THE RISE OF NEW MODELS OF START-UP SUPPORT: HOW MAKERSPACES, HACKATHONS, AND START-UP COMPETITIONS INFLUENCE ENTREPRENEURSHIP

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Abstract

This thesis explores the phenomena of makerspaces, hackathons, and start-up competitions, which have become more widespread throughout the past decade in many entrepreneurial ecosystems around the world. These organisations aim for supporting founders and start-ups through the development of ideas and innovations, venture teams, or legitimacy among others. The main objective of this thesis is to empirically investigate the resources and processes of makerspaces, hackathons, and start-up competitions and analyse how founders utilize these resources for the development of their ventures. The thesis applies abductive methods, based on interview and social media data that allow in-depth insights into experiences and perceptions of both supported founders and the management of start-up support. The first paper compares these start-up support models with business incubators and accelerators and analyses their competing and complementary functions as organisational sponsors (Amezcua et al., 2013). The second paper explores how founders in makerspaces, hackathons, and start-up competitions utilize resources. This lens also enables analysing how these models of support can mitigate founders' limitations to accurately collect and evaluate information. The analysis sheds light on the mitigation of founders' bounded rationality (Gavetti et al., 2007; March & Simon, 1958) in new models of start-up support (cf. Cohen et al., 2018). The third paper explores how founders in makerspaces, hackathons, and accelerators deal with uncertainty and how mechanisms of uncertainty coping correspond with principles of creational entrepreneurial methods such as the lean start-up methodology (Alvarez & Barney, 2007; Gans et al., 2019; Sarasvathy, 2001). Overall, findings suggest that these models of start-up support offer significant complementary functions to founders in entrepreneurial ecosystems. The results also indicate that makerspaces, hackathons, and start-up competitions can mitigate bounded rationality through opportunity structures that support experimentation and playful learning. This thesis further shows how perceptions of uncertainty and respective coping mechanisms differ significantly across support models. The findings result in a model of sequencing of support and uncertainty coping mechanisms. It offers an approach to address the fit of support models with start-ups in different development stages. The thesis contributes to practice in offering insights and suggestions for start-ups, support management, and policymakers on issues such as the design and selection of support models, the improvement of support processes, and alternatives for effective entrepreneurship policies.

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I, Paul Sterzenbach, declare that no portion of the work referred to in this thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning. The overall content of all three papers has been produced by the first author (Paul Sterzenbach) and the co-authors took advisory roles to ensure that standards of coherence, methods, structure, and writing are met.

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INTRODUCTION TO THE THESIS

In the UK and many other countries, the majority of start-ups do not survive their early stages of development. In fact, while more than 50% of start-ups in the UK cross the three years survival threshold, less than 7% of start-ups are able to scale up their operations significantly to secure long term survival (FT, 2017; ONS, 2017). Increasing the performance of start-ups and, in turn, securing their survival is the common goal of investors, governments, and founders themselves. Many support mechanisms for start-ups have become established instruments for pursuing this goal. These do not only concern the direct increase of performance or of survival of start-ups but also aim for the mere increase of founding numbers and other entrepreneurial activities.

Support for start-ups that aims for direct or indirect improvement of venture activities is embedded into entrepreneurial ecosystems. While the notion of 'ecosystems' has been used in many contexts (Goswami et al., 2018)[1], entrepreneurial ecosystems provide the frame for different institutions of start-up support that can connect founders and start-ups with different support mechanisms and resources. Looking at entrepreneurship and start-up support through an ecosystem-perspective allows reflecting on the dynamic actions and interactions in the entrepreneurial process (Goswami et al., 2018) and thus in the process of start-up support. Entrepreneurial ecosystems have been defined as "…*a set of interconnected entrepreneurial actors...institutions...and entrepreneurial processes which formally and informally coalesce to connect, mediate, and govern the performance within the local entrepreneurial environment*" (Mason and Brown, 2014, p. 5). This definition includes a variety of dimensions that are worth investigating from different perspectives. First, 'entrepreneurial actors' concern founders and start-ups themselves (and potentially

[1]E.g. business ecosystems (Moore, 1993), innovation ecosystems (Autio & Thomas, 2014), regional entrepreneurial ecosystems (Ács et al., 2014).

individuals in pre-nascent venture phases). They define, influence, and implement entrepreneurial processes, seek resources, as well as become resource providers for other start-ups themselves. Secondly, there are different institutions involved in entrepreneurial ecosystems which connect the various actors. Examples for institutions that support entrepreneurial actors are universities, business incubators, governmental agencies (Etzkowitz, 2008), and, more recently, also accelerators (Goswami et al., 2018; Cohen & Hochberg, 2014). We know that these institutions can offer support for start-ups in different ways (e.g. Pauwels et al., 2015). However, their diversity has increased significantly over the last decades. While business incubators have been a traditional institution to provide support to start-ups in entrepreneurial ecosystems (Schwartz, 2013), more recently, accelerators have gained popularity around the globe since the mid 2000s, originating from the Silicon Valley (Hathaway, 2016; Pauwels et al., 2013). They have been defined as "*fixed-term, cohort-based programs, including mentorship and educational components, that culminate in a public pitch event, often referred to as a 'demo-day'*" (Goswami et al., 2018; Cohen & Hochberg, 2014, p. 4). Accelerators play a key role as intermediaries between founders (on the micro-level) and other actors and resource providers in ecosystems (on the macro-level) (Goswami et al., 2018) and are nowadays considered as one of the main structural institutions of start-up support (Autio et al., 2018).

Besides this development, other models of start-up support have emerged, differing significantly from accelerators or business incubators in the dimensions of resources offered, intentions, as well as support processes. Since a few years, the increasing diffusion of makerspaces, hackathons, and start-up competitions can be observed in many entrepreneurial ecosystems (e.g. Autio et al., 2018; Browder et al., 2019; Lou & Peek, 2016). While research has just started dealing with these support models, their different support processes and resources are already well-established among entrepreneurs and other actors

in ecosystems. The diffusion of new technologies such as 3D printing and single-board computers (e.g. Raspberry Pi, Arduino), which allow experimentation and fast product development for almost everyone interested (Howe & Ito, 2013), as well as the trend of recombining existing technologies and business models (Rayna & Striukova, 2016), leads to more diverse entrepreneurial ecosystems. Nowadays, almost everyone can become an entrepreneur. Access to capital and knowledge is not necessarily a prerequisite anymore to start experimenting with technology and creating minimum viable products. Instead, communities are able to learn and use new technologies very quickly without prior knowledge; and groups such as artists, students, corporate workers, or unemployed and disadvantaged are able to become founders of their own start-up (Browder et al., 2019). This new diversity in entrepreneurial ecosystems also requires different forms of support which acknowledge changes of technology, associated processes of entrepreneurship, and also of target groups. The thesis is motivated by these observations of increased heterogeneity in ecosystems. It explores, throughout different dimensions, how makerspaces, hackathons, and start-up competitions work as models of support, and how founders use their processes and resources. These two overarching questions of resource provision and resource utilization are the foundation of this thesis. They allow diving into particular dimensions on each side of support provision and utilization. Exploring more diverse ecosystems of entrepreneurial actors and their actions and the more diverse landscape of support models is therefore at the centre of this thesis.

Makerspaces, hackathons, and start-up competitions, as different models of start-up support, incorporate two fundamentally contrasting ways of supporting founders. Makerspaces entirely focus on experimentation and collaboration between participants. They constitute organisations where individuals are enabled to create new digital and physical things through developing skills in a collaborative environment with a focus on

discovery and problem-based learning (Browder et al., 2019; Fleming, 2015; Koole et al., 2017). Start-up competitions, in contrast, focus on the creation of competition between founders. They embody isolated demo-days that enable founders to acquire resources through formal or oral communicative interactions about their venture idea (Lucas et al., 2016). Hackathons stand somewhere in between. While they foster experimentation and collaboration, there is also an element of competition that encourages founders to create the winning idea or product. Hackathons have been defined as events in which a variety of different participants, mainly programmers and IT specialists, work collaboratively for a limited time to develop ideas and solutions, often for specific purposes. The term is a combination of the words *hack* and *marathon* (Briscoe & Mulligan, 2014). While these models indicate a change of how support is provided and with what intentions, there certainly is an increased focus on start-up support in general, leading to increased numbers of support organisations overall (e.g. Browder et al., 2019). Although statistics about the diffusion of these support models in particular are sparse (Browder et al., 2019), available numbers provide an indication on their increased quantity, as well as popularity (see Paper 1 of this thesis). The diversification of ecosystems, as described, has also accelerated the diffusion of support models that respond to new technologies, new entrepreneurial methods, and new ways of becoming an entrepreneur. Although support models incorporated in this piece of research also take on elements of business incubators, accelerators, or even co-working spaces, their respective composition of support focus, processes, and resources indeed allow calling them *new models of start-up support*. The thesis therefore focuses on the models of makerspaces, hackathons, and start-up competitions to include a contrasting range of support, as explained. By doing so, the thesis explicitly simplifies the complex landscape of support models for research purposes, that is sometimes characterised by heterogenous terminologies used for different models of support (i.e. no hybrid models are included). The

overall aim is to analyse these three support models by using different perspectives that span across the interplay of resource provision and utilization, differentiations between support models, as well as the utilization of support under uncertainty and under conditions of limited information and capabilities of founders.

To compare established incubation models such as business incubators and accelerators with makerspaces, hackathons, and start-up competitions, an explanatory framework that categorises supporting resources, will be used. Organisational sponsorship theory (Amezcua et al., 2013), which has especially been used in the context of incubation, posits that incubators (and other forms of start-up support) act as intermediaries between start-ups and their environment, providing resources themselves and enabling access to external resources (Amezcua et al., 2013; Amezcua et al., 2019; Goswami et al., 2018). In order to explore new models of support in this thesis, I use organisational sponsorship theory as the foundational framework, which allows analysing their roles as intermediaries. By using this established framework from incubation research, I am thus able to look at the different elements of sponsorship theory in the light of new processes and intentions of support that can be found in makerspaces, hackathons, and start-up competitions. Although the incubation of start-ups, as one stream of organisational sponsorship, is the dominant perspective of start-up support, this does not suffice for exploring new forms of support. Organisational sponsorship theory primarily focusses on the supply side of support and resources (i.e. how sponsors shelter or bridge start-ups; Amezcua et al., 2013). While I use start-up incubation and organisational sponsorship theory as starting points for the analyses of makerspaces, hackathons, and start-up competitions (and to some extend of accelerators), the exploration of these support models also warrants to look at other dimensions of support from different perspectives (e.g. a resource-utilization and action-based perspective).

While organisational sponsorship theory is the framework of start-up support used in this thesis, the theoretical grounding for the individual perspectives of the three papers included, is based on theory of entrepreneurial action. Theory of action allows looking at the individual entrepreneur (i.e. the target group of support), while organisational sponsorship theory rather uses the perspective of support organisations. To explore makerspaces, hackathons, and start-up competitions, the perspective of founders and participants is of particular importance, as in these support models, groups of participants (or cohorts) often shape and influence the processes of support and resources themselves (e.g. Browder et al., 2019). Moreover, to improve support for start-ups, it is essential to understand how founders actually use it. While the thesis also explores support models from a resource provision perspective, more importantly, the research papers include the perspectives of founders using start-up support and taking action.

Entrepreneurial action has been described as the outcome of founders' willingness to bear perceived uncertainty (McMullen & Shepherd, 2016). It distinctively looks at the side of founders and their demands and actions (in contrast to organisational sponsorship). Action, in general, takes place over time. It is inherently uncertain due to an unknowable future. In the entrepreneurial context, action is further characterised by the novelty of markets, products, services, and ultimately ventures. Entrepreneurial uncertainty is thus inherent to the actions of founders (Amabile, 1997; Gartner, 1990; McMullen & Shepherd, 2016). McMullen & Shepherd's (2016) model of entrepreneurial action reconciles two streams of thought: the role of perceived uncertainty (i.e. the knowledge of founders) and the willingness to bear uncertainty (i.e. the motivation of founders). How founders perceive their ability to predict something accurately (Milliken, 1987) and whether they are willing to bear this uncertainty are questions that are at the basis of entrepreneurship (Bylund & McCaffrey, 2017).

Entrepreneurial action however also includes a decision perspective: Founders have to make decisions and evaluations on whether to seek and use resources and on whether to pursue or create opportunities. Their individual capacity to define their needs and judge on the value of resources for their respective needs is limited by their access to information and ability to process information accurately and without biases (i.e. bounded rationality: March & Simon, 1958; Simon, 1955). Due to imperfect information and their limited ability to gather and process new information founders might thus not act in rational ways (Cohen et al., 2018). Theory of entrepreneurial action essentially deals with what founders do, how they act or not act, and how they take decisions under uncertainty, with limited available information, and with limited abilities to collect and process information accurately (McMullen & Shepherd, 2016). Start-up support aims to alleviate some of these limitations through resources and entrepreneurial processes. By exploring makerspaces, hackathons, and start-up competitions through an action-based perspective of founders, the thesis sheds light on how founders actually utilize start-up support and how these models of support can alleviate some of the limitations of founders and their perceived difficulties of entrepreneurial action. Exploring these new support models through the lens of individuals helps to reach in-depth, qualitative contributions that can be used for further analyses of start-up support on both system and individual level. Building on this theory of entrepreneurial action, I focus in particular on entrepreneurial uncertainty and limitations (i.e. bounded rationality) of founders in the context of different models of start-up support (in paper 2 and 3). Both frameworks deal with individual entrepreneurial actors and their limitations and difficulties in regard to decisions and actions, which start-up support aims to alleviate. The level of analysis of this thesis focuses on the individual entrepreneur participating in makerspaces, hackathons, and start-up competitions, as well as managers of these models of start-up support.

This doctoral thesis comprises three distinct research papers that are all concerned with the support models of makerspaces, hackathons, and start-up competitions. The overall aim of the thesis is to disentangle the interplay of resource provision and resource utilization in these models of start-up support, to understand their differentiations and roles from the perspective of participating founders, and to analyse how they utilize resources offered. The first paper deals with the characteristics of different models of start-up support and their roles in entrepreneurial ecosystems for specific groups of ventures. The second paper analyses the provision and utilization of resources in makerspaces, hackathons, and start-up competitions and their roles in mitigating founders' limitations in regard to information, biases, and cognitive abilities (i.e. bounded rationality). The third paper analyses how founders in different models of start-up support cope with uncertainty and how these coping mechanisms correspond with support mechanisms and entrepreneurial methods.[2] The order and logic of these papers follow the general orientation of this doctoral thesis: It is concerned with the phenomena of makerspaces, hackathons, and start-up competitions in entrepreneurial ecosystems that have been observed but not yet been researched in full breadth and depth. By exploring these models of start-up support and their characteristics and analysing how start-ups utilize resources, and what roles uncertainty and entrepreneurial methods play in this process, this thesis unfolds fundamental questions on the design and roles of start-up support, as well as more specific questions on resource utilization and entrepreneurial methods within support models.

While research on accelerators and the 'networked incubator' (Hansen et al., 2000) mostly uses organisational sponsorship theory as the foundational perspective, the apparent differences of makerspaces, hackathons, and start-up competitions warrant a look beyond existing incubation research. In contrast to business incubators and accelerators, one can

[2]Entrepreneurial methods can be defined as coherent sets of principles and guidelines of action that help founders structure the theoretical and practical processes of entrepreneurship (Mansoori & Lackeus, 2019).

observe distinctly unstructured support processes in makerspaces and hackathons that emphasise collaboration and experimentation (Browder et al., 2019; Fleming, 2015), as well as a strong focus on competition between founders participating in start-up competitions (Lucas et al., 2016). And, as mentioned, these models of start-up support have not yet received much attention from a research perspective. I therefore apply abductive, exploratory research methods (Alvesson & Kärreman, 2007; Bamberger, 2018; Dubois & Gadde, 2002; Edmondson & McManus, 2007; Gioia et al., 2013) that take into account existing theoretical lenses used in entrepreneurship and incubation research, as well as the ostensible peculiarities and the underdeveloped state of knowledge on this phenomenon. This allows applying existing theories to other phenomena to explore differences and unearth potentially surprising findings. To pave the way for empirical studies, the first paper conceptualises competing and complementary roles and functions of new models of start-up support. The second and third paper subsequently apply qualitative methods based on interviews and on social media data in conjunction with interviews, respectively. While interviews allow capturing direct insights from supported start-ups and support managers, social media data provide insights into the communication of stakeholders and their perceptions.

Overall, this thesis looks beyond well-known models and processes of start-up support. It analyses makerspaces, hackathons, and start-up competitions and their intentions, resources, support processes, as well as founders' utilization of these support models through different dimensions. By doing so, the results presented offer insights into the full breadth and depth of contemporary support for founders and their ventures – a landscape of support that has become more diverse and fragmented over time. While these insights in itself shed light on how founders utilize resources and how they cope with uncertainty, the framing of start-up incubation (and more broadly organisational sponsorship theory) applied here,

moreover, allow comparing established and newly diffused models of start-up support. The practical implications of this thesis are therefore significant for founders, support managers, and policymakers alike. By including a variety of available models of start-up support in the analysis, the contributions of this study allow making another step on the way towards the further improvement of start-up support – a goal that, although often remaining unachieved, is at the core of the practice and research of supporting start-ups.

1. Resource Provision & Utilization: A Framework of Stakeholders

This section provides a general overview of the common theme of this thesis and connects the theme with theoretical perspectives applied, as well as with research needs that are tackled in this study. The overview helps to understand why this study is important for literature and practice, what the main focus of the thesis is, and how the separate research papers are connected. The research papers of this thesis are connected by one common theme that underpins their research questions and their context of start-up support. The interplay between the provision of resources (or the enablement of resource acquisition) by new models of start-up support and the utilization of resources by participants and founders constitutes the unifying framework of this thesis. Now, what are resources in the context of entrepreneurship and start-up support? Clough et al. (2019) distil a typology of resources from the extant literature: They suggest the categories of human capital (e.g. founder skills, team size), financial capital (e.g. personal funds, investments received), social capital (e.g. internal & external networks), and other capital (e.g. legitimacy, IP). Considering founders' resource dependency (Amezcua et al., 2013; Pfeffer & Salancik, 1978), their limitations to accurately process and evaluate information (Cohen et al., 2018; March & Simon, 1958; Rigby & Ramlogan, 2016; Shane, 2000), and their challenges to make decisions under various types of uncertainty (McMullen & Shepherd, 2006; Milliken, 1987), the study of

resources and of processes of resource development and utilization remains a crucial topic in entrepreneurship research and practice.

Supporting ventures to deal with these challenges through organisational sponsorship (Amezcua et al., 2013), which includes new models of start-up support, is an important approach to increase venture numbers and their growth. Understanding the roles of the new models of makerspaces, hackathons, and start-up competitions (and partly accelerators) from the different perspectives of resource provision and utilization is therefore a step towards improving organisational sponsorship and the development of sustainable ventures. Start-up support, and especially new models that are emerging in many ecosystems, act as windows into the process of resource utilization and its different procedural steps (Clough et al., 2019). They not only offer almost natural sampling opportunities for researchers (Clough et al., 2019) but, more importantly, support models can significantly influence the process of resource utilization. The study of new models of intermediaries for resource acquisition (Amezcua et al., 2013) therefore promises important insights into the processes and limitations of resource utilization and their interplay with the environment.

This thesis looks at the interplay of resource provision and resource utilization to understand what resource provision means in the context of new models of start-up support, and to analyse how participating founders utilize resources and influence the nature of resources. Although the utilization of resources (i.e. demand-side) is a clear focus throughout the study, it is important to recognise the three major stakeholder groups involved in start-up support: The management of support models (often also the main shareholder); founders and participants[3]; and policymakers. These stakeholder groups play crucial roles in the common theme of this thesis (i.e. the interplay between resource provision and utilization) and thus come back throughout all three research papers. Figure 1 shows the simplified roles

[3]Not all participants in new models of start-up support are necessarily founders. Some of them might only participate for educational reasons or as freelancing individuals.

of stakeholder groups of founders and support management that influence new models of start-up support and their operations, as well as the theoretical perspectives applied in this thesis and their respective scope. Founders and the support management are the focus of this thesis and policymakers are not considered in the analyses. While the framework itself and the connections shown are highly simplified, the process of support (in its various forms and nuances) and the interplay of stakeholders is much more complex. For instance, new support models challenge some of the simplified roles presented: Founders and participants in makerspaces can also act as the management of the space themselves. Self-governance is a distinct feature of some makerspaces (Browder et al., 2019). Depending on the type of shareholders (public or private) of the respective support model, the management can also have varying intentions, resulting in different resources and support processes (Grimaldi & Grandi, 2005). Additionally, the environment (i.e. entrepreneurial ecosystem) in which support models and stakeholder groups are embedded into plays crucial roles that can change their interplay in profound ways (Amezcua et al., 2019). For instance, while this thesis does not explicitly consider the impact of policymakers on new models of start-up support, they constitute a stakeholder group that can influence how support works. Findings of this thesis thus also have implications for policymakers and their actions. The process of support can therefore influence the simplified roles and actions of the stakeholders presented.

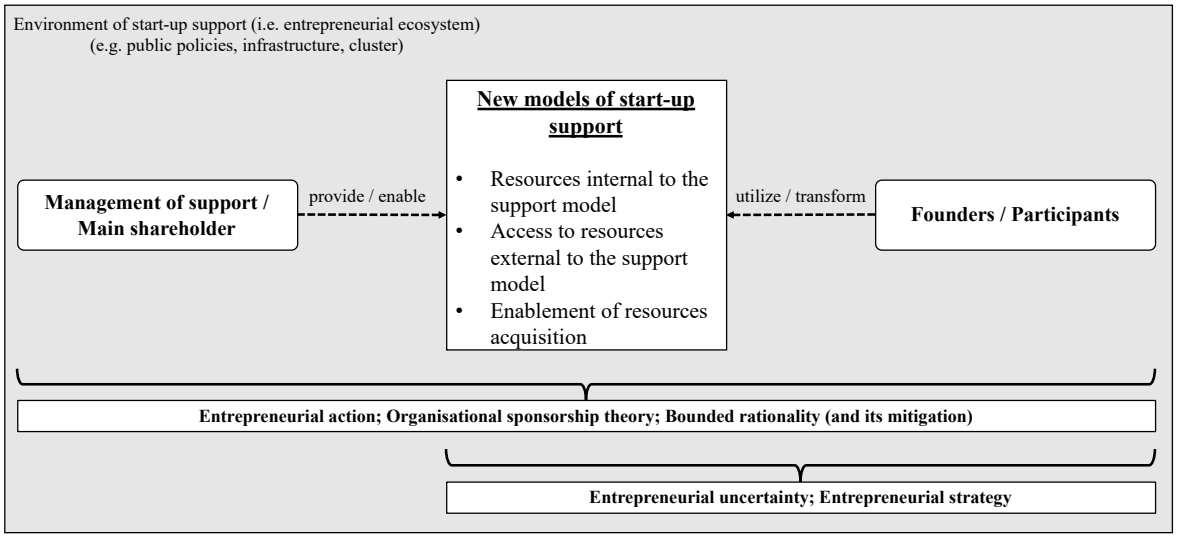

Figure 1: Simplified framework of relevant stakeholders and scope of applied theoretical perspectives[4]

This thesis uses several theoretical perspectives to analyse the phenomena described. Those perspectives encompass different scopes of stakeholders of support and their actions, which help understand the structure of this thesis and the different perspectives of the individual research papers. The selection and use of theoretical perspectives follow the general sequence of the paper that is based on an unfolding logic: The focus moves from overarching characteristics of support models, towards resource utilization, and, finally, entrepreneurial uncertainty und strategy (i.e. from broad to narrow questions).

As an overarching perspective to understand start-up support and classify the new phenomena of makerspaces, hackathons, and start-up competitions, the thesis applies organisational sponsorship theory which posits that incubators (as models of start-up support) work as intermediaries between start-ups and their environment (Amezcua et al., 2013; Amezcua et al., 2019). This perspective includes the whole process of support and its three main stakeholder groups. Key shareholders of support models (often referred to as the incubation management) define what resources are provided and, more importantly, how

[4]Entrepreneurial action (McMullen & Shepherd, 2016); Organisational sponsorship (Amezcua et al., 2013); Bounded rationality (Cohen et al., 2018; Gavetti et al., 2007; March & Simon, 1958;); Entrepreneurial uncertainty (McKelvie et al., 2011; Miliken, 1987); Entrepreneurial strategy (Gans et al., 2019). The role and impact of policymakers was not analysed in this thesis. However, they constitute important stakeholders for new models of start-up support.

those are provided. The approach of *providing* resources to founders stems from the assumption that dependencies of environmental resources can be mitigated by creating a resource-munificent environment (Amezcua et al., 2013; Pfeffer & Salancik, 1978). Founders face resource scarcity and, in turn, they are highly dependent on environmental resources (Amezcua et al., 2013). Incubation, in the traditional sense of sponsorship, aims to create an environment that is resource-munificent and helps founders to access resources. Different support models provide tangible resources such as office space, workshops, and finance, as well as intangible resources such as networks and legitimacy (Pauwels et al., 2015). They work as intermediaries for start-ups that can shelter (i.e. protect or buffer) them from the environment or connect them (i.e. bridge) with other resource providers in the environment (Amezcua et al., 2013). The utilization of resources in new models of start-up support is the second perspective in this framework. Founders and participants in support models might simply utilize offered resources and engage with the support management to acquire resources (as intended by incubators), or they decide to change or transform resources for their respective requirements. While start-up support can simply *provide* resources to participants, they are also *enabled to acquire* resources themselves. The third perspective concerns the role of policymakers for new support models and the interplay of resource provision and utilization. While this thesis does not directly deal with the influence of policymakers on processes of support, it is crucial to acknowledge their role. Entrepreneurship policies that aim to increase founding activities, the quality of start-ups, or their growth have been used in many countries for quite some time (Audretsch et al., 2007, p. 1). Policies aim to support the process of organisational sponsorship to improve how resources are provided (e.g. in a resource-munificent environment), or how start-ups utilize and acquire resources. While the effectiveness and impact of these policies often remain contested and unclear, they directly or indirectly aim to either support and foster the

provision of resources (i.e. the management side) or the utilization of resources (i.e. the founder side).

The process of support and the stakeholder groups are dependent on the availability of information (e.g. about start-ups' needs and the suitability of their actions) and their respective ability to evaluate information accurately. Founders' decisions on resource utilization and the decisions of the support management on resource provision are subject to their respective capabilities to access information and accurately evaluate the needs of ventures (Cohen et al., 2018; Rigby & Ramlogan, 2016). Both groups are limited by their respective bounded rationality in different dimensions (Cohen et al., 2018; March & Simon, 1958; Shane, 2000; Simon, 1955). The thesis therefore considers bounded rationality of founders to take into account both their limitations and the limitations of the support management that influence the support process.[5] While these groups have limited capacities to access and evaluate information, start-up support can nonetheless help mitigate founders' bounded rationality (Cohen et al., 2018). In the context of accelerators, the effective mitigation of founders' bounded rationality has already been identified (Cohen et al., 2018). Based on an analysis of resource provision and utilization, the thesis therefore makes suggestions on how the new support models of makerspaces, hackathons, and start-up competitions can also mitigate bounded rationality[6], despite offering different support functions and processes that are less structured compared with accelerators.

As described, models of start-up support can either offer resources to founders or enable them to acquire certain resources. How to utilize resources nevertheless remains the

[5]To derive suggestions on bounded rationality mitigation, the thesis deliberately assumes that founders are boundedly rational and that their limitations can be mitigated by external measures (Cohen et al., 2018).
[6]The thesis investigates the mitigation of the three main bounded rationality limitations of incomplete information, satisficing, and cognitive biases (Cohen et al., 2018; Hallen & Pahnke, 2016; March & Simon, 1958; Shane, 2000).

choice of the venture.[7] Founders need to make decisions about resources, as well as strategies that build on these resources. They are, however, subject to uncertainty that is inherent to entrepreneurship (Bylund & McCaffrey, 2017). Under uncertainty, they need to make decisions that concern vital resources for the survival and growth of their ventures. Those decisions include actions that take into account the unpredictability of the environment, the unpredictability of the impact of environmental changes, as well as the unpredictability of the impact of ventures' responses (McMullen & Shepherd, 2006; Milliken, 1987). Founders need to decide which action they take in the light of these uncertainties and which resources they need to acquire or develop. The thesis therefore uses the perspective of entrepreneurial uncertainty to investigate how participants in new models of start-up support perceive uncertainty and subsequently how they respond with coping mechanisms. The analysis of founders' approaches towards uncertainty offers a different view on new models of start-up support and their unique resources and processes. New support models move away from rather prescriptive ways of start-up incubation (and resource utilization) towards offering space for experimentation and collaboration in combination with competition. How founders approach uncertainty in more experimental and less structured support environments therefore allows novel perspectives on the resource utilization and actions of founders.

In conjunction with the theoretical perspective of uncertainty coping, the thesis further applies contemporary theory of entrepreneurial strategy (Gans et al., 2019) and looks at the implementation of the entrepreneurial method of the lean start-up methodology. Entrepreneurial methods offer practical frameworks to implement entrepreneurial strategies in a structured way (Mansoori & Lackeus, 2019). The creational method considered in this thesis is part of a fundamental discussion about how founders develop and select strategies

[7]Not in every case, founders can freely choose how they utilize resources. Support models might make it mandatory for their founders to use resources and participate in certain elements of the support programme (Cohen et al., 2018).

for their ventures. Gans et al. (2019) distinguish between processes of optimization or processes of choice (i.e. deselection of less preferred alternatives vs. selection among incompatible options). Optimization approaches rely on the collection and evaluation of information about potential strategies prior to their implementation (Delmar & Shane, 2003). Approaches of choice, by contrast, rely on the premise of action taking to develop strategies (Gans et al., 2019). The latter lens posits that planning capabilities are limited due to the lack of reliable and processable information (Gans et al., 2019; Kirzner, 1973), and that cycles of experimentation, learning, and iteration can tackle this constraint (Blank 2013; Gans et al., 2019; Ries, 2011). The perspective of entrepreneurial strategy incorporates founders and their decisions and actions, as well as the support model which offers founders options to develop, test, and implement strategies (see Figure 1). As new models of start-up support enable founders to freely experiment and learn in playful ways, it raises questions on how founders cope with uncertainty in these unique environments. Instead of using highly structured and potentially mandatory support mechanisms, new support models offer opportunity structures for ideation, experimentation, and playful learning that encourage participants to accept uncertainty. These opportunity structures potentially correspond with certain entrepreneurial methods that similarly suggest accepting uncertainty and embracing action-taking to cope with it (in contrast to information collection prior to decision making). For instance, the lean start-up methodology offers principles and guidelines to develop and implement entrepreneurial strategies based on the assumption that the future is unknowable; it suggests accepting entrepreneurial uncertainty (Mansoori & Lackeus, 2019). The study of uncertainty coping, and corresponding entrepreneurial methods is therefore particularly important in the light of new support models that offer mechanisms and processes which allow accepting uncertainty (see Sarasvathy, 2001, 2008; Fisher, 2012).

Overall, the thesis contributes to research on the role of founders and their utilization of resources in new models of start-up support, which, in contrast to the perspective of the management of support and their resource provision, remains fragmented (Clough et al., 2019). The interplay of both resource provision and utilization, as well as the perspectives of uncertainty coping, and entrepreneurial strategy and methods offer multifaceted insights into the new phenomena of makerspaces, hackathons, and start-up competitions.

2. Methodological Perspective of the Thesis

The methodological perspectives adopted throughout the three research papers are based on the *novelty* of the phenomenon of makerspaces, hackathons, and start-up competitions, as well as the objective to *discover* these phenomena (Bamberger, 2018; Dubois & Gadde, 2002). Research on the new models of start-up support has remained limited so far, while their relevance in practice seems to increase. This state of research raises questions that aim to understand the phenomena deeply and from different perspectives (Edmondson & McManus, 2007). To discover these phenomena of start-up support, this thesis applies abduction, which allows to systematically collect "facts", followed by an attempt to create an imaginary framework that explains the patterns identified in the data (Alvesson & Kärreman, 2007; Bamberger, 2018). As the phenomena are discovered through the lens of start-up incubation and its previously applied theories (e.g. organisational sponsorship), the thesis puts these theories in contrast to the collected "facts". With that, the abductive logic allows developing and modifying extant theories to account for the observations made in the phenomena of interest (Bamberger, 2018; Dubois & Gadde, 2002). The deliberate abductive logic applied in this thesis is thus motivated by gaining an understanding of the phenomena of makerspaces, hackathons, and start-up competitions that

cannot necessarily be fully explained by the existing theories applied in the contexts of start-up incubation or start-up support (see Bamberger, 2018).

While deductive studies, that would for instance examine the impact of new models of start-up support on specific measures, are desirable (and hopefully feasible in the future), the research papers of this thesis apply an abductive logic to explore the phenomena in the light of previously used theoretical lenses. The thesis aims to observe the phenomena through different stakeholder perspectives, while using different theoretical lenses to observe the data (i.e. abduction; Alvesson & Kärreman, 2007; Bamberger, 2018; Dubois & Gadde, 2002). This enables the identification of patterns and subsequently the development of concepts (Gioia et al., 2013).[8] This objective is based on a critical realist perspective of studying phenomena and corresponding elements of constructivism (Mir & Watson, 2001).[9] Observations are naturally limited by errors of researchers such as false interpretations and their respective view of the world (Miles & Huberman, 1994, p. 9). Simply put, researchers are also subject to bounded rationality, as founders and support managers interviewed for this thesis are (Mir & Watson, 2001). The triangulation of findings through different data sources or interviewees, as well as through mutual control of researchers during the process of data analysis is therefore essential (Coyne, 1997; Gioia et al., 2013; Sandelowski, 1995).

The three research papers in essence follow the methodological perspective outlined in approaching the *novelty* of models of start-up support starting from a big picture perspective to approach characteristics and differences, and gradually moving into more fine-grained analyses of crucial aspects such as the utilization of resources. The first paper, which uses a conceptual approach, prepares the stage for the empirical work of the second

[8]While deductive reasoning starts with a theory and ends with confirmation or disconfirmation, this approach aims to articulate a new interpretative rule that resolves a surprising finding from the data (Alvesson & Kärreman, 2007).
[9]As Mir & Watson (2001) note, critical realism and constructivism can be contrasted and both perspectives play important roles for research in the management domain.

and third paper. In placing makerspaces, hackathons, and start-up competitions under the conceptual umbrella of start-up incubation (and organisation sponsorship, Amezcua et al., 2013), this paper conceptually analyses how new models of start-up support compare to established ones and what roles they take in entrepreneurial ecosystems. This conceptualisation of design elements of support models, their roles, and possible implications then helps to prepare and conduct empirical data analyses in the second and third paper. The second paper uses interviews with managers of support models and with a variety of founders that are either supported at the time of the interview or that have participated in support in the past. The selected interviewees often participated in various different new models of start-up support and were therefore able to compare resources and processes. Interviews allow in-depth insights into intentions of founders and support managers, as well as their positive and negative experiences (Yin, 2003, p. 9). As the three research papers have been developed chronologically, conceptualisations from the first paper for instance supported the subsequent formulation of semi-structured interview questions for the data collection. Nonetheless, the data analyses in the second and third paper stand independently and in accordance with methodological guidelines that require (to some degree) impartiality in the interpretation of data through the lenses of existing theories (Alvesson & Kärreman, 2007; Gioia et al., 2013). The third paper uses social media data in conjunction with interviews to dive deeper into qualitative data. Especially the communication of founders and other key stakeholders of new models of start-up support with their environment offers rich insights. While the external communication (esp. on social media platforms) of start-ups can obviously be characterised by their overly positive marketing efforts (Fisher et al., 2017), it nonetheless constitutes a data source that sheds light on the environment of new models of start-up support. Resource provision and utilization are inherently dependent on the environment these models are embedded in (Amezcua et al.,

2013; Amezcua et al., 2019). The data sources and methods applied in the third paper thus offer deeper insights into the roles of new models of start-up support for entrepreneurship. The methodological perspectives described here are explained in more detail in the research papers. This especially concerns the operational aspects of research methods, data collection, and analysis which differ across the papers.

3. Overview of Research Papers

The following sections provide a comprehensive overview of the three research papers included in this doctoral thesis. To allow readers a quick grasp of the research questions, the theoretical perspectives, and the methods and data used, Table 1 summarises the main characteristics of each paper. In presenting three distinct research papers, this thesis follows a 'journal format' instead of a traditional monographic format. Although these papers are all self-contained, they build on the joint context of new models of start-up support and their roles for founders and entrepreneurship. In regard to the authorship of the three research papers, it is important to note that although all three papers have been co-authored, the first author remains the main contributor. The development of initial research ideas, research design, data collection, data analyses, and conceptual development have all been the major responsibility of the first author. This included the development of the research questions, as well as the corresponding research design and operationalisation. The first author was not only responsible for the extensive collection of interview and social media data (through the use of appropriate software), but also for the data analysis, which required technical skills in qualitative data and automatic content analyses, and the derivation of implications for the literature and different stakeholder groups of support.

Table 1: Summary of research papers

	Paper 1	**Paper 2**	**Paper 3**
Title	'Makerspaces, Hackathons, and Start-up Competitions: The Rise of New Models of Start-up Support	'Resource Utilization in New Models of Start-up Support: Makerspaces, Hackathons, and Start-up Competitions as Pacemakers of New Venture Development'	'Intermediaries for Entrepreneurial Methods: How Makerspaces, Hackathons, and Accelerators Support Founders' Uncertainty Coping'
Research Questions	• How do makerspaces, hackathons, and start-up competitions compare to established support models? • Are they fulfilling competing or complementary roles in the entrepreneurial ecosystem?	• How do makerspaces, hackathons, and start-up competitions balance the provision of bridging and buffering mechanisms? • How and for which purposes do supported start-ups utilize provided resources for their growth and development processes?	• How do participants in makerspaces, hackathons, and accelerators deal with uncertainty and what roles do these new support models play for entrepreneurial uncertainty? • How do different elements of the lean start-up methodology correspond with founders' approaches to uncertainty?
Theoretical perspectives	• Organisational Sponsorship[10]	• Organisational Sponsorship[1] • Bounded Rationality[11]	• Effectuation & Creation Theory[12] • Entrepreneurial uncertainty[13] • Entrepreneurial Strategy[14]
Methods / Data used	• Conceptual • Publication & News data	• Qualitative • Interviews	• Qualitative • Social media data and Interviews

[10]Amezcua et al., 2013
[11]Gavetti et al., 2007; March & Simon, 1958; Simon, 1955
[12]Alvarez & Barney, 2007; Sarasvathy, 2001
[13]McKelvie et al., 2011; Miliken, 1987
[14]Gans et al., 2019

3.1 Paper 1: 'Makerspaces, Hackathons, and Start-up Competitions: The Rise of New Models of Start-up Support'

This paper approaches a new phenomenon in the landscape of institutionalised start-up support: the emergence and increasing diffusion of makerspaces, hackathons, and start-up competitions. While traditional start-up incubation, either in the form of business incubators or more recently of accelerators, has seen a global diffusion in the last decades, new institutionalised forms of support have emerged. The dominance of technology- and IT-based start-ups, which allows founding ventures with few resources, seems to have accelerated this development. Research on start-up incubation and the 'networked incubator' (Hansen et al., 2000) has for instance dealt with implications on venture performance (Cohen et al., 2018; Hackett & Dilts, 2004; Schwartz, 2013), environmental and contextual differences in the provision of support (Mrkajic, 2017), and issues related to the government's role in providing start-up support (Clarysse et al., 2005; Dee et al., 2011; Rigby & Ramlogan, 2016). This body of research, overall, contributes to a better understanding of business incubators and accelerators, of how they operate, and of their influence on the performance of start-ups.

The structures, roles, and support mechanisms of makerspaces, hackathons, and start-up competitions are, however, fundamentally different from established models of incubation. They thus change our assumptions on how support works, and they enable new perspectives on research carried out and on theory applied in this context. This paper therefore analyses how makerspaces, hackathons, and start-up competitions compare to established support models and whether they fulfil competing or complementary roles in the entrepreneurial ecosystem. For this purpose, we suggest placing these new forms of organisation under the conceptual umbrella of start-up incubation to understand how they

provide support to founders and to uncover the reasons for their rise in entrepreneurial ecosystems. By developing a conceptual framework that covers the defining dimensions of models of start-up support, the paper provides insights into differences between makerspaces, hackathons, and start-up competitions, and established models. This draws on organisational sponsorship theory as the underlying framework which distinguishes between buffering and bridging as two mechanisms to provide support to start-ups (Amezcua et al., 2013). Buffering mechanisms refer to services that aim to shelter start-ups from their external environment, while bridging mechanisms refer to services that facilitate connections and normative alignment with the environment of start-ups (Amezcua et al., 2013; Cohen et al., 2018; Mrkajic, 2017).

