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**Capturing Conversations in  
Entrepreneurial Ecosystems**

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## Capturing Conversations in Entrepreneurial Ecosystems

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## **Abstract**

This paper examines an innovative methodological approach and dataset for measuring the complex relational dynamics underpinning entrepreneurial ecosystems (EEs). Existing measurement techniques have largely failed to yield sufficiently nuanced data or insights to inform robust policy recommendations within this research field. To rectify this situation, this paper sets out a novel data-driven approach which captures the relational connectivity within EEs at varying analytical levels. By invoking the concept of “conversations” we seek to demonstrate how these “relational metrics” can be captured, measured and interpreted by policy makers to better inform interventions deployed in this policy domain. Drawing on “real-time” data extracted from a digital Meetup platform and combining social network analysis with qualitative interview data, we provide an in-depth assessment of the relational connections within the city of Edinburgh. Overall, the paper demonstrates that the analysis of “conversations” and “conversational spaces” is an important mechanism for exploring and mapping the relational connectivity within EEs. As well as producing novel empirical insights, most importantly this methodological approach provides policy makers with vital “strategic policy intelligence” to help inform public policy frameworks.

## **Keywords:**

**Entrepreneurship**

**Entrepreneurial Ecosystems**

**Networks**

**Conversations**

**Real-Time Data**

**Public Policy**

## 1. Introduction

Despite the importance attributed to “strategic policy intelligence” within policy frameworks in recent years (Flanagan et al, 2011, p. 711), limited empirical attention has been devoted to the methodological processes applicable to enhance policy learning. Therefore, this paper deliberately sets out a novel “data-driven” technique for capturing the relational, spatial and temporal dynamics underpinning entrepreneurial ecosystems (henceforth EEs). Admittedly, this is a somewhat unconventional paper. It does not provide a detailed set of empirical findings followed by, the now obligatory, sparse discussion of their policy relevance. Instead, its core aim is to provide a detailed picture of how this novel methodological approach can be deployed to yield practicable and actionable insights for EE policy makers.

The main focus of this paper is to measure network “connectivity” rather than assessing EEs in their entirety. It does so by developing an innovative technique to track the nature of “conversations” taking place within EEs. Conversations matter for entrepreneurs. They enable them to make sense of their ventures and entrepreneurial experiences through “narratives” and “storytelling” (Lounsbury and Glynn, 2001; Garud, and Giuliani, 2013) which is often crucial for resource acquisition and “vicarious learning” within entrepreneurs, not least because many of the best ideas “originate outside the walls of a company” (Malecki, 2011, p. 42). However, it remains unclear how these narrative processes operate within and shape various communities across EEs (Roundy, 2016). While the critical importance of “conversations” has been strongly demonstrated in the context of innovative processes (Lester and Piore, 2004; Lowe and Feldman, 2008; Uyarra et al, 2017), we wish to

argue this concept has equal resonance for aiding our understanding of the social structures and relational dynamics underpinning EEs.

Recent years have witnessed a burgeoning research output exploring EEs (Alvedalen and Boschma, 2017; Malecki, 2018; van Rijnsoever, 2020). Consequently, the main empirical “unit of analysis” has changed from a dominant focus on individual entrepreneurs towards a much stronger focus on the contextual, institutional and relational factors mediating entrepreneurial behaviour (Autio et al, 2014). This is in line with scholars who advocate the need for greater “pro-social” research which conceives of entrepreneurial opportunities as a “*process of social interaction* (between a community and the entrepreneur) rather than solely as an *outcome of thinking*” by entrepreneurs themselves (Shepherd, 2015, p. 491). In many respects this re-orientation mirrors the manner in which the innovation process is now widely conceived as a systemic process involving a wide variety of different constitutive interconnected actors, institutions and iterative processes (Lundvall et al, 2002; Acs et al, 2014). Consequently, it is increasingly recognised that entrepreneurship (like innovation) is most likely to occur within EEs involving a set of inter-related actors, institutions and processes, bound together by the surrounding culture (Neck et al, 2004; Feldman et al, 2019; Spigel and Harrison, 2018; Audretsch et al, 2019).

Such has been the rapid upsurge of interest in the concept during the last decade it has quickly assumed the mantle of “word du jour” within entrepreneurship research (Lowe and Feldman, 2017 p.2). A cursory trawl of the literature using a well-known search engine identifies nearly 50,000 articles on the topic of EEs<sup>1</sup>. Given the scale of research interest on

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<sup>1</sup> This search process was undertaken with the search term “entrepreneurial ecosystems” in November 2019 using Google Scholar and produced 51,200 results, with nearly 12,000 results published in the last 2 years.

this topic, numerous reviews of the literature have been undertaken despite its relatively nascent status as a field of enquiry (Alvedalen and Boschma, 2017; Cavallo et al, 2018; Malecki, 2018). Importantly, the concept has also been widely propagated by an array of important supranational organisations, such as the EU, OECD and World Bank. This has marked it out as the latest industrial policy “blockbuster” (Brown and Mawson, 2019)<sup>2</sup> and thereby established the concept as the latest “fad” (Brown and Mason, 2017, p. 11) within local economic development policy making (Stam, 2015). The strong resonance with policy makers possibly stems from the fact the practitioner community initially developed and disseminated the concept (see Feld, 2012; Isenberg, 2010; Napier and Hansen, 2011)<sup>3</sup>.

