreneurship in most countries made it easier to comprehend local contexts and cover them through fieldwork by a single researcher. I was also able to draw from my prior work for the World Bank, during which I had conducted an evaluation of incubators and hubs that included fieldwork in Kenya, South Africa, and Uganda (Friederici, 2014a, 2014b, 2015; infoDev & CAD, 2014).

The level of analysis and the external boundaries of hubs were additional scoping concerns. As per the research questions, the study wanted to capture both the ways that entrepreneurs engage with hubs as self-contained organizations, and the ways that hubs could also be

facilitators of interactions with third parties. Actors that engage with hubs (or with entrepreneurs through hubs) were likely to include both individuals and various types of organizations, such as existing ventures, corporations, non-governmental organizations (NGOs), governments, foundations, universities, etc. In addition, hubs could be expected to be open, “something where people could dip in/out of” (Erik Hersman, personal communication, July 14, 2016). In other words, it could not be assumed that entrepreneurs would be easily discernible as hub members or not, and their relationships were more or less guaranteed to extend beyond the internal realm of the hub (for related arguments on incubators, see 2.3.3.3. and 2.3.3.4.). Accordingly, I did not conceive of hubs as clearly bounded organizations before entering the field, and scoping and sampling choices were initially rid of categories like “internal” and “external” to hubs.

In turn, the potentially blurred external boundary of hubs (cf., 2.1.2.) meant that their environment had to be considered at least in as far as it would affect how hubs work. The environment could be expected to play a dual role: as the sphere from or to which entrepreneurs entered or left the hub (cf., 2.3.3.1.), and the sphere into and across which relations of entrepreneurs extended (cf., 2.3.3.2.). While hub environments were not assumed to have a rigid geographical or statutory boundary, they were expected to be geographically concentrated in capital cities where the great majority of technology entrepreneurs and their local partners are located. This meant that, to capture the functioning of hubs, interpersonal relations at the city level and the structural organizational level of analysis (Scott & Davis, 2016) would have to be considered in parallel. Ultimately, the scope before fieldwork thus included technology entrepreneurs embedded in entrepreneurship environments of African capital cities with at least one hub.

3.2. Micro-Social Interactionism as an Analytical Lens

Three fundamental concerns followed from the scoping exercise, informing my choice of an analytical lens. First, the research questions and the theoretical framework warranted a

focus on relationships: entrepreneurs interact with others through the hub or they engage directly with the hub as an organization. Second, entrepreneurs could be expected to have relationships with both organizations and individuals, and these relational arrangements could be anticipated to be diverse, dynamic, complex, and only loosely bounded. Third, the research questions were in part directed at entrepreneurs' subjective experiences.

The incubator literature and the intermediation literature have extensively used the term 'networks' to refer to relations of entrepreneurs and firms, both as a metaphor and in the context of formal-structural network analysis (cf., 2.2., 2.3.3.3., and 2.3.3.4.). The intermediation literature uses the 'innovation networks' concept to refer specifically to the structural-relational dimension of innovation systems, which intermediary organizations are understood to be embedded in (cf., 2.2.). Yet, as several studies in this body of literature show, the system or network context of the intermediary organization does not necessarily have to be operationalized or even conceptualized to understand particular facets of the intermediation process (cf., 2.2.2.). Difficult analytical questions concerning the multi-level nature or the boundedness and overlap of different kinds of innovation systems and networks (e.g., regional vs. technological innovation systems) can safely be left aside for those inquiries into intermediation where the content of relationships between intermediaries and their clients is concerned, or where intermediary-internal dynamics are in the center of attention.

The following analysis thus avoids the 'innovation network' terminology and its implicit notion of inter-organizational networks and systems as objects of analysis. In this thesis, it is the content of relationships that is of interest, or more precisely, the meaning that individual entrepreneurs attach to and derive from relationships. The thesis is not concerned with the formal structure of networks (as measured by centrality, density, clustering, etc.) and it does not elicit (regional, technological, national, etc.) networks or systems of innovation or entrepreneurship.

Social structures of technology entrepreneurs, in this thesis, are thus understood as recurrent or stable patterns of interactions and relations among individual entrepreneurs and between entrepreneurs and others. This is broadly in line with a relational sociological perspective (Emirbayer, 1997), or more specifically with a Simmelian theory of social structure and action as described in Martin (2009): social structures are the crystallizations of enacted relationships; structures are entrenched by repeated, compatible, “transindividual consistencies in action” (p. 5). Such entrenchment can reach a degree where social structures are *perceived by* and treated as a given by individuals, such that the structures develop a ‘life of their own.’ This implies that social structures can have overlapping subcomponents (e.g., teams, communities, and groups) which can be recognized by individuals.

This ultimately leads to a departure from the notion of actors and interaction that is implicit in the innovation intermediation framework and much of the incubation literature. Intermediation and parts of incubation research typically conceive of organizations as ‘black boxes,’ which means that concepts like ‘community’—essential for the study of hubs—can hardly be captured (cf., 2.4.). Howells (2006a, p. 725) himself points to the narrow concept of organization as a limitation of the innovation intermediation framework, and accordingly Sapsed et al. (2007, p. 1328) struggle to clarify the difference and interplay between individual action and organizational action in intermediary organizations.

Similar to peer network and community perspectives on incubation (cf., 2.3.3.4.), I hence choose a lens that focuses on micro-social interactions. In developing the lens, I draw from entrepreneurship research on communities by Marti, Courpasson, and Dubard Barbosa (2013), touching upon many of the analytical problems brought up by the present research questions (e.g., the dual role of an organization as an actor and a container of relationships, blurred boundaries, or the role of external non-entrepreneurial actors). Their argument that “the neglect of attention to local processes might result in partial explanations” and in favor of “open[ing]

the box of concrete interactions between actors and of what they do together” (Marti et al., 2013, p. 13) closely resonates with the present research problem. To develop a micro-sociology, the authors draw from work on “inhabited institutions” (Hallett, 2010), which is itself founded in the sociological tradition of symbolic interactionism (Hallett & Ventresca, 2006).

Although the research questions for this thesis are not concerned primarily with institutional analysis, the symbolic interactionism perspective is useful in its emphasis on individuals’ experiences and their interpretative construction of (shared) meaning from social interactions with other humans and objects (Blumer, 1986). In particular, it introduces a clear theory of individual and collective action, clarifying that social structure is ultimately an expression of the mutual role taking that its members conduct. In other words, individuals engage in “interpretative interaction” to “fit[] together their lines of action to one another,” where “joint or collective action is an outcome of such a process of interpretative action” (Blumer, 1986, p. 16). The focus on individuals’ socially embedded interpretative processes is directly compatible with an individual-centric view of knowledge, knowledge creation, and innovation (Howells, 2002, 2012; see 8.4.2. for further discussion).

A micro-social interactionist lens also provides an understanding of the relationship between individual action and social systems, including organizations. Social systems, much like all social structures, are seen as “regularized operations” resulting from “extended interlinkages of action of diverse actors,” while systems/networks are *not* “self-operating entities... [which would] not requir[e] that attention be given to the participants within the network... because people at different points do something” (Blumer, 1986, p. 19). Organizations can thus become actors in their own right and have a life of their own (e.g., be recognized as supra-individual entities); however, the member individuals (or “inhabitants”) continue to matter as they animate, shape, and alter organizations (see 5.1. for a discussion of hubs as organizational actors).

Therefore, a micro-social interactionist perspective appears suitable to capture all five observable concepts and their interplay (cf., 3.1.). It will allow a focused inquiry into how entrepreneurs experience the multi-faceted and multi-layered relationships that they have with others, how their interpretation is influenced by hub organizations, and how entrepreneurs experience hubs. Methodological consequences and limitations that are inherent to this lens will be addressed in the following sections (see 3.4. and 3.9. respectively).

Given this analytical lens, some terminology clarifications for the remainder of the thesis are in order. The terms ‘interactions,’ ‘exchanges,’ ‘connections,’ ‘relationships,’ and ‘ties’ are used interchangeably to refer to dealings between individuals or between an individual and an organization where at least one individual derives meaning from the behavior of the other through an interpretative process. The term ‘network’ is avoided because of its formal-structural connotation (‘nodes and edges’), unless when referring to prior literature using the expression. Social structures, as explained above, are recurrent or stable patterns of interactions among individuals, which become predictable and recognizable. A ‘relational arrangement’ denotes a pattern of interactions that is not necessarily stable or recurrent, such that this term is broader than ‘social structure.’

Organizations, then, are a type of social structure “created by individuals to support the collaborative pursuit of specified goals” (Scott & Davis, 2016, p. 10). An organization serves to coordinate the action and effort of its members, is externally bounded, and acts as a supra-individual social entity with its own purpose (King, Felin, & Whetten, 2010; Puranam et al., 2014; Scott & Davis, 2016). Social structures can have higher or lower degrees of “organiza-

tionality:” for instance, not every community is an organization, but communities can be equivalent or equifinal to organizations when they serve to pursue collective goals and/or develop actor qualities (Dobusch & Schoeneborn, 2015).¹⁵

Within a micro-social interactionist lens, organizational action is only analytically relevant as it occurs towards individuals; that is, an organization is ‘acting’ whenever an individual derives meaning from the organization as such rather than from individual members of the organization. For hubs, this will normally be the case when staff act on the organization’s behalf, but also when entrepreneurs use a hub space or conceive of a hub’s role in enabling some other action which could not have happened from individuals’ actions alone. This is mostly intuitive for individuals and can thus be captured in interviews: it is conceivable for most people that hubs act and *do* something for them or towards them (e.g., hubs *run* events that software developers participate in, *help* entrepreneurs get funding, *make it* easier to access a mentor, etc.).

3.3. Comparative Case Study Methodology

3.3.1. Rationale for Comparative Case Study Approach

The research questions together with scoping and lens decisions yielded five realizations that informed my choice of comparative case studies as the methodology of this thesis. First, the micro-social interactionist lens warranted a method that allowed capturing the depth and richness of relations. Second, ‘how’ research questions would ultimately require process theory development. Third, the research questions aimed at understanding African hubs as a class of organizations. Fourth, African hubs were apparently a contemporary, emergent, and socially complex phenomenon. Fifth, the study would not be able to focus just on the internal world of hubs, but would also have to capture some elements of hub environments. African cities did not

¹⁵ Opinions in the literature are divided over whether communities should be conceived of as organizations (King, Felin, & Whetten, 2010; Marquis, Lounsbury, & Greenwood, 2011). Seeing ‘organizationality’ as a matter of degree resolves this conflict: communities can be more or less organization-like (Dobusch & Schoeneborn, 2015). Moreover, I conceive of formal organizations as both potential outcomes and causes of communities (Adler, 2001; Marti, Courpasson, & Dubard Barbosa, 2013; O’Mahony & Lakhani, 2011).

only represent a complex social setting, they had also been neglected in prior incubation or intermediation research.

A comparative case study approach appeared to be the most suitable research design in response to these concerns. The overall research goal is to derive processes that consist of causal links triggered by hubs (cf., 1.3.1.), which case studies are particularly well-suited for (Eisenhardt, 1989; Yin, 2009). Comparative case studies enable the researcher to go through an inductive process to build new theory that tests, builds on, complements, or extends a prior (deductive) theoretical framework (Eisenhardt & Graebner, 2007; Flyvbjerg, 2006; Thomas, 2011). Case studies enable such explanatory work, but they also permit descriptive and classification work (Yin, 2009), which would initially be necessary to approach hubs as an under-researched phenomenon (Kerlinger & Lee, 2000). Cases also fit the study of hubs as a phenomenon with unclear boundaries (Yin, 1981); the role of hub environments could be captured by seeing hubs as contextually embedded case studies (Eisenhardt, 1989). Generally, case studies allow the researcher to maintain a robust contextual and historical grounding (M. B. Miles & Huberman, 1994; Yin, 2009).

3.3.2. Generalization and Theory Building from Cases

The goal was to study case examples of hubs to answer research questions about African hubs as a broader class of a real-world phenomenon. In other words, the thesis aimed for analytical generalization beyond examined cases: starting from the theoretical framework, I intended to select cases from the phenomenological class, look for replications of patterns across examined cases, and use confirmed replications to make inferences about African hubs in general (Flyvbjerg, 2006; Yin, 2009).

More specifically, replication consists of *pattern matching* across cases: an initial explanatory pattern is developed, the prediction is tested on some or all cases, and then the pattern is iteratively refined to increase the fit with the data (Eisenhardt, 1989; Yin, 2009). Rich case

study data are also essential for *process tracing*: the discernment of causal mechanisms underlying the observed patterns (A. L. George & Bennett, 2005). Rich data can help rule out alternative explanations and maintain a connection between empirical realities and patterns, which are necessarily abstracted representations of reality (Yin, 2009).

Cross-case comparisons that show similarities and differences (or variation) between the cases are particularly useful to hone and refine theoretical propositions (Bennett, 2004; A. L. George & Bennett, 2005; Yin, 2009). For instance, if similar boundary characteristics of hubs co-occur with a similar membership selection mechanism in each analyzed case, and if the case study data indicate that the selection mechanism is causally connected to the boundary features (cf., chapter 5), this pattern is likely to be generalizable to the entire class ‘African hubs.’ Differences between cases help to corroborate causal chains. For instance, if all hubs have similar boundary characteristics (cf., chapter 5) but informal hierarchies and role divisions vary across hubs (cf., chapter 6), this indicates that a feature that varies between hubs (such as the leadership teams’ goals) might be antecedent to the variation in hierarchies and role divisions across hubs. In each scenario, cross-case comparisons rule out or point towards a certain explanation, while rich case study data is required to substantiate and explicate the mechanism. To address the research questions of the thesis, case comparisons will thus be the key analytical instrument to identify a process which relates the observable concepts to each other (cf., 3.1.).

3.3.3. Case Selection and Working Definition of Hubs

Following from this understanding of comparative case study methodology, all African hubs represented the domain for generalization (Yin, 2009). Accordingly, data collection sites were selected from among African capital cities with at least one hub (cf., 3.1.). Yet, there is immense socio-cultural and economic diversity within Africa, across nations and also within (Fearon, 2003; Posner, 2004; Sá & Aixelà-Cabré, 2013). Hence, choosing a single city as a

fieldwork site might have allowed testing the theoretical framework (Flyvbjerg, 2006), but multiple case study sites were needed to compare the role of different contexts, thus achieving generalizability of derived patterns across African hubs (Eisenhardt, 1989; Eisenhardt & Graebner, 2007; A. L. George & Bennett, 2005).

As a rule of thumb, comparative case study researchers suggest that five to eight cases result in a good balance between the depth of each individual case study and the possibility of replicating or matching patterns across cases (Eisenhardt, 1989; Yin, 2009). Given that most African cities included more than one hub and considering the timeframe of the thesis project, three was considered an appropriate number of cities to be visited.

It was not possible to grasp hub organizations' action or entrepreneurs' relations before fieldwork, so that case selection could not be conducted based directly on hub-related features. Instead, I followed a least-similar selection logic (Bennett, 2004; Przeworski & Tenue, 1970) to select from among African cities as hub environments. The goal was to introduce as much contextual variation as possible, because this would increase confidence that causal pathways identified across hub cases would be generic to hubs and not induced by environmental factors.

This meant that I searched for cities in different regions of Africa, with different socio-economic and cultural environments, and with differences in contextual factors for technology entrepreneurship (such as ICT infrastructure or small business regulation). For pragmatic reasons, I limited the scope to cities that were secure and politically stable at the time of the research, and to cities where English was likely to be spoken fluently by the vast majority of potential participants; this excluded francophone parts of West Africa and some parts of Northern Africa. Following desk research and consultations with development experts, I chose Kigali

(Rwanda), Harare (Zimbabwe), and Accra (Ghana).¹⁶ Table 2 summarizes technology entrepreneurship-related indicators for the three countries, and chapter 4 provides detailed discussions of differences between environments.

	Rwanda (Kigali)	Zimbabwe (Harare)	Ghana (Accra)
Country income group	Low-income country	Low-income country	Lower-middle income country
GDP per capita in USD (PPP)	1,660.6'	1,779.8	4,089.8*
HDI	151	156'	138*
ICT Readiness rank	83*	121'	101
World Bank Doing Business	46*	171'	70
Global Innovation Index (percentage)	0.34*	0.06'	0.24
Failed State Index	36	10'	101*

Note: Indices on innovation and business environments were only interpreted as a very approximate indication, given issues of such indices in their application to developing countries (Zanello, Fu, Mohnen, & Ventresca, 2015). GDP (PPP) uses 2010-2014 values in World Bank (2015b). HDI uses 2013 values of the ranking in UNDP (2015). ICT Readiness uses ranking in Dutta, Geiger, & Lanvin (2015). Doing Business Rankings uses 2014 values of the ranking in World Bank (2015a). Global Innovation Index uses percentage rankings in Global Innovation Index (2015). Failed State Index uses ranking in Haken et al. (2013). Abbreviations: HDI—Human Development Index; GDP—gross domestic product; ICT—information and communication technology; PPP—purchasing power parity; USD—United States Dollar.

* indicates best-ranked country. ' indicates worst-ranked country.

Table 2: Country statistics for field work sites

Organizations in these cities were considered to be hub cases when they conformed to a list of features that had been derived based on The Hub London and iHub as ideal types (cf., 2.1.1., 2.1.2., and Annex B). In effect, this meant that I started from an ideational theory to construct a verificationary theory of African hubs as an organizational form (Ruef, 1999). The verificationary theory provided a working definition of what a hub is, which gave me a systematic way of recognizing hub organizations as such. I felt that starting from ideal types was appropriate because iHub had seemingly been a role model for African hubs (cf., 2.1.3.), while

¹⁶ To represent the research process roughly in its (recurring) chronological sequence, the three cities will be discussed in the same order that I visited them during fieldwork.

the comparison to The Hub London highlighted that not all features of iHub apply to all hubs (cf., 2.1.2. and Annex B).

I also converted visions into implied observable features, because visions could not be expected to necessarily materialize in every hub case. For example, the notion that hubs would be organizations that individuals could “dip in/out of and be the real nerve center for the tech community” (Hersman, personal communication, July 14, 2016) was not an appropriate definitional feature, but rather an envisioned outcome of (among others) an observable policy allowing visitors to enter a hub space without announcing or registering their visit ahead of time.

Ultimately, the verificationary theory of hubs included a list of ten features. An organization, to be included in the study as a hub case study, needed to:

1. have the mission to support technology, social, and/or grassroots entrepreneurial innovation;
2. have a physical Wi-Fi-connected coworking space with hot desks for laptop-based work as the major element of its office layout while closed offices, permanently assigned work spaces, and meeting rooms could not be major components;
3. be located in a city;
4. be ‘open,’ meaning that
 - a) visitors could enter the space at any time and without appointment during normal work hours,
 - b) regular users did not have to pass a formal selection or application process,
 - c) the organization did not limit usage of its space and services to a narrow and specific group of actors, and
 - d) usage fees were absent, small/nominal, or at the most set to cover cost;
5. have staff (managers or hosts) welcoming individuals and connecting them with others;

6. engage in services geared towards facilitating interactions between actors (e.g., running events for networking);
7. envision early-stage technology entrepreneurs as at least one group of users of its coworking space;
8. give discretion to coworking space users over what they work on, without requiring participants to undergo a standardized or formalized work process;
9. allow users to implement interactive activities beyond laptop-based work (such as presentations, workshops, etc.); and
10. invite actors who seek to support entrepreneurs to participate in events and activities (such as networking events, innovation prizes, etc.).

These features in effect operationalized the concept ‘existence of a hub organization’ (cf., 3.1.). Notably, only hub-controlled features were included; this list excluded features which depended on entrepreneurial engagement (such as the actual formation of a community). This approach had the distinct advantage that hubs were included irrespective of success (however this may be defined), activity, or longevity, whereas previous case study research on incubators appears to show a selection bias towards well-established organizations (e.g., Bøllingtoft, 2012; Nicolopoulou et al., 2016).

A total of ten organizations were considered at some point during fieldwork, while six hubs—incidentally two per city—were ultimately found to meet all ten features. Namely, kLab and The Office were included for Kigali, Hypercube Hub and Muzinda Hub for Harare, and iSpace and Hub Accra for Accra.

3.3.4. Approach to Data Collection

As is the norm for case study research (Yin, 2009), I intended to draw from multiple data sources. However, archival material and reliable secondary data on hubs or on technology

entrepreneurship in African cities was bound to be scarce. Following consultations with development experts who had been active in the three countries, I determined that only the few available reports (cf., 2.1.3. and Annex A) and online media (e.g., blog posts, news articles, social media) would be useful as secondary data. Primary data collection through fieldwork was thus expected to yield the lion share of analyzable data.

Given the scope of the thesis and the nature of the research questions, I expected one month per field site to be an appropriate amount of time to collect case study data that would allow for rigorous research (Tracy, 2010). The study did not aim to be an ethnography: a theoretical framework had been in place and the research goals were specified as much as possible in advance. The study did not aim to directly inquire about culture or ideologically sensitive topics. Simply put, the goal was to collect in-depth relationship and perceptual data from an eclectic sample of technology entrepreneurs and supporting actors, including hubs.

I ultimately chose interviews as the data collection approach that could achieve this and align with a micro-social interactionist lens (cf., 3.2.). Participants' perceptions and interpretations were expected to be intricate and multi-faceted, so that a format that would allow for depth and flexibility in the participant encounter would be needed (H. J. Rubin & Rubin, 2004). Interviews would also allow for the best balance of depth and breadth: within and across city contexts, there would be large variety among entrepreneurs' views on hubs. Accordingly, I saw potential that saturation might not be reached easily, increasing the value of collecting data from a larger number of participants, which interviews allow for more than entirely depth-, detail-, and observation-oriented techniques like ethnography.

Nevertheless, some degree of participant observation was expected to be important to capture elements that participants might not be able to describe or not be aware of (such as 'atmosphere' in hubs). Therefore, I intended to include participant observation whenever possible, especially through attending events at hubs or working inside hub spaces.

3.4. Epistemology and Standards of Rigor

In sum, the study followed an in-depth qualitative, case-based, comparative, and theory-building-oriented approach. The research was not hypothesis-driven or variable-based. Still, the study attempted to derive abstract explanatory representations of plausible causal processes (i.e., theory), showing how some concepts relate to others (cf., 3.3.). Such processes were always understood as patterns, which are situational, embedded, and thus contingent on myriad factors within complex social realities, making them fundamentally distinct from economic models or other formulations of law-like causal mechanisms (Amin & Thrift, 2000; Clark, 1998; Nelson, 2016).

Accordingly, the thesis adopted a naturalistic epistemology (Lincoln & Guba, 1985). It was grounded in a post-positivist, constructivist, pragmatic stance towards (eliciting) truth and reality, and it chose qualitative data collection and analytical methods, not because quantitative methods should generally be dismissed, but to align with the present research context and analytical lens (Seale, 1999). I also deemed a post-positivist epistemology to be particularly suitable for capturing diverse perspectives of different participant groups and generally the complexity of dynamic and emergent entrepreneurial and innovation processes (Clark, 1998; Karatas-Ozkan, Anderson, Fayolle, Howells, & Condor, 2014).

This epistemological position led me to use Tracy's (2010) criteria as a guide to improve the quality of the research, while I carefully adjusted the principles in her framework that are based on a post-structuralist stance. For instance, case studies were aimed to generate a "rich complexity of abundance" (Tracy, 2010, p. 841) and "requisite variety" (Weick, 2007) of constructs, theories, data sources, and informants to capture hubs as a complex social phenomenon. I gave particular emphasis to self-reflexivity (L. Richardson, 2000), given that the outcome of the study greatly depended on my personal interpretations and contextualization of experiences and observations I made during the fieldwork and outside of it.

I also attempted to maintain high meaningful coherence (Tracy, 2010). For example, I tried to align the analytical lens (micro-social interactionism focusing on perceptions and interpretations) with data sources (interviews, blog posts) and the presentation of results (vignettes and extensive quotes). Similarly, case studies in chapter 4 as well as quotes and vignettes are meant to increase “empathetic validity” (Dadds, 2008), providing readers with an evocative narrative that they, themselves, can mentally transfer to different settings, even if they have never met an African technology entrepreneur or visited Accra, Kigali, or Harare. Finally, the study was set up to assure transparency of the research process: all steps were carefully documented in an audit trail (Creswell & Miller, 2000), which this chapter reproduces as a “self-critical account of how the research was done” (Seale, 1999, p. 468).

3.5. Fieldwork Preparation

3.5.1. Immersive Review of Reports and Online Media

Before entering the field, I conducted extensive desk-based research of information that could provide insights into hubs and their environments. One Master’s thesis, one policy paper, and several reports by iHub Research (cf., 2.1.3.), development organizations, and industry associations (Baird et al., 2013; Drouillard, Taverner, Williamson, & Harris, 2014; Friederici, 2014b; Gathege & Moraa, 2013; GIZ, 2013; infoDev & CAD, 2014; Jimenez Cisneros, 2012; Koltai, Mallet, & Muspratt, 2013; Marchant, 2015; Moraa, 2012; Moraa & Mwangi, 2012) were identified and reviewed. Newsletters, blogs, social media, and other online media with Pan-African or case-specific coverage of technology entrepreneurship were also reviewed (e.g., VC4Africa.biz, Activator’s Digest, or Disrupt-Africa.com). Altogether, I read hundreds of social media messages, news releases, and blog posts, in addition to dozens of more formalized accounts like reports and briefings.

Problematically if unsurprisingly, most of the reports lacked rigor and appeared to have a more exploratory and partially promotional character.¹⁷ Online media also tended to be limited to entrepreneurial success stories. The sources I followed conveyed the overall message that home-grown technology innovation and entrepreneurship was “on the rise” in Africa, and that entrepreneurs and various supporting actors were working relentlessly to find innovative ways to tackle Africa’s societal challenges, increase employment opportunities, and create a positive entrepreneurial culture for youth. The material tended to implicitly or explicitly follow the network infrastructure expectation, the incubator expectation, or a combination of both (cf., 2.1.4.). While I did not conduct a systematic analysis of these resources before fieldwork, my sense of the hopes that had been invested in hubs was refined through this process.

Any actor names and affiliations as well as contextual information that would be relevant to identify study participants were documented. I treated the information as indicative, requiring triangulation through fieldwork. I familiarized myself, as far as possible from distance, with the urban geography of the three cities and the locations of hubs. Finally, I reviewed information about country and city contexts, specifically about ethnic divisions and colonial histories.

3.5.2. Field Access, Initial Sampling Strategy, and Interview Guide

The study followed a theoretical sampling approach to identify interview participants, looking for “highly knowledgeable informants who can view the focal phenomena from diverse

¹⁷ Specifically, Gathege and Moraa (2013), Moraa (2012), Mwangi and Moraa (2012), GIZ (2013), and infoDev & CAD (2014) are published by organizations that have funded or implemented hubs, usually analyzing their own hub projects. The same is true for an infoDev/World Bank evaluation that I authored (Friederici, 2014b)—a process which showed me the many ways in which funder organizations explicitly or implicitly frame and shape the content of such reports. I concluded that reports with self-evaluations were likely to suffer from strong favorability biases to achieve a self-promotional effect. Baird, Bowles, & Lall (2013) and Drouillard et al. (2014) are not published by hub funders, but these studies make claims about proportions and representativeness based on convenience samples and inconsistent definitions and operationalizations of hubs and accelerators. Koltai et al. (2013) is a report commissioned by the UK Department of International Development to a UK-based consultancy, which is a descriptively rich and valuable resource but which also suffers from inconsistent conceptualizations of important constructs such as “ecosystems” and “hubs.”

perspectives” (Eisenhardt & Graebner, 2007, p. 28). Technology entrepreneurs and hub managers were the core groups as they could most directly speak to the research questions. An introductory blog post (Friederici, 2014c) was referred to in contact emails to provide participants with additional information about the study.

Before fieldwork, I established direct contact with hub managers and other locally based actors who could provide referrals to other participants shortly after my arrival in the field. Yet, I was aware that the convenience of this approach could endanger rigor (Tracy, 2010). I thus exercised reflexivity about the politics of field access, preparing for “backstage dramas” and envisioning potential conflicts (Cunliffe & Alcadipani, 2016), arising, for instance, from competition between hubs or from individuals’ sensitivities and ideologies with regard to entrepreneurship or my role as a researcher from a British elite university (see 3.9. for details).

In particular, fieldwork preparation had confirmed that the rise of hubs in Africa had been accompanied by a largely optimistic rhetoric, but also a growing sense of disaffection, especially among proponents of the incubator expectation (cf., 2.1.4.). While such skepticism was less prevalent in online media, the arguments resonated with opinions I had encountered during earlier work (Friederici, 2014b), made usually by actors who did not engage with hubs. Including contrarian views would be essential to maintain a diversity of perspectives and multivocality in the collected interview data (Eisenhardt & Graebner, 2007; Tracy, 2010). I concluded that there might be a high risk of a self-selection effect in hub participation, so that sceptics of hubs would be hard to identify with hub managers as the starting point of a snowball sampling strategy.

Ultimately, the envisioned sampling frame for interview participants therefore included *all* locally based early-stage technology entrepreneurs, irrespective of the strength of their hub participation. This was also in line with the expectation that hubs’ external boundaries might be blurry (cf., 2.1.). To establish the completeness of the frame, interviews included a prompt

for the participant to name all locally based early-stage technology entrepreneurs known to them. In addition to entrepreneurs, I planned to interview those actors who entrepreneurs would mention as important parts of their network during early interviews.

Because hardly any technology startups in the selected cities would be older than five years, and because hubs focus on the startup formation stage, ‘early-stage’ entrepreneurs were defined to include all CEO founder entrepreneurs that had assembled a team and launched a digital product (i.e., an Internet or mobile application, or a product or service that inherently depended on such software in the value creation process) with demonstrable market traction (i.e., users, downloads, revenue, partnerships, etc.) no longer than three years before fieldwork. Entrepreneurs were included irrespective of whether they had legally incorporated a business.

An interview guide was designed to express the observable concepts (cf., 3.1.) in common terms, using words such as ‘networks,’ ‘connections,’ or ‘brokerage’ (see Annex C). Hubs as organizations were simply referred to by their name, avoiding the term ‘hub’ until the participant mentioned it, and leaders’ actions were referred to with common practitioner terminology such as ‘governance,’ ‘implementation model,’ ‘services,’ ‘mentoring sessions,’ etc. The guide was designed as a basis for semi-structured interviews, with the aim to elicit concepts from the theoretical framework while allowing for flexibility and spontaneous conversation threads (H. J. Rubin & Rubin, 2004). Participant information and consent forms were prepared based on templates received from researchers who had done fieldwork in similar contexts.

3.6. Data Collection during Fieldwork

3.6.1. Continued Theoretical Sampling

Fieldwork began at the end of August 2014. I spent one month in each city. Sampling continued as data collection proceeded. Lists of 32 early-stage technology entrepreneurs in Kigali, 40 in Harare, and 48 in Accra were generated through prompts to participants (cf., 3.5.2.).

Through this process, it became apparent that there appeared to be nuanced degrees of participation with hubs (see chapter 5 for a details). It was hard to find early-stage technology entrepreneurs that did not know at all about local hubs, but in each city, I tried to identify a number of entrepreneurs that were not interested in local hubs and only participated occasionally. This was easier in Accra and Harare than in Kigali (see 3.6.3., 3.7.3., and 5.2. for details).

Additional interviews with non-early-stage entrepreneurs and non-entrepreneurs were prioritized according to the relevance that entrepreneurs had attributed to these actors in previous interviews. Unsurprisingly, hub managers and staff were usually among this group, so that they fell within the theoretical sample both as members of entrepreneurs' networks and as participants that could speak to hubs directly.

3.6.2. Style and Settings of Interviews

Responsiveness and accessibility of participants was excellent: out of about 150 approached individuals, my request was rejected in only one case. Most participants replied at least after the second prompt, and there were few cancellations of interview appointments.¹⁸ No participant rejected the consent form. Some participants had previously been interviewed or approached by Western media or donors, assuming that research interviews served a similar purpose (such as “showcasing” success stories). Once I became aware of this risk, I made an effort to establish that the research interview would be much different in nature and outcome.

During interviews, I followed what has been called an empathetic consensual or responsive interviewing style (Kvale, 2007; H. J. Rubin & Rubin, 2004), aiming to allow participants to unfold their views as freely as possible, with as little prompting and conversational steering as necessary. I applied many interview principles and techniques suggested by Rubin and Rubin

¹⁸ I found that this had five reasons: (1) many participants would regularly be present at or near hubs, or find it easy to commute there; (2) there was generally a courteous but business-like and professional demeanor in local technology entrepreneurship environments; (3) participants were tech-savvy and most of them available through four communication channels (email, phone, SMS, and WhatsApp); (4) participants were eager to share information about a topic that they identified with and often were excited about; and (5) several participants noted my institutional affiliation and origin, and were eager to discuss with (and sometimes challenge) a researcher from the Global North/West.

(2004). Some time was spent to establish a rapport and building trust, asking easy contextual questions at first and presenting myself as friendly and supportive. Most participants were curious about the research project and showed a genuine interest to share their views. I never pressured participants into responding, and allowed them to answer in their own way, prioritizing and adapting to their situated knowledge and experience. I only challenged participants once trust and sympathy had been established, for instance, using the “devil’s advocate” technique, asking repeated “what does that mean” questions, or posing my research puzzles directly to participants (H. J. Rubin & Rubin, 2004).

Care was taken to focus on concrete events and experiences, and to avoid framing questions. I only employed buzzwords like “collaborative innovation,” “ecosystems,” “ICT revolution,” or “disruption” when the participant would use them himself/herself, usually asking clarifications. Meaningful but ambiguous terms like “community,” “skill,” “diversity,” or “impact” were used with care, and I attempted to let the participant establish and convey their subjective meaning in line with an interactionist lens (cf., 3.2.). Unless the participant had an obvious affiliation with a hub, I did not bring up any local hubs until the participant mentioned them or until other topics were exhausted. To further limit the risk of researcher-induced bias, I framed my study as research on “support networks of technology entrepreneurs,” and said that I studied hubs only within this broader context. I kept broader questions about the entrepreneurship environment to the end, as I expected it to be advantageous if participants were already primed to think about the environment only in the specific context of hubs and entrepreneurs’ relations.

Due to my subject-matter expertise and prior experience, I likely misunderstood less than another interviewer might have (Flick, 2009), as it allowed me to prompt participants to clarify startup terminology and jargon, like “monetization,” “traction,” or “Lean Startup.” At the same time, my foreignness to field sites was a constraint during interviews, as it was bound to keep me from fully understanding cultural and social references (see 3.9. for details). More

novice entrepreneurs and younger participants tended to be more curious about the study and asked questions back at the end of interviews. Others, especially those disaffected with the political economy of the international development industry, were curter, especially in the beginning when they were still ‘figuring me out.’ There was one case in which a participant was frustrated with my interview style; I attempted to reestablish the relationship with this participant later and interpreted the information from the interview with particular care.

I generally asked participants where they would like to meet for interviews, so most interviews were held in their work environments. This was sometimes a place at the participant’s office or at a hub or another support organization (meeting room, an open but quiet work area, or the manager’s office). At a participant’s request, I also had interviews in cafés, hotel lobbies, or restaurants. All interviews were conducted at sites in urban environments, which took between 20 minutes and two hours to reach.

3.6.3. Overview of Conducted Interviews

Given the expected variety of perspectives and the wide initial sampling frame of entrepreneurs, it was expected that a large number of interviews could be necessary to collect sufficient material for a rigorous analysis and to reach saturation (A. Strauss & Corbin, 1990; Tracy, 2010). The overall ease of accessibility and identifiability of participants allowed me to conduct 119 formal and three informal interviews, or about 1.7 interviews per day of fieldwork. At times, CEO entrepreneurs preferred to be joined by their startup team in interviews, which I did not encourage but accepted. As a result, seven interviews were with more than one (up to five) participants, for a total of 133 interviewed participants. Six interviews were held via VoIP/Skype. I conducted follow-up interviews with three participants who provided particularly valuable insights.

Interviews were recorded once participants had given consent. They took about 80 minutes on average; the shortest was 40 minutes and the longest lasted 4.5 hours. Notes were

taken in parallel to each recording. One interview could not be recorded due to conditions at the interview site; detailed notes were taken instead. The three informal and spontaneous interviews were also not recorded and instead captured in notes.

About 75% (24 out of 32) of all identified early-stage technology entrepreneurs were interviewed in Kigali, about 35% (14 out of 40) in Harare, and 40% (19 out of 48) in Accra, for a total of 57 interviewed CEO/founder entrepreneurs. Out of all 133 interview participants, 67 (50%) were early-stage technology startup founders, co-founders, or employees, and 23 (17%) were hub managers, staff, or board members (see Table 3 and Figure 6). There were 43 (33%) participants who were neither part of an early-stage startup or a hub; this group consisted of managers and staff of other intermediary organizations, actors like bloggers and mentors, or CEOs/founders of established local tech startups.

	Kigali	Harare	Accra	<u>Sum per group</u>	<u>% of total</u>
Early-stage founders, CEOs	24	14	19	57	43%
Co-founders, startup employees	4	2	4	10	8%
Hub managers	4	4	3	11	8%
Hub staff	0	2	1	3	2%
Hub board members	4	5	0	9	7%
Other intermediary* manager	4	5	1	10	8%
Other intermediary* staff, specialists	1	1	3	5	4%
Ecosystem actors (bloggers, mentors, consultants, etc.)	3	2	4	9	7%
Investors	0	1	1	2	2%
CEO/founder of established local technology venture	3	3	8	14	11%
Tech corporations, mobile operators	0	1	2	3	2%
<u>Total</u>	47	40	46	<u>133</u>	<u>100%</u>

Note: Participants with multiple roles were categorized by their main role. Hub managers for Kigali include former hub managers.

* “Other intermediaries” were mostly incubators, accelerators, startup and prototyping competitions, and entrepreneurial training initiatives.

Table 3: Number of interview participants per actor group and city

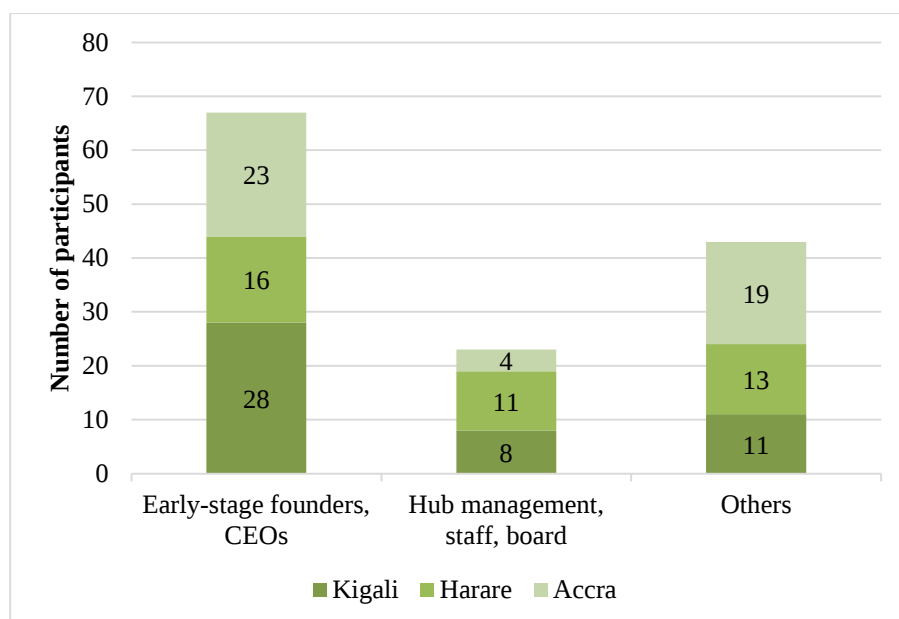


Figure 6: Number of interview participants by actor group and city

I attempted to cover all six case studies of hubs by interviewing the managers of each hub in addition to several affiliated technology entrepreneurs. In some cases, there were only very few technology entrepreneurs affiliated with a hub. This was the case for generalist, non-technology-specific hubs (such as The Office in Kigali or Hub Accra in Ghana) and for recently launched or restructured hubs, like Muzinda Hub or iSpace. Ultimately, I was able to conduct multiple interviews for each hub, while the number of interviews varies greatly from 33 for kLab to three for iSpace.

3.6.4. Participant Observation

I also conducted a limited amount of participant observation to complement interviews. I spent time working at hubs and other intermediaries on about 30 work days. At hubs, I observed activities and the work atmosphere or engaged in serendipitous informal conversations. I attended events at hubs whenever possible, which lasted between one hour (Global Voices meeting) and two days (Smart Rwanda Days) (see Table 4). Unfortunately, fieldwork times did not coincide with many major technology entrepreneurship events, and a scheduled Startup Weekend in Accra was canceled on short notice. Participant observation was also hampered in

Harare as, during the time of my stay, Hypercube was under renovation and Muzinda Hub in the process of moving to a new building (see 4.2.).

Event type	Kigali	Harare	Accra
Networking event at hub	• Farewell event for outgoing kLab manager at kLab	• Pitch Night, with three pitches and mentor talk by CEO of a local bank	• Global Voices meeting at iSpace
Launch of an initiative, presentation at a hub	• Fundraiser for roof for The Office, incl. panel discussion hosted by FinConnect • Launch of UNDP Shift app competition at LaunchIT • Rwandan Government call for participation in Ministry of Agriculture app competition at kLab	• Ben White (VC4Africa) Q&A event at Hypercube	• US Media Committee app competition launch & feedback session
Large conference	• Smart Rwanda Days, policy meeting and entrepreneur showcase organized by Rwandan government (with participation of Rwandan President and outgoing ITU Secretary General) at Serena Hotel, Kigali		
Other		• High-Tech 263 strategy meeting at Startup Zone	

Table 4: Events attended for participant observation

3.6.5. Field Notes

I took field notes to help the self-reflexive process, producing sincere, authentic, and subjective accounts that included personal feelings and opinions (Emerson, Fretz, & Shaw, 2011; Tracy, 2010). Notes taken during interviews and observations were revisited, documented, and organized on a daily basis. Given the density of the fieldwork schedule and the expansive interview strategy, field notes outside of interview notes were filed only weekly. Field notes covered a total of 86 pages. I exchanged and discussed (on average) weekly notes with the primary dissertation supervisor via email or Skype.

3.6.6. Exiting the Field

Several participants bemoaned the lack of data and research about local technology entrepreneurship environments and encouraged me to make findings available in reports and through presentations. While I tried to temper expectations towards full-fledged practitioner-oriented analytical outputs (H. J. Rubin & Rubin, 2004), I had the ambition to provide feedback to participants and use continuous interactions for member reflections which could further validate findings (Tracy, 2010). For this purpose, I gave presentations on first observations towards the ends of my stays in Kigali (at kLab) and Harare (at Startup Zone), to which all participants and others I had been in contact with were invited. Attendance was good in Harare (about 20 people) and very good in Kigali (about 40 people). I presented both positive and critical findings, which stimulated discussion about the state of local technology entrepreneurship and the meaning, challenges, and opportunities of hubs.¹⁹ I also documented descriptive findings and observations in blog posts²⁰ which I disseminated to participants via email.

3.7. **Analytical Process**

3.7.1. Transcription

The interviews resulted in a total of 166 hours of audio recordings, which was too large a quantity to be transcribed within the time constraints of a dissertation project. Interviews with entrepreneurs that shared extensive insights on hubs were thus prioritized, followed by interviews with entrepreneurs across the spectrum of participation with hubs, followed by hub managers, followed by entrepreneurs that had mainly interacted with other intermediaries, followed finally by all other participants.

¹⁹ Especially in the case of kLab, the event became a forum for some entrepreneurs that had not previously spoken up about complaints that they nurtured, prompting the present members of the hub leadership to highlight envisioned improvements and reforms. I held several follow-up conversations with the incoming kLab manager in person and via email, but ultimately turned down her offer to facilitate a kLab board retreat in February 2015, during which the reforms were meant to be discussed.

²⁰ The blog posts are available at <http://cii.oii.ox.ac.uk/author/nicolas/>.

Audio files from interviews were submitted to a Ugandan transcription agency and free-lance transcribers who were accessed through the online platform UpWork (previously ODesk). The agency and individual transcribers were required to sign non-disclosure agreements and complete trial transcriptions. Grab samples of passages were reviewed for each transcript, and extensive feedback was given to transcribers. Two Kenyan transcribers received the bulk of the audio files for transcription. A total of 98 interviews were transcribed and reviewed.

3.7.2. Coding, Logging, and Summaries

The approach to analyzing the collected data was narrative thematic coding and analysis. Thematic coding is a systematic, interpretive way to derive concepts, categories, and causal chains from narrative data, like interview transcripts (Richards, 2009). Emerging concepts and categories can be iteratively reflected against extant theory to extend it or to build new theory (Carroll & Swatman, 2000; Eisenhardt, 1989).

I used Richards (2009) as a detailed and practical guide for the coding process.²¹ The NVivo 10 software was used, and versions of the file were continuously archived to be able to trace back the analysis process and recover lost coding later. The coding process was generally purposive (as opposed to exploratory or open-ended) to derive answers to the research questions and build on the original theoretical framework. I prioritized interview coding similarly to transcription (cf., 3.7.1.).

Descriptive coding was used to track and aggregate case study information and details about specific incidents and actors. Following descriptive coding, topic coding captured the subjects that participants discussed without adding any of my own interpretation. Nodes for topic coding were stored separately from descriptive coding, in folders such as ‘Hub purposes,’ ‘Hub roles,’ and ‘Hub functioning.’ Through such sorting, the coding developed into first-order

²¹ Richards (2009) will not be cited for detailed analytical steps through the remainder of the section.

themes (A. Strauss & Corbin, 1990), where quotes are grouped together that show potential ambiguity or lack of clarity, which can then be reflected against the theoretical framework.

The theoretical framework based on intermediation and incubation theory was used to set deductive second-order categories around ‘brokerage’, ‘networking’, ‘networks’, ‘resources,’ ‘mentoring,’ ‘hub goals,’ ‘space,’ and ‘learning.’ Through iteration, I established sub-categories, building an increasingly detailed hierarchical structure. Themes that could not be captured under the deductive nodes were treated as emergent categories, indicative of new variables and processes that have not been covered in previous theory. These were inductively derived from the data as topic coding proceeded. Topic nodes within the clusters ‘Hub roles’ and ‘Hub functioning’ became particularly rich as coding went on. Sub-clusters were created, such as ‘History, emergence, dynamics of hubs’, ‘Hub boundaries,’ ‘Hub membership & participation,’ and ‘Hub conflicts & tensions.’

During this process, it became clear that processes predicted by the theoretical framework, such as the provision of resources, services, knowledge, and external brokerage were important roles of hubs, but that participants most strongly associated hub processes with other themes. New themes that had emerged often included less tangible but highly salient aspects such as ‘community’ (used to refer to hub participants more broadly, but also to small sub-groups), role divisions and hierarchies, and ambiguity around the external boundaries of hubs.

The data were further reduced and summarized, especially through case study write-ups, tables, and informal visualizations of identified processes and envisioned social structures, which were refined as the analysis progressed (Carroll & Swatman, 2000; M. B. Miles & Huberman, 1994). Partially and conceptually ordered summary matrices and word tables were used most extensively to reduce and simplify data (down to ‘yes’ / ‘no,’ ‘absent’ / ‘present’ statements), in order to allow for systematic cross-case comparisons and pattern matching (cf., 3.3.2.).

At this analysis stage, I increasingly reflected codes against additional theory that could further explicate the patterns in the data. In practice, this meant that I moved from topic codes to analytical codes, which capture interpretations and subtler layers of meaning in the data. I also increasingly filed memos for nodes and sources, to document and systematize my interpretation of interactions between nodes, causal processes, and connections to extant theory.

Iteratively, through numerous cross-case comparisons and parsing the potential causal mechanisms in many possibly ways, this led to the development of the *assembly process theory* (see chapter 7) as the most plausible and encompassing pattern, with the best fit to the data of all six hub cases, out of all alternatives that had been developed. Assembly is still only one potential interpretation and explanation of hub processes among many others, while adherence to a systematic and rigorous analytical process helped to increase the validity and reliability of the theory as a representation of empirical realities (Lincoln & Guba, 1985; Tracy, 2010).

The ultimate coding scheme uses ‘organization / social structure’ and ‘organizing / process’ (Scott & Davis, 2016) as two basic code clusters. In assembly, the concepts captured under these two pillars mutually influence each other: structures trigger processes and processes reconfigure structures. The organization cluster includes sub-clusters on ‘Hub actorhood, goals, and services,’ representing organizational action of hubs. A second sub-cluster under structure is ‘Boundaries, membership, and community,’ which is further divided into ‘External boundaries, wider structures,’ ‘Internal boundaries, hierarchies, roles,’ and ‘Community.’ The organizing/process cluster is organized by the three mechanisms of assembly: ‘Convening,’ ‘Interconnecting,’ and ‘Activating’ (cf., chapter 7), which are themselves segmented into relevant process elements such as ‘selection, entering/leaving the hub,’ ‘bridging / brokering across diverse knowledge domains,’ and ‘Encouragement, social support, motivation from other community members’ respectively. Coding concluded as the scheme stabilized, indicating theoretical saturation (A. Strauss & Corbin, 1990).

3.7.3. Constructing Meta-Information on Engagement with Hubs

For improved comparative analysis, additional meta-information about participants was constructed based on the analysis. In particular, I attempted to address the question of how to categorize hub membership. To capture the variety of engagement patterns, I established twelve categories of typical ways that entrepreneurs engaged with hubs and computed a ‘degree of hub participation’ score for each entrepreneur (see 5.2. and Annex D).

I also attributed an approximate measure of venture maturity to each entrepreneur, discerning between ‘novice’ for entrepreneurs who had products and projects but not yet launched a venture or generated significant revenue, ‘recent launch’ for those that had launched a product or company less than one year ago and were only beginning to generate turnover, and ‘stable’ for those with ventures that were between one and three years old and had continuous revenue streams to sustain themselves. Finally, established entrepreneurs (beyond early-stage), who had started technology ventures over three years ago (before hubs existed in any of the three case study cities), were given the maturity status ‘advanced.’ What could be called ‘aspiring’ entrepreneurs, with no product or project, represented another hub user group but they were outside of my sampling scope (cf., 3.5.2.). Yet, I was still able to make inferences about their hub usage from interviews with others and through participant observations (see 6.1.1.).

3.7.4. Auditing and Feedback

To further improve the reliability of the analysis, I made the process transparent when I sought feedback from others, showing the audit trail that had been created (Creswell & Miller, 2000; M. B. Miles & Huberman, 1994; Tracy, 2010). Field notes, summaries, abstracts, preliminary theorizations, and coding schemes were reviewed and commented on by the primary dissertation supervisor. A colleague hub researcher and the two supervisors contributed extensive feedback to several iterations of chapter 5. In-depth guidance and feedback on the coding

process was obtained from a departmental colleague. Preliminary results were presented at conferences and workshops on intermediaries, entrepreneurship, innovation, and economic geography.

3.8. Ethics

I took measures to assure that the study adheres to high ethical standards. Specifically, this meant respecting multivocality and reflexivity, procedural ethics, as well as situational, relational, and exit ethics (Tracy, 2010).

Principles of multivocality and reflexivity were essential to guarantee the rigor of the thesis (cf., 3.4.), but they also played a role for its ethics. Concretely, throughout the entirety of the research process, I continued to question claims that I derived from what I had observed, taking care not to misrepresent what participants had conveyed. The large number of interviews meant that I heard a plethora of intriguing anecdotes, but I was attentive to reflecting each story against other participants' views. Especially when I took a liking or disliking to a particular participant, I was vigilant not to let such emotions lead me to distort this individual's narrative. While I acknowledge that qualitative research cannot and should not attempt to be objective in a pure sense, I still paid close attention to the accuracy of my constructions and representations of informants' voices.

Procedural ethics (Sales & Folkman, 2000) largely followed standard practices for multiple case study and interview-based qualitative research. The methodology was outlined to the departmental ethics board, giving approval before fieldwork. I followed the general principles of 'do no harm,' obtained informed consent from each interview participant (cf., 3.5.2. and 3.6.2.), and guaranteed privacy and confidentiality, for instance, by storing audio files only on hard drives and a departmental secure cloud server. I avoided deception except with regard to how I introduced the topic of my research: to ensure that interviews were not initially framed

around hubs, I told participants that I researched hubs only within the context of ‘networks of entrepreneurs’ (cf., 3.6.2.).

Given the relational nature of the data (cf., 3.1.), anonymization was a particular concern. The sampling approach relied heavily on personally identifiable data, and participants were expected to explicitly name their connections. This brings up identifiability concerns typical in social network research (Kadushin, 2005). In turn, it is essential to obfuscate participants’ identities to the point where significant effort would be required for readers to cross-reference information in the research account with their personal knowledge of the participant, thereby determining the participant’s identity (deductive disclosure) (Sales & Folkman, 2000). The expected readership of the thesis included the dissertation supervisors, assessors, colleagues, and other academic researchers. Yet, I acknowledged that informants themselves could access the thesis once it was in the public domain and potentially attempt to identify particular participants who were quoted, especially in the context of thick descriptions.

I discussed these anonymization issues with the departmental ethics board, presenting specific passages and highlighting areas of concern. From the advice that I received, I ultimately decided not to mention any names of individual participants and use fictional names for all organizations other than hubs. Vignettes (see 5.3.) use fictional names while non-substantive facts (such as startup business models or details on personal backgrounds) have been altered.

As a result, in the present version of the thesis, no individual informants are directly identifiable. Individuals with intimate knowledge of local contexts could potentially identify a few informants based on quotes and contextual information, but this would require substantial additional effort. Also, where there was a risk of identifiability, only quotes with non-sensitive information, which in some cases had already been in the public domain in the form of blog

posts, were included. Ultimately, even in cases where participants might be identifiable by select individuals who are not among the expected readership of the thesis, this should not cause any harm to the identified informant.

Other sensitive information which could harm participants were also omitted from the manuscript: disclosure of information about revenues and investments, political struggles, or conflicts of interest could affect participants in pursuing opportunities, while such information was mostly not directly relevant for the present research questions. Similarly, tenuous normative or judgmental statements about hubs or about participants' actions and histories were avoided. While it is neither possible nor desirable to eliminate any and all normative statements, any such statements have been made with particular care and only if they added material that was instrumental in addressing the research questions.