While this paper develops conceptualisations to approach the research questions outlined, it also conducts an analysis of keywords found in public media (Factiva) and in academic publications (Scopus) to present evidence for the increased interest in makerspaces, hackathons, and start-up competitions. Applying the conceptual framework developed allows looking at several complementary functions that makerspaces, hackathons, and start-up competitions provide within ecosystems. While new models of start-up support create spaces for collaborative experimentation and playful learning that result in serendipity and team building, they also stimulate short-term, competitive behaviour between start-ups. Makerspaces, hackathons, and start-up competitions thus have the potential to generate coopetition behaviour between participants; a state that can be particularly beneficial for pre-nascent start-ups (Bouncken et al., 2018). These findings contribute to organisational sponsorship theory by suggesting that, in many cases, support mechanisms that have originally been designed to buffer start-ups within a protected space also enable bridging mechanisms which facilitate connections with external resource providers. In regard to practice, the paper contributes to bringing a new set of support tools to light. Both investors

and policymakers can use makerspaces, hackathons, and start-up competitions to provide and support more targeted support for entrepreneurs, which potentially leads to increased venture survival and performance.

3.2 Paper 2: 'Resource Utilization in New Models of Start-up Support: Makerspaces, Hackathons, and Start-up Competitions as Pacemakers of New Venture Development'

This paper analyses the provision and utilization of resources in the new support models of makerspaces, hackathons, and start-up competitions. While these models have emerged in many ecosystems, research has only been dealing with resources provided and utilized in business incubators and accelerators (e.g. Grimaldi & Grandi, 2005; Cohen et al., 2018). Similar to accelerators, new models of start-up support aim for enabling the development of relational connections with the start-up's environment. While makerspaces, hackathons, and start-up competitions seem to apply similar mechanisms of organisational sponsorship (Amezcua et al., 2013; Cohen et al., 2018; Mrkajic, 2017), they, in fact, *mediate* and *practice* differently due to different intentions and processes. However, the relationship between support providers (i.e. models of start-up support) and participants is characterised by significant constraints for individuals to accurately define and evaluate resource requirements. On the one hand, founders are constrained by their bounded rationality to select, utilize, and manipulate resources according to their respective needs (Cohen et al., 2018), on the other hand, support managers are equally constrained by their bounded rationality to accurately evaluate start-ups' needs and to design and provide suitable resources (Gavetti et al., 2007; March & Simon, 1958; Simon, 1955). While these constraints crucially influence the provision and utilization of resources, start-up support models are, at

the same time, also able to mitigate founders' bounded rationality through their support processes (Cohen et al., 2018).

The paper analyses (1) how makerspaces, hackathons, and start-up competitions balance the provision of bridging and buffering mechanisms, and (2) how and for which purposes supported start-ups utilize provided resources for their growth and development processes. Both the analysis of the supply and the demand side call for exploratory approaches that take into account the underdeveloped context of new models of start-up support. Due to the limited research available on the roles of makerspaces, hackathons, and start-up competitions, the paper applies an abductive, qualitative approach for concept development using interview data from start-ups and support management.

The results contribute to research on organisational sponsorship and on mitigation of founders' bounded rationality. The analysis suggests that start-ups utilize resources of makerspaces, hackathons, and start-up competitions to work on their community and identity, on their entrepreneurial processes, and on further resource acquisition. While this approaches the so far neglected demand- and utilization-side in research of start-up support (i.e. how resources are utilized), more importantly, the paper also provides evidence for the rejection and transformation of resources in organisational sponsorship. Supported founders not always use provided resources as intended by the support management, creating possible conflicts between these two groups (and between provision and utilization of resources). This utilization perspective also concerns the mitigation of founders' bounded rationality, which is one of the (more or less explicit) intentions of start-up support (Cohen et al., 2018). While prior research on accelerators, which largely applies a resource provision perspective, points towards mitigation through concentrated and standardized mechanisms (Cohen et al., 2018), this paper applies a utilization perspective, which instead suggests that new models of start-up support can mitigate bounded rationality through offering opportunity structures

that create room for experimentation and playful learning. For practice, these results enable start-ups to make more informed decisions on selection processes to identify and utilize suitable sponsorship models and resources. The paper's focus on resource utilization also allows support managers and policymakers to improve support measures for different target groups. Insights into how start-ups actually utilize, reject, or transform provided resources in these new models of start-up support are necessary to optimise support for different purposes of investment or policy impact. In the future, the study's exploratory results on resource utilization and its suggestions on the mitigation of bounded rationality hopefully enable and facilitate research on the performance implications of founders' participation in makerspaces, hackathons, and start-up competitions (e.g. on founding and scale-up activities).

3.3 Paper 3: 'Intermediaries for Entrepreneurial Methods: How Makerspaces, Hackathons, and Accelerators Support Founder' Uncertainty Coping'

This paper is concerned with founders' approaches to uncertainty and their utilization of entrepreneurial methods in the new support models of makerspaces, hackathons, and accelerators. Uncertainty is at the core of entrepreneurship (McKelvie et al., 2011). Founders face uncertainty about the future of their environment, about potential impacts of this future on their venture, and about the selection of their choices and implications of choices (McMullen & Shepherd, 2006; Milliken, 1987). Entrepreneurial methods offer structured processes and frameworks to deal with entrepreneurial uncertainty. While the mitigation of uncertainty would be a logical approach, as suggested by traditional and linear causational methods, methods such as the lean start-up methodology are based on a creational logic (Sarasvathy, 2001, 2008; Fisher, 2012). The latter method does not necessarily aim to erase uncertainty through evaluating information and ex-ante planning but rather encourages

founders to acknowledge their uncertainty and to create opportunities themselves (Fisher, 2012). While entrepreneurial methods offer frameworks to approach uncertainty, different models of start-up support offer resources and processes to implement these frameworks. Accelerators, for instance, use key principles of the lean start-up methodology (Pauwels et al., 2016; Stayton & Mangematin, 2018). However, the role of makerspaces and hackathons for founders' uncertainty coping and their implementation of entrepreneurial methods is less clear. These models differ significantly in intentions, offered resources, and processes (Browder et al., 2019; Komssi et al., 2015). For instance, their mixture between individual freedom to experiment and facilitated competition between participants could support founders in dealing with different types of uncertainty (McKelvie et al., 2011) and hence with implementing creational methods.

The paper analyses founders' approaches to uncertainty in the light of new models of start-up support and creational entrepreneurial methods, and investigates two questions: (1) How do participants in makerspaces, hackathons, and accelerators deal with uncertainty and what roles do these new models of start-up support play for entrepreneurial uncertainty? And, (2) how do founders' approaches to uncertainty in the three different models of start-up support correspond with elements of the lean start-up methodology? Due to the state of existing research, as well as the questions investigated, an abductive, qualitative research approach to advance theory was adopted. For this purpose, the paper utilizes a unique longitudinal dataset of Twitter interactions (>1 year; n>19000) in connection with interview data from different models of start-up support and their stakeholders. The combination of social media data with interviews allows generating an in-depth picture of uncertainty coping in new support models.

The paper contributes to the literature on uncertainty coping (McKelvie et al., 2011), on the roles of new models of start-up support (Browder et al., 2019; Cohen et al., 2018),

and on the implementation of entrepreneurial strategy (Gans et al., 2019). First, the analysis suggests that coping approaches of founders differ significantly across makerspaces, hackathons, and accelerators. Founders in these models of start-up support approach different types of uncertainty with the development of individual and communal endurance, with active learning and ideation, and with scientification of processes. The results indicate that the varying resources and intentions of new support models influence founders' perceptions of uncertainty, and more importantly their decisions on coping approaches. Secondly, this paper suggests that founders' approaches to uncertainty correspond with different dimensions of the lean start-up methodology. This method inherently relies on the unpredictability of uncertainty (Fisher, 2012; McKelvie et al., 2011). Evidence for how entrepreneurs utilize resources in new models of start-up support to approach uncertainty shows how they implement principles of entrepreneurial methods. Uncertainty is at the core of these methods and coping approaches can therefore be seen as indicators for the implementation of entrepreneurial methods. Thirdly, the paper proposes a model of sequencing the use of models of start-up support, which is based on identified approaches to uncertainty. The model suggests an order of support models following ventures' timeline of development. Makerspaces play a role during the very early processes of entrepreneurship to foster ideation and team building. Hackathons are a vehicle for both experimentation and prototyping, as well as for testing and validation. They are used by makerspaces to develop and test solutions, and by accelerators to screen and select teams and ideas. Accelerators mostly focus on commercialization and funding acquisition at later stages. The results also offer practical implications. Founders are provided with insights about their choice of support model. Support managers can use our sequencing model to decide on the order of their respective support provision. Policymakers benefit from a new perspective on commercialization efforts. In line with the different needs of ventures in different

development stages, it is possible to support different models of support through policies. Exposing start-ups to multiple strategic options that are equally viable (Gans et al., 2019) can be achieved through purposeful sequencing of models of start-up support.

4. Main Contributions of the Thesis

The empirical research conducted leads to several major findings: The first paper finds that makerspaces, hackathons, and start-up competitions have the potential to generate coopetition behaviour between their participants which are particularly beneficial for pre-nascent start-ups and social entrepreneurs (Bouncken et al., 2018). The second paper finds evidence for the utilization, rejection, and transformation of resources in organisational sponsorship and suggests that new models of start-up support can mitigate bounded rationality by offering opportunity structures that create the freedom for founders to experiment and learn in playful ways. While founders utilize some resources as intended by the support management, they reject other resources or use them in different ways. The third paper identifies different approaches of uncertainty coping in new models of start-up support and suggests that these coping approaches correspond with key principles of the lean start-up methodology. Based on these findings, the paper suggests a model of sequencing of support models and mechanisms of uncertainty coping. As outlined, by gradually moving from general characteristics towards more fine-grained analyses of resource utilization, the thesis offers a deep dive into the phenomena of makerspaces, hackathons, and start-up competitions.

Overall, the thesis contributes to several strands of literature within entrepreneurship and offers important implications for the practice of start-up support and entrepreneurship. Conceptually, the results contribute to research on organisational sponsorship (Amezcua et al., 2013), its mechanisms, and utilization by supported founders. The thesis suggests that

mechanisms of organisational sponsorship are less clearly distinguishable than originally thought: In new models of start-up support, buffering mechanisms that usually aim for sheltering start-ups from the environment can also work in a bridging way, enabling connections with the environment. Further the thesis contributes to research on entrepreneurial action through the two constructs of uncertainty and bounded rationality. By applying a resource utilization perspective, the results offer a different perspective on the mitigation of founders' bounded rationality through start-up support. The thesis suggests that not only the highly structured support processes of accelerators can mitigate bounded rationality but also the often deliberately unstructured support of new models of start-up support can tackle this challenge (cf. Cohen et al., 2018). The results further contribute to the literature on uncertainty coping in showing how founders in new support models perceive uncertainty in different ways and respond to it accordingly. Based on the identified approaches to uncertainty, the thesis offers a model of sequencing of models of start-up support and mechanisms of uncertainty coping. This proposed sequencing model contributes to the literature on entrepreneurial strategy (and applied methods) by supporting ventures in applying rules on search and implementation of strategic alternatives (Gans et al., 2019).

While these contributions prepare for further quantitative research on the impact of new models of start-up support on founders and the performance of their ventures, the thesis also offers practical implications for investors, founders, and policymakers. The analysis of the key theme of the interplay between resource provision (or enablement of resource acquisition) and resource utilization (or adoption of methods based on resources) that underpins all three papers can support investors in designing and implementing better support mechanisms for specific target groups. Founders can benefit through more informed decisions on selecting suitable support models and entrepreneurial methods for their respective needs. Policymakers can now consider makerspaces, hackathons, and start-up

competitions as viable options in their toolbox of entrepreneurship policies. By exploring and analysing these phenomena, the thesis offers valuable insights into new instruments of start-up support which can contribute to the quest for increased survival and scale-up rates of ventures.

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CHAPTER 1: MAKERSPACES, HACKATHONS, AND START-UP COMPETITIONS: THE RISE OF NEW MODELS OF START-UP SUPPORT

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Abstract:

Makerspaces, hackathons, and start-up competitions have become an integral part of the entrepreneurial ecosystem. These new forms of organisational sponsorship add to the heterogeneity of start-up support. This paper presents a conceptual framework of the foundational elements of new and established models of start-up support, comparing their overlaps and complementarities. As start-up support has become a common instrument of entrepreneurship policy, makerspaces, hackathons, and start-up competitions and their complementary functions offer valuable new options for policy makers. The framework shows that the focus on collaborative experimentation and the short-term, competitive nature of new support models have the potential to generate coopetition behaviour that can be particularly beneficial for pre-nascent start-ups or social ventures. The paper further conceptualizes how the new models of start-up support change the nature of organisational sponsorship.

Keywords: start-up incubation; makerspaces; hackathons; start-up competitions; organisational sponsorship

1. Introduction

While simply providing resources to start-ups is an old practice, there is increased research interest in the incubation of start-ups and its role as an intermediary between start-ups and their environment. A growing body of literature deals with the performance implications of start-up incubation (Cohen et al., 2018; Hackett & Dilts, 2004; Schwartz, 2013), environmental and contextual differences in the provision of support (Amezcua et al., 2019; Mrkajic, 2017), and issues related to the government's role in providing start-up support (Clarysse et al., 2005; Dee et al., 2011; Rigby & Ramlogan, 2016). The traditional business incubator—first established in 1959 at New York's Batavia Business Center as a redevelopment of derelict industrial space—has seen a rapid development and global diffusion over the last decades. Start-up incubation has also diversified significantly, introducing a wide array of new models such as accelerators (Pauwels et al., 2015) and sector-specialized incubators (Schwartz & Hornych, 2010). Accelerators have now even become the dominant form of start-up support in some countries (NESTA, 2017). Research on start-up support has contributed to a better understanding of the different ways in which business incubators and accelerators provide start-up support and the performance implications for start-ups.

With the recent surge in (tech) start-ups, though, there is a proliferation of new support structures in the entrepreneurial ecosystem, such as makerspaces, hackathons, and start-up competitions, that offer a kind of support which seems different from what incubators and accelerators provide. However, how makerspaces, hackathons, and start-up competitions compare to established models of start-up support and whether they fulfil competing or complementary roles in the entrepreneurial ecosystem is not well understood. This is especially important as policymakers increasingly foster start-up incubation as part of policies that aim to support entrepreneurship (e.g. increasing founding numbers, growth

& survival rates) (Bergek & Norrman, 2008; Phan et al., 2005; Rigby & Ramlogan, 2016; Storey & Tether, 1998). In this paper, we suggest placing makerspaces, hackathons, and start-up competitions under the conceptual umbrella of incubation to further our understanding of how they provide start-up support and to unearth the reasons for their rise in the entrepreneurial ecosystem of tech start-ups. We develop a conceptual framework that explains the roles and functions of the new models for start-up support of makerspaces, hackathons and start-up competitions to provide insight into their place in the entrepreneurial ecosystem and examine how they are different from established models of start-up support. As theoretical basis for our framework, we use organisational sponsorship theory which distinguishes between buffering and bridging as two mechanisms to provide support to start-ups (Amezcua et al., 2013). Buffering refers to providing services that aim to shelter start-ups from their external environment, while bridging refers to services that facilitate connections and normative alignment with the environment of start-ups (Amezcua et al., 2013; Cohen et al., 2018; Mrkajic, 2017).

Our conceptual framework shows that despite various commonalities with established models, makerspaces, hackathons and start-up competitions provide valuable complementary functions within the entrepreneurial ecosystem. The framework reveals that the new models of start-up support redirect support towards creating spaces that allow collaborative experimentation and playful learning while stimulating short-term, competitive behaviour between start-ups. The new support models thus have the potential to generate coopetition behaviour that can be particularly beneficial for pre-nascent start-ups (Bouncken et al., 2018). The procedural and functional characteristics of new models of start-up support also change our view on organisational sponsorship theory. Support mechanisms that seem to have been designed to provide buffering by offering a protected space, also enable bridging by facilitating connections with external resource providers. This

paper provides a more nuanced analysis of the characteristics of established and new models of start-up support, of their overlaps and complementarities, and of the way in which they provide start-ups with buffering and bridging. With our framework we thus show how new support models change our assumptions about the intentions behind start-up support as well as how support can operate differently in the context of tech start-ups.

2. Diversification of Start-up Support

Start-up support intends to create conditions that are favourable for the growth of start-ups, either in a physical or virtual environment. It is a form of 'institutionalised' start-up support because it creates independent organisational structures, such as incubators and accelerators, separating it from other measures like subsidies where no such structures are established. To distinguish between different forms of institutionalised start-up support, we use Pauwels et al.'s (2016, p. 14) definition of an incubation model: 'the way in which an incubation entity provides support to start-ups.' Support models can differ with regard to the scope of functions (Mian et al., 2016) and how they mirror the geographic, political, social, and economic systems in which they are embedded (Phan et al., 2005). In line with previous studies (Aernoud, 2004; Bollingtoft & Ulhoi, 2005; Pauwels et al., 2016; van Weele et al., 2016), in this paper we not only use 'incubation' as umbrella term for various different models of institutionalised start-up support but also extend its scope significantly to include different models into the space of start-up support.

To understand the historical development of different models of start-up support over the past 10 years, we analysed data from Scopus and Factiva that reflects academic and public interest, respectively, and conducted a keyword search for the period of 2008–2018. The selection of terms was based on previously defined models of incubation and NESTA's

(2017) UK incubation database which led us to include 'business incubator', 'start-up accelerator', 'makerspace', 'hackathon', and 'start-up competition' as the basic models of start-up support studied in this paper.[15] We included homonyms and synonyms of terms (e.g. hackerspaces and fablabs) to allow for greater variety but excluded subject areas in Scopus outside our area of interest.[16] While some variations of makerspaces, hackathons, and start-up competitions have existed already since some time, only in recent years a surge of these models of support can be observed in many ecosystems. Although there might also be other models of start-up support that should receive attention in the future, the three mentioned models seem to differ significantly from one another and are thus selected for this study.[17] This is evident when looking at the main characteristics. In contrast to accelerators and business incubators, makerspaces and hackathons are characterised by deliberately unstructured support process that aim to create collaboration of participants (Browder et al., 2019; Fleming, 2015; Koole et al., 2017). Start-up competitions instead clearly focus on creating competition behaviour between participants (Lucas et al., 2016). Although some characteristics can clearly also be found in accelerators (Pauwels et al., 2015), the differences are nonetheless significant. The selection of makerspaces, hackathons, and start-up competitions for this study is therefore based on differences to other support models, as well as a deliberate simplification for research purposes. The landscape of start-up support is increasingly heterogenous and fragmented (e.g. hybrid models exist too) and in order to understand these complex entrepreneurial ecosystems, the paper deliberately reduces this complexity in focussing on the mentioned archetypical support models.

[15]While we also observed a strong growth of co-working spaces, we decided not to include these in our analysis due to their strong focus on office-space provision instead of other forms of start-up support.
[16]The data from the Scopus and Factiva databases was compiled in April 2019.
[17]Both the increasing diffusion of these three models, as well as the apparent differences between them, are the reason for the study's selection of these support models. While this is a deliberate selection, future studies might conduct similar comparisons with other models of start-up support not mentioned here.

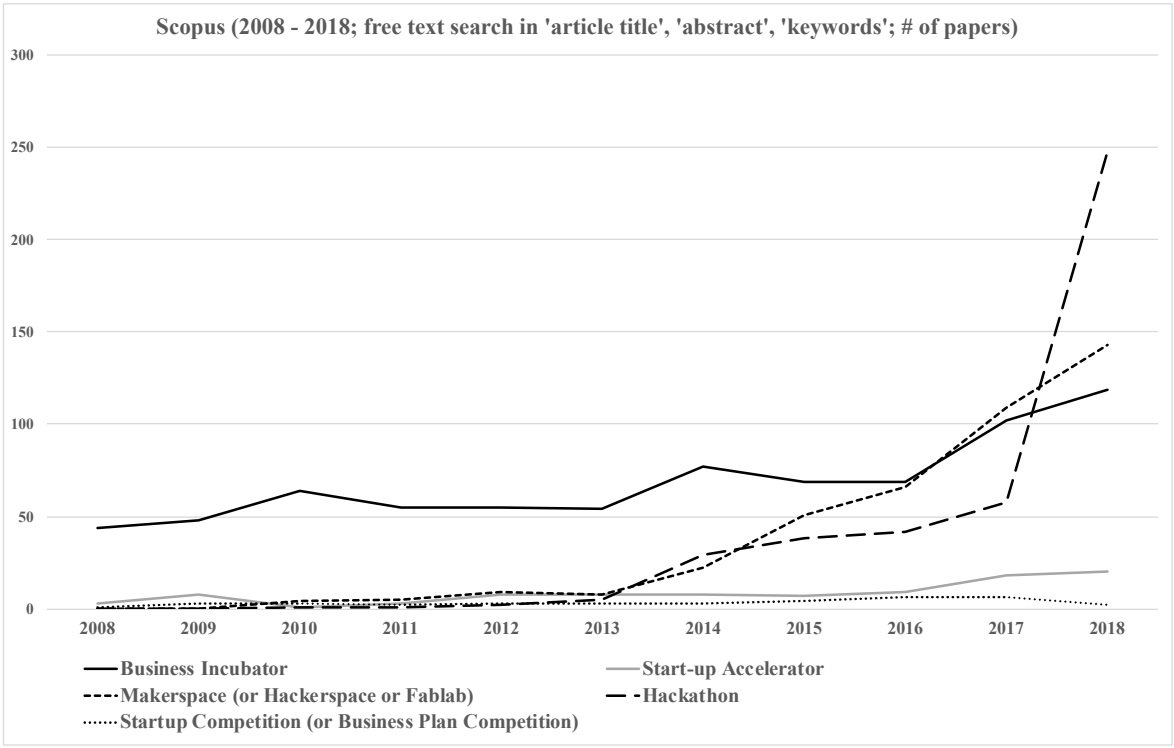

Figure 2: Scopus (2008 - 2018; keywords in 'article title', 'abstract', 'keywords'; # of papers)

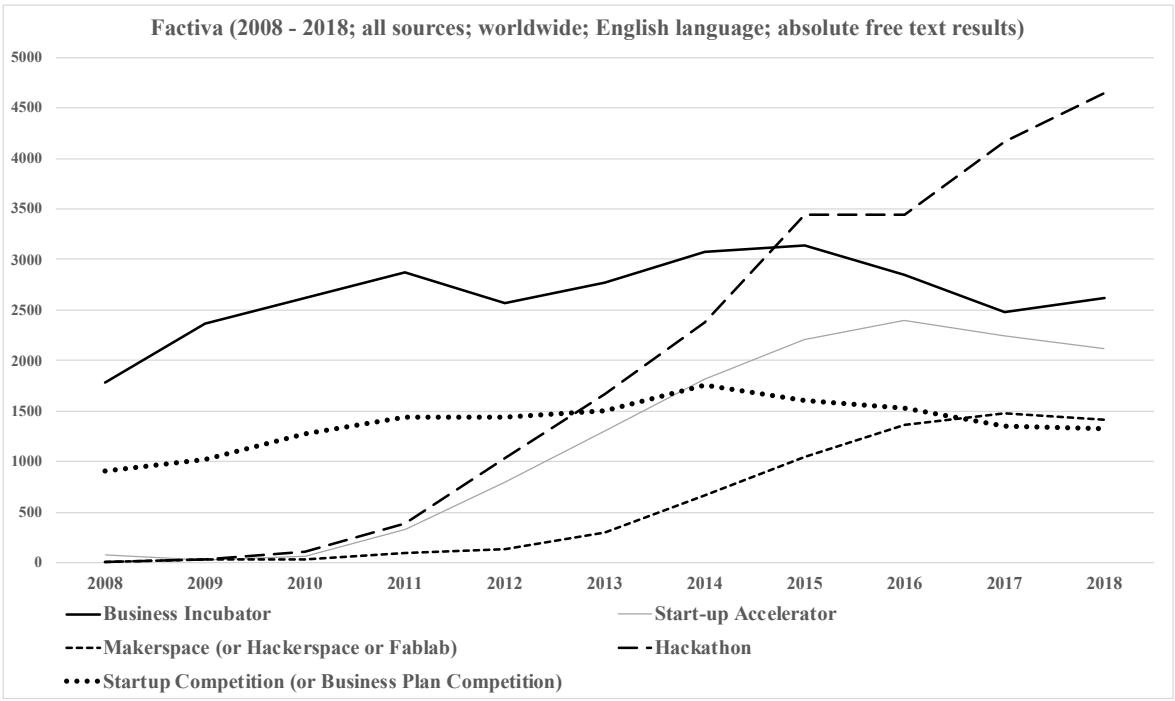

Figure 3: Factiva (2008 - 2018; all sources; worldwide; English language; free text results)

The keyword search confirmed an increased interest in all models of start-up support over time as well as an increasing heterogeneity of the support landscape. The data shows that after the dot-com bubble first created a sharp growth in support models, a decline set in (Aerts et al., 2007; Hackett & Dilts, 2004), followed by a rapid diversification in models of start-up support. Accelerators have developed into a leading support model (Pauwels et al., 2016). Similarly, hackathons have gained traction. While companies such as Google and Facebook use hackathons for in-house innovation development, it has also spread to the non-corporate world, serving as a vehicle for new venture development and team building (Briscoe & Mulligan, 2014; Fattal, 2012; Irani, 2015). Finally, makerspaces (including hackerspaces and fablabs) have increased in popularity since 2012. Taken together, then, institutionalised start-up support is surging when we consider the attention different models of start-up support currently receive in the academic and popular publication outlets.

3. Start-up Support as a Form of Organisational Sponsorship

Although researchers and policymakers tend to assume that start-up support in its various forms contributes positively to the performance of start-ups, the theoretical explanation for this relation is less clear (for an overview see Eveleens et al., 2017). In this paper, we draw on organisational sponsorship theory which is built on insights from resource dependence and population ecology theory. Organisational sponsorship theory considers incubation as a way to mediate the relationship between start-ups and their environment (Amezcua et al., 2013; Cohen et al., 2018; Flynn, 1993). It posits that support models try to provide a resource-munificent environment to improve growth and survival rates of start-ups (Amezcua et al., 2013). We specifically build on Amezcua et al.'s (2013) distinction

between ‘buffering’ and ‘bridging’ which are two mechanisms by which support models broker between start-ups and their environment.

The buffering mechanism that an incubator provides internally shelters start-ups from the external environment and associated risks (Lynn, 2005; Mrkajic, 2017). Buffering aims to reduce resource dependency and to alleviate start-ups’ need to access resources externally (Pfeffer & Salancik, 1978). It allows start-ups to isolate themselves from the environment to conduct their activities within the protected space of the support model. It consists of direct support services that transfer knowledge, capital, or labour to start-ups within the support organisation (Amezcua et al., 2013). In contrast, the bridging mechanism provides start-ups with connections to external resource providers (Mrkajic, 2017) and normative alignment (Zimmerman & Zeitz, 2002). Bridging enables and supports start-ups in connecting to their environment and acquiring external resources (Amezcua et al., 2013). Bridging is built on the assumption that relationships with external resource providers can decrease structural and relational deficiencies of start-ups (Baum & Oliver, 1991). An increase in the quantity and quality of relationships improves start-ups’ social capital and subsequent exchanges of resources and knowledge (Amezcua et al., 2013; Flynn, 1993). It consists of services that enable networking with resource providers outside of the support organisation (Venkataraman, 2002) and field-building services that enable creating networks with similar ventures or future customers. Both types of services buttress the development of legitimacy through normative alignment with the external environment (Aldrich & Martinez, 2005; Amezcua et al., 2013) because they allow start-ups to develop a better understanding of the expectations of their organisational community.

In summary, organisational sponsorship theory allows shedding light on the distinguishing elements of how new models of start-up support provide start-up support compared to more established support models (Amezcua et al., 2013; Pauwels et al., 2016).

Placing makerspaces, hackathons, and start-up competitions under this conceptual umbrella allows policymakers to look beyond the established models of accelerators and business incubators. The analysis of the competing and complementary roles of support models in entrepreneurial ecosystem is crucial to improve public policies that aim to optimally support founding numbers and venture growth (Rigby & Ramlogan, 2016). In the remainder of the paper, we will refer to buffering and bridging as 'functional elements' of support. Figure 4 categorises the different models of start-up support based on their focus on buffering and bridging, respectively, as we will explain in more detail in the next section. Although clear boundaries between the two mechanisms are difficult to define and significant interdependencies exist, some support models tend to focus more on buffering, some more on bridging, and some combine both.

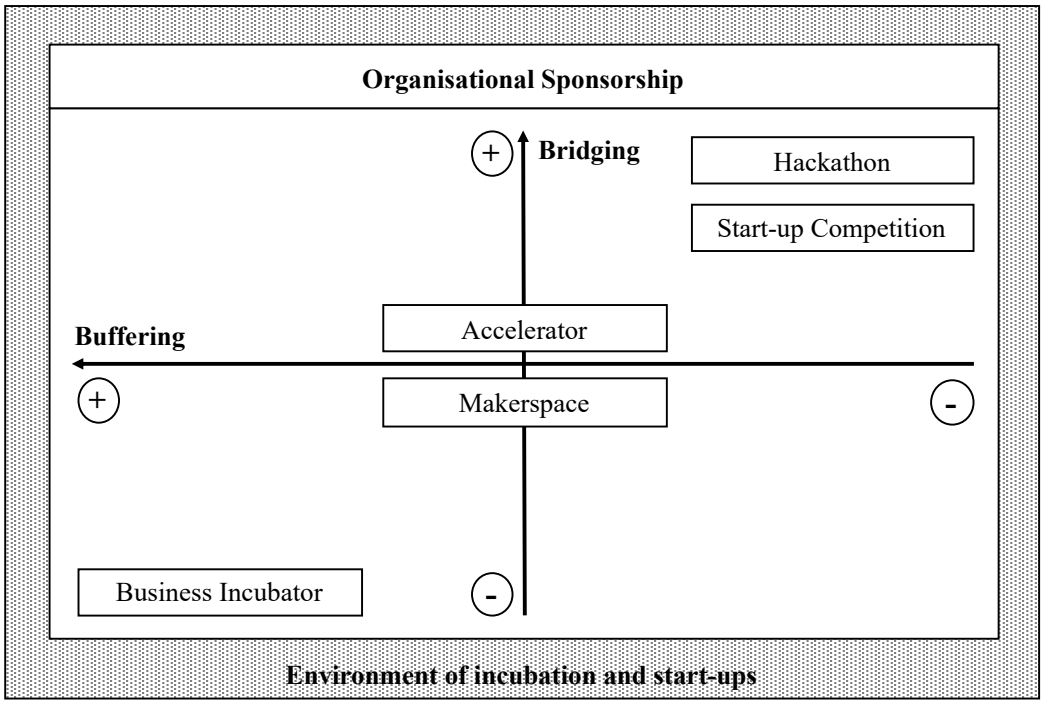

Figure 4: The role of buffering and bridging in models of start-up support

4. Foundational Elements that Shape Models of Start-up Support

To understand the differences and unique configurations of models of start-up support and to compare new models with established ones, we analytically disentangle the elements that shape and define support models and develop a conceptual framework. For this purpose, the paper first delves into functional elements and then elaborates on procedural and structural elements. Our framework's three categories are based on McAdam et al.'s (2016) levels of the start-up environment: macro, meso, and micro. While McAdam et al. (2016) adopt a stakeholder lens concentrating on the external context of incubation, they address less attention to elements internal to models of start-up support. In explaining the different support models, this paper puts functional and procedural elements to the fore and discerns between elements being endogenous or exogenous. We first distinguish between *Functional elements* that define the characteristics of support functions provided to start-ups and *Procedural elements* that shape the process of support provision. Both categories reflect the micro environment and are endogenously determined as support organisations have the agency to shape them. *Structural elements* define the external regional and organisational context of start-up support. They comprise the macro and meso environment and are exogenously determined as support organisations cannot fully influence them. Table 2 provides an overview of the functional, procedural, and structural elements that together form our framework, distinguishing between five models of start-up support. As Table 2 shows, each model represents a unique configuration of these elements explaining the heterogeneity of the support landscape. In the remainder, we will briefly explain each category and its elements and then focus on their interplay to analyse what makes the new support models of makerspaces, hackathons, and start-up competitions unique.

4.1 Functional Elements

Functional elements define the characteristics of support functions that support models can provide to start-ups. As the support model can actively influence these elements (either directly or as an intermediary), they are endogenous. Their characteristics might be affected by procedural elements which will be discussed in the next section. Functional elements reflect the value added or functional perspective that various authors have used. Campbell et al.'s (1985) early work on business incubation identified four values incubators can add to start-ups: the diagnosis of business needs, the selection and monitoring of needed business services, access to capital, and access to networks. Drawing on insights from several studies (Allen & McCluskey, 1990; European Commission, 2002; Sternberg, 1997; Westhead & Storey, 1994) and Campbell et al.'s (1985) four values, Schwartz (2013) developed a more fine-grained list of the main support functions as Figure 5 shows. As mentioned above, we consider the functional elements in light of organisational sponsorship theory and attribute them to buffering and bridging, respectively. However, as Figure 5 depicts, the boundaries between the elements are not always clear-cut, some can be categorised both as buffering and bridging.

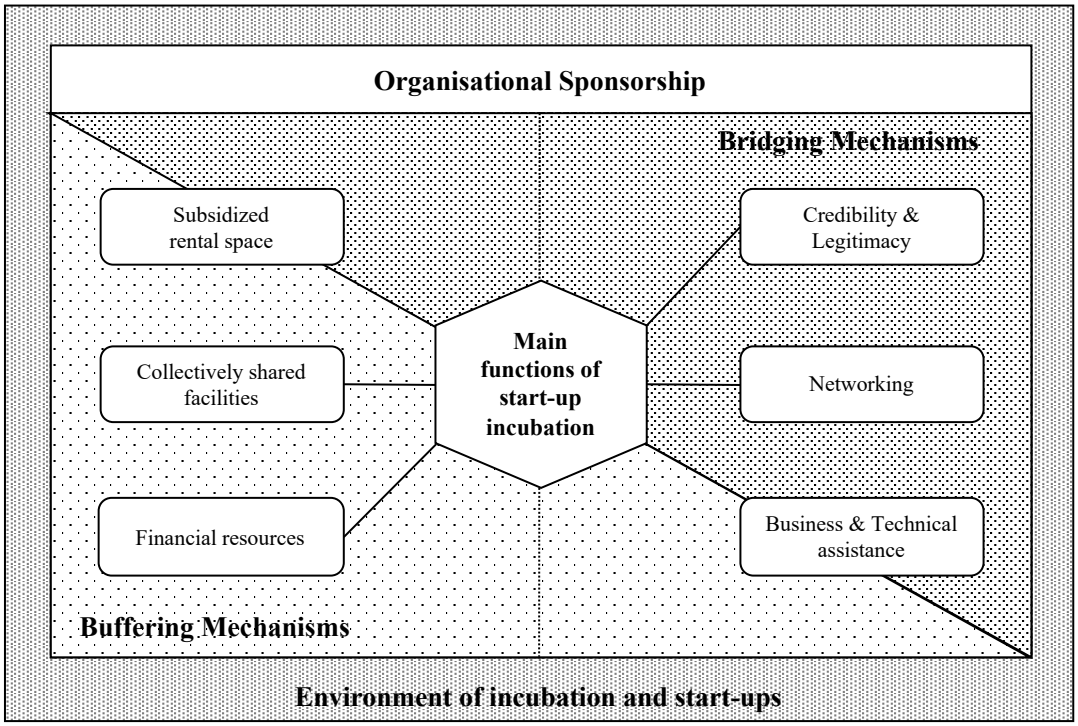

Figure 5: Main functional elements of support of organisational sponsorship (adapted from Schwartz, 2013)

Buffering refers to a support model's provision of financial resources and collectively shared facilities as well as the 'hybrid mechanisms' of subsidized rental space and business and technical assistance. Financial resources constitute one of the major resources that are linked to the growth of start-ups (Clarysse et al., 2011); a lack of capital is one of the main limits for start-up growth (Furlan et al., 2014; Hartarska & Gonzalez-Vega, 2006). However, high information asymmetry and liabilities of newness and smallness are also influencing start-ups' ability to acquire financial resources (Davila et al., 2003; Fisher et al., 2016). By providing non-equity-based (Miller & Bound, 2011) or equity-based capital (Pauwels et al., 2016), support models shelter start-ups from outside risks. Collectively shared facilities can help start-ups to reduce fixed costs and provide them with flexibility (Aerts et al., 2007; Chan & Lau, 2005; McAdam & McAdam, 2008; Schwartz, 2013) due to the economies of scale and scope associated with sharing (Mrkajic, 2017). Supported start-ups are not required to source equipment or laboratory access externally. While subsidized rental space acts as a buffering mechanism by reducing fixed costs and

providing flexibility, it can also function as a bridging mechanism. Close spatial proximity between founders, start-ups, and support management from sharing office space can facilitate networking (Knoben & Oerlemans, 2006) and access to external resources. Business and technical assistance provided internally (buffering) by the support management or the cohort, or externally (bridging) by affiliated advisors addresses information imperfections of start-ups who might not even be aware of their need for assistance (Rigby & Ramlogan, 2016). Assistance can cover daily business processes, long-term strategic planning, or technical knowledge (Allen & McCluskey, 1990; European Commission, 2002; McAdam & McAdam, 2008; Schwartz, 2013).

Bridging focuses on networking activities that support models initiate or support, as well as on legitimacy development of supported start-ups. Networking and its dynamic and multiplex relationships of exchange can enable access to tangible and intangible resources (e.g. knowledge, finance). Support models can help with the formation and development of internal and external networks (Bøllingtoft & Ulhøi, 2005). They act as intermediaries (Schwartz, 2013; Scillitoe & Chakrabarti, 2010) that encourage mutual (internal) sharing of various resources in a formal (contractual) or informal way (Bøllingtoft & Ulhøi, 2005). Externally, support models can facilitate networking with potential customers or suppliers, financial institutions, specialized external support providers (Bøllingtoft & Ulhøi, 2005; Schwartz, 2013), or higher education institutes (HEIs) (Link et al., 2007). Legitimacy and credibility are important functions of support for support models to provide (Ferguson & Olofsson, 2004; McAdam & Marlow, 2007; McAdam & McAdam, 2008; Schwartz, 2013). Start-ups are confronted with liability-of-newness and -smallness concerns due to their high risk of failure (Fisher et al., 2016) and can be considered as low-power actors struggling to build a positive perception or public image that is necessary for resource acquisition (Fisher et al., 2016; Santos & Eisenhardt, 2009). Support organisations can create legitimacy for

start-ups through their strict selection process, their external network by functioning as a central hub that acts as a proof of integrity, and their association with organisations that act as an anchor directly influencing the support models' image. Hence, start-up support can help ventures crossing legitimacy thresholds by providing trust to changing audiences in different socially constructed systems (Fisher et al., 2016).

4.2 Procedural Elements

Procedural elements shape the process of start-up support and the provision of support (McAdam et al., 2016). The elements of cohort composition, incubator governance, and the application and selection process define the internal organisation of the support model which forms the basis for how functional elements are provided to supported start-ups. Procedural elements directly influence the experience of supported start-ups and are embedded in the structural elements of the external organisational context and environment. Despite the external context's impact, it is the support management or its shareholders that define and implement the procedural elements, making them endogenous. While the support management tends to shape the procedural elements, other stakeholders might also intervene by co-creating, shaping, or changing support procedures through interaction and collaboration (McAdam et al., 2016). The procedural elements presented in this paper do not form an exhaustive list but enable a processual comparison of models of start-up support.

Cohort composition defines the characteristics of founders or start-ups that participate in support. Different models of start-up support can specialize in start-ups that are active in one sector, target a customer group, use a particular technology, or are in a specific developmental stage or spatial area (Aerts et al., 2007; Mian et al., 2016; Pauwels et al., 2016). Some models combine specializations, targeting an increasingly narrow group of start-ups. Many different degrees of specialization on different levels are possible,

creating space for heterogeneity of models of start-up support. Ideally, the support processes and the provision of support functions, which are formative for the whole support provision, are aligned with the needs of a particular cohort (Schwartz & Hornych, 2008; 2010). Incubator governance comprises the degree of formalization, the length of the programme, and the role of support management. Formalization defines the obligation of start-ups to participate in or engage with certain support measures. The length of support differs widely, ranging from open-ended programmes to those with a clearly defined end date, often culminating in a demo or presentation day. Management's role differs in the degree of activity and approach (Bollingtoft & Ulhoi, 2005; Grimaldi & Grandi, 2005). Finally, the application and selection processes define who can apply for admission into a support model (Miller & Bound, 2011) and how they select applicants (Aerts et al., 2007; Hackett & Dilts, 2004).