Despite this widespread appeal, the manifest problems associated with operationally deploying the EEs metaphor as a policy tool has prevented the full utility of the concept from being maximised. This problem largely stems from a lack of clarity about the concept (Isenberg, 2016) with many policy makers crudely equating the concept with start-ups (Brown and Mawson, 2019). By the same token, research has found that a strong commonality across many ecosystems is a narrow focus on measurement issues, with key metrics typically a focusing on the *volume of entrepreneurship* in terms of measuring start-up numbers, people’s propensity and intention towards engaging in entrepreneurial activities or the measuring the outputs from universities, incubators and accelerators. These rather crude approaches to empirical measurement focus upon on the things that are “easy to find” (start-ups, scale-ups, unicorns) and “easy to measure” (levels of VC funding,

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<sup>2</sup> Indeed, the EE concept seems to be joining a list of recent academic concepts which have managed to bridge the gap between academia and public policy. Other notable academic concepts entering the “policy lexicon” over the last 20 years, include *inter alia*: clusters, open innovation, innovation systems, smart specialisation and related variety.

<sup>3</sup> In particular, the early work by Dan Isenberg has been instrumental in disseminating this concept (Isenberg, 2010; 2011).

attitudinal perceptions) (see Nylund and Cohen, 2017; Stam, 2018; Szerb et al, 2019; Vedula and Kim, 2019). Much of this owes to an over-reliance on traditional “off the shelf” sources of available data such as governmental surveys and Global Entrepreneurship Monitor (GEM) data (Credit et al, 2017)<sup>4</sup>. Arguably, more sophisticated analysis of socio-economic and spatial processes has been hindered by the lack of meaningful and accessible data (Feldman and Lowe, 2015).

The academic literature on EEs has compounded this problem by often using static (often backward looking) methodologies for examining these complex structures. Brown and Mason (2017, p. 22), hold that most measurement approaches to date have been “fairly rudimentary”. Plus, most studies typically ignore the relational underpinnings of the metaphor. Arguably, it is “the interactions and connectedness” between different component parts of EEs that “create and sustain entrepreneurial ventures and a culture of entrepreneurship over time” (Credit et al, 2017, p. 5). Despite the growing scholarly research interest in this area, to date there has been a dearth of nuanced studies examining the metrics for studying these relational dynamics within ecosystems in a “holistic” way (Stangler and Bell-Masterson, 2015). For example, in the main there has been very little use of novel and real-time data to capture nebulous facets of ecosystems such as culture and relational connections (Credit et al, 2017; Roundy et al, 2017).

This paper attempts to bridge this significant gap by delineating an innovative methodological approach for “capturing conversations” which could potentially provide policy makers with much more dynamic “real-time” metrics to help inform public policy. The

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<sup>4</sup> One early example of this approach is the work undertaken to assess the Scottish entrepreneurial ecosystem (Levie and Autio, 2013).

paper therefore fulfils an important role in contributing to the nascent literature surrounding measurement techniques and EEs. The paper draws upon three main sources of empirical information. First, the research undertook a comprehensive review of the burgeoning literature on EEs. Second, a novel form of social network analysis (SNA) was undertaken utilising a data-driven approach to track and examine the conversations amongst entrepreneurial “meetup” groups in the city of Edinburgh. Third, the SNA was triangulated with 23 in-depth interviews of participants at various meet-up groups. Edinburgh provides a good spatial context for examining EEs issues because it ranks as one of the most successful UK cities for growth-oriented technology entrepreneurship (Spigel, 2016). The Edinburgh ecosystem benefits hugely from its highly educated workforce: with 55% of the population educated to degree level or above, it boasts the most educated workforce per capita of any UK city<sup>5</sup>. Together these sources of data and empirical context provide a strong vantage point for reviewing the rapidly developing landscape surrounding the issue of measurement approaches and EEs.

The remainder of the paper is as follows. First, the paper dissects the definitional ambiguities plaguing this research field. Second, the empirical literature on EEs is assessed. Third, we examine a new and innovative methodological approach for empirically measuring the relational connections within an EE. The penultimate section discusses some of the empirical evidence generated, focusing specifically on how these insights can be used to help inform policy makers in local EEs. The final section draws some conclusions from the study.