Finally, I considered situational, relational, and exit ethics (Tracy, 2010). As an example for exit ethics, I withstood the request that I received from some researchers advising that the thesis would attract more interest from the academic community if it discussed ethical divides as a stereotypically African topic: I deemed this angle to reflect neither the research questions nor the informants' views and concerns with regard to innovation hubs. In another instance, an entrepreneur at a hub urged me to 'break the story' of what he saw as scandalous behavior by the hub leadership. I managed his expectations, clarifying that I am not a journalist, and ultimately omitted the details of this conflict from the thesis because it did not speak to the research questions. As an example for relational ethical considerations, I established good relationships with hub managers and hub community members, "giving back" (in their words) through presentations of preliminary findings in Kigali and Harare (cf., 3.7.4.). Situational ethics were respected, for instance, by allowing hub managers to set some of the rules of my engagement with entrepreneurs, as I knew that I was to some extent interfering with their personal concerns.

3.9. Limitations

The employed case- and interview-based methodology suffers from several limitations. Most importantly, generalizations of findings beyond the studied empirical contexts have to be conducted with care. Hub implementations (rather than hub visions and models) are acutely dependent on a wide range of factors in local contexts (see, for instance, 6.3., 8.2.3., and 8.3.4.). Given cultural and economic idiosyncrasies across Africa (Fearon, 2003; Posner, 2004; Sá & Aixelà-Cabré, 2013), a particular constellation of contextual factors could fundamentally affect processes in a given hub, such that the present findings would have limited applicability. The data were also collected at a particular time point within the (ongoing) history of African hubs, at which a kind of reckoning of the early excitement had started to happen (cf., 1.2. and 2.1.3., see also 8.5.2.). Given that ‘hubs’ are constantly redefined and repurposed, the organizations that are analyzed in this thesis (cf., 3.3.3.) might not be comparable to what ‘hubs’ might come to be in a matter of a few years.

In turn, the thesis takes several measures to mitigate these issues. Cities, cases of hubs, and analytical methods were selected to allow for generalization across all African hubs (cf., 3.3.). Throughout, the thesis sets boundary conditions for the wider applicability of the presented results and theory, namely by explicitly defining the organizational features of a hub (cf., 3.3.3.), by only translating those observations into generalizations for which sufficiently rich data is available (see, for instance, 6.4.), and by specifying conditions under which hub processes do not apply or can be incomplete (see 7.4.). Ultimately, the thesis claims that the developed theory generalizes to African hub organizations as defined in this thesis (cf., 3.3.3.), while it might apply to other organizations in other contexts if the same underlying mechanisms materialize and are integrated (see chapters 7 and 8).

Second, the choice of a micro-social interactionist lens (cf., 3.2.) has several limitations. Specifically, the intermediation literature and studies examining the external brokerage function

of incubators mostly address the inter-organizational level of analysis (cf., 2.2.2., 2.3.3.3., and 2.4.1.). Other studies using a different lens (for instance, incubator impact evaluations, resource-based views, or macro-institutional studies) might rely on theoretical assumptions and epistemologies that are unrelated to or not consonant with the micro-social interactionist lens. Accordingly, the findings of this thesis cannot directly engage with or refute some of the prior literature. In turn, the use of an uncommon analytical lens in application to a new or contemporary phenomenon promises to highlight theoretical gaps and fresh insights which have previously been overlooked (see 8.2.). Altogether, the micro-social interactionist lens can be productive for theory building but assertions about weaknesses in existing work have to carefully calibrated so as not to compare the incomparable.

Third, limitations arise from the qualitative research approach and its naturalistic epistemology (cf., 3.4.). Relational patterns are constructed from interview data (cf., 3.3.4.), while such data is likely to be incomplete and biased. For instance, participants probably gave socially desirable rather than perfectly accurate answers in some instances, highlighting relationships they actually do not have but think they should have, or omitting interactions which they would like to keep private. Similarly, there were several instances where informants' normative judgments about hubs appeared to cloud their perceptions of how hubs worked.

Not only are participants biased, but so too am I. It is important to admit that qualitative researchers are not 'measuring' their participants' perceptions but rather constructing their research subjects (Hardy, Phillips, & Clegg, 2001). On the contrary, giving voice to technology entrepreneurs who have actually engaged with hubs (cf., 3.4.) is an explicit goal of the thesis, in an attempt to ground both grand aspirations by development organizations and media as well as quick dismissals by other commentators (cf., 1.3.1.). It remains that the thesis cannot claim to develop law-like, strongly predictive theory, and that another researcher than myself would

most likely have derived a different account about African hubs than the one presented in this thesis.

Further limitations stem from restrictions in the kinds and quantity of collected data. Namely, some case studies of hubs were discussed by many more interview participants than others (cf., 3.6.3.). This bears the risk that generalized accounts of hub organizations (see chapter 5) and the theorization of hubs that the thesis undertakes (see chapter 7) overly represent particular cases of hubs. Care was taken to analyze variations across cases (see chapter 6) and derive contingencies and typical bottlenecks in the theorized process (see 7.4.), but it cannot be entirely ruled out that the presented results and theory better represent hubs similar to the ones that were covered in more depth during the empirical inquiry.

Relatedly, early interviews in particular could suffer from additional weaknesses; I refined my questioning technique over the fieldwork period, but discovered incidents of leading and framed questions in transcripts of interviews conducted at the beginning of fieldwork. I flagged the discovered incidents for careful interpretation but cannot entirely rule out that other cases remain undiscovered.

Finally, one month of fieldwork per city case study, each with dense meeting schedules, was not enough time to allow for more in-depth participant observation, field immersion, and ongoing reflexivity. Important elements in hubs (e.g., attendance of events, occupation of hub spaces, collaboration practices, etc.) and in cultural contexts might have gone unnoticed as a result. In particular, data reliability could also have been affected by researcher-induced participant bias: my rapport with participants is bound to have been affected by their preconception of a white male researcher from an affluent country and an affiliation with an elite British research university. Especially ethnic and gender divides that could affect the social structure of entrepreneurial communities and networks may not have been mentioned to me in interviews but might still have been important latent variables (Yenkey, 2015).

Chapter 4 Empirical Contexts and Case Studies

This chapter provides detailed case study and background information for the six cases of African hubs for which data was collected.²² For each of the three cities, it will first describe relevant conditions in local environments, and then provide the case studies. Descriptions of environments (4.1.1., 4.2.1., and 4.3.1.) will focus on elements that are relevant to hubs, such as other local entrepreneurship support organizations or other existing social structures of entrepreneurs. Against this backdrop, the chapter develops the six hub case studies (4.1.2., 4.1.3., 4.2.2., 4.2.3., 4.3.2., and 4.3.3.).

Warranted by the present analytical lens and standards of rigor (cf., 3.2. and 3.4.), vivid and dense summaries are presented. The case studies in the present chapter purposefully refrain from abstractions, providing detailed empirical evidence and adding validity and reliability by means of thick descriptions to ensure multivocality, face validity, transferability, and resonance (Bochner, 2000; Geertz, 1973; Golafshani, 2003; Tracy, 2010). Multivocality is particularly important given the micro-social interactionist lens of this thesis: the chapter conveys the lived realities of entrepreneurs engaging with hubs in the most direct way possible, without overly abridging their interpretations.

Yet, case studies are necessarily a filtered and partially reduced representation of raw qualitative data (Huberman & Miles, 1983). To balance the somewhat conflicting demands of multivocality and data reduction, I provide a single coherent and largely chronological account for each hub case study, but draw directly on participants' perspectives in constructing it. Different data sources were compared against each other to assure the accuracy of reports, especially with regard to the founding histories and implementation stages of hubs.²³ Especially in

²² Some passages in this chapter have been adapted from blog posts published by the author, available at <http://cii.oii.ox.ac.uk/author/nicolas>.

²³ To ensure anonymity of participants, fictional names are used for all organizations that played a role in hub histories, except for the names of hubs themselves. No individuals are named.

instances of ambiguity and conflicting data, the case studies use quotes to further convey multivocality.

Thereby, the chapter moves beyond the visions, conceptualizations, and definitions of hubs in the previous chapters, describing concrete, on-the-ground realities and histories. Notably, cases will illustrate how hub leaders' visions were confronted with the realities of implementation, and also indicate failures (as perceived by participants).

While the case studies do not follow the same rigid template, each examines the same five observable concepts of hubs (cf., 3.1.) for easier comparability between cases. The cases thus highlight in particular (1) how hub organizations materialized as social structures (incl. boundaries, goals, hierarchies, membership rules, roles, routines, etc.);²⁴ (2) the actions of hubs towards entrepreneurs, expressed, for instance, in outreach to entrepreneurs, service offerings and adaptations, and actions taken by hub leaders; (3) which local entrepreneurs are engaging with hubs and how; (4) ongoing social interactions within and around hubs; and (5) how entrepreneurs formed groups like teams and communities.

The chapter also lays essential empirical groundwork for the following chapters: throughout chapters 5-7, data will be further reduced and abstracted. The present chapter describes both idiosyncrasies and similarities of hubs, which are summarized in the final section (4.4.) and analyzed in more depth in chapters 5 and 6. The case studies also foreshadow the assembly process (chapter 7), illustrating real examples of how assembly plays out in hubs, while maintaining a descriptive, contextualized, and socially situated perspective.

Comprehensive and grounded descriptions are important because African hubs are a new and emerging phenomenon neglected by prior empirical research, but also because not much research exists generally on technology entrepreneurship in Africa. Ample contextual and

²⁴ This encompasses detail on the founding processes for each hub, including who the funders, founders, and leaders of each hub are and what visions and goals they pursue.

case study information thus serves to inform the analysis in the consequent chapters but also to give the reader a general grasp of local conditions.

4.1. Kigali (Rwanda)

4.1.1. Technology Entrepreneurship in Kigali

4.1.1.1. *Country Context*

Kigali is often mentioned as one of the cleanest and safest cities in Africa. The city is the cultural and economic center of Rwanda, having grown rapidly to a size of about 1 million inhabitants since it became capital at the time of the country's independence in 1962. The city is easy and safe to navigate by car or moto taxi; commutes between different parts of the city usually take 20 to 30 minutes (e.g., between kLab and The Office).

Rwanda is a developmental state, where the government directly affects and often controls economic life (Booth & Golooba-Mutebi, 2012; Hasselskog, 2015). The country remains a low-income country, but the fast rise of its wealth and development levels following the genocide of 1994 has been widely noted (World Bank, 2015). Vision 2020, the country's overarching development strategy, sets the goal for Rwanda to achieve middle-income status by 2020, focusing explicitly on ICTs as an enabler of economic development.

The Rwandan government is an essential force also for local technology entrepreneurship. When President Kagame took office in 2000, the government first focused its efforts on the rollout of ICT infrastructure. Kagame positioned Rwanda as an ICT nation internationally and in development circles ("Kagame co-chairs UN Broadband Commission," 2015). Vision 2020 includes a staged ICT strategy, "National Information Communication Infrastructure" (NICI) I-IV. From 2001 to 2011 under NICI I and II, the Rwanda Development Board (RDB) laid a national fiber-optic backbone that connected all towns and cities in the country, and the government also subsidized Internet connectivity (Mann, Graham, & Friederici, 2014).

Starting around 2011 with the NICI III plan, the government shifted towards encouraging business and entrepreneurship, including a local software and digital content industry. The nation's rise in the World Bank's Doing Business rankings (to 3rd and 2nd among African nations in 2013 and 2014 respectively) was noted as a particular success story of the government's reform program (IFC, 2013; Traoré, Gonzalez, Yedro, Lobet, & Bailey, 2012). The government also provides business directly: entrepreneurs described how the ICT sector depends on tenders by the government, as private demand for technology products remained low. Expatriates are explicitly part of the vision: Rwanda instituted a renewable two-year visa for Entrepreneurs in Information Technology to encourage qualified Westerners to settle in Rwanda and launch ventures. Many international development agencies have their offices in Kigali, and the city offers foreigners better quality of life than many other African capitals.

The vision that Rwanda could become the "Singapore of Africa" has been encouraged, if not actively promoted, by President Kagame ("Africa's Singapore?," 2012; Caryl, 2015). The "Digital President" (Collins, 2013b) shows his support directly, for instance, hosting large policy events in Kigali such as the bi-annual Transform Africa conference. At a similar event, the Smart Rwanda Days 2014, Kagame was joined by outgoing International Telecommunications Union (ITU) General Secretary Hamadoun Touré and two young Rwandan technology entrepreneurs (including one from kLab).

During Kagame's tenure, many Rwandans have explicitly adopted the motivation to develop their country through entrepreneurship (Root, 2016). Several interviewed technology entrepreneurs wanted to use their work to contribute to nation building:

Us, we believe that we are the people who are going to make this country develop... Other fellow youth are just sitting there waiting for the country to do everything... I as a young entrepreneur that I have just woke up one day, thought of this idea, implemented it—I see it as a contribution to the national development... and just giving something big to the country. (Stable technology entrepreneur in Kigali)

In interviews, the genocide itself was not mentioned by Rwandans, who considered it to be a Rwandan matter that foreigners should not be involved in. One participant noted the

potential of ethnic discrimination when positions are assigned in an informal conversation, but there were no mentions or hints towards such tensions in any of the formal interviews.

The genocide, however, does play an essential role in Western media covering contemporary Rwanda, as it provides a hook for an inspirational storyline about how the country was transformed with the help of technology and entrepreneurship (Linshi, 2015; Raghavan, 2014; Root, 2016; K. Strauss, 2014). Yet, both Rwandese and expatriate participants also expressed that Rwandans are typically shy, courteous, unable to think critically and independently, and unwilling to lead or take risks, which was seen to be at odds with Silicon Valley-style technology entrepreneurship. There were also concerns that the national conversation had romanticized the notion of entrepreneurship and diluted public awareness about the challenges that technology entrepreneurs still face.

Entrepreneurs mostly reported that the business case for Rwandan technology startups was still difficult, despite the country's great aspirations. Entrepreneurs described how they could not build on common ways of doing things when trying to market digital products. Instead, entrepreneurs had to learn within industries and markets which were themselves still immature. Customers often became the most important counterparts for entrepreneurial learning, rather than experienced entrepreneurs or professionals.

4.1.1.2. Support Structures for Technology Entrepreneurship Beyond Hubs

Many participants believed that a lack of skills was the most pressing challenge for technology entrepreneurship. The Kigali Institute of Science and Technology (KIST) has increased the country's number of advanced technology students, but several participants highlighted that graduates typically need additional mentoring and training to be able to create technology products. The 2011 MIT Accelerating Information Technology Innovation (AITI) program was particularly important to convene a small cohort of talented and motivated KIST

students (MIT Global Startup Lab, 2011): several participants would later become role models for technology entrepreneurs in Kigali.

The government also provided funding for Carnegie Mellon University (CMU) to open a graduate degree program for East African students in Kigali, which participants praised as a crucial element in Rwanda's efforts to improve the skills of its ICT workforce and entrepreneurs. Yet, at the time of fieldwork, only two cohorts of students had graduated from the Master's program, and it remained unclear how influential CMU would ultimately become. Opportunities to pursue an education abroad have continued to be sought after, even by the country's most venerated technology entrepreneurs (Swider, 2015).

Lacking financing and market opportunities were additional concerns. Opportunities to raise risk capital and equity investments are rare, and they are available mainly through personal contacts. Most stable technology ventures re-invest their revenue. Given the small number of active and successful technology entrepreneurs in Kigali and given the small size of the city itself, participants often mentioned that "everyone knows everyone in tech entrepreneurship."

In recent years, several support organizations have attempted to further strengthen the support available for technology entrepreneurs. Several innovation competitions have been run, which entrepreneurs have welcomed as a source of small-scale prize money. In 2012, Tech Youth Rwanda began to host informal gatherings around technology entrepreneurship topics in collaboration with the Rwandan Agency for Economic Development (RAED). These activities were meant to complement the National Technology Association, which is a section of the Rwanda Business Alliance (RBA), a traditional business association, working as an interface between the private sector and the government.

In addition to kLab and The Office as Kigali's two innovation hubs, informal groups such as Tech Women Rwanda (running their events at kLab) and Fab Founders Rwanda (run-

ning their events at The Office) have been launched. Edify (housed at The Office) and Inkomo provide entrepreneurial training and mentorship services, while FinConnect (also housed at The Office) aims to link entrepreneurs to financiers, for instance, by hosting pitching competitions. In 2014, a mobile operator launched the LaunchIT incubator in the Kacyiru neighborhood near kLab. At the end of 2014, shortly after fieldwork, the first cohort of four startups was accepted, including Accelerate HR, a kLab success story (see 5.3.1.). However, the mobile operator later canceled its support and closed the incubator in early 2016.

4.1.2. Hub Case Study: kLab

4.1.2.1. *Founding Process and Original Vision*

kLab was supported by the Rwandan Agency for Economic Development (RAED), as the government's implementing agency, in the context of the third NICI plan, oriented towards the support of a home-grown software and content development sector. This led to a perception that kLab is a government-initiated hub; however, RAED was neither a driver in the founding process of the hub, nor did it get directly involved in its management.

Tech Youth Rwanda, KigaliHackers (an informal group of software developers), and Ubwenge (a social impact-oriented software development startup) had been organizing ad hoc, informal gatherings around software development and entrepreneurship already in 2011. While interviewed entrepreneurs who had been kLab members from its beginnings emphasized that these parties were the initiators of kLab, kLab's founding story was told slightly differently in public. In this telling, the head of Rwanda Business Alliance (RBA), an adviser to RBA affiliated with an international development agency, and a professor at the soon-to-launch Carnegie Mellon University (CMU) Rwanda independently had the idea to start a tech hub akin to iHub in Nairobi. In some interviews, a sense of competition between Kenya and Rwanda became apparent:

I knew about iHub in Nairobi and I thought it was kind of crazy that we don't have something like that here! (kLab founding board member)

All parties had a joint meeting in November 2011, becoming founding organizations of kLab. The initial General Manager became an additional founding board member, as did The managing director of ProICT, representing Rwanda's software development industry. RAED provided a space in the building where the National Technology Association had its offices, located in Kigali's Kacyiru neighborhood, a business district. The association became the administering body for kLab, recruiting a General Manager as kLab's only employed staff. The international development agency that the RBA adviser was affiliated to funded renovations and furniture (see Figure 7). In total, there were ten founding board members.

Almost the entire space at the top floor of the building was made available for hot-desking, with large window fronts instead of exterior walls. While the design was kept fairly simple, a coffee bar and a foosball table were included to give the space a casual feel and encourage informal conversations (see Figure 8).



Source: kLab Rwanda.

Figure 7: Board members discussing furniture choices during kLab's renovation



Source: kLab Rwanda.

Figure 8: kLab’s outdoor area, showing large window fronts and foosball table

kLab’s vision was initially relatively broad, loosely following what the founders knew about iHub. The goal was for kLab to be a “pre-incubator”—a place where technology ideas are developed and brought to market before additional support is received from elsewhere:

This is supposed to be the creation space: coming here, you try and fail. [It is] for coming up with a product that doesn’t work, then leave it, [and] move on... we also keep in mind that this is an innovation space; you are allowed to come up with a crazy idea. (One of kLab’s managers)

In addition, some of the founders emphasized that the hub would need to address Rwanda’s skill gap, and so skill building became a second, equally relevant goal. An initial goal was to pre-incubate 30 technology innovations, ten per year, and to have 200 active members after one year of operation (Batambuze III, 2013).

In kLab’s initial plan, board members were tasked to mobilize resources, backing, and external contacts for entrepreneurs. They were also meant to mentor entrepreneurs directly during weekly sessions. In addition, kLab set out to engage external mentors, for instance, from

technology companies in Kigali or from CMU. The university was launched shortly after kLab, with a facility in close proximity to the hub.

Mentors were meant to be technical experts and experienced business people. Subject-matter experts from different sectors were envisioned to be included on a case-by-case basis. Sessions were to be offered depending on the availability of mentors, but generally follow a regular weekly schedule. Individual entrepreneurs were also envisioned to be matched to mentors who did not give weekly sessions but had been included in kLab's database. Additionally, kLab aimed to match entrepreneurs with investors. Several of the founders also saw kLab as part of a staged entrepreneurship support process reaching across Kigali, where CMU would educate entrepreneurs, kLab would "pre-incubate" them, and a planned government incubator (part of an innovation park) would take on entrepreneurs with launched startups.

In sum, kLab started out with a diverse but technology-oriented board, pursuing broad and ambitious visions, having formulated a specific, largely hierarchical collaboration model, based on the idea that technology entrepreneurs should learn from more experienced business and technology experts. The roles that entrepreneurs, themselves, would play were not considered in depth.

4.1.2.2. First Phase: Few, Dedicated Entrepreneurs Using kLab, Forming a Community

From its informal launch in May 2012 until the time of field studies in October 2014, kLab's development can be divided in two phases that largely correspond to the tenures of the hub's first and second General Manager. During the first stage, kLab hosted Ubwenge and a handful of newly founded technology startups. kLab had an application process: interested entrepreneurs needed to have a team in place and pitch their idea before being allowed to use the space. kLab's board was responsible for approving the applications, giving applicants the status of 'tenant.' Teams were rarely turned down but the informal hurdle meant that non-tenant entrepreneurs rarely frequented the kLab space.

At any given point, about five to seven teams or ten to 40 individuals (CEO founders, co-founders, and startup staff) were present in the hub space, working on their startups or startup ideas. As planned, mentorship and training programs happened regularly (kLab Rwanda, 2013), and kLab tenants were trained by board members and external mentors. The Ubwenge team had a special role, as its team provided informal, ad hoc software development coaching to other hub members on a daily basis. kLab hosted guests, ran two hackathons, and there were occasional open days on weekends. Technology Women Rwanda, an informal group of female technologists, occasionally used kLab's space for meet-ups.

Still, tenants and mentors mostly had kLab for themselves. Accordingly, the space was rarely used at full capacity and all tenants knew each other. Interested entrepreneurs who had not yet passed the application stage were welcome to use the space informally, but the hub manager kept check on attendance and, if necessary, asked non-tenants to develop a startup project or leave. The core group of 20 or so regular users started to self-identify as the core community of kLab. At the end of this phase, 85 tenants and 21 mentors were registered as members (Collins, 2013a), falling far short of the original goal of 200 active members.

4.1.2.3. Second Phase: kLab Opens Up, Gets Known, but Attracts the 'Wrong' Users

Following kLab's first year of operation, disagreements arose among the board and the General Manager. The board considered kLab's initial setup as not inclusive and effective enough, and started to insist that the manager increase outreach and meet the targeted number of tenant registrations.

kLab's second phase started around September 2013, shortly before the hub's official launch. kLab's first General Manager had left, and with a new manager, more events and ad hoc activities such as hackathons and pitching competitions were held. For instance, the Ministry of Agriculture ran several hackathons at kLab, seeking mobile applications that could be used by Rwanda's farmers. Several interview participants proudly told the anecdote that the

country's Minister of ICT once visited kLab after midnight for a hackathon. kLab also received increased media attention, typically in the context of stories about Rwanda's transformation since the genocide, including by Time, Forbes, Wired, and Slate Magazine (Hiebert, 2013; Linshi, 2015; K. Strauss, 2014). In a Washington Post article (Raghavan, 2014), the General Manager described kLab as a "mini Silicon Valley." kLab thus became a convenient focal point for media, development organizations, entrepreneurship support organizers, and government agencies looking to connect with technology entrepreneurs. Several board members argued in interviews that it was a success in and of itself that Rwanda "had been put on the map" of technology entrepreneurship.

During this phase, kLab's access regime also changed. While the application policy was formally kept in place, it ceased to be enforced. This meant that individuals (mainly freelancers, university students, and recent graduates) started to frequent the hub space at their discretion. With the looser access policy, registered membership indeed rose quickly to about 600 in October 2014 (Ntabgoba, 2014).

However, this rise in activity actually became counterproductive in the eyes of several tenants: they felt that kLab was becoming an Internet café, with many new participants who were not serious about being technology entrepreneurs. Several interviewees reported that it became impossible to personally know everyone using the space. There had also not (yet) been a notable influx of CMU graduates. Interactions between kLab tenants and CMU students were described as ad hoc, while only few people were seen to have a foot in both worlds.

Some entrepreneurs who had been with kLab from the beginning felt that the board got increasingly detached from the daily workings of kLab, and that its decisions were not conducive to the interests of kLab's core community. These participants were weary of conflicts of interest: they felt that kLab was not working for its entire community anymore, and merely helped a selected few who had strong connections to particular board members. They also said

they respected the current manager, but that they were still disappointed that he so easily gave in to pressure from the board to attain “numbers” instead of creating an environment for focused startup work. These participants saw kLab as beyond their control, and not as an organization that they, themselves, could shape. In other words, while the fast-increasing headcount at first seemed to be an unequivocal success for kLab, ultimately doubts arose as to whether it would actually strengthen the membership composition and translate into favorable social dynamics for tenant entrepreneurs.

Moreover, some interviewees mentioned that national and international media had a tendency to overly promote kLab’s successes and that kLab had an incentive to feed these stories, to the point where the increased attention had negative consequences. Such stories easily embedded kLab in the narrative of Rwanda’s rise as an ICT nation, but some entrepreneurs feared that this outsize public image distracts kLab from its grassroots mandate.

In parallel, regular mentorship and training sessions ceased due to decreasing commitment of mentors and board members. Moreover, the two Ubwenge founders left Rwanda in 2014, which left other tenants with less opportunity to engage with highly skilled software developers during their daily work in the space. Tenants who had been with kLab for a longer time were informally given the status of ‘senior tenants,’ effectively assigning them the role of peer mentors. Other mentorship and coaching sessions were now held in a more ad-hoc fashion, based on tenants’ individual relationships with a senior developer of Ubwenge that remained in-country, with CMU faculty, or with established technology entrepreneurs in Kigali. Some interview participants shared a sense that the original core community was dissipating irrespective of—or due to—much higher usage numbers, and that it became unclear if newcomers could replace or reinvigorate the community. Several participants said that they now started to see kLab as “just a space,” and that they would stop using it once they could afford their own office space elsewhere in Kigali.

4.1.2.4. *State at the Time of Fieldwork: A Nested Social Structure and Many Intricate Balancing Acts*

At the time of fieldwork, virtually every early stage technology entrepreneur in Kigali had some sort of relationship with kLab. Yet, the relationships that entrepreneurs had with kLab or its tenants were also extremely varied, differing in nature, intensity, and duration. Most technology entrepreneurs in Kigali either knew one of the board members, had worked at kLab for some time in the past, knew someone that worked in the space, or occasionally attended events and sessions (see Annex D). There also remained a (self-identified) core community at kLab; many members I interviewed expressed a sense of like-mindedness and mutual respect towards other tenants, and most listed several friends and collaborators that they would meet and work with while in the space. Established entrepreneurs had established ties with kLab or its members; few kLab-affiliated startups had received investments and kLab had also become a place to easily access and recruit software developers. At the same time, not more than a handful of startups regularly using the kLab space had started to generate stable revenues.

kLab's leadership was now faced with a lot of uncertainty about the way forward. It began to realize some of the concerns about lacking member commitment (in part through my presence and the questions asked in the context of this study). kLab had experienced that small changes in its access policy and service offerings could fundamentally affect its social environment, and that membership numbers alone were not indicative of collaboration. Concerns were now to define exactly who the stakeholders of kLab were, what its more concrete goals should be, and if and how the hub's governance structure should be altered.

Participants, from board members to tenants, had a common broad vision for an ideal kLab, describing it as an organization or a place that instills skills and facilitates market-oriented, scalable innovations, but it appeared that 'the devil was in the detail.' For example, many

entrepreneurs demanded more hands-on, one-on-one mentorship and active community management, while others said that the onus to change the hub's direction was on members themselves. For some participants, elements in Rwandan culture exacerbated the problems, because the entrepreneurs' humility and shyness meant that they would not take a more activist role in shaping kLab. Ultimately, several members acknowledged their responsibility and advocated regular plenary feedback sessions (see Figure 9) and greater representation on the board.



Source: kLab Rwanda.

Figure 9: kLab board members listening to a presentation about members' concerns

Responding to these challenges, kLab was about to emerge on a third phase at the time of field studies. In early October 2014, a third General Manager took over. The new manager initiated revisions of the membership process as a reaction to tenants' complaints. The vision was now to implement a formalized tier system, where more senior and focused members have privileged access to resources, while newcomers' time would be restricted.

4.1.3. Hub Case Study: The Office

4.1.3.1. *Founding Process and Original Vision*

The Office in many ways followed a different model from kLab. It was started as a rent-based, privately run coworking space in late 2012. It was founded and owned by a US-American expatriate who had been a consultant in international development, moving to Rwanda in 2007 to take up an assignment with the Rwandan government. Between 2009 and 2012, he was based in London, where he heard from friends about coworking, without actually using a coworking space himself. Returning to Rwanda in 2012 for more consulting work, he envisioned starting an agro-processing company.

The impetus to launch The Office came then, out of his personal experience: when he was working from of a friend's home in Kigali, he felt that he would benefit from having access to a coworking space where he could meet likeminded others and share contacts for typical small business needs, such as setting up a website or finding suppliers. In particular, he believed that there were many “creative silos” in Kigali while a gathering place was missing. His understanding of “entrepreneurs” was broad and included small business owners, freelancers, artists, and “creatives.”

The founder further developed the idea with two members of FinConnect Rwanda (a small business financing network), beginning the process in May 2012. They began a word-of-mouth and flyer campaign. It included focus groups to elicit entrepreneurs' specific needs and their willingness to pay: the founders were determined to fund the operation from rent and usage fees. At the same time, the campaign served to promote the idea of The Office:

We really wanted to get people thinking outside the box, what their office would look like, talking to them about how they felt about innovation community and all this kind of stuff, and just planting the seed about what it is we are doing. (The Office founder)

The outreach was irrespective of economic sectors and according to the motto ‘everything entrepreneurship.’ A focus on any particular sector (such as technology) was explicitly

avoided; the space was meant to be used by entrepreneurs from fields as diverse as film, music, technology, agriculture, or manufacturing.

True to the driving founder's original ideas, The Office ultimately "wanted to create a space where innovative and creative people could come together and build something bigger than the sum of their individual parts" (Huwart, 2015). What this would mean in concrete terms was explicitly open-ended:

Essentially... our goal is serendipity... we don't impose any expectations on the people in the community. We want people to basically become fulfilled individuals... people to be happy, people to be sort of pushing themselves. Whether that's starting a business or whether that's like making a really cool piece of artwork that maybe doesn't sell but maybe it's something that they are really proud of. (The Office founder)

Spatial design played a particular role for The Office (George Pericles, 2013, see Figure 11):

The other interesting thing about the space itself is how the space is designed, not just to encourage casual collisions but also how it makes people feel when they are inside the space, and that there [are] very many subtle things that we have done to the space to make it feel very different from a normal office space in Rwanda. I mean, we have cut all the burglar bars²⁵ off the walls, I mean, there is very few offices in the country that don't have burglar bars... to make you feel very open when you are sitting inside the space. (The Office founder)

4.1.3.2. *Entrepreneurship Support Organizations Move in, as Coworking Works for Some but Not All Entrepreneurs*

The coworking space started with twelve members in October 2012 (Huwart, 2015) in a building in Kigali's wealthy Kiyovu neighborhood. The Office offered hot-desking space to individuals and organizations by daily to yearly intervals. Soon after the launch, the exterior of the building was covered with outsize portrait photos of community members, letting the building stand out from its environment.

During the founder's outreach, he had convinced several organizations to permanently rent office space on the floors underneath the coworking space. Around the time that The Office

²⁵ "Burglar bars" are sturdy metal grids installed in front of house windows to secure a building from forced entry. They are common across Africa and also in Rwanda.



Source: Richard Rusa, The Office Rwanda.

Figure 10: Coworking space with open design and brick walls at The Office, Rwanda

opened, FinConnect, Edify (an entrepreneurship training organization), and Kuzirikana (a locally known social technology startup) moved in as long-term tenants. Each of these organizations would bring their own contacts and activities related to entrepreneurship, which was expected to create mutual benefits. This allowed The Office to take up the building as a whole and created a steady flow of rent revenue.

Regular events (weekly to monthly) were hosted on the building's rooftop. Events were diverse, including talks, innovation competitions, lectures, happy hours, and workshops, but also movie nights, small concerts, and parties.

One of the startups regularly housed at The Office was a software development company that was also a social enterprise. The founder and CEO had been a core part of Tech Youth Rwanda, organizing events with RAED in 2011. She considered kLab but ultimately chose The Office due to the promise of contacts and inspiration that it would bring:

I had been to iHub, I saw that and I had seen our own experience where we needed to be in a place that would support us, not just a physical space... The Office is more about “What does your business really need to survive.” We were the first startup that actually moved in here because what we wanted was a great work environment. It’s not even affordable office space I would say. Six hundred dollars a month, you can get much cheaper space somewhere else, but it was that environment that would allow our team to really innovate, because the initial office space that we had, we were locked up in a box and I would say every day, we were isolated.

She also advocates for the benefits of having organizations with a related mandate close by, going so far as to compare being in the building with being in Silicon Valley:

I spent a lot of time researching on culture and what it takes to succeed... I had done research on why Silicon Valley is what it is, and yes, I would say that everything I read about [it] is quite true, in terms of availability of funding, the willingness to take chances, all of that, and the history behind Stanford... when [The Office founder] mentioned what he was trying to do, I just knew, “Yeah, this is perfect.” [We have] affordable office space upstairs... We have [FinConnect] a company that helps link entrepreneurs to investors right over there, we have [Edify] an incubator and accelerator downstairs... We have a connection with investors because of those guys, I have clients because of people upstairs... and with [Edify] downstairs, they are our business advisors.

Yet, other participants reported that The Office might work for some, but not for all entrepreneurs—especially not for those interested in technology, those without means to afford rent or usage fees, and those uncomfortable with the atmosphere. Several participants described The Office as dominated by expatriates, while others said that there was actually a balance between locals and foreigners. A technology entrepreneur affiliated with kLab shared the missing sense of belonging she feels at The Office:

I’ll go back to using the word “down-to-earth...” no matter your economic background or status, at kLab, anyone is welcome and you don’t feel like anyone is judging you for what you’re wearing because maybe you can or can’t afford, or for what you’re driving, whether you do or not. So, I feel, at The Office, it’s a different class of Rwandan or different class of people who can be able to afford [to] go there... [in] Rwanda [with its] economic disparities, you really do have a majority of the young people that are graduating from universities unable to really even afford the coffee I can buy there for 800 Francs. So, even if someone could pay for them to go to The Office, they would probably [have] a bit of [a] complex then. I think as a startup it’s the last thing you want to feel. So, I think this [here at kLab] really does feel like open door.

Yet, others argued that this was precisely what was commendable about The Office while kLab’s open policy had resulted in a *lack of* “community:”

[The Office] is the best place to be. It’s so overwhelming to be there... I did love the community there... Because they are so cheerful... They are so welcoming... there are lots of things going on there. Anything new in Rwanda starts from there. I think people

are getting to know The Office a lot now... People are like, “Ah, okay. You are going to The Office?” “Yeah.” They are like, “Wow, you are someone” ... If for example you arrive at the airport. You are like, “Where can I work from?” They will tell you: “The Office.” ... kLab is a community but not like The Office. The Office is more professional than kLab... The people who work from The Office already have a foothold in society, and mainly, those who work in kLab are just people from nowhere... At kLab, there are a lot of people coming and others are going out... [I’m not at kLab] because there are a lot of people in there and then for the team to keep up with everyone, it’s just a lot of tasks, because the strangers there... there are those students, and there are those who want to surf. So you don’t know who to make contact with and who to call upon. (Novice technology entrepreneur at The Office)

Finally, some technology entrepreneurs held that The Office does not work for them because, there, it was harder to socialize with fellow software developers:

I cannot work in a space where I’m not surrounded by people who are doing exactly what I do. I like kLab because I come here to meet programmers. Sometimes I don’t even come here to write code. I come here because I know that I will go out to lunch with a bunch of people, and we will be cracking jokes that are really funny in our own world, you know? [Laughter] (Stable technology entrepreneur at kLab)

Ultimately, a limited number of technology entrepreneurs engaged with The Office consistently while many attended events and visited the space occasionally. In addition to Kuzirikana, an expatriate founder of a social technology startup (developing a safety-oriented moto-taxi mobile application) was attracted by Kigali’s quality of life, and thus began to use The Office regularly even though his application was targeted a market outside of Rwanda. A handful of novice technology entrepreneurs participated in Edify’s training program and several trainees and volunteers worked with Kuzirikana. Finally, Fab Founders Rwanda, an informal group of hardware producers, used the space for weekly gatherings. Participants generally had divided opinions about the typical stage at which entrepreneurs were using The Office: some argued that advanced entrepreneurs who can afford the fees and know how to make use of The Office’s diverse contacts tended to be better represented, while others reasoned that it is a place to start out and develop ideas.

4.1.3.3. *Expansion of Reach, Coordinating a Wide Range of Actors*

As The Office evolved, it increasingly emphasized its goal to have reach beyond its space, approaching the vision of being a network infrastructure (cf., 2.1.4.). The founder felt

that The Office should differentiate itself from other entrepreneurship support organizations, and avoid duplicating their efforts. He began to identify a potential “silo effect” of coworking itself, and thus underlined that The Office was meant to be an interconnection point in a wider “cohesive and collaborative ecosystem that is churning out world-changing people and innovations” (Coworking Africa, 2015), stretching out across Kigali and beyond:

And so [if we were to provide incubation] in a sense, instead of creating an ecosystem in the city that’s innovative and creative, we will end up creating these silos. And that’s what you see in many of the other ecosystems on the continent... you find that these different innovation hubs, they are oftentimes competing for the same money and they are competing for the same PR and recognition and credibility... so what I am doing is I am building an institution that will never engage in the zero-sum game. So essentially we are never competing with anybody in the city for anything. We are providing office space and we are creating a space for people to come together and do whatever they want. We are creating a space where [Edify] can come in and leverage the rest of their community in the building, and leverage our entire network and then provide a service that’s actually useful to our community as well.

Taking this idea further, the founder later started referring to The Office as a “hub of hubs” (Coworking Africa, 2015).²⁶

He also engaged in a broader conversation about hubs and entrepreneurship support in Africa. The Office wanted to “collaborate by example,” increasing the rate of interactions between diverse actors, even though its founder felt that kLab at times undermined this effort (Huwart, 2015). The founder also published a widely read opinion piece with the title “Why ‘Help’ Is Hurting Africa: Stop ‘Helping,’ Start Doing,” underscoring that entrepreneurship support, in his view, needs to be grassroots-driven, privately-run, and self-funded by entrepreneurs. kLab, as a government-subsidized entity providing work space for free, was seen by some participants affiliated with The Office as unfair competition. These participants also perceived kLab’s zeal for media mentions and its focus on attracting certain numbers of members and startups as counterproductive and damaging to support structures in Kigali. kLab was seen to refrain from collaborations, taking credit for ideas and successes that were not its own, and

²⁶ I had used this expression in a November 2014 blog post (Friederici, 2014d). It is possible that The Office’s founder adopted the phrase.

enticing entrepreneurs (especially successful ones) away from other entrepreneurship supporters such as The Office.

4.1.3.4. *State at the Time of Fieldwork: A New Site for Technology Entrepreneurs*

At the time of fieldwork, The Office was about to launch a coworking outpost in the Kacyiru neighborhood, near kLab and in the same building as the upcoming incubator LaunchIT. For the founder of The Office, this was a good example of the organization's expanding mandate:

The way I expressed it was that, having one tech innovation space in Kigali is fantastic, having three is probably fantastic, but having twenty is not. At some point there is a fallacy of composition: you need to have dynamic spaces [but] if you had an innovation space that has three people working in [it], it's not very dynamic... They want to create an ecosystem around their entrepreneurs, they don't just want to have their entrepreneurs in sort of like a little bubble... They want them to have these collisions as well and so rather than trying to build this separate ecosystem, this separate silo... we came up with an arrangement... anyone in their incubator can come work out of our building here and anyone from our building here can go work out of their incubator. So we are basically creating a natural bridge between our two communities. And in addition to that we are aligning our incentives such that the better [LaunchIT] does, the better that we do and vice versa... we are trying to create this win-win relationships across the city and in so doing, we are... getting more and more macro with how we are approaching the ecosystem. We are basically trying to connect up all the dots and create these incentives such that it makes sense for everyone to work together.

The Office's Kiyovu site also raised money to fund a roof for its event site on top of the building, to be able to screen movies and hold larger events more regularly and predictably. It increasingly engaged with social enterprise circles, and continued its focus on art, music, and fashion. As one of the first African hubs, it became part of the Impact Hub network in 2015.

In sum, The Office largely kept a consistent focus on being a connection node between diverse entrepreneurial actors. Still, its emphasis shifted from an initial focus on coworking and resident small businesses towards being a "hub of hubs," using events to loosely interconnect and inspire a wide range of actors, mainly from the social entrepreneurship field and creative sectors.

4.2. Harare (Zimbabwe)

4.2.1. Technology Entrepreneurship in Harare

4.2.1.1. *Country Context and Technology Sector*

Harare, Zimbabwe's capital, has about 1.6 million inhabitants and is now the nation's cultural and industrial center, following the decline of Bulawayo's manufacturing industry ("Bulawayo," 2015, "Harare," 2015). The city is spread out but most roads are paved and traffic outside of the city center is mostly manageable, leading to commute times of 30 to 60 minutes between different parts of the city.

Political tensions and economic instability have plagued the city as the nation, and technology entrepreneurship is no exception. Zimbabwe's short history since its independence in 1980 has been tumultuous. President Robert Mugabe's contested land redistribution campaigns, beginning in the late 1990s, sparked a series of UN sanctions and withdrawal of international support, which ultimately contributed to a steep economic decline during the 2000s (Balint & Mashinya, 2006; C. J. Richardson, 2005). Mugabe has established a distinct form of authoritarian, nationalist, and populist governance, focused on redress for colonialism, which has kept him in power and the opposition in check (Jenkins, 1997; Maclean, 2002; Ndlovu-Gatsheni, 2009).

Arguably, the country's suspended development process has made "survival" and "necessity" the dominant rationales in Zimbabwe's economic life (Jones, 2010), so that entrepreneurship is ubiquitous, but it is rarely of the long-term- and growth-oriented kind. Generally, economic conditions are poor and evidently worsening. The government in 2013 passed the Zimbabwe Agenda for Sustainable Socio-Economic Transformation (Zim Asset). The reform program includes general provisions in support of the national technology sector, but participants were skeptical that it would have any palpable effect on technology entrepreneurship.

Frustration with this state of affairs and a general sense of distrust among economic actors were ubiquitous during fieldwork. In interviews, participants were frank and upfront, sometimes even confrontational, and they were much more at ease to openly criticize others than in Kigali or Accra. Overall, they were cynical about the possibilities of positive change and an improving economic outlook. The old guard of revolutionaries was seen to be in charge of the levers of the economy, paralyzing corporations, banks, and government agencies. Moreover, participants highlighted that incumbent and larger firms are hardly ever willing or able to partner with startups or to become customers, because they do not trust upstarts or have convoluted hierarchies and decision making processes.

Yet, by far the most widespread challenge mentioned by participants was a lack of entrepreneurial skills and mindset. Some local universities were seen to instill an acceptable level of technical skills, but the participants noted that Zimbabwe's education system did not prepare students to start their own venture. Participants also spoke of a culture of formality and professionalism, which encourages getting a degree and a stable job, but not founding a technology venture. Qualified mentors were also extremely scarce, seemingly a result of the scarcity of successful technology entrepreneurs that could play such a role. Risk-oriented investors were absent.

The country's technology sector was dominated by Econet Wireless, a regional telecommunications group and Zimbabwe's leading mobile operator. The corporation's founder Strive Masiyiwa and his wife Tsitsi are national celebrities and influential figures, notwithstanding long-standing fights with the government over the regulation of Zimbabwe's telecommunications market (Goodstein & Velamuri, 2009; Takavarasha & Makumbe, 2012). Vis-à-vis technology startups, participants mainly saw Econet as the entrenched incumbent, which some even accused of stealing business concepts or bullying them into unfavorable deals.

In the Internet and mobile software and application market, there were only a few startups or established companies that were sustainable. It was noteworthy that smaller technology startups were mostly not orientated at creating product innovations and instead offering content, usually through blogs, information portals, and social media. Some small-scale software development, web design, and digital consulting companies also existed. A handful of startups could be described as companies with a digital product innovation having sustained themselves for some time. These companies provided small-scale services responding to local market niches.

4.2.1.2. *Support Structures for Technology Entrepreneurship Beyond Hubs*

The 2012 VentureOut initiative, running small-scale events and gatherings, marked the first inkling of a technology entrepreneurship support structure. While VentureOut meet-ups ceased already in 2013, the VentureOut Challenge, a small-scale startup team competition, continued to be organized annually, later rebranded as the IAZ Venture Cup.²⁷ The Challenge is run by High-Tech 263²⁸, a well-known Zimbabwean technology and startup-oriented blog. The popularity of the IAZ Venture Cup had been increasing quickly, with the number of applications multiplying from 43 in 2013 to more than 100 in 2014. The organizers reported that about 20% of previous finalists had continued operations.

High-Tech 263 and the IAZ Venture Cup were closely affiliated with Startup Zone, a private coworking space. In effect, a handful of startups were paying rent to occupy rooms in the private home of the Startup Zone founder in Mount Pleasant, a residential neighborhood close to the University of Zimbabwe. The founder ran his own technology startup, EatOut, an online delivery service and culinary event organizer. High-Tech 263 and one other startup became long-term residents. The companies share fiber-to-the-home Internet access, providing

²⁷ IAZ is a local Internet service provider that is sponsoring the competition. It was recently acquired by Econet, which means that, indirectly, both the IAZ Venture Cup and Muzinda Hub are funded by Econet (cf., 4.2.3.1.).

²⁸ +263 is the country calling code of Zimbabwe.

them with among the fastest connections available in Zimbabwe. Residents cherished the “energy” and peer-mentoring that they would obtain:

I loved the energy of being around like-minded people... the peer-to-peer review or the conversation. If you are working with a whole lot of people and not co-founders... if people are just there for a salary then... that disconnect is really, really big. (Startup Zone-affiliated technology entrepreneur)

While most startup support initiatives in Harare were criticized by some participants, Startup Zone was an exception, lauded almost universally. Directly in line with arguments for bottom-up incubators (Bøllingtoft, 2012), entrepreneur-organized and funded entrepreneurial coworking and peer mentorship appeared to be the least contested setup for support structures. In fact, Startup Zone and High-Tech 263 had refused funding offered by international NGOs in support of their startup support work. Yet, informants also mentioned some limitations: by design, the entrepreneurs able and willing to afford to be at Startup Zone formed an exclusive, like-minded, tightly-knit group, inaccessible for most novice entrepreneurs.

Another widely commended initiative was Pitch Nights, a monthly event where entrepreneurs present business ideas (see Figure 11 and Figure 12). Informants described Pitch Nights as a rite of passage for Harare-based entrepreneurial teams turning into a startup. Pitch Nights and The Basement (where the events are hosted) are projects by Emerging Ideas, a local accelerator providing mentorship and contacts without offering physical office space. Emerging Ideas had not yet funded and directly supported an Internet or mobile software startup at the time of field studies, but technology entrepreneurs regularly participated in Pitch Nights.

Notably, most of the support structures existing at the time of fieldwork had been created over a short period of time. All previously mentioned initiatives as well as Hypercube Hub and Muzinda Hub were launched between 2012 and 2014; both hubs launched at the end of 2013. Some participants argued that this was a bandwagon effect: as the IAZ Venture Cup was initiated and local actors saw examples of hubs and other support structures emerge across



Source: Author.

Figure 11: Participant provides feedback at Pitch Nights in Harare



Source: Author.

Figure 12: Zimbabwean businessman giving entrepreneurship advice at Pitch Nights

Africa, a race to be at the forefront of the local technology entrepreneurship scene ensued (cf., 4.2.2., for Muzinda Hub's self-promotion as Zimbabwe's "first technology and innovation hub"). In these participants' views, the quick emergence of support structures does not necessarily mean that they are needed or effective (cf., 4.2.2.3. for an opposing view from the Hypercube leadership). Members of Startup Zone and especially High-Tech 263 expressed discontent with international development organizations meddling with the Zimbabwean technology entrepreneurship landscape, pressing locals to found what became Hypercube Hub.

4.2.2. Hub Case Study: Hypercube Hub

4.2.2.1. *Founding Process and Original Vision*

Hypercube Hub's founding process was as an intricate back and forth of conversations between international development funders and Harare-based actors in the technology and media sectors. In 2011, the manager of IT Fix (the local franchise of an international IT support company) and a Zimbabwean crowdfunding expert had begun informal conversations about establishing a hub in Harare, inspired by the examples of other hubs in Africa. At the end of 2012, a representative of Magnito Fund (a UK-based development funder focused on technology and social impact) started several informal conversations with actors in Harare, gauging interest in, and signaling intention to fund, a social change-oriented innovation hub. Among the actors she approached was the founder of ZimConvo (a local social media startup) who had previously nurtured the idea to start a local hub modeled after Nairobi's iHub:

In late 2012... I didn't even know about their existence [of the ultimate hub funders]. In my head, I was like "iHub," because iHub is like this beacon of light for some people. I haven't been, but iHub is this place where all these techies meet and I thought: "Well, why can't we have our own iHub, and why can't we have iHubs across the country?"

Following a number of separate conversations, the founders realized that significant funds would be needed to make their vision a reality, and decided to combine forces. In parallel, Magnito Fund was joined by another agency interested in funding a hub in Zimbabwe: Funas, an international organization looking to tackle societal problems. Finally, the US Embassy in

Harare also contributed funds and acted as a coordinator of funds and the competitive proposal process. The three funding organizations ultimately published a joint call, contributing a total of approximately £110,000.²⁹

The ZimConvo lead reached out to the IT Fix manager and the crowdfunding expert, and the team of three started work on a detailed concept for a hub. The concept was geared towards the interest that the funding organizations had articulated: technology, job creation, social entrepreneurship, and female entrepreneurship. The (male) team further engaged the (female) lead of a local media company, an app developer, and a (female) young social development and innovation graduate. Increasing the diversity of the team in terms of gender, ethnicity, age, technical backgrounds, and credibility among grassroots technologists was meant to improve the chances of winning the impending call for proposals. Further, a plan for self-sustainability after the end of grant funding was included as this was another selection criterion. As Magnito Fund was preparing the call in 2013, other local actors also became interested in applying, including a group assembled by a local technologist, who later became part of Muzinda Hub. While the call was open for competition and several bids were received, the IT Fix manager's team was ultimately awarded the Hypercube grant in September 2013. The team (now consisting of six members) formed Hypercube's board.

Both funders and founders were meant to enhance Hypercube's offerings. The US Embassy in particular promised to help attract US-American speakers for Hypercube events and build the hub's international standing. ZimConvo was to function as an event collaborator and IT Fix to provide technology support.

²⁹ This sum was calculated based on the initial information published by Magnito Fund exchange rates at the time of the award. A later blog post by Funas indicates a total funding amount of \$280,000, suggesting that an additional sum might have been awarded after the original funding round.

Interviews with the founding team showed that, from among the original missions of the six hubs covered in this study, Hypercube's was closest to iHub's and the network infrastructure vision (cf., 2.1.2. and 2.1.4.). The team nurtured an elaborate mental model of an "ecosystem" which Hypercube would coordinate. The hub's mission was to support and integrate the technology entrepreneurship ecosystem of Harare and Zimbabwe at large, which the team understood to consist of technology entrepreneurs, software developers, knowledge workers, international development organizations (like UNICEF and UNDP), government, social media outlets, universities, and large corporates. Like in iHub's case, a "community" of local entrepreneurs and software developers was envisioned to be at the heart of the ecosystem and in need of support first, before wider connections would be enabled.

Interviewer: So you distinguish ecosystem from community?...

Respondent: Yeah, because I think community [is] initially what we were focusing on... the people, the developers, the entrepreneurs, the designers, you know, like that was like a community... But then, when you take it a step further—I guess, when you look at it holistically—they are just part of that ecosystem. So we are connecting them to corporates... government... media... foreign markets... So you can see, it's quite networked but the issue is that [in Zimbabwe] these networks haven't been established as yet fully. So that is when we realised that our work is beyond just rushing and be like "Oh, let's start an incubator." I mean, [how can] you start an incubator if there is no system? (Hypercube Hub founding team member)

Another founder explained that the team was also explicit about the 'hub' function: he compared Hypercube to "London Heathrow or JFK" (John F. Kennedy airport in New York City), providing a "landing and then people can go elsewhere."

In addition, Hypercube emphasized social development goals such as the inclusion of women in technology. However, several team members expressed that, while they agreed that these were worthy causes, they mainly included them because funders had proposed them as selection criteria.

To allow Hypercube to be a 'hub,' the team carefully selected a location that would encourage "foot traffic" (in the words of one of the founders). Hypercube thus occupied a building in the wealthy neighborhood of Avondale, located at a main road connecting the University

of Zimbabwe and Harare's central business district. The location is close to a large and popular shopping mall, and several development organizations have offices in the area, including Funas. The ground floor of the building was made available as a coworking space with hot desks, while a marquee in front of the house was set up for larger events (see Figure 13). Benches on the front lawn also doubled as meeting space.



Source: Author.

Figure 13: Hypercube Hub building with marquee for events

4.2.2.2. Events Make Hypercube Known and Regular Users Join, while Doubts Remain

Hypercube launched in November 2013 as Harare's second innovation hub after Muzinda Hub, but it quickly became the most prominent one. Its initial focus was on running large events, which became milestones for the hub and for its role as an "ecosystem" coordinator.

The first event milestone was the visit of Travel Founder in November 2013: Zimbabwean entrepreneurs could apply to participate in a tour across Southern Africa, working on

mobile applications. While no interview participants reported that startups formed out of the initiative, several mentioned that it signaled that “something was happening” in Harare’s activity-starved environment.

Hypercube then hosted Zimbabwe’s first Startup Weekend in May 2014, which interview participants felt was a successful event. At least one startup formed which was still pursuing its business at the time of fieldwork. Yet, most participants felt that the Startup Weekend was first and foremost an important learning and networking exercise. The Weekend was also the first event that gathered a wider group of individuals interested in technology entrepreneurship, beyond the smaller more technically oriented groups that VentureOut had convened (cf., 4.2.1.2.). One disappointment for some respondents was that the Startup Weekend had advertised prizes “worth” around \$70 thousand, while the winning teams ultimately received only small amounts of prize money in addition to ad hoc coaching by Hypercube board members.

Following its mandate to support female technology entrepreneurship, Hypercube next hosted the Technovation Challenge in June 2014. Women in ICT Zimbabwe, a local advocacy group, ran the event with the aim to support and educate girls to be able to take up software development. Five girl application developer teams formed during the initiative, some of which later continued their work with support of a local technology company. Interview participants described a productive exchange between Women in ICT Zimbabwe and Hypercube: the advocacy group’s work congealed a story that attracted media attention for the hub, while the group was able to use Hypercube’s professional event infrastructure and coworking space.