4.3 Structural Elements

The structural elements represent the external regional and organisational context and refer to the influence of the macro and meso environment of models of start-up supports (McAdam et al., 2016). Firstly, structural elements highlight the 'regional specificities' a support model is exposed to and the role of external stakeholders. Secondly, these elements define the external organisational context such as the integration into clusters or higher education institutes or the characteristics and compositions of the main shareholders and sources of funding. Structural elements not only define the embeddedness and connectivity of the support model within its environment but also influence the availability of resources and salience of stakeholders (McAdam et al., 2016). These elements are exogenous, as support models have limited influence over them.

The regional specificities contain elements such as infrastructure (e.g. transport) and culture (e.g. risk-taking propensity) of a specific location the model of start-up support is based in and the entrepreneurship policies that influence it directly or indirectly (Rigby & Ramlogan, 2016). Other structural elements are the integration into clusters and links with higher education institutes. Models of start-up supports can maintain formal or informal partnerships with universities or companies and thus play an important role in the development of regional clusters (Siegel et al., 2003). The spatial proximity to those organisations supports exchange and communication (Knoben & Oerlemans, 2006) and the overlap of knowledge or market focus facilitates knowledge exchange and networking (Mowery et al., 1998; Schwartz & Hornych, 2008). The main shareholders of support models can be generally categorized into public shareholders with non-profit interests and private shareholders with profit interests (Becker & Gassmann, 2006). Public shareholders are often universities, regional governments, or their intermediaries and tend to be driven by targets of entrepreneurship policies, cluster policies, and regional development. Private shareholders are more diverse, comprising venture capitalists, business angels (or networks of investors), large (parent) companies, or the community of start-ups itself (Becker & Gassmann, 2006; Grimaldi & Grandi, 2005; von Zedtwitz & Grimaldi, 2006). While some shareholders are mainly interested in high returns on investment, others are more interested in knowledge spillover, generation of innovation, or community building (Becker & Gassmann, 2006). These interests are also reflected in the sources of funding. Public shareholders are more prone to public funding or fee-based models, while private shareholders generate revenues through (equity) investments into their start-ups and potential later stage exits (Grimaldi & Grandi, 2005; Schwartz, 2013).

Table 2: Elements of support and their characteristics for different models of start-up support (based on Bollingtoft & Ulhoi, 2005; Chan & Lau, 2005; McAdam et al., 2016; NESTA, 2017; Pauwels et al., 2016; Schwartz, 2013; Schwartz et al., 2013; Westhead & Storey, 1994)

Actors	Categories	Elements	Characteristics of elements in different models of support				
Interactions between stakeholder groups influence structural, procedural, and functional elements.	**Structural Elements**		**Business Incubators**	**Accelerators**	**Makerspaces / Hackerspaces**	**Hackathons**	**Start-up Competitions**
		Regional specificities	Variable	Variable	Variable	Variable	Variable
		Integration into industrial cluster and Links to higher education institutes	Strong focus	Variable	Variable	Variable	Variable
		Main shareholders and Source of funding	Variable / Fee-based	Variable / Equity investments	Community / Non-profit	Variable / Non-profit	Variable / Non-profit
	Procedural Elements	**Cohort composition (e.g. sectors; development stages)**	Variable	Increased specialization	Variable	Increased specialization	Increased specialization
		Incubator Governance - Degree of formalization - Length - Role of management	Low Long Variable	High Short Active	Low Variable Variable	Low Short Variable	High Short Variable
		Application & Selection process	Varies / Varies	Open / Competitive	N/A	Open / Varies	Open / Competitive
	Functional Elements	**Subsidized rental space and Collectively shared facilities**	Strong focus	Variable	Strong focus	Temporary	N/A
		Financial resources	Various forms	Equity-based, often fixed deals	Not provided	Competition-based prize	Competition-based prize
		Business & Technical assistance	Variable	Strong focus	Strong focus	Strong focus	Variable
		Credibility and Legitimacy	Variable	Strong focus	Variable	Strong focus	Strong focus
		Networking (Internal & External)	Variable	Strong focus	Variable	Strong focus	Strong focus
	Mechanisms of organisational sponsorship		**Buffering**	⟷			**Bridging**

5. Comparing established Models with Newcomers

The comparison of the established support models of business incubator and accelerator with the newcomers of makerspace, hackathon, and start-up competition does not only enable us to reflect on their intentions and support provision but also allows us to contribute to organisational sponsorship theory. However, it is important to acknowledge that unlike established models of start-up support, newcomers are still very much in the development. It is challenging to define archetypical models for these support models as makerspaces, hackathons, and start-up competitions remain rather heterogeneous in their processes, shareholders, and structures. This section therefore firstly reflects on the general intentions that drive the different models, on the processes used, and on the functions provided. It then sheds light on how buffering and bridging mechanisms are balanced in the respective models of start-up supports.

5.1 From Business Incubators to Accelerators

Although there might be a shift from traditional business incubators towards accelerators (NESTA, 2017; see keyword analysis), the raison d'être of the original business incubator is still relevant. Looking back at Allen and McCluskey's (1990) incubator continuum and Bøllingtoft & Ulhøi's (2005) advancement, the business incubator model constitutes the original form of start-up incubation. Although the initial model of a 'real-estate incubator' has increasingly developed into the 'networked incubator' (Bøllingtoft & Ulhøi, 2005; Hansen et al., 2000), its original emphasis on supporting incubatees through economies of scale (Pauwels et al, 2016), often with flexible rental space and business services (Dee et al., 2015), has remained the same. Their services mirror business incubators'

diverse target groups: start-ups in different stages of development as well as rather advanced companies (Hackett & Dilts, 2004). They do not only focus on high-growth start-ups but also serve a variety of needs of other types of companies (NESTA, 2017).

The flexibility and focus on economies of scale also come back in the structural, procedural, and functional elements. Structurally, business incubators strongly rely on their (physical and/or organisational) embeddedness into the environment and focus on structural links with industrial clusters and universities (NESTA, 2017). The funding sources of business incubators reflect the original emphasis on real-estate provision. Incubatees have to pay fees or rents for services and space (Aerts et al., 2007; Dee et al., 2015), which can inhibit early-stage start-ups with limited funding from applying and instead benefit rather advanced start-ups that are not able to participate in equity-based models of start-up support due to opposing shareholder interests (e.g. down rounds leading to decreased valuations). The flexibility of business incubators is also noticeable in the procedural elements. There is usually not a particular specialisation in the cohort composition. The formalization is relatively low and the length of support is highly flexible and fairly long. The exit of incubatees is usually based on their individual needs and development, not on the incubators' sequence of support provision and cohort admission (NESTA, 2017). Although the application and selection process is open, admission works on an ad-hoc basis that is not cohort-based (NESTA, 2017). On a functional level, provided support reflects the general mission of business incubators: while they emphasise rental space and facilities, they also aim to develop internal and external network structures that enable the provision of business and technical assistance. Business incubators mainly focus on buffering, providing support functions internally. However, integration and links with regional clusters or HEIs can support the development of bridging, leading to mixed functions of support. We can also see parallels to the increasingly popular coworking spaces. While these spaces usually do not

provide any active start-up support, they provide shared workspace and facilities and a community that facilitates interaction (Bouncken et al., 2018; Bouncken & Reuschl, 2018).

Looking at the other end of Bøllingtoft & Ulhøi's (2005) continuum, we can see models of start-up support that primarily focus on collaboration and investment acquisition with the accelerator as the archetypical model. Accelerators are a fairly new form of support, tracing back to the US Y Combinator founded in 2005 (Miller & Bound, 2011). Despite this rather short existence, its relevance has evolved significantly. This support model's rationale rests upon rapid growth of early-stage start-ups. Accelerators embody the aim of new venture development by focussing on enabling the validation of business models and providing resources for rapid early-stage growth. Start-ups' access to knowledge and networks as well as the development of legitimacy are accelerators' primary goals (Pauwels et al., 2016).

The structural, procedural and functional elements of accelerators reflect their rationale and target groups (i.e. mostly early-stage tech start-ups). Structurally, this model of start-up support stands out in terms of their main shareholders and source of funding. While accelerators have traditionally been an instrument of private investors (i.e. venture capitalists), more recently the model has also been used by other (public or corporate) shareholders (NESTA, 2017). Nevertheless, the main funding source for accelerators is taking equity from start-ups and acting as an investment organisation for shareholders (e.g. private, corporate, public investors) to nurture start-ups towards growth and later-stage exits (Pauwels et al., 2016). The procedural elements mirror the goal of rapid start-up growth. Accelerators do not only specialize in start-ups in one particular stage of development but also in one sector, often IT and digital technologies (Pauwels et al., 2016). Accelerators' governance is characterized by high formalization and a relatively low duration of support, usually culminating in a demo day. Compared to business incubators, support measures and formalizations are provided or facilitated by more active management by the accelerators'

shareholders. Accelerators maintain an open application process to attract a variety of applicants and to be able to run a highly competitive selection of start-ups. However, the surge in support models can create shortages of applicants, undermining competitive application and selection processes (Cohen & Hochberg, 2014; Miller & Bound, 2011; Pauwels et al., 2016).

The characteristics of functional elements highlight bridging. While accelerators make use of shared space, this mainly serves the purpose of developing other support functions. Buffering is utilised, but mainly to support the bridging of start-ups to their external environment. Through close spatial proximities of founders and support management, mutual business and technical assistance and networking is fostered (Cohen & Hochberg, 2014; Miller & Bound, 2011). The provision of legitimacy through various means helps early-stage start-ups to acquire vital resources (Fisher et al., 2016) which is augmented by offering financial resources to founders. Accelerators provide equity-based, pre-seed investment, made possible through cultivating close networks with business angels or other investors. This focus on intangible resources of legitimacy, knowledge, and networking mirrors accelerators' underlining rationale and the needs of their target groups, making it the archetypical networked incubator (Hansen et al., 2000). Accelerators balance the provision of buffering and bridging to accommodate the cohort's individual needs.

5.2 Makerspaces, Hackerspaces, and Fablabs

The terms makerspaces, hackerspaces, and fablabs are circulating throughout popular media for over a decade (Koole et al., 2017) and are often used interchangeably. Academic literature on this phenomenon is still limited but has been evolving (Browder et al., 2019). We conceptually integrate them into incubation research to understand their potential value for today's start-up landscape. Makerspaces (used as the umbrella term here) have been

defined as organisations where individuals are enabled to create new digital and physical things through developing skills in a collaborative environment with a focus on discovery and problem-based learning (Browder et al., 2019; Fleming, 2015; Koole et al., 2017). While some authors define makerspaces as communities where everyone can work on real or personally meaningful projects (Hlubinka et al., 2013), others highlight the collaborations between participants (Martin, 2015). This focus on creation has its roots in rapid prototyping. Makerspaces enable individuals to make use of digital fabrication and prototyping technology such as 3D printing. It also goes along with new target groups. Although makerspaces have traditionally been run with a non-profit goal, they have become increasingly attractive for potential founders as well as early-stage start-ups to develop prototypes and ideas for subsequent commercialisation.

The focus on experimentation, playing, and problem-based learning (Koole et al., 2017) comes back in the structural, procedural and functional elements. Structurally, makerspaces are unique in terms of their non-profit community shareholders. The community of makers tends to run the operation without an explicit profit model (mostly donations or member fees) (Tiepmar et al., 2018). Makerspaces have also become important for universities' entrepreneurship programmes. For instance, in the UK the University College London operates an established makerspace (MakeSpace) that is open for students and staff, the University of Edinburgh has started a pilot makerspace (uCreateStudio), and the University of Manchester is planning to include a new makerspace as the centrepiece of its new engineering campus development.[18] The procedural elements further illustrate openness and flexibility. Despite the presence of parent organisations such as universities, there is usually no particular cohort composition, and the incubator governance is rather modest. Makerspaces provide general guidance and instructions for the use of tools and

[18]See www.mecd.manchester.ac.uk

feasibility but do not utilize a dedicated support programme. Formalization is low with variable length of participation and influence of management teams. However, Koole et al. (2017) propose the dimensions of level of formality and level of participant control to illustrate possible variation between makerspaces. Access to the space is usually not restricted (possible restriction to students and staff of parent organisation) and open for the public – there is no selection process.

The structural and procedural elements significantly influence the functional elements. While there is naturally a strong focus on shared space, facilities, and equipment in makerspaces, the individual community shapes the intangible resources. Constantly changing members or participants and their individual interests, knowledge, and networks influence the process of mutual support (Koole et al., 2017). Makerspaces thus make use of a mixture of buffering and bridging. Unlike accelerators, bridging is focused more strongly on building connections with other participants that move in and out of the makerspaces though. Bridging also occurs in a more organic manner due to the community-based approach of this support model (Acquier et al., 2017). The community-based approach also comes back in its two subforms, hackerspaces and fablabs, which are relatively well-defined models despite Davee et al.'s (2015) identification of around 45 used terms. Originating from 'c-base', a first community-led space founded 1995 in Berlin (Cavalcanti, 2013), hackerspaces focus on programming and computation. Similarly, fablabs rely on digital technology but focus on hardware development (Davee et al., 2015; Lô & Diochon, 2018).

Although the rationale does not focus on commercialisation only, makerspaces offer support to potential founders or teams of early-stage start-ups that require prototyping or experimentation facilities (Browder et al., 2019). The community-based, collaborative, and non-profit spirit of makerspaces can also be appealing to other target groups. Start-ups with a social or ethical business model and people without the intention of immediate

commercialise products could prefer this model of start-up support to other growth-oriented models due the community feel. The community-based spirit is illustrated in the increasing establishment of university makerspaces that aim to enable student and staff to do rapid prototyping and potential commercialisation. By offering a mixture of buffering and bridging, makerspaces offer institutionalised forms of support for specific needs of start-ups that tend to be more community-based or non-profit-focused.

5.3 Hackathons

Hackathons are events in which a variety of different participants, mainly programmers and IT specialists, work collaboratively for a limited time to develop ideas and solutions for different purposes. The term is a combination of the words *hack* and *marathon*. Hackathons' historical roots can be traced back to first events in 1999 (Briscoe & Mulligan, 2014). Despite this early focus on IT, nowadays hackathons are also used to address societal problems, innovation generation, and product development. The diversity in purpose is reflected in the possible target groups. With their focus on problem-solving and new team composition, hackathons target potential founders and early-stage start-ups and can thus be regarded as part of the support landscape. However, this support model has also become relevant for larger organisations (e.g. NGOs or large technology companies) aiming for rapid generation of innovations or prototypes (Fattal, 2012; Granados & Pareja-Eastaway, 2019; Irani, 2015).

The structural elements are as diverse as the possible shareholders/organisers (private, public, community). Nevertheless, most hackathons are run on a non-profit basis – usually, there are no fees for participants and the organisers can vary. While large organisations or technology companies use it as a vehicle for in-house innovation development or problem-solving (Fattal, 2012; Irani, 2015), public organisations such as

universities and innovation agencies organise hackathons to solve problems in certain domains or to act as an enabler for start-up development. Despite different shareholders and their varying missions, the procedural elements (i.a. the general rules of events) tend to be similar across different hackathons (Komssi et al., 2015). The cohort composition depends on required and complementary skills to achieve the individual hackathon's objectives which means that it is often specialized on a sector, technology, or group of individuals (e.g. students, IT professionals). The incubator governance mirrors the open-source legacy. The degree of formalization is mostly low and apart from the rather short length of events (several hours to several days) with a fixed end date, participants largely enjoy great freedom and self-organisation. Hackathons that take place outside of a closed (parent) organisation emphasise their open-source roots – the application process is usually open to the public with highly limited selection processes.

On a functional level, hackathons offer various kinds of support to their participants. The temporary provision of shared office space enables close proximity between participants and team members, with the potential for improved communication (Knoben & Oerlemans, 2006). The competition-based structure with a final demo presentation enables gaining first financial resources through prize money and increased legitimacy in the case of winning. Complementary team compositions furthermore aim to provide participants with mutual technical or business assistance. Hackathons also allow participants to broaden their internal and external networks. They form venues for prospective employers to test and hire new team members or employees or for venture capitalists, business angels, or other investors to spot talent during demo presentations (Komssi et al., 2015). Hackathons, as a form of organisational sponsorship, mostly focus on providing bridging by connecting participants with their environment. Venture capitalists increasingly use hackathons as an instrument to quickly identify and evaluate new ideas, technologies, business models, and teams. This

growing interest of venture capitalists and companies might be a first indicator of the value of hackathons, despite a current lack of studies providing evidence of such impact (Granados & Pareja-Eastaway, 2019). The support functions of hackathons underpin their development from an instrument for rapid R&D to a vehicle for new product and start-up development (Chowdhury, 2012).

5.4 Start-up Competitions

Start-up competitions are based on the instrument of venture pitches: formal or oral communicative interactions of entrepreneurs about their venture idea and performance to secure funding (Lucas et al., 2016) and obtain legitimacy (Schwartz et al., 2013). These competitions take the form of isolated demo-days that enable acquiring resources in an institutionalised way. While in some cases the tangible (i.e. financial) rewards are provided immediately, start-up competitions can also act in a gatekeeping way, enabling subsequent (or prior) access to investors and networks. Often, they also provide services or business assistance to start-ups (Lucas et al., 2016) prior to or after the demo-day. The instrument of venture pitching relies on narrative sensemaking, promoting start-ups' opportunities (O'Connor, 2002; Pollack et al., 2012). The quality of these narratives influences legitimacy building, funding decisions of investors, and thereby venture success (Chen et al., 2009). From an entrepreneurship policy perspective, start-up competitions aim to increase the quantity and quality of start-ups by acting as a tool for the encouragement of entrepreneurial activity and by providing support (Foo et al., 2005; Schwartz et al., 2013).

The structural elements of start-up competitions can be rather diverse. While the shareholder structure can vary – there is for example an increasing number of privately funded start-up competitions (Schwartz et al., 2013) –, start-up competitions usually do not have fees for participants. Shareholders of start-up competitions can benefit, though, from

possible follow-up investments. Like hackathons, these events can be used as a screening tool for (private) investors or as a tool of entrepreneurship policy (e.g. university engagement) (Schwartz et al., 2013). Hence, strong links to higher-education institutes are common, especially in student-focused competitions (Wright et al., 2017). Although the procedural elements can vary widely, the fundamental concept of start-up competitions tends to stay the same (Schwartz et al., 2013). Start-up competitions usually target a specific group of founders or start-ups (specialized cohort composition), mirroring the shareholders' goals or interests. They might not only address a specific sector or technology (Schwartz et al., 2013) but also certain societal problems. The pre-defined rules of the competitions are reflected in the incubator governance. Strict conditions for the proposals or business plans, fixed presentation time, and pre-scribed presentation style and content create a high degree of formalization. Naturally, start-up competitions are rather short in length, but pre-selection pitchings, pitch training, and post-pitch assistance can significantly increase the overall length. While the support management only takes on a moderator role, advisory committees that assess business plans engage in extensive feedback and coaching. The application process is usually open with a selection process that sometimes involves some pre-selection before the final pitch event (Russel et al., 2008; Schwartz et al., 2013).

Start-up competitions' functional elements underpin their unique value as a model of start-up support; they mirror the functions and resources of accelerators' demo-days. Through competition-based prize money, early-stage start-ups or individual founders are able to obtain their first financial resources (e.g., grants or equity-investments), thus serving the purpose of buffering. There is also a strong focus on legitimacy building (Lucas et al., 2016) and networking (Foo et al., 2005), though, which implies a bridging function instead. Start-up competitions provide cognitive legitimacy, which is a requirement and enabler for the acquisition of other resources. Winning start-up competitions sends a strong positive

signal to investors, customers, and future team members (Lucas et al., 2016; Pollack et al., 2012; Schwartz et al., 2013). For early-stage start-ups, the pitch can be the most important signalling strategy available (Elsbach, 2003; Pollack et al., 2012). In terms of networking, start-up competitions contribute to connections with other start-ups facing similar challenges, and with a variety of external resource providers acting as judges or attending the demo-day (Foo et al., 2005; Schwartz et al., 2013). Furthermore, the repetition of pitching enables increased preparedness and reiteration of the business model, leading to improved social skills, increased legitimacy, and a better network. Despite their one-off character, founders and start-ups can use start-up competitions repetitively and thus benefit from the buffering by incrementally building up financial resources and the bridging towards various different external audiences. The relatively accessible nature of start-up competitions and limited need for commitment makes start-up competitions attractive to founders and start-ups that are not able or willing to participate in lengthier or more extensive models of support. Due to their accessible nature, start-up competitions can be beneficial both for pre-nascent start-ups (Passaro et al., 2016) and for nascent start-ups, aiming to become an established company (Schwartz et al., 2013).

6. Competitive or Complementary Models and the Changing Nature of Buffering and Bridging Mechanisms

The analysis of the foundational elements of models of start-up support does not only enable comparing the models on a functional, procedural, and structural level but elaborating on whether new support models are competing against established ones or if they take complementary roles in the entrepreneurial ecosystem instead. Table 3 presents an overview of the overlaps and complementarities of the new models of start-up support vis-à-vis the

established ones. We define overlaps as processes and/or functions of support that are similar in intention (raison d'être) and/or implementation (mode of action) and therefore lead to a state of competition between support models. This definition assumes that within the support landscape different models compete for high-quality founders or start-ups. We define complementarities as processes and/or functions of support that are distinctly different in intention (raison d'être) and/or implementation (mode of action) and therefore create a state of complementarity between support models. The underlying assumption is that different models of start-up support can serve different start-up needs in an entrepreneurial ecosystem (i.e. fit of needs/support). This analysis subsequently reflects on how the nature of buffering and bridging changes in the light of overlaps and complementarities between support models and how this influences our thinking about organisational sponsorship theory.

By looking at the distinguishing features of the new models of start-up support in terms of how their processes and functions act in a complementary way, we draw two conclusions. Firstly, the new support models all focus on collaborative experimentation and playful learning, but each model does so in different ways. While makerspaces and hackathons put emphasis on creating a collaborative learning environment to achieve this, start-up competitions tend to be more concerned with the gamification aspect of playful learning for market and/or educational purposes (Passaro et al., 2017). Makerspaces and hackathons, in particular, achieve collaborative experimentation and playful learning through low levels of programme formalization and a community-based approach which give participants considerable decision-making power. While the support occurs in a fairly protected environment (both physically and conceptually, due to the focus on experimentation) and makes use of buffering mechanisms (e.g., shared space and equipment, and internal assistance), overall the functional focus of makerspaces, hackathons, and start-up competitions is more oriented towards bridging. Fostering connections with other

participants and external resource providers as well as developing legitimacy for the start-up and venture idea are key objectives of the new models of start-up support. Looking at the fundamental rationales, the procedural characteristics, and the functional focus of the new support models, we argue that they are especially suitable for individuals or teams in a pre-nascent start-up stage. Learning, team building, and, subsequently, prototype development and testing are at the core of early-stage start-up development. Creating conditions for collaborative experimentation and playful learning in an informal environment that provides bridging is particularly important for this group as it enables them to develop into fully operational start-ups.

Table 3: Overlaps and complementarities of new and established models of start-up support

Models of start-up support	**Business Incubator**		**Accelerator**	
	Overlaps	**Complementarities of new models**	**Overlaps**	**Complementarities of new models**
Makerspace	• Focus on workspace and equipment (both can provide labs and tools) • Both models rely on fees of participants (although business incubators act as a property developer and makerspaces ask for 'symbolic' fees) • Low degree of formalization • Potential provision of business and/or technical assistance	• Community-based approach (i.e. community acts as main shareholder) • Focus on playful learning and experimentation • Very low 'symbolic' fees • Suitable for individuals in pre-nascent start-up stage	• Strong focus on business and/or technical assistance from support management and peers (buffering and bridging)	• Community-based approach (i.e. community acts as main shareholder) • Focus on playful learning and experimentation (manifested in lower degree of formalization and less active support management) • Suitable for individuals in pre-nascent start-up stage
Hackathon	• Provision of workspace (short-term vs. long-term provision illustrates different intentions) • Low degree of formalization	• Cooperative approach of hackathons focusses on team building and new product development • Hackathons are time restricted (short-term nature increases pressure of solution development) • Suitable for individuals in pre-nascent start-up stage	• Compression of accelerators' cohort model (start-ups join the same workspace to facilitate cooperation and potentially coopetition) • Adoption of a homogenous cohort composition possible (e.g. technology, sector) • Strong focus on business and/or technical assistance from support management	• Accelerators' equity-based investments are contrary to competition-based prizes (differing target groups and advantages and disadvantages for start-ups) • Low degree of formalization • Cooperative approach of hackathons focusses on team building and new product development • Also suitable for individuals in pre-nascent start-up stage

			and peers (buffering and bridging) • Strong focus on bridging (networking and legitimacy), often supported by demo-day/pitch event	
Start-up Competition	• Potential provision of business and/or technical assistance (pre and post demo-day)	• Focus on demo-day function and underlying bridging mechanisms • No focus on physical space (allows distributed competition models) • Emphasis on competition among participants may encourage coopetition behaviour	• Isolation of the demo-day function of accelerators and its ex-ante and ex-post support mechanisms • Adoption of a homogenous cohort composition possible (e.g. technology, sector) • High degree of formalization and competitive selection process • Strong focus on bridging (networking and legitimacy)	• Accelerators' equity-based investments are contrary to competition-based prizes (differing target groups and advantages and disadvantages for start-ups)

Secondly, while accelerators are also time-restricted, hackathons and start-up competitions significantly increase this pressure with their much shorter programme duration. This short-term nature, combined with a competitive element, increases the pressure for the cooperative development of solutions, on the one hand, and competition among participants, on the other. Hackathons and start-up competitions award the high pressure that start-ups experience through immediate pay-offs in the form competition-based prizes (e.g., finance, office space, mentoring). While accelerators' main pay-off is attracting financial resources, mainly from equity-based investments, our conceptual framework shows that the new competition-based models of start-up support award resources more as a way to motivate start-ups to continue their development and to gain legitimacy; the actual prize is of limited monetary value. We thus argue that creating the conditions for coopetition behaviour to emerge is a main feature of the new models to support start-ups in their development (Bengtsson & Kock, 2014; Bouncken et al., 2018). This coopetition behaviour is further supported by the bridging mechanisms that the new models of start-up support provide. Their activities as a connective intermediary for start-ups underpin the inherent basic principles of coopetition. Simultaneous collaboration and competition between participants require networking efforts, both internally and externally (Bengtsson & Kock, 2000).

Despite the various overlaps with the established models, we argue that the new models of start-up support have significant potential to add complementary functions to the entrepreneurial ecosystem. Due to their specific features, makerspaces, hackathons and start-up competitions offer support that seems particularly well suited to individuals and teams in pre-nascent start-up stages as well as start-ups that shun the more traditional support which has a strong commercial orientation. The distinctive features of collaborative experimentation and playful learning allow start-ups in pre-nascent stages to work on

validating their ventures ideas and on building their teams. Furthermore, the focus on cooperative solution development of makerspaces and hackathons motivates such start-ups to start creating real products and going beyond the narrative of the venture idea. Furthermore, the community-based approach of some of the new models of start-up support makes these more attractive to social entrepreneurs that seek to scale their ventures without losing sight of their social mission (Acquier et al., 2017). Collaborative experimentation in a competitive setting goes well with the objective of social entrepreneurs to use business skills to address societal issues (Mair and Marti, 2006).

Based on our conceptual analysis, we also argue that what makes the new models of start-up support unique urges a rethinking of the nature of buffering and bridging in providing start-up support. While Amezcua et al. (2013) note that direct support measures, which transfer knowledge, capital, or labour, can act as a buffering (capital, space, labour) or a bridging (knowledge) mechanism, new support models change the nature of these mechanisms. The common intention behind buffering is to develop start-ups' internal resources and to reduce resource dependencies from the environment. However, the new models of start-up support seem to provide those direct support measures in a different way. For instance, hackathons and makerspaces do not only provide physical space to reduce start-ups' cash burn rate, and thus provide buffering, but also to enable internal (field building) and external networking, thus repurposing the space's function towards bridging. Moreover, while external resource providers have access to the space, hackathons and makerspaces have a strong internal focus on team building and mutual support. Still, makerspaces also provide buffering but in a rather unique way; that is, the tools and equipment they provide to make ideas into real products alleviate start-ups' dependency on physical external resources. Similarly, the distinguishing feature of awarding competition-based prizes (e.g., finance, space, mentoring), common in hackathons and start-up competitions, also provides

a unique blend of buffering and bridging. The original assumption of financial support as acting in a buffering way still seems to hold true as the prize money can be one of the main means for start-ups to fund their venture in a pre-nascent stage (especially for tech start-ups in the software sector). However, the intentions behind these prizes not only concern the reduction of resource dependency, but also the development of start-ups' legitimacy that enables networking. Winning a hackathon or start-up competition generates a strong positive signal to the environment. Competition-based prizes thus act as a bridging mechanism and the buffering that the financial support provides might even become a side benefit.

7. Conclusions

In this paper, we have developed a conceptual framework that deepens our understanding of the new support models of makerspaces, hackathons and start-up competitions by identifying their structural, procedural and functional elements. Our conceptual framework explains what makes these models distinctive when they are considered as a form of start-up support and how they compare to the more established support models of the traditional business incubator and the accelerator. With our framework, we offer one of the first attempts to conceptualize makerspaces, hackathons, and start-up competitions by putting them under the umbrella term of incubation. We show that while makerspaces particularly focus on collaborative experimentation, and start-up competitions make use of a short-term, competitive process, hackathons combine both seemingly contrasting features. Despite these differences, all three models draw on a combination of collaborative experimentation and playful learning within a competitive setting which results in creating the conditions for coopetition behaviour between individuals and/or start-ups to develop. These unique features make the new models of start-

up support particularly suitable for pre-nascent start-ups and social ventures, target groups that seem less well served by established support models. Using organizational sponsorship theory (Amezcua et al., 2013; Cohen et al., 2018), we also show how the new models of start-up support provide a unique blend of buffering and bridging mechanisms to support start-up growth. While some support mechanisms seem to be aimed at buffering, our analysis suggests that, overall, they have a stronger focus on enabling bridging instead. At the core of all three models lies the objective to support start-ups in creating relational connections, legitimacy, and related intangible resources. We thus demonstrate conceptually that makerspaces, hackathons, and start-up competitions provide significant complementary support functions in the entrepreneurial ecosystem. While the impact of these new support models remains a question to be investigated in the future, policymakers can still consider them as additional options that do not only stand in competition to established support models but offer significant complementarities. New models of start-up support can therefore enrich policies that aim to foster entrepreneurship by offering more variety and other support functions that can be beneficial for different groups of founders and ventures (Bergek & Norrman, 2008; Rigby & Ramlogan, 2016).

Using our conceptual framework as starting point, future research could examine how new models of start-up support mediate between different groups of individuals or start-ups and different types of environment. For example, how does the emergence of makerspaces, hackathons, and start-up competitions relate to changing start-up needs and the diffusion of new entrepreneurial approaches such as the Lean Start-up (Ghezzi, 2018; Mansoori et al., 2019; Ries, 2011). With regard to advancing organisational sponsorship theory, future studies could analyse how new support models and start-ups balance the provision and requirement of buffering and bridging, respectively. Also, what role do new support models fulfil in the design and implementation of policies for regional and

entrepreneurial development is a question which concerns the need for more studies in different institutional contexts (Dutt et al., 2015; Mrkajic, 2017). While qualitative work could focus on developing concepts and uncover the depth and width of the heterogeneous landscape of new models of start-up support, quantitative studies are needed to establish whether there are clear relations between new support models, their specific design, and the growth and performance of start-ups. We hope that our conceptual framework will be a source of inspiration for scholars interested in explaining how, why and with what effect the new support models of makerspaces, hackathons, and start-up competitions diffuse and start having an impact on entrepreneurial ecosystems.

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CHAPTER 2: RESOURCE UTILIZATION IN NEW MODELS OF START-UP SUPPORT: MAKERSPACES, HACKATHONS, AND START-UP COMPETITIONS AS PACEMAKERS OF NEW VENTURE DEVELOPMENT

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Abstract:

This study analyses the utilization of resources in makerspaces, hackathons, and start-up competitions from a practice-based view. Using an abductive, qualitative approach, the paper investigates how offered buffering and bridging mechanisms in support models are utilized and transformed by start-ups. Building on organisational sponsorship and bounded rationality, our findings enable a more nuanced view on organisational sponsorship and the potential misalignment of supply and demand of resources. Although we can see that start-ups indeed use some resources in line with the intentions of support, we also find that they only use some of the offered resources while rejecting or transforming others. Start-ups seem to shop around to select resources that they evaluate as most useful or most enjoyable. While we assume here that this utilization of resources is a consequence of their bounded rationality, we also suggest that new models of start-up support are able to mitigate these limitations through specific support mechanisms. By analysing the new phenomena of makerspaces, hackathons, and start-ups competitions in entrepreneurial ecosystems we offer insights into the utilization of resources in organisational sponsorship and a different perspective on bounded rationality mitigation through start-up support.

Keywords: start-up incubation; resource utilization; organisational sponsorship; bounded rationality

1. Introduction

Start-up incubation has grown rapidly over the past decades, not only in numbers but also in diversity. While accelerator programmes have been thriving around the globe, we can also observe the emergence and growth of new forms of institutionalised start-up support such as makerspaces, hackathons, and start-up competitions (SUCs). Although these models often focus on specific needs in providing rather unconventional measures of support for participating start-ups, they are part of an ongoing shift in incubation. Similar to accelerator programmes (Pauwels et al., 2015), they seemingly aim to enable the development of relational connections with the start-ups' environment. Start-up support acts as an intermediary (organisational sponsor) brokering between start-ups and resource providers (Amezcua et al., 2013). Functions provided by such an intermediary can be categorised into (1) buffering mechanisms, which shelter start-ups from the external environment and its risks (Lynn, 2005) by providing resources internally; and (2) bridging mechanisms, which enable relational connections with external resource providers (Amezcua et al., 2013; Mrkajic, 2017). Makerspaces, hackathons, and start-up competitions ostensibly focus on enabling relationships with the start-ups' environment (bridging) but also provide buffering mechanisms that require balancing the support provision. While this results in potential tensions in their support provision, they also *mediate* and *practice* in very different ways compared to other models of sponsorship. It remains unclear when and how their bridging or buffering mechanisms are required and how those are actually utilized by start-ups.

Our research is motivated by a lacking understanding of the utilization of resources through founders in new models of start-up support (i.e. the demand-side). We approach this question of resource utilization in makerspaces, hackathons, and SUCs to develop a more nuanced view on organisational sponsorship (i.e. the work of intermediaries supporting the growth of start-ups). The provision and utilization of resources in start-up support can be

misaligned in regard to varying intentions of resource providers and expectations of start-ups. While we explicitly analyse resource utilization in this paper, we combine this with existing literature on the supply (or provision) of resources to start-ups to gain a better understanding of possible discrepancies or conflicts between supply and demand. We situate the supply of resources, the utilization of resources, and their potential misalignment in organisational sponsorship theory (Amezcua et al., 2013; Mrkajic, 2017) as the basis for start-up support. However, the relationship between support providers and founders, which embodies the core of sponsorship theory, is characterised by significant constraints for individuals to accurately define and evaluate resource requirements. Founders often do not know what they need and how they need to act (Rigby & Ramlogan; 2016). They struggle to access information and to evaluate them accurately (i.e. bounded rationality: Cohen et al., 2018; March & Simon, 1958). While start-ups' selection, utilization, and manipulation of resources is critically influenced by founders' bounded rationality (Cohen et al., 2018), managers of support are equally subject to their bounded rationality that impacts how they define and evaluate needs and therefore design and provide resources (Gavetti et al., 2007; March & Simon, 1958; Simon, 1955). These constraints can be assumed to be crucial for the supply and utilization of resources. We hence use the perspectives of organisational sponsorship and bounded rationality[19] in the unique settings of new models of start-up support, resulting in an overarching research questions that allows using an exploratory approach: How and for which purposes do supported start-ups utilize provided resources for their growth and development processes?

Due to the limited research on the role of makerspaces, hackathons, and start-up competitions as enablers of new venture development, we apply an abductive, qualitative approach for the exploration of the phenomena (Bamberger, 2018; Dubois & Gadde, 2002).

[19]We do not measure bounded rationality here, but assume its existence based on prior literature described in the following.

We analyse data from start-ups and support management by considering the perspectives of organisational sponsorship and bounded rationality. Our findings suggest that start-ups indeed use some resources in line with the intentions of start-up support, while completely rejecting or transforming others. The analysis overall suggests that start-ups utilize resources to work on their *community and identity*, on their *entrepreneurial processes*, and on *further resource acquisition*. While we do not measure bounded rationality in our analysis, we can suggest that, based on our analysis of resource utilization, new models of start-up support can also mitigate bounded rationality in offering opportunity structures for experimentation and playful learning. Here, the attempt to mitigate bounded rationality does not rely on concentrated and standardized mechanisms as they happen in accelerators (cf. Cohen et al., 2018), but on more unstructured and experimental support mechanisms. We offer a more nuanced view on the utilization of buffering and bridging mechanisms and on the impact of new models of start-up support on founders' bounded rationality that allows critical reflections on organisational sponsorship, the fast-paced developments of new support models, and their causes and consequences.

2. Three new Models of Start-up Support

Before elaborating on the theoretical bases of start-up support, we first define the 'new' models of start-up support that are the focus of this paper. The importance of these models in entrepreneurial ecosystems has grown significantly over the last decade. While traditional business incubators and accelerators are established all over the world, makerspaces, hackathons, and SUCs can now be found in many ecosystems as well. These models do not only differ on a procedural (i.e. how is support provided) and functional (i.e. what support is provided) level, but they also have different target groups and intentions. We

shed light on the potential contributions of new models of start-up support and their support measures for start-ups. As there is an extensive body of literature that deals with the established models of business incubators and, more recently, accelerators (e.g. Cohen et al., 2018; Cohen & Hochberg, 2014; Miller & Bound, 2011; Pauwels et al., 2016), we refrain from defining them here in detail.

2.1 Makerspaces

Makerspaces (or the subforms of hackerspaces or fablabs explained later) have been defined as organisations that enable individuals, civil society, or start-ups to develop and create new digital or physical ideas and products in a collaborative environment. These spaces focus on discovery and problem-based learning through tinkering and testing (Fleming, 2015; Koole et al., 2017). Some authors highlight the importance of communities and personally meaningful projects (Hlubinka et al., 2013), while others describe how makerspaces emphasise the collaborations between participants (Martin, 2015). This focus on creation and collaboration has its roots in the open-source-based 'maker movement' that also uses principles of rapid prototyping (Singh, 2018). Makerspaces provide individuals with an environment that offers digital fabrication and prototyping technology and tools such as 3D printing. Since the foundation of the *Make*-magazine in 2005, makerspaces and the maker movement have become appealing for different target groups (Singh, 2018). While makerspaces traditionally operated in a non-profit way, nowadays they can also serve founders of start-ups that use prototyping and testing facilities. There has been a significant rise of makerspaces in the last decade with rough numbers of around 500 spaces in North America and around 600 in Europe (Lou & Peek, 2016). This rise has been even more rapid in China which has included the development of makerspaces into its national innovation policy (Wang, 2016).

The provision of shared space, facilities, tools, and equipment is accompanied by intangible resources that are mostly shaped by the individual community of makerspaces. The rotation of members or participants and their respective interests, knowledge, and networks shape mutual and intangible support measures (Koole et al., 2017). The communities' interests and focus have taken shape in two subforms that focus on software and hardware, respectively: hackerspaces and fablabs. Originating from 'c-base', a first community-led space founded in 1995 in Berlin (Cavalcanti, 2013), *hackerspaces* primarily focus on programming and computation. In contrast, *fablabs* rely on digital technology to create hardware. Although both subforms are well-defined, a variety of terms is being used to describe the general phenomenon of makerspaces and its varying characteristics (Davee et al., 2015).

2.2 Hackathons

Hackathons are events in which different participants work together to develop solutions and physical or digital products in a specified amount of time. The term is a combination of the words hack and marathon and can be traced back to first events in 1999 (Briscoe & Mulligan, 2014). While there was an early focus on IT, mainly involving programmers and IT specialists, nowadays hackathons also target different societal problems, the generation of innovation, and product development. This diversity of aims, also emerging from different shareholders (e.g. universities, corporates, public organisations), is reflected in different target groups. Hackathons' focus on quick, iterative problem-solving and new team composition appeals to large corporates as well as to public organisations promoting entrepreneurship. While NGOs or large technology companies aim for rapid generation of innovations or prototypes to solve specific problems, public

organisations predominantly try to promote and develop entrepreneurial activity (Fattal, 2012; Irani, 2015).