As planned, the US Embassy helped to attract speakers: a representative of the Silicon Valley-based startup Evernote spoke at Hypercube in July 2014. In September 2014, the founder of VC4Africa, a Pan-African startup investor portal and blog, held a question-and-answer session, discussing opportunities and challenges for technology startups across Africa (see Figure 14).



Source: Author.

Figure 14: Question and answer session with VC4Africa lead at Hypercube

Beyond events, the grant allowed Hypercube to offer usage of the space for free over a year-long test phase. Individual software developers and aspiring entrepreneurs without a regular office space started using the space to work or meet clients. Informants saw the provision of free coworking space and bandwidth as an obvious benefit, as many did not have access to other places where bandwidth and electricity would be stable and affordable. Several participants also mentioned instances of spontaneous knowledge exchanges, and some related that meeting others at the hub had given them “energy” and confidence to pursue their startup idea. Yet, apart from about ten to twenty regulars, most developers and entrepreneurs passed through the space irregularly. One entrepreneur described a usage pattern that resonates closely with the

network infrastructure vision of hubs (cf., 2.1.4.): his regionally operating startup relied on Hypercube but also on BongoHive (a hub in Lusaka, Zambia) and the Botswana Innovation Hub (a technology park in Gaborone) as entry points to local technology entrepreneurship scenes.

However, coworking also had its limitations. Notably, several participants mentioned that interactions at Hypercube were not particularly useful because the people they could meet there were unskilled and inexperienced or working on unrelated ideas. Accordingly, working at Hypercube for extended periods of time did not seem to be attractive for more experienced or capable software developers, who were able to afford an Internet connection at home. For example, two software developers described the limits of peer learning if no suitable peers are available:

Those [two advanced software developers] are the only guys I can work with really out of all the ideas... Because some of them are totally divorced from what I'm trying to do and what I'm doing.

Given that lacking skills and resources were widely regarded as the key issue for technology entrepreneurs (cf., 4.2.1.1.), several participants who were not affiliated with any hub questioned Hypercube more fundamentally. Based on their own stories, these informants argued that the priority for aspiring entrepreneurs should be to develop skills and experience, without focusing on events, innovation competitions, and networking. They reasoned that networking is only useful when the interaction happens with someone to learn from, such as an experienced entrepreneur. However, few seasoned technology entrepreneurs were among contacts of Hypercube's board, and so these entrepreneurs had not felt compelled to visit the hub, at least not outside of large events. Channels to customers and partners that the hub could enable were also sparse, such that hub-facilitated networking was limited to other aspiring but inexperienced technologists and entrepreneurs.

Similarly, some respondents argued that most of the challenges that Zimbabwean technology entrepreneurs face are beyond the control of, and have nothing to do with, a hub like

Hypercube. Several participants felt that Hypercube's (and other hubs') leaders were unaware of the immediate and plain needs of local entrepreneurs because they were not entrepreneurs themselves. One participant diagnosed a lack of "soul" and true commitment to technology entrepreneurship on the part of hub leadership teams, while another made a fervent plea that the way that Hypercube and other hubs allocate their resources was misguided:

Respondent: Hubs are trying to build Silicon Valley.... I don't know where they got... their things mixed up.

Interviewer: Why are they getting it wrong?

Respondent: Because people who are leading the hubs have never been in the thick of things. [laughs] So it is sort of a loop. I mean how can they get it when they have never done it?.... Our hubs are run by... anti-entrepreneurs... But there's an entrepreneur who is struggling... We have thirsty people here; they are dying from thirst... The money used for [hub] meet-ups, actually 200 dollars could be enough to empower them to the next stage... The final conclusion was: [the hubs'] resources would be better spent empowering entrepreneurs who are struggling to do things. (Technology entrepreneur in Harare)

Following a similar sentiment, High-Tech 263 started to publicly question the possibility of Hypercube becoming financially sustainable given its initial reliance on donors. In interviews, High-Tech 263 members showed themselves as deeply skeptical of development organizations' intervention in technology entrepreneurship, including the financial support that Hypercube received. In their view, technology entrepreneurship has to be driven by local entrepreneurs. One informant argued that interventions are distracting rather than helpful, and that they "kill the hunger" of locals. Another participant bemoaned that international NGOs guide parts of the "ecosystem" in the wrong direction, thereby fragmenting local groups. This critique resonated with comments made by several participants outside of the High-Tech 263 sphere, noting that a sense of competition had been growing between the emerging hubs and other entrepreneurship support organizations in Harare.

4.2.2.3. *State at the Time of Fieldwork: Reform, Renovation, and More "Process"*

While the Hypercube leadership team remained assertive that accepting donor funds was not by itself problematic, it concurred that self-sustainability was essential for the hub's

future. The leadership acknowledged the criticism by the High-Tech 263 group but felt that technology entrepreneurship in Harare was on the right track:

They [High-Tech 263] have been fairly critical about us. They possibly haven't collaborated with us quite as much as I feel they could have or should have; however, we still continue. We are aware that they are involved in a coworking space [Startup Zone] but we look at that and say, "Well, that just validates how potentially large the tech ecosystem in Zimbabwe can be, that within less than a year of us establishing, we now have up to six coworking spaces and tech hubs." BongoHive in Zambia has been around for three years, and Zambia still only has one tech hub and that is BongoHive. (Hypercube founding team member)

However, the team admitted that Hypercube's mandate and future orientation might be too ambiguous. In one interview, a team member expressed that the leadership might have been too lofty in its approach to the hub. Another Hypercube-affiliated participant characterized funders as "dictating" terms, such as the inclusion of women in technology in Hypercube's agenda. Another described how the team struggled to derive a concrete mandate from the broad vision of ecosystem coordination that the hub had given itself:

I think we needed a lot more focus. One of the challenges that we have been having is there is a lot to do on the ecosystem, too much for any one player to actually do, and it's very easy to get lost in all the things that are happening without actually seeing whether you are having any impact... It's also a function of the idea behind the tech hubs... and the funding mechanism that a lot of the tech hubs have been using, where most of it is kind of social development funds... Is doing a program in high schools in Zimbabwe that teaches kids IT code... part of our mandate? It's not saying that it shouldn't be done, but is it something that Hypercube should do? ... Two or three years down the line, what's going to have come out of Hypercube as an innovation hub? Did innovation actually come out?

The team ultimately decided to focus on startup development, or improving the success rate of participating teams—much like the traditional goal of an incubator (cf., 2.3.1.). Accordingly, the Hypercube leadership wanted to find a revised model to generate a more direct contribution to startup development while also making money for the hub from channels other than donors. At the same time, it felt that the test year had shown that there was interest and demand for a tech-focused hub, while the state of the local scene did not make traditional incubation, investment, and sustainability models viable.

In October 2014, at the time of fieldwork, the Hypercube building underwent a comprehensive renovation. A few entrepreneurs and freelancers continued to use the space to access the Internet (see Figure 15). Upon completion, Hypercube was set to introduce a structured support process and charge for usage of the hub according to a tier system. Entrepreneurs were planned to be able to choose between on-demand usage of the coworking space and join a startup building process centering on regular, facilitated peer-mentoring sessions. In regular intervals based on milestones, teams were envisioned to receive feedback and validation from mentors and other community members. The upstairs area of Hypercube's building was meant to be office space for founders of somewhat more established startups such as ZimConvo, who would also act as informal and ad hoc mentors. In addition, the leaders of Hypercube and Muzinda Hub founded a local association of hubs and coworking spaces, to counter the signs of fragmentation that had occurred. At the time of fieldwork, only one informal session had been held, in which Startup Zone had not been included.

However, Hypercube's ambitions did not come to fruition. Following fieldwork through most of 2015, the hub was operational. Yet, towards the end of the donor funding period, the Hypercube team did not deem it feasible to financially sustain the implementation and ultimately closed the hub in December 2015. A Hypercube team member was quoted with the following statement:

The truth is that Hypercube has been facing challenges for quite some time including ensuring we had the right team to execute our mandate, underestimating the turbulent Zimbabwe economy, failure in implementing adequate policies and procedures to support our growth, significant delays in the little income we were receiving to cover operational expenses, and adapting our business model quickly enough to reflect the realities of the Zimbabwe marketplace. (Jackson, 2015b)

In sum, Hypercube's story started with influences from abroad, both through donor representatives coming to Zimbabwe and through the inspiration that the founding team took from iHub and other African hubs. Yet, facing criticisms and challenges in enticing entrepreneurs to



Source: Author.

Figure 15: Hypercube coworking space during renovation period

use the space regularly, Hypercube intended to move much closer to a traditional incubator approach, in part to make its impact on developing startups concrete and measurable. Ultimately, this approach was not financially sustainable because of too low interest, capacity, and resources on the part of technology entrepreneurs in Harare.

4.2.3. Hub Case Study: Muzinda Hub

4.2.3.1. *Founding Process and Original Vision*

Muzinda Hub (initially Muzinda Umuzi Hub) was initiated and funded by Higher Life Foundation, a social impact organization that finances education for children in hardship. The foundation is chaired by Tsitsi Masiyiwa, the wife of Strive Masiyiwa (cf., 4.2.1.1.). Econet, its employees, and the Masiyiwa family are the major funders of Higher Life Foundation.

Interviews provided conflicting accounts of how Mrs. Masiyiwa arrived at the proposal to set up a hub in Zimbabwe. While one participant described the process as entirely Masiyiwa's initiative, another indicated that the CEO of a Zimbabwean software development company planted the idea in a conversation. In the latter account, the CEO had been inspired by Nairobi's iHub and (what he perceived as) its large and growing contribution to Kenya's digital economy.

It remains that Masiyiwa informally suggested the notion of a hub to the Higher Life board. The foundation's leadership saw unemployment as a pressing problem in Zimbabwe and felt that the country's high and rising mobile penetration and high literacy rates (as an indicator for basic education) represented an opportunity. Broadly, Muzinda Hub was meant to interconnect 'technology,' 'social impact,' and 'entrepreneurship' to generate startups and solutions that could solve social problems, generating employment in the process. Relations between entrepreneurs and government ministries and universities were also supposed to be enabled.

The Higher Life leadership also felt that a hub would be in line both with the foundation's social purpose and with Econet's long-term, broader interests in developing the technology sector of Zimbabwe:

No doubt [having the hub is] smart business... The future is definitely not in voice, it's in data, it's in broadband. But you see, for one to be able to push broadband and data, you need a very strong ecosystem that consumes the product. So for Econet this is not just charity work... Econet's interest is to have a very strong [pause] I don't know what we will call ours, "Savannah Valley." (Member of Muzinda Hub leadership)

From interviews, it did not appear that the hub's implementation model had been developed in more detail than such broad ambitions. The hub was simply meant as a place for entrepreneurs to meet and collaborate, while benefiting from office space and bandwidth. "Muzinda" is a Shona³⁰ term meaning "homely place" or a "king's homestead." The hub manager and potentially board members and Econet staff were envisioned to provide mentorship.

³⁰ Shona is one of two dominant languages in Zimbabwe.

Muzinda Hub occupied a medium-sized residential house in Harare's Strathaven neighborhood, with one large and a handful of smaller rooms that were converted into office and meeting space. Higher Life Foundation representatives became the hub's board, choosing an implementation team composed of Zimbabweans with backgrounds in business support, software development, entrepreneurship, and social development.

4.2.3.2. *Low Resonance with Entrepreneurs and Lacking Direction for Implementation*

Muzinda Hub opened in October 2013, shortly before Hypercube's launch, making it a point to have launched as Zimbabwe's first technology innovation hub. The hub employed an executive director to liaise between hub implementation and the board, as well as two managers: an incubation specialist and a local technologist. The latter had earlier been part of an unsuccessful bid for the Hypercube grant (cf., 4.2.2.1.).

Muzinda initially organized two social change-oriented hackathons, meant to spark attention and surface candidates. However, the hackathons did not resonate as well as expected, and only few technologists and entrepreneurs showed interest and readiness to form startup teams and join the hub permanently.

Several individual entrepreneurs and freelancers used the hub space occasionally, but the hub's location in a residential neighborhood and detached from public transportation added a logistical challenge for university graduates and students. Among the regular users of the hub space were two small startup teams. In interviews, the entrepreneurs reported to have received occasional coaching by the hub managers, but largely attributed value only to free use of the hub space. Both products had been developed independently of the hub, before these entrepreneurs started using the space regularly. Still, the Muzinda leadership repeatedly mentioned the two teams as the hub's primary successes, even if the concrete value that Muzinda Hub added to these startups was never assessed or specified. In one interview, a member of the Muzinda

Hub leadership spoke of seven startups that Muzinda had incubated; however, managers were not able to identify which seven teams could be meant.

The external perception of Muzinda Hub was strongly shaped by participants' views of Econet's role. Some informants argued that Muzinda was a separate, well-intended, and relevant Higher Life Foundation initiative, where goals are related to social impact but not to Econet's financial bottom line. Others speculated that Econet had a longer term business interest in supporting talented knowledge workers and entrepreneurs who could later be recruited, but added that this was fair game and ultimately beneficial for both Econet and Zimbabwe. Skeptics outlined how Econet was out of touch with grassroots technology entrepreneurship. These respondents felt that there was a risk that Muzinda could become a mere innovation procurement channel, where entrepreneurs' projects are absorbed by the corporation without being nurtured as independent companies.

4.2.3.3. State at the Time of Fieldwork: A Radical Shift from Hub to Impact Sourcing Provider

Soon after the early disappointments, the Muzinda Hub's leadership team and managers started to deliberate how to reorient the hub. In fact, interview participants mentioned that internal discussion had quickly yielded a resolution that the hub should not be sustained in its initial form. The hub ceased outreach or self-promotion, while allowing entrepreneurs who were already using the Strathaven house to continue doing so. Publicly, Muzinda Hub's leadership described the first year as merely a test phase, arguing that a shift in emphasis had always been a possibility.

In particular, Higher Life Foundation was dissatisfied with the small number of entrepreneurs that Muzinda Hub could support. Two or even seven startups did not appear to be anywhere near an acceptable scale for the Foundation's ambitions, given its far-reaching goal to tackle Zimbabwe's devastating unemployment problems. Interviews revealed that Higher Life Foundation instead compared itself to other large philanthropic organizations, specifically

the Rockefeller Foundation, which had recently announced a “Digital Jobs” initiative meant to “impact 1 million lives in six countries in Africa by catalyzing sustainable ICT-enabled employment opportunities and skills training for high potential but disadvantaged African youth” (Rockefeller Foundation, 2013, p. 1). With this frame of reference, Muzinda’s potential outcomes appeared unimpressive.

Other interview participants questioned this rationale. These informants were convinced that technology entrepreneurship is not about numbers or quantity, but about quality. They bemoaned that, in their view, Higher Life Foundation did not make a serious and long-term commitment to nurturing “big apps,” that is, technology startups with exponential growth potential.

Still, following Higher Life’s wishes, Muzinda Hub changed direction and now aimed to train many individuals instead of incubating few startups. Higher Life Foundation made a larger space available in Vainona (see Figure 16 and Figure 17), a neighborhood in the Northeast of Harare, close to the University of Zimbabwe. Muzinda engaged a business development consultancy to conceptualize a new program.

A new goal was set: to educate 1,000 university graduates in applied software development and startup skills while also inculcating them with an entrepreneurship mindset. Participants were envisioned to develop functional software and applications for projects outsourced by large corporates such as Econet. Having participants work for corporate customers was meant to generate a revenue stream for the hub but also give participants applicable skills and contacts, thereby equipping them to become employees in the technology sector or to start software companies on their own.

In sum, Muzinda Hub had initially been inspired by iHub, and first attempted to be an organization that fit the definition of a hub (cf., 3.3.3.). Yet, its leaders had only a loose idea of how a hub works and how it could be made a reality. When they saw that impact on the scale



Source: Author.

Figure 16: Muzinda Hub's new facility in Vainona, a suburb of Harare



Source: Author.

Figure 17: Muzinda's new facilities have been used as a training center for students

and of the kind that they had imagined would take time or remain elusive, they made a radical shift towards large scale. The new approach was favored as it would be easier to communicate by showing high output figures, like numbers of course participants or graduates. The leaders felt that a mass-oriented skill building program would be more “tangible.”

Muzinda Hub’s revised setup, envisioned at the time of fieldwork, does not conform to the definition of a hub adopted for this thesis; the new ‘hub’ would be more akin to an impact sourcing provider (Rockefeller Foundation, 2015); that is, a combination of a training center and an outsourcing firm with a social purpose. Therefore, Muzinda Hub will be treated as an abandoned hub initiative in the remainder of the thesis.

4.3. Accra (Ghana)

4.3.1. Technology Entrepreneurship in Accra

4.3.1.1. *Country Context and Technology Sector*

Following Ghana’s liberalization policies throughout the 1980s and 90s, Accra’s economy has become increasingly globalized and internationally connected (Ammassari, 2004; Globalization and World Cities Research Network, 2011; Grant, 2009). The city’s population has grown rapidly to about 2.3 million (“Accra,” 2015), and its economic geography has been fragmenting and diffusing in the absence of urban planning (Grant & Yankson, 2003; Larbi, 1996). Depending on the time of the day, commutes between different parts of the city can take 45 minutes to several hours in thick traffic.

Compared to other African capitals, Accra’s technology sector is fairly old, dense, and established (Zachary, 2004). In part, this is due to Ghana’s longer history of academic institutions with a focus on technology. Notably, the “African father of the Internet,” Nii Narku Quaynor, is a known personality in Ghana as one of the first Africans and the first Ghanaian to hold a computer science degree, and the founder of Ghana’s first computer science department at the University of Cape Coast in 1979 (New African Magazine, 2014). The legacy of technology-

orientation in academia was continued by the University of Ghana (in East Legon, Accra), the Kwame Nkrumah University of Science and Technology (KNUST, in Kumasi), and the Advanced Information Technology Institute at the Ghana-India Kofi Annan Centre of Excellence in ICT (AITI-KACE, in Accra). KNUST in particular developed into one of the leading technically oriented universities in Sub-Saharan Africa, while Ashesi University, a private liberal arts college at the outskirts of Accra, established a reputation as Ghana's elite business school. Thus, with several universities focusing on applied software development skills and partially on entrepreneurship training, at the time of fieldwork, an active and large, if fragmented, group of software developers and technology companies were based in Accra.

Also the telecommunications sector is growing faster and it is more competitive compared to other African nations (Oxford Business Group, 2016), following liberalization and privatization reforms during the first decade of the 2000s (Frempong, 2010). Participants described a diversified and active landscape of technology corporates and established businesses, while it was mostly seen as disconnected from younger technology entrepreneurs. In interviews, two established entrepreneurs argued that they had little to gain from interacting with more junior peers, and that, in Ghana's "reputation-based economy," they were forced to focus their networking efforts on government representatives or established businesspeople.

This also meant that skills gaps were more specific than for Kigali and Harare. Informants reported that many software developers with basic coding skills were active in Accra, but more specialized programmers, such as e-commerce experts, were missing. Moreover, several respondents noted that there was a "missing middle" in the level of skill of software developers: these participants maintained that excellent developers were rare and thus in high demand, commanding high wages, while the majority of programmers were able to develop basic digital products but not live up to quality standards of the Global North.

Beyond skills, aspiring technology entrepreneurs in Accra were seen to lack cognitive skills and entrepreneurial attitudes which participants felt were essential. Specifically, respondents noted that too many novices were “talkers but not doers” (Baidoo, 2015): young entrepreneurs were seen to miss a sense of urgency, persistence, critical thinking, ambition, and dependability, often focusing on marketing themselves rather than creating value by building viable digital products. Participants argued that this was the reason why events, prizes, and innovation competitions had been very popular across Accra. While vague, this diagnosis seemed to be a particularly consistent finding, mentioned independently and without my prompting by seven participants with widely varying organizational backgrounds and levels of experience. One participant went so far as to argue that “Ghanaians settle for mediocrity,” and another reasoned that Ghanaians, as other Africans, “celebrate their successes too early” before they are “real” successes (both of these participants are themselves Ghanaians).

In a stark contrast to Harare, participants in Accra claimed that the Ghanaian government should get more involved to support technology entrepreneurship, for instance, providing startup grants or funding support structures. The Ghanaian government has indeed sought to increase its support for technology entrepreneurship, mainly through the \$10 billion mega project Hope City, but the effort has been delayed (Vourlias, 2015), and thus this particular government initiative did not appear to be relevant to interviewed participants.

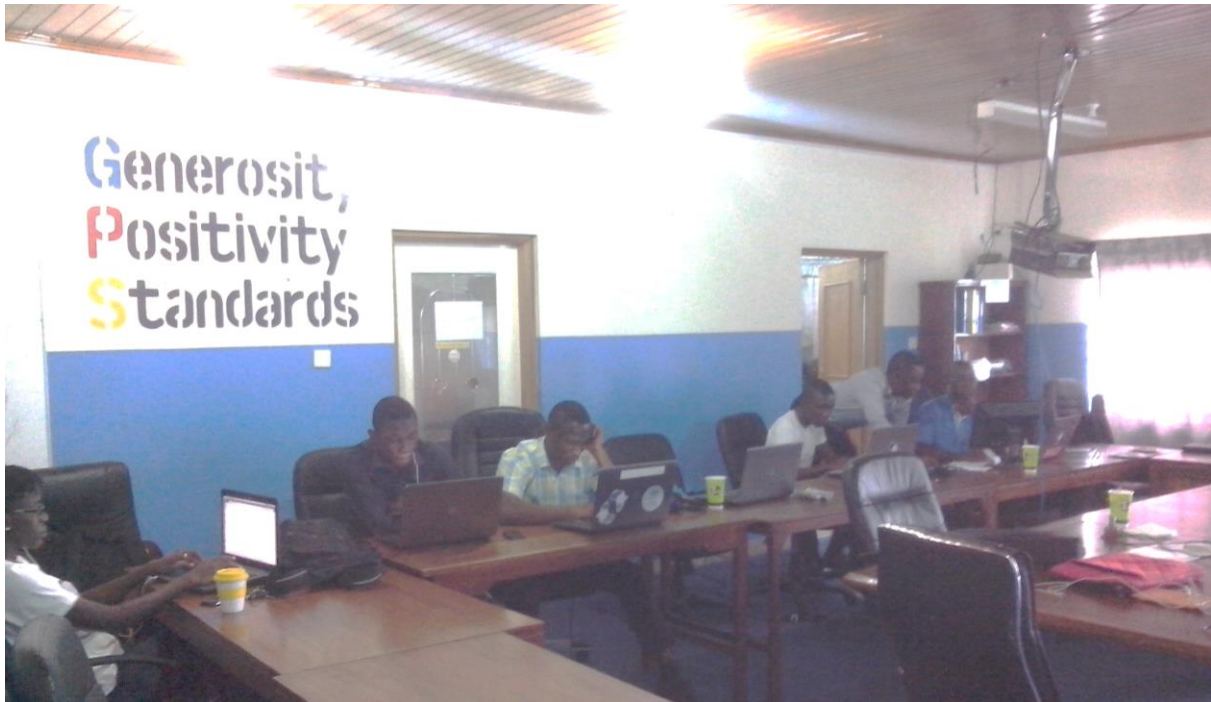
4.3.1.2. Support Structures for Technology Entrepreneurship Beyond Hubs

Also the history of support structures for technology entrepreneurs in Accra dates back much further than for Kigali or Harare. Namely, the first initiative of note was Busy Internet, founded in 2001. Busy Internet started as an Internet café, but it soon became a central gathering point for Accra’s technology scene (Zachary, 2004). Several more experienced technology entrepreneurs recounted that during the 2000s, Busy Internet convened the few dedicated and competent technologists of Ghana, who sought to use high-speed Internet which they could not

access elsewhere. Busy Internet is located at the Ring Road in Kokomlemle, which is a central, convenient node in Accra's urban geography, making it a particularly appealing meeting point even for unaffiliated technologists and businesspeople. As its core business, however, Busy Internet is today a premium Internet service provider, and thus not explicitly focusing on supporting technology entrepreneurs.

Instead, the Meltwater Entrepreneurial School of Technology (MEST) became the most widely noted entrepreneurship support organization in Accra. MEST was established in 2008 with US\$20 million of funding from Meltwater Foundation, the philanthropic arm of Meltwater, a San Francisco-based media monitoring company. In the following years, the in-depth training and incubation program led to the creation of several software startups that were considered African success stories with international exposure (Butcher, 2012). MEST occupied a gated compound and a large house in Accra's East Legon neighborhood, close to the campus of the University of Ghana.

While it has often been discussed as a "hub" (e.g., Gathege & Moraa, 2013), MEST (2016) describes itself as "school and incubator" (see Figure 18 and Figure 19). MEST is selective and explicitly aims to nurture an exclusive group of trainees and incubatees. MEST also brokers connections between startups and external partners, often drawing on its contact network in Silicon Valley. MEST provides support almost exclusively to client startups, with the exception of making space available for occasional incubatee-organized startup events. Incubator fellows provide coaching and advice to startups, and take on labor-intensive tasks and chores. Given its selectivity and standardized, hands-on, and client startup-focused support process, MEST fits with the common understanding of networked incubators (Bøllingtoft & Ulhøi, 2005; Hansen et al., 2000), and was thus ultimately excluded as a hub case (cf., 3.3.3.).



Source: Author.

Figure 18: MEST trainees are educated in a school-like setup



Source: Author.

Figure 19: MEST's incubator defines itself through its startups

While participants widely acknowledged MEST as Accra's foremost technology entrepreneurship support organization, it was seen to have few ties to other organizations in Accra or to technology entrepreneurs outside of its incubatees and trainees. Only few individual MEST-supported entrepreneurs appeared to engage with hubs and hub-affiliated entrepreneurs on occasion.

Aside from MEST, in the early 2010s, the Accra chapter of the Google Developer Group (GDG) became an important support structure for technologists. With small amounts of funding from Google, the group ran events for software developers. Participants involved in the initiative reported that the group for some time became one of the largest and most active GDG chapters globally. Entrepreneurial and startup topics were also debated within the group, but respondents said that this fell short of mentoring or coaching. Several chapter leads became active technology entrepreneurs or supporters, including one of the managers of iSpace.

In contrast to Kigali and Harare, a formalized group of angel investors existed in Accra, the Ghana Angel Investor Network (GAIN), founded in October 2013. While the group had not made investments in startups developing digital products at the time of fieldwork, the existence of the group created a sense of possibility for many participants. This was notable because several informants argued that angel investors were the most essential and suitable support channel for entrepreneurs in Accra, more important than hubs or MEST. These participants—mainly experienced entrepreneurs or investors—referred to above-mentioned issues in Ghanaian's entrepreneurial spirit and startup development capacity, claiming that only hands-on, regular mentorship by an angel investor, committed to the enterprise because of his/her equity share ("aligned incentives"), could bring about the change in outlook that aspiring technology entrepreneurs needed.

This line of argumentation led some informants to a direct critique of hubs, reasoning that hubs can build skills and connect entrepreneurs, but that entrepreneurs can "get lost in the

community stuff.” Hubs were seen to face inherent limitations when it comes to the provision of capital and hands-on mentoring, instead offering only lightweight support:

Hub Accra is just like, you become a member... you’ve got a network of people you can chat with and connect with: you collaborate loosely. If you do something, it’s on your own... iHub and iSpace almost are the same. iSpace is also this sort of a loose coalition where you come and do your stuff. (Mentor in Accra)

Hubs were oftentimes described as out of touch and unaware of entrepreneurs’ realities.

Similarly, some participants argued that development organizations are particularly susceptible to (what they felt was) the illusion that hubs can build businesses:

I find that it’s encouraging that there is a group of programs such as MEST and iSpace and Hub Accra and competitions and incubators across the continent... but I am also slightly cynical... because I feel like... they haven’t become full-blown investments. [Instead] they [are a form of development] aid... like, they are the... new building schools and sinking wells and building hospitals in Africa, which is good but I think that those starting these programs need to start looking at it from a different perspective: “I am doing this as an investor,” just like the Y-Combinator guys would do, like Sequoia Capital would do [it]. (Stable technology entrepreneur in Accra.)

Altogether, several support structures existed in Accra that were unavailable in Kigali and Harare (e.g., a well-funded incubator or an angel investor network), but they were also more fragmented and hubs were not directly connected to them. Busy Internet, MEST, the GDG, and hubs appeared to cater to different groups of technology entrepreneurs: namely, an “old guard” of established technology entrepreneurs and businesspeople for Busy Internet; a young technologically savvy, wealthy, and US-oriented elite for MEST; technically oriented, idea-stage programmers or aspiring entrepreneurs for the GDG; and middle-class, driven novice or fledgling entrepreneurs for the two hubs.

Fragmentation was explicit in the geographical dispersion of organizations: Busy Internet, MEST, and the two hubs were located in different neighborhoods at 30 to 90-minute driving distances in normal traffic conditions. Also, while MEST is located close to the University of Ghana and the hubs are located in a bustling neighborhood full of small businesses and restaurants, the city’s established technology companies are located in other areas of the city.

It thus seemed that the local technology entrepreneurship environment had neither a geographical nor a social center, and none of the existing support organizations appeared aware of or attempting to change this. One participant related that she felt that Accra's technology entrepreneurship scene was missing a coherent "brand" like Nairobi has.

4.3.2. Hub Case Study: iSpace

4.3.2.1. *Founding Process and Original Vision*

The founding process of iSpace had several parallels with the one of Hypercube Hub in Harare (cf., 4.2.2.1.). In 2011, a London-based Ghanaian business development manager and an Accra-based IT application manager ran a prototyping competition, promoted as Ghana's first pitching contest for mobile applications. The IT manager had earlier been the lead of the local Google Developer Group (GDG), in which the demands of local software and application developers had been a prominent topic. Among other issues, programmers had lamented the lack of a dedicated work space.

The mobile applications competition caught the attention of London-based Magnito Fund which signaled interest in strengthening ongoing grassroots initiatives in Accra's technology scene. Throughout 2012 and 2013, the managers started to prepare a proposal for the launch of a technology-oriented innovation hub in Accra for submission to Magnito Fund. The fund facilitated co-funding from Funas, as in Hypercube's case. While the London-based manager maintained contact with Magnito Fund, the Accra-based manager was able to engage Google Africa for a contribution, using relationships built during his time with the GDG. Finally, Magnito Fund and Google coordinated additional support from a South African technology training provider.

In their proposal, the two managers sought to balance the social development-related interests of Funas and Magnito with the more technology and entrepreneurship-focused con-

cerns of Google and the training provider. They hence included social entrepreneurship activities, mentorship for technology startups, and training and education for software developers in their plan. The two founders developed separate proposals for each of the four funders, emphasizing different elements of their concept depending on a given funder's interests. Still, like for Hypercube, iSpace was planning on generating revenue from member entrepreneurs, thereby becoming self-sustainable and independent from donor support.

Following the successful bid to the four funding organizations, iSpace Foundation was launched in 2013 as a legal entity. The IT manager became the local and operational hub manager, while the London-based manager was tasked with maintaining donor relationships. The goals that the founders set for iSpace were initially unspecific:

[The goals we proposed] were very, very basic... The overall goal was to create a very conducive environment to form startups, to start their business without going through those obstacles. So to be specific, we wanted to make rent easy for startups, we wanted to get rid of Internet problems for them, [and] we wanted to make consultancy and then mentorship easy and readily available to them. (iSpace staff member)

In a media interview, one of the founders framed iSpace's missions in more relationship-oriented terms, typical for hubs (cf., 2.1.1. and 2.1.2.):

[iSpace's purpose is] to nurture a local network of like-minded and focused tech entrepreneurs, providing a place where they can work, meet, collaborate, network, learn and have fun. (iSpace co-founder cited in Human IPO, 2013)

iSpace rented the top floor of a building in Accra's Osu neighborhood, a lively district with a high density of nightlife, small businesses, and restaurants. Close to Oxford Street, the area is particularly popular with tourists and expatriates. The space has an open entry area with casual seating, a larger open coworking area which is also used as an event space (see Figure 20 and Figure 21), several booths for laptop-based work, and two meeting rooms (one of which often doubles as the manager's office).



Source: Author.

Figure 20: Startup taglines on stairs to iSpace facility



Source: Author.

Figure 21: Coworking and event space at iSpace

4.3.2.2. *Offering a Training and Events, but Low Resonance of Coworking*

iSpace opened through a soft launch in September of 2013. Magnito established contacts through which iSpace was meant to learn how to set up the hub, namely to CCHub (the Nigerian role model hub) and AfriLabs (the African association of technology innovation hubs). In line with the initial concept, iSpace started to offer courses based on three modules, from basic coding skills, through prototyping, to commercialization. At the time of fieldwork, one twelve-week training course had been offered as a pilot to determine participant demand and readiness.

However, iSpace's early activity focused mainly on events. The hub began by organizing several smaller events and later hosted the #Hack4Good hackathon in June 2014. TechWomen Ghana and other informal groups organized events and gatherings in the space and several app development trainings were hosted (Cofie, 2014; Koltai et al., 2013; Treisman, 2012). Events focused on social entrepreneurship and social development became an emphasis in part because iSpace felt it had not been able to develop a compelling approach to "building startups:"

We tried to do a bit of both at the same time but I think we have done more "social good" than building... startups because there are certain things that need to be [done] properly before we can do more for startups. So currently, yes we provided the space for them... but we have not been so involved in what they are doing. (iSpace staff member)

During its first year, the coworking space remained largely empty. The iSpace team used its personal contacts to invite entrepreneurs, but over the one-year period, only about three startups operated out of the hub, each for a few months. Among them was a locally known software development social enterprise, which iSpace had helped promote. The coworking was informally let to these startups without a charge but in exchange for in-kind contributions of effort and equipment during events. Other users were charged per usage. Informants mentioned that coworking mainly consisted merely of being in the same room, not of intense knowledge or information exchanges, and no personal relationships were built; there was no 'community' to speak of. Ultimately, even the few regular companies moved out: participants mentioned

reasons such as concerns for the safety of equipment, too little space for a company with growing staff, and too much noise for staff who prefer focused work. iSpace-external informants conveyed a sense that the hub was not a place where “serious” or “proper” companies were located, and that it was more suitable for freelancers and networking.

iSpace also conducted a wider outreach effort, mainly targeting software developers through online-based groups such as GDG and some limited outreach to universities. In interviews, participants explicitly mentioned that the long distances and commute times were an issue for casual individual users: while many tried out the space once, few would make the hours-long trip to Osu from their homes (e.g., on the outskirts of Accra) on a daily basis.

4.3.2.3. *State at the Time of Fieldwork: Trying to Attract Regular Members and Build Startups*

At the time of fieldwork, as iSpace had been operating for one year, its leaders argued that the first year had been a test phase—similar to Hypercube’s and Muzinda Hub’s case (cf., 4.2.2.3. and 4.2.3.3.). Yet, iSpace founders blamed the mindset of Ghanaian technology entrepreneurs. One of the founders later argued that they had errantly listened to the “talkers” while they should have designed the space for the “doers” (Baidoo, 2015). Similarly, an iSpace staff member shares the hub’s issues to attract entrepreneurs:

I think we have more people talking than doing here... I think it has become fashionable to be an entrepreneur... Now, this is the space, come work on the idea! We are charging very little to come work on the idea here and they don’t show up. (Interview with iSpace co-founder)

In response, iSpace decided to revise its membership and support approach, introducing a modified for-pay tier system, where entrepreneurs willing to pay for higher tiers would receive more in-depth mentorship and privileged access to desk and office space. It was expected that higher-tier members would be those entrepreneurs “who already know what they want to do” while lower-tier members...

could be like freelancers and co, so we are going to build a lot of projects for them, so they can just come and then try a project or two. We pay them and all that, so at the end of the day we have specific projects coming from the space. (iSpace staff member)

The selection process was meant to be lightweight, mainly serving to focus membership somewhat more around technology. The goal was now to attract a core group of software developers and entrepreneurs who would regularly work out of iSpace to form the kind of community that had so far been elusive. This concern was connected to iSpace's concern to achieve financial independence and expressed in specific targets:

But 2015 our objectives and goals are quite different... we are looking at building more people, building more start-ups, getting more people to use the space. One of our KPIs [key performance indicators] is to get the space being utilized because we have a target number... for members, active traffic... we want to have fifty active people using the space in the day... that number is important because it will... give us enough money to pay for the rent and then pay for the utility bills and then to pay staff as well. (iSpace staff member)

iSpace also hired program and community managers, tasked to coordinate existing activities and increase outreach and thus membership. iSpace now also wanted to work more closely with MEST and Hub Accra, for example, in the context of the an innovation competition initiated by the World Bank which iSpace was going to host in 2015 (Jackson, 2015a). Moreover, iSpace envisioned to target specifically unsuccessful MEST applicants to entice them to become members.

As the core benefit for iSpace members, the hub aimed to improve its offering of mentorship. Out of the four funder organizations, Google provided the most support beyond its financial contribution. iSpace initiated a mentorship program for member entrepreneurs, for which Google flew in and accommodated some of its employees, so that consultations could be offered to entrepreneurs free of charge. Specifically, the leadership envisioned a structured support process for higher-tier members (including monthly meetings, milestones, etc.), not unlike traditional incubation programs (cf., 2.3.3.1.).

In sum, iSpace was a case where a hub founding had been driven by funder organizations and without a detailed vision of how a hub could work in Accra. Once the mere provision of work space and hosting events did not produce startup development (which was conceived

of as the most important outcome), the hub leadership made a shift towards a more hands-on incubation-like process.

4.3.3. Hub Case Study: Hub Accra

4.3.3.1. *Founding Process and Original Vision*

Hub Accra developed out of an entrepreneurship training program at Learning Ghana Online (LGO), an online course-based educational institution founded in 2012 by several US-American expatriates with backgrounds in education and social development. The founding process of Hub Accra was spontaneous and quick, taking only a few months in late 2012 and early 2013. Once the LGO founders and volunteer trainers had identified a need among students for a permanent workspace, they engaged with Swarm Invest, a newly founded micro- and crowdfunding startup that had won a startup competition in Accra. Further, the team contacted the founder of an agriculture social enterprise to be a Ghanaian co-founder for the hub with entrepreneurial experience.

The Hub Accra team ultimately consisted of six people, four of whom had been involved in LGO. One of the team members, a US-American with previous experience in humanitarian work, was made CEO of the hub. The Swarm Invest founder, a Ghanaian social innovation consultant and entrepreneur, became the Chief Operating Officer (COO). iHub was explicitly a role model for the founders:

So Nairobi was a strong influence on us. What we had seen in iHub and what it had spurred on in that economy gave us some ideas on what we could also do here. So I would say we didn't do this in isolation. A lot of this was done trying to look at what had happened in other parts of the continent.

Still, the team admitted in interviews that their initial vision had not been very elaborate. Their plan was instead on getting the hub started in some form, quickly raising additional funds, and adapting the operation along the way. Ultimately, Hub Accra adopted a broad mission, describing itself as a “collection of changemakers” with the “mission [] to accelerate the African

Startup Ecosystem by engineering an environment for innovation” (Hub Accra, 2014). Like The Office in Kigali (cf., 4.1.3.), Hub Accra did not focus on a specific sector.

LGO provided the hub with a space close to Swarm Invest, without external funding. Hub Accra occupied the ground floor of a small two-story building, consisting of a small meeting room and one large room with desks that could be moved out of the way for events (see Figure 24, Figure 23, and Figure 24).

4.3.3.2. *Popularity Among Novice Entrepreneurs, Events, and Hands-off Management*

Hub Accra opened in April 2013. Interviewed entrepreneurs described the interaction with others using the space as the most useful outcome of Hub Accra. Especially in the beginning, members were motivated and curious, excited about the fact that a “place for young entrepreneurs” now existed in Ghana. One entrepreneur said that, for an individual entrepreneur just starting out, the hub offered “everything I needed,” which for him included a laptop, bandwidth, the space, and several business contacts he made at the hub.



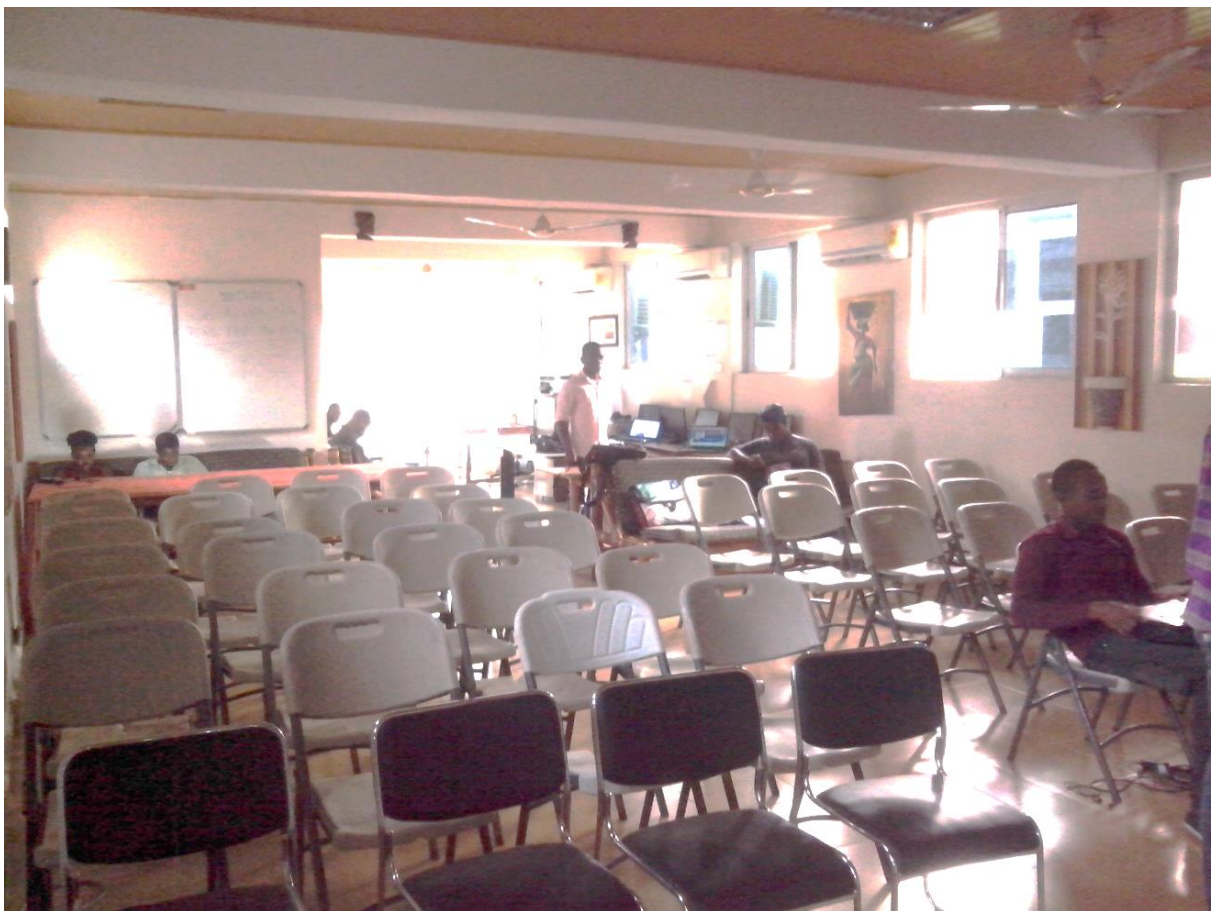
Source: Hub Accra.

Figure 22: Hub Accra building in Osu neighborhood



Source: Hub Accra.

Figure 23: Hub Accra space during a workshop



Source: Author.

Figure 24: Hub Accra space before an event

During Hub Accra's first year, founders of about seven fledgling startup projects worked out of the space fairly regularly while many individual entrepreneurs used the space occasionally. Most of the projects were very small operations, not usually registered as companies and generating no or little revenue. The projects and entrepreneurs covered a wide range of fields including agriculture, arts, animation, technology, and logistics. Yet, informally, a majority of the members shared an interest in technology.

Entrepreneurs that wanted to use the space initially had to pay a nominal charge of 1 Ghanaian cedi (about £0.20) per day. The space became very popular—40 or more people were using the space on most days and it was difficult to find a seat for people arriving after the morning hours. While Hub Accra was very crowded, informants reported that most users came mainly for the bandwidth and few interacted with each other. Towards the end of 2013, the daily charge was increased to 5 cedi (about £1), which led many casual users to drop out, and now there were about 15 to 20 people using the space on any given day. The hub also increasingly hosted events, often with international speakers, such as from the London Business School and Unreasonable at Sea (Young Turks, 2014).

Around the time of the fee change, a more consistent group of entrepreneurs was using the space, including members of the seven startup projects. Informants reported that these entrepreneurs (including a large share of technology entrepreneurs) started to know each other personally, informally exchanged advice, went to lunches together, and generally created a pleasant social environment for one another. At least one team which later founded a startup formed after its members had met each other at Hub Accra. Two or three active members organized informal gatherings around topics of interest (mainly software). Some participants said that the time after the fee increase was more useful because interactions became more sustained and meaningful, even if the excitement and buzz of the initial period had somewhat gotten lost.

Respondents pointed out that peer exchanges were almost entirely initiated by entrepreneurs themselves, without much facilitation by the hub (other than the provision of space). The Hub Accra management was reported to have interacted with entrepreneurs only rarely. Technology entrepreneurs shared in interviews that Hub Accra had promised more hands-on support through an incubation program, and to funnel financing from the Rockefeller Foundation to their startup through Swarm Invest, but neither of these intentions materialized. Similarly, another technology entrepreneur said he was disappointed that Hub Accra had not brought him investors, contrary to what (he felt) the hub had promised. Episodes such as these illustrated why several participants felt that the hub management was somewhat out of touch: the managers were seen to mostly travel and fundraise for the hub, but not interact with entrepreneurs, which sometimes was interpreted as a sign of lacking genuine commitment. One interviewed entrepreneur explained:

Interviewer: But isn't [the hub's] mission to do whatever you need?

Respondent: I don't think that is it. [laughing]

Interviewer: What is it then?

Respondent: The focus of a hub... I think they are more interested in providing the ecosystem... so like the hub is the nest and so the eggs are your business. They are not interested in bringing you eggs, you have to make your own eggs... and succeed as a business, but they are really just interested in providing you with the space and the ecosystem for you to flourish. But I don't think they are... looking at a mandate where they would be the ones to guide every action.

Also the events which Hub Accra organized were unpopular among those entrepreneurs who regularly used the space. One pointed out that events are in the evening, which does not work for people like him who live outside of Accra because they need to start their commute in the late afternoon to be home at a reasonable hour. Another entrepreneur said he initially attended events, but realized that he did not benefit from most presentations by international speakers: he felt that these visitors were unaware of local market conditions and could not add

much to his business. It appeared that Hub Accra's events attracted a wider group of hub-external actors, but excluded the regular users of the hub.

Meanwhile, the Hub Accra management pursued a host of strategies and initiatives to pay for the hub's activities and raise core funding, modifying its concept along the way. Initially, the founding team developed a stage model where LGO was meant to train entrepreneurs, Hub Accra would provide business incubation through the "Startup West Africa" accelerator program, and Swarm Invest would facilitate funding for entrepreneurs. However, this stage model was never implemented. Hub Accra also developed other far-reaching ambitions that have so far not materialized, such as the launch of a hackerspace within the hub or the scaling of operations to rural regions of Ghana. An unsuccessful crowdfunding campaign was meant to raise \$75,000 to fund the hub. A fundraising tour that the CEO and COO conducted in the US did not bear much fruit, with the exception of a partnership with the US Media Committee, which provided funding for a citizen participation mobile application project. Still, Hub Accra used its communications to emphasize long lists of partnerships with entrepreneurship support organizations, such as Kairos Society, the World Economic Forum, the Global Entrepreneurship Week, and Startup Weekend (Hub Accra, 2014) even if these affiliations were usually of the loose kind.

In sum, most interviewed technology entrepreneurs reasoned that Hub Accra was useful for some time, to meet likeminded peers and to have an almost free space with good bandwidth, but that these benefits were only relevant during a short stage of their businesses. All entrepreneurs believed that, at some point, they "grew out of" the hub, or needed to move on for another reason. One of the startup projects, a car tracking hardware startup, received continuation support from a local technology corporation. One stable hub-external technology entrepreneur in Accra explained that someone like him would never consider joining Hub Accra because it was

unclear to him what kind of entrepreneurs he should expect to find at the hub. For him, Hub Accra was a failed attempt to replicate iHub.

4.3.3.3. *State at the Time of Fieldwork: Events, Diversification, and Impact Hub Network*

Despite the low relevance of events for most consistent users of Hub Accra, this is where the hub management set its immediate emphasis at the time of fieldwork. A particular milestone was the Hack of Big Choices which Hub Accra organized in collaboration with MEST, promoted as West Africa's largest ever hackathon (Butcher, 2015; Jackson, 2015). In somewhat of a contrast to regular users' views, the management saw hackathons as a viable way to “build the community” and “source talent:”

So the focus on the hackathons... seems like the right thing to do [to] involve the community and because we have... done hackathons in Colombia and Mexico and other places... So we want to see what kind of talents are out there and make sure that [Hub Accra] doesn't get lost and the idea is not falling apart. The hackathons are a great way to source people and do that. (Member of Hub Accra leadership)

Plans to implement an acceleration or incubation program still existed, and also the hackerspace was still on the management's agenda. In addition, Hub Accra intended to establish a women's hub. The different initiatives were meant to be implemented whenever suitable grant funding opportunities were to arise.

Hub Accra was also preparing an application to become part of the Impact Hub network, hoping to benefit from practical advice and the increased recognition that the membership would bring. Like The Office in Kigali, Hub Accra was accepted into the Impact Hub network as Africa's third hub in August 2015, relaunching under the name Impact Hub Accra (Nduati, 2015).

In sum, Hub Accra was a case where individual novice entrepreneurs formed a small, informal entrepreneurial community, with little facilitation by the hub management other than making a space available and promoting the hub as a place for “change makers” and entrepreneurship. In turn, Hub Accra's management was prolific but following an ad-hoc approach,

constantly changing its strategy, mostly focusing on promotion and the pursuit of one-off external funding opportunities that could fit with the hub's (very broad) mission.

4.4. Chapter Summary

This chapter presented thick descriptions of technology entrepreneurship environments of Kigali, Harare, and Accra and of six hubs located in these cities (see Table 5 for a summary). The next two chapters will increasingly move from description to analysis and from the concrete to the abstract, developing generalizations and conceptualizations from cross-case comparisons. Specifically, chapter 5 examines similarities across all six hubs, deriving the general social structure of African hubs as an organizational form. Chapter 6 analyzes differences: it shows how components of social structures differed across hub cases and explores potential antecedents for such variation. Given that chapters 5 and 6 examine similarities and differences across hubs in-depth, in this section, only few highly salient case observations are noted.

Unsurprisingly, the six analyzed hubs showed many idiosyncrasies. Yet, one apparent theme was the importance of iHub as an inspiration that initiated the founding of hubs. Founding team members of five out of six analyzed hubs (all except The Office) explicitly referred to iHub as their original role model. Ideas which iHub had popularized, including 'community,' 'serendipity,' 'ecosystem,' 'openness,' 'exposure,' and various 'hub' metaphors ('central connect point,' 'node,' 'nerve center', etc.), were essential in defining the aspirations of hub leaders and funders in all of the six cases.

Yet, once hub implementations began, leaders quickly realized that they needed to adapt their vision to local conditions:

In our initial proposal, I think we were over-ambitious, a little bit, and I feel like Zimbabwe has its own context. When people think "tech hubs," everybody automatically thinks "iHub," or "Silicon Valley." But I think each country has its context and the hubs and the ecosystem were developed in a different way. (Hypercube management team member)

	Kigali, Rwanda	Harare, Zimbabwe	Accra, Ghana
Hubs	kLab, The Office	Hypercube, Muzinda Hub	iSpace, Hub Accra
City context	• Cultural and economic center of Rwanda • Rapid population growth to 1 million inhabitants • Often described as one of the cleanest and safest cities in Africa	• Cultural & industrial center of Zimbabwe • About 1.6 million inhabitants • Economically depressed, political repression	• Population grown rapidly to 2.3 million • Fragmented and diffuse economic geography; absence of urban planning, (Grant & Yankson, 2003; Larbi, 1996) • Active, large, fragmented, software developer & technology startup scene
Descriptive assessment of hub environment	• ‘Nascent and ambitious, trying to break through’ • Government-backed effort to make country regional ICT hub, ‘Singapore of Africa’ • Rwandan government with staged 20-year ICT strategy (NICI I-IV plans); currently in stage of private sector and content development support, following large investments in connectivity infrastructure (e.g., supporting 3G & 4G roll-out) • External perception of Rwanda shaped by 1994 genocide; discourse about role of ICT and entrepreneurship to help re-construction • kLab receiving much praise in national media • Manager of The Office with blog post “‘Help’ Is Hurting Africa: Stop ‘Helping,’ Start Doing;” * strong supporter of grassroots entrepreneurship, privately-run initiatives	• ‘Very nascent and hampered, fighting against all odds’ • Country with long stretch of economic depression, but previous history (1980s) of strong educational institutions; e.g., still very high literacy • Despite poor socio-economic & market conditions, two hubs established, and increasing activity towards end of 2013 • Hubs with diverse funders, ranging from international donors to Zimbabwean social impact foundation • Active technology entrepreneurship blog (High-Tech 263) with apparent bias against donor and development funding • No signs of government support • Political tensions & instability as additional factor hampering startup activity	• ‘Late nascent, full of success stories’ • MEST regarded as most successful incubator in Africa • City/country is often featured in technology entrepreneurship media as source of successful, role model technology startups, many of them MEST-affiliated • Busy Internet, founded in 2001, as “legendary,” first-of-its-kind in Africa Internet café and later tech business incubator; long history of tech scene and nascent technology entrepreneurship • Elite support programs like Stanford Seed with a presence • Formalized angel investor network • No signs of direct government support; hubs and support groups appeared grassroots-driven

Note: Abbreviations: AITI-KACE—Advanced Information Technology Institute-Kofi Annan Centre of Excellence; GAIN—Ghana Angel Investor Network; ICT—information and communication technology; IWPR—Institute for War and Peace Reporting; JICA—Japan International Cooperation Agency; MEST—Meltwater School of Technology; NICI—National Information Communication Infrastructure; USD—United States Dollar.

* Cf. <https://medium.com/@theofficerw/help-is-hurting-africa-11b94706a3c>.

Table 5: Overview of hub environments and contextual information

Hubs struggled to move from the broad goal to emulate iHub to consistent and specific missions of their own, and to translate those mission into services. Interview participants worried that a ‘hub’ was too fuzzy of an idea: often, neither hub members nor outsiders were able to determine what to make of hubs and how to engage with them. During implementation, the multiple stakeholder groups of hubs also had different ideas of where hubs should direct their efforts, or how hubs could set in motion the kinds of catalytic effects that iHub was seen to have in Kenya. Accordingly, board members of hubs were divided over priorities, and entrepreneurs often felt that hub visions were detached from their realities.

Entrepreneurs saw hubs as an interesting idea and many were excited about them early on, but they rarely felt that hubs helped them progress with their startup project. Of the 57 interviewed technology entrepreneurs, only a handful reported that they had formed startup teams “at the hub,” that is, after meeting team members in the hub space. Hubs appeared to make only a very small direct contribution to startup creation and success, and most entrepreneurs reported that they would pursue their startup even if the hub in question did not exist. Entrepreneurs sometimes pointed out that the vagueness of hubs’ purposes led to a degree of disorganization and inconsistency, especially for hubs in the early implementation stages.

The promise of hubs appeared to lie in creating ‘communities,’ and indeed, in cases such as kLab, The Office, and Hub Accra, entrepreneurs felt that a community existed and provided them with benefits, such as learning opportunities and emotional or motivational support. Yet, there appeared to be difficult balancing acts for hubs on the way towards community. Both entrepreneurs and third parties (like mentors, experts, or corporate partners) often merely ‘passed through’ hubs, while sustained interactions that led to collaborations were rarer. Also the idea that actors with different levels of expertise would interact through hubs was difficult to turn into a reality: more experienced entrepreneurs reported that they had little time to contribute, and that they did not expect benefits from engaging with others who were at or below

their own level of skill. Hub spaces were sometimes too crowded (kLab, Hub Accra) and sometimes not crowded enough (Hypercube, Muzinda, iSpace). Hub communities were sometimes described as too stable (so that new influences were missing) and at other times as too dynamic (so that mutual familiarity was lacking). Similarly, entrepreneurs felt that hub visitors or partners (like experts giving a talk or development organizations running an innovation competition) did not contribute to the hub community, given a lack of immersion and commitment.

Ultimately, these issues meant that, in some cases, both hub leaders and members felt that more “process” (i.e., more hands-on services) was the right way forward (e.g., for iSpace, Hypercube, and to some degree kLab), even if this was equivalent to moving away from the openness that had originally been a defining feature of the hub. In other cases, hub leaders moved in the opposite direction, focusing on events to allow for more open-ended networking (The Office, Hub Accra).

The cases thus demonstrated the fluid decision making that hub funders and leaders (i.e., managers, staff, founders) engaged in, and how their decision-making was affected by evolving perceptions of purposes, successes, and failures of a given hub. While hub leaders thus had an influence on the interactions of technology entrepreneurs, entrepreneurs also shaped hubs, mainly through their participation in or abstinence from events, and through the regularity with which they used hub spaces. Entrepreneurial participation also appeared to depend on the level of optimism or skepticism about hubs that existed in a given city among a given group of entrepreneurs. For instance, many entrepreneurs in Accra felt that hubs lacked relevance (cf., 4.3.1.2.) and participants in Harare complained that hubs wasted precious resources on the wrong things (cf., 4.2.1.2.), while technology entrepreneurs in Kigali felt that hubs have shortcomings but were generally an important addition to the country’s quest to become an “ICT nation” (cf., 4.1.).

In sum, the case studies showed messy processes that happened when hub visions (cf., 2.1. and Annex B) met on-the-ground realities, ultimately leading to adjustments (kLab, Hub Accra), reshaping (Hypercube, iSpace), and in one case abandonment (Muzinda Hub). Even without further analysis, the case studies thus showed that a dyadic view (cf., 2.3.3.2.) is necessary to understand processes in hubs, as the unilateral action of hubs (e.g., services offered) only determined in small part what happened consequent to their existence.

Chapter 5 The Structure of Hubs: Fluidly Bounded Communities

This chapter is the first of two results chapters. Based on cross-case comparisons, it shows commonalities in the social structures of all six examined hubs. Like chapter 4, this chapter fleshes out and connects the relevant observable concepts (cf., 3.1.), but unlike chapter 4, it moves from concrete observations to abstractions. It utilizes the least-similar comparative logic underlying the selection of cities (cf., 3.3.3.): by examining what was similar across hubs in diverse environments and with diverse implementation histories, the chapter identifies generic features of African hubs. It ultimately derives a generalized, abstracted understanding of the social structure that materializes in hubs as defined in this thesis (cf., 3.3.3.), thereby characterizing African hubs as an organizational form. Simply put, this chapter shows what makes an organization a ‘hub’ and not an incubator, coworking space, firm, etc.

The chapter begins by highlighting what it means when hubs act towards entrepreneurs (5.1.), setting the stage for an in-depth examination of how entrepreneurs interpret and derive meaning from hubs (cf., 3.2.). The chapter draws on the case study data to derive three typical but fundamentally different ways in which technology entrepreneurs engage with hubs (5.2.), using vignettes to capture entrepreneurs’ perspectives as vividly as possible (5.3.). Based on observations from individuals’ perspectives, group-level subcomponents of hubs are outlined, namely core communities and peripheral communities (5.4.). Finally, the overall social structure is characterized and typified through the notion of *fluid boundaries* (5.5.).

Overall, the chapter is meant to elucidate in detail the different elements which together characterize the social structure of hub organizations: hubs’ organizational action, individual entrepreneurs’ participation, hub communities as social-structural components, and hubs’ organizational boundaries. This chapter thus delineates the observable concepts in depth (cf., 3.1.), placing them within the organizational or structural level of analysis (Scott & Davis, 2016).

Chapter 6 will complement this chapter by showing variation between the social structures observed in different hubs. In other words, the present chapter analyzes the general social structure of hubs, while the next chapter highlights different versions. Together, chapters 5 and 6 establish the key components of the assembly process theorized in chapter 7.

5.1. Organizational Action of Hubs

This section establishes how a hub can *act* or *interact with* entrepreneurs and others (cf., 3.1. and 3.2.). When a hub is founded, it is given a name, physical address, website, social media accounts, budget, bank account, etc. The hub's leaders start to act on the hub's behalf, conducting outreach towards constituents, having conversations, running campaigns, etc. Most hubs are formally registered, usually as foundations or under another not-for-profit status. In this process, an *organization*—a social entity that is more than the aggregation of individuals, with its own identity and actor qualities (Dobusch & Schoeneborn, 2015; King et al., 2010)—is created (cf., 3.2.).

This is noteworthy for hubs: at face value, hubs embrace informality more than incubators and they usually emerge from informal beginnings. Indeed, the case studies showed that non-organizational groups of entrepreneurs (e.g., interest groups, professional communities, circles of friends or colleagues) pre-dated hubs in all cases, but the founding of hubs formalized and stabilized these social structures as organizations (O'Mahony & Lakhani, 2011). Thus, hubs were defined by the informal relationships that they emerged from and that existed within and outside of them, but they also became 'more than' those relationships.³¹

This section thus provides a short descriptive account of the organizational action of hubs seen through a micro-social interactionist lens (cf., 3.2.)—it shows *what hubs do* in the eyes of hubs' constituents. Thereby, the section summarizes what makes hubs organizational

³¹ In my reading, this is also why organizational scientists adopt the notion of 'social structure,' as a more encompassing concept than 'network,' to refer to organizations as entities (cf., Scott & Davis, 2016).

actors. Overall, the section highlights that hub organizations not only implement services directed at entrepreneurs (5.1.1.), hub spaces also work as social enclosures and spatial fix points (5.1.2.) and hubs symbolize meaning towards external actors, affecting their participation decisions (5.1.3.).

5.1.1. Services

The most apparent way in which the six cases of hubs acted towards entrepreneurs was through the provision of services, such as work space, mentoring sessions, occasional training courses, events, presentations, hackathons, etc. Services are defined here as all activities under a hub leadership's direct control, thus occurring as a direct result of its decisions.

Hubs provided several services that incubators commonly provide, such as subsidized space, business advice, and brokerage to external parties (cf., 2.3.2.). Yet, hubs offered these services in a less formalized and more ad hoc manner (see also 6.3.1.). For instance, the role of space varied for entrepreneurs: some entrepreneurs came to hubs as they needed a representable office to meet clients, others sought a place to work occasionally during visits to a city, and yet others occupied hub spaces over long stretches of time to work on startup projects. The physical space of a hub was designed as a coworking space or an open office structure, which entrepreneurs could use at their own discretion (cf., 3.3.3.). Unsurprisingly, the provision of space as a service was more important for entrepreneurs who could not access or afford them independently. An entrepreneur in Harare summarized:

Sometimes I work from here... either when there is no power at home, when the net is down or when I need something really fast... after seeing a client.

Hubs also did not have formalized service provider-client agreements (such as contracts), which meant that they were often not fully committed to providing a particular service at a particular point in time, and that the beneficiary of the service was not usually specified clearly. For instance, at Hypercube, design training sessions were held on short notice and informally, and the hub extended an open invitation to entrepreneurs in the city to join. Hubs also

offered various forms of open events (meet-ups, hackathons, innovation competitions, etc.) much more than incubators.

Services other than space were mostly enacted by the hub manager, other hub leaders (such as board members), and other actors enrolled to conduct the service (trainers, mentors, speakers, etc.). The manager of a hub played the most complex role, as he/she interacted with entrepreneurs directly but also facilitated service provision by others:

For mentors, you use best practices. You show how a mentor and a mentee did something. You shout it out, you write something, and then every mentor would want to do the same thing. Those are some of the things that you do in a community, and you don't want to become very strict but also you keep a friendly relationship with everyone. So you use others against others. (Hub manager in Kigali)

5.1.2. Spaces as Social Enclosures and Locational Fix Points

Making spaces available as a service was similar to the familiar function of incubators which provide a subsidy towards the rent or real-estate cost of a venture (cf., 2.3.3.1.). Yet, the case study data also showed roles of hub spaces that went beyond service provision. Hub spaces shaped entrepreneurs' interactions in two significant ways.

First, hub spaces worked as *social enclosures* (Lawrence & Dover, 2015). For instance, people who were regularly present in a space began to associate common practices and routines with the space, such as the choice of the desk or a morning coffee at the hub's bar. Physical space afforded opportunities for regular face-to-face interaction, which in turn was a basis for establishing trust. Hub spaces were thus instrumental in establishing the social environment for regular users of the hub (Bøllingtoft & Ulhøi, 2005).

Moreover, hubs also provided a locational fix point within a city for individuals who were not regularly present in the hub space. Through events but also by regularly opening their space for casual users and visitors, hubs allowed actors from across a given city (and sometimes beyond) to interact. Hubs were a venue where regular users met visitors, but also where visitors met other visitors—even if neither party had a direct affiliation with a hub, it was often a popular meeting point. Moreover, meetings were not always planned: by virtue of having a permanent

space where individuals with roughly similar interests convened, the likelihood of serendipitously meeting a relevant other was increased compared to such meetings happening in, say, cafés or restaurants. This is an element that distinguished hubs from associations or regular event series: hubs were only able to become locational fix points because they had a permanent space available for unplanned and unannounced visits (cf., 3.3.3.). In other words, because of a hub's physical and open space, actors knew, literally, where to go to make contact with a particular group of people or conduct particular kinds of work:

I saw an interest... in embedded systems [technology], and kLab is ... suited for that. So these are the people who just come here..., do the research, use the Internet, sit here, because... this is the only place we have [here in Kigali]. (kLab manager)

5.1.3. Symbolizing a Purpose to Facilitate Participation and Intermediation

The least clearly perceptible but maybe most important feature of hubs' organizational action was symbolization. Any given hub symbolized a purpose to other actors in its urban context and beyond. Through interactions with a hub (however direct or indirect they may have been), actors interpreted what a hub did and what it stood for, ultimately associating the hub with meaning (cf., 3.2.).

What a hub symbolized was closely tied to its vision, mission, and goals, and to the actions that hub leaders undertook to communicate the hub's purpose to others.³² Case descriptions (cf., chapter 4) showed how, for each hub, funders and founders developed an original organizational purpose which was communicated and adapted over time. Hub leaders and to some extent hub funders reached out to other actors who they deemed relevant, trying to convince them to participate in hubs or provide support in the form of referrals, endorsements,

³² 'Vision' is understood here as a loose mental model that hub leaders have about how the hub works and what it can achieve in the long term, often tied to an aspirational and idealistic component. 'Mission' is the more implementation-focused, concrete, and mid-term oriented counterpart to vision. 'Goals' are concrete, often quantified, targets that the hub wants to attain (e.g., '500 members by 2014'). 'Purpose' is used as the umbrella term for all three terms.

sponsorships, etc. Such outreach utilized formalized channels such as blog posts, launch events, and marketing campaigns, but mainly relied on countless informal conversations.

Hubs' initial purposes were thus intertwined with funders' and founders' visions. The case studies also demonstrated that most initial hub purposes were determined through negotiation and coordination between a group of local founders and international or bureaucratic funder organizations (The Office was the only exception). Moreover, hub funders, founders, and leaders played an important role in continuously redefining and modifying the stated purpose of a hub. In most cases, hub funder or founder organizations formed a board, governing the hub and overseeing the actions of hub managers. Hub outreach also depended on board members' pre-existing connections: Hypercube attracted international speakers from Silicon Valley through its ties to the US Embassy in Harare, or kLab involved established local technology entrepreneurs in Kigali based on several board members' personal contacts. This, in turn, meant that Hypercube symbolized the 'internationally connected' and 'donor-driven' hub to other actors in Harare, and that kLab became associated with the Rwandan technology elite.

In all these cases, hubs' overall purpose was initially defined loosely, and then modified during the symbolization process, depending on the communicating party's particular beliefs and the recipient's interpretation (cf., 3.2.). Such interpretations were done by actors who visited a given hub and interacted with the hub leadership and regular users (direct interaction) but also by others who had only heard of the hub and might never have visited (indirect interaction).

Such symbolization is hardly unique to hub organizations: any organization is perceived and interpreted by external actors, and any organization's leaders are the most prominent communicators of the organization's purpose. Yet, because hubs were a new concept that was potentially relevant for a wide range of actors, hubs (more than incubators) appeared to be 'all things to all people:' different informants, and sometimes the same informant at different points

in an interview, arrived at divergent interpretations of what a given hub was, what it did, and how entrepreneurs participated.

Most participants resorted to vague understandings of hubs. A common theme was that hubs symbolized central convening points for “communities” of technologists or grassroots and novice entrepreneurs (even for participants who did not use the ‘hub’ term):

Respondent: You should encourage the entrepreneurs to... be more in touch with the local community around them.

Interviewer: So, “local community,” you need to explain a little bit more to me because that can mean many things.

Respondent: Another one... is Ashesi University... There are also other, I don't know whether to call them ‘accelerator programs’ that are running in Accra today, like, what is that one called [pauses] Hub Accra. Hub Accra is one, another one is iSpace, right here in Accra... those communities, because there are lots of young entrepreneurs in that space as well... So in terms of local community these are sort of the people I am thinking about. (MEST-affiliated technology entrepreneur in Accra)

Likewise, hubs were seen less as venture creators and more as agenda setters and promoters of a purpose:

I think the impact that [hubs] have made is that they have really publicized the whole issue of startups. So it is now something that is being talked about, people... know that there is something happening to encourage entrepreneurship. (Technology entrepreneur in Harare)

If today things like The Office, which is a self-made innovation center, can be there and operate and remain in business, then it should inspire many more people across all of Africa, because what needs to be done is already here and you have people to prove this. (Technology entrepreneur in Kigali)

Thus, hubs symbolized organizations which stood for a wider shared purpose and which represented its entrepreneurial constituents. For instance, kLab symbolized ‘the place for young technologists in Rwanda,’ or Hub Accra was understood as the ‘place that promotes entrepreneurship in Ghana.’

Such symbolization had palpable influence on hubs’ social structures. Symbolization was the cognitive equivalent to hub spaces as locational fix points in physical space. The content of what a hub symbolized for a given actor determined his/her participation decision.

First and foremost, this applied to technology entrepreneurs' participation decision (see 5.2.). At the outset, any entrepreneur in a given city was able to choose to engage with a hub, as hubs would not normally have formal selection processes tied to exclusive, tangible, and predictable benefits (e.g., funding, mentorship, etc.). Instead, through direct or indirect interactions with the hub, actors first developed an understanding of who they could expect to be regular users of the hub and what kinds of interactions they could expect to have at the hub, before they determined whether participation would be worth their while. For example, in Hub Accra's case, several stable and advanced technology entrepreneurs in Accra interpreted the hub to be a place for novice entrepreneurs, and thus decided that they did not want to visit the hub and interact with its regular users (cf., 4.3.3.2.):

I mean [long pause] I am familiar with iSpace, I'm familiar with Hub Accra... I've never really gone to any of them to say "Let's do something together." ... I could do that, but I haven't. (Stable technology entrepreneur in Accra)

Actors' judgment was often normative rather than pragmatic: Hypercube was dismissed and avoided by the High-Tech 263 group because it had accepted donor funding, which was counter to High-Tech 263's ideals (cf., 4.2.2.).

Symbolization also determined the participation of non-entrepreneurial actors, such as mentors and organizations wanting to access technology entrepreneurs. Here, a hub's symbolization facilitated intermediation between third parties and individual technology entrepreneurs. This role of hubs was especially important for actors who were not otherwise able to access technology entrepreneurs, such as government agencies, development institutions, or other large and/or foreign organizations. An entrepreneur in Kigali described an instance in which an agriculture-oriented grant-maker approached kLab:

It [was] like an event. This guy comes and then he says specifically I'm more interested in people who work in agricultural solutions, 'ICT agriculturalists,' that they take. Then these guys get already introduced to all the teams that are out there. Now, they come, make a public presentation and then tomorrow, [they] meet all the guys who are interested. So, [the representative of the grant maker] set up like a whole day interviewing people, you'll see him, give him business proposals, perspectives and projections, how far have you gone in for this.

This grant maker approached kLab because it had developed a notion that kLab was ‘the place in Rwanda where entrepreneurial software developers can be found.’ In other words, what kLab symbolized allowed otherwise unrecognized technology entrepreneurs to be identified by an external actor, or at least helped hub managers in their brokerage efforts on behalf of entrepreneurs.

In sum, symbolization of hubs followed from leaders’ and funders’ decisions on how to frame and communicate a given hub’s purpose, which shaped entrepreneurs’ and partner organizations’ participation decisions. Actors not closely involved with hubs often arrived only at a loosely defined, general interpretation of hubs as ‘places where grassroots (technology) entrepreneurs can be found.’ This, in turn, meant that hubs’ symbolization facilitated in particular intermediation between individual novice entrepreneurs and large or foreign organizations.

5.2. Membership as Self-Selected Degree of Participation

This sense of community here [at the hub]: It’s... a warm place where you come and you can talk to anyone... That kind of thing is needed. (Technology entrepreneur in Kigali)

I wouldn’t normally be here [at the hub, except] for two reasons: if I am having a meeting or if I need to download something very big... because they got way faster Internet! (Technology entrepreneur in Harare)

The previous section outlined actions by hub organizations towards entrepreneurs: it described *what hubs did*. Yet, the case studies (chapter 4) showed that entrepreneurs played an essential role for *how hubs worked*, in line with dyadic perspectives on incubation (cf., 2.3.3.2.). This section will therefore examine the ways in which entrepreneurs participated in hubs.³³

However, as the above quotations illustrate, the ways in which technology entrepreneurs engaged with hubs varied greatly. Moreover, dissimilar to incubators (cf., 2.3.5. and 2.4.), technology entrepreneurs were not usually seen as ‘clients’ of hubs, as this would have implied

³³ The terms ‘engagement with hubs’ and ‘participation in hubs’ will be used synonymously. Both are closely related to ‘membership in hubs:’ as the following sections will show, the degree of membership is the result of the intensity of engagement/participation. Membership is thus a status or outcome while engagement/participation refers to decisions and actions taken by entrepreneurs.

some form of service provision agreement (cf., 5.1.1.). It was thus challenging to determine the external boundaries of hubs: while entrepreneurs' participation appeared to matter greatly, it was not apparent which entrepreneurs should be considered and which ones not.

Instead of 'clients,' the study thus examined the broader notion of 'membership' in hubs, to determine who was part or not of hub organizations (Scott & Davis, 2016). Yet, determining hub membership was also not straightforward, as it was not usually codified through a contract or another formal rule structure. Hub membership was complicated because the openness of hubs allowed entrepreneurs to pursue highly varied modes of participation; membership was rarely binary, stable, or formalized. Even where hubs registered members in databases, such codifications were not usually an adequate representation of membership: for instance, in kLab's case, many of the 600 registered members visited the hub only once while others used kLab's space every day (cf., 4.1.2.3.).

Consequently, the study attempted to derive an adequate definition of hub membership from the case study data, drawing on more indicative themes relating to participation, such as entrepreneurs' commitment or level of activity in relation to hubs. It became clear that hardly any entrepreneur engaged in all possible ways with, or felt strongly committed to, any of the six analyzed hub organizations. Yet, there were also very few technology entrepreneurs who did not engage with local hubs at all (at least in Kigali and Harare). Instead, entrepreneurs seemed to decide *how much* they wanted to participate at a given point in time, for instance, by being present in the physical hub space, by attending events, by peer mentoring others, or by starting initiatives and projects with others. Ultimately, the study accepted that there was no clear distinction between entrepreneurs 'inside' and 'outside' the hub organization.

I hence decided to iteratively derive an understanding of the social structure of hubs without conceptually pre-imposing an external boundary. I identified twelve possible ways that

individuals engaged with hubs (see Annex D). This list was used to establish a *degree of hub participation* score for each interviewed technology entrepreneur, from zero to 12.

Entrepreneurs' hub participation and startup maturity scores (cf., 3.7.3.) were used to explore the data for patterns. Categories of hub participation were sorted by the number of entrepreneurs that each category applied to, and entrepreneurs were sorted by hub participation scores, from high to low. This exercise resulted in a table that visualized the pattern of membership across all entrepreneurs (see Annex D). The analysis showed variation in participation styles but also some systematic patterns (see Table 6, Table 7, and Annex D).³⁴ Entrepreneurs fell into three participation categories: kernels of communities, apprentices, and networkers. Each category will be briefly outlined in this section and illustrated in more depth by means of vignettes in the next section (see 5.3.).

First, a small number of active entrepreneurs (n=9) were present in hub spaces most of the time. They mentored others, ran activities, and were associated with the hub by hub-external actors and media. These entrepreneurs were usually between the 'recent launch' and 'stable' stage. They were categorized as *kernels of hub communities*, with hub participation scores between nine and 12, exemplified by Kigali Entr #1 in Table 7 and by Pacifique in the first of the below vignettes (5.3.1.).

Second, a larger group (n=28) consisting mainly of novice entrepreneurs can be described as *apprentices*. Apprentices worked in hub spaces regularly and received mentoring and training, but did not usually mentor others or run activities beyond working on their own startup. They had a degree of hub participation score between six and eight, and are exemplified by

³⁴ The sample of interviewed technology entrepreneurs was not representative of all entrepreneurs in a given city. Therefore, absolute and percentage figures in Table 6, **Error! Reference source not found.**, and Annex D only refer to sampled entrepreneurs. Still, the sample was purposefully drawn to eliminate bias towards greater or lower participation scores and, at least in Kigali and Harare, most existing early-stage technology entrepreneurs were interviewed (cf., 3.5. and 3.6.). The values are thus at least roughly indicative for the population of technology entrepreneurs in the three cities at the time of fieldwork.

Accra Entr #18 and Accra Startup Employee #4 in Table 7 and by Kizito and Bright in the second vignette (5.3.2.).

Hub participation category	Average startup maturity score ^a	Average degree of hub participation ^b
Kernels of communities (n=9)	2.22	9.78
Apprentices (n=28)	1.54	7.21
Networkers (n=44)	2.70	2.36
All interviewed entrepreneurs (N=81)^c	2.25	4.86

^a Maturity scores range from 1 to 4, where 1 is 'novice,' 2 is 'recent launch,' 3 is 'stable,' and 4 is 'advanced' (cf., 3.7.3.). Values indicate mean scores for all interviewed entrepreneurs per category.

^b Degree of hub participation ranges from 0 to a maximum of 12, indicating the number of ways in which entrepreneurs engaged with hubs (cf., 3.7.3.). Values indicate mean scores for all interviewed entrepreneurs per category.

^c Interviewed entrepreneurs considered for this analysis included CEO/founder entrepreneurs at all maturity stages as well as co-founders and startup employees (cf., 3.6.3.).

Table 6: Startup maturity and hub participation scores by hub participation category

	Kigali Entr #1	Accra Entr #18	Accra Startup Employee #4	Harare Entr #9	% of all interviewed entrepreneurs (N=81)
Startup maturity level	3 (Stable)	1 (Novice)	1 (Novice)	3 (Stable)	
Degree of hub participation (participation category)	11 (Kernel)	7 (Apprentice)	7 (Apprentice)	2 (Networker)	
Knows of hub(s)	y	y	y	y	95%
Participates in hub events	y	y	y	y	64%
Goes to the hub for networking	y	y	y		62%
Interacts with hub manager / staff, board	y	y	y		58%
Has worked out of the hub in the past	y	y	y		48%
Works out of hub at least occasionally	y	y	y		44%
Works out of hub regularly	y				27%
Receives mentoring / training at hub	y				26%
Others identify them with hub	y	y	y		23%
Mentors peers occasionally	y				19%
Runs activities, events at the hub					11%
Mentors peers regularly	y				9%

Table 7: Engagement with hubs by four example entrepreneurs

Third, the largest group of technology entrepreneurs in the sample (n=44) engaged with hubs as *networkers*: they knew of hubs, went there to meet people and participate in events, and contacted hub leadership and staff to obtain information and referrals. Some networkers worked at the hub occasionally, or they had temporarily worked there in the past, but networkers did not currently work at a hub regularly. Entrepreneurs who had started a venture independently of hubs (including established entrepreneurs) appeared to be the purest networkers: most of them had never worked inside the hub space and only some of them provided mentoring occasionally to less advanced entrepreneurs. Networkers had hub participation scores between zero and five; they are exemplified by Harare Entr #9 in Table 7 and Philani in the third vignette (5.3.3.).

5.3. Three Ways of Entrepreneurial Engagement with Hubs

This section uses vignettes of entrepreneurs to illustrate the three typical types of engagement with hubs that were found in the case study data: *kernels of hub communities*, *apprentices*, and *networkers* (cf., 5.2.). The vignettes serve to provide the reader with an intuitive understanding of hub participation by technology entrepreneurs. They show how hubs were accommodated within dynamic and idiosyncratic entrepreneurial processes, moving away from the service-centric view dominant in incubator research (cf., 2.3.2. and 2.3.3.).

A vignette is a vivid account of a particular informant that exemplifies themes in the data (M. B. Miles & Huberman, 1994). As a style of presenting findings, vignettes are geared towards thick description, multivocality, and empathetic validity (cf., 3.4.). More specifically, vignettes are meant to allow for naturalistic generalization (Stake & Trumbull, 1982), where readers are provided with vicarious experience permitting them to “make choices based on their own intuitive understanding of the scene, rather than feeling as though the research report is instructing them what to do” (Tracy, 2010, p. 845).

Vignettes are used here to reduce complexity and large quantities of qualitative data from across case studies. This implies that none of the following vignettes is perfectly representative of the respective hub participation type, but each captures most of the themes that were particularly prevalent within a given type.

5.3.1. Vignette 1: Pacifique, a Kernel of the kLab Community

Pacifique had been with kLab from day one. Coding had always been his passion: already as a teenager, he taught himself HTML to sell websites to others, paying for high school by himself. Right after graduating from KIST (Kigali Institute of Science and Technology) four years ago, he started learning how to be an entrepreneur. He had been the best coder of his cohort, but it was only when he worked with a local tech startup and joined talks on entrepreneurship that he began to understand that it would take more than coding to start his own company. The events he attended were run by Tech Youth Rwanda, an association of young technology entrepreneurs, mostly with support from the Rwandan Agency for Economic Development (RAED). The group wanted to get things moving and create a more vibrant environment for software and app innovation in Kigali. Back then, he was also part of KigaliHackers, a Facebook group of software developers that got together at KIST about once a month to talk shop about software development. High-caliber coders were few and far between in Kigali, but the founders of KigaliHackers (expats with Silicon Valley experience) were probably the best ones, and it was a great informal learning environment.

Pacifique started to work on his company Accelerate HR (a multi-platform application for human resource management for corporates and NGOs in Kigali) at the end of 2011, a few months before kLab started. He had gotten the business idea when he was talking to a friend who worked at an NGO, and now he felt like he could use his coding skills to solve a problem by building a viable product. Pacifique acquired the first customers by himself; then he got two

team members on board and formally launched the venture. Accelerate HR soon moved into an office in the Kigali Business Center. Since then, the venture had been the focus of his life.

When kLab started mid-2012, it was an obvious step to join. kLab was the only place for technology entrepreneurs in Kigali and it looked like a promising project, especially because some of the experienced coders of KigaliHackers were part of it. In the following months, Accelerate HR became successful mostly because of his hard work, building reliable and functional software while maintaining solid relationships with customers, but kLab definitely helped him as well. If he was not on a client visit, he would sit at his laptop in kLab's work space or discuss with his team. Not having to pay rent allowed him to keep his cost and pricing low.

The former KigaliHackers founders that were now tenants of kLab had become friends; they appreciated how keen Pacifique was to improve his code and his product, and they helped him whenever he was stuck. kLab was just a great fit for Pacifique; he felt comfortable there and spent most days in the space. Even later, he did not really consider getting a desk at The Office: coders were better off at kLab, he thought. Pacifique counted most of the dozen or so senior tenants at kLab as his friends. It was a motivating factor to be around driven people like him, with similar challenges. It gave him a sense of community.

For the first year or year-and-a-half of kLab, it was a closely-knit community and there were not many newcomers, but then things changed. Pacifique didn't know all the students that now came to kLab and he did not appreciate it when one of them was using his usual desk. He genuinely encouraged people to join kLab and wanted the community to grow, but it annoyed him that many just used kLab as an Internet café. It was difficult to get to know others because there were new faces every day. For him, this was not what tech entrepreneurship was about, not what community was about, and not what kLab was about.

Still, Pacifique was keen to mentor others, as long as they had an entrepreneurial mindset and ambition. Such mentoring was never formal. Pacifique appreciated when novices approached him with questions—even if it cost him precious time for his startup. Sometimes, he would get lunch with them. Mostly he was happy to spend time with the ones that showed genuine drive and motivation.

The attention from the media (both local and international) that he received as his startup was promoted as a success story of kLab was a nice bonus. He got great exposure and it seemed to open doors with clients and investors. He got a mention as one of the “Best 30 Young African Entrepreneurs” in Fast Company. His story as a Rwandan tech entrepreneur making it seemed to be an inspiration to many, and he started to feel like a local celebrity. Over time, Pacifique had also become somewhat of a spokesman for kLab. Whoever came to the hub was bound to be introduced to him as well. He felt that he was part of something bigger, at the forefront of important cultural change in Rwanda. Most of all, he wanted to see other entrepreneurs like him build useful products.

Still, in late 2014, after two years at kLab, Pacifique got a sense that it was time to move on. His business was growing, and he was able to afford his own office space. He also felt that he needed a different kind of support if he wanted to scale his company even further, maybe go regionally. The KigaliHackers founders had left, as had some of the other senior tenants. Pacifique was also aware that, at some point, he should make space for newcomers that rely on the free space more than he does. At the same time, he knew that kLab benefited greatly from him and his presence as a role model. He was on the verge of moving out but he was also concerned that kLab would suffer if he left.

5.3.2. Vignette 2: Kizito and Bright, Apprentices at Hub Accra

Kizito and Bright had known each other from their time at a local startup that was one of the first ones to work out of Hub Accra. They had been hired as engineers and gotten along

well with each other. When Kizito and Bright joined Hub Accra, they could not quite believe that such a place existed in Ghana: they loved the concept that entrepreneurs would come together and help each other with their businesses. The company that had hired them failed quickly, but Kizito and Bright decided to work together on their own project—this was the first time they were their own bosses. They developed a prototype for a piece of hardware that could do basic soil diagnostics, which they wanted to sell to farming cooperatives.

Kizito and Bright stayed at Hub Accra. They found it valuable to have a venue where they could meet with others to discuss their business, a place which would be respectable enough to have client meetings, and a work space that offered Wi-Fi with good bandwidth 24/7. In the beginning, when Hub Accra charged only one cedi, it was very busy, and also Kizito and Bright came to the space almost every day. At this rate, Hub Accra was cheaper than most Internet cafés. They did not interact much with the hub leaders; it seemed that they were either traveling or they did not really know how to reach out to entrepreneurs in the space. Generally, they were not interacting much with the people in the room: it seemed like many were just hanging out at the hub to use the bandwidth while others were working on interesting projects but kept a low profile.

Still, Kizito and Bright soon got to know the other dozen or so entrepreneurs that were using the space as regularly as them. They gave advice to others (especially to those with IT projects), received some ideas how to approach clients, and found an informal mentoring relationship with the CEO of a more advanced agriculture startup who paid regular visits to the hub. It helped that there were several software developers who Kizito and Bright could exchange with for technical advice. Hub Accra also ran many events, but Kizito and Bright were not very interested.

Soon, Hub Accra increased the daily fee to five cedi, and only the ‘real guys’ stayed. It certainly was not as lively as before, but somehow Kizito and Bright initially felt freer. They

now knew everyone else that was in the space, and it was easier to strike up a conversation with the whole group. Now it was even more important that the entrepreneurs using the space all happened to be interested in tech: most in the room shared the same passion and read the same blogs, so they could talk about the most recent tech developments in Silicon Valley, the UK, or across Africa. Kizito and Bright felt like they had found likeminded people that understood their ambitions and problems.

On the other hand, it did not take long until Hub Accra also felt somewhat boring: the same three or so startups were in the space every day. Kizito and Bright were now looking for investors, which Hub Accra could not really help them with. They had heard that iSpace was offering investor access, but they found it too expensive. They wished they had a hub in Accra that would be like the hubs in Kenya. During their search for investors, they had approached a more advanced entrepreneur that sometimes spent time at Hub Accra, and he introduced them to the CEO of a large local tech company. The CEO saw value in Kizito's and Bright's business and appreciated that they had hustled and gotten client contacts with their prototype. The CEO took Kizito and Bright under his wings and offered them work space in his office building, where they would also have access to hardware and equipment. After a little over one year in Hub Accra, Kizito and Bright now felt they did not need the hub anymore and decided to move out. They would still come to the hub occasionally to catch up with others, but now spent most of their time working on the next prototype and talking to customers.

5.3.3. Vignette 3: Philani, a Networker in Harare

Philani did not understand what all this 'hub' fuss was about. For him, any good tech entrepreneur focuses on customers first: find a customer's 'pain' and build a business to solve it. To that end, hanging out at a hub could at best be a way to get customer leads and at worst be a distraction and a waste of time.

Philani was one of the better coders in Harare, and he experimented with a price tracking system right when he left college. He got in touch with people at High-Tech 263, and that was how he got started as a tech entrepreneur. He later started his own blog with a software developer friend; they wanted to publish material about how to build and run a tech startup rather than about current news. Philani's first product, a commodity price tracker, was launched two years ago—about a year before there were any hubs in Harare—and it was now running smoothly but without much potential for growth.

Philani was currently working on his second app-based startup. He had launched the product about a year ago; it was a system that allowed banks to manage their mobile money customers. The market was not friendly, but he hustled and did a lot of legwork, speaking to middle managers at banks and trying to find the decision makers. He had gotten some traction and signed up a handful of banks, with good revenue coming in. In the long run, he saw a lot of potential in this market even outside of Zimbabwe, and he felt that product development and customer acquisition would keep him busy at least for another two years. That's also why Philani had just turned down an invitation to join a Pan-African startup competition: he didn't see how such an event could provide value for what he needed to do. He had co-founded both his companies with a family friend, who was a fairly good coder but much better at dealing with customers. They had also recruited three interns that were helping with customer support.

When the hubs started in Harare, Philani took notice, as everyone in Harare's tech community did. The news was all over the local blogs: hubs were supposed to "build community" and boost tech entrepreneurship in Harare. Philani was all for that goal, but he was not sure why local tech entrepreneurs would need hubs for this. What would these hubs do on a daily basis? He heard from colleagues that hubs were running different kinds of app competitions and workshops, and that they offered free coworking space. That didn't seem relevant to Philani's startup; he was still very busy building out the user base and signing up more banks.

He knew a few people who began working out of Hypercube, and so he went there maybe once a month to check in with them. When Philani went, it was nice that people showed support for his work; they encouraged him and congratulated him on having launched one of the few revenue-generating software products in the country. Philani or his colleagues also went to Hypercube to record podcasts for their blog; for instance, they would interview an entrepreneur about his/her insights gained from running a tech startup. Finally, Philani felt that he got some business value out of the hub because he met an established local tech entrepreneur at an event there, and they were now talking about a partnership.

Still, Philani was critical of hubs. For him, through hubs, non-entrepreneurs were trying to run the entrepreneurial movement, which did not make sense and did not work. Hubs seemed to attract a lot of people that were not serious about tech entrepreneurship. The focus on social impact that some of the hubs chose made things worse: Philani felt that often people that were interested in social development and ‘helping Africa’ missed how to build products that people would buy. African hubs did not seem to push entrepreneurs to focus on the market.

Philani had much more respect for the Y-Combinator accelerator in Silicon Valley or the newly founded Emerging Ideas accelerator in Harare, which were run by entrepreneurs who had a proven startup record. Instead, he saw that very few of the people at hubs had revenue-generating startups, so he could not really take hubs seriously. He felt that the money that was used on hubs would be better spent to directly support struggling tech entrepreneurs who were already trying and “suffering in the name of startups,” as he liked to say. Philani thought that people could benefit more from hubs if they already knew what they were doing, as hubs could not lead them on the path to tech entrepreneurship. What was great about hubs was that they gave a work space and free internet to some entrepreneurs who needed it, but for tech entrepreneurs like Philani, they remained a place to check in with from time to time for networking, and no more than that.

5.4. Nested Hub Communities

Based on the categorization of entrepreneurial participation patterns (cf., 5.2. and 5.3.), the analysis was concerned with identifying supra-individual or group-level social structures that hubs' overall structure was made up of (cf., 3.1. and 3.2.). Given the diversity of membership and participation, it was apparent that interaction happened, not always between the hub (as a clearly bounded entity) and other organizations (such as clearly bounded startups), but usually among individual entrepreneurs and groups of entrepreneurs (teams, interest groups, communities, sub-communities, etc.) as well as diverse other actors with facilitation by the hub (cf., 3.1.). In other words, interaction was happening 'within and around' hubs, and between various individuals and organizations.

Specifically, I found that hub participation intensity and richness varied across *nested levels*, where the center of the overall structure was embodied by the hub's work space (cf., 5.1.2.). The levels consisted of symbolically and socially bounded components (Lamont & Molnár, 2002; Scott, 2004). Boundaries differed significantly in strength. Entrepreneurs and other actors self-selected into and out of different levels of participation intensity, with high intensity at the hub's core (regular face-to-face interaction with multiple others inside the hub space) and low intensity at the periphery (occasional or one-off visits to the hub for events) (cf., 5.2.). Stronger boundaries appeared to exist towards hub cores; weaker boundaries towards the periphery.

Thresholds between levels were not usually explicit or formal, but understood as conventions by hub participants. In most cases, the regularity and continuity with which a given entrepreneur was present in a hub space became the most important heuristic. For instance, the few startup teams that occupied Hub Accra or iSpace became known as these hubs' core members. In some cases, such thresholds were made more explicit; for instance, the notion of 'senior tenant' was used in kLab in Kigali to refer to those entrepreneurs who had been coming to the

space regularly since the hub's founding or for a longer period of time. Such attributions of 'core' or 'seniority' status were not formally recognized but they carried meaning for hub participants, which could be socially enacted (Lamont & Molnár, 2002). For instance, newcomers to a hub were asked by other members not to occupy desks that senior tenants usually used.

The analysis thus yielded two discernible subcomponents of hubs' overall social structure: *core communities* and *peripheral communities* (see Table 8). I conceptualize both components as communities in a broad organizational-sociological sense because members were "voluntary collections of actors whose interests overlap[ped] and whose actions" were "organized for a shared purpose" (O'Mahony & Lakhani, 2011, p. 185).

Core and peripheral communities were reminiscent of notions of 'community' that prior incubator literature had proposed. Social relations-focused studies used the community concept to refer to close-knit peer groups of incubatees inside of incubators (cf., 2.3.3.4.) while earlier incubator studies referred to the "local community" (or the "local business community") as the incubator's environment from where incubatees are selected and additional support resources are drawn (cf., 2.3.3.1.). However, there were also differences. Specifically, core communities of hubs were not as clearly bounded from the external environment as incubatee communities (see 5.4.1. and 5.6.; cf., 2.3.3.4. and 2.4.1.). Moreover, peripheral communities of hubs were not external to hubs (see 5.4.2. and 5.6.) while the "local community" of incubators was conceptually located strictly outside of incubators (cf., 2.3.3.1.).

This section details the two types of hub communities before the following section (5.5.) introduces the notion of 'fluid boundaries' as a social-structural pattern specific to hubs. The last section in this chapter (5.6.) highlights the differences between fluidly bounded hubs and incubators and innovation brokers.

	Core hub community	Peripheral hub community
Size	Few members (approx. 5-30)	Many members (approx. 30-hundreds)
Actors	Novice entrepreneurs, advanced entrepreneurs who started out as novices in the community; higher degree of similarity between actors	Entrepreneurs of all maturity stages, mentors, technology corporations, government agencies, and development organizations; lower degree of similarity between actors
Relationships and social dynamics	Dense, strong ties: frequent face-to-face interactions, lasting co-location, friendships, socialization, tacit knowledge exchange	Sparse, weak ties: occasional face-to-face & online interaction, brief co-location, acquaintances & professional contacts, information exchange
Boundary strength	Strongly bounded: barriers to access; takes time and effort to become a member (e.g., regular work from space); high commitment and identification towards hub; 'like-mindedness' refers to strong identification with other members (e.g., same challenges as entrepreneurs)	Weakly bounded: low/no barriers to access; takes no/little time and effort to become a member (e.g., event attendance); weak commitment and identification towards hub; 'like-mindedness' refers to loosely shared purpose (e.g., a stake in technology entrepreneurship in a city)
Membership	- Social boundaries: e.g., members of a technical sub-community running a session in a meeting room, or a hub space being regularly occupied by 'techies' - Symbolic boundaries: e.g., 'regulars,' 'senior tenants,' entrepreneurs associate with a hub by others	- Social boundary: e.g., actors included on a mailing list for startup events - Symbolic boundaries: e.g., a particular representative of a technology corporation is considered by technology entrepreneurs as a member of the 'local community'
Authority, status, hierarchy	- Defined within social boundaries: e.g., 'senior' community member's opinion is given greater weight at a community meeting - Defined within symbolic boundaries: e.g., a desk is known to be reserved for a specific 'regular' hub user	- Defined by social boundaries: e.g., an established serial entrepreneur being a judge in a startup competition - Defined by symbolic boundaries: e.g., an outspoken entrepreneur is respected for authenticity and considered a leader of the local startup scene
Roles of expertise, division of labor	- Defined within social boundaries: e.g., a group of junior developers listening to a senior developer's instructions - Defined within symbolic boundaries: e.g., an individual known as the 'person to talk to about the local maker movement'	- Defined by social boundaries: e.g., an entrepreneurship activist speaking on a panel - Defined by symbolic boundaries: e.g., a celebrity blogger that is known for his ability to promote local technology startups

Note: Social boundaries are conventions that are enforced/materialized through exclusionary boundary work, while symbolic boundaries are conventions and provide a basis for enforcement, but are not necessarily enacted (cf., Lamont & Molnár, 2002).

Table 8: Differences in boundary features between core and peripheral hub communities

5.4.1. Core Communities

Core communities formed the structural cores of hubs. They included entrepreneurs that fell into the *kernel of community* and *apprentice* categories (cf., 5.2., 5.3.1., and 5.3.2.). They sometimes showed increased group-levels of trust and social cohesion based on rich social interactions, thereby enabling socially situated and interactive learning, especially for tacit, technical, and experience-based knowledge (see also 6.1.3.3. and 6.2.2.). Core communities spanned across other formal structures, such as formal employment with other organizations or startups operating out of hubs. As pointed out by incubator researchers (Peters et al., 2004), these features make core communities of hubs similar to communities of practice (Brown & Duguid, 1991) and collaborative communities (Adler, Kwon, & Heckscher, 2008) (see 8.3.3. for a more explicit conceptual comparison).

Technology entrepreneurs became members of core communities, not through formal appointment (such as a membership contract), but through the intensity of their participation. Individuals within a core community spent several days per week in a hub space, usually over months or even years. Members thus had the potential to have many, frequent, and rich interactions with each other, often developing into friendships or one-on-one mentorship relationships. Over time, core community members often “entrepreneurialized” each other (Marti et al., 2013): they learned through socialization how to be an entrepreneur (how to run a startup, how to use a certain technology, how to pitch, etc.) (see also 6.2.2. and 6.5.).

Novice entrepreneurs tended to participate most intensely and thus represented the lion share of members in core communities. Advanced entrepreneurs were only part of core communities when they had started out in a community as novice entrepreneurs. In other words, many members of core communities were not ‘entrepreneurs’ in the sense of opportunity-driven, well-trained, experienced, etc. individuals, and most had not yet founded a venture.

Instead, a large share of core communities consisted of graduate students, independent consultants, or freelancers who had product ideas and were seeking to explore and learn about the entrepreneurial process or find team members.

The boundary around a core community was initially symbolic (Lamont & Molnár, 2002): it was understood as a convention by its members and thus recognizable to them. Symbolic boundaries were then enacted by community members, so that they became social boundaries (Lamont & Molnár, 2002). For instance, a person that was visiting Hub Accra for the first time was approached and asked who they were, because they were not recognized as a member of the hub's core community of regular users (cf., 4.3.3.2.). This means that hubs' core communities were bounded towards their environment even if there were no formal boundaries in place (Santos & Eisenhardt, 2005).

In some core communities, members also ran activities for their peers. The motivation to invest time and effort was usually born out of commitment and identification with other members of the community (see 6.1.3. for details). Hub spaces became social enclosures for core communities (cf., 5.1.2.), so that members took on important roles in welcoming and integrating new members:

Yeah, actually we interact a lot with fellow tenants: we interact with the new tenants, we are the senior tenants. So, we do help the new tenants or the coming people. (Stable entrepreneur at kLab)

As members of core communities typically knew each other professionally and socially, there was the potential for sub-groups, including labor and role divisions as well as informal hierarchies, to develop (see 6.1.2. and 6.1.3. for details):

They are still tenants... it's informal but it's a trend that we're seeing because when someone spends two and a half years here, they have accumulated a lot of information, they've learned a lot. The new guy who walks in the next day can learn from them before even going to the senior mentors. (Hub manager)

5.4.2. Peripheral Communities

Peripheral communities consisted of *networker* entrepreneurs who did not regularly work in the hub space (cf., 5.2. and 5.3.3.) as well as guests and occasional hub users, mentors, technology corporations, government agencies, and development organizations. In other words, peripheral hub communities were sparse and diverse, composed of both people and organizations, interacting casually, irregularly, and infrequently, especially at events.

Peripheral community members interacted with each other or with members of core communities, mostly to exchange information and for other instrumental reasons. They spent little time in the hub space: some peripheral community members paid weekly, short visits (e.g., to attend networking events) while others came to the hub space only once. Interaction frequency and intensity also varied over time: for short periods, some peripheral community members worked intensely at the hub before again moving out of the hub's core. In interviews, they used phrases like "checking in with" members of core communities, or other expressions that conveyed a casual and ad hoc types of interactions:

If you want to bounce ideas, to get people's perception about certain things, Hypercube is [the] place to be. (Networker entrepreneur in Harare)

Some members did not even live in the city that the respective hub was located in (e.g., guest speakers or participants' in the hub's social media). This could lead to frictions between core and peripheral community members:

For me an event like... the networking event within the Rwandan environment, with random business owners, CEOs, that is helping... investors, business institutions... But coming here and teach me how in the UK things are being done, that's just not... I would like... firsthand experience. (Novice technology entrepreneur at kLab)

Peripheral community members were thus only loosely affiliated with the hub organization and did not have an intimate understanding of core communities, but they were also not external the organization in the same way as a non-client venture would be external to an incubator (cf., 2.3.3.3.). They had a stake in what the hub symbolizes (cf., 5.1.3., e.g., 'Hypercube as the place for social technology entrepreneurship in Harare'), while hubs' openness allowed

them to partake only to the degree that suited their purposes and interests (cf., 5.2.). This shared purpose or interest—however broad or vague it might have been—meant that this peripheral component of hubs’ social structure could also be conceptualized as a community (O’Mahony & Lakhani, 2011).

For instance, kLab’s list of 600 members (cf., 4.1.2.3.) indicates that these individuals at some point felt that they had a stake in kLab’s work or sought to be affiliated with kLab, even if this affiliation only materialized in a single visit. Similarly, Hub Accra’s long list of partnerships (cf., 4.3.3.2.) includes organizations with only loose ties to the hub, such as one-off collaborations or informal advisors. Groups of women technologists used kLab, Hypercube, and iSpace only for occasional meetings, but they still each “belonged to” the given hub more than to other local organizations:

I mean, it’s also something that they [the hub] wanted to do in terms of helping women in technology, and us, [we’re] like a subset of what they intend to do in future... We know that if anyone asks them to support women in technology, they will know we are working with tech women. (Lead of a women technologist group)

In all these cases, peripheral community members became part of a given hub’s social structure: these were actors who other hub members expected to meet at a hub event or who could be found and identified through the hub. The examined hub organizations’ peripheral communities blended in with wider social structures of technology entrepreneurship. In other words, the distinction between hub external / non-member and hub internal / member actors became blurred, as one technology entrepreneur clarifies:

Interviewer: You’re describing [how] you meet your people, you meet your investors, you meet your mentors: all that’s happening at kLab. Is there anything like that happening... outside of the hub? Do people have their own networks?

Respondent: Yeah, of course, we have our own networks. [But] I’ve never met any of those guys outside because they are much more harder to reach outside, through our community outside. [Pauses] I’d ask you to define what you mean by “outside,” because once you are within a community, then the boundaries of the community are not exactly within the facility itself. So, the community extends its own presence here, online, outside the country, within the diaspora. So, yeah, the community is everywhere. It’s much more hard to define “outside” because even when you’re not within kLab itself, you still receive notifications about this, you still receive emails communications, and you can interact with these people... See now, the thing is we know who is who, who is interested in what,

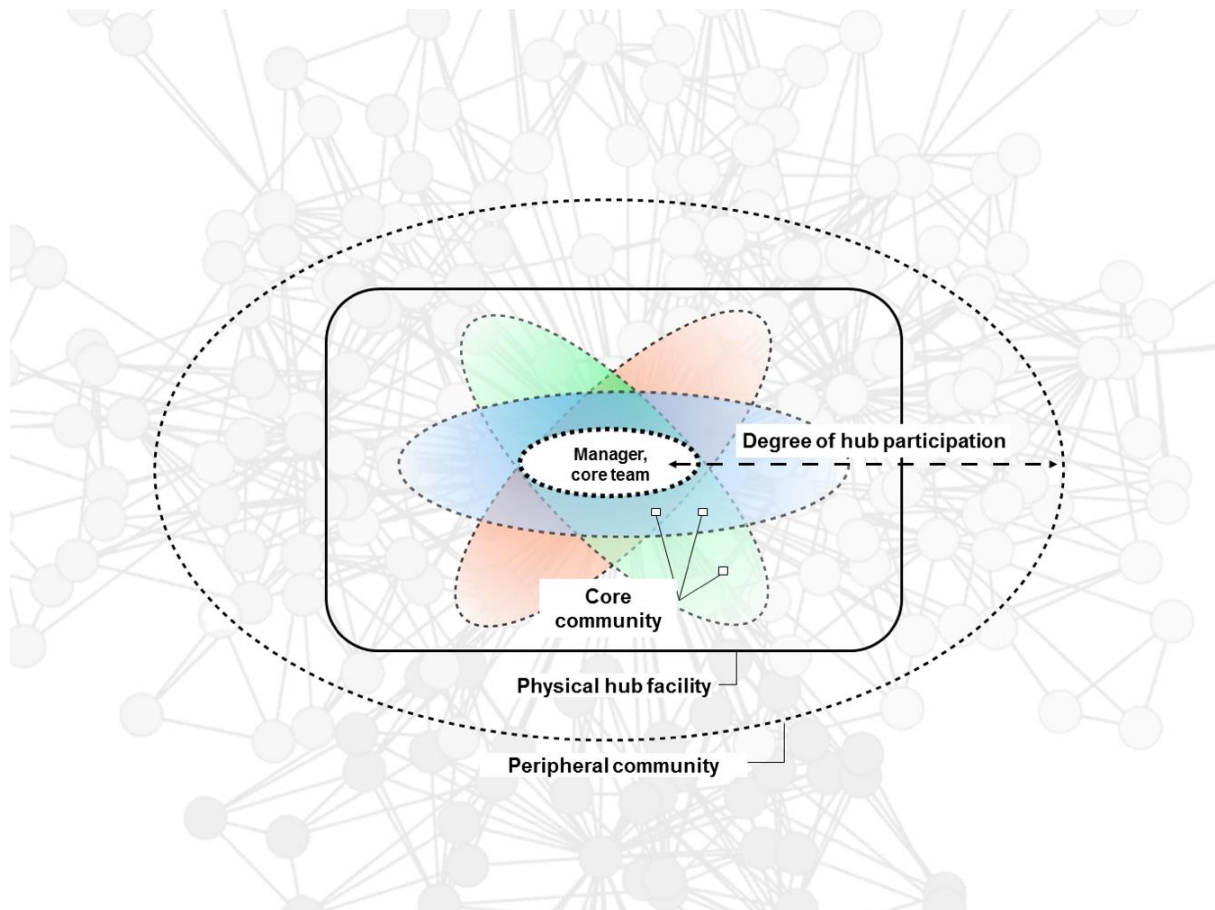
and even when you're not here... even when you're no longer an active member of this community, they'll let you know, especially if they know that whatever is coming might interest you. (Stable technology entrepreneur at kLab)

5.5. Fluid Boundaries

The previous sections show that neither membership in core communities nor in peripheral communities was based on formal criteria. Hubs were bounded from their external environments and had internally bounded components at nested organizational levels, but neither external nor internal boundaries were formal, rigid, or permanent.

To capture these patterns in a generalized form, I conceptualized hub organizations as social structures with *fluid boundaries*, drawing from the notion of organizational fluidity (Faraj, Jarvenpaa, & Majchrzak, 2011; Schreyögg & Sydow, 2010) (see Figure 25). This conceptualization encapsulates that symbolic and social boundaries separating communities existed in hub organizations. Within boundaries, patterns of interactions could stabilize, resulting in a discernible organizational social structure generic to hubs. Yet, boundaries were permeable and changeable by actors' independent and strategic action.