In terms of support provision, hackathons are guided by the strict time limitation that mostly spans across one day or weekend. Although participants are provided with shared office space for this period, the main intention of space is to enable close proximity between participants and team members to improve communication and team building (Knoben & Oerlemans, 2006). The composition of teams with complementary skills aims to enable mutual technical or business assistance among participants. Similarly, prize money that is provided to the winning team of a final demo presentation does not only serve as a financial resource but increases legitimacy. Building and expanding internal and external networks of participants is another aim of hackathons. While new team members or employees can be tested and hired or collaborations between teams can be established internally, hackathons enable developing networks with the external environment when investors, business angels, or customers attend demo presentations (Komssi et al., 2015).

2.3 Start-up Competitions

Start-up competitions (SUCs) are based on an isolation of the demo day functionality of accelerators and hackathons. They rely on formal and oral communication of entrepreneurs or start-ups about their idea, start-up, or performance to acquire funding (Lucas et al., 2016) and to obtain legitimacy (Schwartz et al., 2013). This instrument of venture pitching relies on narrative sensemaking to promote future opportunities of start-up growth (O'Connor, 2002; Pollack et al., 2012). The (perceived) quality of pitches critically influences start-ups' access to resources such as legitimacy, external funding of investors, and hereby the performance of ventures (Chen et al., 2009). Although SUCs might provide tangible resources immediately to winning participants, they can also act as gatekeepers that

enable prior or subsequent access to networks, investors, or customers, as well as assistance. SUCs could therefore also act as a policy tool to increase the quantity and quality of founders and start-ups by encouraging entrepreneurial activity and the support provision of other actors (Foo et al., 2005; Schwartz et al., 2013).

While SUCs mirror the basic functions and processes of accelerators' demo days, they act as an institutionalised and independent entity. Founders or start-ups can receive first financial resources in the form of competition-based prize money (different forms possible: e.g. grants, equity-investments). As mentioned, there is a strong focus on creating legitimacy (Lucas et al., 2016) and developing networks (Foo et al., 2005), often supported by competition for prize money. The exposure from winning an SUC creates a strong signal to investors, customers, or partners (Lucas et al., 2016; Pollack et al., 2012; Schwartz et al., 2013). In some cases, pitching is even the only available strategy for signal creation and exposure to the public (Elsbach, 2003; Pollack et al., 2012). In turn, winning an SUC can create normative and cognitive legitimacy, needed for the acquisition of other resources. SUCs can also contribute to the creation and development of internal and external networks of start-ups. For instance, internal networking can lead to mutual support from participants that face similar challenges, and demo presentations or pitches that are visited by business angels, investors, or corporate partners can lead to newly developed external networks (Foo et al., 2005; Schwartz et al., 2013). Start-ups also benefit through repetition of pitching or repetitive participation in different SUCs. Preparing and iterating the storyline and business model can lead to improved social skills, increased legitimacy, or networking.

3. Organisational Sponsorship Theory: Potential Discrepancies between Supply and Utilization

We use organisational sponsorship theory to situate makerspaces, hackathons, and SUCs in the established literature on start-up incubation (supply side), and to enable more nuanced views on mechanisms of sponsorship in the light of resource utilization (demand side). Most of the existing literature on network-based incubation (e.g. Hansen et al., 2000; Bollingtoft & Ulhoi, 2005; Ahmad & Ingle, 2013) theoretically relies on resource dependence theory (Amezcua et al., 2013; for an overview see Eveleens et al., 2016). Institutionalised start-up support provides organisational sponsorship by brokering between supported start-ups and resource providers, acting as a mediator between start-ups and their environment (Amezcua et al., 2013; Flynn, 1993). The measures of support either aim for protection and internal provision and development of resources (buffering) or for start-ups' enablement to access resources from external resource providers (bridging) (Amezcua et al., 2013; Cohen et al., 2018). Although respective spatial environments significantly affect the support provision, incubation, in theory, aims to provide a resource-munificent setting for start-ups to improve growth and survival (Amezcua et al., 2013). Start-up support always happens in interaction with the environment it is situated in, but the characteristics of these interactions differ.

These characteristics of interactions shape support and have been broadly split into two categories of mechanisms, namely buffering and bridging. 'Buffering mechanisms' are support measures that models of start-up support provide internally. They aim to shelter start-ups from the external environment and associated risks (Lynn, 2005; Mrkajic, 2017). The intention is to reduce the dependency of start-ups on access to external resources and to alleviate their dependency on external actors in the environment (Pfeffer & Salancik, 1978). Support models and their buffering mechanism allow start-ups to isolate themselves from

the environment, at least to some degree, and enable conducting activities internally instead. Buffering mechanisms include support measures that directly transfer capital (in the form of finance, equipment, or space), knowledge, or labour to start-ups (Amezcua et al., 2013). However, some of these direct support measures might also act in ways that do not shelter start-ups but rather enable connections to the external environment – they act as bridging mechanisms for start-ups.

'Bridging mechanisms' aim for relationships of start-ups with other organisations or actors in the environment that increase the flow of resources and its application to improve competitiveness and subsequent survival (Amezcua et al., 2013; Flynn, 1993; Mrkajic, 2017). The underlying assumption is that networks with external resource providers can mitigate start-ups' lack of networks and structures and some of the resulting disadvantages (Baum & Oliver, 1991), such as the development of social capital and legitimacy of start-ups (Zimmerman & Zeitz, 2002). An increased quantity and quality of networks can increase start-ups' legitimacy that is critical for the acquisition of further resources (Amezcua et al., 2013; Flynn, 1993). Amezcua et al. (2013) conceptualize bridging mechanisms as consisting of services that enable 'external networking' with actors outside of the incubator (Venkataraman, 2002), as well as internal networking or 'field building' services that facilitate networks with similar start-ups. Both types of service can act as catalysts for the development of legitimacy through start-ups' normative alignment with their environment and individual 'organisational community' (Aldrich & Martinez, 2005; Amezcua et al., 2013).

While traditional (property-based) forms of support, such as business incubators, clearly put emphasis on buffering, accelerators and other new models tend to focus more on bridging to facilitate networks with the start-ups' environment (Pauwels et al., 2015). However, the emerging trend towards bridging that the increased diffusion of makerspaces,

hackathons, and SUCs suggests, as described above, is oversimplified. These new models of start-up support have different intentions, varying aims or missions, and use buffering or bridging mechanisms in unique ways. Despite the large body of existing research that analyses the support provision of business incubators and accelerators and their impact on start-ups, makerspaces, hackathons, and SUCs have largely been neglected in the literature. In this paper, we therefore analyse the demand side in investigating how and for which purposes start-ups utilize makerspaces, hackathons, and SUCs for their growth and in their development processes. Whilst the supply of resources in organisational sponsorship has been the focus of other studies, it remains unclear what founders do with these resources. For instance, while some founders use resources as intended by the models of start-up support, others might refuse to use some resources, or even transform and adjust them for their individual requirements. Consequently, we approach the demand and utilization of resources in makerspaces, hackathons, and SUCs to develop a more nuanced view on organisational sponsorship that complements the existing literature on resource provision.

While we approach new models of sponsorship that have so far largely remained empirically untouched, the interplay of resource provision and utilization potentially creates conflicts. The supply of resources through mediators and the demand and utilization of resources through founders and start-ups have the potential to be misaligned, creating significant discrepancies in practice that have important theoretical implications (Grimaldi & Grandi, 2005; Schwarz & Hornych, 2010). The provision and intended use of resources of new support models can differ from how start-ups actually utilize these resources. This does not only concern resources that support models directly provide to founders, but also how they act as intermediaries to enable founders to access external resource providers. The expectations of founders might also not match their actual experience in new models of start-ups support. Start-ups join different models of support with certain expectations and goals

to increase their growth. Although these expectations clearly differ across the variety of support models (e.g. depending on the development stages of ventures), they are not necessarily satisfied by support providers. The misalignment between expectations of founders in makerspaces, hackathons, and SUCs and their experience also influences their utilization of resources. However, this does not necessarily only include a mismatch in a negative sense but could also include resources that are provided although not expected by start-ups. Understanding the utilization of resources helps understanding potential conflicts and misalignment between founders and support management.[20] The paper's research objective therefore not only aims for deeper insights into new models of start-up support and founders' resource utilization, but, in turn, sheds light on possible conflicts in organisational sponsorship.

4. The Use of Resources in new Models of Start-up Support: A Bounded Rationality Perspective

The interplay of supply and demand outlined is characterised by assumptions and evaluations made about the usefulness of resources and the needs of start-ups in specific development stages. The support management has to develop and provide resources that they evaluate as being supportive and beneficial for the growth of participating start-ups. Founders have to make decisions and evaluations about whether to use provided resources, transform or adjust them, or even reject the use of sponsors' resources. The individual ability and capacity to define the needs of start-ups both from a sponsorship, as well as from a start-up perspective critically influence these evaluations about demand and needs of resources.

[20]We use literature on the provision of resources in incubation and focus empirically on the utilization of resources.

We therefore use the assumption of bounded rationality (March & Simon, 1958; Simon, 1955)[21] for the analysis of resource utilization to account for individuals' limitations of conducting accurate evaluations. While we do not explicitly measure bounded rationality or its mitigation in our analysis, we use the assumption that individuals (such as founders) are limited by their abilities to conduct accurate evaluations (i.e. bounded rationality) to analyse resource provision and utilization.

In the context of organisations and large firms, bounded rationality has been explored extensively by *The Carnegie School* which proposes that organisational designs aim at making information more accessible and processable to decrease cognitive demands on individuals (for an overview see Gavetti et al., 2007). Despite the rather long history of this economic perspective, it remains unclear how the concept works in new ventures, how founders deal with their bounded rationality, and how ventures can mitigate bounded rationality (Cohen et al., 2018; Hallen & Pahnke, 2016). We posit that the cognitive limitations of founders can be mitigated by external actors and their measures. New models of start-up support, as organisational sponsors, can mitigate the bounded rationality limitations of founders through specific support mechanisms. The concept is at the centre of start-up support – it impacts resource provision and utilization, and concurrently, measures external to the venture can mitigate it (Cohen et al., 2018).

Start-ups have found to be limited by their abilities and capacity to accurately define and evaluate their needs (Rigby & Ramlogan, 2016). Cohen et al. (2018) apply *bounded rationality* (Gavetti et al., 2007; March & Simon, 1958; Simon, 1955) to the context of start-ups based in accelerators. For instance, start-ups often have limited knowledge due to being active in new sectors or developing novel products (March & Simon, 1958; Shane, 2000;

[21]Simon (1955) and March & Simon (1958) have defined bounded rationality as the limited ability of individuals or organisations to act rational due to imperfect information and their limits to gather, interpret, and process new information.

Simon, 1955) (i.e. *incomplete information*). They might also misinterpret or falsely generalise feedback (Eggers & Song, 2015; Grimes, 2018) or make wrong judgements about the quality of external resources due to their limited networks (Hallen, 2008). This can lead to premature *satisficing* where start-ups stop their search activities when reaching preferred or expected results (Hallen & Pahnke, 2016; Simon, 1955; Winter, 2000). Furthermore, Grimes (2018) sheds light on the important factors of founders' psychological ownership of ideas and their reaction to threats to their identities. Identity-based constraints significantly influence bounded rationality (Grimes, 2018). This is in line with another core element of bounded rationality. *Cognitive biases* are the result of overemphasizing or discounting information (Zhang & Cueto, 2017). The confirmation or disconfirmation of founders' own believes or the availability of information (easy availability vs no availability) impacts this behaviour and therefore creates cognitive biases (Cohen et al., 2018; Tversky & Kahneman, 1974).

Overall, these limitations originating from bounded rationality suggest a significant impact on start-ups' utilization of resources (Cohen et al., 2018). Founders might select or reject the wrong resources[22], utilize resources in ways that do not lead to the best possible outcome, or act in wrong ways in regard to starting and stopping search activities for resources and information. We can therefore assume that the way founders utilize resources is determined by their abilities and constraints to collect and evaluate information correctly (Cohen et al., 2018; March & Simon, 1958; Shane, 2000), and by their capability to deal with questions of identity and purpose (Grimes, 2018). For instance, their limited knowledge on their sector, their products, and their potential customers (and resulting consequences on e.g. networks) might lead to misjudgement on required resources (e.g. Newbert & Tornikoski, 2013). Founders might also stop their search activities when reaching the desired

[22]The suitability of resources at different development stages of start-ups is a different research area (e.g. McAdam & McAdam, 2008).

results (Hallen & Pahnke, 2016; Simon, 1955; Winter, 2000), and, hence, they do not use the full potential of available resources, or they do not acquire the necessary resources at all. Their cognitive biases that emerge from overemphasizing or discounting information (Zhang & Cueto, 2017) might also lead to misjudgement on required resources and on how to use resources for which purpose. While the suitability of resources at different development stages of start-ups is a research area in itself (e.g. McAdam & McAdam, 2008), the bounded rationality of founders can be seen as the limiting factor between offered/available resources (which might be suitable) and actual utilization of resources. As research on this relationship remains limited[23], in this paper, we consider the bounded rationality of founders to analyse their utilization of resources in models of start-up support.

Bounded rationality also concerns the management of support and its abilities to define and offer suitable resources to start-ups. Although prior experience might positively influence management's abilities of judgement, especially rather inexperienced sponsors potentially struggle to provide the right support.[24] Managers of support significantly shape resources offered. Their decisions are thus dependent on their respective abilities to process information and judge on founders' needs (i.e. bounded rationality). Based on previous literature, we assume in this paper that both founders, as well as the support management are limited by their bounded rationality.

While bounded rationality influences both founders and support management, it has been suggested that its limitations can be mitigated; either within a firm context (e.g. Gavetti et al., 2007) or outside of the firm through interventions and support mechanisms of organisational sponsors (Cohen et al., 2018). It has been suggested that advice from VCs

[23]While research on founders' bounded rationality (e.g. Cohen et al., 2018; Grimes, 2018) and on their utilization of resources has received attention (e.g. Sullivan & Ford, 2014), the relationship between both parts remains underdeveloped in the literature.

[24]Venture capitalists, as another type of organisational sponsor, are more helpful to start-ups with increased experience, and higher numbers of previous investments made (Hallen & Pahnke, 2016, Lee et al., 2011).

and accelerators can positively influence venture development (e.g. Sapienza et al., 1996) and that the design of accelerators can mitigate founders' bounded rationality (Cohen et al., 2018), but the characteristics of new models of start-up support could change assumptions on bounded rationality mitigation. What roles makerspaces, hackathons, and SUCs take as organisational sponsors remains unclear, especially in the context of bounded rationality. We thus employ the concept to explore how start-ups utilize resources in new support models and, through this, we identify (utilized) support mechanisms in makerspaces, hackathons, and SUCs that can mitigate founders' cognitive limitations. Due to the characteristics and intentions of these new models, mitigation of bounded rationality might work differently compared to accelerators (cf. Cohen et al., 2018).[25] Figure 6 depicts the research framework that covers the different elements described.

[25]This also relates to their intentions. New models of start-up support do not necessarily aim to create information-rich environments for founders but instead aim for providing (physical & mental) space for purposeful information collection and processing. In contrast to accelerators, they do not aim necessarily for standardization or concentration of activities (cf. Cohen et al., 2018) but rather allow individualism or even disorganisation (Browder et al., 2019).

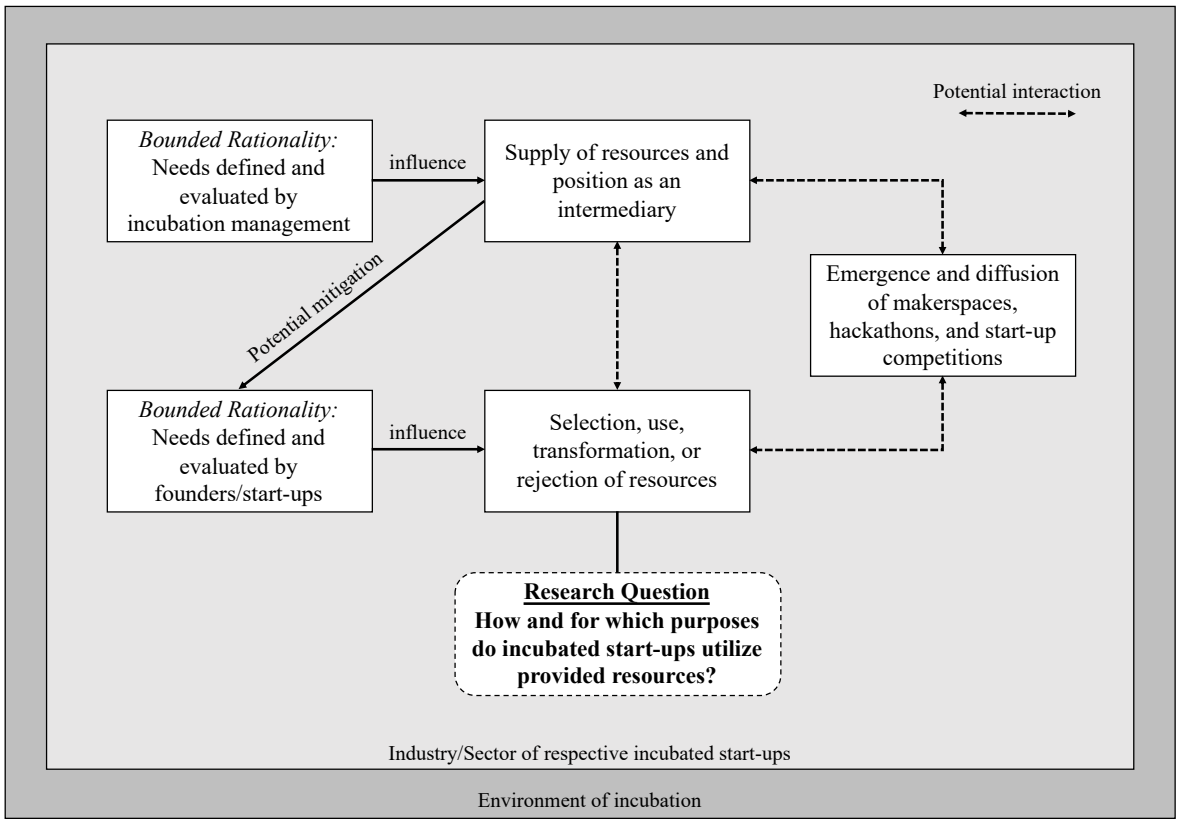

Figure 6: Research framework

5. Research Methods, Methodology, and Data Collection

Methodologically, we base our research on Edmondson & McManus' (2007) contingency framework. Although some of the available theoretical foundations from both incubation research and behavioural economics lead to the guiding assumptions and research questions outlined, little is known about roles, determinants, and performance of makerspaces, hackathons, and SUCs in those contexts (*nascent state of theory*). Consequently, we aim to unravel and analyse the purpose and role of new support models for start-ups from a resource utilization perspective. For this purpose, an abductive, qualitative approach is most suitable. This approach uses prior theoretical perspectives as analytical lenses and aims for the development of new "interpretative rules" that offer explanations for surprising findings from the data (Alvesson & Kärreman, 2007; Bamberger,

2018; Dubois & Gadde, 2002; Gioia et al., 2013). Based on semi-structured interviews with supported start-ups and support managers we gain retrospective and real-time insights from both a needs/requirements-perspective and a support-provision-perspective.

Overall, our sampling captures insights from a broad selection of models of start-up support to enable the development of initial theoretical concepts. Hence, we include interviewees that have gained experience in accelerators, makerspaces, hackathons, and SUCs which are owned by different, private or public shareholders. This diversity is due to the importance of shareholders that crucially influence aims, processes, and support provision (Grimaldi & Grandi, 2005; Becker & Gassmann, 2006). We deliberately include accelerators as an established support model to situate new models in the incubation literature and to enable comparisons between different models. To assure appropriate coverage of relevant models and emerging propositions that require triangulation (Sandelowski, 1995; Coyne, 1997), we started approaching potential interviewees through personal networks and subsequently expanded iteratively following our snowballing strategy, as well as emergent themes from the data (Corbin & Strauss, 2014; Sandelowski et al., 1992). Geographically, the data collection initially focussed on the North-West of England region and then gradually expanded to other regions.

In total, we conducted 22 semi-structured interviews that are specified in more detail in Table 4. Those include 16 interviews with founders of ICT (software & hardware) start-ups that participate or have recently participated in an accelerator, makerspace, hackathon, or start-up competition. As the length of operation of these models of start-up support greatly differs, the data includes both start-ups that are still participating in support (but have already gained significant experience), as well as start-ups that have participated in and/or exited one or several support models in the recent past. The sampling deliberately targeted potential interviewees that have participated in more than one support programme or model. These

founders hold valuable information due to their experience in different models of start-up support and are thus able to provide reflections in a comparative way. We have also interviewed 6 managers of support models to capture their perceptions in our analysis. Support managers also hold valuable information on the actual utilization of resources and support mechanisms. In average, interviews lasted around 60 minutes.

We follow Gioia et al.'s (2013) approach in transcribing[26] and coding the interviews with NVivo 11 software into 1st order concepts, 2nd order themes, and finally aggregate dimensions. This allows depicting a dynamic picture of relationships between our entities of interest and emerging concepts that can serve for future testing (Yin, 2003). Several hundred of 1st order concepts emerged as the interview structure has been left deliberately loose following our abductive approach. The analysis focuses on the resource-utilization-level. We first coded 1st order concepts regarding the perceived provision of buffering and bridging mechanisms in the respective models of start-up support. We also coded 1st order concepts that directly refer to resource utilization and that provide insights into how and why start-ups use accelerators, makerspaces, hackathons, or SUCs. The emerging 2nd order themes and aggregated dimensions were conceptualized based on prior research dealing with organisational sponsorship and resource utilization to extend existing theory in line with abductive logic. Finally, secondary data from support and start-up websites were checked to triangulate interview data about communicated aims and intentions of support or development stages of start-ups. Figure 7 and 8 show the data structure including conceptualised 2nd order themes and aggregated dimensions. The 6 aggregate dimensions that emerged from the coding and conceptualisation are based on the underlying perspective of organisational sponsorship theory (see abductive approach, Alvesson & Kärreman, 2007; Bamberger, 2018; Dubois & Gadde, 2002). They show how founders utilize buffering and

[26]Two interviewees did not agree to recording due to confidentiality concerns. Therefore, interview notes were used in these cases to analyse their statements retrospectively.

bridging mechanisms for their respective needs. Contrary to the simplified definitions of these two basic mechanisms, our aggregate dimensions show that founders do not only utilize them as intended but also for their own specific purposes. For instance, while buffering mechanisms shelter start-up in the traditional, tangible sense (e.g. through funding), founders also use them to shelter emotionally from perceived threats to their identity and community. The coding therefore allows extending the understanding of these mechanisms in articulating new interpretative rules for these empirical findings (Alvesson & Kärreman, 2007; Bamberger, 2018).

Table 4: Summary of interviewees

Support Model	Location	Interviewee title	Industry of start-up	Number of employees	Participation in other forms of support
Accelerator 1	Distributed across the UK	CEO 1	Education technology	2	No
		CEO 2	3D graphics	2	Accel., SUC
		CEO 3	Health services platform	1	No
		Founder of accelerator	N/A	N/A	N/A
Accelerator 2	North-West of England	CEO 1	Smart cities	6	No
		CEO 2	Online videos	2	SUC
		CEO 3	Health services platform	9	No
Makerspace 1	London and Amsterdam	CEO 1	Agriculture technology	4	Accel., SUC
		CEO 2	Internet of things / Fashion	5	Maker., SUC
		CEO 3	Internet of things / E-commerce	2	Maker.
		CEO 4	Health care	2	Accel., Maker., SUC
		CEO 5	Beauty / E-commerce	2	No
		CEO 6	Internet of things	5	Accel., SUC
Makerspace 2	North-West of England	Chair of the board of makerspace	N/A	N/A	N/A
Hackathon 1	North-West of England	CEO	Internet of things / Smart cities	3	Hack., SUC
Hackathon 2	North-West of England	Project manager of hackathon	N/A	N/A	N/A
Hackathon 3	North-West of England	Project manager of hackathon	N/A	N/A	N/A
		Project manager of hackathon	N/A	N/A	N/A
Start-up Competition 1	Distributed across the UK	CEO 1	Natural language processing	4	Accel.
		CEO 2	Smart devices / AI	2	SUC
Start-up Competition 2	North-West of England	CEO	Smart cities	5	Maker., SUC
Start-up Competition 3	South-West of Germany	Project manager of innovation centre & SUC	N/A	N/A	N/A

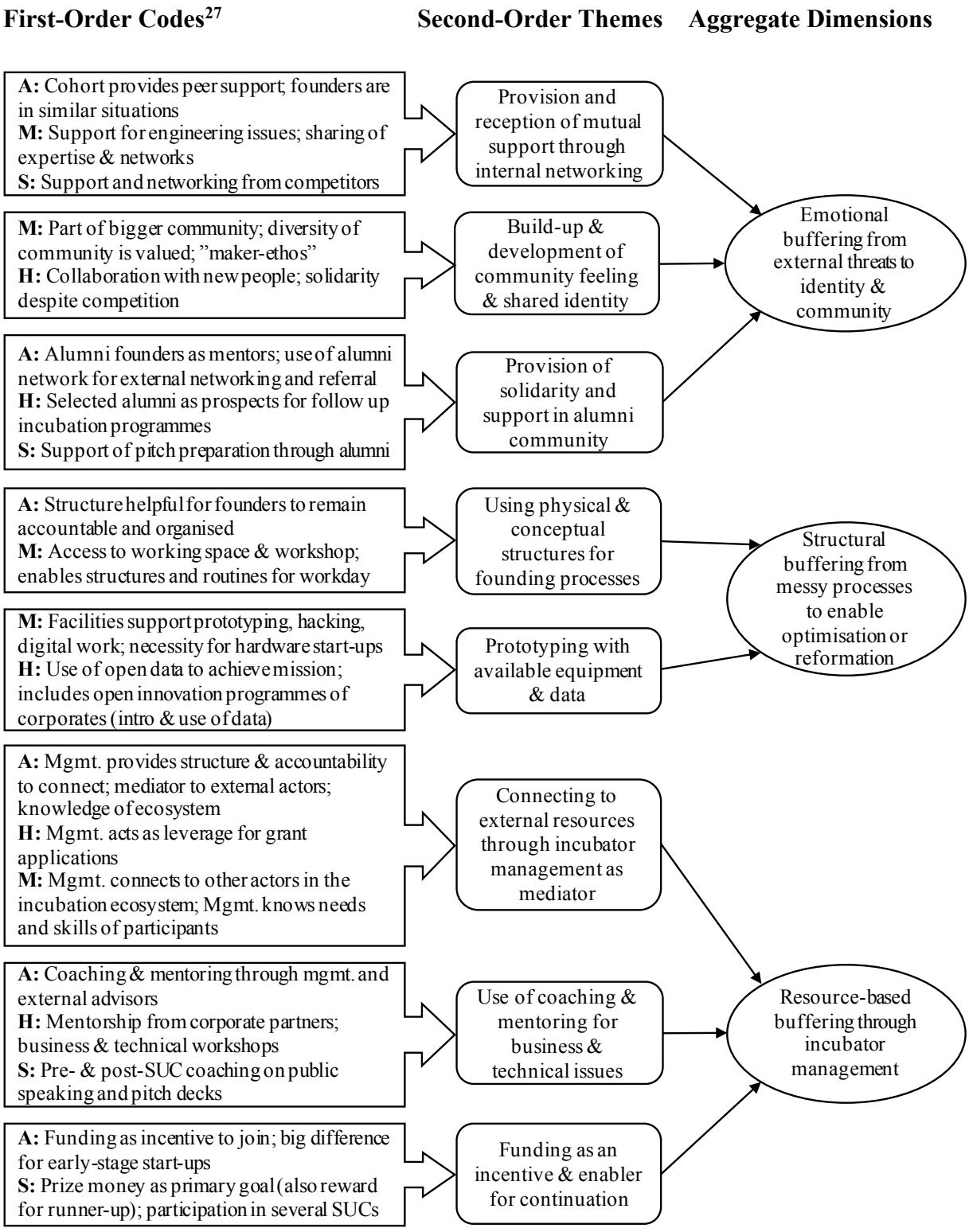

Figure 7: Data structure

[27] A = Accelerator, M = Makerspace, H = Hackathon, S = Start-up Competition

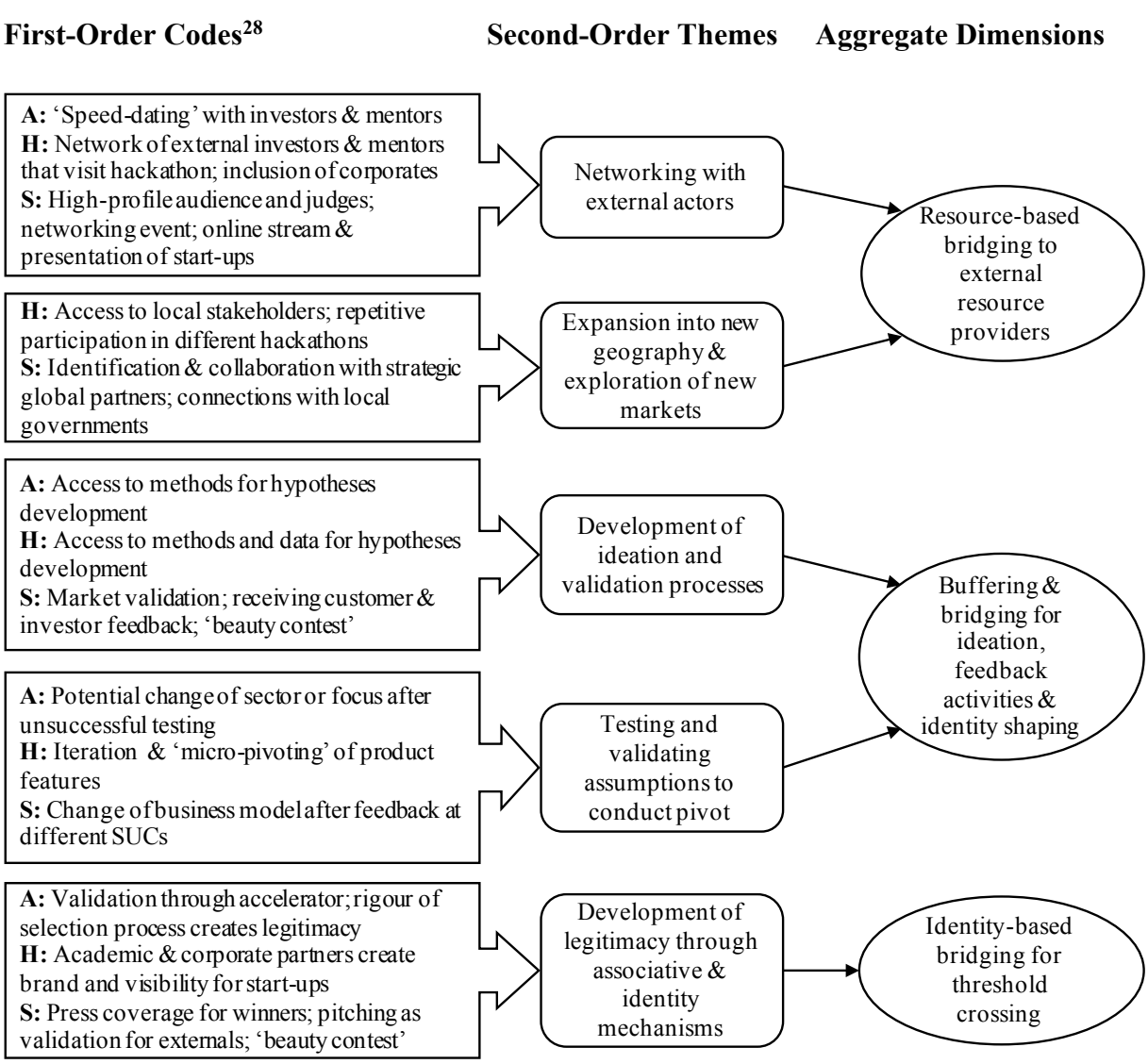

Figure 8: Continued data structure

[28] A = Accelerator, M = Makerspace, H = Hackathon, S = Start-up Competition

6. Findings: How Start-ups utilize Resources in New Models of Start-up Support

The analysis of the empirical results is structured by the question outlined. We first reflect on the provision of resources in new models of start-up support. The analysis reflects on how start-ups utilize resources, enabling a more nuanced view on the mechanisms of organisational sponsorship. Based on this analysis, we offer explanations on how makerspaces, hackathons, and SUCs can help start-ups to mitigate their (assumed) bounded rationality in the following discussion.As some interviewees participated in various models, they have been able to compare the resources provided and allow insights into how and why they used which resources in different models. We structure this section along the dimensions of provided resources (i.e. buffering and bridging mechanisms) and only elaborate on findings that are significant for our research objectives. This mostly concerns the utilization of resources that confirms or disconfirms the initial intentions of resource provision, as well as surprising findings that cannot necessarily be explained through existing theories.

First, we can observe that start-ups make use of several resources that can be classified as buffering mechanisms. Several start-ups in our sample enter makerspaces and hackathons because of the perceived strong *community feeling and shared identity*. Makerspaces' focus on community building results in a unique atmosphere that supports collaboration, experimentation, and mutual assistance. Interviewees evaluate this community and the emerging shared identity as strong assets. Similarly, participants in hackathons value the community and collaboration with different people as exemplified in two quotes:

> M: *It is a really incredible community of different start-ups and individuals, and I think the main reason we're here is for the community.*
> M: *An important part of being in a space like this is that we get to engage with other creatives and people in similar stages of the lifetime of the company.*

M: *We're all sharing our network of investors and things like that, so it very much comes from the community within, I think.*

H (mgmt.): *They may miss out if they don't collaborate with people they don't know.*

Founders in our sample also make use of *tangible resources* provided by support models. For instance, start-ups use the equipment and machines in makerspaces for prototyping purposes, but they mention that this might not be sufficient to scale their production. They also use access to data in a hackathon to build first minimum viable products:

M: *So, we're not the heaviest of users of the workshops but we couldn't live without it. We couldn't be in a regular co-working space that doesn't have this so, yeah, for us it's definitely essential.*
M: It's great for prototyping but selling 15, 20, 30, a 100 of them clearly doesn't work.
H (mgmt.): *Now the idea was that the project would make a lot of this data available as open data to anyone who wanted to use it to, say, develop a new app, or come up with a solution for the city; so, something that would bring real societal benefit, that's the idea.*

We also observe how start-ups make use of office space available in makerspaces. In fact, makerspaces in our sample do not only provide workshops and equipment but also coworking space that can be used exclusively by start-ups or freelancers. In our sample, founders highlight the unique mixture of workshop and coworking space in makerspaces. Start-ups value these resources that provide a physical structure for their founding process as exemplified in two quotes by interviewed founders:

M: *I feel like working space is really important, so cheap working space. And access to workshops I think is really important.*
M: *No doubt it's because it's a relatively good way to get access to workshops, but then it's an enjoyable place to work. You get a kitchen, for example.*

Together with an emphasis on community feeling and shared identity, the physical environment, incorporating basic facilities such as kitchens or meeting rooms, contributes

to the creation of a physical as well as conceptual structure for the founding process of start-ups.

Our results further illuminate how start-ups and founders utilize the funding or prize money available in some models of start-up support. This mainly concerns start-up competitions, as there is usually no funding offered in makerspaces or hackathons. We find that start-ups see the financial support as an incentive for participation, as well as an enabler for continuation. As two founders describe, especially early-stage software start-ups benefit from this, and some start-ups participate predominantly because of the financial resources:

> SUC: *But I mean in terms of the prizes it's quite often helpful to younger companies who work with software. You know, the prize is in the region of $10,000. They may take a software company quite a long way.*
> SUC: *But it's investors potentially but, I mean, I don't think they care either to be honest, it's mainly just money.*

In line with these findings, we further observe that start-ups participate repetitively in start-up competitions (and sometimes hackathons) to exploit financial opportunities and/or develop legitimacy. This enables start-ups to increase periods of 'bootstrapping' and to refrain from immediate rounds of external investment:

> SUC: *So, we went to China and we pitched in both of those competitions: and we came second in IoT; and third in Scientific Electronic. So, we won quite a lot of prize money.*

Start-ups in makerspaces and hackathons also use the respective support management as connectors to external resources. Two interviewees describe how the support management helps in reaching external connections and resources such as grant money or exhibitions:

> M: *And so through [Makerspace 1] we've exhibited for free at really cool conferences, or we've participated in competitions and won money.*
> H (mgmt.): *If they really want to go down that road and build something, then yeah, we'll try to do that. In the shorter term I will try and find them grant money that fits with the product and give them some leverage.*

While this assistance buffers start-ups in reducing their required efforts to identify and access resources, it actually works in a bridging way in connecting start-ups with resource providers.

Our findings further illuminate how start-ups in our sample make use of several resources in new models of start-up support that can be classified as bridging mechanisms. For instance, start-ups use new support models for purposes of external networking (i.e. external of the support model). We observe that start-ups in hackathons included in our sample make use of networking opportunities with representatives of corporate partners that attend and support the hackathon (e.g. with workshops and data access). Interviewees in start-up competitions similarly made use of networking opportunities with people in the audience. Two quotes emphasize how founders in SUCs are not that much interested in building connections with the cohort and other founders, or in knowledge and learning but rather focus on external networking:

> H (mgmt.): *And there's been continuing conversations since the Hackathon. So, I think that kind of constant contact is very important as well to nurture it.*
> SUC: *It wasn't actually the connections with the fellow entrepreneurs I found useful, it was the people in the audience. So really useful, knowledgeable, well-connected people.*
> SUC: *But I look at it as really just the networking, because it's very rarely now I am getting any sort of insight from anybody in this sector that's going, wow, I didn't know that.*

Our findings further suggest that some start-ups use hackathons and SUCs to expand their geography and access new markets. This is consistent with findings presented earlier; although hackathons and SUCs are often seen as one-off events, some start-ups use them repetitively to exploit resources. Two interviewees elaborate on how they have been able to access stakeholders and partners in different regions that help to expand their geography:

H: *Again, it's something we would have never thought of, but the programme seems really good and the access to the stakeholders is really good. So, through these programmes I think you can expand your geography quite easily.*
SUC: *Finding those right strategic partners globally, making sure you're going in there on governmental side as well.*

We also observe that start-ups use both buffering and bridging mechanism for activities concerning *ideation, feedback, and identity shaping*. This involves both the development of ideation and validation processes and minimum viable products (i.e. testing), as well as the pivot of ideas based on prior testing of assumptions. Founders in makerspaces and hackathons especially use the support to experiment and to learn in playful ways. In contrast to accelerators, the support in these two models is more unstructured, offering participants the freedom to ideate and conduct experiments. Two interviewees describe how they are able to experiment using the resources available:

M: *We also saw ourselves as part of the machine, as part of an environment where creatives can use [digital fabrication], so being in a makerspace obviously gives you access to that.*
H: *You have access to these companies, and we can just tell them, well look, here's an idea that we haven't fully developed, but […] can we just try it on you? That's something that you obviously rarely ever get to do with a paying client, and it's something that we're actually doing now […].*

While interviewees in makerspaces, hackathons, and SUCs all used the available resources for the development and validation of assumptions on their customers and business models, we only find evidence for start-ups using resources of a hackathon and a start-up competition to actually pivot their model.

H: *It holds the most value in terms of validating the business case and proposition. They don't really support on the product level at all, but getting a proposition, and having access to the data.*

SUC: *I feel like it's relatively obvious in competitions where they will provide feedback look at the Award, for example, it's clearly all about market validation and getting customers to pick yours because it's got a star on it.*

SUC: *And there was an eco-system there, we decided to switch from the studio to kind of a platform type model. You know just after exploring different ideas, looking at competition and going, well let's see if we can do this.*

Finally, start-ups in our sample use bridging mechanisms in hackathons and start-up competitions to develop legitimacy. In contrast, we do not find that founders in makerspaces utilize resources for legitimacy creation. As mentioned earlier, hackathons in our sample have strong connections with corporate and public partners. Founders use these partners to develop their visibility and legitimacy. Start-ups that participate in SUCs mainly benefit through social media and press coverage that emerges from successful participation but also from contacts with key decision makers, as illustrated in the following quotes. Further, we can observe that start-ups consistently use logos and marketing material of the respective SUC on their websites after participation.