In other words, who was included within a given organizational boundary changed over time and was based, not directly on hub leaders' selection decisions, but rather on entrepreneurs' participation decisions. Entrepreneurs re-evaluated their engagement on an ongoing basis, with the option to limit or terminate it whenever they felt that they did not benefit from it anymore. This was made possible by hubs' particular organizational features (cf., 3.3.3.) and the resultant mechanism of self-selected membership (cf., 5.2.). Due to hubs' openness, actors could move up or down on the scale of hub participation, moving closer to or further away from the organizational core of hubs, at their own discretion. Reciprocally, the facilitative and indirect nature of hubs' organizational action (cf., 5.1.) resulted in flexibility also for entrepreneurs, as entrepreneurs (like hubs themselves) did not make formal and permanent commitments.



Source: Author, designed by Tuukka Toivonen.

Note: Strong line represent physical boundary. Dotted lines represent social boundaries, implying an underlying symbolic element that has been socially enacted (cf., Lamont & Molnár, 2002). Node shading indicates different actor groups.

Figure 25: Social structure of hub organizations: fluidly bounded arrangement of core and peripheral communities

At the same time, hubs lent a *degree* of stability and permanence to relational arrangements that was higher than for informal interest groups or event series (cf., 5.1. and 5.4.). In some cases, core communities closely resembled stable organizational environments, where routines, specialized learning, division of labor, etc. occurred (cf., 5.4.1.). This is why individual and novice entrepreneurs were particularly attracted to core communities of hubs: they were otherwise missing the benefits of routinized interactions (learning, information exchange, socialization, etc.).

Hubs' fluid boundaries also allowed intermediation between communities to serve as a basis for intermediation between specific community members. For core community members,

members of the peripheral community were “known strangers” (Marti et al., 2013): peripheral community members were clearly seen as outside of the core community and yet as useful interaction partners who share the same interests. Vice versa, for peripheral community members, core communities made individual entrepreneurs accessible. For example, peripheral community members were able to approach hub managers and core community members to obtain referrals to other community members. In other words, core communities served as a pool for weak-tie-based search processes (Hoang & Antoncic, 2003): peripheral community members only needed a rough idea of who they could expect to find at the hub to identify individual entrepreneurs who they could partner with.

Hub managers became brokers between core and peripheral communities, as they were aware of core community members’ work, competences, and needs:

There is no [formal] agreement with them... we refer those people [from the core community] to private consultants... In three [cases], private consultants ended up merging with the startups. (Hub manager)

Once a core community had stabilized, hub managers were able to use simple tools like mailing lists to inform entrepreneurs about opportunities arising from peripheral community members’ approaches (note that the brokerage is initially unspecific and directed at the core community rather than any individual):

Through the system there [at the hub]. So, the newsletters with the emails that [the hub manager] sends... You have a sense that chances for you to get partnership investments or projects going [are] here. (Technology entrepreneur)

Another entrepreneur described a similar brokerage dynamic, but this time as it would be initiated by her (note similarly to the previous example that she initially has only a vague notion of who exactly she wants to be connected to, but she can anticipate that the hub manager would know the appropriate contacts within the peripheral community):

If I would like to meet NGO people in the marketing side of things, I know [the hub manager] has those contacts. So, I’m looking to do something, market myself through a news agency, I know [the hub manager] is always a phone call away, same as [one member of the hub’s board].

The nested social structure of hub organizations was thus the result of a balancing act of decision making by entrepreneurs faced with the option to engage with hubs as organizational actors: entrepreneurs alternated between the appeal of being embedded in stable social structures and the need for independence and product focus. Entrepreneurs' participation decisions differed based on idiosyncratic perceptions of hubs, but also the same entrepreneurs made different choices over the course of the entrepreneurial process. Fluid boundaries were the social-structural outcome of many entrepreneurs' individual but interdependent balancing acts (cf., 3.2.).

5.6. Implications: Hubs vs. Incubators and Innovation Brokers

In sum, this chapter showed that hub organizations can be understood as social structures with nested levels: a core community of mostly novice entrepreneurs is enclosed by a peripheral community of various other stakeholders of (technology) entrepreneurship. Internally and externally, the social structure of hubs is fluidly bounded, meaning that community members move towards or away from the core based on continual decisions as to what degree of hub engagement provides them with benefits. The boundary around core communities is stronger, while the boundary around peripheral communities (i.e., the external boundary of hubs towards their environment) is weak and mostly symbolic. This does not mean that boundaries are non-existent: fluid boundaries are permeable but still have tangible roles, namely to allow for stable and routinized—and thus predictable—patterns of interaction (including hierarchies, division of labor and roles, and brokerage) within or across a given boundary.

This particular social structure makes hubs different from many types of intermediary organizations and from incubators. While intermediation and incubation researchers often think in clear internal / external distinctions, such as client / intermediary organization or incubatee / non-incubatee (cf., 2.2.2. and 2.3.3.), these distinctions are less meaningful for hubs. In hubs, an entrepreneur who was 'internal' during one month might be 'external' during the next. A

mentor might be a contributor to a hubs' services for years without ever signing a contract or receiving remuneration from the hub, and then decide to cease her support, without the hub organization having any control over her choice. This mentor is internal to the hub in one sense (i.e., contributing to its services) but external in another (i.e., having no formal commitment), and the degree to which she is at the hub's core is a matter of her ongoing decision making (i.e., it is self-selected).

Specifically, the relationship between a hub and an entrepreneur differed from the relationship that an intermediary or incubator would have with an entrepreneur, in four ways. First, there was no client-service provider relationship between hubs and specific entrepreneurs; hub services were merely of a facilitative, untargeted, and ad hoc nature (cf., 5.1.1.). Second, membership in hubs was determined informally: there was almost never a contract or another type of codification, and instead, informal attributions like mentions on a website, individual commitment, or peer recognition served to establish participation (in contrast to formal service agreements or contracts for intermediaries and incubators). Third, there was no binary or stable distinction between hub-internal actors and hub-external actors, while such distinctions are usually clearly defined for intermediaries (e.g., employees vs. intermediary clients and third parties) and incubators (e.g., incubatees vs. non-incubatees). Fourth, typically entrepreneurs engaged with hubs in their individual capacity or while they were forming a team but not as an already formed startup firm.

Entrepreneurial participation differed between hubs and incubators in two additional ways.³⁵ First, membership in hubs was predominantly self-selected by entrepreneurs instead of resulting from a competitive selection process, which is the norm in incubators (cf., 2.3.3.). Second, a numerical majority of hub members (broadly defined) would not regularly be present

³⁵ Selection mechanisms and contributions to the intermediation process by parties other than the intermediary organization itself are not applicable or specified in the intermediation literature.

in the hub space and not normally contribute to hub activities, while the sum of ad hoc interactions by these actors formed an essential part of the overall social structure of the hub; this is in contrast to a fixed set of incubatees using an incubator as their permanent office and receiving others only as guests.

Together, these differences in membership regimes (i.e., who is part or not part of an organization) resulted in hubs being less strictly bounded from their environments compared to intermediaries and incubators. In hubs, external social structures and different layers of internal structures were found to *blend into each other*: boundaries existed but they were fluid. Similarly, hubs were in some sense also less bounded from their constituents (i.e., technology entrepreneurs): the distinction between ‘service provider’ and ‘client’ was all but dissolved. Entrepreneurs became an integral part of hub organizations; the inner world of a hub was unimaginable without entrepreneurs (its ‘clients’) being a part of it and shaping it.

Hubs are thus different from incubators insofar as they integrate a peripheral community into their organizational social structure: they become a ‘hub’ for a wider and more loosely defined group of actors than some group of direct ‘clients’ (i.e., incubatees for incubators). While the incubator literature distinguishes between internal micro-communities and external local (business) communities (cf., 2.3.3.1. and 2.3.3.3.), in hubs, both the core and peripheral community are integral parts of the organization. Hubs are defined by the co-existence and interplay of both communities, and their social structure would be incomplete without the peripheral community. In other words, hubs blend parts of the local business community into the periphery of their organizational structure. This is in effect what iHub’s leaders refer to when they argue that the iHub “community” would blend in with the local “tech community” or “tech ecosystem” of Kenya (cf., 2.1.2.).

For instance, organizations such as Startup Zone or MEST (cf., 4.2.1. and 4.3.1.) have core communities (i.e., close-knit groups of entrepreneurs interacting frequently and learning

from each other) but they are distinct from hubs such as Hypercube and Hub Accra (cf., 4.2.2. and 4.3.3.) because their organizational structures do not include peripheral communities. Startup Zone and MEST might run occasional events and have connections to external parties, but these external parties are not integrated within the social structures of these organizations.

While some incubator studies had alluded to a blurring of internal and external networks of incubators (Bøllingtoft & Ulhøi, 2005; Hackett & Dilts, 2004b; Phan et al., 2005), in hubs, the discernment of ‘inside’ and ‘outside of’ the organization thus becomes even more ambiguous. New venture creation perspectives (cf., 2.3.3.1.), which implicitly or explicitly conceive of incubators as self-contained service providers and incubatees as clients (e.g., Bergek & Norman, 2008), appear entirely inapplicable to hubs. Even dyadic and social network perspectives on incubators (cf., 2.3.3.2.-2.3.3.4.) do not entirely capture how entrepreneurs and other actors blend in with hub organizations and become part of their social structures.

Hubs do not appear to be different from intermediaries in general, but distinct from some narrow understandings of how intermediary organizations relate to their clients and environments. Hubs can be seen as intermediaries: brokerage and connection making between two or more parties is facilitated by hubs (cf., 5.1.3. and 5.5.; see 8.1.4. for details). Yet, during the intermediation process, the connected parties actually become part of the hub’s social structure at least temporarily; they are no longer external to hubs in a strict sense. This is a contrast to conceptions of intermediaries as brokers in networks, which imply that intermediaries are clearly bounded entities (nodes) facilitating ties (edges) between other external parties (nodes) (e.g., Kauffeld-Monz & Fritsch, 2013, cf., 2.2.).

Overall, the chapter thus shows the uniqueness of hubs as social structures when compared to incubators and innovation brokers (as a specific type of intermediary). This means that prior intermediation and incubation theory can only be applied to some elements in hubs, but

hubs should not be treated as any other intermediary or as merely a new incubator model (see 8.1.4. for an explicit discussion).

Likewise, it appears questionable that practitioners' incubator expectation towards hubs (cf., 2.1.4.) is adequate: if hubs are not formally bounded organizations that select ventures for entry into a standardized support program, then it might not be suitable to assume that they can create or develop startups (see 8.1.3. for a detailed discussion). The network infrastructure expectation (cf., 2.1.4.) appears more appropriate but the analysis in this chapter also showed that not all connections in hubs are of the same kind. Specifically, the social structure of hub organizations is multi-layered and includes symbolic and social boundaries, so that not all actors are seamlessly connected to each other within a single even 'network' (see 8.1.3. for details).

For the remainder of the thesis, the chapter highlights that the analysis must consider core and peripheral hub community in conjunction. Ultimately, it is the interplay of nested levels of communities which underlies the processes that hubs trigger.

Chapter 6 Variance in Hubs: Community Activation and Organizational Patterns

This chapter builds on the findings of chapter 5, further approaching answers to the research questions. Chapter 5 detailed how African hub organizations were found to be structured *in general*, which was useful to specify the observable concepts and to distinguish hub organizations from incubators and the notion of innovation brokerage. However, this generalization by itself cannot speak to processes in hubs (i.e., how hubs work, cf., 1.3.). Namely, it does not afford an explanation for the diversity across hubs observed in chapter 4. For instance, chapter 5 cannot account for how kLab and The Office in Kigali defined ‘like-mindedness’ and ‘diversity’ in entirely different ways, leading to starkly divergent patterns of participation and interaction (cf., 4.1.2. and 4.1.3.).

This chapter will thus complement the general description by eliciting *systematic variation* across hubs, looking for differences in hub social structures and potential explanations. Simply put, the last chapter showed what makes an organization a ‘hub,’ while this chapter shows *what are key differences between hubs and how they come about*.

Given the research questions and observable concepts (cf., 3.1.), the chapter conceives of social structures as outcomes, and of organizational actions as (potential) antecedents.³⁶ Thereby, it establishes the starting and end point of hub processes while it does not determine the mechanisms that connect them. The chapter thus stops short of developing process theory, but it establishes the findings and concepts to support the theory development conducted in chapter 7.

³⁶ I acknowledge that organizational actions and hub social structures are mutually causally related. Yet for the sake of analytical clarity, the process will be imagined to happen in the direction from actions to outcomes. The notion of an organizational pattern will help as an analytical tool to capture some of the mutual causality, or more specifically, the dynamic interdependence of social structures and organizational actions (see 6.3.).

Using the findings of chapter 5, this chapter conceives of hub social structures as consisting of fluidly bounded core and peripheral communities (cf., 5.4.-5.5.). The depth of meaning that is derived from relationships (cf., 3.2.) differs fundamentally between core and peripheral communities. This means that variation of social-structural features across core communities of different hubs should be analytically distinguished from variation across peripheral communities.

In turn, hubs' organizational actions are analyzed as potential antecedents for social-structural outcomes (cf., 3.1.). Based on the results from the previous chapter, organizational actions will be understood to consist of services, spaces as social enclosures/fix points, and symbolization (cf., 5.1.).

Consequently, the chapter proposes the notion of an *organizational pattern* as a substantive way to distinguish different types of hubs. It suggests that hubs ought not be classified by service models but instead by social structures that materialize following an interactive process between hub's organizational actions and entrepreneurs. The chapter also derives two specific organizational patterns found in the six hub cases.

In short, the chapter aims to establish in what ways core and peripheral communities of hubs differ from case to case (6.1.) and what antecedents contribute to this variation (6.2.). The chapter then proposes the concept of organizational patterns as a way of classifying hubs (6.3.). Finally, the chapter applies this concept to the six hubs in the sample, showing that they adhere to three different organizational patterns (6.4.).

Ultimately, the chapter identifies antecedents (hubs' organizational action), outcomes (differences in hub social structures), and systematic co-occurrences of antecedents and outcomes (organizational patterns). Consequently, chapter 7 will develop the causal mechanisms that connect antecedents and outcomes, explaining *how* the latter arise from the former.

6.1. Variation in Social Structures Across Hubs

6.1.1. Participating Actor Groups

Cross-case comparisons, summarized in Table 9, showed patterns of participation in core and peripheral communities. Several patterns were general across hubs, further illustrating the results of chapter 5. For instance, non-entrepreneurial actors (e.g., mentors, bloggers, etc.) only very rarely participated in core communities. kLab and The Office were exceptions; this was due to the particular circumstance that non-entrepreneurial support actors had offices in the same building as the hub spaces, making it convenient for them to participate regularly. There was also a clear pattern that more advanced entrepreneurs participated less in hubs, especially in core communities.

Yet, this chapter focuses on observations of systematic variation. One set of findings relates to differences between hubs with a technology orientation (kLab, Hypercube, Muzinda, and iSpace) and hubs targeting all entrepreneurs, that is, non-technology-oriented hubs (The Office, Hub Accra). These groups of hubs differed in three ways.

First, actors seeking to support *technology* entrepreneurs (software mentors, organizers of hackathons, etc.) very consistently participated in the peripheral communities of technology-oriented hubs, while they were rarely part of peripheral communities of non-technology-oriented hubs. Second, vice versa, actors seeking to support any entrepreneur participated in technology-oriented hubs only in exceptional cases (e.g., in kLab's case, where a general entrepreneurship support group happened to be located in the same building). Third, a limited number of technology entrepreneurs participated in non-technology-orientated hubs, while non-technology entrepreneurs never participated in technology-oriented hubs.³⁷ This does not mean that all entrepreneurs participating in technology-oriented hubs were 'technologists' in a narrow sense, but all had at least an interest to engage with technology:

³⁷ The only exception were freelancers and students simply accessing hub spaces to use bandwidth.

	kLab		The Office		Hypercube		Muzinda Hub		iSpace		Hub Accra	
	CC	PC	CC	PC	CC	PC	CC	PC	CC	PC	CC	PC
Technology entrepreneurs												
Aspiring (incl. freelancers, consultants, etc.)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Novice	Y	Y		Y	Y	Y	Y	?		Y	Y	Y
Recently launched	Y	Y	Y (1)	Y	Y	Y	Y	?		?	Y (1)	Y (1+)
Stable	Y	Y	Y (1)	?		Y		Y		?		Y (1+)
Advanced		Y		?								Y (1+)
Non-technology entrepreneurs												
Aspiring (incl. freelancers, consultants, etc.)		Y	Y	Y		Y		Y		Y	Y	Y
Novice			?	Y							Y	Y
Recently launched			?	Y							?	?
Stable			?	?							?	Y (1+)
Advanced			?	?								?
Actors seeking to support technology entrepreneurs												
Hub manager(s), hub staff	Y	Y	Y	Y	?	Y	Y	Y	?	Y		Y
Mentors	Y	Y				Y				Y		Y
Interest groups (e.g., coder communities, Women in Tech gatherings, etc.)	Y	Y		Y		Y				Y		
Partners running innovation competitions (hackathons, etc.)		Y				Y				Y		Y
Partners running trainings (e.g., on coding)		Y				Y				Y		
Partners running events (e.g., about technology trends)		Y				Y				Y		Y
Financiers who made investments in members of core community		Y										

Table 9: Hub participation patterns for various actor groups

	kLab		The Office		Hypercube		Muzinda Hub		iSpace		Hub Accra	
	CC	PC	CC	PC	CC	PC	CC	PC	CC	PC	CC	PC
Actors seeking to support any entrepreneurs												
Hub manager(s), hub staff		Y	Y	Y								Y
Mentors		Y		Y								?
Interest groups		Y		Y								
Partners running innovation competitions (e.g., pitching or business model competitions)			Y	Y								
Partners running trainings (e.g., how to write a business plan, accounting, etc.)			Y	Y								Y
Partners running events (e.g., discussing trends in social entrepreneurship, creative industries)			Y	Y						Y		Y
Financiers who made investments in members of core community			?									
Other actors												
Local government		Y										
International speakers		Y		Y		Y						Y
Local development organizations								Y				
International development organizations		Y		Y		Y				Y		Y
Local bloggers and media		Y		Y		?				Y		?
International bloggers and media		Y		?		Y				?		?

Note: All social structures assessed as they were found at the time of fieldwork. Y (1) indicates instances where the data clearly indicate that only a single individual fell into a given category. Y (1+) indicates instances where there was only one known case of an individual falling into a given category, while the data was inconclusive whether there were others. ? indicates entirely missing or inconclusive data. Abbreviations: CC—Core Community, PC—Peripheral Community.

Table 9 (continued): Hub participation patterns for various actor groups

Not everyone who's here now is specifically... a 'techie'... even agriculture major people... come here, use the space... so if we get business major people, who... maybe come here for some distribution management, something, together working [with] another techie person... then this place is serving its real purpose. (Manager of a technology-oriented hub)

In the following, 'technology entrepreneurs' will thus refer to all technologist entrepreneurs (e.g., software developers with product ideas) and to entrepreneurs with an interest specifically in technology and involved in launching a technological product (e.g., a mobile application, Internet software, etc.). Thus, two clear if unsurprising distinctions in hubs' social structures were that (1) actor groups in peripheral communities aligned themselves directly with a hub's focus on technology vs. entrepreneurship in general, and (2) core communities of technology-oriented hubs were entirely focused on technology while technology was only one of many sectors in core communities of non-technology-oriented hubs.

In turn, Table 9 also indicates three more subtle participation patterns. First, only technology entrepreneurs in kLab's core community spanned a wide variety of maturity stages. kLab's core community also included technology-oriented mentors, and only kLab's peripheral community included technology-oriented financiers. On the contrary, despite their technology orientation, Hypercube, Muzinda, and iSpace did not count technology entrepreneurs beyond the 'recently launched' stage as members of their core communities. Generally, 'stable' and 'advanced' entrepreneurs did not appear to self-select into core communities. kLab's core community included stable technology entrepreneurs, but those had grown inside the community and were committed to it (see 6.1.3.1.). Stable and advanced entrepreneurs did not appear to benefit from participation in existing core communities consisting of novices:

[Hypercube doesn't provide value for me at the] same magnitude as someone who is a rookie in the industry [because it] gives them the place to collaborate, get to meet each other, build their skills. (Stable entrepreneur in Harare)

Second, all hubs except Muzinda Hub included a wide range of actor groups as members in their peripheral communities. Third and finally, several other actors (such as local government or international speakers) participated in peripheral communities seemingly based on funder organizations' ties rather than for any thematic reason.

6.1.2. Content of Interactions

6.1.2.1. *Interaction Content in Core Communities*

There was also variation in what hub participants derived from interactions within core and peripheral communities—that is, in the content of interactions. kLab was the only case in which interactions in the core community happened explicitly to exchange technical knowledge: more inexperienced entrepreneurs learned from more experienced entrepreneurs or from technology experts, such as senior software developers or (more rarely) faculty of Carnegie Mellon University. Members of kLab had a clear notion of technical learning as knowledge transfer from individuals perceived to already have certain skills towards others who wanted to attain them. 'Technical knowledge' should be understood broadly here: this referred to specific advice on how to create software code but also on feedback on software or application product development and marketing:

[Presenting software code to each other] is the main way [for collaboration] ... Sometimes the only way to prove to yourself [that you can do it] is to make sure that other people say, "Yeah, this is exactly what we want." At the end of the day it's entrepreneurship and you're creating a product and it's for someone else. (Stable entrepreneur at kLab)

kLab participants thus had a clear concept of others' skill levels. They assumed that skills could be assessed reliably, and that the hub should be structured accordingly. Participants argued that core communities needed to include different levels of skill so that inexperienced members can learn from experienced ones. Alternatively, mentors should be involved:

The biggest value [of kLab] for me really was the fact that I could hang around with the people from [Ubwenge] ... I would always try to show off, say, the code I write... He always wanted to have his contribution to give someone help. (Technology entrepreneur at kLab)

Mentors are very experienced people. So, if your problem is much more on software development, they are going to guide you... not code for you, but you can tell them “This is where I’m stuck,” and they’ll help you get out of the specific part. (Entrepreneur at kLab)

Also knowledge-related or professional role divisions were more pronounced in kLab’s case compared to other hubs. Entrepreneurs were referred to by labels such as “techie” or “business person.” The idea that a technology expert, an entrepreneurship/business expert, and a subject-matter expert were needed to found a successful startup was very prevalent, and entrepreneurs tried to organize accordingly:

Skills are the biggest gap we have here.... [What kLab should do is] assess them, assess the potential [of] who [has] those skills to do it... This guy is very good in software development, this guy is a very good business guy and this guy is very good in whatever. Now we give you a team... That can be a model. (Technology entrepreneur at kLab)

Finally, within kLab’s core community, sub-communities formed around technical subjects. The existence of sub-communities depended on the presence of committed individuals to lead them, and on the buy-in of other core community members:

So that’s why the idea of having communities is perfect. It works. When you have a community, this is something where it’s on a need basis. So you have a community, you meet four times a month...for example it’s a community of Java, you say, “Monday we shall talk about object oriented programming.” If I’m a programmer and let’s say... I [already] know what is object-oriented programming, I won’t come. But if on day two you talk about classes and I’m having a hard time with classes..., I’ll show up. If on day three you talk about ‘loops,’ I know what is object-oriented programming, I know what is classes but I don’t know what is ‘loops’—and I’ll attend. So I think that’s where you make it inclusive: you have community events, you have open events. I think 90% of events are open and then whoever is interested will come. (Stable technology entrepreneur)

Similar dynamics occurred in Hub Accra’s core community; however, role divisions and hierarchies were much less ingrained, and mentors were not part of the core community. In effect, a small group of technology-minded entrepreneurs began to run irregular small presentations and workshops (cf., 4.3.3.2.) while their exchanges did not amount to continuous peer-mentoring relationships (i.e., entrepreneurs giving each other direct and applicable advice on startup projects).

For core communities of kLab and Hub Accra, participants also reported that startup teams formed out of interactions at the hub. This indicates that initial conversations about product ideas and interests had evolved into tangible collaborations during which trust was built, labor divided, responsibility allocated, etc. One startup team had formed out of interactions of core community members at Hub Accra, while several developed out of the kLab core community. Similarly, many members of kLab described other members as friends, as did some members of Hub Accra's core community. To a limited extent, this was also true for Hypercube: one startup team had developed out of a Startup Weekend event and used the hub space occasionally, but it soon moved their operation into the home of one of the founders. Interestingly, for Hub Accra and kLab, core community members reported that they interacted *less* with others during periods when hub spaces were used at full capacity, as they found it harder to establish meaningful and interesting conversations with unfamiliar newcomers (cf., 4.1.2.3. and 4.3.3.).

In the four other hubs (The Office, Hypercube, Muzinda, and iSpace), interaction within core communities included occasional informal conversations, for instance, about current projects or the challenges of entrepreneurship. In few incidences, participants related that this amounted to peer mentoring. Yet, exchanges mostly remained at a superficial level without developing into ongoing relationships such as friendships or collaborative projects. For instance, core community members of iSpace reported that they rarely interacted with the few others working in the room.

Hence, in micro-social interactionist terms (cf., 3.2.), participants had meaningful interactions with others when they started to know them, trust them, and regularly engage or collaborate with them, which did not necessarily happen by merely working in the same space. In other words, strong social ties, based on more frequent and emotionally relevant exchanges, did not result directly from co-presence (Rivera, Soderstrom, & Uzzi, 2010).

6.1.2.2. *Interaction Content in Peripheral Communities*

Unsurprisingly, the content of interactions among peripheral community members was more diverse (cf., 5.4.2.). For all hubs, interactions were described as “networking,” a term which participants mostly used to refer to instrumental knowledge exchange, for instance, about other actors’ changing affiliations, opportunities for contract work, upcoming calls for proposals or tenders, etc.

Peripheral communities differed by the types of partners that hubs engaged for events (including presentations, competitions, etc.). Technology-oriented hubs (kLab, Hypercube, Muzinda Hub, and iSpace) and Hub Accra ran technology innovation-oriented events and activities, such as hackathons or Startup Weekends (cf., 6.1.1. and Table 9). Accordingly, the content of interactions within peripheral community depended on the topics of events: for instance, a speaker at Hypercube conveyed his perspective on technology trends in Africa, a Rwandan government official explained to kLab members how the Ministry of Agriculture envisioned to source ideas for mobile applications for the benefit of Rwandan farmers, the Tech Women Ghana lead debated with her group at iSpace how more women could be brought into technology corporations, etc.

Interactions within the peripheral communities of technology-oriented hubs thus revolved around instrumental information, general knowledge, and opinion exchanges concerning topics loosely connected to the shared interest of ‘technology’ or ‘technology entrepreneurship.’ For novice technology entrepreneurs, this was often referred to as “exposure:” beginners were seen to develop an understanding of the wider field of technology entrepreneurship without necessarily gaining knowledge that would be applicable directly to their startup projects.

kLab and Hub Accra were cases in which advanced entrepreneurs and experienced businesspeople (mostly employees of technology corporates) from peripheral communities functioned as occasional mentors for members of the hubs’ core communities. Advanced technology

entrepreneurs also became regular mentors for specific startups at kLab, and at least two made equity investments. In this exceptional case, members of the hubs' peripheral community thus established tangible exchange relationships with core community members.

Interactions in peripheral communities of non-technology-oriented hubs (The Office and Hub Accra) stood out as they emphasized content such as 'inspiration,' 'awareness,' or 'empowerment' for entrepreneurs. Third party organizations usually ran events and activities, with the purpose to convey motivation and a sense of possibility to entrepreneurs rather than providing funding, mentoring, or knowledge about how to create products. In such interactions, event organizers tried to communicate that being an entrepreneur is a valuable goal in and of itself. For instance, in the case of The Office, events emphasized success stories of entrepreneurs. Several participants also mentioned that The Office had a welcoming atmosphere, and that events such as movie nights, small concerts, exhibitions, etc. were popular and inspiring:

I've been to events [at The Office] ... When people meet there, it's "We are from Kigali." ... You do not know even who's doing what and you talk freely to each other. (Technology entrepreneur in Kigali)

In sum, exchanges within peripheral communities of The Office and (to a lesser extent) Hub Accra helped instrumental information exchange, but also served to stimulate entrepreneurial motivation. Interactions were not focused on deep exchanges of practical or technical knowledge.

6.1.3. Activation of Hub Communities

6.1.3.1. *Differences in Roles of 'Community' Across Hubs*

Together, differences in participating actor groups and content of interactions resulted in marked differences on the group level: some core and peripheral communities appeared to work fundamentally differently from others. Specifically, for some hubs, participants explicitly recognized communities as such, attributed social and emotional functions to them, and identified with or felt responsible for them. For instance, in kLab's case, several stable entrepreneurs

within the core community continued to work out of the hub's space even though this was not in their business interest:

As far as I'm concerned, I think I'm at the verge of really moving out of kLab but I'll feel bad if I leave kLab behind self-destructing itself... maybe simply because I started here and I know how cool it was really in the beginning. (Stable technology entrepreneur at kLab)

We have [another work] space [our company] is supposed to be working from but we prefer coming to work from kLab... That's what I called addiction... It's not like we have the best infrastructure at kLab, it's not like we have everything, the best Internet or anything... just coming at kLab makes us more comfortable. (Stable technology entrepreneur at kLab)

Similarly, several kLab members feared that their community was in danger when the hub opened for students and aspiring entrepreneurs: it became less rewarding to engage with any given newcomer, as the risk that the newcomer was not 'likeminded' increased. Instead, kLab members wished that entrants be held accountable; they wanted at least a portion of the hub's resources to be reserved for committed entrepreneurs and felt a sense of ownership for kLab. In those cases, entrepreneurs also believed that they had an obligation to contribute to the hub itself:

For the time [being], we are just giving back to kLab... When there is like new people trying to develop businesses, we share with them our experiences... It's doing the work of the mentor... What we benefited from, we need to give it back to the community. (Stable technology entrepreneur at kLab)

Novices described what they felt was a "sense of community," providing them with emotional support and a "safe space" within which an entrepreneurialization process happened (Marti et al., 2013):

I think there's something about being a startup... we need to share the experiences. I think it just keeps you brave enough. I think for me, that was key: this sense of community here. It's also a warm place where you come and you can talk to anyone and feel free to ask how your business is doing, and, you know, "It's killing me" or "I got a client and I'm doing really well." That kind of thing is needed. (Novice technology entrepreneur at kLab)

To a lesser extent, participants also reported such dynamics for Hub Accra:

When you come first as an entrepreneur, and [in] the space, there is this energy of you see[ing] other people working... Initially, it's very, very encouraging. (Novice technology entrepreneur at Hub Accra)

6.1.3.2. Conceptualizing Community Activation

Thus, in some communities of some hubs, individuals appeared to interact because of more than a loosely shared purpose. These groups seemed closer to a narrower community concept, similar to Tönnies' notion of *Gemeinschaft* (Tönnies & Lichtblau, 2012). Brint (2001, p. 9) provides a critique and summary of sociological community concepts updating Tönnies' work for contemporary contexts, defining...

communities as aggregates of people who share common activities and/or beliefs and who are bound together *principally* by relations of affect, loyalty, common values, and/or personal concern (i.e., interest in the personalities and life events of one another). (Emphasis in the original)

Hence, Brint's definition of communities requires an emotional bond or *personal mutual concern* between participants, while O'Mahony and Lakhani's (2011) definition sets a lower bar of voluntary action towards a shared purpose (cf., 5.4.).

In Brint's terminology, core and peripheral hub communities thus become *elective communities* (choice-based and concentrated in space) if and when members feel concern for each other. Brint (2001) highlights that this characteristic is not mutually exclusive towards instrumental motivations: affective and instrumental reasons can underlie community relationships in parallel. Elective communities show the most variation in terms of underlying sociological mechanisms (such as identification or mutual support) compared to, for instance, communes or virtual communities (Brint, 2001).

The breadth of Brint's understanding of elective communities is useful to conceptualize the observed variation in hub communities. Case studies showed a wide range of group-level outcomes, which could not be adequately defined by group size or instrumental motivations alone. For example, in kLab's and Hub Accra's case, interactions were *less meaningful* for participants when there were *more* individuals using the hub space, specifically upwards of a threshold where it became difficult to personally know other community members.

I conceptualize this variation in mutual concern across communities as *activation*. In this thesis, the term is used to refer to the depth and richness of social meaning that participants derive from interactions with other members in a community. Activation is thus what differentiates a community where members are merely co-present from one where participants care about each other and *recognize the community* as a separate social entity (cf., Benner, 2003). Members of active communities thus derive meaning not only from other individual members but also from the existence of the group-level social entity. The community itself, beyond individual members, begins to have social functions: within it, goals get defined, roles and hierarchies are set and enforced, commitments are expected and sanctioned, etc. (Brint, 2001). Thereby, an active community stands out as a social structural component from its environment while exchanges across the community boundary continue to happen (Faraj et al., 2011; Lave & Wenger, 1991; Marti et al., 2013): the “richness of context generates a fluidity and heterogeneity within and beyond communities” (Handley, Sturdy, Fincham, & Clark, 2006, p. 641).

Accordingly, in this thesis, a community is conceptualized as *in existence but inactive* when individual participants only loosely share a purpose but otherwise remain independent from one another regarding their goals, concerns, identification, commitment, etc. On the contrary, in *active* communities, members have “fraternal feelings” for one another, provide each other with mutual support, and accept constraints for their individual interests (Brint, 2001).

Since core hub communities are smaller, enable more frequent face-to-face interaction, and are more strongly bounded than peripheral communities (cf., 5.4.), core hub members potentially have stronger mutual concern than peripheral ones. An *inactive* core community can thus be equivalent to an *active* peripheral community with regard to certain social functions such as ‘rituals to integrate’ or the ‘level of participation expected.’ Table 10 summarizes this conceptualization for the two types of hub communities.

	Active core community	Inactive core community	Active peripheral community	Inactive peripheral community
Archetypical virtues of community: fraternalism and mutual support				
Levels of member participation expected	High	Low	Low	None
Strong fraternal feelings typical among members in closest contact	High	Low	Low	None
High levels of mutual support	High	Low / None	Low	None
Strong, self-conscious identification with community	High	Low / None	Low	None
Oral memory, traditions, and/or folklore	High	Low / None	High / Low	Low / None
Archetypical virtues of community: informal dispute settlement, low levels of stratification				
High levels of ritual to integrate	High	Low / None	Low / None	None
Dispute resolution through rules, discussion, informal mediation	Rules / discussion	Discussion / informal mediation	Discussion / informal mediation	Information mediation / None
Stratified / unstratified (status, positions, hierarchies)	High / Low	Low / None	Low	None
Archetypical vices of community: enforced conformity, illiberalism, intolerance				
Levels of enforced conformity	High / Low	Low / None	Low	Low / None
Constraints on pursuit of individual interests	High / Low	Low / None	None	None
Creation of deviance	Low	None	Low	None
Strong boundaries between members and non-members	High / Low	Low / None	Low	None

Note: / indicates that either state can be present in a hub community of the given category.

Source: Adapted to hub communities from Brint (2001, p. 12-13).

Table 10: Sociological differences between active / inactive core and peripheral hub communities

The concept of community activation thus allows capturing some of the variation observed across hubs. Specifically, the concept implies that a given core or peripheral community was ‘active’ when participants themselves interpreted interactions with others to be of personal concern to them, and when they, themselves, felt that a community existed. This also means

that activation is a conceptual bridge between the broad community concept from organizational sociology used in chapter 5 and participants' interpretative processes (cf., 3.2.): while inactive core and peripheral communities are not perceived by participants as communities, active communities are recognized as such. In other words, in active communities, members perceived the communities as supra-individual entities which 'did something' for them.

6.1.3.3. Core and Peripheral Community Activation Observed in Case Studies

I found that peripheral communities were active in most hubs, while active core communities were rarer (see Table 11). Compared to peripheral communities, activation appears to take longer for core communities, and requires more commitment by entrepreneurs, mentors, and other supporting actors, rather than only by hub leaders. This is unsurprising given the lower threshold for peripheral communities to become active (cf., Table 10): participants felt a weak, general personal concern for others loosely affiliated with the hub, which was enabled by occasional meetings at events or during visits at the hub space. It appeared to be easy and quick to establish an active peripheral community because hub environments were starved of relevant and well-organized events which were openly accessible and did not require commitment. Peripheral communities thus became active in cases where hubs (or, specifically, the hub manager and partner organizations) frequently ran events with large attendances, which succeeded at least partially in all cases except Muzinda Hub. The Office was an exceptional case where participants were effusive about the hub's "welcoming atmosphere;" this complemented the frequent events and led to the most active peripheral community of the hubs in the sample.

However, event participation did not translate into activation of core communities. kLab was the only hub with a fully active core community, even if activation had suffered over the months before fieldwork when the hub loosened its access policy (cf., 4.1.2.3. and 6.1.3.1.). Hub Accra and The Office had partially active core communities: subsets of entrepreneurs used the hub space regularly and felt concern for each other but this did not amount to a strong

commitment to the hub or to the community, and not all regular users felt concern for others.³⁸

At the time of fieldwork, Hypercube, Muzinda Hub, and iSpace did not have active core communities, even though there were hints of one at Hypercube.

Social-structural outcome	kLab	The Office	Hypercube	Muzinda Hub	iSpace	Hub Accra
Core communities						
Active?	Yes (tech)	Partial	In progress			Partial (tech)
Sub-communities?	Yes	?				Yes
Informal hierarchies, role divisions, etc.?	Yes	Yes	Partial			Yes
Peripheral communities						
Active?	Yes	Yes (!)	Yes		Partial	Yes
Sub-communities?	Yes	Yes	Yes		Yes	?

Note: ? indicates missing or inconclusive data. ! indicates strong activation.

Table 11: Comparison of activation in core and peripheral communities across hub cases

These findings provided further confirmation that core and peripheral communities of hubs are substantively different social structures. This is a contrast to the original iHub vision where “the iHub community” (i.e., iHub’s core community) and “the tech community of Kenya” (i.e., iHub’s peripheral community) seamlessly blend into each other (cf., 2.1.2.). While core and peripheral communities can interact and enhance each other (cf., 5.4. and 5.5.), they can also exist largely independently of each other. In some cases, there were even concealed conflicts between core and peripheral community members, for instance, when it came to the use of space for events or when hub managers invited international speakers who core community members deemed irrelevant to their work (e.g., Hub Accra and in some instances kLab).

³⁸ Data for The Office was not entirely conclusive as the two interviewed technology entrepreneurs who were part of its core community reported a degree of concern for other community members but could not point to a sustained group of peers with whom they interacted at or through the hub. Data for Hub Accra was somewhat inconclusive as several of the long-term members of the core community had recently ceased to use the hub regularly or were contemplating such a move.

6.1.4. Community Activation and Perceptions of Hub Success

Community activation was related to perceptions of whether hubs were successful. Namely, there appeared to be a relationship between a hub's technology orientation and the emphasis that different groups of members put on core or peripheral community activation.

Specifically, in all cases of technology-oriented hubs, hub managers and entrepreneurs were concerned about core community activation. For instance, iSpace and Hypercube managers emphasized that the lack of an active core community in their hubs was the key problem for them to address in order to attain the goal of developing or creating technology startups (cf., 4.3.2.3. and 4.1.3.2.). Both also felt that "more structure" or "more process" was needed to better involve technology entrepreneurs. In fact, the managers envisioned a move towards standardization and selection, somewhat undermining the defining hub feature of 'openness' (cf., 3.3.3.):

We are trying to make it easy for someone who has got a relatively small budget to actually still be a member but also committing something into the actual community and the space itself... So, someone may come in and, say, they have been running a startup for a year, they meet the criteria in that they are members of Hypercube, they do have a team that's between two and four people and so for us it's like "Ok, they meet the bar, they can actually start participating, but they still need to adhere to our process." (Hypercube manager.)

Similarly, many technology entrepreneurs at kLab felt the hub's open access policy undermined core community activation and were disappointed when mentor participation became more irregular (cf., 4.1.2.3.). Muzinda hub managers attempted to use hackathons, not to establish the hub's peripheral community, but to source members for an envisioned active core community (cf., 4.2.3.2.).

Notably, only actors who were close to entrepreneurial processes in technology-oriented hubs emphasized the importance of active core communities. In kLab's case, the initially small size of the hub's core community prompted board members who were not involved in entrepreneurial processes to urge the manager to increase member participation numbers (cf., 4.1.2.2. and 4.1.2.3.). In Muzinda Hub's case, the board was also keen on "numbers" (cf., 4.2.3.3.). Yet,

the outcomes were different in the two hubs. A core community had already been active at kLab, and at the time of fieldwork, its concerns were communicated to the hub's board, which promised adjustments. For Muzinda, the absence of an existing core community and lacking resistance from hub managers allowed the board to radically alter the hub's setup.

Contrary to managers and entrepreneurs at technology-oriented hubs, managers of The Office and Hub Accra were preoccupied with running many large-scale events to attract greater numbers of individuals and partner organizations, with the goal to activate peripheral communities. Both hubs' core communities were only partially active and, in Hub Accra's case, showed signs of dissipation at the time of fieldwork, but hub managers were alarmed in neither case. For Hub Accra, the leadership was even described as detached by some core community members (cf., 4.1.3.4., and 4.3.3.3.).

In sum, it appeared that actors involved in entrepreneurial processes of technology startups favored active core communities. These participants championed changes for hubs when core community activation had not been achieved or was at risk. In turn, hub funders favoring high numbers of participation were not concerned with core community activation. Leaders of non-technology-oriented hubs worked towards activating peripheral hub communities.

6.2. Variation in Hubs' Organizational Action

The previous section showed that social structures of the six hubs varied greatly. Specifically, it highlighted marked differences between hubs which focus on technology and those that do not (cf., 6.1.1. and 6.1.2.). Moreover, the prior section underscored that hub communities were not equal in what they signified for their members: some were active, allowing members to derive meaning from group-level social dynamics, while others were inactive, only affording participants to convene in space and interact superficially (cf., 6.1.3.). Finally, the section showed that core community activation was a concern mainly for technology-oriented hubs

trying to develop startups, while peripheral community activation was important predominantly in non-technology oriented hubs.

This section briefly outlines how variance in the organizational action of hubs related to such differences in social structure. It does not examine the causal mechanisms that connect antecedents and social-structural outcomes. Instead, the section identifies co-occurrences of social-structural features with aspects in hubs' organizational action (cf., 5.1.).

6.2.1. Services as Unrelated to Variation in Social Structures

As shown in the previous section, differences in hub social structures were associated with whether or not a hub was oriented towards technology. One underlying antecedent could have been that leaders of technology-oriented hubs implemented different services compared to non-technology-oriented hub leaders, which attracted different kinds of user groups.

Indeed, some service provision differences existed. For example, kLab matched entrepreneurs with mentors in a database, Hypercube ran a Startup Weekend, and iSpace began offering a software development-oriented training. Such services were explicitly geared towards *technology* entrepreneurs and would be of little use for other entrepreneurs. The Office and Hub Accra, as non-technology oriented hubs, did not offer such services, focusing entirely on providing space and organizing frequent and sometimes large-scale events.

Yet, the implementation histories of technology-oriented hubs (kLab, Hypercube, Muzinda, and iSpace) also showed that their service propositions maintained an ad hoc character. In most cases, offerings beyond space were envisioned to attract technology entrepreneurs into core communities (cf., 6.1.4.) but at the time of fieldwork, such offerings had been implemented only sporadically or not at all. In fact, none of the four hubs put in place a rigorous support program to guide technology entrepreneurs through the product development process, which would have involved employing coaches, regular consultations with entrepreneurs, planning

and milestone-setting, etc. Hub-controlled service provision by itself (cf., 5.1.1.) was minimal and not comparable to technology incubators, such as MEST in Accra (cf., 4.3.1.2.):

[It is a] fact that they [MEST] are the only formalized incubator institution that you have. I have been to Hub Accra, iSpace... I have been to iHub in Kenya, and in comparison to all of these, I feel like MEST is very different, because [it has] a bunch of... fellows who are just sitting there waiting to help people. You also have Silicon Valley veterans sitting on the board giving you really good advice, and this is the only place that I have come across that actually does something like this. (Stable technology entrepreneur in Accra)

[For] Hub Accra and iSpace, if someone has an idea, this is the community to plug into. It's loose, it's ad hoc, but you plug into some sense of community... And then Meltwater [MEST] is more of "We are creating entrepreneurs directly." (Mentor in Accra)

In sum, it thus appeared that effective service provision was not an important differentiator between hubs' organizational actions, and was thus ruled out as a significant antecedent for variation in hubs' social structures.

6.2.2. Hub Spaces and Core Community Activation

The role of space as a social enclosure (cf., 5.1.2.) was an antecedent mainly for variations in *core* community activation. Core communities only appeared to become active in hubs where a consistent group of entrepreneurs had used the hub space for an extended period of time (cf., 6.1.3.), which was hampered when the group of users on a given day did not overlap with the group of users on the next day (cf., Hypercube case, 4.2.2.2., or Hub Accra case, 4.3.3.2.). Muzinda, iSpace, and Hypercube appeared to lack a group of dedicated entrepreneurs who frequented the space consistently over some time, making core community activation impossible.

The observation that kLab (a technology-oriented hub) and The Office and Hub Accra (non-technology-oriented hubs) each had at least partially active core communities (cf., 6.1.3.) would at first point to the conclusion that a hub's technology orientation is not related to core community activation as a social-structural outcome. However, the partially active core community of Hub Accra consisted mainly of technology entrepreneurs (cf. 4.4.2.3.). The core

community of The Office was driven mainly by leaders and employees of co-located entrepreneurship support organizations rather than by entrepreneurs (cf., 4.1.3.). The Office's core community was only partially active and appeared to remain in this state, because technology entrepreneurs themselves did not appear to want to commit to the hub beyond using the coworking space and attending events in an ad hoc fashion.

Ultimately, an active core community appeared to be enabled mainly by consistent co-presence of a group of entrepreneurs with a loosely defined shared interest, but it seemed to be further enhanced when this interest was more specific, for instance, focusing on technology and software development. In these cases, overlapping interests became opportunities for more sustained engagement, especially for specialized learning and peer mentoring (cf., 6.1.3.1.). For example, in kLab's case, entrepreneurs worked intensively and continuously on startup projects that required interactive technical learning, which allowed informal hierarchies and more detailed role divisions to develop. This, in turn, enabled product development in teams, accompanied by continued exchanges across teams.

These findings imply that the technology orientation of a hub does not have a direct implication for community activation, but technology-oriented hubs depend on core community activation more than non-technology-oriented hubs, because active core communities are conducive to the collaborative development of technological products.

6.2.3. Symbolization and Technology Orientation of Peripheral Communities

Symbolization (cf., 5.1.3.) co-varied most apparently with differences in peripheral hub communities. This was unsurprising because symbolization was instrumental for actors' initial participation decisions and for intermediation between core communities and large and foreign organizations, which themselves partook mostly in peripheral communities (cf., 5.1.3. and 6.1.1.).

Concretely, the technology orientation of a hub was expressed in its purpose and outreach efforts, thereby translating into what the hub symbolized for others. Entrepreneurs within a given city and hub partners perceived technology-oriented hubs as “places for technology entrepreneurship” or “places for the tech community,” while non-technology-oriented hubs were seen as “places for entrepreneurship” or “places for entrepreneurial community.” Consequently, technology and non-technology-oriented support actors affiliated with different hubs according to this division line (cf., 6.1.1.):

Within a community... so if for example HP [Hewlett Packard] lands in Rwanda and they tell me they need... two people, let's say. I can pick two people from the community who are very good... I even write a blog and say that these two guys worked for HP for ten days, HP gave them some laptop and even gave them 400 dollars per hour for ten days.

Similarly, local technology companies looked to technology-oriented hubs specifically for finding software developers and other technical specialists. Technology hubs became a potential channel to access skilled and specialized labor. This happened frequently in kLab's case, where board members' personal connections further enhanced the process:

We had trouble with recruiting and finding... talented software developers... so the idea really was for our companies to have a pool of software developers [that we] can tap into when [we] have big projects. (Advanced technology entrepreneur in Kigali)

Yet, the symbolization aspect of the process became even more explicit in Accra, where more advanced technology entrepreneurs had only a cursory familiarity with hubs while still regarding them as ‘places for technology’ which could be useful to them:

Interviewer: So [when you talk about your network], you are not mentioning organizations like Hub Accra or iSpace...

Respondent: Innovation hubs, yeah.

Interviewer: Is that how they are called?

Respondent: Yeah, that is how I would call them... that is something that I am now getting more actively into: networking with others who are doing similar things... I know of iSpace; I have seen Hub Accra online only. I have been to iSpace once, that is, when I was looking for a developer. Nothing major has come out of it for me personally.

The role of technology-orientation as a participation filter was more complex for self-selection into core communities. The prospect of attaining technical knowledge from peers and

sharing a specific interest was an important asset of technology-oriented core communities (cf., 6.1.2.); yet, other technology entrepreneurs explicitly opposed hierarchies and role divisions that came with an emphasis on technology expertise (cf., 6.1.3. and 6.2.2.):

I feel like people feel more in a community at The Office [than at kLab] ... there's no, "He's a mentor and he's a tenant"—no! ... When people come [to kLab], you can easily categorize: these are tenants, these are mentors... Mentors speak to mentors during events... tenants talk to tenants, and I don't feel that mix happening. (Stable technology entrepreneur in Kigali)

I feel like most people would actually go for The Office than being at kLab because in The Office, I'm going to find other entrepreneurs that are working there, as this also makes sure that businesses are sustainable and make money... It's a coworking space for any entrepreneurs... It's a good thing, you know, diversity. There is so much that you can learn from people from different backgrounds. (Novice technology entrepreneur in Kigali)

6.3. Distinguishing Hubs by Organizational Patterns

So far, this chapter has shown that hub social structures varied even though hubs offered very similar and limited sets of services (open work space, events, and ad hoc training or mentoring). Structures also varied despite no significant differences in selection mechanisms between hubs, as all were open for self-selected membership (cf., 5.2.). On the contrary, differences in hub social structures seemed to be related to the technology orientation of a hub, as this affected community activation, symbolization, and self-selection mechanisms. Table 12 summarizes these results.

6.3.1. Inadequacy of Models to Categorize Hubs

These results showed that it might not be analytically useful to distinguish hubs by service offerings. Because self-selection by participants (rather than selection by the hub) determines membership and because interaction with other entrepreneurs (rather than with hub staff) is a key source of value for hub participants, meaningful differences between hubs arose from who chose to participate 'how much' and for how long (cf., 5.2.-5.4.). Key determinants for participation decisions were the shared purpose and mission of the hub (expressed through symbolization) and existing social structures at the time of the participation decision.

Hub feature	kLab	The Office	Hypercube Hub	Muzinda Hub*	iSpace	Hub Accra
Period of operation	36 months	27 months	12 months	12 months	17 months	15 months
Shared purpose	Tech entr	General & social entr	Tech & social entr	Tech & social entr	Tech & social entr	General & social entr
Mission	Pre-incubator, supporting/creating technology startups, skill development	Creating an innovation community, spanning creative silos and sectors	Supporting/creating social technology startups	Supporting social technology innovation, skill development	Supporting/creating social technology startups	Coordinating startup ecosystem, convening change makers
Strategy changes	Tier system: balance between core community and casual users	More regular events, greater orientation towards creative industries over time	“More process:” formalized support program based on peer mentoring	Abandoning ‘hub’ approach and move towards impact sourcing	“More hands-on:” formalized support program, milestone setting, training, mentoring	More large events with high publicity value (e.g., “largest hackathon of West Africa”)
Novice technology entrants work in space?	Yes		Yes	Yes (low usage)		Yes
Stable technology entrants work in hub space?	Yes (previous novices)	Yes				
Events with wide reach?	Yes	Yes	Yes		Yes	Yes
Core community						
Active?	Yes (tech)	Partial	In progress			Partial (tech)
Sub-communities?	Yes	?				Yes
Hierarchies, role divisions?	Yes	Yes	Partial			Yes
Peripheral community						
Active?	Yes	Yes	Yes		Partial	Yes
Sub-communities?	Yes	Yes	Yes		Yes	?

Note: ? indicates missing or inconclusive data. Abbreviations: entr—entrepreneurship, entrants—entrepreneurs.

Table 12: Hubs’ organizational actions and community activation

It thus appears questionable to group hubs by service or implementation models. Models are akin to recipes for managers, in that they provide guidance by codifying some coherent set

of good practices while allowing for improvisation and adaptation (Baden-Fuller & Morgan, 2010). For hubs, models can thus be understood as the combination of hub leaders' visions and missions together with their service provision decisions. They represent 'what ought to be' rather than 'what is,' and implicitly assume that a modeler (here: a hub manager or leader) has a high level of control and knowledge over what happens in the organization. For instance, The Hub London and iHub served as 'role models' for other hub managers: they represented elaborate but abstracted and aspirational mental images of how a hub could or should work (cf., 2.1.1 and 2.1.2.).

In contrast, the results presented so far clearly showed that hubs' implementation histories were anything but controlled and predetermined; they were 'messy' rather than 'clean.' For instance, five out of the six hubs were modeled after iHub in Nairobi (all except The Office), but none of them ultimately came to resemble iHub. Four of the five iHub aspirants (all except kLab) changed strategies away from iHub's ideal and towards more traditional incubation approaches (Hypercube and iSpace), impact sourcing (Muzinda), or a wide-reach/loose-touch approach neglecting core community activation (Hub Accra). In every case, contextual factors and, in particular, entrepreneurs' participation decisions led to social-structural outcomes that differed markedly from the originally envisioned models.

It would certainly not be wrong in general to categorize hubs by service models. For example, an analysis aiming to derive context-independent yet applicable guidance for hub managers in fact ought to focus on models, as such representations take the perspective of managers. Still, the context of this thesis and the present research questions about "how hubs work" demand a more grounded approach that also considers the messy realities of implementation as well as other actor groups' perspectives (especially of entrepreneurs).

6.3.2. Organizational Patterns

I therefore introduce the notion of an *organizational pattern* as a meaningful differentiator between hubs. This concept is meant to capture the interplay of ‘what ought to be’ (model) and ‘what is’ (social structures). It acknowledges that hub models do not directly translate into social structures, and that they are mediated by affordances and limitations of hubs’ organizational action and by the decisions of entrepreneurs and partners.

Organizational patterns are still an abstraction from complex and messy hub histories, but they include elements beyond hub leaders’ goals and visions. Patterns account for the observation that models were recursively envisioned by hub leaders and actualized in interaction with entrepreneurs and other actors. Simply put, organizational patterns incorporate the observation that there was ‘only so much that hubs could do,’ and that hub social structures were profoundly shaped by the engagement of local entrepreneurs and other supporting actors. While ‘organizational pattern’ is not clearly defined in organization science, the term seems appropriate as it is generally used to refer to internally coherent, actualized (rather than merely envisioned), intermittently stable, and environmentally contingent forms of collective or coordinated action (Drazin & Van de Ven, 1985; Freeman, 1999; Gebert & Boerner, 1999; Wales, Monsen, & McKelvie, 2011).

More specifically, the results showed that hub leaders had to endeavor to achieve a good *fit* between social structures that they aimed to create and the practices of interaction which members were willing and able to adopt. For instance, novice technology entrepreneurs benefitted from participation in active core communities, as those enabled sustained, product-oriented interactions within a consistent small group of peers and mentors. Yet, active core communities were hard for hubs to create: often, hub managers, hub funders, and entrepreneurs lacked mutual awareness, or there was simply an insufficient number of technology entrepre-

neurs in a given city who wanted to engage. It appeared easier to activate peripheral communities, simply by running many regular events that convened actors around a loosely defined shared purpose. This was enough to fulfill missions of non-technology-oriented hubs, seeking to ‘empower’ or ‘inspire’ individuals, loosely coordinating them rather than creating products or enterprises directly.

Organizational patterns of hubs thus represent *intermittent, proposed solutions* to problems of organizing, such as division of labor and integration of efforts (Puranam et al., 2014). Conceptualizing organizational patterns as intermittent solutions recognizes that hub leaders learned over time and adapted to contextual conditions—all hub managers described their activities as experimental. Unlike for acontextual models, patterns incorporate that both the envisioned and the realized social structure of a hub are moving targets. In turn, seeing organizational patterns as propositions encapsulates that hub modelers (i.e., their leaders) suffer from cognitive biases and constraints (see 7.4.4. for details), which means that they continuously revise their approaches as they learn more about opportunities and constraints for the hub.

6.4. Two Observed Patterns: Technology and Entrepreneurship Hubs

The concept of an organizational pattern can now be applied to the present case study data. While no two hubs among the six case studies were truly alike, the distinction between technology-oriented and non-technology-oriented hubs was an apparent division line between systematic co-occurrences of organizational actions and social-structural outcomes. The two organizational patterns identified within the six case studies are thus referred to as the *technology hub* and the *entrepreneurship hub* (see Annex E for details).

The four technology hubs (kLab, Hypercube, Muzinda, and iSpace) all resembled each other closely, at least as far as models, organizational actions, and adaptations by hub leaders were concerned (cf., Table 12). They ultimately aimed at the creation of technological innovations and products, which they wanted to achieve by allowing viable entrepreneurial teams to

form. Technology entrepreneurs were meant to collaborate, dividing labor and coordinating efforts according to specialization and skill levels. Social structural outcomes differed between kLab on the one hand and Hypercube, Muzinda, and iSpace on the other, but this was largely due to low participation of entrepreneurs in Harare and Accra. The latter three hubs all *attempted* to achieve a social structure similar to kLab's: in all cases, hub leaders were primarily concerned with activating core communities.

kLab, Hypercube, Muzinda, and iSpace can thus be categorized as technology hubs, only that mission achievement varied, which led to differences in stability. At the time of fieldwork, one of the four technology hubs had already abandoned the hub model (Muzinda), two were struggling to activate core communities and contemplating a move towards a formalized incubation process (Hypercube and iSpace), and the final one faced tensions arising from balancing acts between core community demands and the founders' goals of reaching a wider group of participants (kLab). kLab had come closest to stability, as it had approached the ideal of a social structure for technology hubs: an active core community as the source of startup teams, supported by an active peripheral community. Yet, overall the data showed that the technology hub organizational pattern proved more difficult to stabilize as it bore inherent conflicts between formalization ('structure' and 'process') vs. hub-typical openness and entrepreneur-led organizing.

The Office and Hub Accra were the two non-technology-oriented hubs from which the entrepreneurship hub organizational pattern was derived. Their initial models revolved less around creating products, and more around stimulating empowerment, inspiration, and creativity among members. To this end, entrepreneurship hubs sought to facilitate open-ended, loose, 'serendipitous' encounters between diverse actors in active peripheral communities. Entrepreneurship hubs refrained from emphasizing privileges or assigning roles for members:

I think this is one of the biggest misunderstandings about innovation spaces that currently exist... "who is a mentor and who is a mentee" ... For us, we are really trying to break

that down; we are trying to recognize that every single person in the space has something different or interesting to contribute... for me, it's about encouraging inclusiveness.
(Manager of an entrepreneurship-oriented hub)

Hub Accra was a case of an entrepreneurship hub which ran technology-oriented events (hackathons) and hosted a partially active core community that included technology entrepreneurs. Yet, Hub Accra resembled The Office more than the other hubs in the sample. Technology entrepreneurs in Hub Accra's core community did not have sustained exchanges of technical knowledge, instead remaining at the level of interest groups. There were also no informal significant hierarchies and role divisions in Hub Accra's core community, which were observed in kLab's core community and envisioned for iSpace's and Hypercube's core communities (cf., 6.1.4.). Both The Office's and Hub Accra's leaders emphasized the importance of an active peripheral community over an active core community; events and wide reach were ultimately prioritized to bring in a multitude of partners and promote the hub to a larger audience. Core communities were not directly encouraged or nurtured, seemingly because goals like inspiration were more effectively achieved through an active peripheral community.

It should be noted that the technology hub and the entrepreneurship hub are merely the two patterns derived from the six case study cases of hubs. While these six hubs were selected to allow for maximally possible generalization across all African hubs (cf., 3.3.), other patterns are conceivable and likely to exist. Moreover, as organizational patterns are conceptualized here as abstracted types of hubs (cf., 6.3.), none of the hubs in the sample fits either pattern perfectly. In fact, it is precisely the analytical point of an organizational pattern to identify meaningful differences between hubs without getting lost in the idiosyncrasies of any particular case. Distinguishing between only two organizational patterns will facilitate the theory building process of the next chapter.

6.5. Implications: Dynamic and Contingent Patterns vs. Service Models

In sum, this chapter showed that, even though the six hubs offered similar services, their social structures varied greatly. In particular, variation concerned the level of activation of hub communities. In active communities, members showed concern for each other and recognized the community as a social entity with a ‘life of its own.’ Variation in the activation of core communities appeared to be related to whether hub spaces had worked as a social enclosure for a consistent group of entrepreneurs, seeking to learn from and collaborate with each other. Active peripheral communities were more common, occurring in any hub that ran frequent events with consistent and large attendance.

The chapter thus illustrated that the creation of active entrepreneurial communities, anchored in hub spaces, is the essential outcome of processes in hubs. Yet, it also highlighted that different hubs focus on different levels and kinds of communities, and that community activation can only be achieved with the participation of entrepreneurs. Specifically, communities consisting mainly of *technology* entrepreneurs reflected the necessities of technical knowledge exchange, specialization, and prior occupational identities and roles, such as seniority and expertise (Bailetti, 2012; Benner, 2003). Bridging and connecting different levels of skill and experience was an explicit concern for leaders and participants of technology hubs, while such hierarchical thinking was explicitly discouraged in entrepreneurship hubs.

To capture this interplay between community level, community activation, organizational action, and entrepreneurial participation, the chapter proposed the notion of an organizational pattern (cf., 6.3.2.), suggesting the technology hub and the entrepreneurship hub as two patterns found among the six hub cases (cf., 6.4.). Simply put, organizational patterns are the fusion of what hub leaders try to do and what entrepreneurs in a given city decide to actually participate in. Organizational patterns thus become intermittently stable templates for the as-

sembly process developed in the next chapter (see 7.2. and 7.3.): at a given point in time, entrepreneurs decide if they fit with the pattern that a hub offers, which reinforces or weakens the assembly of either core or peripheral communities (see. 7.2. and 7.4.).

The observation that hubs' organizational patterns depend on both hub leaders' and entrepreneurs' actions is consistent with much of the intermediation and incubation literature. Namely, studies showing interdependence between intermediary organizations and their clients apply in this context. For instance, the chapter found entrepreneurs' networking capabilities and openness to participate in hubs affect hubs' outcomes, and also that hubs struggle to position themselves as appealing to all of their many potential stakeholders (cf., 6.1.1.); both these findings are consonant with the intermediation literature (cf., 2.2.2. and 2.4.).

The concept of hub organizational patterns also builds on dyadic and community perspectives on the incubation process (cf., 2.3.3.2. and 2.3.3.4.). These streams of literature appeared meaningful for the context of hubs, specifically because they addressed some of the limitations of earlier service-oriented studies and the incumbent venture creation view of incubation (cf., 2.3.2. and 2.3.3.1.). The present findings suggested that service and venture creation perspectives might have some merit for hands-on incubator implementations such as MEST where the incubator organization and its staff control and shape much of what is happening inside the organization (cf., 4.3.1. and 6.2.1.). Yet, because hubs' organizational action was predominantly facilitative and not interventionist (cf., 5.1. and 6.2.), service and venture creation perspectives appeared to have little to contribute to explanations of hub social structures (cf., 5.6.) or variations across hubs (cf., 6.1. and 6.2.). Using organizational patterns instead of service models to categorize hubs is an attempt to avoid the shortfalls of early incubator typology literature, relying on crude and simplistic typologies based on easily observable features which were mostly found to be unrelated to incubator impacts or actual incubation processes (Bruneel et al., 2012; Hackett & Dilts, 2004b).

However, the notion of an organizational pattern also goes beyond dyadic and community incubation perspectives. First, organizational patterns incorporate environmental contingencies. In contrast, dyadic and community views only conceive of incubatees (i.e., client startups *internal* to the incubator organization) as the counterpart for the actions of incubator managers and staff (cf., 2.3.3.2. and 2.3.3.4.). Admittedly, the realm of environmental factors that I consider in organizational patterns is limited: contexts are conceptually reduced to technology entrepreneurs and partners, fluidly self-selecting into and out of hub organizations (cf., 5.2. and 5.5.). Still, this is a useful building block for a contingency theory that relates specific environmental factors to social structures (see 8.2.3. for details).

Altogether, this chapter thus showed how hubs differ from each other, and it highlighted elements in the organizational action of hubs which appear to be related to those differences. The idolized notion of a ‘hub’ as a buzzing place where entrepreneurs collaborate and learn, interacting with various partners for mutual benefit (cf., 1.2. and 2.1.), was not a reality in the studied hubs. In many cases, communities were inactive: members did not feel that they were part of a social entity that was bigger than them, and interactions remained ad hoc (cf., 6.1.). The chapter also demonstrated that it is important to distinguish between different hubs in order to determine organizational processes as, for instance, technology and entrepreneurship hubs consist of different social structures (e.g., leaders’ ambitions, types of participants, content of interaction) (cf., 6.4.). It thus showed that initial hub models might be designed after iHub, but local contexts in large part determine the actualized social structure of hubs.

These insights complete the analysis of hub social structures and the explication of antecedents which appear to give rise to these structures. Thereby, the chapter lays the conceptual groundwork for the development of process theory in the next chapter.

Chapter 7 A Theory of How Hubs Work: The Assembly Process

This chapter outlines the process theory developed in this thesis. It draws on the previous case studies and results chapters, which detailed implementation histories (chapter 4), explicated the social structure of African hubs in general (chapter 5), and described systematic variation of social structures and organizational actions of hubs (chapter 6). Based on process tracing and cross-case comparisons (cf., 3.3.2.), the present chapter builds on these rich findings to suggest causal mechanisms that connect the observable concepts (cf., 3.1.). In other words, while chapters 4, 5, and 6 provided descriptions and evidence, this chapter provides a general explanation of how the observed social structures came into being. It will therefore be more abstracted from empirical realities, using terser and more conceptual language while avoiding quotes and case descriptions.

Namely, the chapter theorizes the process that African hubs trigger as *assembly of technology entrepreneurs*. The chapter begins by discussing the outcome of assembly, active entrepreneurial communities (7.1.), in order to clarify what phenomenon is being explained. The chapter then shows interrelated components of the assembly process: how an initial model leads to the creation of communities via three mechanisms: *convening*, *interconnecting*, and *activating* (7.2.). The chapter then specifies conditions for the stability of assembly outcomes, namely a good-enough fit between the hub's organizational pattern and local entrepreneurs' capacity and motivation to participate (7.3.). Finally, the chapter identifies issues which typically inhibit the effectiveness of assembly, such as tensions between underlying mechanisms or cognitive constraints of hub managers (7.4.).

7.1. Outcomes of Effective Assembly: Active Entrepreneurial Communities

In simple terms, assembly explains how a hub can become 'more than just a space.' Every hub in Africa provides entrepreneurs with work space and free bandwidth but the data

showed that some hubs play a more wide-ranging support role for entrepreneurs. Most significantly, hubs' actions lead to the creation of organizational patterns, which in turn shape the formation of entrepreneurial communities. These communities would not exist without hubs (at least not in the same form); they are the outcome of assembly.

Thus, hubs *structure* the social context of technology entrepreneurship in a given city. They lend a greater degree of permanence, stability, and predictability to particular kinds of social structures which would otherwise not exist or which would be more ephemeral. On the micro-level, specific interactions between specific actors are enabled to intensify and become more prevalent (e.g., lasting longer, dividing roles, etc.). Active communities enable particularly sophisticated and meaningful social interactions, but hubs do not always succeed in creating them (cf., 6.1.3.).

I refer to hubs as *assemblers* to use a more specific concept than 'structuring.' Assembly is thus a type of organizational structuring process: the actions of individuals are coordinated, labor is divided, and individual effort is integrated in a distinct way (Puranam et al., 2014). Hubs join otherwise separate but complementary components (entrepreneurs and supporting organizations) into something larger and collectively more meaningful (active communities). Hence, 'assembly' appears to be a suitable image for the kind of structuring and organizing that hubs are doing.

The metaphor is thus meant to signify both 'construction' and 'gathering.'³⁹ Hubs construct something new, by gathering existing and available but otherwise dispersed constituents, joining them according to a template. The assembled 'constituents' are entrepreneurs and non-entrepreneurial partners (hub managers, mentors, support organizations, etc.). 'Availability' of constituents refers to a minimum possibility for an actor to engage with the hub, depending on,

³⁹ Assembly is unrelated to assemblage (Deleuze & Guattari, 1987). Yet, the underlying reasons for choosing the metaphor are similar: researchers have used assemblage to "speak of emergence, heterogeneity, the decentred, and the ephemeral in nonetheless ordered social life" (Marcus & Saka, 2006, p. 101), which bears some resemblance to the present goals for a theorization of hub processes.

for instance, geographical location or interest in the hub's goals. 'Dispersion' of constituents before assembly is related in part to geographical distance between actors, but it is more precisely characterized by individuals' cognitive differences and distances, such as low mutual awareness, differences in knowledge and capacities, or a lack of shared understandings. The assembled 'new something' is a social structure (i.e., a particular arrangement of relationships) that is non-random and different from the (hypothetical) arrangement that would exist without the hub. Finally, the 'template' according to which the social structure is assembled is the hub's distinct organizational pattern, shaping which entrepreneurs are brought in contact with other entrepreneurs and with supporting actors.

The metaphor also has unintended associations, such as assembly lines or the assembly of a piece of furniture. Unlike 'assembly' might suggest, hub processes do not result in a final, permanent, and material outcome. Assembled entrepreneurial communities are intermittently stable but still amenable to change, as new members enter, others leave, the commitment level of entrepreneurs varies over time, etc. Organizational patterns as templates are also not comparable to manuals, as this would imply that all detail of how components get joined are standardized and pre-specified, and that there is only a single correct solution. Assembly as an *organizational* process is rather more ambiguous, complex, and indeterminate compared to assembly as a *mechanistic* process (e.g., in a manufacturing plant).

Seeing assembly as a structuring process gives a hint of hubs' impact on entrepreneurs and their environments. While the present dataset (or any imaginable dataset) does not allow for rigorous comparisons of social structures in a city with hubs vs. an equivalent city without hubs, an in-depth understanding of the assembly process makes it possible to imagine a hypothetical hub-less urban social structure. The hypothetical comparator is thus the social structure of technology entrepreneurs in a given city, all else equal to the observed state, minus the organizational action of hubs and its effects.

While such a hypothetical comparative reasoning will always be tenuous, it is reasonably certain that the entrepreneurs who were observed to be embedded in hub social structures would have undergone a different entrepreneurial process without hubs existing. That is, they would have made different connections with different actors. Without the hub's organizational action (cf., 5.1.), these technology entrepreneurs would have had to rely more on interactions with others who they knew independently of the hub, such as colleagues from university, family and business contacts, friends, customers, etc. (G. George, Kotha, Parikh, Alnuaimi, & Bahaj, 2016). The individuals who ultimately became members of hub communities would have been more disjointed, or 'disassembled,' *from each other*. In micro-social interactionist terms (cf., 3.2.), these actors would not have derived meaning from each other in the same way or with the same intensity; they would not have learned from each other, socialized or entrepreneurialized each other, been aware of each other's issues, etc. in the same fashion or with the same vigor.

It is important to note that this hypothetical disassembled state would not necessarily be 'worse:' assembly does not by itself imply that hubs have positive impact, for example, in the sense of a surplus in economic development. Seeing hubs as assemblers illustrates that hubs introduce assumptions (i.e., models) about which collaborations lead to positive entrepreneurship and innovation outcomes (i.e., greater number and more successful startups, better ideas, higher entrepreneurial motivation, etc.). Thus 'impact' ultimately depends on whether these assumptions are accurate, and to what extent they can be put into effect in local contexts. If assumptions are wrong or cannot be realized, then hubs could have negative impact or be wasteful, which is in effect what hub sceptics argue when they say that hubs distract entrepreneurs from 'what really matters' (e.g., learning from customers) or that hubs cost too much for the little they offer (e.g., networking opportunities which could just as well be enabled by events and workshops) (cf., 4.2.2.2., 4.3.1.2., and 5.3.3.). The present theorization of the assembly

process thus does not address the question of hubs' impact directly. Social-structural outcomes by themselves are value-neutral.

The proposition that effective assembly leads to the creation of active entrepreneurial communities merely implies that, through hubs, certain relationships and interactions are made more likely to exist than others, which in turn has a further structuring effect on relationships made and sustained consequently. An individual embarking on an entrepreneurial process in a city with hubs will face a local social structure with a different complexion compared to the hypothetical same individual with the same enterprise in the same city but without hubs. For instance, without kLab existing, a given observed interaction 'advanced technology entrepreneur recruited a software developer in Kigali' might have otherwise happened through a job board or personal contacts instead of through the hub, and probably another developer would have been recruited. Simply put, the existence or absence of entrepreneurial communities assembled by hubs partially determines with whom entrepreneurs connect.

7.2. From Models to Communities: Three Mechanisms of Assembly

While the previous chapters have shown the outcomes of hubs and the elements that they combine, what is still missing for an explanatory theory is an account of *how* the elements are joined (i.e., the assembly process itself). This section shows that assembly consists of three mechanisms arising from hubs' organizational action: *convening*, *interconnecting*, and *activating*. Every mechanism also represents a process in its own right, but the term 'mechanism' will be used here to highlight that convening, interconnecting, and activating are subcomponents of the larger assembly process.

In other words, it is through convening, interconnecting, and activating that the existence of a hub organization (cf., 3.1. and 3.3.3.) leads to the creation of active entrepreneurial communities. By itself, each mechanism is present in many other organizational processes: for

instance, interconnecting (see 7.2.3.) is closely related to boundary spanning, a well-known process in organization science (e.g., Fleming & Waguespack, 2007).

Hence, it is only through the *combination and integration* of convening, interconnecting, and activating that assembly materializes as a process that is unique to hubs. Each mechanism is thus a *necessary condition* for assembly: neither mechanism achieves the creation of active entrepreneurial communities by itself. In the remainder of the thesis, assembly will thus be described as *effective* when convening, interconnecting, and activating have occurred in conjunction, thereby creating active entrepreneurial communities.

7.2.1. Initial Hub Model and Organizational Action

As previous chapters have shown (cf., 6.3.1., in particular), funders and leaders of a hub develop an initial hub *model*, which is equivalent to a desired or envisioned organizational pattern for the hub. This model is introduced to local environments through the organizational actions of hubs: services, hub spaces, and symbolization (cf., 5.1. and 6.2.).

Hubs' organizational action results from their unique combination of organizational features (cf., 3.3.3.). Namely, hubs are able to trigger assembly as they combine stability on some organizational dimensions with transience on others. Hubs have a permanent physical space and establish a stable, if loosely defined, shared purpose. Thereby, hubs are recognized and approachable by actors from geographically and cognitively distant spheres (i.e., disassembled constituents), even if these actors do not initially have a concrete expectation of how hubs work (cf., 5.1.3.). At the same time, social-structural components of hubs remain fluid (cf., 5.5.), meaning that they are never made permanent or formal: entrepreneurs and others continue to be given the opportunity to self-select into and out of different levels of the hub. In other words, hubs are 'high on symbolization'⁴⁰ while less emphasis is on formalized, standardized, or directed actions.

⁴⁰ I thank Vaughn Tan for offering this pithy comment at a workshop.

7.2.2. Convening

By combining the permanence of physical hub spaces as locational fix points with the transience of participation (cf., 5.1.2. and 5.2.), hubs first *convene* actors. Convening is the creation of occasions for interaction by gathering actors and giving them orientation. Staying in the assembly metaphor, convening refers to the act of getting the parts together in one place. This refers to literal co-location in physical space (e.g., entrepreneurs working in the same coworking space or individuals attending an event), but also has a strong symbolic element (cf., 5.1.3.): actors feel affiliated with a hub if they perceive that they have a stake in the hub's loosely defined shared purpose. As a result, affiliated actors are more likely to find and interact with each other, for instance, obtaining referrals during a hub visit.

By convening actors, hubs thus create a forum and context for relationship formation without directly facilitating any particular interaction. Practitioners refer to this form of enabling interactions as “creative collisions” or “serendipity” (cf., 2.1. and chapter 4). While convening thus includes little steering by hub leaders (unlike brokerage between two specific parties), the hub model is still reflected in the convening mechanism, as hubs create different kinds of occasions for participant-guided interactions. For instance, a technology hub might host a Startup Weekend which attracts a group of people with a particular interest in technology entrepreneurship but not artists. While interactions following from the act of convening are initiated and maintained by participants, the hub thus shapes which actors have an opportunity to engage with each other.

Convening is inherently about bringing actors together who would not otherwise have interacted. This implies that actors are initially different or distant. ‘Different’ can be understood here in an institutional sense: actors who originally have dissimilar views, norms, values, etc. are given a platform to interact with one another to negotiate new institutions (Dorado, 2005; Mair & Hehenberger, 2014; Montgomery, Dacin, & Dacin, 2012). ‘Distance’ speaks

more directly to economic geography, where geographical distance is intertwined with other forms of distance (e.g., cognitive, relational, organizational, social, institutional, etc.) (Boschma, 2005). Specifically, convening refers to the creation of an opportunity for face-to-face interactions outside of actors' regular and narrowly defined organizational contexts, and is thus related to temporary proximity, anchor organizations, and buzz (Feldman, 2003; Giblin & Ryan, 2015; Storper & Venables, 2004; Torre, 2008) (see 8.3.2. and 8.3.4. for details).

7.2.3. Interconnecting

Beyond convening, hubs also *interconnect* actors. This refers to the facilitation of specific relationships across pre-existing distances or differences. Compared to convening, interconnecting is less open-ended and more directed by hub leaders. The interconnected parties are known to hub leaders, and also the content of the facilitated interaction is at least partially pre-specified based on what the hub leader has identified as a complementarity of interests.

Which actors a hub interconnects again depends on the hub's model. Usually, a hub model includes specific assumptions about which interconnections are particularly worthwhile to focus on. For instance, an entrepreneurship hub might connect donor organizations with specific social entrepreneurs who are part of core communities. Technology hubs might instead match mentors with specific sets of experience with early stage entrepreneurs missing a related skill, or introduce 'techies' to business people.

Like convening, interconnecting is based on the assumption that overcoming pre-existing distances or differences between actors leads to positive innovation and entrepreneurship outcomes. More specifically, hub models usually include a concept of actor groups with complementary knowledge. Group affiliations are determined for instance by geographical origin (e.g., local meets foreigner), specialization (e.g., Java software developer gives advice to a startup team), sector (e.g., agricultural entrepreneur meets technology entrepreneur), profes-

sional identities (e.g., designer meets software developer), or levels of seniority (e.g., an experienced professional mentors novice entrepreneurs on business strategies). Such group affiliations serve as heuristics for hub leaders as to which pairs of actors would benefit from being interconnected.

The interconnection mechanism is related to a narrow understanding of intermediation (e.g., brokerage, cf., 2.2.2. and 2.4.), to *tertius iungens* brokerage in organizations (Obstfeld, 2005), boundary spanning and boundary objects/organizations (Fleming & Waguespack, 2007; Guston, 2001; Star & Griesemer, 1989), and to the “global pipelines” idea in economic geography (Bathelt et al., 2004).

7.2.4. Activating

Convening and interconnecting together create entrepreneurial communities in a broad sense: loosely bounded groups of actors with complementary knowledge and a generally defined shared purpose (cf., 5.4.). Entrepreneurial communities in this sense were created by all six hubs: loosely defined communities form merely by launching a hub, running events, attracting a group of people to hub spaces, signing up members on a list, etc.

Yet, assembly is only complete and effective when these social structures are also *activated*. Underlying activation is the mutual personal and affective concern of community members (cf., 6.1.3.2.). Most importantly for assembly, through activation, a community develops a ‘life of its own’ that is partially independent from the hub’s organizational action. An active community in part sustains itself: current members recruit new members, boundaries and rules get enforced, participants make commitments of time and effort, etc. This does not mean that individuals ‘stop to matter’ (cf., 3.2.); an active community becomes a supra-individual social entity but it still depends on the continuous reaffirmation of commitment and boundary work by its members (cf., 6.1.3.2.).

Activation is thus the mechanism through which hubs can have the most transformative effect on social structures: from a disassembled state marked by no or a very low mutual concern and awareness, activation makes a community stable and recognized by members who feel committed to each other and the community as a whole. An active community spurs group-conform individual action more than an inactive community. This is particularly important for hubs as they are unable to engage participants by “hard bargaining and horse training” (i.e., direct incentives and rewards), and thus rely on “creating affective ties and common interpretive systems, as participants attempt to form and re-form transitory coalitions” (Scott & Davis, 2016, p. 31). Ultimately, activating thus enables collective action: once group-level shared meaning is established, it becomes possible for a greater number of “individuals [to] fit their lines of action to one another” (Blumer, 1986, p. 16). Activation is thus the mechanism by which the whole of a community becomes more than the sum of its parts.

However, activation is also the most socially complex of the three mechanisms. Unlike convening, it requires the development of rich shared meaning and concern between actors (e.g., friendships, socialization, sustained technical knowledge exchange, etc.); a loose common interest will only develop into activation if shared meaning is deepened through repeated interactions, role divisions, etc. (cf., 6.1.3.2.). Activation is also unlike interconnecting: it is undirected by hub leaders and instead arises from the formation of a self-sustaining group-level social entity beyond any particular triad of actors. In other words, for activation to occur, a group of actors need to independently decide to continuously invest effort and concern into the group over a sustained period of time. Such more complex social dynamics and interdependencies are also more difficult to grasp for hub leaders and participants (see 7.4.4.).

Activating is a particular type of institutionalization of social structures (Martin, 2009). It resembles community-based entrepreneurialization (Marti et al., 2013), as well as organizational learning and routinization of practices in incubators (Bruneel et al., 2012; Levitt & March, 1988).

7.3. Stability of Hubs: Demands of Different Organizational Patterns

Chapter 6 showed that effective assembly does not occur in all hubs, and that activation only materialized for some hubs at some levels of hub communities (i.e., core vs. periphery) (cf., 6.1.3.3.). The chapter also illustrated that, in entrepreneurship hubs, leaders were concerned with activating peripheral hub communities, while leaders and members of technology hubs emphasized the importance of active core communities (cf., 6.1.4. and 6.4.).

These observations give an indication about how effective assembly relates to hub stability. Namely, technology hubs require that their core community is active to become stable, while it is sufficient for entrepreneurship hubs to assemble an active peripheral community. In other words, for a hub to become stable, convening, interconnecting, and activating have to happen at whichever hub community level is essential to the hub's organizational pattern (technology hub vs. entrepreneurship hub), which itself originates from the hub's purpose and model (cf., 6.3.).

This means that hubs can effectively assemble communities but still fail to stabilize as organizations. For example, a technology hub without an active core community will not be stable, as a peripheral community alone does not allow for entrepreneurial team building and the development of technological products. Active peripheral communities are important as a support channel for core communities of technology hubs, but they do not give a technology hub stability by themselves (cf., 6.4.). For example, Hypercube was able to effectively assemble technology entrepreneurs in an active peripheral community, but it ultimately closed its operation as it was unable to activate its core community (cf., 4.2.2. and 6.1.3.3.).

This insight explains why the technology hubs in the sample were less successful at stabilizing their operations. Different organizational patterns of hubs depend on different types and degrees of entrepreneurial participation. The technology hub organizational pattern is more difficult to stabilize because it requires more commitment by entrepreneurs in general, and also that entrepreneurs at different levels of skill and maturity contribute substantial effort and time. In turn, the entrepreneurship hub pattern requires only loose interactions in the hub's periphery to stabilize.

Hubs can thus stabilize only when there is a good-enough fit between the organizational pattern of a hub and local entrepreneurs' willingness and ability to partake in the pattern (cf., 6.3.2.). Complicating things further, the question of 'fit' is a moving target: entrepreneurs make decisions based on the organizational pattern that they find at a given point in time. This means that they might not participate even if the hub's model (i.e., the envisioned pattern) suits them well; a hub will only stabilize when a critical mass of entrepreneurs actually partakes over a sufficient period of time. For example, a strong core community is essential for technology hubs, but if it does not exist at a particular moment, incoming entrepreneurs see less of a reason to participate, making the community less likely to become active in the first place. In cases where not enough entrepreneurs find the existing organizational pattern suitable for their needs, hubs can thus fail if they depend on the particular level of community which they cannot activate.

7.4. Fragility, Tensions, and Limitations of Assembly

Only one hub from among the six case studies (kLab) effectively assembled both an active core and peripheral community. The two entrepreneurship hubs assembled active peripheral communities, while their organizational action was not directed at activating core communities. Yet, even in these three cases of stable hubs, the assembly process was not always smooth, marked by tensions and tradeoffs. Altogether, the case study data showed that all hubs

aimed for effective assembly, but more often than not, challenges came in the way. This section theorizes typical pitfalls, thereby specifying some of the conditions that have to be in place for assembly to be effective.

7.4.1. Low Availability of Constituents

A fundamental problem for hubs is that assembly depends on active participation of entrepreneurs and supporting actors, and yet hubs are unable to offer an immediate benefit (such as funding, mentoring, etc.) to these constituents. Effective assembly involves the creation of an active entrepreneurial community which develops a life of its own, beyond the control of the hub (cf., 7.2.4.). If in a given city, there are simply not enough entrepreneurs to contribute to such a community, or if the entrepreneurs that exist are not willing or able to participate, assembly cannot be effective.

Moreover, a critical mass of entrepreneurs also needs to be willing to participate to the degree that is required for a given hub's organizational pattern. If technology entrepreneurs in a given city are only willing to commit to peripheral hub communities (e.g., attending events regularly) but not to form a core community (e.g., working out of the hub space regularly and interacting with others), lacking core community activation can destabilize the hub as a whole (cf., 7.3.). This, in turn, means that enough entrepreneurs need to believe that participation in the core community is useful for them to begin with. The perceived usefulness, however, also depends on other participating entrepreneurs, so that there can be positive and negative feedback loops following from self-selection effects in hub participation.

Harare provided insightful examples for the ways in which lacking participation can hamper assembly (cf., 4.2.1.). First, there were not many entrepreneurs with basic skills, and the market opportunity for technology startups was very limited. Moreover, potential partner organizations (e.g., technology corporations) did not trust startups and did not engage with hubs. Finally, as a matter of principle and values, some important actors in local environments

were unwilling to participate. On the other hand, many people were interested and excited about technology and entrepreneurship, seeking “exposure” to these topics.

Ultimately, this meant that event series such as Pitch Nights and exclusive coworking arrangements such as Startup Zone worked well, but technology hubs did not. To stay in the assembly metaphor, some of the constituent parts to be assembled were nonexistent in the local environment while others were unavailable to hubs. Even when a few aspiring and novice technology entrepreneurs used Hypercube’s space occasionally, complementary constituents (e.g., more experienced technology entrepreneurs, mentors, partners) were missing. Novices were unable to form an active core community by themselves, because they could not learn enough from each other, which led them to feel that the value of the community was low. Hypercube became ‘just a space with bandwidth,’ and core community assembly was ineffective. Ultimately, the hub closed down even though assembly of the peripheral community was successful, as core community activation would have been needed to stabilize the technology hub pattern. These findings illustrate that skill-based communities (such as core communities in technology hubs) can fail if only novices participate, because peer learning will be more limited without more experienced community members (Grugulis & Stoyanova, 2011).

7.4.2. Tensions Between Convening, Interconnecting, and Activating

Assembly can also falter because of tensions between the three underlying mechanisms (convening, interconnecting, and activating). For instance, novice entrepreneurs were more likely to self-select into core communities but this resulted in a decreasing value of interactive learning so that consistent collaborations suffered. For assembly, this meant that hubs faced a tradeoff between self-selection of membership degree (convening) and the typical level of skill and commitment of self-selecting members (activating). This was problematic for kLab, Hypercube, and Hub Accra.

Similarly, hubs struggled to reach out to a diverse audience beyond national borders (convening, interconnecting) while also staying true to the values and principles of their core communities (activating)—this was also the case for kLab, Hypercube, and Hub Accra. Interconnecting was in conflict with activating, for instance, in kLab’s case, where hub managers brokered opportunities only for some entrepreneurs within core communities, letting others feel slighted, ultimately damaging the entrepreneurs’ mutual concern for each other (cf., 4.1.2.3.).

7.4.3. Social Cohesion Among Diverse Actors

One specific and important tension between convening and activating is inherent in the purpose of assembly: to transform disjointed constituents into a coherent whole. In formal terms, disassembled social structures are marked by high degrees of distance and difference between actors (cf., 7.2.2. and 7.2.3.). Yet, for activation, mutual concern and social bonds have to be created among a group of individuals. Given the significance of homophily for interpersonal tie formation (McPherson, Smith-Lovin, & Cook, 2001), hubs tend to struggle to bring together diverse actors (convening) while at the same time stimulating them to create a socially cohesive community (activating).

For assembly to be effective, participants who are different thus still need some degree of ‘like-mindedness,’ which in effect functions as a common denominator of shared meaning. In technology hubs, a common specific interest in software and mobile applications served this purpose. In entrepreneurship hubs, participants used vaguer notions such as “entrepreneurial spirit” or “atmosphere” to describe like-mindedness. It is thus some notion of shared interest or purpose that brings together actors who differ in other respects (e.g., sectoral affiliation, level of seniority, etc.).

Issues can thus arise for assembly in cases where multiple dimensions of cognitive differences and distances are closely correlated. For instance, in all three cities, technology entre-

preneurs' experience level was inversely related to their interest in participating in core communities or in casual networking events such as Startup Weekends. Ultimately, experienced and inexperienced technology entrepreneurs diverged in a way that made it hard for hubs to assemble them into a single coherent community, even though the two groups shared the same interest in technology. Similarly, foreign visitors were often seen to be valuable sources of knowledge and resources, but they rarely became part of entrepreneurial communities, as their concerns and experiences did not overlap closely enough with those of local entrepreneurs. Assembly can thus break down when differences between actors are configured in such a way that mutual concern and a minimum degree of shared meaning is undermined.

7.4.4. Loose Coupling and Coordination Neglect

The vagueness and newness of hubs as an organizational form and their communal and fluidly bounded social structures resulted in highly uncertain and ambiguous means-ends chains. Because of hubs' mostly facilitative rather than interventionist organizational action, the link between what hubs did and what happened as a result of their actions was indirect and tenuous. More plainly, it was near-impossible even for actors at the core of hubs to understand their impacts. Active entrepreneurial communities happened as a result of hubs' organizational action, but the effect chain was intricate and hard to determine (for instance, due to above-mentioned subtle tensions between convening, activating, and interconnecting).

This means that the organizational action of hubs and social-structural outcomes form a loosely coupled system (Orton & Weick, 1990). Due to hubs' particular organizational features (cf., 3.3.3.), their actions do not translate into entrepreneurial communities directly (i.e., the two elements are *distinctive*) but communities are influenced by organizational action, and vice versa (i.e., the elements are *responsive*). This helps to explain how hubs can be “simultaneously open and closed, indeterminate and rational, spontaneous and deliberate” (Orton & Weick, 1990, pp. 204–205). Hence, assembly can be thwarted by hub managers who try the

impossible: to tightly couple hubs (e.g., introducing control and attempting to confine means-ends-chains).

Effective assembly rather appears to rely on intricate balancing acts, where hub managers not only include or exclude different actor groups and manage resources, but indirectly stimulate desired kinds of interaction and collaborative activity. At the same time, hubs are small operations: the six hubs in the sample typically had only a single operational manager, who was sometimes supported by assistants and volunteers. In addition, hub managers usually negotiate the demands of entrepreneurs and funders, which can be conflicting and opaque. Delicate balancing of permanence and transience, vague goals, diverging interests of stakeholder groups, and the fluid interplay between core and peripheral hub communities make it very hard for hub leaders to understand their own organizations, notwithstanding their central position (cf., 5.4. and 5.5.).

More concretely, hub leaders face cognitive constraints relating to coordination neglect (Heath & Staudenmayer, 2000). This means that hub leaders overly focus on actor roles and determining how labor can be *divided*, while they are unable to grasp the complex interdependence of individuals' actions and how efforts can be *integrated*. Difficulties to activate core communities were a prime example: many hub leaders had trouble understanding how co-located working (i.e., people working in the same room) would lead to collaboration (i.e., people working together and integrating their efforts). Similarly, given hub leaders' capacity and resource constraints, it can be difficult for them to effectively manage all three mechanisms (convening, interconnecting, and activating) in parallel, and to understand potential tensions (cf., 7.4.2. and 7.4.3.).

Such perceptual constraints can be more pressing for hub funders and hub leaders detached from the entrepreneurial process (cf., 6.1.4.). Leaders sometimes steered hubs' organizational action away from assembly (e.g., for kLab and Muzinda, and to a lesser extent for

iSpace and Hypercube), because active entrepreneurial communities (as the outcomes of assembly) were less visible and more difficult to assess than simpler metrics such as the number of members (see 8.4.2. for details).

Coordination neglect can be an issue in all forms of organizing. Yet, it is an exacerbated problem for assembly, in contrast to, for instance, incubation because the former is inherently about the creation of an active entrepreneurial community as a social entity with a life of its own (cf., 7.2.4.). In contrast, incubation is not geared towards the coordination of as many and as diverse a range of actors. Moreover, incubatees are assumed to be independent of each other; community interdependence in incubators has traditionally been seen as a byproduct of co-location but not as an intended outcome of incubation (cf., 2.3.3. and 2.3.5.).

7.5. Implications: Assembly as an Organizational Process Unique to Hubs

This chapter presented assembly as a theory of how hubs work. It generalized the findings from the previous chapters into an abstract account of how hubs facilitate interactions for technology entrepreneurs. The chapter illustrated that hubs' initial models translate into organizational actions. These actions are of a facilitative nature; hubs provide occasions, or more scientifically, social and spatial frameworks, within which interactions get structured and bounded. They convene and interconnect previously distant and different technology entrepreneurs and others, leading to the formation of entrepreneurial communities. Hubs can also activate communities, making assembly effective. Yet, a hub only becomes stable if an entrepreneurial community is assembled at the level (core vs. periphery) that is essential to the hub's organizational pattern.

Assembly is thus a process resulting from the organizational action of hubs towards entrepreneurial actors: hubs 'assemble' entrepreneurs, just as incubators 'incubate' startups and just as intermediary organizations 'intermediate' or 'broker' connections for client firms. This

means that assembly is a process that happens consequently to the existence of a hub organization. However, it does not imply that hubs have perfect control over all parts of the assembly process: namely, the assembly process depends on participating entrepreneurs, just like intermediaries interdepend with their clients and incubatee ventures play a role in the incubation process (cf., 6.5.). Finally, the existence of a hub also does not by itself indicate that assembly must be successful or effective (cf., 7.1. and 7.3.), just as not all intermediaries/incubators are effective at intermediation/incubation. In fact, the assembly process is fragile, riddled with inherent tensions, and difficult to determine and manage for hub leaders, because it depends on continuous and synergetic participation by entrepreneurs and their supporters (cf., 7.3. and 7.4.).

As assemblers, hubs are thus highly dependent on and deeply embedded in their environments. They ultimately play a more facilitative role compared to incubators and most intermediaries, which are typically more interventionist or service-oriented. Hubs rather function as a physical, social, and symbolic infrastructure or platform for mostly self-guided interactions of entrepreneurs (see 8.3.1., 8.3.3., and 8.4.2. for details). Not the services that hubs provide but a combination of distinct organizational features trigger assembly. This combination is typically given for hubs while it is not typically present in similar organizational forms, like incubators or most types of intermediary organizations (cf., 3.3.3., 5.6., and 6.5.).

More specifically, assembly depends on the integration of convening, interconnecting, and activating (cf., 7.2.), in contrast to other organizational forms which focus on entirely different processes or emphasize only one of these mechanisms. For example, interconnecting (cf., 7.2.3.) is akin to external brokerage by networked incubators and other innovation brokers (cf., 2.2.2. and 2.3.3.3.) while those are not typically triggering the convening or activating mechanisms.

Assembly is thus a particular kind of intermediation process where the intermediary organization (i.e., the hub) plays a particularly sophisticated and complex role: it triggers the

creation or transformation of social structures (i.e., active entrepreneurial communities) rather than merely connecting individual actors within an existing social structure (cf., 7.1. and 7.2.4.; see 8.1.4. for an explicit comparison). In sum, the chapter developed the theory of assembly as a process that is unique to hubs; it is related to but also substantively different from typical conceptions of both intermediation and incubation.

Chapter 8 Discussion

The three substantive chapters gave a rich picture of hubs and their roles in supporting, or rather facilitating, relational, communal, and collaborative processes among technology entrepreneurs. This chapter uses the findings and theory developed in previous chapters to directly address the research questions. To this end, it abstracts and generalizes from the six hub cases that were examined empirically (cf., 3.3.2.), giving a condensed account about how entrepreneurs engage with African hubs (8.1.1.) and about how African hubs work (8.1.2.). The chapter then examines the merit of practitioners' network infrastructure and incubator expectation (8.1.3.). Consequently, comparisons of hubs with incubators and intermediaries from the previous chapters (cf., 4.4., 5.6., 6.3., and 7.5.) are synthesized to show explicitly how assembly differs from intermediation and incubation (8.1.4.).

The chapter also goes beyond answers to the research questions, discussing wider theoretical and practical issues that have surfaced throughout the analysis. First, the chapter elaborates on implications for intermediation and incubation arising from the inadequacy of the theoretical framework to explain hub processes. Namely, the chapter identifies a lack of a sophisticated theory of organization in intermediation research (8.2.1.), flags theoretical consequences of the increasing diversity of entrepreneurship support organizations (8.2.2.), and makes suggestions for the development of environmental contingency theory (8.2.3.).

Consequently, the chapter devotes one section to a discussion of how assembly theory speaks to theoretical puzzles and gaps at the intersection of economic geography and management research. Most significantly, assembly theory is used to highlight that entrepreneurship research has neglected the study of organizations or organization-like social structures that entrepreneurs are part of (8.3.1.). A further contribution is identified for literature on micro-geographies of innovation: assembly is positioned as a theory that connects individual-focused knowledge creation perspectives with the contested 'buzz' concept (8.3.2.). Further, assembly

is outlined as an integrative theory for a fragmented literature on various notions of communities (8.3.3.). Lastly, a call is made for more research on differences between the roles of support organizations in early-days vs. mature entrepreneurship environments (8.3.4.).

Finally, the chapter indicates practical implications for hub leaders and hub funders, such as development organizations, local governments, or technology corporations. Namely, it illustrates a fundamental implication of seeing hubs as ‘assemblers’ rather than ‘creators:’ hubs can only assemble parts that already exist in local environments (8.4.1.). The chapter further details this point by highlighting some of the misguided expectations of development organizations towards hubs and problematizing the notion of ‘infrastructure’ (8.4.2.). Further, hub funders’ uncritical use of ideals such as ‘diversity’ and ‘openness’ is examined (8.4.3.). To close, the chapter underlines path dependencies arising from self-reinforcing mechanisms within the assembly process (8.4.4.).

8.1. Summary of Results and Answers to Research Questions

8.1.1. How Technology Entrepreneurs Experience and Engage with African Hubs

The foundational research question of this thesis concerned the ways in which technology entrepreneurs in African cities experience and engage with hubs. The refined research questions were:

- 1a. How do African hub organizations interact with technology entrepreneurs?
- 1b. How do technology entrepreneurs participate in African hub organizations?

Chapters 5 and 6 contained most of the detail needed to answer these questions. They specified that organizational features of hubs (cf., 3.3.3.) result in three forms of organizational action: services, the establishment of spaces as social enclosures and locational fix points, and symbolization (cf., 5.1.). These can be understood as the actions *of* hubs *towards* entrepreneurs: actions come from the hub as a social entity and are directed at entrepreneurs (cf., 3.1.). Symbolization is a particularly rich and important form of hub action. By signaling a loosely defined

purpose (such as kLab is ‘the place for tech entrepreneurship in Kigali’), African hubs compel a wide range of actors, including most or all technology entrepreneurs in a given city, to associate meaning with the hub and consider participating (cf., 5.1.3. and 6.2.3.).

Hubs rarely offer funding or other tangible resources directly, other than the provision of work space as a service (cf., 5.1.1. and 6.2.1.). Thus, technology entrepreneurs participate in hubs, in part to use free or cheap bandwidth and office space, but mainly to derive a cognitive benefit (e.g., knowledge, motivation, comfort, inspiration, ideas, etc.). Crucially, this benefit is derived, not directly from a hub organization’s action or from interactions with hub leaders, but from interactions with other hub members (cf., 5.2. and 5.5.). Ultimately, technology entrepreneurs participate in hubs when they expect to derive a total benefit (service and cognitive value) that outweighs the perceived cost, which is broadly defined and includes social, affective, and normative aspects (e.g., travel cost, usage fee if any, perceived social obligations, invested time and effort, opposition to hubs out of principle, etc.).

Based on their perception of the benefit, technology entrepreneurs participate more or less intensely in hubs. Since hubs impose barely any limitations on participation other than nominal usage fees (i.e., hubs do not select or recruit entrepreneurs), it is up to the entrepreneur to decide ‘how much’ to participate (5.2.). Different technology entrepreneurs make different choices (cf., 5.3.).

These decisions can be highly idiosyncratic, but there are also systematic variations. Specifically, novices, who have not yet started a venture and do not have their own office space, typically frequent hub spaces more than advanced entrepreneurs. Moreover, non-entrepreneurial support actors (like mentors or investors) only have frequent interactions with others within a hub space if their regular workplace is co-located to the space. The range of actors attending networking events or occasionally visiting hub spaces is broader and includes individuals who

loosely feel that they have a stake in the hub's purpose and/or that they can access instrumental information (cf., 5.4.2.).

Because the benefit of participation for a given entrepreneur depends in large part on other members, different entrepreneurs' choices influence each other, leading to group-level participation patterns that develop over time. These patterns are reinforced by a hub's ongoing organizational action. Namely, a core community composed of regular users of the hub space develops, while occasional users of hub spaces, visitors of core community members, and attendees of events form a peripheral community (cf., 5.4.).

These communities are not formally but fluidly bounded towards each other and towards the hub's environment (cf., 5.5.). Depending on the hub, core or peripheral communities can contain group-level structures, ranging from team-based collaborations through role divisions and informal hierarchies to friendships and personal concern towards other community members (cf., 6.1.3.). These micro- and meso-level structures in turn affect the cognitive benefits for members.

As a hub's initial model, its organizational action, and emergent core and peripheral communities influence each other over time, they fuse into an organizational pattern (cf., 6.3.). For instance, technology hubs represent a pattern that is different from the entrepreneurship hub pattern (cf., 6.4.). Hub members continuously review whether they benefit from being part of the hub's pattern, moving further towards the hub's core or further away.

A given technology entrepreneur's participation decision thus interdepends with the hub's ongoing organizational action, but also with other members' engagement choices and the social structures that form as a result of these interdependent processes. The participation of technology entrepreneurs in African hubs is thus varied, dynamic, and emergent, depending on whichever gains can be derived from those interactions that hub participation enables entrepreneurs to have.

8.1.2. How African Hubs Work

The main research question of this thesis was how African hubs work. Following a review of common expectations towards hubs and the academic literature, the question was reformulated in three more precise research questions referring to technology entrepreneurs' interactions and relations:

- 2a. How do African hub organizations enable relationships among technology entrepreneurs?
- 2b. How do African hub organizations enable relationships between technology entrepreneurs and non-entrepreneurial partners?
- 2c. Do African hub organizations create or enable entrepreneurial communities, and if so, how?

Chapters 6 and 7 elaborated on the findings and theory needed to answer these research questions. Namely, based on observed variation in hubs' social structures, hubs were theorized as assemblers of technology entrepreneurs.

Assembly consists of three inter-related mechanisms that are rooted in hub models and hubs' organizational action (cf., 7.2.1.). At the outset, through symbolization and establishing a locational fix point for actors who share a hub's purpose (cf., 5.1.2. and 5.1.3.), hubs *convene* and *interconnect*. Convening refers to the creation of occasions for interactions (e.g., open hub spaces and regular events) which allow originally distant and different actors to get in contact with one another (cf., 7.2.2.). Interconnecting consists of directed and explicit facilitating of relationships by hub leaders and staff, who attempt to liaise between (what they see as) complementary actor groups, such as experienced and novice technology entrepreneurs (cf., 7.2.3.). Depending on the participation decisions of entrepreneurs (cf., 8.1.1.), convening and interconnecting lead to the formation of core and peripheral hub communities, defined by their members' shared purpose. These communities exist in all hubs, but the participating actor groups

and the content of interactions vary, reflecting a given hub's original model (cf., 6.1.1. and 6.1.2.).

Over time, this leads hubs to be structured according to distinct organizational patterns (cf., 6.3.). For instance, technology hubs differ from entrepreneurship hubs in terms of what they are trying to achieve, who participates, what kinds of events are being held, etc. (cf., 6.4.). This means that hubs construct communities according to a particular template, without necessarily making social structures denser or larger. Hubs' organizational action can further reinforce the organizational pattern, but this is contingent on the pattern's fit with entrepreneurial participation decisions (cf., 7.3.).

If there is a sufficient fit and entrepreneurs consistently participate, hubs' organizational action ultimately helps *activate* hub communities and complete the assembly process. Activation means that community members develop mutual concern, shared understandings, and a recognition of the community as such (cf., 7.2.4.). Communities thereby develop 'a life of their own:' they become supra-individual and partially self-sustaining social entities within which social dynamics such as role divisions, commitment, hierarchies, etc. can develop and be enforced (cf., 6.1.3.). Core communities are activated by hub spaces' role as social enclosures while peripheral communities are activated by regular events with consistent participation, by hub spaces' role as locational fix points, and by symbolization (cf., 6.1.3.). It is often more difficult for hubs to activate core communities, as a consistent group of entrepreneurs needs to occupy a hub space for a sustained period of time for social enclosure effects to unfold (cf., 7.4.).

Only if technology entrepreneurs have been convened, interconnected, and activated in communities, assembly will be complete and effective (cf., 7.2.). The outcomes of assembly are thus active entrepreneurial communities (cf., 7.1.). A hub stabilizes when assembly has been

successful at the hub community level that is more important within a given hub's organizational pattern. For example, technology hubs rely on active core communities, as it is their goal to facilitate the creation of technological products and startups, which can hardly be achieved by active peripheral communities. On the contrary, entrepreneurship hubs stabilize if their peripheral community can be activated: active peripheral communities coordinate different economic sectors or motivate entrepreneurs (cf., 6.4.). To answer research question 2c. directly: hubs always create entrepreneurial communities in a broad sense (a loosely bounded group of actors knowing each other and sharing a purpose) but they only create entrepreneurial communities in a narrow sense (a strongly bounded group of actors with mutual concern for each other and recognizing the community as such) in some cases (cf., 6.1.3.).

It is difficult for hub leaders to understand such complex interdependencies. They typically face an array of obscure balancing acts and tradeoffs, and cannot control the assembly process (cf., 7.4.4). Because of the complex interplay between hub models, organizational action, entrepreneurs' participation decisions, organizational patterns, and hub stability, assembly is a fragile, complex, and somewhat indeterminate process (cf., 7.4.).

In the case of effective assembly, hubs create active entrepreneurial communities which themselves have a structuring effect on interactions of entrepreneurs and supporting actors in a given city. The observation that hubs follow distinct organizational patterns implies that, as a result of hubs, certain configurations of relationships have been made more likely to exist than others. Core or peripheral hub communities have been lent a greater degree of permanence, stability, and predictability over other social-structural configurations, such as a disassembled state where actors, for example, rely more on their own contacts (cf., 7.1.).

8.1.3. Merit of Network Infrastructure and Incubator Expectations

Based on these answers and the findings of previous chapters, it is now possible to discuss the merit of the two expectations that practitioners have of African hubs, the network infrastructure and incubator expectations (cf., 2.1.4. and Annex B). Unsurprisingly, several observable elements that both expectations assumed to exist in hubs were indeed found in the six examined cases; namely, hubs provided cheap or free Wi-Fi connected work space, ran networking events, and aimed to support innovation and entrepreneurship outcomes.

Yet, the observations of this thesis also highlight several ways in which the network infrastructure expectation of hubs can be misleading about how hubs work, usually because its underlying aspirations are hard to turn into realities, or because of unintended consequences. Notably, the notion that hubs host or facilitate an ‘ecosystem,’ with generative positive interdependencies between actors, should be seen as mostly an aspiration. Active hub communities show features of multiplicative and self-sustaining interdependencies, but community activation is also the mechanism that hubs struggle most to achieve (cf., 6.1.3. and 6.1.4.). Accordingly, also the notion that hubs create or enable communities (which the network infrastructure expectation suggests) is true for some hub community levels and for some hubs, but the creation of *active* communities is far from an immediate consequence of a hub’s existence (cf., 5.4., 6.1.3., 7.4.4., and 8.1.2.).