H (mgmt.): *Traction or visibility is really important, and I think what we're really trying to do is sort of add good names to our partners. To be able to say that we work with Cisco and BT and Transport for Greater Manchester, those are really great things also in attracting new clients.*

SUC: *But we're already seeing that, you know, the way the team was able to amplify our messaging on social media, the contacts that we've made, it's so much different compared to all the other events that we've participated before.*

SUC: *And of course, it got us a lot of press, I was on the front page of the Shenzhen Times. Our profile goes up, connections go up, so that's quite important to us.*

SUC: *The scale of this event, obviously the profile of the organisers and the venues, I mean you pitch at one of the most prominent venues in the country… It attracts such high-profile guests and judges that…you get on a completely different level with this pitch programme.*

7. Discussion

We situate our study in organisational sponsorship theory as the basis for incubation research (Amezcua et al., 2013; Cohen et al., 2018; Flynn, 1993). While organisational sponsorship acts as an important theoretical foundation, it remains unclear how start-ups actually utilize the resources offered. Based on qualitative data from start-ups participating in different new support models in the UK, we suggest a more nuanced view on the utilization of organisational sponsorship and further reflect on how new models of start-up support contribute to the mitigation of start-ups' bounded rationality. Table 5 provides an overview of our empirical findings and the resulting development of theoretical concepts.

Table 5: How start-ups use resources and how new models of start-up support can mitigate bounded rationality

Models of Start-up Support	**Start-ups' use of resources in new models of start-up support**						**New support models' potential mitigation of start-ups' bounded rationality[29]**
	Community & Identity Work: Emotional buffering from external threats to identity & community	**Entrepreneurial Process Work:** Structural buffering from messy processes to enable optimisation or reformation	**Resource Acquisition Work:** Resource-based buffering through support management	**Resource Acquisition Work:** Resource-based bridging to external resource providers	**Entrepreneurial Process Work:** Buffering & bridging for ideation, feedback activities, and identity shaping	**Community & Identity Work:** Identity-based bridging for threshold crossing	
Accelerator	• Provision and reception of mutual support through internal networking • Provision of solidarity and support in alumni community	• Using physical & conceptual structures for founding processes	• Use of coaching & mentoring for business & technical issues • Connecting to external resources through support management as mediator • Funding as an incentive & enabler for continuation	• Networking with external actors	• Development of ideation and validation processes • Testing and validating assumptions to conduct pivot	• Development of legitimacy through associative & identity mechanisms	**Incomplete information:** Broadens search. **Satisficing:** Reignites search. **Cognitive biases:** Reduces biases.[30]
Makerspace	• Provision and reception of mutual support through internal networking	• Using physical & conceptual structures for founding processes	• Connecting to external resources through support management as mediator		• Testing and validating assumptions to conduct pivot		**Satisficing:** Reignites search through peer feedback and new options for prototyping. **Cognitive biases:** Reduces biases through exposure to

[29]Framework of bounded rationality adapted from Cohen et al. (2018)
[30]See Cohen et al. (2018)

	• Build-up & development of community feeling & shared identity	• Prototyping with available equipment & data					diverse community and diverse feedback.
Hackathon	• Build-up & development of community feeling & shared identity • Provision of solidarity and support in alumni community	• Prototyping with available equipment & data	• Use of coaching & mentoring for business & technical issues • Connecting to external resources through support management as mediator	• Networking with external actors • Expansion into new geography and exploration of new markets	• Development of ideation and validation processes • Testing and validating assumptions to conduct pivot	• Development of legitimacy through associative & identity mechanisms	**Incomplete information:** Broadens search through exposure to new team members (with different backgrounds) & direct access to (corporate) customers or partners. **Satisficing:** Reignites search through peer feedback and immediate feedback on prototypes. **Cognitive biases:** Reduces biases through exposure to new team members, customers & partners, or new markets.
Start-up Competition	• Provision and reception of mutual support through internal networking • Provision of solidarity and support in alumni community		• Use of coaching & mentoring for business & technical issues • Funding as an incentive & enabler for continuation • Repetitive participation	• Networking with external actors • Expansion into new geography and exploration of new markets	• Development of ideation and validation processes • Testing and validating assumptions to conduct pivot	• Development of legitimacy through associative & identity mechanisms	**Satisficing:** Reignites search through expert feedback / validation at (repetitive) pitch events. **Cognitive biases:** Reduces biases through expert feedback / validation at (repetitive) pitch events and reduction of overconfidence.

7.1 Expanding our Understanding of the Utilization of Organisational Sponsorship

We provide empirical insights into how founders utilize sponsorship mechanisms makerspaces, hackathons, and start-up competitions. Overall, this also allows to draw conclusions on the main functions of these three models. In regard to makerspaces, our data suggest that they work as a long-term community hub and collaborative workspace where founders benefit from a diverse community and specialised equipment. While the tangible activity of prototyping does play a role, founders also benefit from networking activities and hence bridging to their environment. In regard to hackathons, our data point towards a strong focus on mutual assistance and internal networking (facilitated by the development of new teams), as well as on external networking with partner organisations (corporations or governmental actors). We find that founders in SUCs predominantly focus on external networking and the development of public exposure (i.e. legitimacy). Participants also benefit through mutual exchange and support.

While previous research has focused on organisational sponsors and their intentions, structures, and processes of support provision (e.g. Amezcua et al., 2013; Cohen et al., 2018), it remains unclear how start-ups actually use these resources in makerspaces, hackathons, and SUCs. Our study proposes an extension of sponsorship theory based on resource utilization, rather than provision. This analysis approaches the practical discrepancies between resource supply and utilization in suggesting three distinct categories of resource utilization that each encapsulate a mechanism of buffering and bridging: Community and Identity Work, Entrepreneurial Process Work, and Resource Acquisition Work.

7.1.1 Community & Identity Work

Our findings indicate that start-ups utilize resources of sponsorship to build their community and to work on their identity. First, this is manifested in how start-ups emotionally buffer themselves from external threats to their community and identity. For instance, entrepreneurs participating in makerspaces or hackathons use the community to build up a shared identity (i.e. 'maker-ethos' or 'hacking community'). While prior studies mostly put emphasis on learning and knowledge transfer within a cohort (in accelerators or incubators) of start-ups (e.g. Cohen & Hochberg, 2014; Schwartz & Hornych, 2008; 2010), our findings suggest that identity and community building is vital for many founders to create a sense of belonging and identification which supports entrepreneurs' daily structures (e.g. through peer control) or their processes (e.g. ability to deal with failure). Secondly, our data indicate that start-ups utilize resources for identity-based bridging to cross their respective legitimacy thresholds (Fisher et al., 2016). We find that founders in hackathons mainly use academic and corporate partners to develop legitimacy through associative mechanisms (Baum & Oliver, 1991; Fisher et al., 2017). Their connections with powerful actors work as a signal of approval to the environment. Start-ups participating in SUCs use the pitching opportunities as a 'beauty-contest' which creates coverage in social media and the press. They develop their legitimacy through identity mechanisms (Fisher et al., 2017) that focus on storytelling and narrative sensemaking (Pollack et al., 2012). We contribute to the discussion on legitimacy through sponsorship by identifying specific modes of legitimacy development in new models of start-up support. This can support founders and sponsor in making dedicated decisions for reaching legitimacy thresholds and for steering different mechanisms.

7.1.2 Entrepreneurial Process Work

Our findings indicate that start-ups utilize resources in makerspaces, hackathons, and SUCs to develop and optimise their entrepreneurial processes. First, our data show that start-ups use buffering mechanisms in makerspaces and hackathons to structurally approach their messy entrepreneurial processes that require optimisation or reformation. For instance, founders use the physical and conceptual structures in makerspaces for creating or revising their founding processes. While (archetypical) entrepreneurship practice relies on quick, iterative MVP development and validation that requires external feedback (Hoang & Antoncic, 2003; Fisher, 2012; Leyden et al., 2014), our findings suggest that although start-ups know common frameworks (e.g. Osterwalder et al., 2010; Blank, 2013), they often do not know how to apply them. They use the physical (e.g. equipment) and conceptual (e.g. experimentation-based learning) structures in makerspaces to develop their founding processes. This is exemplified in start-ups' utilization of available equipment and data in makerspaces and hackathons to create prototypes. They do not need to acquire these resources externally anymore.

Secondly, our findings suggest that entrepreneurs use both buffering and bridging mechanisms for ideation and feedback activities and identity shaping. While they use hackathons to get access to methods and data for ideation and hypotheses development, enabling to validate assumptions with peer groups or corporate partners, some founders use SUCs to receive customer and investor feedback and validate demand. We further find evidence for start-ups using these validation mechanisms to conduct pivots based on the participation in hackathons or SUCs. Our observations suggest that entrepreneurs in hackathons perform 'micro-pivots' on prototypes. This matches with the sponsor's intentions to support iterative processes in ideation and product development (Komssi et al.,

2015). Start-ups in our sample also use feedback received in SUCs to make decisions on pivots. However, those rather focus on their business models instead of products or services.

7.1.3 Resource Acquisition Work

Our findings indicate that start-ups utilize resources of sponsorship to acquire further intangible and tangible resources either through the support model itself or through external resource providers. Firstly, we find that start-ups use buffering mechanisms to access resources through the support management. While this expectedly incorporates the use of internal coaching and mentoring offers for business or technical issues (in hackathons and SUCs) (Amezcua et al., 2013), start-ups also use the support management of makerspaces and hackathons as mediators to facilitate connections with internal and external actors. Managers often hold knowledge of the needs and resources of participants and take an active role in connecting start-ups among themselves (internally) and with external resource providers. This mechanism therefore works in a buffering as well as a bridging way. While the support management alleviates the need of founders to reach out to other start-ups themselves (internally; buffering), they also benefit from external connections that have been facilitated to increase the flow and application of resources (bridging). This duality, in part, also concerns the provision of funding through equity deals, grants, or prize money. We find that some start-ups in SUCs use this model of sponsorship repetitively to access funding which is either provided by the sponsor itself or by external providers. Although SUCs are also driven by intentions such as networking or legitimacy development, some founders are only interested in acquiring as much prize money as possible.

Secondly, our data indicate that start-ups utilize bridging mechanisms to access further external resources. For instance, they use opportunities in hackathons and SUCs to network with external actors that offer resources that cannot be found in the support model.

Our findings suggest that founders participating in these models of start-up support aim to expand their geography and explore new markets in the respective region or country of the sponsor. This expansion, in turn, allows accessing further external resources such as funding, market knowledge, and partnerships. The potential repetitive participation of start-ups in hackathons and SUCs supports these efforts, as mentioned.

7.2 Mitigation of Bounded Rationality from a Resource-Utilization-Perspective

While the analysis of bounded rationality in large corporations has remained relevant since the 1950s (see March & Simon, 1958; Simon, 1955), recent studies have also applied it to founders and start-ups in the context of accelerators (Cohen et al., 2018). However, Cohen et al.'s (2018) theoretical model is based on the design choices of accelerators and employs a resource-provision-perspective. We therefore also apply bounded rationality to our empirical insights from start-ups' resource utilization to offer suggestions on how new models of start-up support can mitigate the bounded rationality of founders. This is structured by three bounded rationality limitations that entrepreneurs face (Cohen et al., 2018): incomplete information (March & Simon, 1958; Shane, 2000; Simon, 1955), satisficing (Hallen & Pahnke, 2016; Simon, 1955; Winter, 2000), and cognitive biases (Cohen et al., 2018; Tversky & Kahneman, 1974). Our findings suggest that makerspaces, hackathons, and SUCs can mitigate entrepreneurs' bounded rationality in different ways than accelerators do. While the latter model of sponsorship makes use of standardised activities, concentrated consultation and mentorships, and disclosure of ideas (see Cohen et al., 2018) to mitigate the bounded rationality limitations of entrepreneurs, new support models are characterised by enabling self-organisation, experimentation, and playful learning with an emphasis on founders' freedom of choice; elements of sponsorship that work entirely different (Browder et al., 2019).

Firstly, we suggest that participation in hackathons can mitigate the bounded rationality limitation of incomplete information. Emotional buffering from external threats to the community allows founders to get exposure to new community and team members with different backgrounds. Resource-based bridging to external resource providers allows founders to access (corporate) customers or partners. Both mechanisms can lead to broadened search activities which mitigate their limitation of incomplete information about technologies, products, and markets.

Secondly, we suggest that participation in makerspaces, hackathons, and SUCs can tackle founders' limitation of premature satisficing. On the one hand, makerspaces and hackathons enable prototyping and quick iteration through equipment and guidance, while, on the other hand, founders receive peer feedback that is supported by the sponsors' focus on enabling collaboration and broad experimentation. Founders use makerspaces and hackathons to learn in playful ways, discover technology, and experiment freely, which is different to the designs of accelerators that use standardization of activities and compulsory participation in support measures (Cohen et al., 2018). Nevertheless, our results suggest that despite these structural and procedural differences, both models can help mitigating founders' limitation of satisficing. In regard to SUCs, we suggest that founders' participation can reignite search activities through (negative) expert feedback and validation at (repetitive) pitch events. This is congruent with concentrated consultations in accelerators (Cohen et al., 2018).

Thirdly, we suggest that makerspaces, hackathons, and SUCs can help alleviate founders' limitation of cognitive biases. Similar to the mitigation of incomplete information, we find that emotional buffering from external threats to the community and resource-based bridging to external resource providers lead to opportunities for accessing and building diverse communities and teams, as well as connections with partners in new markets or

regions. Entrepreneurs in our sample use the diverse community and external actors for accessing novel feedback; it thus supports them in reducing biases. In line with Cohen et al.'s (2018) results, we suggest that SUCs can reduce biases by providing (repetitive) expert feedback at pitch events and subsequently reducing possible overconfidence of founders.

In conclusion, we suggest that makerspaces, hackathons, and SUCs can mitigate the three major bounded rationality limitations of entrepreneurs. Although their designs, processes, and intentions differ significantly from accelerators (cf. Cohen et al., 2018), we suggest that they can mitigate bounded rationality with an impact on the search activities of start-ups. While accelerators use concentration and standardization of support mechanisms to target founders' bounded rationality limitations, our results indicate that the mechanisms to mitigate bounded rationality in makerspaces, hackathons, and SUCs are not necessarily the result of intentional resource provision. Rather, those models, in their unique ways, offer opportunity structures to be used in flexible and unforeseen ways. These are not based on standardization of activities or concentration of processes, as observed in accelerators, but allow individualism of founders and, in some cases, disorganisation of structures and processes of support.

8. Conclusion, Limitations, and Future Opportunities for Research

This paper analyses the utilization of resources in makerspaces, hackathons, and start-up competitions and offers suggestions on how these new models of start-up support can mitigate founders' bounded rationality. Overall, our findings indicate that supported founders utilize resources of makerspaces, hackathons, and SUCs to work on their *community and identity*, on their *entrepreneurial processes*, and on *further resource acquisition*. Although some ventures utilize resources as intended by the support

management, others shop around the market of support to select resources that they evaluate as most useful or most enjoyable. Our results also suggest that new support models can mitigate the bounded rationality of founders in offering opportunity structures that enable experimentation and playful learning. This approach is contrary to the concentrated and standardized mechanisms that mitigate bounded rationality in accelerators (cf. Cohen et al., 2018).

Overall, our results lead to several theoretical contributions, as well as implications for practice. Theoretically, we contribute to research on organisational sponsorship and mitigation of bounded rationality. This is based on evidence provided for resource utilization, rejection, and transformation in organisational sponsorship. We approach the so far neglected demand- and utilization-side in this context, as well as pave the way for further studies on the fit of support measures. Insights into how founders in makerspaces, hackathons, and start-up competitions utilize resources help understanding the roles of these new models of start-up support and are a first step towards measuring their impact on entrepreneurial behaviour and development. We also contribute to the theoretical discussion on bounded rationality of founders and its mitigation through external measures. While this discussion originates from research on bounded rationality mitigation in accelerators (Cohen et al., 2019), our results extend it towards more unstructured and experimental models of sponsorship. We suggest that new support models can mitigate bounded rationality in different ways and, with that, we challenge the notion of the importance of highly structured support programmes.

With regard to practical implications, our results allow drawing important conclusions for entrepreneurs, for support managers, and for policymakers. As this is one of the first empirical studies on makerspaces, hackathons, and SUCs, our findings can support start-ups in their selection processes to identify and utilize suitable sponsorship models and

resources. Support managers benefit from our analysis of resource utilization and our suggestions regarding the mitigation of bounded rationality to better target and design their support measures. Knowledge on how start-ups actually use their provided resources is a crucial factor in the optimisation of measures. Finally, policymakers concerned with regional or national entrepreneurship policies are enabled to improve their approaches and to consider promoting makerspaces, hackathons, and SUCs as additional instruments in their toolbox.

Despite several contributions, we recognise that this study also has methodological limitations. For instance, while our sample allows rich insights, it consists of founders in different environments that might produce varying results. As the environment is a crucial factor for start-up support, findings might differ in other regions or countries (Amezcua et al., 2019). Moreover, this paper explicitly does not measure bounded rationality or its mitigation through support. We instead suggest that, based on our empirical analysis of resource provision and utilization, we can derive mechanisms of bounded rationality mitigation. Analysing which resources are used, in which ways they are used, and under which circumstances of resource provision they are used, allows drawing conclusions about bounded rationality mitigation.[31] In the future, studies could measure bounded rationality and its mitigation in different environments to supplement these suggestions. We also recognise that our results do not allow evaluations of expediency and adequacy of support measures. Nevertheless, answering how and why founders utilize resources, is crucial to conduct future impact studies. It is for instance necessary to analyse the impact of new models of start-up support on entrepreneurial development and to investigate whether they improve foundation or scale-up activities of start-ups. Especially differences in processes and mode of action compared to accelerators (e.g. unstructured and individualised vs. standardized support) suggest that the impact of sponsorship on different groups of start-ups

[31]Based on previous literature, this includes an assumed bounded rationality of founders, as previously explained in this paper.

deviates. This also concerns the promotion of makerspaces, hackathons, and SUCs in public policy programmes. Although governments often heavily support these initiatives to facilitate entrepreneurial learning, venture foundation, or technology transfer (e.g. UK Digital Strategy[32]; Exzellenz Startup Center.NRW initiative in Germany[33]), studies assessing the performance of policies remain scarce. We finally suggest that future research could extend our findings on a practice level to create connections with entrepreneurial methods and strategy. For instance, this might concern how missions proclaimed by support models (e.g. societal, technical, product problems) interact with entrepreneurial practice and growth strategies.

[32]See: https://www.gov.uk/government/publications/uk-digital-strategy/2-digital-skills-and-inclusion-giving-everyone-access-to-the-digital-skills-they-need
[33]See: https://cps-hub-nrw.de/news/2019-01-23-exzellenz-start-centernrw

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CHAPTER 3: INTERMEDIARIES FOR ENTREPRENEURIAL METHODS: HOW MAKERSPACES, HACKATHONS, AND ACCELERATORS SUPPORT FOUNDERS' UNCERTAINTY COPING

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Abstract:

Entrepreneurial methods such as the lean start-up methodology have become ubiquitous in practice and education. At the same time, new models of start-up support such as makerspaces, hackathons, and accelerators can be found in many entrepreneurial ecosystems. Both entrepreneurial methods and new models of start-up support are concerned with entrepreneurial uncertainty. Entrepreneurial methods offer tools for founders to cope with their perceived uncertainty and support models offer resources and opportunities to implement these tools. Nevertheless, it remains unclear how participants in makerspaces, hackathons, and accelerators deal with uncertainty, what roles these new models of start-up support play in coping with uncertainty, and how founders' approaches to uncertainty correspond with the lean start-up methodology. This paper investigates these questions by building on theories of entrepreneurial strategy. We apply an abductive, qualitative approach that relies on a longitudinal dataset of Twitter interactions and interviews from participants and managers of support. We find that founders' approach different types of uncertainty with the development of individual and communal endurance, with active learning and ideation, and with scientification of processes. The coping approaches differ significantly across support models and we propose that these approaches match with different elements of the lean start-up methodology. Based on our analysis, we finally suggest a sequencing model of support models and mechanisms of uncertainty coping that adds to discussions on the purpose of new models of start-up support.

Keywords: start-up incubation; uncertainty coping; entrepreneurial methods

1. Introduction

Entrepreneurs, venture capitalists, managers of support, and other practitioners have been preaching and practising creational entrepreneurial methods such as the lean start-up methodology (LSM), and their variations for quite some time. More recently, research on these entrepreneurial methods has also taken off. Based on groundwork on creation theory (Alvarez & Barney, 2007) and effectuation (Sarasvathy, 2001), a growing body of literature deals with differences of entrepreneurial methods and their history (Bartolini et al., 2018; Mansoori & Lackeus, 2019), the adoption and implications of lean start-up approaches (Ghezzi, 2019; Hampel et al., 2019; Mansoori et al., 2019), founders' responses to processes such as pivoting (Grimes, 2018), and implications for entrepreneurship education (Harms, 2015). The proliferation of these entrepreneurial methods results in important new research directions that promise implications for theory and practice. Along with this development goes the progressing diffusion of new models of start-up support that act as intermediaries between founders and their environment (i.e. organisational sponsors; Amezcua et al., 2013). While accelerators have become well established in the last decade and been the subject of various studies (e.g. Cohen et al., 2018; Pauwels et al., 2015), makerspaces and hackathons are rather new phenomena that occupy specific roles in the development processes of start-ups. Overall, despite mixed results regarding performance implications (e.g. Cohen et al., 2018; Lukes et al., 2019; Schwartz, 2013), start-up support has become an established, yet constantly evolving, instrument that aims to boost entrepreneurial activity and start-up growth.

Emerging research (Mansoori et al., 2019) suggests that these new models of start-up support promote the adoption of creational entrepreneurial methods (e.g. Baker & Nelson, 2005; Sarasvathy, 2001) and help start-ups in dealing with uncertainty (Busch & Barkema, 2020). However, it remains unclear how participants in makerspaces, hackathons, and

accelerators use the provided resources to deal with uncertainty and how these support models promote the application and adoption of entrepreneurial methods such as the lean start-up methodology. Research on accelerators points towards a strong focus on the adoption of key principles of this methodology (Pauwels et al., 2016; Stayton & Mangematin, 2018) that is based on its position as an intermediary, facilitating openness and interactions (see Amezcua et al., 2013; Mrkajic, 2017). For instance, Mansoori et al. (2019) have examined the influence of the lean start-up methodology on relationships of entrepreneurs and coaches. Empirical studies on makerspaces (Browder et al., 2019) and hackathons have nevertheless remained limited. Both models constitute important new agents that promise change. In particular, their unique features and intentions correspond with certain elements of the LSM in different ways. The mixture between individual freedom to collaborate and facilitated competition between participants could for example help founders in dealing with different types of uncertainty (Busch & Barkema, 2020; McKelvie et al., 2011). Based on previous literature (e.g. Busch & Barkema, 2020; Engel et al., 2017; McMullen & Shepherd, 2006), we assume here that founders are subject to uncertainty that is inherent to entrepreneurial actions. In this paper, we explore (1) how participants in makerspaces, hackathons, and accelerators deal with uncertainty and what roles these new models of start-up support play in relation to entrepreneurial uncertainty, and (2) how founders' approaches to uncertainty in the three different support models correspond with elements of the lean start-up methodology.

We apply an abductive approach (Alvesson & Kärreman, 2007; Bamberger, 2018; Dubois & Gadde, 2002; Gioia et al., 2013) that relies on an extract from a unique longitudinal dataset of Twitter interactions (>1 year; n>19000) in connection with interview data from start-up support models and their stakeholders. This allows us to capture and qualitatively analyse the perceptions in and around new models of start-up support to derive findings on

founders' handling of uncertainty, as well as the roles of new support models in relation to the lean start-up methodology. While we do not measure uncertainty empirically, we can derive categories of uncertainty coping by looking at the expressions and perceptions of founders. From previous literature (e.g. Busch & Barkema, 2020; Engel et al., 2017; McMullen & Shepherd, 2006), we can make assumptions on entrepreneurial uncertainty and, with this, derive coping mechanisms of founders. For this purpose, we utilize Miliken's (1987) types of uncertainty (McKelvie et al., 2011) and Mansoori and Lackeus' (2019) conceptual dimensions that define entrepreneurial methods. Our analysis leads to three major results: Firstly, we provide evidence of significant differences in founders' approaches to uncertainty across makerspaces, hackathons, and accelerators. Our analysis suggests that founders' perceptions of uncertainty vary as do their approaches to cope with it. Secondly, we propose that these approaches to uncertainty match with principles of the lean start-up methodology. The analysis thus sheds light on the adoption of entrepreneurial methods in new models of start-up support (Mansoori & Lackeus, 2019). Thirdly, we offer a more fine-grained analysis of the roles of support models over time and identify systematic differences of the use of models of start-up support in different phases of venture development (cf. Mansoori & Lackeus, 2019). Our proposed model adds to the discussion on the sequential use of support models and coping mechanisms. These results contribute to research on uncertainty coping (Busch & Barkema, 2020; McKelvie et al., 2011), as well as on the roles of new models of start-up support (Browder et al., 2019; Cohen et al., 2018). Based on the proposed sequencing model, we also suggest practical implications for founders and stakeholders of start-up support that can help to navigate the variety of models.

2. Theoretical Framework

2.1 Dimensions of Entrepreneurial Methods and underlying Theories on Opportunities, Strategy, and Uncertainty

While entrepreneurial methods have been practiced and taught extensively for quite some time now, more recently they have also received increased attention from an academic perspective. The emergent field of research has in fact developed from using effectuation as its dominant logic (Sarasvathy & Venkataraman, 2011) towards an acknowledgement of the plurality of the term 'entrepreneurial methods' (Mansoori & Lackeus, 2019). What we call entrepreneurial methods in this paper is part of a more fundamental discussion about how entrepreneurs choose their strategies and whether they engage in a process of optimization or a process of choice (i.e. deselection of less preferred alternatives vs. selection among incompatible options) (Gans et al., 2019). Entrepreneurial methods address this fundamental question by offering (practical or theoretical) frameworks to navigate and implement processes of optimization or of choice. While optimization approaches rest upon gathering and evaluating information about potential strategies prior to implementation (Delmar & Shane, 2003), approaches of choice rely on action to develop entrepreneurial strategy (Gans et al., 2019). Under the latter lens, planning capabilities are considered to be limited due to the lack of reliable and processable information (Gans et al., 2019; Kirzner, 1973); a constraint that can be tackled with the implementation of (practical) cycles of experimentation, learning, and iteration (see Blank 2013; Gans et al., 2019; Ries, 2011).

The fundamental dichotomy between optimization and choice processes comes back in another differentiation which concerns entrepreneurs' approaches to opportunities. Discovery theory and creation theory describe and explain the formation and origin of entrepreneurial opportunities (Alvarez & Barney, 2007). While both theories assume that entrepreneurs aim for forming and exploiting opportunities (Alvarez & Barney, 2007; Shane,

2003: 4), they differ in how they define the nature of opportunities. Discovery theory suggests that opportunities exist and emerge independent of the entrepreneur, often through exogenous shocks (i.e. external changes of the environment or context) (Kirzner, 1973: 10; Shane, 2003: 23). Creation theory, as the logical antagonism (Alvarez & Barney, 2007), suggests that opportunities do not exist independent of the entrepreneur. Actions and enactment of entrepreneurs who explore the production of products or services create opportunities (Alvarez & Barney, 2007, Baker & Nelson, 2005; Sarasvathy, 2001). Although discovery and creation theories deal with opportunities, their perspectives reflect in Gans et al.'s (2019) theoretical developments concerning strategy. In particular, the role action plays in processes of choice matches creation theory. Rather than relying on exogenous developments and ex-ante evaluations of arising opportunities, entrepreneurs take actions to create opportunities themselves and develop and influence strategies that can exploit those. Nevertheless, while these perspectives seem to be contrasting, they could in fact be complementary for entrepreneurs (Gans et al., 2019).[34] Figure 9 provides an overview of these theoretical perspectives and their common theoretical basis.

Opportunity development	**Implementation of opportunity development**	***Shared theoretical basis***	**Implementation of strategy development**	**Entrepreneurial strategy development**
Discovery of opportunities (Entrepreneurs discover opportunities)	Identification of exogenous shocks and utilization of external changes.	*Availability and processability of information*	Gathering and evaluation of information to select strategic options prior to implementation.	**Processes of optimization** (Deselection of less preferred alternatives)
Creation of opportunities (Entrepreneurs create opportunities)	Taking action to explore options for production and to create opportunities.	*Impact of and cocreation through action*	Bypassing of limited planning capabilities (due to information limitations) through action taking.	**Processes of choice** (Selection among incompatible options)

Figure 9: Theoretical categorisation of entrepreneurial opportunity and strategy development[35]

[34]Gans et al. (2019) develop a stopping rule based on the paradox of entrepreneurship that highlights the complementarities of both processes of optimization and processes of choice.
[35]Based on Alvarez & Barney (2007) and Gans et al. (2019)

Entrepreneurial methods offer frameworks to discover or create opportunities and to implement processes of optimization or processes of choice – they aim to help entrepreneurs along ventures' development stages. While there is an abundance of practical literature on the implementation of these methods (e.g. Brown, 2008; Osterwalder et al., 2010), research has only been starting to systematically analyse their characteristics and implications. While Mansoori & Lackeus' (2019) framework of conceptual dimensions[36] helps us to distinguish between different entrepreneurial methods, we focus in this paper on the lean start-up methodology and its building blocks to identify how those correspond with founders` uncertainty coping mechanisms. Figure 10 depicts how the LSM builds on perspectives of opportunity and entrepreneurial strategy development, as well is defined by the characteristics of Mansoori & Lackeus' (2019) conceptual dimensions.

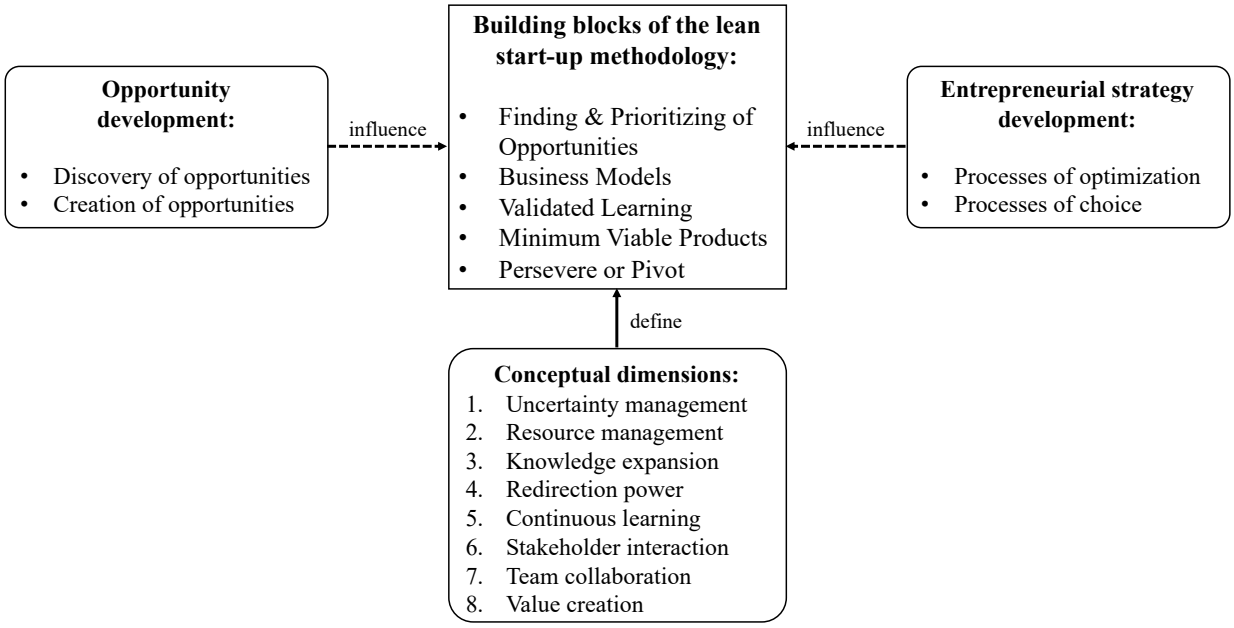

Figure 10: Defining dimensions of entrepreneurial methods[37,38]

[36]We refrain here from explaining and defining the background of the conceptual dimensions as their terms are largely self-explanatory and as their background was explained extensively by Mansoori & Lackeus (2019).
[37]The conceptual dimensions have been adapted from Mansoori & Lackeus (2019). While we recognise their dedicated dimension of 'uncertainty management', we suggest that, as outlined, entrepreneurial methods based on effectual reasoning are inherently characterised by different types of uncertainty.
[38]Shepherd & Gruber (2020) identify the building blocks of the lean start-up methodology from a research perspective.

Another fundamental part of entrepreneurial methods is how they view uncertainty; a concept that is at the very basis of entrepreneurship (Bylund & McCaffrey, 2017). Uncertainty can be defined as an individual's perceived inability to predict something (e.g. the environment or actions) accurately (Milliken, 1987). In fact, it has been suggested that uncertainty 'separates entrepreneurial action from mere action' (McMullen & Shepherd, 2006). While some research suggests that uncertainty is intrinsic to action, entrepreneurial action is furthermore subject to novelty (of new products, markets, ventures) that enhances uncertainty (Amabile, 1997; Gartner, 1990; McMullen & Shepherd, 2006). Entrepreneurial methods that are based on effectual reasoning[39] (Sarasvathy, 2001) suggest that founders actually do not try to predict a future that is unpredictable but rather create the future by starting with their given set of means and select between possible outcomes of those means (Sarasvathy, 2001, 2008; Fisher, 2012). This reasoning does not attempt to mitigate or erase uncertainty through evaluating information and ex-ante planning (in contrast to causational reasoning[40]), but it acknowledges the uncertainty and dynamics of entrepreneurs' environment (Fisher, 2012). While uncertainty is at the basis of effectual reasoning and entrepreneurial methods that make use of it, and while the implications of uncertainty for entrepreneurial actions have been analysed (McKelvie et al., 2011), it remains unclear how exactly founders deal with uncertainty in the context of new models of start-up support[41] and how this might relate to the utilization of the lean start-up methodology.

To investigate this question, we employ Milliken's (1987) three types of uncertainty that are still relevant (see McKelvie et al., 2011). *State uncertainty* suggests that the

[39]We only deal with the effectual (or creational) method of the lean start-up methodology in this paper. We acknowledge that principles of other methods such as effectuation and design thinking can also be found in the lean start-up methodology. We also deliberately exclude causational methods in our analysis.
[40]Methods based on causation are linear in nature, they build upon the definition of goals and the selection of suitable means to achieve those (Sarasvathy, 2001). Entrepreneurs engage in a process of discovery, evaluation, and exploitation of opportunities (Shane & Venkataraman, 2000, p. 218).
[41]Busch & Barkema (2020) analyse uncertainty-coping in an incubator embedded in a high-uncertainty environment.

environment is unpredictable and that components of the environment are changing in an unpredictable way (i.e. "What is happening out there?", McMullen & Shepherd, 2006). *Effect uncertainty* suggests that the impact of environmental changes on the organisation is unpredictable (i.e. "How will it impact me?", McMullen & Shepherd, 2006). *Response uncertainty* suggests that there is a lack of knowledge about response options to uncertainty and that the consequences of response choices are unpredictable (i.e. "What am I going to do about it?", McMullen & Shepherd, 2006). Although these types of uncertainty concern the environment, uncertainty should be treated as part of the perceiver's (i.e. founder's) cognition (McKelvie et al., 2011; Milliken, 1987); a proposition that justifies our focus on founders' coping approaches.

Entrepreneurial methods address the three types of uncertainty by offering frameworks that allow entrepreneurs to deal with uncertainty in structured ways. Hence, in this paper, we employ the lean start-up methodology that is based on creational logic, which is defined along Mansoori & Lackeus' (2019) dimensions of entrepreneurial methods. *The lean start-up methodology* (LSM) suggests that entrepreneurs design and test hypotheses to discover the future (Blank, 2013). This method rests on the assumption that humans can improve their judgement by repeated testing and iteration (Ries, 2011, p. 150). This testing relies on hypotheses development and constant, repetitive interactions with customers. Blank (2013) suggests three iterative steps to conduct customer discovery, validation, creation, and finally company building.[42] The iteration of hypotheses development and testing are at the core of the lean start-up methodology (Mansoori & Lackeus, 2019). While we only focus on this method here, it is nevertheless important to acknowledge the fluidity of entrepreneurial methods. For instance, parts of the methods of *effectuation* and *design*

[42]Blank (2013) and Ries (2011) propose the build-measure-learn loop: (1) mapping assumptions and building a minimum viable product to collect feedback; (2) testing the MVP with customers to validate/invalidate hypotheses; (3) learning and designing the next round of experiments.

thinking can be found in LSM as well. Effectuation suggests that entrepreneurs take action to create the future and to manage its uncertainty (Sarasvathy, 2001; Fisher, 2012). Design thinking suggests that entrepreneurs (or designers) apply sensibility and human-centred user research to understand problems in-depth and create customer value (Brown, 2008). Both the action-taking approach of effectuation (Sarasvathy, 2001), as well as the empathy-based and customer-centric approach of design thinking (Liedtka, 2015) come back in the lean start-up methodology and its focus on assumption testing and customer discovery (Blank, 2013).

As mentioned, these methods have become ubiquitous both in entrepreneurship education (Harms, 2015) and in the wider start-up community (Ghezzi, 2019). While traditional perspectives on uncertainty (Milliken, 1987) act as foundation for these methods, more recent research on creation theory (Alvarez & Barney, 2007) and entrepreneurial strategy (Gans et al., 2019) emphasise the role of action-taking for entrepreneurs. To address opportunity and strategy development, research suggests that entrepreneurs should take action, instead of relying on the collection of information prior to decision making. Taken together, the further dissemination, as well as development of entrepreneurial methods renews questions regarding how founders deal with uncertainty and how elements of the particularly popular lean start-up methodology correspond with founders' coping mechanisms.

2.2 New Models of Start-up Support as Intermediaries for the Adoption of Entrepreneurial Methods and for Uncertainty Coping

Start-up incubation has been an instrument for purposes of investment, regional economic development, and promotion of entrepreneurship for quite some time (Mian et al., 2016). The way in which incubation and support is conducted has changed significantly,

however. While the traditional business incubator, which still has relevance today, often relies on the provision of property (e.g. offices or laboratories) (Bollingtoft & Ulhoi, 2005; Dee et al., 2011), the appearance and diffusion of accelerators (Pauwels et al., 2016), and more recently of makerspaces and hackathons, has notably changed the perspective on start-up support. These new models of start-up support increasingly work as 'networked incubators' (Bollingtoft & Ulhoi, 2005; Hansen et al., 2000) that aim to facilitate network and legitimacy development for start-ups (Cohen et al., 2018). Despite their differences, organisational sponsorship theory allows to place all of these support models under the same umbrella concept of intermediaries that mediate between founders and their environment (Amezcua et al., 2013).

Accelerators originate from the US Y Combinator that was founded in 2005 (Miller & Bound, 2005). They primarily focus on enabling rapid growth of early-stage start-ups (Pauwels et al., 2016). Nowadays, accelerators can be found all over the world; their proliferation has led to them becoming the predominant model of start-up support in many ecosystems. Accelerators are characterised by their short-term, time-limited, and cohort-based processes that put emphasis on knowledge acquisition, networking, and legitimacy development (Cohen et al., 2018). While this support model has been the focus of an increasing number of empirical studies, research on makerspaces has so far been limited (Browder et al., 2019). This stands in contrast to their rapid development. Since 2006, the number of makerspaces has increased to well over 1400 worldwide (Lou & Peek, 2016). Makerspaces (or subforms of fablabs or hackerspaces) are organisations that allow their participants to develop and create new digital or physical ideas and products in a collaborative environment (Fleming, 2015; Koole et al., 2017). They provide physical tools and access to manufacturing technologies such as 3D printers (Browder et al., 2019).

Hackathons similarly can be traced back to the early 2000s. They constitute time-limited events in which participants work together to develop new products or solutions for particular problems (Briscoe & Mulligan, 2014). Hackathons aim to support the development of new teams with complementary skills, as well as external networking with partner or investors to enable the creation of tangible solutions (or minimum viable products) in a short period of time (Komssi et al., 2015). While broad definitions for all three models of start-up support exist, it is important to acknowledge the diversity within models of accelerators, makerspaces, and hackathons. Depending on shareholders or ecosystems, their intentions and provided resources can differ significantly, resulting in varying terms used.

While it seems logical that organisational sponsors can influence entrepreneurial action and the adoption of entrepreneurial methods – they work as intermediaries in between founders and their environment –, it is less clear how exactly they help participants in their actions and decision processes. For instance, new support models can help founders in adopting entrepreneurial methods and therefore also in coping with uncertainty. In fact, while there have been some attempts to unravel these questions concerning the model of accelerator (e.g. Cohen et al., 2018; Stayton & Mangematin, 2018), empirical research on makerspaces (Browder et al., 2019) and hackathons in the context of entrepreneurship has remained limited. For instance, research suggests that accelerators use key principles of the lean start-up methodology for their highly structured programmes of support (Pauwels et al., 2016; Stayton & Mangematin, 2018). Mansoori et al.'s (2019) analysis of the influence of the lean start-up methodology on relationships between entrepreneurs and coaches evidences the utilization of this method. Their findings suggest that coaching based on the lean start-up methodology increases the pace and breadth of entrepreneurs' knowledge acquisition. While entrepreneurs increasingly adopt creational entrepreneurial methods (Ghezzi, 2019), accelerators work as enabling intermediaries that seem to facilitate and actively push their

adoption. This relationship also concerns uncertainty as the underlying construct for entrepreneurship and creational methods (Busch & Barkema, 2020; Bylund & McCaffrey, 2017). Makerspaces, hackathons, and accelerators can support their participants in dealing with uncertainty. They offer resources and processes to participants that (if utilized or adapted) influence how participants approach their perceived uncertainty, and that can, in turn, influence entrepreneurial actions. Coping with uncertainty can reduce properties such as hesitancy, indecisiveness, and procrastination that might lead to missed opportunities for entrepreneurial action (Casson, 1982; McMullen & Shepherd, 2006).

While these insights suggest that new models of start-up support can influence participants' approaches to uncertainty (see Busch & Barkema, 2020) and their adoption of the lean start-up methodology, it remains unclear what roles makerspaces, hackathons, and accelerators take in these processes. Especially makerspaces and hackathons differ significantly in intentions, offered resources, and processes which changes previous assumptions on uncertainty coping and influence of organisational sponsors (Cohen et al., 2018; Mansoori et al., 2019). We thus analyse founders' approaches towards uncertainty in different models of start-up support to investigate the respective contributions of their support.[43] The proliferation of accelerators, makerspaces, and hackathons in many ecosystems around the world could have important implications for how entrepreneurs make choices and utilize entrepreneurial methods. The interaction between these support models, the lean start-up methodology, and approaches to uncertainty illustrates the importance of our study.

[43]In contrast to prior research (e.g. McKelvie et al., 2011), we do not focus on the implications of uncertainty on entrepreneurial action. We also do not measure uncertainty, but only assume that entrepreneurs are subject to uncertainty based on prior literature.

3. Research Methods

3.1 Methodology and Data Collection

The methodology of this paper follows Edmondson & McManus' (2007) contingency framework in looking at the state of theory to determine the appropriate methodological approach. This framework makes use of a continuum of the state of prior theory and research which can be applied to our research objective. While theorisation exists on certain parts of our research framework such as creation theory (Alvarez & Barney, 2007; Sarasvathy, 2001), entrepreneurial uncertainty (McKelvie et al., 2011; McMullen & Shepherd, 2006), as well as organisational sponsorship theory ('incubation as an intermediary between start-ups and environment'; Amezcua et al., 2013), research on the phenomenon of interest has been limited. Especially in the context of the mentioned theoretical perspectives, new models of start-up support open up different insights into the behaviour and perceptions of founders. Moreover, while entrepreneurial methods, such as the lean start-up, constitute practical frameworks, their theoretical underpinning has only been addressed recently. On the flipside, the utilisation and adoption of these methods also bears implications for the further development of theory. Similarly, organisational sponsorship theory has so far incorporated different actors such as accelerators, business incubators, or venture capitalists, but has failed to include the new intermediaries of makerspaces and hackathons that can change our assumptions about support mechanisms (Amezcua et al., 2013). Taken together, the current pace of development of creational entrepreneurial methods (as a plural term, Mansoori & Lackeus, 2019), and models of start-up support and their countless variations offer new insights when combined. New support models and their specific approaches of developing ventures (e.g. how to ideate and experiment) can provide different perspectives on entrepreneurial uncertainty and founders' coping mechanisms. While the perspectives of entrepreneurial strategy (and connected

methods), organisational sponsorship, and uncertainty are well developed in general, they have not been tailored to the new models of start-up support. By employing these theoretical perspectives in a novel context, we can thus develop and interpret new rules that build on existing theory and illuminate the empirical phenomenon (i.e. abduction; Alvesson & Kärreman, 2007; Bamberger, 2018; Dubois & Gadde, 2002).

We use an abductive, qualitative approach that is most suitable for the articulation of new interpretative rules that can emerge from applying existing theories onto an empirical phenomenon (Alvesson & Kärreman, 2007; Bamberger, 2018; Dubois & Gadde, 2002; Edmondson & McManus, 2007; Gioia et al., 2013). For this purpose, we exploit an extract from a unique longitudinal dataset of Twitter interactions (>1 year; n=19098) in connection with interview data from start-up support models and their participants. The data allow analysing perceptions of participants and stakeholders, on the one hand, and looking at the intentions, functions, and processes of support, on the other. Our data collection captures the perceptions of participants, start-ups, and external stakeholders of different types of start-up support over time. The interpretations of these perceptions offer rich insights into how supported founders address uncertainty and what roles new support models play. We collect all tweets of 6 support models, as well as responses and mentions over the period of 3 to 14 months (shorter for hackathons, longer for accelerators and makerspaces) based on respective keywords. Our sample includes two support organisations for the models of accelerator, makerspace, and hackathon, respectively. Geographically, we focus on support based in Greater Manchester, UK. However, one accelerator (Ignite) changed its model over the course of our data collection into distributed (and partly remote) operations across the UK and one makerspace (Barclays Eaglelabs) runs several makerspaces across the UK. Both are nevertheless still active in the city of Manchester. One organisation (hacmanchester) offers both regular hackathons and a permanent makerspace. The selection of our samples

follows the initial collection of social media data from six support organisations (that constitute three models of start-up support). These organisations are well known in the start-up scene of Manchester and the UK and therefore receive sufficient coverage on Twitter and other media. This also results in good accessibility of interview partners, especially on the start-up side, whose insights helped triangulate findings. We use the open-source TAGS Google sheet[44] to collect tweets on an hourly basis that have either been posted from the support organisation's accounts, mention their names or respective hashtags, or respond to the accounts. The tweets and other metadata have been written automatically into Google spreadsheets which could be extracted into Excel files. Overall, we collected around 19098 unique tweets. More details about the characteristics of our datasets are provided in Table 6.

Table 6: Overview of Twitter data

Support organisations (model)	**Location of organisation**	**Duration of data collection**	**Unique tweets collected**	**Number of retweets (based on RT count)**	**Number of tweets from start-ups & other actors**	**Number of tweets from mgmt. (including associated accounts)**
@igniteaccel (accelerator)	Distributed across the UK	01/12/2017 – 22/02/2019	3700	2521	2493	1215
@mi-idea (accelerator)	Manchester	01/12/2017 – 22/02/2019	1969	1080	1272	719
@madlabuk (makerspace)	Manchester	01/12/2017 – 20/02/2019	6895	4022	4728	2031
@eagle_labs (makerspace)	Distributed across the UK	05/03/2018 – 22/02/2019	5038	3333	3979	1117
@hackmanchester (makerspace and hackathons)	Manchester (series of events)	01/12/2017 – 20/02/2019	551	261	412	146
#cityvervehack (hackathon)	Manchester (one-off event)	01/02/2018 – 26/04/2018	945	681	766	179
Overall	-	-	*19098*	*11898*	*13650*	*5407*

To gain retrospective insights on the intentions and experiences of start-ups and support managers, we also conducted a number of semi-structured interviews with managers

[44]See https://tags.hawksey.info

of support organisations and entrepreneurs that have participated in different models of start-up support. We chose our interviewees based on participation or involvement in support organisations that are included in our Twitter datasets and based on their experience with different models of start-up support. This two-stage approach enables us to triangulate emerging propositions accordingly (Coyne, 1997; Sandelowski, 1995). In total, we have included 10 semi-structured interviews for triangulation that are specified in more detail in Table 7.

Table 7: Overview of interview data

Interviewee title	**Participation in support models (included in Twitter data)**	**Industry of start-up**	**Location of founder / interviewee**	**Number of employees**
Board member of makerspace	Makerspace (yes)	N/A	Manchester	N/A
Director of Makerspace	Makerspace (no)	N/A	Manchester	N/A
CEO of start-up	Makerspace (yes)	Internet of things / Smart cities	London	3
CEO of start-up	Makerspace (yes)	Agriculture technology	London	4
Project manager of hackathon	Hackathon (yes)	N/A	Manchester	N/A
Director of hackathon	Hackathon (no)	N/A	Manchester	N/A
CEO of start-up	Hackathon (yes)	Internet of things	London	3
Founder of accelerator	Accelerator (yes)	N/A	Newcastle	N/A
CEO of start-up	Accelerator (yes)	3D graphics	Manchester	3
CEO of start-up	Accelerator (yes)	Smart cities	Manchester	6

3.2 Opportunities and Risks of Social Media Data

The use of social media data in the field of management research has increased significantly since platforms such as Facebook, Twitter, and LinkedIn have become ubiquitous. Especially research in the marketing domain has used social media extensively to investigate various questions around customers, markets, and technology (Lamberton &

Stephen, 2016). Twitter data is characterised by the short length of postings (called tweets); tweets are restricted to 280 characters. In contrast to other social media platforms, Twitter mainly focusses on texts rather than pictures or videos. These characteristics of Twitter data can decrease the complexity of the analyses. Although rather short texts might condense content, the consistent format of tweets helps in conducting data collection and analysis. In addition, Twitter allows third parties (limited) access to their historic data through an API.[45] Open-source tools such as the TAGS Google sheet enable researchers to systematically collect tweets over time.

While data from Twitter and other social media platforms have been used extensively in marketing research as a natural source of customers' expressions, entrepreneurship research has only picked up this trend more recently (e.g. Antretter, 2019; Fischer & Reuber, 2014). Nonetheless, recent calls for papers in relevant entrepreneurship journals call for using social media data and investigating its relevance (see Carter et al., 2019 & Schjoedt et al., 2019). While these researchers mostly suggest investigating the implications of social media for entrepreneurship, we utilize this data source to analyse perceptions and experiences of founders. Twitter data provides opportunities to gain novel insights into how founders and stakeholders of local ecosystems communicate and interact. Especially in the (local) context of start-up support, founders and stakeholders use Twitter to foster engagement and communication (O'Brien et al., 2017).

Nevertheless, using this data source also bears risks. Most importantly, entrepreneurs who use Twitter seem to express themselves in overly positive ways. While this might be a strategy of signalling to increase legitimacy (i.e. Twitter as a marketing tool) (Fisher et al., 2017), collected statements can be biased and thus require contextualisation. To get a complete picture of the experiences of founders in new models of start-up support it is

[45]The access to tweets is currently limited to 6-9 days of historic data but this has been changed in the past.

necessary to filter tweets and to use interviews as an additional data source that allow contextualising impressions gained through Twitter data. Simply put, tweets can show what resources founders receive in start-up support and how it works well for them, but not necessarily what they do not receive, what they need, and what does not work well. While Twitter can constitute a powerful data source for the qualitative analysis of perceptions of founders and other stakeholders in entrepreneurial ecosystems, it requires triangulation through other data sources to balance overly positive and biased statements. For instance, Obschonka et al. (2017) elaborate how firms use Twitter accounts to construct a specific entrepreneurial style that is displayed and promoted publicly. While in larger firms, the marketing department plays a role in crafting this style, early-stage start-ups likely do not put significant efforts into marketing strategies. Nevertheless, impression management on Twitter can crucially bias the data collected (Obschonka & Fisch, 2018). Social media data therefore requires triangulation (for instance through interviews) to solidify identified findings and concepts (Drummond et al., 2018).

3.3 Data Analysis and Data Structure

We started our analysis with looking at the perceptions of individual participants, start-ups or other external stakeholders about provided support and utilisation of the support environment and its processes. In accordance with our abductive approach, we use existing theories as lenses to analyse our data (Alvesson & Kärreman, 2007; Bamberger, 2018; Dubois & Gadde, 2002). Subsequently, we analysed the characteristics of the respective support model and the intentions of the main shareholder and the support management through interviews. To triangulate our initial results that are based on a qualitative analysis of the collected tweets (i.e. perceptions), we use interview data from some participants, as well as from managers of support. We follow Gioia et al.'s (2013) approach in creating first-

order codes (based on collected and transcribed communication and statements), second-order themes, and aggregate dimensions. Our articulation of these new concepts can serve for future empirical testing (Yin, 2003). However, due to differences in the size of our Twitter and interview data, our approach is two-staged, combining automatic and manual analyses. To be able to qualitatively analyse a dataset of over 19000 tweets, we employ software for automatic content analysis that makes use of semantic and statistical natural language processing methods. We choose SPSS Text Analytics for Surveys (version 4.0) as the suitable application to analyse short texts, as it has been successfully used in other research projects before (e.g. Batrinca & Treleaven, 2015) and as there is extensive, up-to-date documentation available.[46] The following process demonstrates our approach for the analysis of Twitter data:

1. Automated hourly collection of tweets with TAGS script based on keywords and account names.
2. Conversion of Google spreadsheets into Excel files with tweets and metadata.
3. Cleaning of data from duplicates, blanks, and hyperlinks with Excel. Splitting of datasets into content from support management (including private accounts of support management) and start-ups and other actors.
4. Automatic and manual thematic analysis using IBM SPSS Text Analytics for Surveys.
    a. Use of automatic extraction of concepts from tweet content with onboard semantic mechanisms.[47]
    b. Exclusion of remaining names, @s, and hyperlinks.
    c. Use of automatic category building with onboard semantic and statistical techniques.[48]
    d. Manual improvement of thematic categories to account for the unique context and false categorisations. Manual screening for accuracy and plausibility to improve definitions of categories.
5. Extraction of relevant filtered and categorised data into Nvivo 11 software and manual coding of tweets into first-order codes.

[46]https://www.ibm.com/support/knowledgecenter/en/SS6A7K_4.0.1/com.ibm.spss.tafs.kc.doc/pv_welcome.html
[47]For details see: https://www.ibm.com/support/knowledgecenter/en/SS6A7K_4.0.1/com.ibm.spss.tafs.help/tas-extract.htm
[48]For details see: https://www.ibm.com/support/knowledgecenter/en/SS6A7K_4.0.1/com.ibm.spss.tafs.help/tm_intro_categorization_defined.htm

Our datasets also include retweets (RTs) of other tweets as they are often seen as endorsements from the respective accounts, adding a valuable picture of the interactions. While the longitudinal collection of tweets allows an insightful analysis, after our initial automatic content analysis, we recognised that the majority of tweets falls into the category of marketing and promotional activities. This is in line with previous research that deals with blogs or tweets as an impression management instrument of ventures (Gegenhuber & Dobusch, 2017). We thus filter for tweets that reflect real perceptions of participants in support. Subsequently, these filtered tweets were coded manually. In regard to conducted interviews, we transcribe statements made and use NVivo 11 software for coding them into first-order codes. The first-order coding of both Twitter and interview data is used to manually create second-order themes and aggregate dimensions presented in the following Figures 11 and 12. Table 8 provides exemplary tweets (i.e. perceptions) and the corresponding first-order codes.

Table 8: Exemplary tweets (perceptions of participants and stakeholders) and corresponding first order codes[49]

Exemplary tweets	First-order codes
'Lovely email from @techireland this morning. Really good to see organisations like them, @igniteaccel, and many others, injecting humanity into the world of tech startups. Too often it's all about growth, raising money, "hustle" and "crushing it"...' 'Do you maybe feel a "digital laboratory" could be a cold, clinical place? Well Manchester's MadLab (@madlabuk) disproves that entirely. A thick slice of the human condition is there…' 'I joined an amazing accelerator programme at 6 months pregnant, they even had an emergency plan for if I went into labour on site as it lasted 3, months. Thanks @igniteaccel'	**A, M:** Solidarity and 'humanity' of founders and support management help to deal with hostile sides of entrepreneurship. **A:** Provisions of incubator account for individual needs of participants and create feeling of security.
'Startups - If moving away from home is not an option to join an accelerator programme - you might want to read up on the fab @igniteaccel - who's new model aims to remove that potential barrier.' 'An Ezoic UK team member introduced a 'Wellness Wednesday" - yoga, meditation, mindfulness etc. It's been really popular with the team.' 'Brilliant talk by @FunzingUK and Dada Jyotirupananda last night, teaching the ways of mediation and telling his story as a monk living in western cities at @madlabuk.'	**A, M:** Use of support as a shelter that allows and enables private commitments, work-life balance, and varying locations for founders. **A:** Embracing individualism and personal characteristics of founders.

[49]Spelling mistakes and abbreviations in exemplary tweets have been corrected to ensure readability.

‘A really personal and poignant article from one of my colleagues on the @igniteaccel programme. Mental health is a difficult subject, even in this day and age, but it shouldn't be., “How I beat Social Anxiety to create a Startup”’	
‘The kid took part in an excellent introduction to computer games design today put on by @MakoEducationUK at @madlabuk We’re really lucky to have so many opportunities like this in Manchester.’ ‘Last few places left on YouthLab, our free creative summer school for 14 - 19-year olds. Learn new skills, develop a portfolio and gain your Bronze Art Award.’ ‘Bubbling enthusiasm from 8-year-old daughter talking about her day spent coding a drone and making a computer game with a friend.’ ‘Still time to apply for 'Making it Digital' with @madlabuk A series of digital fabrication workshops designed to equip unemployed and underemployed women with skills to kickstart careers and open up new job opportunities in technology and beyond!’ ‘Excited to visit #Manchester tomorrow to find talented individuals who want to start new commercial tech businesses that help unlock opportunities for people in places hard-hit by globalisation & automation.’	**M:** Learning programmes for children to promote STEM subjects and the use of technology. **M:** Workshops for unemployed / disadvantaged groups to increase employment chances and entrepreneurial activities.
‘I strongly believe that taking ownership over your environment is so important - make, fix, reuse -and love everything you have - everything should have a purpose #zerowaste @madlabuk are sharing a great ethos with us today.’ ‘I think you can make a good argument that all the good/sustainable makerspaces are in old converted industrial buildings. Shiny buildings and kit generally imply top-down, funded model.’ ‘After finding a cheap barrel on the Facebook Marketplace, I was able to build a dust separator for the Woody Dusty woodworking space at @hacmanchester. During some testing, I was able to catch even the fine dust which will go a long way to saving on vacuum filters.’	**M:** Ownership of space and activities to improve facilities and resources create identification and commitment. **M, H:** Community development creates feeling of belonging.
‘Intro-ing @BikeLightmyway , who used a @Raspberry_Pi for the 1st time this weekend & won #CityVerveHack ! Team, as your project develops, get in touch with @fortyfourMu @DigInnMMU @McrRaspJam @TheMagP1 . Very supportive community for proactive do-ers.’ ‘Anyone at #CityVerveHack can jump up for 30 seconds to pitch an idea to work on this weekend. Yes, you can pitch more than one! Teams will form around ideas participants are most drawn to, all informed by this initial sharing in the room.’	**A:** Involving interdisciplinary people and external partners to develop prototypes. **H:** Initial team building and ideation activities are aimed at creating interdisciplinary and complementary teams.
‘@igniteaccel "Some of the challenges we’re looking for pre-accelerator businesses to potentially tackle include: , - What technologies can empower older people?, - How can product design and marketing be adapted to appeal across the generations?”’ ‘All settled in for the @igniteaccel showcase this afternoon and ready to introduce everyone to our vision!’ ‘“If you’re not tracking you’re guessing” wise advice from @baileytalks @igniteaccel , For #marketing, #writing & everything that matters.’	**A:** Development of visions for ventures and presenting & testing of visions with customers. **A:** Tracking of customer interactions and product performance to learn and iterate.

‘Fantastic to be learning from such a dedicated group at IgniteAbility shaping #disability #entrepreneurs through the the experiences gained from the successes with refugees @igniteaccel - ARCLinkageGrant with @SSI_tweets, @NDS_Disability & @breakthruAU.’ ‘Did we mention - we read a LOT of books. As the lovely @tristanwatson, CEO of @igniteaccel puts it: "Reading is a superpower.", Here, he helpfully shares a snapshot of the Ignite team’s favourite reads that they recommend to founders.’	**A:** Observation of people’s needs, behaviour, and experiences to expand knowledge. **A:** Empathize with specific groups of people who could turn into customers to explore new directions and opportunities.
‘Something is baking in our lab @mi_idea ! Soon everyone will be able to visit and have a live immersive demo of the innovation we are working on with @Cortexica and #cisco.’ ‘Were you at the @placetech #PropTech Trend Talk at the @mi_idea in #Manchester on Friday? @jordanisonfire gives his key takeaways and shares the sensor data we monitored live from the event!’ ‘It’s @IBMWatson Cognitive Lab time for the #NationwideEmergingTalent Digital Skills Academy today at @mi_idea ... time to build some #cognitive #chatbots and visual recognition machine learning models with @IBMcloud’ ‘Another demo is live!! AI-SAFE, combining real-time video analysis with advanced algorithms and machine learning to ensure that employees are correctly kitted out with the safety gear they require. Working closely with @Cortexica come and visit us today @Mi_idea to learn more!’ ‘Putting the @TFGM API to use with live @MCRMetrolink times for the @hacmanchester's new Hackscreen.’	**A, M:** Building frugal prototypes to learn from insights about development processes and customers. **H:** Using technology to create frugal prototypes that allow experimentation and learning. **M:** Use own resources at hand to experiment with prototypes that allow to expand knowledge base.
‘Proud to be creating an ecosystem that supports the dreams and ambitions of startups in #Manchester. Finding a *place* to start is the hardest part. Let’s continue to unlock more opportunities together.’ ‘It recognised the work of our team, our volunteers and the communities we support but also enabling us to promote grassroots innovation more widely. @madlabuk speaks on what it meant to win at the #BigChipAwards.’ ‘A day crippled by chronic pain and depression led to the spark of an idea. We started @igniteaccel with a vision and ended it today with an early product we are super proud of.’ ‘This, although a good sign that Telegram is taking privacy seriously (finally), is also a huge issue for Iranian businesses., I met Iranian siblings a few years ago, as part of coaching the @igniteaccel program. They sold legal luxury products to the Iranian market.’	**M:** Incubation as an initiating place to start entrepreneurial activities. **M:** Support of ‘grassroots’ innovation activities of volunteers and communities. **A:** Ideation activities emerging from own resources at hand and individual limitations and problems.
‘Another Wednesday evening spent at @hacmanchester. I decided to try and make some Xmas decorations but figuring out how to use my Illustrator skills appropriately for a laser cutter whilst learning to use a laser cutter is a steep learning curve!’ ‘Wednesday’s are becoming my favourite day of the week; last night I spent another evening at @hacmanchester on the laser cutter. Nothing exciting to show this time as I wanted to learn more about the power/speed settings and preventing laser burn!’	**M, H:** Using own skills and equipment at hand to expand knowledge. **M, H:** Engaging and learning with wide range of stakeholders and their resources. **A:** Interact with a wide range of stakeholders to

‘I’ve joined @hacmanchester and went to my first open evening tonight. I made friends with the laser cutter and made a coaster of a recent illustration. It’s not perfect but I’m chuffed with my first attempt!’ ‘Amazing to see @hacmanchester teaching #soldering to all ages @makerfaire_uk today. The PCBEEs are beautiful - bringing #electronics to life.’	benefit from their contribution.
‘@hike_seo @igniteaccel Thanks for all your help so far guys. Glad you decided to pivot; you've got a great product! Keep up the great work.’ ‘Once again, a day with our @igniteaccel family has confirmed, and majorly helped with, some big decisions, exciting and nervous, and pizza, and hugs.’ ‘This reminded me of how @igniteaccel hammered home the Mom test. I struggle with this feedback loop as it’s easy to fall into old (easier) habits. Will adopt his simple approach.’	**A:** Cohort of founders and support management help with decision making and potential pivoting. **A:** Use of iterative models for feedback and testing activities.
‘Great article mentioning our post accelerator @mi_idea, @TweetsbyMSP, @CiscoUKI. @MayorofGM we're a startup in Bright Building, we've got a brand-new video platform for all those people who consume hours of video on their phones, worldwide patent pending, can we meet to show you?’ ‘As we head into the weekend for a (much needed) rest, one last thank you to our wonderful sponsors @UKFast, @ECOMRecruitment, @Bruntwood_UK, @UKBing, @Mi_IDEA, @indiespring, @TweetsbyMSP, @bcs, and @Cisco.’ ‘Very proud to be working alongside all these clever startup types on our tech accelerator @igniteaccel. They are helping us build Prolifiko into a super-smart writing coach that we *know* you are going to love.’	**A:** Attempt to interact with as many people as possible to collect feedback. **A:** Narrow down customer problems and ask different customer groups for feedback. **H:** Validation and testing of vision and customer problems through pitching in front of potential (corporate) customers or their intermediaries.
‘Did you know it's often faster by bike? @fasterbybike are building a tool to show you where in #Manchester you could save time by cycling.’ ‘Prototype web tool to highlight major commuter corridors where it's would be faster to cycle than drive, thanks to suggestion from @awjre. Developed at #CityVerveHack. Work in progress - suggestions welcome.’ ‘Inspiring girls into STEM – two of our Year 11 pupils recently won a coding competition to test and challenge digital skills and creativity @hac_100.’	**H:** Use of means to contribute and create value added for stakeholders. **H:** Creation of prototypes that create value for users from the beginning.

The data structures presented in Figures 11 and 12 use Gioia et al.’s (2013) approach by creating first-order codes, second-order themes, and aggregate dimensions. However, we extend this three-layered principle to incorporate the two sides of interest: (1) characteristics and intentions of models of start-up support, and (2) perceptions of participants and partners. This approach has been used in other studies before (e.g. Gegenhuber & Dobusch, 2017) to

account for two different perspectives on the phenomena of interest. In our data structure, first-order codes are categorised by the respective support model. We use theorisations in our second-order themes and aggregate dimensions, based on the theoretical lenses used (Alvesson & Kärreman, 2007; Bamberger, 2018; Dubois & Gadde, 2002). The second-order themes that cover the characteristics of support models and their 'push' for entrepreneurial methods use definitions from creational methods (as defined by Mansoori & Lackeus (2019)). As this paper only focuses on the lean start-up methodology, we will however not distinguish explicitly between different entrepreneurial methods. The lean start-up methodology also includes parts of other methods (i.e. effectuation and design thinking) and therefore an analysis distinguishing by entrepreneurial method would not be possible here. While the exemplary tweets above offer insights into the creation of first-order codes, the coding structures presented below capture the entire findings.

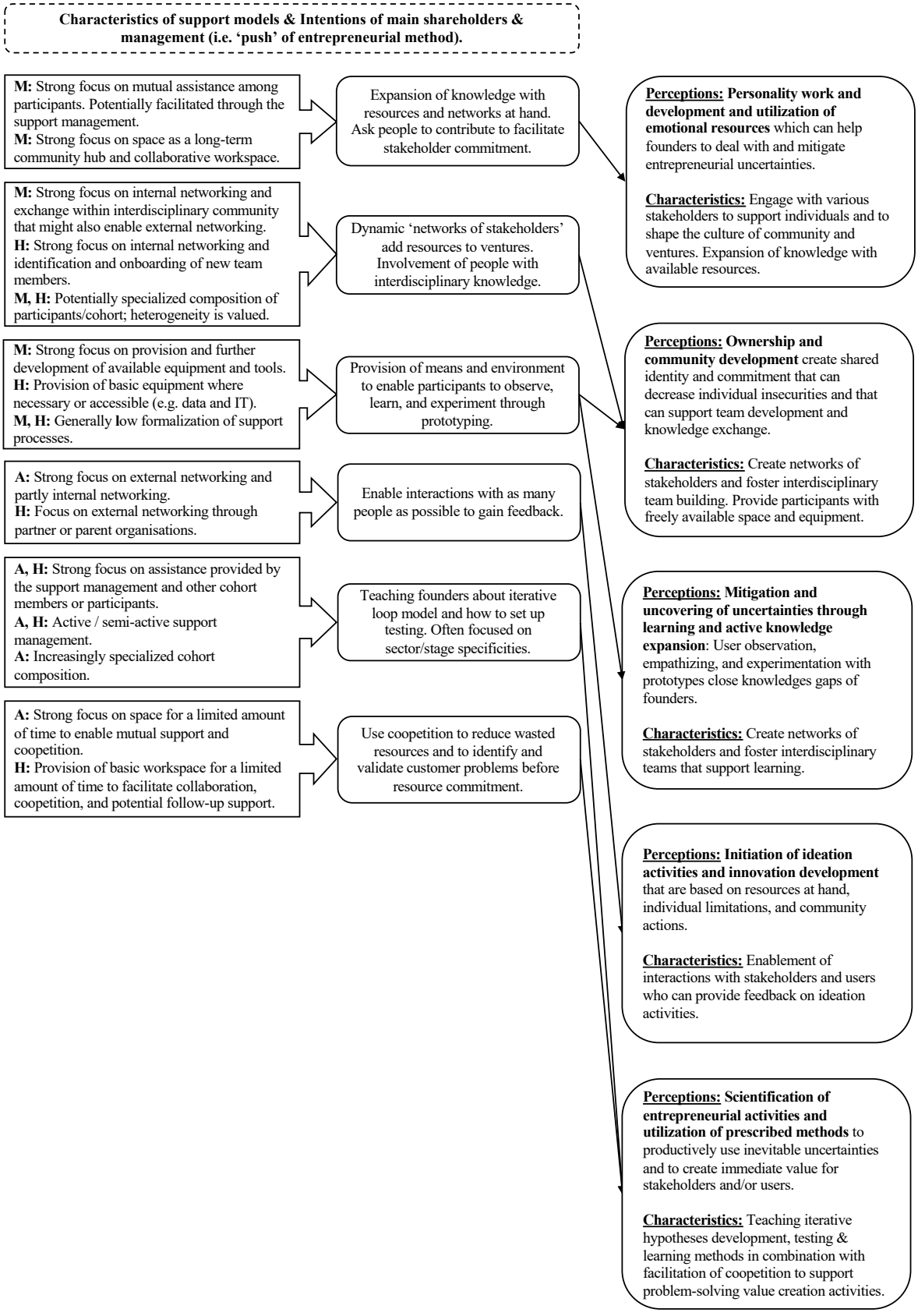

Figure 11: Coding structure for characteristics and intentions of support models

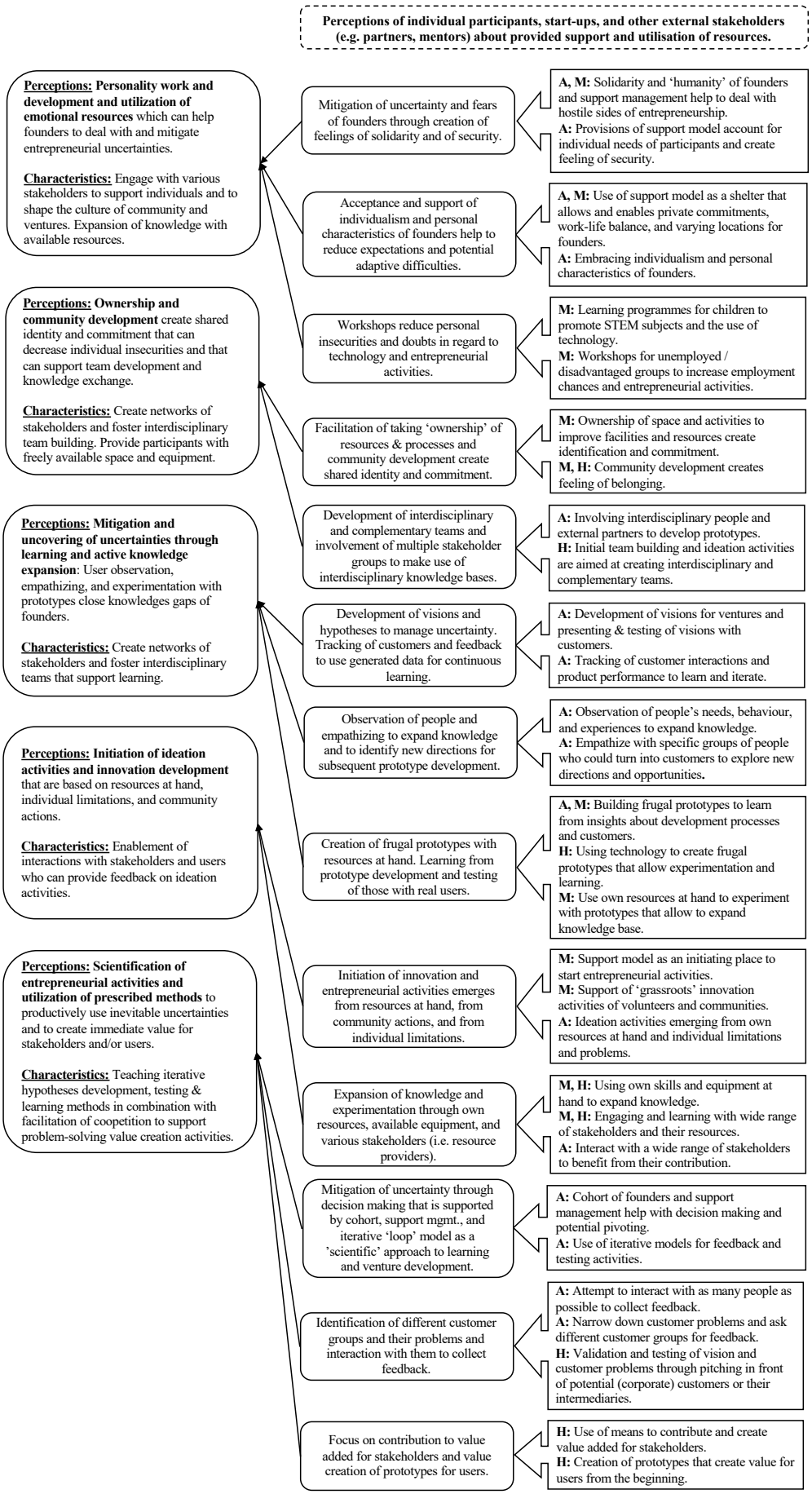

Figure 12: Coding structure for perceptions of participants and partners

4. Findings

4.1 Approaches to Uncertainty in New Models of Start-up Support

The structure of the analysis of empirical results follows our research questions, as well as the five identified approaches of participants to uncertainty. By putting participants and entrepreneurs and their perceptions of support into the focus, we are able to analyse how they deal with uncertainty in new models of start-up support and how the roles of these models differ in terms of entrepreneurial uncertainty.[50] Based on Mansoori & Lackeus' (2019) dimensions of entrepreneurial methods, we analyse how elements of the lean start-up methodology correspond with approaches to uncertainty across the three models. This analysis relies on the perceptions of participants in these support models and of other external partners (as shown in our analysis of tweets and interviews).[51] We further reflect on preconditions for this entrepreneurial method which are shaped by the characteristics of models of start-up support and intentions of their main shareholders or managers. We refer to this as 'push' of entrepreneurial methods. Table 9 presents a summary of these findings which are further explained in the following. The findings presented include second-order themes and aggregate dimensions that originate from the coding structures shown in Figures 11 and 12.[52] It also shows how dimensions of entrepreneurial methods match with participants' approaches to uncertainty. The five approaches to uncertainty presented, emerge from the data analysis that considers the assumed entrepreneurial uncertainty, and result in three overarching categories of uncertainty coping that are assigned to the types of perceived uncertainty in the discussion section.

[50]We do not measure uncertainty here but assume that uncertainty exists based on the literature. We thus only analyse coping mechanisms.
[51]It is important to notice that the findings based on tweets shown in the following analysis have been triangulated through interviews. Interview data did primarily serve for the purpose of triangulation and in-depth quotes are therefore not provided.
[52]Sequence of analysis: (1: Table 8) coding of tweets into first-order codes; (2: Figures 11 & 12) creation of coding structure; (3: Table 9) discussion & analysis by creating table of support models / uncertainty coping.

Table 9: Participants' approaches to uncertainty in models of start-up support

Approaches to uncertainty / Models of start-up support and dimensions of entrepreneurial methods	**Individual & Communal Endurance**		**Active Learning & Ideation**		**Process Scientification**
	Personality work and development & utilization of emotional resources	**Ownership and community development**	**Learning and active knowledge expansion**	**Initiation of ideation activities and innovation development**	**Scientification of entrepreneurial activities and utilization of prescribed methods**
Makerspace	• Mitigation of uncertainty and fears of founders through creation of feelings of solidarity and of security. • Acceptance and support of individualism and personal characteristics of founders help to reduce expectations and potential adaptive difficulties. • Workshops reduce personal insecurities and doubts in regard to technology and entrepreneurial activities.	• Facilitation of taking 'ownership' of support resources & processes, and community development create shared identity and commitment.	• Creation of frugal prototypes with resources at hand. Learning from prototype development and testing of those with real users.	• Initiation of innovation and entrepreneurial activities emerges from resources at hand, from community actions, and from individual limitations. • Expansion of knowledge and experimentation through own resources, available equipment, and various stakeholders (i.e. resource providers).	
Hackathon		• Facilitation of taking 'ownership' of support resources & processes and community	• Creation of frugal prototypes with resources at hand. Learning from prototype development	• Expansion of knowledge and experimentation through own resources, available	• Identification of different customer groups and their problems and

		development create shared identity and commitment. • Development of interdisciplinary and complementary teams and involvement of multiple stakeholder groups to make use of interdisciplinary knowledge bases.	and testing of those with real users.	equipment, and various stakeholders (i.e. resource providers).	interaction with them to collect feedback. • Focus on contribution to value added for stakeholders and value creation of prototypes for users.
Accelerator	• Mitigation of uncertainty and fears of founders through creation of feelings of solidarity and of security. • Acceptance and support of individualism and personal characteristics of founders help to reduce expectations and potential adaptive difficulties.	• Development of interdisciplinary and complementary teams and involvement of multiple stakeholder groups to make use of interdisciplinary knowledge bases.	• Development of visions and hypotheses to manage uncertainty. Tracking of customers and feedback to use generated data for continuous learning. • Observation of people and empathizing to expand knowledge and to identify new directions for subsequent prototype development. • Creation of frugal prototypes with resources at hand. Learning from prototype development and testing of those with real users.	• Initiation of innovation and entrepreneurial activities emerges from resources at hand, from community actions, and from individual limitations. • Expansion of knowledge and experimentation through own resources, available equipment, and various stakeholders (i.e. resource providers).	• Mitigation of uncertainty through decision making that is supported by cohort, support mgmt., and iterative ‘loop’ model as a ’scientific’ approach for learning and venture development. • Identification of different customer groups and their problems and interaction with them to collect feedback.

Dimensions of creational entrepreneurial methods that correspond with participants' approaches to uncertainty[53]	**Uncertainty mgmt.:** Management of present personal & emotional uncertainties to create the future. **Resource mgmt.:** Expansion of resources based on own limitations and personal characteristics. **Knowledge expansion:** Starting of entrepreneurial process with own personality traits and handling of emotional uncertainties.	**Redirection power:** Development of community and inclusion of community into processes of direction shaping. **Stakeholder interaction:** Collective shaping of venture direction through active stakeholders that commit resources. **Team collaboration:** Fluid and dynamic team boundaries based on 'network of stakeholders'. **Team collaboration:** Focus on interdisciplinarity of team members.	**Knowledge expansion:** Observation of people and empathizing result in documented insights. **Redirection power:** Empathy with users enables to identify and test new directions. **Continuous learning:** Development and testing of frugal prototypes enables learning. **Knowledge expansion:** Formulation and testing of hypotheses expand knowledge on customers. **Continuous learning:** Customer interactions are the basis for analytical processes that enable learning.	**Knowledge expansion:** Initiation of ideation and innovation development is based on personal traits and resources, and new actors entering the network. **Stakeholder interaction:** Stakeholder (i.e. user) feedback is at the core of prototype development and testing and can be the basis for ideation activities.	**Redirection power:** Processes of empathizing with users are the basis for redirection. **Continuous learning:** Deliberate gathering of information through development and testing of prototypes. **Knowledge expansion:** Loop-model based on hypotheses testing aims to expand customer knowledge. **Redirection power:** Pivoting as a fundamental and necessary reaction to changes of information. **Continuous learning:** Analytical approach to identification of customer groups and to collection and analysis of customer feedback and data.

[53]We only take into account here the definitions of creational methods (Mansoori & Lackeus, 2019) and deliberately include findings that go beyond the lean start-up methodology. Although we only focus on the lean start-up methodology in our paper, we therefore acknowledge the existing fluidity of methods. As mentioned, the lean start-up methodology also incorporates some of the dimensions of other methods such as effectuation and design thinking.