Similarly, the network infrastructure expectation assumes that hubs facilitate ‘flows of knowledge,’ bringing together ‘diverse’ people by being ‘open.’ Each of these hopes have a universally positive connotation, but the thesis showed that realities in hubs are more contested and conflicting. Namely, knowledge does not seamlessly ‘flow’ between actors, but instead requires sustained interactive learning to be *created*, which is only afforded by few hubs (cf.,

6.1.2. and 6.1.3.).⁴¹ Also, while all hubs convene and interconnect distant and different actors (cf., 7.2.2. and 7.2.3.), the types of distance and difference can differ starkly between hubs (cf., 6.1.1. and 6.1.2.), especially between technology and entrepreneurship hubs (cf., 6.4.). Finally, even though hubs are by definition ‘open’ in the sense that they do not have a selection process for interested entrepreneurs, hub communities can still have exclusion effects arising from symbolic and social boundaries: actor groups self-select into and out of hubs depending on whether they find others with similar interests in a hub and whether they feel welcome there (see 8.4.3. for details). Overall, this means that hubs in fact need to balance homogeneity (social cohesion) and heterogeneity (diversity of competences, resources, knowledge, etc.) on different dimensions, leading to intricate balancing acts and subtle tensions (cf., 7.4.3.).

The incubator expectation was much less elaborate, basically reducing hubs to entities that try to create or develop startups irrespective of more complex concepts such as community, ecosystems, diversity, etc. (cf., 2.1.4. and Annex B). The thesis showed that the incubator expectation towards hubs does not have much merit. If hubs are defined (as they were in this thesis) by organizational features that differ from traditional features of incubators (cf., 2.3.1., 2.3.5., and 3.3.3.), then hubs *do not work like* incubators. Hubs’ distinct features, such as the absence of a selection process or the increased discretion given to entrepreneurial participants to shape hub organizations, have significant consequences for the processes that hubs trigger.

Notably, the assembly process does not and could not possibly ‘create’ or ‘develop’ startups directly, as the incubator expectation assumes. The incubator expectation thus fails to appreciate that hubs are concerned with stimulating and facilitating social interaction dynamics rather than supporting a clearly defined set of ventures, and it ultimately presumes hubs should generate outcomes which they inherently cannot achieve. It is no wonder that proponents of the

⁴¹ This finding was consonant with Howells’ (2002, 2012) clarification that, strictly speaking, knowledge itself does not flow. It is information that flows while knowledge creation happens through the interpretation of information by individuals.

incubator expectation often see hubs as failures: hubs, by definition, cannot achieve the goals that they are imagined to pursue by these commentators.

8.1.4. How Hubs Work Differently from Intermediaries and Incubators

Finally, the theoretical framework based on intermediation and incubation theory can be applied and extended for hubs based on the findings and theory developed in this thesis. Chapter 7 clarified that assembly is the process resulting from the organizational action of hubs towards entrepreneurial actors: hubs ‘assemble’ entrepreneurs, just as incubators ‘incubate’ startups and just as intermediary organizations ‘intermediate’ between two parties in innovation processes. Hence, a comparison of how hubs work to how intermediaries/incubators work is equivalent to a comparison of assembly and intermediation/incubation.

Broadly speaking, Howells’ (2006a) notion of intermediation fits: assembly is a process that involves two or more actors who are part of entrepreneurial innovation processes (cf., 2.2.1 and 2.2.3.). There are also several more specific insights from the intermediation literature that explain elements of how hubs work. Namely, the large number of studies showing various forms of interdependence between intermediary organizations and their clients translates well to assembly. For example, the intermediation literature found that (1) client attitudes and capacities (e.g., absorptive capacity or networking capabilities) interdepend with intermediation’s effectiveness, (2) intermediation systematically varies by the innovation process stage that client firms are involved with, (3) goals and influences from intermediary funders can be in conflict with those of clients, (4) intermediary organizations’ internal adaptations can lead to external positioning problems, (5) the multifaceted contact networks of intermediaries can lead to misaligned interests between different intermediation stakeholders, and (6) the prior affiliations, experience, heterogeneity, and competences of intermediary staff members and managers affect the intermediation process. The previous chapters have shown that each of these findings

applies directly to hubs (assuming that the notion of an intermediary ‘client’ is equivalent to ‘members’ of hubs, cf., 5.2.).

There are also some similarities between incubation and assembly. Hubs provide subsidized work space and, to a limited extent, business assistance (cf., 2.3.1., 2.3.2., and 5.1.1.). The incubation process works differently for entrepreneurs at different maturity stages, as does assembly (cf., 2.3.3.2. and 5.2.). The interconnecting mechanism within assembly is akin to what networked incubators have been understood to do: broker connections between entrepreneurs and external partners (cf., 2.3.3.3., 5.1.3., and 7.2.3.). Moreover, through co-presence in the social environment of an incubator, entrepreneurs can form communities that aid entrepreneurialization and interactive learning processes, as they do in hubs (cf., 2.3.3.4., 5.4., 6.1.2., and 6.1.3.). Finally, funder interests can diverge from entrepreneurs’ interests, which can lead to tensions that incubator managers need to negotiate, similar to typical tensions in the assembly process (cf., 2.3.3.5. and 7.4.4.).

However, the assembly process as a whole is unique to hubs. Assembly is triggered through a distinctive combination of organizational features (cf., 3.3.3.), which is not typically given for incubators and most types of intermediary organizations. Hubs’ organizational action is geared towards *integrating* convening, interconnecting, and activating (cf., 7.2.), in contrast to intermediaries and incubators, which typically emphasize direct service provision or focus only on one of the three assembly mechanisms (e.g., interconnecting for networked incubators and innovation brokers).

As intermediation is a broad concept (cf., 2.2.1.), assembly can be understood as a form of intermediation (cf., 7.5.). Yet, when comparing assembly to narrower concepts within the intermediation framework such as innovation brokerage, it becomes apparent that assembly is a rather particular type of intermediation that substantively differs from many other processes

subsumed under this broad umbrella. The thesis demonstrated that coordination between technology entrepreneurs and others depends on organizational processes that are more intricate than ‘networks as channels’ and ‘intermediaries as brokers’ perspectives would suggest (Hansen et al., 2000; Hoang & Antoncic, 2003; Kauffeld-Monz & Fritsch, 2013).

Similarly, when adopting a very broad definition of incubators as “organizations where entrepreneurs work before they start their own firms” (Cooper, 1985, p. 76; cf., 2.4.1.), hubs can be understood as incubators. Yet, when adopting the dominant venture creation view of incubation (cf., 2.3.3.1.), it is hard to find commonalities between incubation and assembly. Although dyadic and community views on incubation explain some elements of hub processes (such as the creation of core communities), substantial differences remain also between assembly and these perspectives, for example, regarding hubs’ fluid boundaries and their greater dependence on the external environment (cf., 5.6. and 6.3.3.).

Altogether, assembly should thus be seen as a specific kind of intermediation process that is different from common understandings of incubation. Table 13 summarizes the key differences between hubs / assembly on the one side compared to intermediation in general, innovation brokerage, and incubation on the other side.

8.2. Implications for Intermediation and Incubation Research

8.2.1. Need of a Theory of Organization for Intermediation Studies

Throughout, this thesis has pointed to the limits of theorizing hubs as brokers within innovation systems/networks (cf., 2.2.2.). Hubs were found to create fluidly bounded social structures (cf., 5.5.) through facilitative organizational action (cf., 5.1.); they did not broker connections between external organizations. Moreover, the use of a micro-social interactionist lens (cf., 3.2.) allowed the thesis to identify heterogeneity in the content of interactions and in

Differences between intermediaries/incubators and hubs			
Organization feature	Intermediary or incubator		Hub / assembly
Relationship between organization and entrepreneur	Service provider—client		Community—member
Means to determine entrepreneur status	Formal agreement (e.g., service provision contract)		Informal agreement (e.g., regular attendance of events)
Distinction of internal/external actors	Binary (in / out), stable		Continuous (degree), dynamic
Supported entrepreneurial actor	Ventures, small enterprises		Individual novice entrepreneurs, newly formed teams
Differences between broker-type intermediaries/brokerage and hubs/assembly			
Organization or process feature	Broker / brokerage		Hub / assembly
Boundedness towards entrepreneurs	Intermediary is a separate organization from the client organization		Member becomes part of hub organization
Facilitation of interactions	Directed (creation of a link between two specific others)		Directed (interconnecting) and undirected (convening & activating, members initiate interactions but hub provides occasion)
Connecting different and distant actors	Client “plugs into” network of broker to access different and distant others		Integrating different / distant actors into an entrepreneurial community as a new social structure
Differences between incubators and hubs			
Organization or process feature	Incubator / incubation		Hub / assembly
	Venture creation view	Dyadic / community view	
Goal	Venture creation or development is immediate goal		Venture creation or development is ultimate goal
Entry of entrepreneurs in process	Selection from among applicant ventures conducted by the incubator		Self-selection by entrepreneurs based on organizational pattern
Facilitation of interactions with non-entrepreneurial actors	Directed brokerage (creation of a link between venture and external partners by incubator/staff)		Directed (interconnecting) and undirected (convening & activating; members initiate interactions)
Process differentiation by entrepreneurs	Standardized staff-guided process	Staff-guided process adapted to incubatee	Idiosyncratic, largely entrepreneur-led process
Relationship between organization’s staff and entrepreneur	Unidirectional relationship from incubator staff to venture	Interactive relationship between incubator staff and venture	Interactive relationship between hub staff and entrepreneur
Relationships among entrepreneurs	Incubatees independent from each other	Community of incubatees	Core and peripheral community of members
Control over process	Incubator staff determine incubation	Incubatees shape incubation together with incubator staff	Entrepreneurs shape assembly process, hub staff loosely facilitate
Boundary towards environment	Formally bounded towards external business community	Networks of incubatees reach across boundary of the incubator	Fluidly bounded, peripheral community blends in with external environment

Table 13: Differences between broker-type intermediaries, incubators, and hubs

the kinds of social structures that hubs formed (cf. 5.5. and 6.1.). It was in explaining such findings that intermediation theory fell short, despite hubs' fit within the broad definition of intermediaries in the literature (cf., 2.2.1.).

In sum, it appeared that intermediation theory was missing a sufficiently rich *theory of organization*. This is surprising given that this field is concerned with outcomes of intermediary *organizations*. An explanation might be that intermediation literature was born out of regional innovation research—a discipline that does not overlap much with organization science.

Specifically, the present analysis of hubs suggests three areas in which intermediation research could expand its theoretical toolkit. First, the literature, with few exceptions (Boari & Riboldazzi, 2014; Kirkels & Duysters, 2010; Sapsed et al., 2007), conceives of actors as 'black box' organizations (intermediaries and client firms). Thus, conceptualizations about how individuals are forming and shaping organizations, and how organizations are in turn shaping individual behavior, are missing. Intermediation theory seems to assume a formal-structural network perspective, where separate organizations (nodes) have relationships with each other (ties). This view is explicit in network analyses (e.g., Kauffeld-Monz & Fritsch, 2013; Kirkels & Duysters, 2010) but it is also implicit in the original framework (Howells, 2006a) and qualitative follow-on studies (e.g., Gassmann et al., 2011; Tran et al., 2011).

Supra-individual and organization-like social entities like 'community,' essential for the context of hubs, can thus not be captured in a traditional intermediation lens. Howells (2006a, p. 725) himself points out this limitation, which also becomes apparent in somewhat evasive and murky accounts of how the organizational action of intermediaries and individual action influence each other (Sapsed et al., 2007). The results of this thesis give further credence to studies that attempt to analytically connect the internal dynamics of intermediary organizations with the intermediation process (cf., 2.2.2.), and suggest communities as useful meso-level constructs, cutting across intra- and inter-organizational perspectives.

Second, intermediation theory misses an explicit concept of organizational boundaries. Intermediary organizations and their client firms are implicitly conceived of as formally and clearly bounded entities. ‘Clients’ of intermediaries are understood as external to the organization. However, in hubs, entrepreneurs (clients) move into and out of the hub organization, and in fact become an integral part of the organizational process; the value creation for one client is intertwined with the participation of another. While Howells (2006a, p. 725) calls for studies that consider “more complex multi-actor relationships,” intermediation does not appear to consider cases where the external sphere of the intermediary organization blends into the internal one, as appears to happen in hubs. The thesis advocates for more research on how ‘internal’ and ‘external’ worlds of intermediaries might be interspersed, and on how intermediary boundaries might be symbolic and multi-dimensional (Santos & Eisenhardt, 2005; Scott, 2004).

Third, the intermediation literature is missing a deeper appreciation of differences between organizational forms that fall under the wide umbrella ‘intermediaries.’ Howells (2006a) acknowledges the literature on knowledge-intensive business services (such as business consultancies) and technology transfer offices, but he does not discuss whether there might be systematic differences between the ways in which particular forms affect innovation processes.

This thesis shows that fundamentally different processes triggered by different forms of organizations (e.g., assembly vs. incubation vs. innovation brokerage) can be subsumed under the umbrella of intermediation, which is helpful to capture the varied roles of non-firm organizations for entrepreneurship and innovation processes in a single analytical framework. Yet, it is questionable whether all types of such involvement are indeed comparable to each other, and if findings for one intermediary type translate well to another. Potentially, the literature would benefit from a typology or categorization of differences between intermediation processes, which could begin by identifying different forms of intermediary organizations that trigger particular kinds of intermediation processes (like assembly).

8.2.2. Novelty and Diversity of Entrepreneurship Support Organizations

From among all forms of organizations seeking to support entrepreneurs, the business incubator has certainly received the most attention in the academic literature.⁴² Yet, ‘incubator’ has been defined so loosely and is conceptually so ambiguous (cf., 2.3.1.) that incubation literature has come to include a variety of organizations which are actually difficult to compare. In the blunt words of Aernoudt (2004, p. 127):

[O]ften when a concept becomes fashionable, candidates try to appropriate it in order to use it as a brand, even if the underlying referee is miles away from what the concept incubator might refer to.

Twelve years after this critique, the literature continues to avoid problematizing the boundary conditions of the incubator phenomenon, and has thus lost track of what defines the organizational form ‘incubator.’ Yet, if an ever wider array of organizations is considered to be incubators, this is bound to lead to confusion about what incubators (in general, as an organizational form) do and how they work.

For instance, venture creation perspectives on incubators, assuming a service-focused and standardized intervention (cf., 2.3.3.1.), have little to contribute to an explanation of hubs, but they also do not fit for bottom-up incubators, which are driven by entrepreneurial initiative (Bøllingtoft, 2012), or for laissez-faire incubators, where incubator staff only minimally intervene in entrepreneurial processes (Bergek & Norrman, 2008). Yet, this is not to say that venture creation perspectives are generally misguided: they might simply apply to a *different kind of* incubator.

For incubation theory to become more valid and useful, it would have to better specify to which types of incubator organizations it applies and to which ones not. It appears that what

⁴² This statement assumes that science and technology parks (as well as special economic zones, technopoles, and similar policy-driven agglomerations) represent collections of organizations rather than organizations in their own right.

has been discussed under the unifying theme of ‘incubation’ actually includes an array of accounts of how rather different organizations support or create new ventures. Service models have been an insufficient attempt at categorization because services are only indirectly linked to the incubation/assembly process (cf., 2.3.2., 2.3.3.2., and 6.3.).

In recent years, the expanding scope of incubator research might have finally reached its limits. Practitioners and applied researchers have proposed a flurry of organizational forms, implicitly or explicitly arguing that these forms are in some substantive sense ‘new’ and/or different from incubators. Examples include innovation hubs discussed in this thesis, but also accelerators (Pauwels et al., 2016), coworking spaces (Merkel, 2015), innovation labs (Gryszkiewicz, Lykourantzou, & Toivonen, 2015), innovation spaces (Bloom & Faulkner, 2016), social labs (Hassan, 2014), maker spaces, digital fabrication labs⁴³ (Smith & Hielscher, 2013), and Living Labs⁴⁴ (Dell’Era & Landoni, 2014).

It seems that there is increasing diversification and specialization among organizational forms of entrepreneurship support, and that the interest in such organizations has expanded far beyond the realm of regional development. At this point, it is unclear how many of these new forms are appealing to their backers simply because they seem to be new and hip, and how many offer genuine innovations. Still, it appears increasingly questionable that it is wise to subsume all this organizational diversity under ‘incubation.’

For instance, the findings of this thesis suggest that conceptualizing The Hub London as a “social incubator” (Nicolopoulou et al., 2016) masks important differences between (what is commonly understood as) incubation and the processes that happen uniquely in hubs. In great detail, Nicolopoulou et al. (2016) echo many of the findings of this thesis. For example, they

⁴³ Digital fabrication labs include Fab Labs; cf., <http://www.fabfoundation.org/fab-labs/>.

⁴⁴ Cf., <http://www.openlivinglabs.eu/aboutus>.

quote an informant who directly confirms elements of assembly, such as self-selected membership and entrepreneurial commitment, informal roles and hierarchies that form in hub communities, and the importance of support actors in a hub's peripheral community:

The relationship with the Hub before was based on my physical presence in the building but now I don't spend as much time there... I work remotely. I am still very much involved with the leadership team of many hubs—I am however now a member colleague, and not so much a service user, sometimes I even operate as an associate... I got for example my financial skills from outside (providers), 4-5 years ago... the hub is not on the top of the pyramid, (and as) networks are flat structures, I also serve the hub as much as they do. (Informant cited in Nicolopoulou et al., 2016, p. 11)

Nicolopoulou et al. (2016) ultimately reason that these distinct interaction patterns and process features are due to The Hub's focus on social innovation, declaring that it is thus representative of a "social incubator" model. The authors maintain that...

there are three core processes of social innovation in an incubation context; (1) the need for collaborative networks to drive learning and knowledge transfer; (2) creation of social capital underpinned by social entrepreneurship and leadership; and (3) ultimately, dyadic values-based relationships. (p. 6)

The findings of this thesis suggest that such an argument is problematic. In fact, many, if not most, of the interaction patterns that Nicolopoulou et al. (2016) discuss appear to be due to the organizational features and actions of hubs in general (cf., 3.3.3. and 5.1.) rather than an outcome of The Hub London's particular focus on social innovation. While it might be true that different purposes of hubs indirectly and over time yield different organizational patterns (cf., 6.3. and 6.4.), Nicolopoulou et al. are in a way repeating some of the early missteps of incubator research by labeling a model according to some observable feature without substantiating the causal link between the feature and processes that affect and involve entrepreneurs (cf., 2.3.2.). Similarly, accelerators have been discussed as a "new generation incubation model" (Pauwels et al., 2016) while one might just as well argue that acceleration should be understood as a departure from, rather than an evolution of, incubation (for instance, due to acceleration's avoidance of offering office space).

What this thesis (and specifically assembly theory) contributes to this analytical problem is a focus on process and organizational patterns, rather than on features and service models. In effect, it argues that incubator research needs to develop a clearer notion of how organizational features translate into organizational action (beyond services), and to conceptualize the dynamic interplay between entrepreneurs and incubators (or hubs, accelerators, etc.) more rigorously and more deeply than ‘supply’ and ‘demand’ (cf., 2.3.3.2). Similar to the intermediary literature (cf., 8.2.1.), conceptualizations of the organizational nature of incubators are often rather crude, using notions such as ‘passive intervention,’ ‘co-production,’ ‘porous boundaries,’ ‘leveraging entrepreneurial agency,’ ‘institutionalizing,’ ‘embedding,’ ‘anchoring,’ and ‘social environment,’ without exploring them in more depth (cf., 2.3.3.). These notions are intuitively appealing but they do not sufficiently specify the organizational mechanisms at work.

Only once the *organizational processes* that incubators, hubs, accelerators, etc. trigger are well-understood can their (different or similar) impacts on entrepreneurs be determined in a sensible way. If scholars continue to use the ‘incubator’ term loosely, then they need to acknowledge that ‘incubation’ is no longer indicative for a particular kind of organizational process but merely a wrapper for processes such as service-oriented incubation, bottom-up incubation, laissez-faire incubation, coworking, assembly, acceleration, etc. Such an awareness, in turn, might help avert some of the false hopes and premature disappointment among practitioners: in many ways, the disillusionment of proponents of the incubator expectation towards African hubs resulted from their narrow understanding of ‘incubation,’ leading these observers to rely on a misguided assumption of how hubs work (cf., 2.1.4 and 8.1.3.). It would also allow for a critical examination of quantitative empirical approaches which operationalize incubator typologies by means of service portfolios, which is still a common methodological practice (Dutt et al., 2016).

More importantly, a process perspective can help determine which organizational forms should count as ‘new.’ The thesis demonstrated that hubs share many features with incubators, and yet the organizing processes that they trigger are fundamentally different. The thesis thus argues that research on entrepreneurship support organizations ought to avoid simplistic categorizations, or calling an organizational form ‘new’ just because its name is new. Instead, scholars should examine how combinations of organizational features (in interaction with entrepreneurs) yield different processes of organizing (Puranam et al., 2014). For instance, hubs as organizations might not be considered ‘new,’ as their individual features are also given in either coworking spaces, innovation competitions, or bottom-up / laissez-faire incubators. Still, this thesis shows that a particular combination of features can trigger a process that substantively differs from traditional incubation or coworking.

8.2.3. Funding Landscapes and Structural Contingencies

Finally, this study echoes calls for the development of more elaborate environmental contingency theory for incubators and intermediary organizations (Mian et al., 2016; Phan et al., 2005). Local environments influenced the assembly process in two specific ways, which represent potential starting points for additional theory building.

First, future research could more explicitly theorize funder and founder influence, examining the origins of *models* of incubators, intermediaries, and hubs. The thesis showed that the founding stories of African hubs were rooted in contemporary trends of international development and a broader aspirational discourse around technology entrepreneurship in Africa. Hubs are new, hip, and inexpensive, they allow for the engagement of multiple stakeholders in an ad hoc fashion, and they fit with popular development discourses around themes such as ‘community,’ ‘participation,’ ‘grassroots,’ and, of course, ‘entrepreneurship’ and ‘innovation.’ Moreover, iHub’s perceived success nurtured a widely held belief that hubs can be transform-

ative for entire nations (cf., 2.1.2.). Many hubs in Africa thus received support from development organizations over a short period of time, not because entrepreneurs suddenly needed hubs, but because the notion of a ‘hub’ had captured the interest of funder and support organizations (cf., 2.1.3.). Yet, this thesis also showed that hubs and assembly turned out to be much harder to implement than founders had initially believed (cf., chapter 4 and 7.4.).

The theoretical implication here is that scholars have to be mindful to avoid excessive functionalism when they try to explain intermediation, incubation, or assembly processes: a particular organizational model might often be envisioned and implemented because it fits a particular political, opportunistic, and/or discursive context, not because it immediately and effectively addresses a palpable need. In this vein, principal-agent perspectives could go beyond merely diagnosing conflicting interests between funders and entrepreneurs (cf., 2.3.3.5.) and instead examine more closely how particular interests of funders are continuously negotiated, and how they translate into specific organizational consequences (e.g., technology hubs vs. entrepreneurship hubs or other differences in organizational patterns).

A particularly useful literature could be research on imprinting, as it provides an account of how environmental influences get infused into organizations through founders and leaders (Johnson, 2007; Marquis & Tilcsik, 2013). Alternatively, the boundary organization concept could help capture how ‘different worlds’ (development organizations vs. grassroots technology entrepreneurs) are loosely interconnected through hubs and similar organizations (Guston, 2001; O’Mahony & Bechky, 2008).

Second, assembly, through the concept of an organizational pattern, includes at least a rudimentary concept of structural contingency (cf., 6.3.2., 6.5., and 7.4.1.). It thereby goes beyond client interdependence attested in studies of intermediation (cf., 2.2.2.) and dyadic incubation perspectives (cf., 2.3.3.2.) in its consideration of how the availability of entrepreneurs in a given city affects the internal structure of a hub. In a way, this theorization was born out of

analytical necessity: it was more difficult for hubs to discern between ‘internal’ and ‘external’ than for intermediaries and incubators, as entrepreneurs fluidly self-selected into and out of hub organizations (cf., 5.2. and 5.5.). Yet, also in intermediation and incubation research, the blurring organizational boundaries has been alluded to (Boari & Riboldazzi, 2014; Phan et al., 2005; Sapsed et al., 2007).

Studies examining the relationship between the presence of (certain kinds of) entrepreneurs in a given city or local context and the internal structure and process of an intermediary/incubator could thus complement research on the role of funders. This need for theory building seems particularly pressing for incubation studies: prior research on successful cases of networked incubators, bottom-up incubators, and social innovation hubs has been conducted in cities such as Boston, London, and Aarhus (Bøllingtoft, 2012; Bøllingtoft & Ulhøi, 2005; Hansen et al., 2000; Nicolopoulou et al., 2016). This raises the suspicion that those incubation processes that, like assembly, require intensive entrepreneurial participation might be contingent on external factors such as city size, the number of accessible technology entrepreneurs, entrepreneurs’ own wealth, etc.

8.3. Contributions of Assembly Theory to Entrepreneurship and Innovation Research

Assembly theory was developed to account for the finding that the six hubs in the sample induced and sustained rather different social structures, with different participants, diverse contents of interactions, and with varying degrees of stability (cf., 6.1.). Broadly speaking, assembly thus contributes to theory on the role of social structures (or ‘networks’) that underlie geographically concentrated innovation and entrepreneurship processes. This is a vast field of interest, spanning several academic fields and disciplines (Howells & Bessant, 2012; Kemeny, Feldman, Ethridge, & Zoller, 2016; Storper et al., 2015).

More specifically, assembly is a theory of how entrepreneurial interaction gets configured and coordinated in space by a particular kind of organization. The thesis showed that intermediation and incubation theory explained elements of this process, but assembly was unique in as far as it was directed at the *creation* of social structures with minimal organizational intervention (cf., 8.1.4.). Through assembly, facilitative organizational actions together with entrepreneurial decisions yield partially self-sustaining entrepreneurial communities (cf., 7.2. and 8.1.2.). This section therefore reflects assembly theory against literatures beyond intermediation and incubation, exploring further theoretical contributions of the thesis.

8.3.1. Organizations and Networks of Entrepreneurs

The basic implication of assembly is that entrepreneurs in a given city do not collaborate in a vacuum. Instead, they interact with one another through particular social structures that are created in part by organizations like hubs. Hubs thus predetermine entrepreneurial interactions, if only in an indirect or indeterminate way (cf., 7.1. and 7.4.). Social structures like hub communities were found to be reifications of hub leaders' visions, which materialized through the interplay with preferences of local entrepreneurs. This meant that the social structures that hub organizations created both resulted from entrepreneurial decisions and had a structuring effect on ensuing entrepreneurial decisions (cf., 7.1. and 7.3.).

When comparing these findings against extant entrepreneurship literature, it is important to first acknowledge that entrepreneurs (and soon-to-be entrepreneurs) are rather particular economic actors. By definition, they seek to establish their own organizations (ventures) and choose not to look for employment. At the same time, this lack of embeddedness in established and stable structures is also a liability (Aldrich & Fiol, 1994; Stinchcombe, 1965). African entrepreneurs face particular constraints and are often forced to more extensively rely on informal social interactions because formal support channels are absent or exclusive (Devine &

Kiggundu, 2016; G. George, Kotha, et al., 2016). Assembly is thus a particular organizing process that allows flexible compromises for entrepreneurs who seek supportive social structures but lack financial resources and shy away from formal commitments, maintaining independence of their (idea for a) venture.

This begets the question whether assembly is just one of many other processes that organizations could stimulate to establish structures that can balance these conflicting demands of entrepreneurs. Comparing assembly to incubation and innovation brokerage highlighted how small and simple differences in organizational features (such as service provider/client vs. community/member relationship) can prompt drastically different organizational processes (cf., 8.1.4.). If effective assembly creates active entrepreneurial communities (cf., 7.1.), which other organizational processes would lead to similar or other social-structural outcomes? How does organizational action shape and affect entrepreneurial processes and the interactions of individual entrepreneurs?

The entrepreneurship literature has surprisingly few answers to offer in response to these questions. Granted, the myth of the lone entrepreneur is now in decline. Entrepreneurs have been shown to interact with diverse others through multi-functional social networks (Elfring & Hulsink, 2003; Hoang & Antoncic, 2003) and there is also a rich literature on entrepreneurial teams and small groups (Benner, 2003; Harper, 2008; Ruef, 2010). Yet, the field has mostly seen entrepreneurs as the ones *doing the organizing* of new firms and markets (Santos & Eisenhardt, 2009; Shane & Delmar, 2004). It has ignored how entrepreneurs *are being organized* or become *part of organizations* (other than their own ventures).

A fairly recent literature in organizational behavior has called attention to this wide gap and begun to examine how entrepreneurs are affected by organizational contexts throughout their careers (Burton, Sørensen, & Dobrev, 2016; Sørensen & Fassiotto, 2011). Here ‘organization’ is indeed understood as a structuring device, providing entrepreneurs with knowledge,

resources, and connections. Yet, this literature is concerned only with formal organizations (like corporations) which entrepreneurs are embedded in before they actually become entrepreneurs.

Another extensive body of literature discusses geographical areas that feature agglomerations of entrepreneurial activity. Here, ‘organization’ is located at the macro level, seen to consist of informal institutional and relational arrangements which govern entrepreneurial interaction (S. J. Bell, Tracey, & Heide, 2009). Such macro-level organization of entrepreneurs has variously been captured in concepts like clusters (Porter, 1998), regional networks of entrepreneurs (Powell, 1990; Thornton & Flynn, 2003), or, most recently, as entrepreneurial ecosystems (Isenberg, 2014; Spigel, 2015; Stam, 2015).

This literature resonates with assembly because it discusses how entrepreneurs shape social structures (Aldrich & Martinez, 2010; Feldman et al., 2005; Pitelis, 2012). For instance, regional collectives of enterprises have been found to generate higher levels of external trust than individual entrepreneurs (Auerswald & Branscomb, 2002). It also explicitly recognizes the role of networks as social entities in their own right rather than seeing them merely as aggregations of interactions (Gulati, 1998; Powell, 1990). However, this literature does not clarify how social structures are initially created, and if organizations—in the meso-level sense of bounded, goal-oriented social entities—play a role in the process. The literature remains entirely at the inter-organizational or macro level of analysis.

In sum, the entrepreneurial careers literature neglects the role of non-formal and emergent organizations, and only addresses the legacy effect of organizational contexts which entrepreneurs were embedded in before they became entrepreneurs. In turn, the regional networks literature ignores the meso level of analysis, or ‘organizational’ level of analysis in the usual sense (Scott & Davis, 2016).

This gap points to the persistence of the “bifurcated history” of entrepreneurship research, “typically focusing on either individuals or environments but not linking the two”

(Thornton & Flynn, 2003, p. 401). Researchers have repeatedly pointed out that regional social structures of entrepreneurship are characterized by multilevel interdependencies (Phan et al., 2005; Thornton & Flynn, 2003). Yet, with few exceptions (see 8.3.3.), the existing entrepreneurship literature seems to ignore the influence of organizations in a wider sense than corporations and in a narrower sense than regional networks. Examples of neglected organizations include formal organizations such as incubators and accelerators, but also semi-formal, emergent, or informal ones such as hubs, associations, interest and networking groups, professional and entrepreneurial communities, or venture capitalist and angel investor groups. These organizations are analytically between networks (as loosely bounded systems of economic organization at the macro level) and individual entrepreneurs and firms (as clearly bounded actors at the micro level).

For example, formalized meso-scale organizational environments like science parks were found to shape entrepreneurs' networks (Johannisson, Alexanderson, Nowicki, & Senneseth, 1994). Through an ethnographic approach, Bøllingtoft and Uthøi (2005, Bøllingtoft, 2012) provide further nuance, showing that incubators can provide an organizational setting for social structures of entrepreneurs. Between the lines, such studies allude to organizational processes, but they fall short of an explicit theorization of the role of organizations in shaping entrepreneurial social structures.

This is a curious theoretical oversight: assembly theory shows that organizations like hubs are tangibly shaping how entrepreneurs work with each other and with others (cf., 7.1.), possibly in more palpable ways than the macro-level economic organization of a region. Assembly thus highlights the missing role of organizations in entrepreneurship research, and fills a part of this gap by discussing the consequences of one particular organizational form (hubs) in a particular empirical context (African cities). It opens up a wide realm of inquiry that could

examine how social structures of entrepreneurs are created and shaped by organizations. Assembly thus adds missing pieces to entrepreneurship studies, which have so far left unanswered where social support structures for entrepreneurs come from and why they are difficult to establish in some contexts.

8.3.2. Micro-Geographies of Knowledge and Innovation

Assembly makes a second contribution to a realm of inquiry which scholars have recently started to refer as the micro-geography of innovation (Liu & Marx, 2016). Micro-geographical analysis is poised to depart from and complement regional, national, and inter-organizational perspectives on learning and knowledge exchange which have dominated economic geography, such as theory on knowledge spillovers (Audretsch & Feldman, 1996), knowledge clusters (G. G. Bell, 2005; Maskell, 2001), national systems of innovation (Lundvall, 2007), regional innovation systems (Asheim & Coenen, 2005; Cooke, 2001), or regional innovation networks (Brenner, Cantner, & Graf, 2013; Sternberg, 2000).

Assembly makes a contribution in this context as it provides an analytical bridge between an individual-focused view of knowledge creation (Howells, 2002, 2012) and buzz (Bathelt et al., 2004; Storper & Venables, 2004). The former starts from the notion that knowledge only resides in individuals and not in firms (Howells, 2002, 2012). While information can be codified and flow from one individual to another, knowledge creation relies on an individual's own interpretation of information, which implies that any person's knowledge is unique, even concerning the same phenomenon or object. This view is directly in line with the analytical lens of this thesis (cf., 3.2.).

Any individual's knowledge is thus inherently dependent on the knowledge of people he/she interacts with. Yet, many kinds of information flows are spatially constrained: tacit knowledge can only be created through a process of experiential learning, which largely de-

depends on sustained face-to-face interactions with other knowledgeable individuals. Hence, spatial and social contexts shape knowledge creation in as far as they enable and structure interactive learning. In sum, knowing becomes an active process that is mediated, situated, provisional, pragmatic and contested (Blackler, 1995). Howells (2012, pp. 1006, 1010) summarizes the implication for research on the geography of innovation and knowledge creation:

It is the distributed nature of knowledge and the division of knowing in an economy that is so crucial to understand here in the process of innovation and makes the paradox of the individualism of knowledge together with its highly inter-related and inter-dependent nature so important in its social and economic study... [W]e need to understand the micro-level of knowledge processes before we can say anything meaningful about wider level processes relating to knowledge. We, therefore, should acknowledge, at a detailed level, how individuals interact with each other to generate and share knowledge with each other.

Consequently, he argues that firms become innovative by creating “knowledge contexts” within which tacit knowledge (embodied in individuals) can be purposefully recombined through social interactions (Howells, 2002).

The literature on buzz (Bathelt et al., 2004; Storper & Venables, 2004) makes similar arguments but discusses wider urban geographies, where knowledge is exchanged beyond and outside of the boundaries of firms. Because the concept of buzz has been very popular but also applied quite loosely, it is useful to revisit the complete definition by Bathelt et al. (2004, p. 38):

Buzz refers to the information and communication ecology created by face-to-face contacts, co-presence and co-location of people and firms within the same industry and place or region. This buzz consists of specific information and continuous updates of this information, intended and unanticipated learning processes in organized and accidental meetings, the application of the same interpretative schemes and mutual understanding of new knowledge and technologies, as well as shared cultural traditions and habits within a particular technology field, which stimulate the establishment of conventions and other institutional arrangements.

The buzz concept has been used to explain locational advantages which urban contexts provide for innovative activity that depends on face-to-face interactions outside of firms (Storper & Venables, 2004), especially in the creative industries and some professional service sectors (Evans, 2009; Tether, Li, & Mina, 2012). Yet, buzz has also been criticized as diffuse and vague, distracting from the role of concrete interactions. For instance, Power and Lundmark

(2004, p. 1025) argue that “things [such] as a cosmopolitan street life or accidental face-to-face encounters play relatively little part in the flow of experiences, knowledge and innovation.” In line with the individual-focused view of knowledge creation, these authors contend that exchanges at the workplace, which are more sustained and practice-oriented, are underlying knowledge creation, so that it is not buzz but rather the movement of workers from one firm to another that transfers knowledge between organizations.

Assembly represents a useful theoretical contribution in this context because it reconciles these two perspectives. It shows that knowledge exchange indeed depends on sustained face-to-face interaction, which is better enabled by stable knowledge contexts rather than by ad-hoc meetings in non-professional settings. At the same time, it shows that not only firms and workplace environments represent knowledge contexts. Organizations or organization-like social entities other than firms (such as hub communities) can also enable knowledge creation, especially if they attain a high degree of stability and activation (cf., 7.2.4.).

Power and Lundmark (2004) are thus correct to argue that people meeting in cafes, bars, or on the street—or even people working next to each other in a hub space—does not necessarily result in knowledge exchange and innovation. Yet, active communities might indeed stimulate an information and communication ecology outside of firms that buzz hinges on. Assembly thus shows how, specifically, buzz comes into being. Because knowledge is embodied in individuals and is mostly created through concrete social interactions, buzz does not ‘just happen.’ Instead, it unfolds through social structures which might be formally bounded (such as workplaces at firms) or fluidly bounded (such as communities), but which in all cases first need to be established through purposeful individual, collective, and/or organizational action.

8.3.3. Entrepreneurial Communities

Assembly also contributes to a fragmented literature on communities. Namely, it reconciles scattered arguments and conceptualizations, applying them to individual entrepreneurs as members of communities.

First, assembly builds on the communities-of-practice concept, which has dominated organization and innovation research. The concept resonates with assembly theory because it highlights that knowledge can be created and exchanged beyond and outside of formal organizational boundaries and structures (Brown & Duguid, 1991). Furthermore, it clarifies that innovation happens when the knowledge that individuals have gained through practice and specialization can be recombined (Brown & Duguid, 2001). The related notion of ‘collaborative communities’ further emphasizes the importance of trust and social cohesion in enabling socially situated interactive learning, especially for tacit, technical, and experience-based knowledge (Adler et al., 2008).

Assembly translates and adapts these ideas to the context of entrepreneurs, showing that entrepreneurial communities differ from communities of practice in terms of how they are created, how flexible membership is, and how heterogeneous the communities are. Communities of practice were developed as a concept to capture collaboration outside of hierarchies in (multi-national) corporations. The concept of community as a postindustrial form of organizing in the knowledge economy (Adler et al., 2008; O’Mahony & Lakhani, 2011) later came to assume a single mode of organizing that is internally homogenous and purposeful. In agreement with earlier critique (Amin & Roberts, 2008; Grugulis & Stoyanova, 2011; Roberts, 2006), the thesis deems the communities-of-practice idea as conceptually too vague and based on an unrealistic assumption of homogeneity within and between communities to be directly applicable to entrepreneurship.

Instead, assembly shows that entrepreneurial communities can be initiated at nested and fluidly bounded levels, requiring varying participation intensities from members. Entrepreneurial communities differ in terms of what information is exchanged and how this happens (for instance, in technology hubs vs. entrepreneurship hubs). The concept of communities of practice is thus useful to understand knowledge creation in small entrepreneurial communities focusing on specialized and technical learning (such as core communities of technology hubs), but assembly shows that not the same dynamic applies in any entrepreneurial community. For instance, larger, looser, and more heterogeneous communities (such as peripheral communities of entrepreneurship hubs) can also serve to coordinate actors and facilitate motivation. Moreover, the sheer absence or unwillingness of individuals with complementary skills can inhibit entrepreneurial communities from unfolding peer learning effects (cf., 7.5.1.; Grugulis & Stoyanova, 2011).

More closely related to peripheral communities is Benner's (2003, 2008) notion of regional learning communities. Based on research in Silicon Valley, he emphasizes the role of geographically concentrated occupational communities as enablers of networking, learning, and sensemaking, allowing members to deal with new and dynamically changing information that flows across and outside of firms. Benner explicitly mentions the role of professional associations in "building" communities, while he does not detail the causal links between associations' organizational actions. Benner (2003, p. 1826) argues that "effective learning communities [are marked by] high levels of trust and openness [and] have to be rooted in extensive, interaction communication, [sic] in which people recognize themselves as part of a coherent community that gives meaning and structure to the information shared through the organization." This description closely resembles the notion of community activation, proposed in this thesis (cf., 6.1.3.).

To Benner's ideas, assembly adds a theory of how such communities can be created through organizational actions. It clarifies that a shared occupational identity is but one possible unifier for individuals: communities can also be assembled from diverse occupational groups as long as some shared purpose unites participants and supports the creation of mutual concern (cf., 7.2.4. and 7.4.3.). Moreover, assembly shows that communities do not only serve for knowledge exchange between professionals across firms; they can also provide a venue for entrepreneurial teams and collaboration to be initiated (cf., 6.1.2.).

Complementing the notion of regional learning communities is the account of a local community by Marti et al. (2013). The authors found that a localized and bounded community enabled an entrepreneurialization process and the establishment of an "entrepreneurial culture." Specifically, the tightly-knit community allowed for roles and "sub-worlds" to develop: members who occupied a workspace divided labor and coordinated their efforts. At the same time, the community also allowed members to connect to "known strangers" outside of the community. This concept is akin to core communities with fluid boundaries in hubs suggested in this thesis (cf., 5.5.). Yet, assembly specifies that communities of entrepreneurs co-located in the same space can interact with a peripheral social structure that represents a community in its own right (cf., 5.4.) rather than only with disparate "known strangers."

In sum, assembly theory thus integrates the fragmented literature on learning or entrepreneurship-oriented communities by suggesting that different kinds of communities serve different purposes of coordination. It shows that core/localized communities can be more conducive to tacit and specialized knowledge exchange and to collaboration, while peripheral/regional communities can facilitate instrumental information exchanges and enable cognitive outcomes such as inspiration. Moreover, assembly represents a process theory of how (different kinds of) entrepreneurial communities are created through organizational action and partici-

pants' decision making, whereas prior literature usually assumes that communities already exist. Specifically, it demonstrates that core communities require more commitment from participants and are often harder to establish, while peripheral communities are easier to create, for instance, by running regular events.

Such a more nuanced view could offer a useful starting point to theorize the 'organizational layer in between' regional social structures and concepts (networks, systems, buzz, etc.) and individual entrepreneurs (cf., 8.3.1. and 8.3.2.). For this effort, the notion of 'infrastructure' could provide a useful conceptual nexus, as this idea resonates both with community researchers and macro theorists (Van de Ven, 1993). For instance, Marti et al. (2013, p. 24) describe an entrepreneurial community as an "'infrastructure' of interpersonal interactions" and Benner (2003) refers to communities and associations as "organizational infrastructures" (p. 1815) or "soft infrastructure" (p. 1810). Assembly can be seen as a basis for more research that examines both the organizations that stimulate the creation of social structures (such as hubs) and the particular social-structural outcomes themselves (such as entrepreneurial communities).

8.3.4. Alternative Anchor Organizations for Early Days Environments

Finally, assembly theory also provides a tentative explanation for the observation that hubs play an outsize role in many African cities compared to similar organizational forms in cities and regions in the Global North. African capitals clearly differ from cities like London, where urban landscapes abound with coworking spaces, hubs, makerspaces, incubators, and other entrepreneurship support organizations (Borowczyk Martins, 2016). Yet, in such mature and dense contexts, no individual support organization stands out. It would be difficult to find an incubator in Silicon Valley that has been attributed a similar importance for the region as iHub has been seen to have for Nairobi, Kenya, and even for the entire African continent (cf., 2.1.2. and 2.1.3.). Similarly, hubs in Harare and Kigali were seen by many participants as the most significant enablers of technology entrepreneurship in these cities even where assembly

was ineffective (cf., chapter 4, 6.1.4., and 7.3.). In Accra, however, the MEST incubator was recognized as the most important social structure for technology entrepreneurs (cf., 4.3.).

While the present data do not allow for an explicit comparison of African cities and geographies in the Global North, the assembly process together with these observations gives an indication about why hubs have had a particular appeal in Africa. Given the newness and limited opportunities for technology entrepreneurship in most cities, few other organizations could assemble technology entrepreneurs (that is, convene, interconnect, and activate entrepreneurial communities). Established technology enterprises barely exist, investors are practically absent, and universities are under-resourced, while early-stage entrepreneurs themselves are small in numbers, fragmented, and unable to draw on existing resources, capacities, and contact networks. Arguably, stakeholders of technology entrepreneurship are ‘more disassembled’ (i.e., more distant and different from each other) and miss organizations that could induce or formalize the social structures needed for them to interact and collaborate (cf., 7.1.).

Cities and regions of the Global North usually have *anchor organizations* which make assembly less essential. Anchor organizations are typically universities or large firms with strong research and development capacity, which help create and develop enterprise clusters through spin-offs, knowledge externalities/spillovers, global connections, and diversification economies (Agrawal & Cockburn, 2003; Feldman, 2003; Giblin & Ryan, 2015; Niosi & Zhegu, 2010).

Hubs can thus be understood as attempts to create small-scale and more informal anchor organizations where the private or public sector has not been able to do so. This anchor function is particularly important for actors who are new to local contexts, such as international visitors and immigrants or expatriates looking for partners. For example, hubs anchor these actors’ search of novice technology entrepreneurs, who would not be identifiable without hubs (cf., 5.1.3. and 6.2.3.). The setup of hubs is particularly suitable for African cities, as they allow

entrants to quickly discover potential partners despite trust deficits and cultural barriers. Maybe more importantly, hubs are also an important symbol for the activeness of technology entrepreneurship:

I didn't understand that at that time, the importance of such a location in terms of being a central point where all the people interested in IT [can] come. If you would come to this country before kLab, and [Rwandans] claim [the country] is an ICT hub, you would run around and say "Where is IT here?" [It would seem like] there is nothing going on. You have small companies left and right, you don't even know where they are, you don't even have Yellow Pages here, right? ... Everybody who comes to this country and has to do with IT, the first place they go to is kLab. We get some very famous people going there... Now you can say, "Yes, there is something going on in Rwanda." Before, you could not. (kLab founding board member)

Admittedly, this thesis cannot fully substantiate this theory, and thus calls for future comparative research on the relative importance and differences in roles of the same types of organizations in mature vs. early-days entrepreneurship environments.

8.4. Practical Implications

The final section of this chapter explores practical implications. Addressed in part at a practitioner audience, it uses less conceptual language compared to the rest of the thesis. Like the previous section, the discussion here goes beyond the research questions; yet, this section is more strictly limited to African hubs as a phenomenon without discussing entrepreneurship support organizations in the Global North.

The thesis did not conduct an impact evaluation of hubs, and so this section does not assess whether hubs work (cf., 1.3.1.). This is important to note because 'impact' has been a key concern and difficult topic for hub funders and leaders. Especially in cases where development organizations or governments funded hubs, hub leaders have faced pressure to justify how their expenses generate economic or social development.

While I acknowledge the importance of impact evaluation, this thesis demonstrates that we first need to clarify how hubs work before we can answer whether they work. It suggests that hubs unfold impact mainly through the assembly process, which is complex and fragile,

and often beyond the comprehension and immediate control of hub leaders (cf., 7.4.). I therefore believe that a rush to judgment about hubs based on established evaluation methods (for instance, from incubators) might be well-intended but ultimately risks perpetuating misunderstandings and misguided expectations about hubs. For instance, in several cases discussed in this thesis, funders and leaders expected hubs to achieve things they were inherently unable to achieve (such as the creation of startups or the development of a skilled labor force; cf., chapter 4 and 8.1.3.). In other cases, funders established quantitative targets for hubs which actually disrupted assembly more than strengthening it (cf., 7.4.4.).

In sum, this section argues that hubs should be seen as assemblers, and consequently, their targeted outcome ought to be the creation of active entrepreneurial communities (cf., 7.1.). Accordingly, hubs have to be measured against the environments they operate in, while hub leaders might be powerless in the face of many constraints in African cities (8.4.1.). Moreover, active entrepreneurial communities and other outcomes of hubs might be ‘formally absent;’ I suggest that this is an issue that funders have to acknowledge and work on (8.4.2.). Finally, hub funders and leaders ought to be more keenly aware of unintended consequences and limitations of assembly (8.4.3. and 8.4.4.). Altogether, I maintain that hubs represent a valuable and promising addition to African technology entrepreneurship, but also that they need to take seriously criticisms of lacking effectiveness, exclusionary tendencies, and wastefulness.

8.4.1. One Can Only Assemble What Is There

The most fundamental practical implication of this thesis is that ‘only what is there can be assembled.’ This assertion brings into focus that hubs are powerless towards some challenges in technology entrepreneurship environments of African cities. Hubs are mainly facilitators of interactions and creators of social structures. They do not directly build capacity for, or infuse resources into, technology ventures. Market opportunities for African technology startups remain scarce, and the few already well-connected and skilled entrepreneurs are usually better

positioned to exploit them than startups. Notwithstanding institutional and governance failures (Acemoglu & Robinson, 2010; World Bank, 2014), shortages of skills, expertise, and trust continue to be pressing problems in urban and national contexts:

It's just that *there were no* Rwandans. No Rwandan mentors... The thing is, with the industry in Rwanda, you find that everything is a startup. There's no one who has had like 20 years [worth of] knowledge or experience. I right now might be the go-to person because of my five years [of] solid experience, while someone who is just graduating is looking up to me. So, we don't have older people or another generation of people who have existed before us. (Technology entrepreneur in Kigali)

Against this backdrop, assembly highlights both the opportunities and limitations of hubs. Assembly consists of reconfigurations of actors which do not inherently create more (economic, social, affective, etc.) value than original configurations did (cf., 7.1.). The impact of hubs thus depends on whether actors, through newly enabled relationships with others, are collectively able to create more value. This value difference can be substantial, for instance, if teams of founders begin to collaborate and develop a startup that they otherwise would not have launched, or if an entrepreneur is inspired by a success story at a hub event and encouraged to bring her product idea to fruition. Yet, such examples also illustrate that the impacts of assembly are indirect and far-flung, and thus largely unpredictable.

It is essential to acknowledge that, strictly speaking, it is not hubs themselves that generate socio-economic outcomes, but other economic actors with facilitation of hubs. For the most part, hubs recombine and restructure what already exists. If technology entrepreneurs and supporting actors do not have sufficient intrinsic capacity (knowledge, skills, motivation, etc.) and resources (finances, assets, etc.), this will continue to limit them even within active entrepreneurial communities. Simply put, a hub without capable entrepreneurs cannot create startups, irrespective of how effective it is at assembly.

Yet, problematically, the more capable entrepreneurs are typically the ones who do not self-select into hubs (cf., 6.1.1.). The sampling effort for this thesis yielded lists of about 50 early-stage technology entrepreneurs in each capital city and about five to ten advanced ones.

Only a small share was closely affiliated with hubs (cf., 5.2., 5.3., and Annex D) and, across all three cities, only a handful of entrepreneurial teams formed a team and founded a venture *as a result of* a hub (cf., 6.1.2.). Thus, even if the sampling effort failed to identify as many as half of all existing technology entrepreneurs, this indicates that it is impossible for a given African hub to ‘create’ or ‘develop’ dozens of startups in a short period of time. This observation also illustrates that more numerous novices have very few experienced actors to connect to, while Harare and Kigali showed that novices had little to learn from each other. A technology entrepreneur in Harare describes the limits of peer learning if no suitable peers are part of a hub (cf., 4.2.2.2.):

... the distribution of skills. Someone would really want to come and work at [the hub], he feels like... he is skilled and everyone at [the hub] is not as skilled as he is, he doesn't see the benefit of working from here. So I think that's one of the main reasons a lot of people just decide to go solo because they can't find people that are credible enough to work with them.

Understanding the assembly process as the core of what hubs do allows a shift away from thinking about them as an economic development or startup creation intervention, such as traditional (government-led) incubators (cf., 2.1.4., 2.3.3.1., and 2.3.4.). Instead, it becomes apparent that any impacts that hubs create unfold with and through the participation of their constituents. Any value generated by hubs is co-produced, rather than injected or added. Hubs hardly ever create startups—or ‘create’ rather than facilitate—any economic activity.

This explains in part why hubs have not been able to live up to the expectation that they could generate high-growth startups: hubs will not be able to assemble successful startups if the components are unavailable in local contexts. The ways in which hubs work differ from expectations of commentators and funders, and even of hub leaders (cf., 7.4.). Leaders who insisted on venture creation as the most important outcome for a hub had to face this reality, often deciding to move closer to traditional incubation models (cf., 6.1.4.).

8.4.2. Hubs and Development: Infrastructures and Formally Absent Outcomes

Seeing hubs as assemblers also enables a clearer view on the outcomes that hubs can be expected to achieve, and those outcomes can or cannot be measured. The thesis demonstrated that hubs' organizational action is directed at the creation of supportive social structures for technology entrepreneurs, specifically, active entrepreneurial communities (cf., 7.1.).

Yet, none of the six hubs analyzed in this thesis had explicitly pursued community activation. All of them harbored visions of coordination, and 'community' was seen to be essential for any given hub's functioning, but hubs only employed simple quantitative targets, such as attendance of hub spaces and events, membership, or numbers of startups created (cf., chapter 4 and 6.3.). These findings show that hub leaders struggle to understand the impact chains of their organizations (cf., 7.4.4.), and are tempted to cling to measurable statistics even if they are only crude proxies for notions such as 'networking,' 'community building,' or 'ecosystem co-ordination.'

In contrast, this thesis made clear that such metrics are entirely inappropriate to capture the social dynamics of community activation, which are underlying hubs' complexity but also represent their greatest promise (cf., 6.1.4. and 7.2.4.). For instance, the cases of kLab, Hub Accra, and iSpace showed that core community activation is not well-represented by the number of entrepreneurs that work in a hub space on a given day. Co-presence does not by itself imply an active community; activation requires the formation of a supra-individual social entity that is socially cohesive, allocates roles, nurtures trust, etc. (cf., 6.1.2.). An active core community depends on a minimum degree of like-mindedness that can actually be put at risk when the number of entrepreneurs in a hub space increases to a point where mutual recognition becomes impossible. Community activation depends on sustained, rich social interactions among a group of dedicated actors, which requires time and consistent (rather than large-scale) entrepreneurial participation.

Similarly, members of peripheral hub communities, even if they only attend events or visit hub spaces occasionally, can derive benefits from hubs that go beyond those of ad-hoc networking. A hub's permanence gives peripheral communities an orientation point, for instance, to access novice entrepreneurs or to meet foreign actors who use hubs as a first point of contact when entering an African country. Such benefits can be substantial but largely go unassessed if funders focus on narrow output measures.

It is thus on the level of communities that hubs unfold their most significant outcomes. In turn, for any given venture, a hub can only be expected to support a narrow segment of the entrepreneurial process, again contributing in a way that is hard to quantify and measure.

It appears that an expectation of measurable socio-economic development as a direct outcome of hubs' action is unwarranted or nearly impossible to verify. In light of intricate community formation and self-selection dynamics highlighted in this thesis, hub funders and implementers should admit that the impact of hubs is difficult to predict and assess. Hubs remain unattractive for funders that expect concrete 'returns on investment,' direct effects on startup creation and development, or measurable social impact. Ultimately, hubs are not an intervention with effects that are measurable, linear, and predictable, but a facilitator for entrepreneurial interaction. There is a need to focus, not on planned impacts of hubs, but on outcomes that are "formally absent" (Ferguson, 1994), such as the activation of core and peripheral hub communities.