4.1.1 Personality Work & Development and Utilization of Emotional Resources

Our findings suggest that participants in makerspaces and accelerators utilise resources to work on their personality, as well as to develop and utilise emotional resources. Participants in these models of start-up support approach uncertainty on a personal level. First, we can observe that participants try to mitigate their fears and uncertainty through the creation of feelings of solidarity and security. Perceptions in makerspaces and accelerators included in our sample point towards feelings of solidarity and 'humanity' of founders and the support management that help to deal with the (perceived) hostile sides of entrepreneurship. One participant tweets about an email from the Ignite accelerator:

> *Lovely email from @techireland this morning. Really good to see organisations like them, @igniteaccel, and many others, injecting humanity into the world of tech startups. Too often it's all about growth, raising money, "hustle" and "crushing it"...*

Support models also account for the individual needs of their participants to create feelings of security. As one tweet describes, this can even concern provisions for maternity which alleviate personal uncertainties:

> *I joined an amazing accelerator programme at 6 months pregnant, they even had an emergency plan for if I went into labour on site as it lasted 3, months. Thanks @igniteaccel.*

Secondly, our findings show that participants in makerspaces and accelerators are supported in the development of individualism and their personal characteristics. Founders perceive this as a reduction of the expectations of support models to deliver quick venture growth. They also perceive an alleviation of potential difficulties in their adaptation processes to the new environment of a support model. For instance, participants use the support as a shelter that allows and enables them to make private commitments, have a (perceived) work-life balance, or to use distributed locations for founders. One tweet exemplifies how a makerspace is seen as the opposite of a cold place to work at:

Do you maybe feel a "digital laboratory" could be a cold, clinical place? Well Manchester's MadLab (@madlabuk) disproves that entirely. A thick slice of the human condition is there.

Accelerators in our sample also embrace individualism and personal characteristics of founders. Instead of grinding off the characteristics of individual founder, accelerators allow and support the characteristics of founders that make them unique (and potentially stand out). For instance, they are encouraged to continue using their local accents (e.g. in a pitch) despite that some are equated with a working-class background in England. One founder elaborates on his experience of a pitch training:

Embrace your regional accent, channel your passion, jump up & down to pitch - tell the audience "fuck you I'm a founder!" Laughing at today's brilliant pitch training.

Thirdly, our findings show that a variety of workshops in makerspaces aim to reduce personal insecurities and doubts in regard to technology and entrepreneurial activities. This can include learning programmes for children or workshops for unemployed or disadvantaged groups to increase employment chances and entrepreneurial activities. One participant expresses how children engage in activities of the makerspace:

Bubbling enthusiasm from 8-year-old daughter talking about her day spent coding a drone and making a computer game with a friend. Thanks @madlabuk!

4.1.2 Ownership and Community Development

Our findings suggest that participants in makerspace, hackathons, and accelerators take ownership (i.e. responsibility) of resources and processes and the active development of their local community. Participants in these models of start-up support approach uncertainty on a communal level. First, we can observe that participants in makerspaces and hackathons take shared ownership of *their* resources and processes in the respective support organisation. They perceive a common feeling of responsibility for the quality and

development of resources and make the it their own environment of support. This also mirrors in the active development of a community which creates a shared identity and further commitment. The support management actively facilitates the shared responsibility and ownership that participants take. For instance, participants in a makerspace tweet about the community's efforts to develop tools and tangible resources:

> *I strongly believe that taking ownership over your environment is so important - make, fix, reuse -and love everything you have - everything should have a purpose…*
>
> *Another Wednesday evening spent at @hacmanchester. I decided to try and make some Xmas decorations but figuring out how to use my Illustrator skills appropriately for a laser cutter whilst learning to use a laser cutter is a steep learning curve!*

Secondly, our findings show that participants in hackathons and accelerators develop and make use of interdisciplinary and complementary teams and involve different groups of stakeholders to benefit from interdisciplinary knowledge bases. While accelerators involve interdisciplinary people and external partners to develop prototypes, hackathons put more emphasis on initial team building and ideation activities. Participants in accelerators are already part of a team when entering the support programme, while participants in hackathons enter the programme for the very reason of developing interdisciplinary and complementary teams. One manager of a hackathon elaborates in the interview on their efforts to build teams with mixed skills:

> *We encouraged them to try and keep their team numbers at a maximum of five; and also, to talk to each other about their skill sets and try and mix their skills through their teams. Because it's not much use to anyone if you have a team composed entirely of designers, with no developers, they're not going to get a whole lot done.*

4.1.3 Learning and Active Knowledge Expansion

Our findings suggest that participants in makerspaces, hackathons, and accelerators utilise resources to learn and actively expand their knowledge in several dimensions. They mitigate or uncover uncertainties of knowledge through user observation, empathizing, and experimentation with prototypes. First, we find that participants in accelerators develop visions and hypotheses to manage uncertainty and track customers and their feedback for continuous learning. Presenting their vision to relevant stakeholders helps participants to test their perception of reality. Confirming or disconfirming this general direction of the venture, helps founders to cope with their overall uncertainty regarding knowledge. A tweet from a participant of the Ignite Accelerator illustrates how their development process started with a vision:

> *A day crippled by chronic pain and depression led to the spark of an idea. We started @igniteaccel with a vision and ended it today with an early product we are super proud of.*

Secondly, our findings show that participants in accelerators make use of observations and empathizing with users to expand knowledge and to identify new directions for subsequent prototype development. For instance, they observe people's needs, behaviour, and experiences and they try to empathize with specific groups of people who could turn into customers to explore new directions and opportunities. This customer-centric approach towards learning and knowledge expansion can be observed particularly in accelerators included in our data. One tweet from the organisers of the CityVerveHack introduces a prototype developed and calls for feedback:

> *Prototype web tool to highlight major commuter corridors where it's would be faster to cycle than drive, thanks to suggestion from @awjre. Developed at #CityVerveHack. Work in progress, suggestions welcome.*

Thirdly, our data show that participants in makerspaces, hackathons, and accelerators create frugal prototypes with resources available to them to learn from the development process and from testing with real users. While participants in makerspaces and hackathons seem to focus on the process of experimentation and prototype development itself, participants in accelerators rather put emphasis on the customer in this process. Participants thus use both the process of experimentation as well as the testing of developed prototypes with real users to expand their knowledge. For instance, the board member of a makerspace explains that participants essentially want to freely experiment with available tools at first:

> *If I'm in that space I want to mess around with the 3D printing for a bit, I want to talk to peers and then I might have a more structured thing.*

4.1.4 Initiation of Ideation Activities and Innovation Development

Our findings suggest that participants in makerspaces, hackathons, and accelerators utilise resources to initiate activities related to ideation and innovation development. Based on resources at hand, individual limitations, and community actions, these activities aim to alleviate uncertainties regarding the initiation of entrepreneurial activities. First, our data show that participants in makerspaces use the physical and cultural space available for the initiation of entrepreneurial activities. This is based on volunteers and communities (e.g. communities based on technologies or cultures) that are actively involved in the development of 'grassroots' innovations. Ideation activities in accelerators emerge from the resources at hand and the limitations that can work as starting point for founders' ideas. One tweet describes an ideation workshop taking place in a makerspace that is focussed on sustainability questions:

> *Heading to "Feeding the City: Idea Generation Workshop" tonight at @MadLabUK, "Can you imagine a world where city life & sustainable food go hand in hand?"*

Secondly, our findings show that experimentation and knowledge expansion in makerspaces, hackathons, and accelerators are based on participants' own resources, available equipment, and various stakeholders (i.e. resource providers). Founders in makerspaces and hackathons focus on skills and equipment immediately available to them, while founders in accelerators put emphasis on interactions with a wide range of stakeholders to benefit from their contributions. One tweet exemplifies the mix of participants and attendees at a hackathon in our sample which helps start-ups to access diverse skills and feedback:

> *Cyclists, bus-users, pedestrians, councillors, developers, transport planners, designers, data pros, students & Eccles-cake lovers pitching ideas at #CityVerveHack - great human mix.*

4.1.5 Scientification of Entrepreneurial Activities and Utilization of Prescribed Methods

Our findings suggest that participants in hackathons and accelerators engage in processes of scientification of entrepreneurial activities and utilise elements of entrepreneurial methods in prescribed ways. In line with these methods, they aim to use entrepreneurial uncertainties in a productive way to create immediate value for stakeholders and users. Firstly, our data show that participants in accelerators mitigate uncertainty through decision-making processes that are based on support from the cohort of start-ups or from the management and rely on iterative loop models that promise a scientific approach to learning and venture development. For instance, one participant mentions how he used support received for implementing test methods, and a tweet from an accelerator in our sample exemplifies the pivot of a participating venture:

This reminded me of how @igniteaccel hammered home the Mom test. I struggle with this feedback loop as it's easy to fall into old (easier) habits. Will adopt his simple approach.

A great example of one of our brilliant @mi_idea companies pivoting to add huge value to the healthcare sector.

Secondly, our findings show that participants in hackathons and accelerators aim to systematically identify different customer groups and their problems to collect feedback in an interactive way. We find that participants in accelerators attempt to interact with as many people possible to collect feedback and aim to narrow down customer problems and ask different customer groups for feedback. Participants in hackathons included in our sample use the mechanism of pitching to validate and test their vision and identified customers problems with (corporate) customers or their intermediaries. For instance, one tweet announces the pitching of participants at the end of a hackathon:

We're here at day 2 of the #CityVerveHack. The teams are progressing with their ideas and getting ready to present their progress to the panel!

Another tweet demonstrates how conferences and events with external partners are held at the venue of the Mi-Idea accelerator to enable participants to interact with stakeholders:

Packed room for techUK's #Supercharging18 conference in Manchester - looking at digital opportunities for the UK economy. Hosted at @TweetsbyMSP Bright Building, home of @mi_idea & @CiscoUKI innovation centre.

Thirdly, our data show that participants in hackathons focus on contributions that (ostensibly) add value to stakeholders. For instance, they aim to create direct value for users through their prototypes. Participants follow the principles of entrepreneurial methods in putting immediate value for customers at the centre of attention, as a tweet of a hackathon, focussed on creating transportation solutions for the city of Manchester, exemplifies:

The groups pitch #innovative ideas to hack, including talkative bus stops and next generation cycling!

5. Discussion

In this discussion, we use the findings presented to, firstly, reflect on the apparent links between approaches to entrepreneurial uncertainty and the roles of models of start-up support. We also discuss how elements of the entrepreneurial method of lean start-up match with participants' approaches to uncertainty. This also concerns preconditions for the implementation of this method which mirror in the identified approaches to uncertainty. We, secondly, suggest a model that seeks to disentangle the dynamics between support models and entrepreneurial method in approaching the sequencing of support and adopted method. The discussion brings together the three parts of approaches to uncertainty, models of start-up support, and entrepreneurial method that underpin the empirical results presented.

5.1 Uncertainty Coping, the Roles of New Support Models, and the Lean Start-up Methodology

We provide empirical evidence for how participants in new models of start-up support approach and handle different elements of entrepreneurial uncertainty and what roles makerspaces, hackathons, and accelerators play in this process. For this purpose, we assign the five approaches to uncertainty identified to three overarching categories of uncertainty coping which take different roles in makerspaces, hackathons, and accelerators respectively: (1) Personal & communal endurance; (2) Active learning & ideation; and (3) Process scientification. The creation of these categories, essentially, is a fourth step of theorisation that is based on the aggregate dimensions of the coding structure. It helps consolidating the findings and assigning them to different types of uncertainty. We argue that founders use these three categories of uncertainty coping for different types of perceived uncertainty. Table 10 provides a summary of these links which are explained in the following sections.

Table 10: How participants in new models of start-up support approach different types of uncertainty

Support models / Types of uncertainty	**State uncertainty**	**Effect uncertainty**	**Response uncertainty**
Makerspace	• Active learning & ideation	• Individual & communal endurance • Active learning & ideation	• Individual & communal endurance
Hackathon	• Active learning & ideation	• Active learning & ideation	• Process scientification
Accelerator	• Active learning & ideation	• Individual & communal endurance • Active learning & ideation	• Individual & communal endurance • Process scientification

We also compare how the identified approaches towards uncertainty correspond with different dimensions of the lean start-up methodology. As explained earlier, uncertainty is at the core of creational methods (Bylund & McCaffrey, 2017). The lean start-up methodology suggests that founders should accept the unpredictability of the future to utilize actions and decisions that actively control this unknowable future about the environment and responses of the venture (McKelvie et al., 2011; Sarasvathy, 2001). While our findings suggest that participants of new models of start-up support approach uncertainty in three different ways, these approaches furthermore match with dimensions of entrepreneurial methods. It is therefore possible to analyse which parts of the lean start-up methodolgy participants in our sample adopt (deliberately or unknowingly) through their approaches towards uncertainty. Table 9 shows the corresponding dimensions of entrepreneurial methods for each of the five approaches to uncertainty identified. Analysing how approaches to uncertainty match with entrepreneurial methods such as lean start-up advances our understanding of how founders utilize methods in new models of start-up support and in general.

5.1.1 Personal & Communal Endurance

Our findings indicate that founders cope with uncertainty in developing and using *personal and communal endurance*. On the one hand, they work on their personality and utilize emotional resources, and, on the other hand, take communal ownership of resources and processes and actively develop their local community. For instance, participants in makerspaces and accelerators try to mitigate personal uncertainty and fears associated with entrepreneurial activities through feelings of solidarity and security which the community of participants creates. Despite a strong role of the community (especially in makerspaces), founders in these support models experience support for their individual characteristics. They do not seem to be pressured to adapt their behaviours to the specific community. To develop this community, participants in makerspaces and hackathons take ownership of and responsibility for resources and processes in *their* support model. We suggest that this can lead to a shared identity and increased commitment to the joint intentions of the community. Participants (and also the support management) in hackathons and accelerators also put emphasis on the development of interdisciplinary teams; a process that often relies on the strength and diversity of the mentioned community.

Our findings especially highlight the role of makerspaces for the development of personal and communal endurance. This support model provides great freedom to their participants to build and nurture a diverse community and to develop individualism at the same time (Browder et al., 2019; Fleming, 2015; Koole et al., 2017). Considering Milliken's (1987) types of uncertainty, we suggest that coping through personal and communal endurance development, approaches response and effect uncertainty that founders perceive. They try to cope with their perceived uncertainty about how changes in the environment will influence their venture, how they can respond, and how their chosen responses will work. As previous research (Casson, 1982; McMullen & Shepherd, 2006) has suggested,

uncertainty coping through personal and communal endurance development can mitigate negative properties of founders such as hesitancy or procrastination. By mitigating these properties, makerspaces and accelerators help founders to identify opportunities and to increase entrepreneurial activities (McMullen & Shepherd, 2006).

We suggest that *individual and communal endurance* as an approach to uncertainty corresponds with dimensions of *effectuation, which, in essence, acts as one foundation of the lean start-up methodology (Ghezzi, 2018)*. Effectuation suggests that founders manage present personal and emotional uncertainties to create the future. Founders are encouraged to start their entrepreneurial process with own personality traits and to expand resources based on their own limitations and personal characteristics (Sarasvathy, 2001; Fisher, 2012). This matches with founders' development and utilization of emotional resources as an approach to uncertainty. In creating feelings of solidarity and safety, and in accepting and embracing personal characteristics, they follow principles of effectuation. We also suggest that the dimensions of redirection power, stakeholder interaction, and team collaboration match with how founders take communal ownership of resources and processes and actively develop their local community. Founders include the community in decision-making processes and use active stakeholder to collectively shape the direction of their ventures. With regard to team collaboration, founders in our sample develop interdisciplinary and complementary teams that aim to benefit from different knowledge bases of their members. This corresponds with the principles of effectuation and thus lean start-up, which suggest keeping team boundaries fluid based on networks of stakeholders to be able to improve products and business models based on feedback (*Ghezzi, 2018;* Mansoori & Lackeus, 2019).

5.1.2 Active Learning & Ideation

Our findings indicate that founders cope with uncertainty in conducting *active learning and ideation* activities that expand their knowledge and initiate entrepreneurial prototype development. While participants in makerspaces and hackathons mostly use the resources at hand to learn from the creation of frugal prototypes, participants in accelerators also develop visions to manage their uncertainty and observe people to expand knowledge and identify directions for the development of minimum viable products. We find that participants in all three models of start-up support take action to initiate ideation activities and innovation development. While they initiate these activities through their own resources at hand, provided equipment, and networking with stakeholders, participants in makerspaces and accelerators furthermore use their own limitations and collective actions of the community to start their process of ideation.

To reflect on the differences between the three models of start-up support, it is important to recognise the different development phases of founders. Participants in makerspaces and hackathons are mostly at the very beginning of venture development. The purpose of these support models is to enable founders to ideate and collaborate (Browder et al., 2019; Komssi et al., 2015). In contrast, participants in accelerators have already developed initial prototypes or ideas when entering the support programme (Cohen et al., 2018; Pauwels et al., 2016). We suggest that despite differences in participants' development stage, their perceived need to take action in the form of learning or ideation is similar. Considering Milliken's (1987) types of uncertainty, we suggest that coping through active learning and ideation approaches state and effect uncertainty that founders perceive. They perceive environmental uncertainty in that they do not know how components of their environment will change and how these changes will affect their ventures. Activities of learning and ideation aim to mitigate these uncertainties in illuminating ventures'

environment (state uncertainty) and in revealing different impacts of the environment on ventures' actions (effect uncertainty). Supported founders feel that they have to take actions concerning these perceived uncertainties.

We suggest that *active learning and ideation* as an approach to uncertainty corresponds with dimensions of *the lean start-up methodology*, and partly with its underlying definition of *effectuation*. Regarding learning and active knowledge expansion of founders the lean start-up methodology suggests formulating and testing hypotheses and interacting with customers as the basis for analytical processes (Blank, 2013; Ries, 2011). Founders in our sample indeed take actions in line with these principles: They use observations to expand knowledge and to identify directions for the development of prototypes. They develop and test these frugal prototypes with real users and develop visions and hypotheses that allow tracking customers and their feedback to learn and pivot. We further suggest that the initiation of ideation and innovation activities as an approach to uncertainty matches with principles of effectuation. It proposes to utilize personal traits, as well as newly emerging actors in the founder's network to initiate ideation activities (Mansoori & Lackeus, 2019; Sarasvathy & Dew, 2005). Our findings suggest that when founders initiate these activities, they rely on the resources at hand, on various stakeholders and the community, and on their individual limitations. These processes can all be found in dimensions of the lean start-up methodology too, which are, in part, based on other creational methods such as effectuation or design thinking (*Ghezzi, 2018*).

5.1.3 Process Scientification

Our findings indicate that founders cope with uncertainty in approaching entrepreneurial activities with *processes of scientification* and with the utilization of prescribed entrepreneurial methods. Participants in hackathons and accelerators follow

structured methods to identify different customer groups, identify their needs and problems, and interact with customers to collect feedback. In hackathons, participants moreover focus on the creation of direct value for customers when developing prototypes. As discussed in the next section, this is one of the central pillars of the highly structured lean start-up methodology which is based on effectual reasoning. In accelerators, participants use iterative loop models supported by the start-up cohort and the management to make decisions and to learn. Founders in hackathons and accelerators follow methods and processes that resemble real scientific approaches in other domains to approach perceived uncertainty. Considering Milliken's (1987) types of uncertainty, we suggest that founders who cope with uncertainty through processes of scientification address their perceived response uncertainty. By utilizing processes that seem scientific, founders cope with their lack of insight into response choices and their inability to predict the outcome of response choices for their venture. Instead of trying to predict the future, founders seem to accept unpredictability and rather use processes that lead to actions and decisions to control the unknowable future (McKelvie et al., 2011; Sarasvathy, 2001). Participants in hackathons and accelerators in our sample use this approach and are actively pushed to do so by the support management. While these models of start-up support teach (seemingly) scientific methods to participants, founders also receive the means to implement processes that allow them to control the future (e.g. through networking and access to customers).

We suggest that *process scientification* as an approach to uncertainty corresponds with dimensions of *the lean start-up methodology*. This method proposes procedural steps for founders that resemble scientific processes that should be followed to increase performance or reach a certain goal.[54] The iterative loop-model used relies on hypotheses testing and subsequent pivoting (Blank, 2013). Founders participating in hackathons and

[54]Evidence for actual performance increases and advantages for ventures following these suggested processes has been limited and is part of a contested academic discussion (see Felin et al., 2019; Iskander, 2018).

accelerators in our sample use core processes and principles that resemble scientific testing. For instance, they conduct structured processes to identify customers and to gather data from customer interactions. Founders use processes that are similar to the empathizing-step of design thinking (which partly feeds into the lean start-up process), as well as the loop-model of the lean start-up methodology. In trying to approach learning and venture development in a (seemingly) scientific way, they can justify their decisions for themselves and potential investors. Hence, decision making (on a level of response uncertainty) becomes more justifiable for founders who approach their uncertainty with a scientification of processes found in the lean start-up methodology.

5.2 Sequencing of Models of Start-up Support

After discussing the relationship between approaches to uncertainty and models of start-up support, as well as how approaches to uncertainty correspond with dimensions of entrepreneurial methods, we now bring together these three parts. We suggest a model of sequencing of support models that builds on the identified approaches to uncertainty and their match with principles of the lean start-up methodology. Start-up support and the adoption of entrepreneurial methods do not happen in a static way. Rather, managers of different models of start-up support and participants are part of a dynamic environment that is characterised by the assumed uncertainties outlined. As shown, founders simultaneously utilize different approaches to uncertainty that mirror the principles of entrepreneurial methods. Our data suggest that ventures sequence the use of specific support models and the adoption of dimensions of the lean start-up methodology (through varying approaches to uncertainty). Managers and shareholders of support also sequence these models for different purposes. We thus suggest that support models and identified approaches to uncertainty can be placed on a timeline of venture development. As we acknowledge the limitations of stage models in the area of start-up development (Fisher et al., 2016; Jawahar & McLaughlin,

2001), and recognise the alternative perspective offered by the 'dynamic state approach' (Levie & Lichtenstein, 2010), we use the basic dichotomy of 'ideation' and 'commercialization' activities that serves as the frame for the timeline of development[55] of ventures in our model shown in Figure 13. This model is based on both our findings on uncertainty coping from the start-up side, as well as on the analysis of interviews with support managers.

Firstly, our findings on makerspaces indicate that while founders approach uncertainty with individual and communal endurance, as well as active learning and ideation, the support management supports principles of effectuation (which are foundational for the lean start-up methodology; Ghezzi, 2018). Both support management and participants put emphasis on experimentation and playful learning with available means and equipment to foster ideation activities. Participants in a makerspace are not necessarily part of a fully developed venture team yet. Rather, they aim to develop a diverse community that allows knowledge exchange and subsequently the identification and onboarding of new team members. Our findings suggest that makerspaces can be placed at the beginning of ventures' timeline of development. They play a role during the very early processes of entrepreneurship in for instance fostering ideation activities and team building. It is nevertheless also important to note that some participants in makerspaces only engage in activities that are not directly related to entrepreneurship. We call these activities (e.g. participating in or running of workshops) pre-ideation or pre-entrepreneurial activities (see Figure 13). We suggest that these activities can also serve as a springboard for ideation activities resulting in entrepreneurial work, as participants can transfer towards entrepreneurial activities in makerspaces.

[55]We deliberately refrain from defining distinct development stages in between these two basic activities due the ambiguous definitions available (Jawahar & McLaughlin, 2001; Fisher et al., 2016; Phelps et al., 2007).

Secondly, our findings on hackathons indicate that while founders approach uncertainty with process scientification and to a lesser extent with individual and communal endurance, as well as active learning and ideation, the support management actively promotes principles of the lean start-up methodology. Participants of hackathons mostly focus on activities to experiment and build prototypes, as well as on the creation or expansion of their teams. The management of hackathons puts emphasis on the development of value-adding solutions that can be tested and commercialized quickly. Hackathons are a vehicle for both experimentation and prototyping, as well as for testing and validation. Our findings thus suggest that they are able to combine support and resources for early processes of entrepreneurship with targeted intentions for commercialization.

The findings further indicate that makerspaces use hackathons as a vehicle to facilitate the focussed development and testing of solutions. They organise hackathons within the physical space and structures of makerspaces or encourage participants to attend at external ones. We thus propose that hackathons serve as a vehicle (e.g. for makerspaces) combining ideation activities with more focussed attempts of creating and testing solutions for commercialization. In fact, various stakeholders use this support model to bridge the gap between ideation and commercialization. While hackathons have been used by large corporations to facilitate in-house innovation activities (Granados & Pareja-Eastaway, 2019), our findings suggest that accelerators also use them to attract high-quality applicants for their programmes. Accelerators that run competitive selection processes can use hackathons as a mechanism to screen and select promising participants and their products and teams. For instance, one hackathon included in our sample offered the winning team a place in their accelerator cohort to foster and expedite their commercialization activities. Our findings therefore suggest that hackathons can be placed in between makerspaces and

accelerators on the timeline of venture development, serving as a vehicle for the focussed development of solutions and/or for the screening and selection of ventures.

Thirdly, the findings on accelerators indicate that while founders address uncertainty with individual and communal endurance, active learning and ideation, as well as process scientification, the management mostly supports principles of the lean start-up methodology. Accelerators' shareholders are primarily interested in validation and iteration activities which enable rapid growth of ventures and subsequent funding acquisition; some even act as investors (Cohen & Hochberg, 2014). While this is congruent with the intentions of participants in accelerators, our findings show that accelerator cohorts can be heterogeneous concerning different development stages and different needs. For instance, ventures in advanced development phases might still need to continue ideation and experimentation activities, using basic principles of effectuation that might develop into more structured processes that can be found in the lean start-up methodology. Despite these mixed cohorts and mixed needs in accelerators, we suggest that accelerators can be placed at the commercialization stage of the timeline of ventures. Participating ventures mostly focus on commercialization activities and aim to acquire investment. This is in line with previous research conducted on accelerators (e.g. Cohen & Hochberg, 2014; Pauwels et al., 2016). Figure 13 depicts the model showing the suggested sequencing of support models, that builds upon founders' approaches to uncertainty identified and their match with the lean start-up methodology.

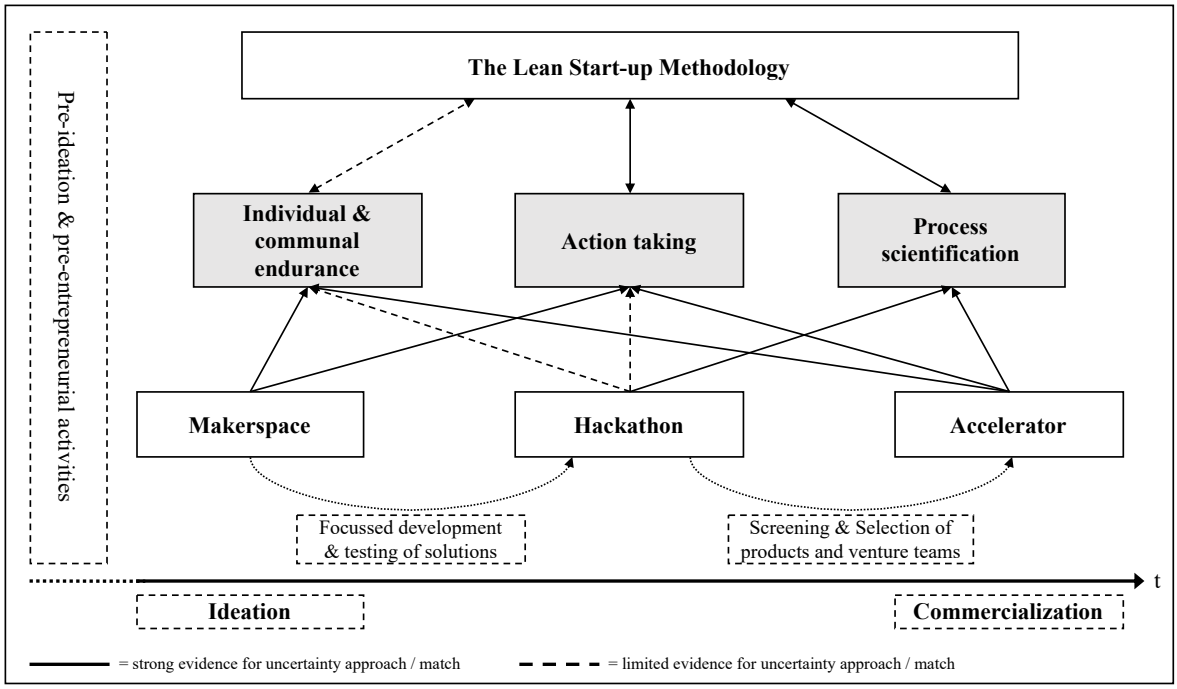

Figure 13: Model of sequencing of support and entrepreneurial methods

Based on our model of sequencing, we finally suggest that new models of start-up support can indeed help their participants to implement Gans et al.'s (2019) stopping rule of finding and testing two options before committing to one ("test two, choose one"). Makerspaces, hackathons, and accelerators can expose ventures to a variety of equally viable options before selecting one (as Gans et al., 2019 suggest). Sequencing of support can help with the exposure and selection. While models of start-up support that are predominantly concerned with activities of ideation enable the search and testing of equally viable options, support models concerned with commercialization support founders in the selection of options and in subsequent implementation activities. We thus suggest that the sequencing of support models can contribute to effective entrepreneurial processes concerning the decision-making of founders. Sequencing can support founders in addressing 'the paradox of entrepreneurship' (Gans et al., 2019).[56] Taken together, the development process of

[56]The paradox of entrepreneurship (Gans et al., 2019): Ranking viable strategies requires knowledge gained through experimentation, but experimentation requires some level of commitment that can preclude certain strategic options which might be equally viable.

founders and their ventures correlates with ventures' and support management's sequential use of models of start-up support. While this model would suggest deriving assumptions on the suitability of support models in different stages of development, this remains a more holistic research question to be investigated in the future.

6. Conclusion, Limitations, and Future Areas of Research

This study analyses how founders in makerspaces, hackathons, and accelerators deal with uncertainty and what roles these new models of start-up support play for uncertainty coping and the adoption of principles of the lean start-up methodology. For this purpose, we build on previous literature that allows us to make assumptions on entrepreneurial uncertainty and that hence enables to derive mechanisms of uncertainty coping. As the context of this study (i.e. new support models) has so far been underdeveloped in research, our exploratory results lead to several contributions to the literature, as well as practical implications. Theoretically, we contribute to research on understanding entrepreneurs' approaches to uncertainty and how they correspond with dimensions of the lean start-up methodology; an entrepreneurial method that has diffused rapidly in recent years (Ghezzi, 2018). New models of start-up support offer an environment that promotes specific mechanisms of uncertainty coping. Our results thus contribute by extending the understanding of entrepreneurial uncertainty and the application of entrepreneurial methods. Our analysis suggests that approaches to uncertainty differ significantly across accelerators, makerspaces, and hackathons. We further contribute in assigning identified coping mechanism to three different types of uncertainty (McKelvie et al., 2011; Milliken, 1987). While we provide evidence for varying approaches to cope with uncertainty, more importantly, we propose that these approaches to uncertainty match with principles (or

dimensions) of the lean start-up methodology. This sheds light on the adoption of entrepreneurial methods in new models of start-up support (Mansoori & Lackeus, 2019). Overall, our results therefore contribute to perspectives of uncertainty coping, as well as to a better empirical understanding of the phenomena of makerspaces, hackathons, and accelerators.

We also contribute by proposing a model of sequencing the use of support models, both from a start-up and a management perspective. By applying a dichotomic timeline of venture development that distinguishes between the basic activities of ideation and commercialization, we offer a more fine-grained analysis of the roles of support models in different phases of venture development (cf. Mansoori & Lackeus, 2019). We suggest that the sequencing of support models and mechanisms of uncertainty coping can help ventures in their search processes and in implementing entrepreneurial methods such as lean start-up.

Our results also offer practical implications for entrepreneurs, support managers, and policymakers. As this study constitutes an attempt to empirically address the lean start-up methodology in the context of new models of start-up support, our analysis can provide founders with valuable insights regarding their choice of support model and use of uncertainty coping mechanisms in the respective phases of venture development. Support managers can draw conclusions from our findings about the sequencing of support models for different purposes. They can use our insights for the facilitation of ideation or commercialization activities, as well as for running their selection processes. Policymakers are offered an alternative viewpoint on commercialization efforts: Promoting the use of new support models and entrepreneurial methods that can expose start-ups to multiple, equally viable options, can be an approach to improve entrepreneurship policy.

Apart from the theoretical and practical contributions outlined, we also hope to inspire future studies to use novel datasets such as ours. The collection and qualitative

analyses of longitudinal social media data allow different perspectives on entrepreneurship research that can contribute significantly to questions concerning entrepreneurial behaviour or communication in ecosystems. The combination of Twitter data with interviews of support managers and supported founders and our staged analysis approach (i.e. automatic filtering; manual coding; triangulation) allow in-depth insights into the public and personal communication of ventures and other stakeholders in entrepreneurial ecosystems.

Despite several contributions, we recognise that this study also has methodological limitations in dimensions of the theoretical framework and data analysis. For instance, while in theory, different entrepreneurial methods are clearly distinguishable, in practice, distinctions can be fuzzy, and the statements analysed might not always be clearly assignable (i.e. interpretative risk). As mentioned, the lean start-up methodology incorporates parts of other methods such as effectuation and design thinking (and vice versa). We also recognise that social media data has the risk of neglecting negative statements and collecting biased statements. People might only post overly positive and biased statements on Twitter. We mitigate this limitation by filtering tweets and by triangulating through interview data. Finally, we acknowledge that our exploratory results will require additional empirical work in the future to formulate evaluations of the fit of models of start-up support and entrepreneurial methods with ventures' phases of development. Nevertheless, we hope that our results lay the foundation for studies of fit and impact. For example, it is necessary to delve more deeply into the individual roles of hackathons and makerspaces in ecosystems and analyse their impact on the quality of developed ideas and products, as well as on founders and venture teams. In turn, this could lead to increased performance of start-ups. Similarly, impact studies are needed to investigate the actual influence of entrepreneurial methods on venture development. While methods such as the lean start-up methodology

have been widely used in practice, academic research in this context has just started to gain momentum – a development that we hope will increase in breadth and depth.

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CONCLUSION OF THE THESIS

This thesis investigates the phenomena of the new support models of makerspaces, hackathons, start-up competitions, and accelerators from different perspectives. By using insights form existing literature on incubation, as well as qualitative data in the form of interviews and social media data, the three research papers analyse the roles of models of start-up support in ecosystems, their support functions, how founders utilize resources and cope with uncertainty, and how entrepreneurial methods are applied. The studies especially shed light on how founders use, and transform offered support. The analysis of new support models from a resource utilization perspective (and not only from a provision perspective) generates important insights for the discussion on the value of start-up support. This perspective is also used to investigate how founders in new models of start-up support cope with uncertainty, which constitutes the central concept of entrepreneurship (Bylund & McCaffrey, 2017). The identified coping mechanisms correspond with key principles of entrepreneurial methods (i.e. the lean start-up methodology), and, taken together, result in a model of sequencing of support models. Overall, the thesis offers exploratory findings on models of organisational sponsorship that, despite their rapid diffusion in many entrepreneurial ecosystems, have so far only received limited attention in entrepreneurship research.

After researching the new phenomena of makerspaces, hackathons, and start-up competitions in entrepreneurial ecosystems from three different perspectives, two central dimensions that define start-up support stand out. The two dimensions of time and space determine both established incubation models such as the accelerator or business incubator, and new models of start-up support introduced. How long the respective support model offers resources, as well as if and what kind of physical space is provided to founders, are crucial questions to understand other characteristics of support. While there are obviously a

variety of other dimensions that define the characteristics of support (as shown in the first paper), time and space are of essence as they often act as the foundation for other resources provided. Despite the growing importance of other characteristics that have been used for comparison of models (e.g. structuring of programmes, purpose of models in different development stages), these dimensions continue to be at the core of start-up support and at the core of related entrepreneurial processes. Figure 14 depicts these basic differences of models of start-up support. The figure especially highlights the novelty of makerspaces, hackathons, and start-up competitions. In contrast to accelerators, their characteristics of time and space can still vary significantly. While over time some dominant support designs might emerge, as shown with accelerators, the newness of makerspaces, hackathons, and start-up competitions entails heterogeneity. These models adjust or expand resources and thus also change their roles in ecosystems and influence how founders utilize resources.[57] They are still not stable, and their characteristics are not clearly defined yet, which can create volatile responses of founders who utilize offered resources. Time and space and their variability in new models of start-up support are therefore a cornerstone of this piece of research and will continue to be fundamental for any studies on start-up support to follow.

[57]The characteristics of space and time in new models of start-up support are often more volatile than in traditional forms of business incubation. The flexibility of processes and resources is one of their defining factors.

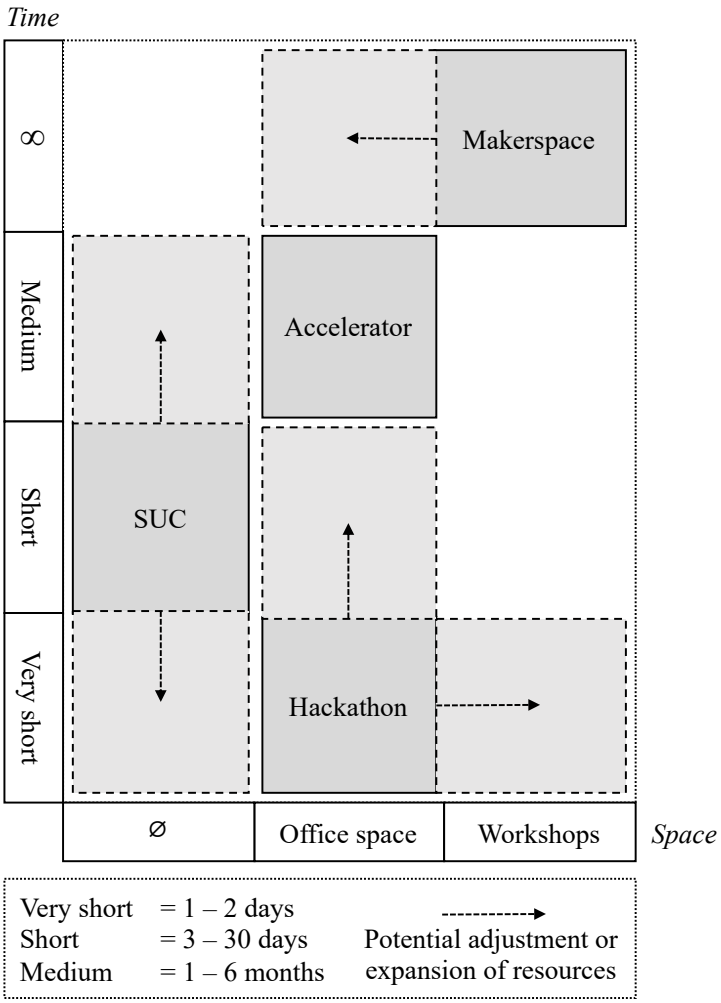

Figure 14: Models of start-up support defined by time and space

The main results of this thesis contribute to entrepreneurship research, as well as offer valuable insights for the actors involved in the practice of start-up support. By considering makerspaces, hackathons, and start-up competitions as organisational sponsors and therefore as models of start-up support, the thesis offers comparisons to the established models of business incubator and accelerator. The comparison shows that new models of start-up support offer both competing and complementary support functions in entrepreneurial ecosystems. These functions are characterised by opportunity structures that allow founders to play and experiment, while facilitating competition between founder at the same time. The thesis also provides evidence for how founders in new models of start-up support utilize, transform, and reject resources. The results suggest that founders use

resources to work on community and identity, entrepreneurial processes, and further resources acquisition and that their limited capacities to access and evaluate information (i.e. bounded rationality) can be mitigated by new support models. While prior research suggests that founders' bounded rationality can be mitigated by structured support programmes (e.g. accelerators; Cohen et al., 2018), this thesis suggests that, in contrast, the unstructured support offered in new models of start-up support can also mitigate bounded rationality. For instance, the experimentation and playful learning activities in makerspaces and hackathons contribute to the mitigation of founders' bounded rationality in exposing them to a diverse community and diverse feedback. The thesis also shows how founders in new models of start-up support cope with their perceived uncertainty and how these coping mechanisms correspond with principles of the lean start-up methodology (as one of the most popular entrepreneurial methods). Across different support models, the perceptions of uncertainty differ, resulting in varying coping mechanisms. Based on the analysis of uncertainty coping and insights from the support management, the thesis finally suggests a sequencing model of support models and mechanism of uncertainty coping. While makerspaces are particularly suitable for pre-nascent ventures and founders, hackathons offer more focussed processes to develop minimum-viable-products and targeted solutions, and accelerators focus on commercialisation activities. This sequence corresponds with mechanisms of uncertainty coping and, through those, with principles of the lean start-up methodology.