To develop an improved awareness for opportunities and limitations of hubs, I propose that practitioners employ the *infrastructure* metaphor more rigorously and critically. Indeed, hubs are comparable to interconnection components or gathering places in other systems. Hubs represent for knowledge and digital economies what crossroads, town squares, airports, train stations, etc. represent for physical transportation infrastructure, or what public schools, universities, libraries, community centers, or town halls represent for civic and education systems.

The analogy demonstrates that infrastructural components differ fundamentally from private enterprises with regard to funding and governance regimes. Specifically, when the notion of an infrastructure is thought through, it becomes clear that:

1. Infrastructure is embedded. Infrastructure without users cannot create value; it is always a means to an end, but never an end in and of itself. The value created by infrastructure depends on the ends that users are able to achieve with the help of the infrastructure.
2. Infrastructure has to be built, leading to costs which users at a given point in time cannot usually shoulder.
3. Infrastructure, once built, is a public good (i.e., non-excludable and non-rivalrous within capacity limits) that needs maintenance. It is hard and often not economical to recuperate its cost directly from its users or to expect users to sustain it.
4. Usage cannot and should not be narrowly pre-specified. This relates to time of usage, group of users, and the ultimate purpose of usage. Infrastructure use ideally happens on-demand; it is self-selected. Pricing mechanisms help capacity management or to enable preferential access for some user groups (e.g., nominal, peak, or tier pricing), but prices are not usually based on the cost per user.
5. Infrastructure is most cost-effective when capacity utilization is high but short of congestion.
6. Infrastructure can have large positive societal impacts, but effects usually unfold over the long term, are difficult to measure, and hard to predict.
7. A particular piece of infrastructure usually plays only a minimal role in enabling a given user's endeavor, to the point where the user might not be fully aware of its value and take it for granted.

8. Infrastructure projects are often politically contested, as they concern the allocation of resources for the benefit of some but not other groups of a population. They run the risk of becoming prestige or vanity projects.

These intuitive features of infrastructure can serve as analogues for hub funders and leaders, allowing them to adjust and calibrate their expectations. For example, in Hypercube's case, it appeared that the leadership team's self-imposed emphasis on financial sustainability ran counter to the original idea of a 'hub' (cf., 2.1.2., 4.2.2.2., and 4.2.2.3.). The Hypercube team was intent on charging users for usage, from which they concluded that they would need to offer a substantial value to any given user, as users would not otherwise be willing to pay and contribute. At the same time, not enough technology entrepreneurs appeared to exist in Harare who would want to use a hub. In a sense, the team and Hypercube's funders gave insufficient consideration to the above-mentioned features 1., 2., 3., 4., and 7.

These features also illustrate that the network infrastructure expectation of African hubs is not exactly misguided, but it somewhat glances over thornier issues of infrastructure, such as its embeddedness, large upfront cost, and low immediate or immeasurable impact (cf., 2.1.4. and 8.1.3.). Finally, 'infrastructure' could be a useful metaphor that spans across practitioner and scholarly debates about hubs, other entrepreneurship support organizations, and entrepreneurial communities (cf., 2.1.1., 2.2.3., 8.3.1., and 8.3.3.).

8.4.3. Diversity and Exclusion in Entrepreneurial Communities

Assembly refers to the convening, interconnecting, and activating of diverse (i.e., cognitively different and distant) individuals. Yet, convening and activating can be in tension, because convening is geared towards bringing people together who would not otherwise come together, while activating depends on like-mindedness, mutual commitment, and social cohesion (cf., 7.4.3.). This can lead to a difficult process of calibration for hubs. It can be especially hard to bring together two actor groups if one of them can expect to gain more from a relation

than the other, for example, in the case of novice technology entrepreneurs interacting with more experienced ones (cf., Grugulis & Stoyanova, 2011 for a similar dynamic in communities in the media industry). In fact, entrepreneurs made less use of hubs as they matured, contrary to stage-dependent usage in incubators (McAdam & McAdam, 2008).

More technically, a given hub's participants move towards homogeneity on some dimension of cognition or shared meaning (e.g., knowledge, skills, values, goals, etc.). This process is partially due to socialization (cf., 6.1.2. and 6.1.3.) but also to the inherent dynamics of self-selected membership (cf., 5.2.). Homogeneity is important for attracting members since hubs use a shared purpose to entice participation and enable information flows (O'Mahony & Lakhani, 2011; Puranam et al., 2014). Those entrepreneurs who self-identify with a given hub community will be more likely to work with each other through a hub community, which reinforces the draw to join for similar others.

This creates tradeoffs and tensions in the assembly process (cf., 7.4.), such as an emphasis on either the core or the peripheral community in a given hub (cf., 6.4.). The three hubs that achieved stability in the sample (kLab, The Office, and Hub Accra; cf., 7.3.) experimented with catering towards more diverse groups of entrepreneurs, but ultimately abandoned some of them in favor of more coherent communities. This is not necessarily surprising as a sociological phenomenon: simply put, wherever there are boundaries, there will be exclusion (even if boundaries are fluid). A certain degree of homogeneity might well be a necessary condition for hubs to achieve community activation.

However, this implies subtle but important conflicts between normative and idealistic frameworks that hub funders and leaders are often devoted to, expressed in buzzwords such as 'diversity,' 'openness,' 'inclusiveness,' and 'multi-stakeholder.' Especially funders and leaders of entrepreneurship hubs emphasize the importance of inclusiveness and 'bridging differences' (cf., 4.1.3., 4.3.3., 6.3., and 6.4.).

There is thus a vision amongst many funders that hubs are inherently diverse or heterogeneous social structures, which is in part misguided. Counter to their expectations, self-selected organizational membership in ‘open’ organizations like hubs can result in *increasing* homogeneity among members. Even—or especially—in cases where organizations allow for entirely open participation, membership will not necessarily be ‘diverse’ in every sense. For instance, the two entrepreneurship hubs in the sample (The Office, Hub Accra) attracted entrepreneurs from a wide variety of economic sectors, but became increasingly homogenous concerning their culture and values (cf., 4.1.3. and 4.3.3.). Similarly, the case of kLab showed that core community activation can help specialized learning but thereby also increase members’ sense of ownership of the hub, which is in part a desired outcome but can also lead to rejection of newcomers and changes (cf., 4.1.2.).

In sum, depending on the self-selection mechanism, homogenization can focus on different member attributes for different hubs, but there is likely to be at least one cognitive aspect for which members of a hub are alike and increase in similarity over time. This means that hubs, by trying to be open and diverse, might in some sense achieve the opposite.

8.4.4. Path Dependency and Early Moments in Entrepreneurship Environments

A practical issue that is closely related to homogenization of entrepreneurial communities is path dependency. In organizations, path dependence arises from self-reinforcing mechanisms which ultimately narrow down the options for an organization to change direction, potentially leading to lock-in, where the organization is stuck in a particular pattern (Schreyögg & Sydow, 2011; Sydow, Schreyögg, & Koch, 2009).

In hubs, major self-reinforcing mechanisms include the homogenization of members through self-selected membership (cf., 6.1.1., 6.1.2., and 8.4.3.) and community activation (cf., 6.1.3.). Both mechanisms are essential for the assembly process, and they can ultimately form

the basis for the kinds of transformative and generative dynamics that hubs aim for (cf., 2.1.1. and 2.1.2.). Neither of the mechanisms is thus inherently a problem for hub practitioners.

Yet, these mechanisms also imply that decisions that hub leaders and participants make early on in the assembly process play a more important role compared to later decisions. For instance, the complexion of a hub's first core community will determine which entrepreneurs self-select into the community for months and possibly years, such as in the case of kLab (cf., 4.1.2.). Similarly, a hub's initial model can lead the hub to adhere to a particular organizational pattern (e.g., technology hub vs. entrepreneurship hub), which in turn shapes consequent decisions of leaders and entrepreneurs (cf., 6.4. and 6.5.).

Given that hubs alter social structures in entrepreneurship environments (cf., 7.1.), these path dependencies also play an essential role in shaping the opportunities for entrepreneurs in a given location. The six hubs examined in this thesis depended on entrepreneurial participation, but initial goals were set by funders and hub leader teams, usually without extensive consultations of expected user groups, such as novice technology entrepreneurs. Ultimately, initial models served as strong guiding frameworks even if service implementations showed little variation (cf., 6.2., 6.3., and 7.2.1.).

An entrepreneur who enters an entrepreneurial environment is faced with whatever social structures hubs created before her entry (cf., 7.1.). In fact, given that much of her social learning will come from peer interactions, the entrepreneur might not actually consider that communities and ways of collaborating could look any different from how they have been shaped by hub leaders' and earlier hub participants' decisions.

This implies that practice and research ought to pay particular attention to early moments in relationship formation of entrepreneurship environments. Studies have clearly shown that historical paths of collective and interdependent entrepreneurial decision making, institu-

tion building, and social network formation can determine the development of an entrepreneurship environment for decades (Saxenian, 1994; Storper et al., 2015). More research into the role of organizations like hubs and organization-like social structures such as communities could shed further light on how location-based entrepreneurial opportunities arise.

Chapter 9 Outlook and Conclusion

In this last chapter, the thesis outlines broad directions for future research (9.1.), beyond the more specific recommendations made in the last chapter (cf., 8.2. and 8.3.). It ends by summarizing the thesis and highlighting its overarching significance (9.2.).

9.1. Future Research

The inquiry highlighted several areas which were beyond the scope of this study but could be particularly fruitful for additional research. First and foremost, the thesis makes a case that more theory is needed on the ‘layer in between’ macro-level systems or networks of entrepreneurial innovation and individual entrepreneurs or ventures at the micro-level (cf., 8.3.). Organizations like hubs represent a facilitative infrastructure that enables certain configurations of relations more than others. Boundaries are introduced that shape collaboration and interaction among entrepreneurs. Hubs and similar organizations structure the interaction of technology entrepreneurs, include and exclude actors from collaboration and coordination processes, and ultimately distribute economic opportunities (if in subtle ways). If social structures are indeed an impactful contributor to entrepreneurial activity and economic development in regions and cities (Kemeny et al., 2016; Storper et al., 2015), then we need to better understand through which organizational processes they are created, maintained, and transformed.

Such a research agenda would make important contributions to the field of economic geography. There has been growing consensus that the field has underappreciated heterogeneity among firms (Desrochers & Leppälä, 2011; Ottaviano, 2010; Taylor & Asheim, 2001), but this still leaves non-firm organizations unaccounted for. It appears that (mainstream) economic geography has not kept step with the rich organizational literature that has established the fading role of organizations with formal boundaries (e.g., firms, corporations, and bureaucracies) relative to other organizational forms with symbolic and social boundaries (Schreyögg & Sydow, 2011; Scott, 2004). This thesis shows important intersections between organizational research

and key concepts from economic geography, such as geographically concentrated knowledge creation (Howells, 2012), anchor organizations (Agrawal & Cockburn, 2003), and buzz (Bathelt et al., 2004; Storper & Venables, 2004). The thesis highlights that organizational mechanisms (such as assembly) often underlie macro-level system concepts from economic geography (cf., 8.3.2. and 8.3.4.). Much more work on such mechanisms is needed.

The thesis also demonstrated that organizational forms need to be more closely linked to processes in intermediation and incubation research. It suggested that intermediation and incubation were too widely defined and too ambiguous to discern between processes which differ in substantive ways (cf., 8.2.1. and 8.2.2.). At the same time, it showed that coordination between technology entrepreneurs and others depends on organizational processes that are more intricate than the dominant ‘networks as resource channels’ and ‘intermediaries as brokers’ perspectives (e.g., Hansen et al., 2000; Hoang & Antoncic, 2003) would suggest. For incubation research, the thesis highlighted a contradiction: despite increasing acknowledgment that entrepreneurs shape the incubation process together with incubator managers (cf., 2.3.3.), incubator typologies continue to rely on service models which assume a one-sided and controlled incubation process (cf., 2.3.2.).

Future studies can thus learn from this thesis by focusing on *differences between processes* (at a granular analytical level), not between service models, to distinguish between intermediary and incubator organizations. The thesis suggests that comparing processes could yield more meaningful typologies, which will help manage expectations about what a particular organizational form can deliver and how it should be assessed (cf., 8.4.1. and 8.4.2.).

A deeper inquiry into forms could also address ‘why’ questions which were beyond the scope of this thesis. Specifically, the question ‘why incubators exist’ is usually answered through some notion of market failure (Phan et al., 2005). The thesis included several pointers as to why hubs exist, why they exist where they exist, and why they work in particular ways.

In contrast to market failure arguments, the thesis included hints that an institutional reasoning might provide better answers to these questions. It demonstrated, for instance, that hubs, at the time of implementation, were anything but a proven, functional tool to achieve a pre-determined goal. Instead, African hubs appeared to be established based on aspirations to re-create iHub Nairobi, an ideal-typical role model for the wider organizational form ‘hubs.’ Based on this model, hub leaders and donors developed a strongly favorable view of hubs without appreciating how they might actually work in particular contexts (2.1.3). Ultimately, African hubs appeared to rarely work like iHub because local implementation realities (such as the low availability of entrepreneurs) came in the way (cf., 7.4. and 8.4.1.).

In fact, to this day, it has even remained unclear if iHub itself works as it has been imagined to work (cf., 2.1.2.). For instance, commentators noted that only few equity investments in technology startups are made in Kenya, because the hundreds of fledgling teams in the country lack the skills to develop market-ready businesses (Jorgic, 2014). A rigorous analysis if and how iHub, as an assembler, can have the widespread and transformative impacts that it envisions has not yet been conducted.

For future research, the thesis thus points to an interesting tension between an isomorphism of models versus a divergence in actualized processes across different contexts. An institutional theory lens could help capture how models get transferred and translated to different contexts (Dalpiaz & Tracey, 2013). Such a study could collect data on the timing and missions of other hub implementations, as well as the continent-wide spread of hub narratives. This could shed light on how relational ontologies and discursive patterns that define and promote organizational forms are driven by philanthropic and development organizations (Korff, Oberg, & Powell, 2015; Ruef, 1999), resulting in the diffusion of an organizational form irrespective of its impacts or service offerings. The role of local contexts could then be captured by examining

contestations and adaptations of models. For instance, the idea of local “anti-isomorphic divergence” of incubator organizations has been suggested (Kim, 2015), which raises the question under which conditions divergence or isomorphism will prevail, and how such processes happen across levels of stakeholder interactions (e.g., global vs. Africa, or African nation vs. city).

Traditional structural contingency perspectives could provide an interesting contrast to such institutional research. Structural contingency theory starts from the premise that organizations reflect the times during which they are created and the wider social structures within which they are embedded (Stinchcombe, 1965). The basic argument of contingency theory is that the design of new organizational forms is a strategic response to environmental changes (Daft & Lewin, 1993). In particular, structural contingency theory offers conceptual tools to better understand the notion of “environmental fit” (Drazin & Van de Ven, 1985), which this thesis used only in an intuitive sense (cf., 6.3. and 6.5.). It is an intriguing hypothesis that hubs (and other fluidly bounded organizational forms) have arisen because, compared to incubators, they better fit into economies which have become more entrepreneurial and dynamic rather than managerial and static (Audretsch & Thurik, 2001; Thurik, Stam, & Audretsch, 2013). Similar arguments have been made to explain the rise of networked, modular, cellular, or “unfettered” forms of organization in the 1990s and 2000s (Child & McGrath, 2001; Larson & Starr, 1993; Lechner & Dowling, 2003; R. E. Miles, Snow, Mathews, Miles, & Coleman, 1997).

It would thus be a challenging but worthwhile research agenda to examine if and how the internal structures of entrepreneurship support organizations come to reflect wider structures of digital economies or technology entrepreneurship in Africa and elsewhere. Research comparing African nations with countries in the Global North could be particularly pertinent here, building on arguments that personal and informal contacts might be even more important for African entrepreneurs than for their Western counterparts (Devine & Kiggundu, 2016; G. George, Kotha, et al., 2016).

Structural contingency, broadly defined, could also help to explain the interplay of different support organizations within the same city or region. The thesis showed instances in which implementations of hubs depended on the existence or absence of other local support organizations. Some hub leaders sought to differentiate their hub from other local hubs, while others saw their hub as one segment of a system-wide, staged support process. For instance, novice entrepreneurs were envisioned to form teams at kLab and then move on to the LaunchIT incubator to benefit from more formalized startup development services (cf., 4.1.1.2. and 4.1.2.). Hubs also played different roles in Accra compared to Kigali and Harare, as MEST in Accra was a dominant actor for technology entrepreneurship in Ghana (cf., 4.3.1 and 8.3.). Yet, empirical research and theory on how differentiation, complementation, or competition of entrepreneurship support organizations work within or across geographical contexts is currently absent, once more highlighting the bifurcated history of entrepreneurship research (cf., 2.2.3. and 8.3.1.; Thornton & Flynn, 2003).

9.2. African Hubs as Assemblers: A Promising but Misunderstood Phenomenon

African hubs are a pervasive and contested phenomenon. From about 80 hubs in 2013 (BongoHive, 2013), the tally increased to 173 in 2016 (Firestone, 2016). According to a range of international development organizations, hubs have been “helping to drive economic growth in Africa” (Kelly & Firestone, 2016) and “spearhead[ed] tech social entrepreneurship” (Hivos, 2015), thus representing “a key part of Africa’s future” (Oxford & Jeffries, 2013). Hub leaders have tried to position hubs as network infrastructures for a Pan-African digital economy, while many established technology entrepreneurs have dismissed them as an ineffective version of incubators (cf., 2.1.4).

This thesis took a step back from enthusiastically led practitioner debates, and sought to examine how hubs work through the eyes of technology entrepreneurs in African cities. The study thereby offered a grounded perspective on what is otherwise a conversation marked by

grand aspirations, self-promotion, and somewhat erratic lines of argumentation. The thesis deployed technical academic literature on intermediation and incubation to explain hubs as a dynamic and complex contemporary phenomenon.

This work answered questions about how technology entrepreneurs engage with African technology innovation hubs, and how hubs work (cf., 8.1.). It theorized hubs as *assemblers of technology entrepreneurs*. By convening, interconnecting, and activating entrepreneurs, hubs can create active entrepreneurial communities and thus transform the social structures that entrepreneurs are embedded in (cf., 8.1.2.). The theorization was necessary because neither intermediation nor incubation theory could fully explain the processes that hubs were observed to trigger. Intermediation theory captured neither the role of communities nor the creation of social structures through facilitative organizational action (cf., 8.1.4.). Incubation theory could not account for hub processes, as it assumed incubators to be formally bounded, interventionist organizations, creating or developing selected startups directly (cf., 8.1.4.).

In sum, this work showed that African hubs are not adequately represented as network infrastructures, incubators, or a generic type of intermediary. Hubs instead assemble previously distant and different technology entrepreneurs and their supporters into entrepreneurial communities. Hubs thus modify the social structures available for technology entrepreneurs in a given city, thereby reconfiguring economic opportunities (cf., 7.1.).

Yet, assembly is not a mechanistic process, and it is difficult to manage and predict (cf., 7.1. and 7.4.). The thesis problematized that hubs struggle to become ‘more than just a space.’ Co-location and co-presence (i.e., people meeting or working near each other), for instance, were rarely found to translate into coordination and collaboration (i.e., people learning from each other, working together, and integrating their efforts). Simply put, getting technology entrepreneurs in the same room seems to be a necessary, but not a sufficient condition for hubs to achieve their far-reaching goals. Hubs have to face questions such as:

- How can relationships be established and maintained through organizational actions?
- Which actor groups should technology entrepreneurs seek to form relationships with?
- How strong or weak do ties have to be to lead to innovation and entrepreneurship outcomes?
- How can an organization generate ‘energy’ (i.e., motivation, inspiration, personal concern) among groups of entrepreneurs?

In this vein, the thesis highlighted that community activation is a key mechanism which is necessary for hubs to be effective, but which is also the most difficult to complete (cf., 6.1.3., 7.1., and 7.3.). Moreover, for assembly to work, the constituent parts have to be available in local environments, which is not always the case in African cities (cf., 8.4.1.). If hubs convene only unskilled entrepreneurs and if no partners and markets for technology businesses exist in local contexts, hubs cannot by themselves generate enterprises and economic development. Hubs can be transformative only if an assembler is needed to begin with, for instance, when entrepreneurs at different levels of experience and partner organizations exist and are keen to engage with each other, but are lacking venues to do so.

Through these insights, the thesis advances intermediation and incubation studies (cf., 8.2.) as well as research on entrepreneurship support organizations located at the intersection of economic geography, entrepreneurship studies, and organization science (cf., 8.3.). The thesis also helps development organizations, African policymakers, and practitioners grasp hubs as a pervasive phenomenon (cf., 8.4.).

The larger implication for African hubs is that they cannot be expected to work like the role model case of iHub (cf., 2.1.2.). Because assembly is participation-dependent, fragile, and hard to put into practice (cf., 7.4.), hubs are often forced to abandon iHub’s vision, falling far

short of being an impactful force for technology entrepreneurship on a national scale. In fact, even the more limited outcomes that hubs achieve are difficult to measure in simple metrics (i.e., they are formally absent), which has led to disillusionment with and abandonment of the original hub idea among many hub leaders and funders (cf., 7.4.4. and 8.4.2.).

Assembly thus ultimately highlights both the potentials and limitations of hubs (cf., 8.4.). Through a grounded empirical inquiry, the thesis shows that a rhetorical positioning of hubs as the “future of Africa” (Oxford & Jeffries, 2013; Wakoba, 2014) is certainly overblown. As iHub and The Hub London have demonstrated, hubs can be transformative or inspirational (cf., 2.1.1 and 2.1.2.). Yet, not every hub in every context will achieve such results, because *hubs are facilitators and not creators* of interactive or collaborative entrepreneurial value creation. As assemblers, hubs depend on the active participation of their constituents and on a good fit with their local environments.

For scholars, assembly is an intriguing process where social structures of technology entrepreneurship are created through dynamic and environmentally contingent organizational action. For practitioners, assembly illustrates ways to go beyond the hype and buzzwords, understanding opportunities and limits of hubs. As hubs continue to proliferate throughout Africa and other emerging markets, it will be important to take the lessons of assembly to heart: hubs are a unique organizational form with much promise especially for low-income contexts, but they also face inherent tensions and can only work with what is available in any given city.

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Annex

Annex A: Reports and Media Mentions of African Hubs, 2012-2015

Source	Title	Organization	Date of publication	Scope (geography, hubs)
Reports				
Moraa, 2012	*iHub_Model: Understanding the Key Factors of the iHub Model	iHub Research	2012	Kenya
Mwangi & Moraa, 2012	The Impact of ICT Hubs on African Entrepreneurs: A Case Study of iHub (Nairobi)	iHub Research	2012	Kenya
Baird, Bowles, & Lall, 2013	Bridging the “Pioneer Gap”: The Role of Accelerators in Launching High-Impact Enterprises	ASPEN	2013	Global
Gathege & Moraa, 2013	Draft Report On Comparative Study On Innovation Hubs Across Africa	iHub Research	2013	12 hubs in African capital cities
GIZ, 2013	Technology Hubs--Creating space for change: Africa's technology innovation hubs	GIZ	2013	Predominantly Kenya, Ethiopia
Koltai, Mallet, & Muspratt, 2013	Ghana Entrepreneurship Ecosystem Analysis	Koltai & Company, UKAID/DFID	2013	Ghana, incl. Hub Accra & iSpace
Friederici, 2014	The Business Models of mLabs and mHubs: An Evaluation of infoDev's Mobile Innovation Support Pilots	infoDev, World Bank	2014	Kenya, South Africa
Drouillard, Taverner, Williamson, & Harris, 2014	Digital Entrepreneurship in Kenya 2014	GSMA	2014	Kenya, Nairobi-based hubs
infoDev & CAD, 2014	Do mLabs Make a Difference? A Holistic Outcome Assessment of infoDev's Mobile Entrepreneurship Enablers	infoDev, World Bank	2014	Kenya, South Africa
Marchant, 2015	Who is ICT Innovation For Challenges to Existing Theories of Innovation, a Kenyan Case Study	Center for Global Communication Studies, University of Pennsylvania	2015	Kenya

Table 14: Reports discussing African hubs between 2012 and 2015

Author	Title	Medium, website	Date of publication	Geographical scope
Magazine articles and blog posts about hubs in general audience media				
Katharine Gammon	A New Silicon Valley? Tech Hubs Spring Up In Africa	Fast Company Exist	02-Apr-12	Africa
Erik Hersman	From Kenya to Madagascar: The African tech-hub boom	BBC.co.uk	20-Jul-12	Africa
Geraldine de Bastion	Innovation hubs drive development in Africa	Alumni Portal Deutschland	Oct-13	Africa
Javier Espinoza	African Tech Hubs and Funds Hope to Bridge the Digital Divide	The Wall Street Journal, Frontiers	29-Apr-14	Africa
Kathleen Caulderwood	From The “Silicon Cape” To The “Silicon Savannah,” African Tech Hubs Are Booming	International Business Times	04-May-14	Africa
Jonathan Kalan	Inside East Africa’s technology hubs	BBC.com	18-Nov-14	East Africa
n/a	Homes for Africa’s tech entrepreneurs	The Economist	12-Mar-15	Africa
Sophie Mongalvy	Inside the African Tech Hub Rising in Nairobi	Bloomberg Business	30-Jul-15	Kenya
Trevor Analo	Is Nairobi no longer the innovation hub of Africa?	The East African	02-Sep-15	Africa
Curt Hopkins	How Africa grew more than 200 local tech scenes	The Daily Dot	05-Oct-15	Africa
Posts on technology- and entrepreneurship-oriented blogs				
n/a	Listing the African Tech Hubs	OAfrica	27-Apr-11	Africa
Brenda Zulu, Prue Goredema	Technology hubs charting new ground	eLearning News	25-Apr-12	Africa
Geraldine de Bastion	Technology Hubs in Africa: A New Culture of Community Driven Innovation?	Digital Development Debates	09-Nov-12	Africa
Jonathan Kalan	Inside East Africa's Tech Hubs Part 2: Culture	Wamda	14-Mar-13	Africa
Adam Oxford, Duncan Jefferies	Why tech hubs are a key part of Africa's future	Green Futures Magazine	03-Jul-13	Africa
Hilary Heuler	Hub life: Africa's techies have found a model to bring together local startups and Western capital	ZD Net	06-Jan-15	Africa
Bolade Popoola	Impact Hub’s Resilience Africa To Launch New Incubators	Tech Cabal	17-Jan-15	Africa
Tayo Akinyemi	11 key lessons for innovation hubs in Africa	VC4Africa	30-Mar-15	Africa

Author	Title	Medium, website	Date of publication	Geographical scope
n/a	10 Hubs, Incubators and Accelerators for African Startups	She.Leads.Africa.	13-Apr-15	Africa
Ronda Zelezny-Green	Does innovation matter for the Global South?	Panoply Digital	20-Apr-15	Africa
Evans Kidero	Why Nairobi is Africa's most successful ICT hub	iHub	04-Jul-15	Africa
Jake Bright, Aubrey Hruby	The Rise Of Silicon Savannah And Africa's Tech Movement	TechCrunch	23-Jul-15	Africa
Loren Treisman	The Long Road to Stimulating Tech Innovation in Africa	Huffpost Tech, UK	02-Sep-15	Africa
Jovago.com	The Importance Of Innovation Hubs In Africa	Modern Ghana	06-Oct-15	Africa
n/a	Start Up Nation: Africa's Hubs, Incubators and Accelerators	Ijinle Africa	n/a	Africa
n/a	Technology hubs alone will not create the jobs needed for Africa's youth	Quartz	n/a	Africa
Blog posts by funder, support organizations				
Matt O'Reilly	Africa's Tech Hubs	Indigo Trust	06-Sep-12	Africa
Tayo Akinyemi	Engaging African Tech Hubs in the Search for Digital Jobs	The Rockefeller Foundation	18-Dec-14	Africa
Ian Scoones	Steps Africa Sustainability Hub Launched in Nairobi	Steps Centre	10-Jun-15	Kenya
Beatrice Pembroke	A global hub for new ideas: African enterprise takes centre stage	British Council	26-Jul-15	Africa
Kudzai M Mubaiwa	The case for Business Incubators and Innovation Hubs	Lions Africa	31-Aug-15	Africa
Tim Kelly	Tech hubs across Africa: Which will be the legacy-makers?	World Bank	30 Apr 2014 (updated Sep 2015)	Africa
Posts on personal & other blogs				
Rauf Aregbesola	2014 LSE Africa Summit: Africa tech hubs – A tale of hope or hype?	LSE, Africa at LSE	05-Mar-14	Africa
Chris Hanyane	Innovation, start-ups and Tech Hubs in Africa	LinkedIn	27-Aug-14	Africa
Jonathan Kalan	Inside Africa's Hubs	Kalan	n/a	Africa

Note: Online key word search was conducted on 26 October 2015, using the key words “Africa hubs” and reviewing the first 150 results.

Table 15: Blog posts and online articles discussing African hubs between 2012 and 2015

Annex B: Comparison of Role Model Hubs and Practitioner Expectations

Feature	The Hub London / Impact Hub	iHub Nairobi	Ideal type hub	Network infrastructure expectation	Incubator expectation	Network infrastructure vs. ideal-type hub	Incubator expectation vs. ideal-type hub vision	Network infrastructure vs. incubator expectation
Vision								
Original vision Why “hub”?	Original goal was to connect people with ideas within London. Later, connecting people with similar agendas from across the world.	Original goal was to connect tech community within Nairobi. “Nerve center.” People can dip in and out of. Later, connecting locals with foreigners and expats.	Connecting people locally within a city and beyond the city to within a field of entrepreneurial activity. Central connection point.	Connecting people locally within a city and beyond the city to a regional or international field of entrepreneurial activity. Central connection point.	Not specified	Same	Not specified	Not specified
Hubs as new or different organizational form?	Not like other organizations. “Borrow from the best.” Combination of incubators, accelerators, coworking spaces, think tanks.	Not like other organizations. Combination of incubators, coworking space, community center, venture capital broker.	Not like other organizations. Combining elements from other forms such as incubators and coworking spaces.	Not like other organizations	Like incubators	Same	Different (contrary)	Different (contrary)
Infrastructure, services								
Activities?	Hub facilitates through hosting (welcoming procedure, events)	Hub facilitates through community management (facilitating interactions, events)	Networking events and other efforts to let members interact with each other	Networking events and other efforts to let members interact with each other	Not specified	Same	Not specified	Not specified

Feature	The Hub London / Impact Hub	iHub Nairobi	Ideal type hub	Network infrastructure expectation	Incubator expectation	Network infrastructure vs. ideal-type hub	Incubator expectation vs. ideal-type hub vision	Network infrastructure vs. incubator expectation
Value creation & addition process?	Ecosystem of resources, inspiration, and collaboration opportunities	Innovation ecosystem in a box	“Ecosystem” (generative interdependence of elements)	Not specified	Not specified	Not specified	Not specified	Not specified
Space	“Collaborative environment,” particular spatial design to encourage people to interact	“Community:” grassroots, hub is “blank canvas,” member-led governance	Open coworking space. Encouraging people to interact.	Open coworking space. Encouraging people to interact.	Open coworking space. Encouraging people to interact.	Same	Same	Same
Space constraints	Not specified	Inspired by coworking spaces in Global North, but requiring variable setup, cheap and flexible	n/a	Not specified	Not specified	Not specified	Not specified	Not specified
People and relations								
Governance	“Community:” grassroots, “self-generating,” member-led governance	“Community:” grassroots, hub is “blank canvas,” member-led governance	“Community:” member-led governance	Hub creates, nurtures, enables community	Not specified	Different (contrary)	Not specified	Not specified
Commonalities among participants?	“Community,” like-mindedness, higher cause (social impact), motivation, inspiration	“Community,” like-mindedness, common cause (techies)	“Community:” like-mindedness & cause	Not specified	Not specified	Not specified	Not specified	Not specified

Feature	The Hub London / Impact Hub	iHub Nairobi	Ideal type hub	Network infrastructure expectation	Incubator expectation	Network infrastructure vs. ideal-type hub	Incubator expectation vs. ideal-type hub vision	Network infrastructure vs. incubator expectation
Common cause of members? How are members referred to?	Social impact, social change Social innovators, change agents	Technology “Techies,” tech entrepreneurs	n/a	(Both) Social impact, social change Social innovators, change agents. Technologists, “techies,” tech entrepreneurs	Not specified	Same (combination)	Not specified	Not specified
Differences of participants?	Diverse people who would not meet outside the hub	Diverse stakeholders of tech community who would not meet outside the hub	“Diversity;” heterogeneity of interacting participants	“Diversity;” heterogeneity of interacting participants	Not specified	Same	Not specified	Not specified
Membership	Openness, everyone with interest in social innovation	Openness, everyone in tech community	Openness, everyone with a particular shared interest	Openness, everyone with a particular shared interest	Selection or self-selection, particularly of incapable entrepreneurs	Same	Different (contrary)	Different (contrary)
Mode of interaction	Networking. Serendipity.	Networking. Engineering serendipity; “by putting a lot of smart people in one room, innovations emerge”	Networking. Serendipitous encounters.	Networking. Serendipitous encounters.	Not specified	Same	Not specified	Not specified
Content of interaction	Inspiration, knowledge, experience	Knowledge sharing	Flows of knowledge and meaning	Flows of knowledge and meaning	Not specified	Same	Not specified	Not specified

Feature	The Hub London / Impact Hub	iHub Nairobi	Ideal type hub	Network infrastructure expectation	Incubator expectation	Network infrastructure vs. ideal-type hub	Incubator expectation vs. ideal-type hub vision	Network infrastructure vs. incubator expectation
Groups beyond entrepreneurs & innovators?	Mentors, partners, peers, investors	Technology community, industry, academia, investors and venture capitalists	n/a	(Both) Mentors, partners, peers, investors. Technology community, industry, academia, investors and venture capitalists	Mentors, partners, peers, investors. Technology community, industry, academia, investors and venture capitalists.	Same (combination)	Same (combination)	Same
International ties?	Not specified	Exposure to tech luminaries from the Global North, West	n/a	(iHub) Exposure to tech luminaries from the Global North, West	Not specified	Same (iHub)	Not specified	Not specified
Context								
Nature of local context?	Urban (unspecific)	Africa-specific, African needs (e.g., monetary constraints, no bandwidth at home)	n/a	(iHub) Africa-specific, African needs (e.g., monetary constraints, no bandwidth at home)	Not specified	Same (iHub)	Not specified	Not specified
Boundaries, relation to local context	Not specified	Hub-community blends in with tech community, local tech ecosystem	n/a	(iHub) Hub-community blends in with tech community, local tech ecosystem	Not specified	Same (iHub)	Not specified	Not specified

Feature	The Hub London / Impact Hub	iHub Nairobi	Ideal type hub	Network infrastructure expectation	Incubator expectation	Network infrastructure vs. ideal-type hub	Incubator expectation vs. ideal-type hub vision	Network infrastructure vs. incubator expectation
Contribution to local context?	Not specified	Looking for gaps in the local “business ecosystem” and trying to fill them	n/a	(iHub) Looking for gaps in the local “business ecosystem” and trying to fill them	Not specified	Same (iHub)	Not specified	Not specified
Wider context	Not specified	Not specified	n/a	Embedding within Africa-wide or global “knowledge economy” or “digital economy”	Not specified	Different (added)	Not specified	Not specified
Relation to other infrastructure	Not specified	Not specified	n/a	Blend with Africa’s ICT infrastructure	Not specified	Different (added)	Not specified	Not specified
Outcomes								
Ultimate goals, mission	Creating, developing, facilitating social enterprise and innovation	Creating, developing, facilitating technology enterprise and innovation	Creating, developing, facilitating enterprise and innovation	Creating, developing, facilitating enterprise and innovation	Creating, developing, facilitating enterprise and innovation	Same	Same	Same
Immediate, concrete goal	Not specified	Not specified	n/a	Not specified	Startups created/developed and their success	Not specified	Different (new)	Not specified

Feature	The Hub London / Impact Hub	iHub Nairobi	Ideal type hub	Network infrastructure expectation	Incubator expectation	Network infrastructure vs. ideal-type hub	Incubator expectation vs. ideal-type hub vision	Network infrastructure vs. incubator expectation
Types of entrepreneurship, or innovation?	Social innovation	Home-grown software enterprises. African innovations. Mobile apps and software, “mobile first”	n/a	(Both) Social innovation. Home-grown software enterprises. African innovations. Mobile apps and software, “mobile first.”	Not specified	Same (combination)	Not specified	Not specified
Intermediate outcome	Not specified	Skill building, learning for young graduates	n/a	Not specified	Not specified	Not specified	Not specified	Not specified
Ultimate and broader goals	Impact, innovation, change, social enterprise	Local economic development. Local, national, and regional level effects	Wider positive impact beyond hub	Wider positive impact beyond hub	Not specified	Same	Not specified	Not specified

Note: “Ideal type hub” column indicates “n/a” when The Hub London and iHub Nairobi differed substantively.

Table 16: Comparison of The Hub London vision, iHub vision, network infrastructure expectation, and incubator expectation of hubs

Annex C: Interview Guide

[Primer if participant is not an entrepreneur] Think of innovators and entrepreneurs that are in the process of designing and marketing mobile applications, or that have just made an Internet or mobile application available in the market.

1. Which actors do you/these entrepreneurs interact with?
2. What do the actors that entrepreneurs engage with contribute to your/tech entrepreneurs' venture or project? How do they contribute?
3. How important is the role of 'networks' and professional networking with peers and supporting actors for you/entrepreneurs?
4. Networking with which other groups is the most important for you/tech entrepreneurs?

[If participant has not mentioned hub independently] Now think of organizations like LOCALHUB.

5. What role do these organizations play for you/tech entrepreneurs?
6. What makes these organizations 'hubs'? What is it that they do at their core? What is the core function that they have that other organizations do not fulfill?
7. How important is the hubs' role in brokering connections to others?
8. Which other supporting actor groups do innovation hubs broker contacts to for you/tech entrepreneurs?
9. How do hubs broker or facilitate connection to other supporting actors or actor groups for you/tech entrepreneurs?

[If additional time was available]

10. How does the entrepreneurship environment in LOCALCITY look like? What are challenges and opportunities? How does this influence the work of entrepreneurs? How does it influence what hubs do?

Annex D: Hub Participation Patterns

Partici- pant	Case study	Hub asso- ciated with	Startup maturity status	Kno ws of hub(s)	Partic- ipates in hub events	Goes to the hub for net- work- ing	Interacts with hub manager / staff, board	Has worked out of the hub in the past	Works out of hub at least oc- casion- ally	Works out of hub regu- larly	Receives mentor- ing / training at hub	Others iden- tify them with hub	Men- tors peers occa- sionall y	Runs activi- ties, events at the hub	Men- tors peers regu- larly	De- gree of hub partic- ipation
Kernels of communities																
Kigali Entr #1*	Ki- gali	kLab	Stable	y	y	y	y	y	y	y	y	y	y		y	11
Kigali Entr #12	Ki- gali	The Office	Novice	y	y	y	y	y	y		y	y		y	y	10
Kigali Entr #2	Ki- gali	kLab	Recent Launch	y	y	y	y	y	y	y		y	y	y		10
Kigali Entr #11	Ki- gali	kLab	Recent Launch	y	y	y	y	y	y			y	y	y	y	10
Harare Entr #2	Ha- rare	Hy- per- cube	Recent Launch	y	y	y	y	y	y	y		y	y	y		10
Kigali Entr #14	Ki- gali	The Office	Stable	y	y	y	y	y	y	y		y		y	y	10
Accra Entr #13	Ac- cra	Hub Accra	Novice	y	y	y	y	y	y	y	y	y				9
Kigali Startup Em- ployee #3	Ki- gali	kLab	Stable	y	y	y		y	y	y			y	y	y	9
Kigali Entr #3	Ki- gali	kLab	Stable	y		y	y	y	y	y	y	y	y			9

Partici- pant	Case study	Hub asso- ciated with	Startup maturity status	Kno ws of hub(s)	Partic- ipates in hub events	Goes to the hub for net- work- ing	Interacts with hub manager / staff, board	Has worked out of the hub in the past	Works out of hub at least oc- casional- ly	Works out of hub regu- larly	Receives mentor- ing / training at hub	Others iden- tify them with hub	Men- tors peers occasional- ly	Runs activi- ties, events at the hub	Men- tors peers regu- larly	De- gree of hub partic- ipa- tion
Apprentices																
Kigali Entr #9	Ki- gali	kLab	Novice	y	y	y	y	y	y	y	y					8
Kigali Entr #13	Ki- gali	kLab	Novice	y	y	y	y	y	y	y	y					8
Kigali Entr #23	Ki- gali	kLab	Novice	y	y	y	y	y	y	y	y					8
Kigali Entr #24	Ki- gali	kLab	Novice	y	y	y	y	y	y	y	y					8
Kigali Startup Em- ployee #1	Ki- gali	kLab	Novice	y	y	y	y	y	y	y	y					8
Kigali Startup Em- ployee #2	Ki- gali	kLab	Novice	y	y	y	y	y	y	y	y					8
Kigali Startup Em- ployee #4	Ki- gali	kLab	Novice	y	y	y	y	y	y	y	y					8
Kigali Entr #20	Ki- gali	The Office	Recent Launch	y		y	y	y	y	y		y		y		8
Harare Entr #4	Ha- rare	Muz- inda	Recent Launch	y	y	y	y	y	y		y	y				8
Harare Entr #5	Ha- rare	Muz- inda	Recent Launch	y	y	y	y	y	y		y	y				8

Partici- pant	Case study	Hub asso- ciated with	Startup maturity status	Kno ws of hub(s)	Partic- ipates in hub events	Goes to the hub for net- work- ing	Interacts with hub manager / staff, board	Has worked out of the hub in the past	Works out of hub at least oc- casion- ally	Works out of hub regu- larly	Receives mentor- ing / training at hub	Others iden- tify them with hub	Men- tors peers occa- sionall y	Runs activi- ties, events at the hub	Men- tors peers regu- larly	De- gree of hub partic- ipa- tion
Accra Entr #8	Ac- cra	iSpac e	Stable	y	y	y	y	y				y	y	y		8
Kigali Entr #8	Ki- gali	kLab	Novice	y	y	y	y	y	y	y						7
Kigali Entr #4	Ki- gali	kLab	Novice	y		y	y	y	y	y	y					7
Harare Entr #8	Ha- rare	Hy- per- cube	Novice	y	y	y	y	y	y		y					7
Accra Entr #17	Ac- cra	Hub Accra	Novice	y	y	y	y	y	y			y				7
Accra Entr #18*	Ac- cra	Hub Accra	Novice	y	y	y	y	y	y			y				7
Accra Startup Em- ployee #4*	Ac- cra	Hub Accra	Novice	y	y	y	y	y	y			y				7
Kigali Entr #17	Ki- gali	kLab	Recent Launch	y	y	y	y	y	y	y						7
Kigali Entr #16	Ki- gali	kLab	Recent Launch	y			y	y	y	y			y		y	7
Kigali Entr #5	Ki- gali	kLab	Recent Launch	y	y	y	y	y					y		y	7
Harare Entr #10	Ha- rare	Hy- per- cube	Recent Launch	y	y	y	y	y	y				y			7

Partici- pant	Case study	Hub asso- ciated with	Startup maturity status	Kno ws of hub(s)	Partic- ipates in hub events	Goes to the hub for net- work- ing	Interacts with hub manager / staff, board	Has worked out of the hub in the past	Works out of hub at least oc- casional- ly	Works out of hub regu- larly	Receives mentor- ing / training at hub	Others iden- tify them with hub	Men- tors peers occasional- ly	Runs activi- ties, events at the hub	Men- tors peers regu- larly	De- gree of hub partic- ipa- tion
Harare Entr #14	Harare	Muzinda	Recent Launch	y	y		y	y	y		y	y				7
Kigali Entr #10	Kigali	kLab	Novice	y			y	y	y	y	y					6
Harare Startup Em- ployee #1	Harare	Hypercube	Novice	y	y	y		y	y		y					6
Harare Startup Em- ployee #2	Harare	Hypercube	Novice	y	y	y		y	y		y					6
Harare Entr #13	Harare		Recent Launch	y	y	y	y				y	y				6
Networkers																
Accra Est Entr #2	Accra		Advanced	y	y		y						y	y		5
Kigali Entr #7	Kigali	kLab	Novice	y	y	y	y	y								5
Kigali Entr #6	Kigali	kLab	Recent Launch	y		y	y	y	y							5
Kigali Entr #15	Kigali	kLab	Recent Launch	y	y	y	y						y			5
Harare Entr #1	Harare	Hypercube	Stable	y	y	y			y				y			5

Partici- pant	Case study	Hub asso- ciated with	Startup maturity status	Kno ws of hub(s)	Partic- ipates in hub events	Goes to the hub for net- work- ing	Interacts with hub manager / staff, board	Has worked out of the hub in the past	Works out of hub at least oc- asion- ally	Works out of hub regu- larly	Receives mentor- ing / training at hub	Others iden- tify them with hub	Men- tors peers occa- sionall y	Runs activi- ties, events at the hub	Men- tors peers regu- larly	De- gree of hub partic- ipa- tion
Kigali Est Entr #3	Ki- gali		Advanced	y	y	y	y									4
Kigali Est Entr #1	Ki- gali	kLab	Advanced	y		y	y						y			4
Kigali Entr #18	Ki- gali	kLab	Novice	y	y	y		y								4
Kigali Entr #21	Ki- gali		Novice	y	y	y	y									4
Accra Entr #6	Ac- cra		Novice	y	y	y	y									4
Kigali Entr #22	Ki- gali	kLab	Recent Launch	y	y	y	y									4
Accra Entr #3	Ac- cra		Recent Launch	y	y	y	y									4
Accra Startup Em- ployee #3	Ac- cra		Recent Launch	y	y	y	y									4
Accra Entr #10	Ac- cra		Stable	y	y	y	y									4
Accra Entr #14	Ac- cra		Stable	y	y	y	y									4
Harare Entr #6	Ha- rare		Novice	y	y	y										3
Accra Entr #16	Ac- cra		Recent Launch	y	y	y										3

Partici- pant	Case study	Hub asso- ciated with	Startup maturity status	Kno ws of hub(s)	Partic- ipates in hub events	Goes to the hub for net- work- ing	Interacts with hub manager / staff, board	Has worked out of the hub in the past	Works out of hub at least oc- casional- ly	Works out of hub regu- larly	Receives mentor- ing / training at hub	Others iden- tify them with hub	Men- tors peers occa- sional- ly	Runs activi- ties, events at the hub	Men- tors peers regu- larly	De- gree of hub partic- ipa- tion
Accra Entr #2	Ac- cra		Stable	y	y		y									3
Harare Est Entr #3	Ha- rare		Advanced	y	y											2
Accra Est Entr #8	Ac- cra		Advanced	y			y									2
Harare Entr #7	Ha- rare		Novice	y	y											2
Accra Entr #9	Ac- cra		Recent Launch	y	y											2
Harare Entr #9*	Ha- rare		Stable	y	y											2
Harare Entr #11	Ha- rare		Stable	y	y											2
Accra Entr #4	Ac- cra		Stable	y		y										2
Accra Startup Em- ployee #2	Ac- cra		Stable	y	y											2
Kigali Est Entr #2	Ki- gali		Advanced	y												1
Harare Est Entr #1	Ha- rare		Advanced	y												1

Partici- pant	Case study	Hub asso- ciated with	Startup maturity status	Kno ws of hub(s)	Partic- ipates in hub events	Goes to the hub for net- work- ing	Interacts with hub manager / staff, board	Has worked out of the hub in the past	Works out of hub at least oc- casion- ally	Works out of hub regu- larly	Receives mentor- ing / training at hub	Others iden- tify them with hub	Men- tors peers occa- sionall y	Runs activi- ties, events at the hub	Men- tors peers regu- larly	De- gree of hub partic- ipa- tion
Accra Est Entr #1	Ac- cra		Advanced	y												1
Accra Est Entr #3	Ac- cra		Advanced	y												1
Accra Est Entr #4	Ac- cra		Advanced	y												1
Accra Est Entr #5	Ac- cra		Advanced	y												1
Accra Est Entr #6	Ac- cra		Advanced	y												1
Accra Est Entr #7	Ac- cra		Advanced	y												1
Accra Entr #15	Ac- cra		Novice	y												1
Accra Entr #19	Ac- cra		Novice	y												1
Accra Entr #7	Ac- cra		Recent Launch	y												1
Accra Entr #5	Ac- cra		Stable	y												1
Accra Entr #11	Ac- cra		Stable	y												1

Partici- pant	Case study	Hub asso- ciated with	Startup maturity status	Kno ws of hub(s)	Partic- ipates in hub events	Goes to the hub for net- work- ing	Interacts with hub manager / staff, board	Has worked out of the hub in the past	Works out of hub at least oc- casional- ly	Works out of hub regu- larly	Receives mentor- ing / training at hub	Others iden- tify them with hub	Men- tors peers occa- sional- ly	Runs activi- ties, events at the hub	Men- tors peers regu- larly	De- gree of hub partic- ipa- tion
Accra Entr #12	Ac- cra		Stable	y												1
Harare Est Entr #2	Ha- rare		Advanced													0
Kigali Entr #19	Ki- gali		Novice													0
Accra Entr #1	Ac- cra		Recent Launch													0
Accra Startup Em- ployee #1	Ac- cra		Stable													0
			Count Ki- gali	30	22	27	27	24	21	18	12	7	9	6	7	
			Count Harare	18	15	11	7	10	11	3	8	7	4	1	0	
			Count Accra	29	15	12	13	5	4	1	1	5	2	2	0	
			Total	77	52	50	47	39	36	22	21	19	15	9	7	
			% of par- ticipants in Kigali	97%	71%	87%	87%	77%	68%	58%	39%	23%	29%	19%	23%	

Partici- pant	Case study	Hub asso- ciated with	Startup maturity status	Kno ws of hub(s)	Partic- ipates in hub events	Goes to the hub for net- work- ing	Interacts with hub manager / staff, board	Has worked out of the hub in the past	Works out of hub at least oc- casion- ally	Works out of hub regu- larly	Receives mentor- ing / training at hub	Others iden- tify them with hub	Men- tors peers occa- sionall y	Runs activi- ties, events at the hub	Men- tors peers regu- larly	De- gree of hub partic- ipa- tion
			% of par- ticipant in Harare	95%	79%	58%	37%	53%	58%	16%	42%	37%	21%	5%	0%	
			% of par- ticipant in Accra	94%	48%	39%	42%	16%	13%	3%	3%	16%	6%	6%	0%	
			% of total partici- pants	95%	64%	62%	58%	48%	44%	27%	26%	23%	19%	11%	9%	

Note: * indicates entrepreneurs who have been features in vignettes of chapter 6.

Table 17: Hub participation of interviewed entrepreneurs and startup employees

Annex E: Comparison of Technology and Entrepreneurship Hub

	Technology hub	Entrepreneurship hub
Case studies with the pattern	kLab, Hypercube Hub, Muzinda Hub, iSpace	The Office, Hub Accra
Case study most closely resembling the pattern	kLab	The Office
Initial model		
Role model	iHub	Impact Hub
Vision	Collaboration of technology entrepreneurs generates innovation & economic development.	Impactful ideas & successful businesses are created when entrepreneurs are empowered & inspired.
Mission	Product development. Turning individuals with ideas into technology startup teams. Skill development.	Convening & coordinating diverse sectors. Bridging creative silos. Inspiring & celebrating entrepreneurs.
Intended services	Team building. Mentor & investor matching. Facilitating peer mentoring & learning. Brokering opportunities.	Frequent & diverse events. Creating an environment conducive to creativity. Enabling serendipitous interaction.
Organizational action		
Services	Open work space. Ad hoc trainings. Ad hoc mentorship by hub leaders & their contacts. Team building and prototyping events (hackathons, Startup Weekends).	Open work space. Welcoming & introductions. Networking and inspirational events (happy hours, movie nights, entrepreneur showcases, motivational speeches).
Hub spaces	Social enclosure for collaboration (teams and individuals working on technology startups). Locational fix point for technologists.	Locational fix point for entrepreneurs seeking to meet and network with other entrepreneurs.
Symbolization	‘Place for technology’ in a given city	‘Place for entrepreneurship’ in a given city
Participation of entrepreneurs		
Who participates?	Technology entrepreneurs: software developers with product ideas, seeking technical knowledge.	Entrepreneurs: individuals with business ideas, seeking to interact with other entrepreneurs or ‘creatives’
Which entrepreneurs participate how much?	Core: Novice or stable; advanced if having grown within core. Periphery: any level.	Core: Novices without a permanent office. Periphery: any level.
Participation of supporting actors		
Who participates?	Technical mentors. Organizations and advanced entrepreneurs seeking to access software developers. Organizations seeking to support technology entrepreneurs.	Organizations and individuals seeking to support entrepreneurs.
Which supporting actors participate how much?	Core: selected mentors working with technology entrepreneurs. Periphery: all others.	Core: selected organizations and individuals co-located with the hub. Periphery: all others.
Social-structural outcomes		
Content of interactions in core	Peer mentoring. Socialization: how to be a technology entrepreneur; how to ‘build tech startups’ (Lean Startup, etc.). Specialized and technical	Socialization: how to be an entrepreneur; why it is desirable to be an entrepreneur. No hierarchies as an ideal, while active members are often recognized as leaders.

	Technology hub	Entrepreneurship hub
	knowledge exchanges. Role divisions and hierarchies of expertise.	
Content of interactions in periphery	Instrumental knowledge exchange and networking. Exposure to technology topics.	Instrumental knowledge exchange and networking. Inspiration, awareness, motivation, sense of possibility.
State of stability, mission achievement	Active core community, supported by active peripheral community.	Active peripheral community.
Typical pitfalls for leaders	Unclear how to activate core communities. Balancing of core and peripheral community activation.	Emphasis on peripheral community leads to neglect of core community.
Adaptations by leaders		
Concerns for leaders	Core community is not active because of low participation. Core community is not active because of high but inconsistent participation. Hub cannot point to successful technology startups it 'created.'	Supporting organizations only provide ad hoc support (incl. funding). Other local entrepreneurship support organizations not willing to support the hub.
Proposed adaptation	Move towards tiered system. 'Process' and 'structure.' Soft selection mechanisms. Adopting incubation-like model. Abandoning 'hub' model.	Increase level of activity by running more events to show scale and reach. 'Collaborate by example' with other support organizations.

Table 18: Technology hub and entrepreneurship hub as organizational patterns