In regard to practical contributions, this thesis offers founders insights into the increased diversity of start-up support. Founders can benefit from more choice to select support mechanisms that are suitable for their respective needs and are therefore supported in their selection of resources they evaluate as adequate. The support management similarly benefits from insights into the resource utilization of supported founders. Providing mechanisms that are actually utilized by founders is crucial for support organisations. The

thesis also contributes to the practice of start-up support and incubation in proposing a model of sequencing for different models of start-up support and mechanism of uncertainty coping. The support management could use the model to facilitate the transition of founders from experimentation and playful learning towards more focussed commercialisation processes. The sequencing model can also help to set up new selection processes for the admission of suitable founders and ventures into support programmes. Policymakers can consider these new models of start-up support and their sequencing as new options for supporting entrepreneurial behaviour (and founding numbers), as well as commercialisation activities. Policies that promote these new support models should especially acknowledge the value of unstructured support mechanisms (as offered in makerspaces and hackathons) and the opportunities arising from collaborations between different models of start-up support.

1. Summary of Contributions to Literature & Practice

The following summary of contributions provides a comprehensive overview of the individual contributions of the three papers to the literature, as well as to the practice. This section distils the major contributions of this thesis on a paper level and subsequently offers connections between these individual results. As a plain repetition of the papers' results would not be helpful, Table 11 extends the overview table in the introduction section to provide the reader with a comprehensive summary of the contributions. The following subsections then elaborate on the connections between these contributions on the levels of literature (and theory) and practice. The purpose of this section is not to simply repeat the contributions of each paper, but instead to shed light on some of the rather surprising contributions of the overall thesis to the literature and to practice.

Table 11: Contributions of research papers

	Paper 1	Paper 2	Paper 3
Title	'Makerspaces, Hackathons, and Start-up Competitions: The Rise of New Models of Start-up Support	'Resource Utilization in New Models of Start-up Support: Makerspaces, Hackathons, and Start-up Competitions as Pacemakers of New Venture Development'	'Intermediaries for Entrepreneurial Methods: How Makerspaces, Hackathons, and Accelerators Support Founders' Uncertainty Coping'
Research Questions	• How do makerspaces, hackathons, and start-up competitions compare to established support models? • Are they fulfilling competing or complementary roles in the entrepreneurial ecosystem?	• How do makerspaces, hackathons, and start-up competitions balance the provision of bridging and buffering mechanisms? • How and for which purposes do supported start-ups utilize provided resources for their growth and development processes?	• How do participants in makerspaces, hackathons, and accelerators deal with uncertainty and what roles do these new support models play for entrepreneurial uncertainty? • How do different elements of the lean start-up methodology correspond with founders' approaches to uncertainty?
Theoretical Frameworks used	• Organisational Sponsorship[58]	• Organisational Sponsorship[50] • Bounded Rationality[59]	• Effectuation & Creation Theory[60] • Entrepreneurial uncertainty & action[61] • Entrepreneurial Strategy[62]
Contributions to the Literature	• Conceptualisation of new models under the incubation umbrella. • Complementary functions of new models in ecosystems. • Coopetition behaviour can develop between participants.	• Evidence for resource utilization, rejection, and transformation. • Resources in new support models are used for work on community and identity, entrepreneurial processes, and further resources acquisition. • New models can mitigate bounded	• Understanding of founders' uncertainty coping mechanisms in new support models and their correspondence with the lean start-up methodology. • Perceptions of uncertainty and coping approaches differ across support models.

[58]Amezcua et al., 2013
[59]Gavetti et al., 2007; March & Simon, 1958; Simon, 1955
[60]Alvarez & Barney, 2007; Sarasvathy, 2001
[61]McKelvie et al., 2011; McMullen & Shepherd, 2006; Miliken, 1987
[62]Gans et al., 2019

		rationality through opportunity structures that create serendipity, experimentation, and playful learning.	• Sequencing model of models of start-up support and mechanisms of uncertainty coping.
Practical Contributions	• Evidence for increased interest in new support models in media and research in the absence of reliable statistics. • New support models could be particularly suitable for pre-nascent start-ups & social ventures. • Framework of design elements helps in selection and design of support measures.	• Knowledge on resource utilization helps managers in designing support. • Analysis of resource provision & utilization helps founders in selection of suitable support models. • New perspective on the mitigation of bounded rationality enables management and policymakers to rethink conflict between structured & unstructured support.	• Founders are provided with an overview of support models in different development stages. • Support managers can use the insights for the facilitation of ideation and commercialization activities and for their selection processes. • Promotion of new models of start-up support that expose founders to equally viable options can improve entrepreneurship policy.

1.1 Contributions to the Literature

This thesis contributes to the literature, as well as to the theory it entails, in rather overarching and in more detailed ways. The exploration of the *novelty* of makerspaces, hackathons, start-up competitions, and in part of accelerators constitutes a more overarching contribution to the literature. Exploring and analysing the resource provision of new models of start-up support, their roles in entrepreneurial ecosystems (in comparison to more established models), and the utilization of their resources and processes by founders offers valuable contributions to the wider entrepreneurship literature. While research in fields such as corporate innovation, urban studies, or arts management has investigated roles and possible implications of the phenomena of makerspaces and hackathons (e.g. Lô & Fatien

Diochon, 2018; Martin, 2015), entrepreneurship research has not kept up with these developments (Browder et al., 2019). Overall, the thesis offers explorations and analyses of these models in the context of entrepreneurship. The results of the research papers provide initial concepts that can advance the understanding of new models of start-up support in an entrepreneurial setting, as well as their future potential to influence entrepreneurship. In the following, this subsection describes three major contributions to the literature that can be distilled from the research papers.

Firstly, the conceptualisation of these organisations under the umbrella term of start-up incubation forms the foundation for analysing makerspaces, hackathons, and start-up competitions in the context of entrepreneurship. The application of the concept of start-up incubation to these new forms of organisational sponsorship (Amezcua et al., 2013) not only enables drawing conceptual comparisons with other forms of start-up support, but also to empirically explore makerspaces, hackathons, and start-up competitions through the lens of participating founders. Although makerspaces, hackathons, and start-up competitions might sometimes seem very different from the original business incubator that has become ubiquitous in the last decades, organisational sponsorship theory (Amezcua et al., 2013) allows conceptualising them under the term of *incubation*. Incubators work as intermediaries or brokers between founders and their environment. They offer buffering mechanisms that shelter start-ups from the external environment and associated risks (Lynn, 2005; Mrkajic, 2017), as well as bridging mechanism that facilitate connections of start-ups to their environment and that can result in resource acquisition and normative alignment (Amezcua et al., 2013; Baum & Oliver, 1991; Zimmerman & Zeitz, 2002).

By pushing the boundaries of the definition of *start-up incubation* (and of models of start-up support) towards non-conventional processes of organising support and towards more volatile definitions of space and time (as outlined in the previous section), this thesis

offers a different understanding of organisational sponsorship and its associated mechanisms. Not only does the analyses of new models of start-up support challenge some assumptions on the intentions of buffering and bridging mechanisms, it also sheds light on how these mechanisms work under conditions that are contrary to those in business incubators or accelerators. For instance, while accelerators make use of structured (and often compulsory) support functions, makerspaces and hackathons enable their participants to experiment and to decide themselves which resources to use. While these new models of start-up support ostensibly provide buffering mechanisms (in the form of space and tangible resources) that aim to shelter founders from the environment, the analysis suggests that these buffering mechanisms also work in a bridging way. The provision of tangible buffering mechanisms serves the objective to support start-ups in creating relational connections, legitimacy, and related intangible resources (i.e. bridging mechanisms). The specific context of new support models contributes to a better understanding of organisational sponsorship theory. In fact, to understand the behaviour of start-ups (e.g. decisions on resources acquisition), it is crucial to consider novel environments such as in new models of start-up support. As mentioned, support models provide a window into processes of start-ups and their acquisition of resources (Clough et al., 2019). The initial step of conceptualising new support models under the umbrella of *incubation* constitutes the basis of this thesis and allows empirical analyses on the interplay between resource provision and utilization.

Secondly, this thesis contributes to the literature on resource utilization of founders that are part of highly influential environments such as new models of start-up support. As mentioned, new support models can be quite different from established models of incubation and, more importantly, to the environment of founders that do not participate in support organisations. The availability and the characteristics of resources and associated processes differ and, therefore, studying the utilization of these resources in new models of start-up

support is particularly important. Understanding the utilization of resources lays the foundation to conduct future impact studies and to optimise support measures that increase venture emergence, growth, and survival. The results (of the second paper) contribute to the literature in proposing three overall modes of resource utilization in new models of start-up support. Founders use resources to work on their *community and identity*, on their *entrepreneurial processes*, and on *further resource acquisition*. This illuminates how founders utilize resources in makerspaces, hackathons, and start-up competitions. For instance, participants in makerspaces use the community to build a shared identity that helps them dealing with setbacks and failure. Participants in hackathons access methods and data for ideation and hypotheses development that enable the validation of assumptions with peer groups or corporate partners. Founders in start-up competitions use feedback received at pitching events to make decisions on pivots. They also use SUCs to expand their geography and explore new markets and resource providers in the region of the respective start-up competition. The results further show how founders reject and transform resources offered by these models of start-up support. The results suggest that founders not always utilize resources as intended. For instance, some founders in the software sector (that does not require large funds to start) shop around in different support models (e.g. SUCs) to simply access several sources of prize money. In these instances, other resources, such as networks or legitimacy are of lower priority for the involved founders.

While previous research has often concentrated on the provision of resources (supply-side) (e.g. Cohen et al., 2018), this thesis emphasizes the so far neglected demand- and utilization-side. This focus also concerns the discussion on the bounded rationality of founders and its possible mitigation through external support measures in the form of support models.[63] While the analysis of bounded rationality has received attention for quite some

[63]This thesis deliberately assumes that founders are boundedly rationale and that external measures can mitigate these limitations (Cohen et al., 2018).

time, research has mostly focussed on its mitigation in large corporations (Cohen et al., 2018; March & Simon, 1958; Simon, 1955). Entrepreneurship research has only picked up the concept more recently in the context of start-up accelerators and by using a resource provision perspective (Cohen et al., 2018). Simply put, bounded rationality posits that founders have limited capabilities to accurately collect and evaluate information and are therefore restricted in their abilities to define and evaluate their needs (Cohen et al., 2018; March & Simon, 1958; Shane, 2000; Simon, 1955).[64] This thesis has shown how new models of start-up support can mitigate these limitations by enabling access to information and by supporting the evaluation of information or resources. While in accelerators this mitigation relies on structured, concentrated, and often standardized support mechanisms, the results of the thesis suggest that the unstructured approaches of makerspaces, hackathons, and start-up competitions can also mitigate bounded rationality (cf. Cohen et al., 2018). These support models offer new forms of opportunity structures that can enable experimentation and playful learning of participating founders. The analyses in the second paper suggest that these deliberately unstructured support mechanisms can mitigate the bounded rationality of founders in novel ways. For instance, the exposure to the diverse community found in new models of start-up support, that relies on coincidence, can provide new information to founders, reignite their activities, and reduce their biases. In suggesting that new support models offer different (and deliberately unstructured) routes towards bounded rationality mitigation, the thesis contributes to bounded rationality research in the context of entrepreneurship and challenges the dominant notion of the importance of highly structured support programmes.

[64]This concepts also applies to the support management. It is therefore important to acknowledge that they are also limited by their bounded rationality, which can influence how they provide resources and design the support process.

Thirdly, this thesis contributes to the literature on uncertainty coping of start-ups and their adoption of entrepreneurial methods in new models of start-up support. Uncertainty is at the very basis of entrepreneurship and theory of action (Bylund & McCaffrey, 2017; McMullen & Shepherd, 2016). Founders perceive that they are unable to predict developments in their environment and the outcome of their actions (Milliken, 1987). They can either try to predict the future or they can accept the unpredictability. Both possible paths mirror in different entrepreneurial methods that offer theoretical and practical frameworks to support entrepreneurs in their decision processes and to cope with uncertainty (Mansoori & Lackeus, 2019; Sarasvathy, 2008). The lean start-up methodology (which is based on creational logic[65]) suggests accepting the unpredictability of the future and creating opportunities through action-taking[66]; and, in contrast, the methods of discovery-driven planning and prescriptive entrepreneurship suggest that the future is predictable through information gathering and processing (Mansoori & Lackeus, 2019). While entrepreneurial methods are in essence concepts that require action to be implemented effectively (McKelvie et al., 2011), new models of start-up support offer resources and opportunities to enable the implementation of these tools. This thesis analyses how the three elements of uncertainty coping, entrepreneurial methods, and start-up support are interconnected (third paper). The results on uncertainty coping in makerspaces, hackathons, and accelerators suggest that founders approach uncertainty with the development of *individual and communal endurance*, with *active learning and ideation*, and with *scientification of processes*. These coping approaches (and their identified subcategories) differ significantly across the three support models included in the analysis.

[65]As opposed to causational logic and discovery theory (Kirzner, 1973: 10; Shane, 2003: 23).
[66]This thesis only includes the lean start-up methodology in its analyses as new support models take an especially prominent role in the dissemination of creational entrepreneurial methods.

While this analysis contributes to a better understanding of perceived uncertainty in new models of start-up support and the variations of coping approaches, the thesis also proposes that the identified approaches to uncertainty correspond with principles of entrepreneurial methods. As mentioned, the lean start-up methodology suggests accepting the unpredictability of the future (Alvarez & Barney, 2007, Baker & Nelson, 2005; Sarasvathy, 2001). Founders should utilize actions and decisions that actively control this unknowable future about the environment and responses of the venture (McKelvie et al., 2011; Sarasvathy, 2001). How founders cope with uncertainty is therefore an indicator for the adoption of certain principles of this method. The thesis contributes to the entrepreneurship literature by proposing connections between uncertainty coping and entrepreneurial methods, and, in turn, by shedding light on the adoption of the lean start-up methodology in new support models (Mansoori & Lackeus, 2019).

Finally, the thesis offers a model of sequencing of models of start-up support and uncertainty coping mechanisms. Instead of using a detailed stage-model for the development of start-ups that has various limitations (e.g. Fisher et al., 2016; Jawahar & McLaughlin, 2001; Levie & Lichtenstein, 2010), the thesis applies a dichotomic timeline of venture development that distinguishes between the basic activities of ideation and commercialization. This model contributes to the literature in offering a more fine-grained analysis of the roles of models of start-up support and mechanisms of uncertainty coping in different phases of venture development (cf. Mansoori & Lackeus, 2019). Founders participate in new support models in a sequential way (i.e. makerspace, hackathon, accelerator) and use approaches for uncertainty coping (often simultaneously) that correspond with principles of entrepreneurial methods applied.

The results also show how the management of support uses the sequencing of different models. For instance, the management of makerspaces uses hackathons to enable

the focussed development and testing of specific solutions. Accelerators use hackathons as a screening and selection tool to identify promising ideas and teams. Finally, the proposed sequencing model contributes to the literature on the implementation of entrepreneurial strategy (Gans et al., 2019). The sequential participation in new models of start-up support can expose ventures to a variety of equally viable options and support them in the selection and implementation of one strategic alternative (see Gans et al., 2019). Considering different support models as complementary organisational sponsors that can be used at different development stages and for different purposes, contributes to the development of effective entrepreneurial processes and the decision-making of founders. The proposed theoretical model therefore helps to approach Gans et al.'s (2019) 'paradox of entrepreneurship' through external support measures.[67]

1.2 Contributions to Practice

As this thesis is concerned with the context of new models of start-up support and the actions of founders, it naturally offers several contributions to the practice of entrepreneurship, to the organisation and operationalisation of support, and to policies that aim to promote entrepreneurship. The contributions to practice are especially important in the light of the novelty of makerspaces, hackathons, and start-up competitions and their increasing diffusion and relevance in entrepreneurial ecosystems. The following subsections offer practical contributions for founders, support management, and policymakers, that have been distilled from the results of the three research papers.

[67]The paradox of entrepreneurship (Gans et al., 2019): Ranking viable strategies requires knowledge gained through experimentation, but experimentation requires some level of commitment that can preclude certain strategic options that might be equally viable.

1.2.1 Founders

The thesis offers founders a better understanding of new support programmes that emerge on the *market* of start-up support. Founders of early-stage start-ups are often presented with a variety of support programmes and organisational sponsors (Amezcua et al., 2013) that they can access and use to acquire and develop resources. While there are more competitive support programmes, such as accelerators, that require founders to go through selection processes (Pauwels et al., 2015), less competitive support offerings, that often have no entry barriers at all, can be found in many entrepreneurial ecosystems too. The new support models of makerspaces and hackathons, and to a lesser extent start-up competitions, are mostly open for every interested founder. This variety of support models leaves start-ups with a black box. It is difficult for them to see through potential marketing efforts of these models and to decide for or against support programmes[68], especially as competitive selection mechanisms can differ significantly. First, the conceptualisation of the characteristics of new models of start-up support (and their design elements) allows a better understanding and comparison of new and established models. Founders could use this to identify and select the suitable support model for their respective needs. Given their limited capacity to accurately evaluate information (i.e. bounded rationality) (Cohen et al., 2018), the thesis can support founders' understanding of how different support models compare and how other founders use their resources, and, in turn, influence their decision-making processes.

Secondly, the thesis offers founders a model for the sequencing of support models and corresponding uncertainty coping mechanisms. While the model also describes how the management uses different support models in a sequential way (founders can benefit from

[68]Although there are some support programmes that are highly successful and can select their participants among large numbers of applicants, other, less famous programmes potentially struggle to attract enough participants.

these insights), it proposes an archetypical sequence of the utilization of models of start-up support. Combined with insights on founders' bounded rationality and its mitigation in new models of start-up support, the sequencing model supports founders in selecting support and approaches to uncertainty that suit their respective development stage.[69] Understanding how and why other start-ups utilize, transform, or reject resources in new models of start-up support enables founders to reflect on their behaviour and their adoption of certain entrepreneurial methods.

1.2.2 Support Management

This thesis also offers practical contributions that can be valuable to the management of support models. Similar to participating founders, the support management can benefit from the conceptualisation of design elements of support and the comparison of new and established models. These insights can help in designing and running different models of start-up support for different purposes. Depending on the main shareholder (e.g. public or private), support models might have varying intentions for their measures. To achieve these intentions, it is important to understand the variety of possible ways of designing and running support. This thesis provides an overview of the variety of start-up support, as well as differences that originate from different shareholder goals. It is also of particular interest for the support management to get insights into how founders actually use (and reject) provided resources. Resource utilization is not always in line with the original intentions of shareholders. Based on the results, the support management can therefore adjust certain measures to take into consideration the actual utilization of resources.

[69]As this is not an impact study, the proposed model only describes the identified behaviour of start-ups. This does not necessarily mean that there is a positive correlation with certain growth or survival measures.

To optimise start-up support, it is crucial to incorporate the behaviour of start-ups when those are confronted with resources offered in the different models of support. Contrary to the belief that highly structured support programmes are necessary to mitigate bounded rationality (Cohen et al., 2018), the results of this thesis suggest that unstructured support programmes can also contribute to bounded rationality mitigation of founders. This opens up additional choices for shareholders of support organisations: New models of start-up support that have less structured and rigorous processes constitute additional options of organisational sponsorship. They diversify the toolbox of start-up support for different stages of venture development. This thesis approaches the diversity in proposing a sequencing model for support. The sequential use of support models can be a way for the management to target founders who either require a focus on ideation processes or commercialisation of their ventures. As shown, they could also use certain models of start-up support as a precursor or follow-up measure to achieve their actual intentions.

Rather than drawing strict boundaries between the different models of start-up support, the thesis proposes to consider the models as complementary organisational sponsors. Support models can overlap, and they can offer complementary functions for other models. These insights can be used by the support management to better target resources and to use the new support model in parallel for different purposes. As the support management can also act as an investor for participating start-ups, the proposed sequencing model could also contribute to better selection processes. Investors can for instance use hackathons as a pre-screening tool to select ideas and teams for future investments or for more focussed programmes such as accelerators.

1.2.3 Policymakers

The results of this thesis also contribute to the work of policymakers concerned with regional or national entrepreneurship policies. Policies that aim to increase founding numbers, the survival of ventures, and growth rates have received increasing attention in recent years (Cox & Rigby, 2013; Rigby & Ramlogan, 2016). Entrepreneurship policies can be classified into hard policies that include initiatives related to finance and infrastructure, as well as soft policies that include initiatives related to intangible resources such as knowledge, learning or networks (Rigby & Ramlogan, 2016). Tax credits are one example for a policy measure that can be targeted at both support management and supported founders – these credits nowadays constitute the major initiative to support SMEs in OECD countries (Cunningham et al., 2016). Other measures target the direct provision of finance (Cox & Rigby, 2013), legitimacy development through public support or public procurement initiatives (Edler & Georghiou, 2007; Frenkel et al., 2005), or technology advisory (Shapira & Youtie, 2016). Although studies that investigate the impact of incubation on these mentioned indicators have come to varying conclusions (Hackett & Dilts, 2004; Lukes et al., 2019; Schwarz, 2013), policymakers continue to promote start-up support in its different forms. This thesis contributes to these efforts in offering insights into how makerspaces, hackathons, and start-up competitions work and into how start-ups utilize their resources. Policymakers can therefore consider these new models of start-up support as additional options in their toolboxes.[70] Promoting new models of start-up support can improve their policy approaches in helping founders accessing the right resources required in different development stages. The diversification of start-up support suggests that more founders can better find their preferred (and potentially adequate) model of organisational sponsorship. In

[70]It is important to note that policies are not 'tools' as they carry interpretative flexibility (Flanagan & Uyarra, 2016). As mentioned, the design of support models can differ widely even within the same category and depending on various factors such as environment and intentions.

particular, promoting this diversification through public policies could lead to an increased usage of new support models and of corresponding mechanisms of uncertainty coping (as suggested in the sequencing model) that expose founders to multiple strategic options that are equally viable (Gans et al., 2019). This approach could improve entrepreneurship policies in considering the diversity of support models (and their complementary functions) as an important factor for the effective implementation of entrepreneurial strategies.

In particular, policymakers should acknowledge the benefits of unstructured support programmes. While it might seem compelling to consider highly structured support mechanisms as superior, the deliberate disorganisation (and self-organisation) in makerspaces and hackathons enables the important functions of playful learning and experimentation in the entrepreneurial process. Traditional policies for entrepreneurship (e.g. science parks and business incubators, tax breaks, support of clusters) are therefore enriched by new insights on these new models of start-up support. In practical terms, this could, for instance, mean that policymakers promote the setup of makerspaces in universities, libraries, schools, and other public institutions. Makerspaces can introduce people to technologies, entrepreneurial thinking, and, most importantly, they enable playful learning and experimentation. Policies could also support the convening of hackathons and start-up competitions on a regional, as well as national level. This could target various stages of entrepreneurial development. For instance, hackathons can be used as an instrument to introduce pupils and students to fundamental ideas of experimentation and coding, or to promote certain technologies or sectors.[71] Start-up competitions can be supported on a regional level, as well as on a national level to promote entrepreneurship on a larger and more prominent scale.[72]

[71]Two examples can be found in the city of Manchester (UK): hac100.com organises hackathons for pupils and adults; The Graphene Hackathon focuses on the commercialisation of graphene technologies.
[72]One example of a SUC supported nationally is Pitch@Palace that has developed into a series of pitching competitions on a UK and international level.

While the promotion of new models of start-up support can be an important policy measure in itself, the establishment of cross-linkages and cooperation in between different support models constitutes another promising goal. This means that participants in makerspaces are enabled to first experiment and learn in playful ways, and subsequently, they can move into models of start-up support that are more focussed on iterative testing and commercialisation (i.e. hackathons and accelerators). Policymakers can facilitate cooperation between support models (and their shareholders) and hence enable founders to move from model to model, covering the whole process of entrepreneurial development.

2. Limitations of the Thesis and Opportunities for Future Research

Although this thesis offers several contributions to the literature and to practice, there are also limitations. Those limitations can open up opportunities to conduct research in the future that build on the exploratory results presented here. While methodological limitations are discussed in the individual research papers, this section rather concentrates on overarching limitations that concern the research questions and their aims in general. These limitations are to some extent typical for exploratory research such as conducted in this thesis and therefore open up several opportunities for future research that can build on explorative results.

Firstly, while this thesis investigates a broad variety of different models of start-up support, their utilization by founders, and roles of entrepreneurial methods, the diversity (and similarity) of support models and entrepreneurial methods creates potential issues of attribution. As founders use several models of start-up support (sometimes at the same time or sequentially), boundaries and definitions of support designs can blur. The correct attribution of the characteristics of design elements of different models of start-up support

becomes difficult for founders who participate in several support models, as well as for researchers who interview founders. While the support models can be defined in archetypical ways that allow comparisons (as shown in the thesis), there is still plenty of room for divergence. A similar issue arises when looking at entrepreneurial methods such as effectuation, design thinking, and the lean start-up methodology. While in theory, these methods differ significantly (Mansoori & Lackeus, 2019), in practice distinctions are more difficult. Founders who use and mix these methods struggle to distinguish individual characteristics, and researchers struggle to assign attributes of these methods correctly. Distinctions between these methods can in practice be fuzzy, and the statements of founders underlie interpretative risks that make it difficult to assign them to entrepreneurial methods. Focussing on the lean start-up methodology only mitigates this to some extent, as other entrepreneurial methods partly feed into LSM as an overarching method.

The exploratory results and propositions of this thesis can be used to overcome these limitations in the future. For instance, one could suggest conducting studies in environments and under conditions that researchers can control. Start-up support, in general, allows controlling the conditions – founders are part of a more or less controlled environment (Gans et al., 2019). Future studies should investigate the adoption of specific entrepreneurial methods and their impact on specific measures under more controlled conditions. Practically, researchers could try to access support models owned by universities that often allow more influence over their programmes by entrepreneurship researchers. In this environment, researchers could conduct controlled experiments in offering specific entrepreneurial methods to founders. In conjunction with other resources considered (and processes and structures of support), such experiments can lead to more insightful results on the adoption and impact of entrepreneurial methods. These experimental studies could also look at the renewed discussion on entrepreneurial strategy (see Gans et al., 2019) in the

context of new models of start-up support. As explained, the sequencing of new support models and entrepreneurial methods can be used to implement Gans et al.'s (2019) perspectives on entrepreneurial strategy. This proposition should be tested empirically, and potentially in experimental ways that can control the choices of founders (e.g. regarding methods).

Secondly, while this thesis investigates how founders utilize resources in new models of start-up support, the study does not directly (and quantitatively) analyse the fit and adequacy of support measures for different types of ventures. Simply put, just because founders utilize resources in specific ways, these resources (and actions of resource acquisition) are not necessarily most suitable for them. As explained in the second paper, founders are subject to bounded rationality and their respective abilities to access and evaluate information.[73] Similarly, the support management is subject to bounded rationality and might not offer the most suitable resources and processes to participants. The findings of this thesis suggest that processes and modes of action differ across models of start-up support (e.g. unstructured vs. structured support). This indicates that the fit and adequacy of support measures also differ depending on the respective perceived needs of ventures.

Future studies could thus approach the question of the adequacy of resource and processes in new models of start-up support. The identification of support mechanisms in makerspaces, hackathons, and start-up competitions, as well as understanding how founders use resources, as presented in this thesis, is crucial to conduct those future studies that analyse fit and adequacy. Overall, the fit of resources and the required actions of founders at specific stages of venture development are not only part of a contested discussion among researchers (e.g. Fisher et al., 2016; Jawahar & McLaughlin, 2001; Levie & Lichtenstein, 2010), but also remain a challenge for shareholders of support models and policymakers.

[73]This thesis also suggests that new models of start-up support can mitigate bounded rationality in specific ways.

The optimisation of organisational sponsorship is one of the core questions in entrepreneurship research and practice. New models of start-up support contribute to this challenge in offering more variance and therefore more options that can fit better for certain groups of founders and ventures.

Thirdly, this thesis does not analyse the impact of support on quantitative measures such as firm growth or firm survival. The question of the impact of support is closely connected to the previous limitation explained. While investigating and optimising the fit of support measures and start-ups' needs is a step towards an improved impact of start-up support, the measurement of impact is a different challenge in itself. This thesis offers exploratory results that prepare both of these future steps. The analysis of the impact of participation in makerspaces, hackathons, and start-up competitions requires an exploration of the phenomena beforehand. Understanding the characteristics and differences of new models of start-up support is a necessity to define variables that allow measuring impact.[74] Future research could, for instance, qualitatively and quantitively investigate the individual impact of new support models on ideation processes, the quality of products and venture teams, as well as on growth measures such as turnover, customer acquisition, received funding, or firm survival. This also concerns the study of the impact of entrepreneurial methods. While this thesis offers insights on how supported founders use entrepreneurial methods through their uncertainty coping mechanisms, the actual impact of these methods on firm growth or survival remains contested (Ghezzi, 2018). All these future studies will however need to deal with certain methodological challenges that have come up in previous attempts to measure impact. In particular, accessing track records of (private) support programmes and selecting appropriate and measurable variables will remain difficult. Nevertheless, conducting impact studies is crucial to justify the raison d'être of new models

[74]There are various possible quantitative and qualitative variables for the impact measurement of support on entrepreneurial growth that could be considered.

of start-up support and to increase founding numbers, the performance of ventures, and survival rates.

Finally, the choice of the theoretical perspectives applied in this thesis is subject to some limitations. The decision to place makerspaces, hackathons, and start-up competitions under the conceptual umbrella of incubation and its theoretical basis of organisational sponsorship (Amezcua et al., 2013) is fundamental to all three research papers and constitutes the basis for this PhD thesis. Although, as explained, some characteristics of these new organisational forms seem contrary to traditional definitions of incubation (e.g. unstructured, non-compulsory support), all three models have the intention to support founders within a certain physical space and with other tangible and intangible support measures (i.e. resources). It is therefore possible to consider these organisations as intermediaries that offer buffering mechanisms to shelter from threats of the external environment or bridging mechanisms to connect with external resource providers (Amezcua et al., 2013). Makerspaces, hackathons, and start-up competitions indeed act as intermediaries between ventures and their environment.[75] It is thus logical to place these organisations under the incubation umbrella to draw comparisons to other models of start-up support, and to investigate their specific roles in the range of organisational sponsors that are active in many ecosystems. This results in a deeper understanding of mechanisms of organisational sponsorship theory.

Nevertheless, other theoretical perspectives could be applied to study this context, especially from outside the entrepreneurship and management domains. This could open up the discussion on these new organisations. Participants in makerspaces and hackathons are, for instance, not necessarily founders. They might not have an initial intention to develop a venture but instead be motivated by the community, artwork, or artisanal activities. Situating

[75]Accelerators act as intermediaries too, as previously noted.

these organisations in literature of education, urban studies, or innovation management could thus open up new avenues, especially for research about the pre-formational phases of founders and ventures. As makerspaces, hackathons, and competition events are also increasingly used by large corporations to foster their innovation activities, it is also conceivable to use theoretical perspectives from the area of technology innovation (e.g. open innovation, creativity) for future research. Investigating the potential of these new support organisations in the context of large corporations could, for instance, provide new insights on the facilitation of creativity in technology companies. As incumbent corporations increasingly try to open up their innovation processes to external actors (Gassmann et al., 2010; Laursen & Salter, 2014), makerspaces, hackathons, and competition events could also play roles in the collaboration of large corporations with early-stage start-ups. The choice of the theoretical perspective applied should follow the main target group of the respective models of support studied (i.e. founders, artists, employees of large corporations), as well as concrete future research interest. This thesis overall offers a deep dive into new models of start-up support, founders' resource utilization and mechanisms of uncertainty coping, as well as the application of entrepreneurial methods. The results and insights provide the basis for conducting future research in the directions suggested. Hopefully, this thesis will inspire future research on makerspaces, hackathons, start-up competitions, and other models of organisational sponsorship in the entrepreneurship domain, as well as beyond.

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APPENDICES

Appendix 1: Semi-structured Interview Guidelines

Target groups:
Supported start-up founders; Managers of support

Note:
Depending on the interviewee, not all questions have been asked and some questions have been adjusted. Some ad-hoc questions have also been asked during the interviews to clarify upcoming topics and issues. The management of support models have been interviewed by using a similar topical structure (i.e. based on types of resources) but adjusted questions.

a) General information about the start-up or founder:

1. For how long are you working on your business idea / start-up?
2. How many people are working in your team?
3. What is your educational background?
4. What is your start-up's sector or industry? Do you have any previous experience or expertise in this sector?
5. Is this your first support programme you are participating in?
6. Did you also apply for other programmes?
7. What was the main reason for joining the support model?

b) Functions of support

1. What kind of support is provided by the incubator in a tangible and intangible way?
2. Was it targeted towards your industry / sector?
    a. Does the support management or your mentor have industry specific knowledge?
3. Did you receive industry specific support from other start-ups based in the incubator?

4. Would you prefer some diversification (also of knowledge) or is it more helpful to be in the same sector or to use the same technologies?

Rental space and share facilities (only if relevant)

1. How did the provision of space or facilities benefit your start-up?
    a. Would you need any additional facilities that are crucial for your development?

Financial Resources (only if relevant)

1. How did the provision of financial resources (e.g. prize, investment) benefit your start-up?
    a. Was this the only or the easiest way to acquire those resources?

Credibility & Legitimacy

1. Do you see any benefits in terms of image or visibility, which emerge through participation in the support programme?
    a. How did this help you?

2. What creates legitimacy from your viewpoint?

Business & Technical assistance

1. Was there mutual support or support through the support management (esp. technical)?
    a. How was the process? What did you miss or need?

Networking (internal & external)

1. How is your experience regarding networking and communication with other teams in the incubator?

2. How often do you communicate with other teams? Daily, weekly?

3. Are you or other teams concerned about being open with industry specific knowledge/information? Might this hinder your networking or support?

4. How is your experience with external networking (e.g. investors, customers, universities)? Does incubation support this?

c) Procedural Elements

Cohort composition (more questions under section b)

1. How many other teams or founders are in your cohort or incubator?

2. How would you evaluate the composition of the cohort?

3. How did the cohort composition influence the provision of support?

Incubator governance

1. How was the role of the support management? E.g. active vs passive

2. Are there regular meetings or regular communication events (formalized)? Or is it more informal?
    a. Is attendance compulsory or voluntary?

3. How would you evaluate the overall length of the programme? (including pre or post interactions)

4. How does the support management influence the support you are receiving?

Application and selection process

1. How would you evaluate the application and selection process?
    a. Did it encourage you?
    b. Was there competition?

d) Structural elements

Regional specificities

1. Does the region or city and its special characteristics have any positive or negative implications on your business?
    a. What is missing in this ecosystem?

2. How might the specific ecosystem influence the process of support?
    a. Do you see differences to other regions or cities?

Integration into cluster & Links to HEI

1. Do you have linkages with companies or universities outside the incubator? Did the incubator help to facilitate networks? How did this help you?

Main shareholder & Source of funding

1. How did the main shareholder (public, private, community) influence the process of support?
    a. Were there specific goals that did or did not match with yours?

e) <u>Final Questions</u>

1. Which area is most problematic, where were your expectations not fulfilled?

2. What was the main advantage of participating?

3. Would you participate again?

4. What would you do differently, from a start-up viewpoint and from an support management viewpoint?

5. Does the incubator influence your entrepreneurial practice? Do you do things differently due to your participation?

    a. Do you currently use, or have you used any specific entrepreneurial methods such as design thinking or the lean start-up methodology? If so, how do you use them, and for what areas and tasks?

6. Is there a conflict between opening up to the market very quickly vs staying protected in the incubator?

7. What do you need right now?

Appendix 2: Extracts of Twitter Data Collection and Analysis

Top Tweeters	No.	@'s	% RT	Twitter Activity
mi_idea	784	1485	2%	
TweetsbyMSP	54	333	24%	
harksys	45	135	49%	
wattlbot	31	51	32%	
techcharterUK	28	61	14%	
wattl	25	108	56%	
myro_	24	25	42%	
nchrisso	23	80	39%	
sarahmartin_SM	20	102	5%	
Patrici23911700	18	#N/A	89%	

		Sheet Calculation
Number of links	2045	
Number of RTs	1080	<-estimate based on occurrence of RT
Number of Tweets	2263	
Unique tweets	1969	<-used to monitor quality of archive
First Tweet in Archive	24/11/2017 09:45:31	GMT
Last Tweet in Archive	22/02/2019 18:37:09	GMT
In Reply Ids	174	
In Reply @s	189	
Tweet rate (tw/min)	0.1	Tweets/min (from last archive 10mins)

Figure 15: Example of automatic analysis of data quality in TAGS script

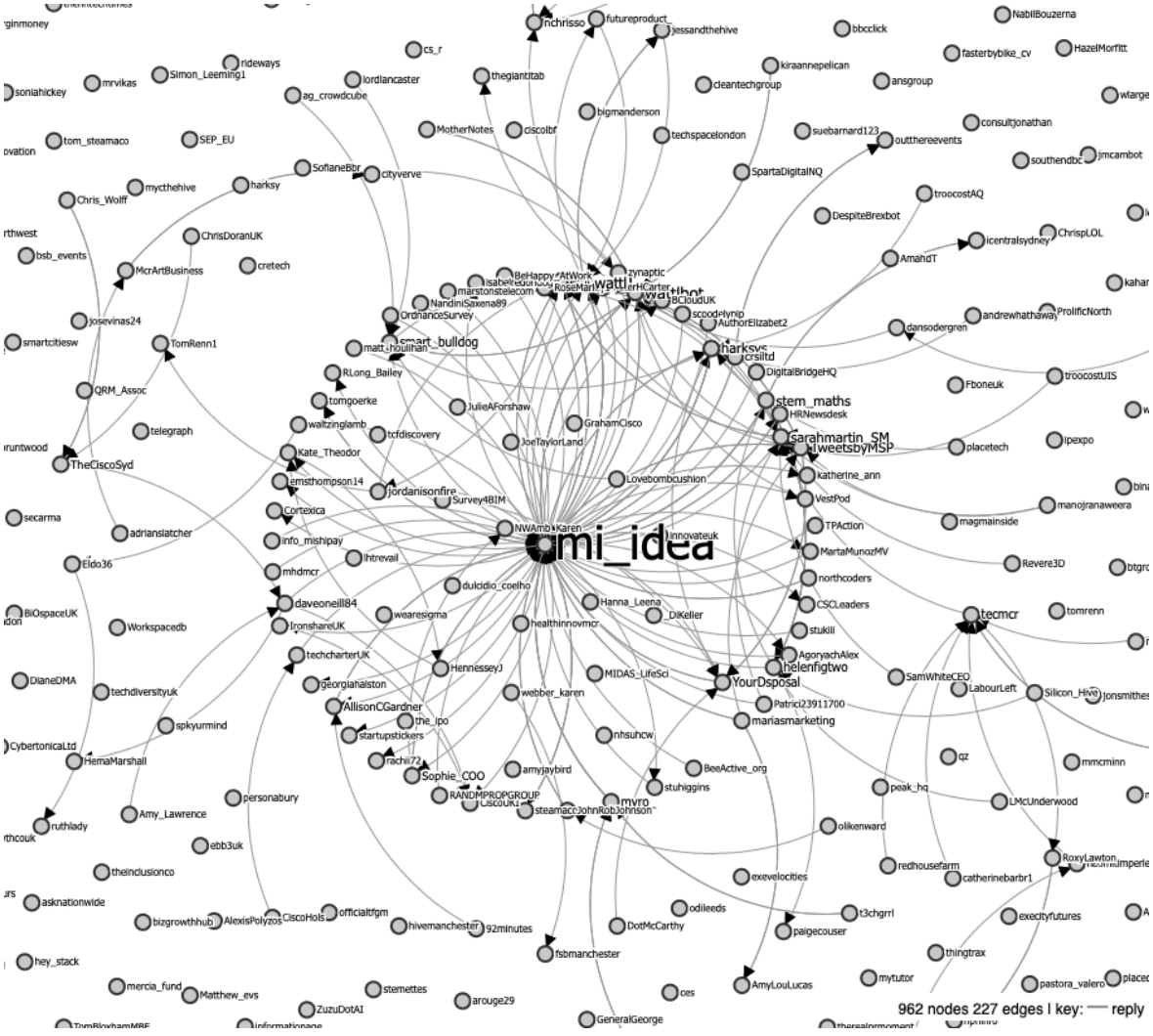

Figure 16: Exemplary extract of network of collected tweets (replies) from TAGSExplorer