## **2. Definitional Ambiguities**

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<sup>5</sup> <https://www.cityam.com/edinburghs-entrepreneurial-ecosystem-encouraging-start-up/>



Arguably, the EE concept is being held back by a lack of definitional clarity. This, coupled with its strong propensity for interpretive flexibility, has led to a number of recurring ambiguities within both the academic literature as well as policy development. First and foremost, definitional opacity has crucially hindered initiatives deployed to empirically examine and measure EEs. This situation begs the fundamentally important question: if you cannot be sure of what something is, how can you establish its parameters and measure it effectively? Indeed, a cursory look at the long list of competing definitions reveals that considerable heterogeneity exists in terms of how different scholars perceive, and importantly define, EEs<sup>6</sup> (see Table 1 below). While some definitions emphasise the importance of their interconnectedness and “interacting components” between different actors and processes (Mason and Brown, 2014; Mack and Meyer, 2016; Audretsch and Belitski, 2017; Bruns et al, 2017), several others stress the importance of key components (Roundy et al, 2017) such as infrastructure (Rijnsoever, 2020), entrepreneurial agents such as VCs, universities (Miller and Acs, 2017; Wright et al, 2017) and start-ups (Auerswald and Dani, 2017; Spigel, 2017)<sup>7</sup>.

Crucially, many definitions fail to properly encapsulate the “systemic” nature of the original concept. This ignores the intrinsically relational nature of ecosystems including somewhat “hidden” relational aspects such as networks, social capital, culture and “buzz”<sup>8</sup>. Within EEs, entrepreneurs often need to seek out other actors “who can supply them with

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<sup>6</sup> A recent paper helpfully outlines the main definitions used within the nascent EE literature (Cavallo et al, 2018).

<sup>7</sup> Many empirical studies take individual parts of EEs such as universities (see, for example, Wright et al, 2017) and then examine them in isolation rather than attempting to scrutinise them in their entirety which, *prima facie*, goes against the systemic nature of the concept.

<sup>8</sup> Storper and Venables (2004) claim buzz is an unplanned contact system and a form of accidental knowledge creation which engenders “learning processes taking place among actors embedded in a community by just being there” (Bathelt et al, 2004, p. 31).

resources and with whom they can interact” (Rijnsoever, 2020, p. 2). Entrepreneurs frequently use events such as hackathons, conferences, meetups and informal drinks as a means of fostering their social networks which are often arranged via digital platforms such as Meetup.com and Twitter (Motoyama et al, 2018; van Weele et al, 2018). Due to these strong overlapping internal connections between different actors, well-functioning ecosystems are often conceived as being more than the “sum of their parts” (Brown and Mason, 2017). In other words, it is often the relationships, networks and conversations between different entrepreneurial actors which are the most crucial ingredients governing the performance of these complex organisms. While social capital within an ecosystem strongly shapes the performance of the entrepreneurial actors within a region, it remains somewhat neglected by scholars (Kemeny et al, 2015).

**Table 1: Expansive/Specified Versus Narrow/Vague Definitions of Entrepreneurial Ecosystems**

<b>Expansive/Specified</b>	<b>Narrow/Vague</b>
<p>“set of interconnected entrepreneurial actors (both potential and existing), entrepreneurial organisations (e. g. firms, venture capitalists, business angels, banks), institutions (universities, public sector agencies, financial bodies) and entrepreneurial processes (e. g. the business birth rate, numbers of high growth firms, levels of “blockbuster entrepreneurship”, number of serial entrepreneurs, degree of sellout mentality within firms and levels of entrepreneurial ambition), which formally and informally coalesce to connect, mediate and govern the performance within the local entrepreneurial environment” (Mason and Brown, 2014, p.5).</p>	<p>“a set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship” (Stam, 2015, p. 1765).</p>
<p>“A combination of social, political, economic, and cultural elements within a region that support the development and growth of innovative start-ups and encourage nascent entrepreneurs and other actors to take the risks of starting, funding, and otherwise assisting high-risk ventures” (Spigel, 2017, p. 50).</p>	<p>“Entrepreneurial ecosystem as a multidimensional set of interacting factors that moderate the effect of entrepreneurial activity on economic growth” (Bruns et al, 2017, p. 1).</p>
<p>“A dynamic, institutionally embedded interaction between entrepreneurial attitudes, abilities, and aspirations, by individuals which drives the allocation of resources through the creation and operation of new ventures” (Acs et al, 2014, p. 479).</p>	<p>“we conceptualize the entrepreneurial ecosystem as a set of <i>actors</i> that interact and exchange resources in a network under an institutional regime and an infrastructure” (Rijnsoever, 2020, p.2).</p>

Cumulatively, these problems clearly highlight the urgent need for greater specification of what EEs are so that scholars can adopt a more homogenous and uniform view of the parameters encompassing this phenomenon. As many definitions of EEs can appear “vague and opaque” (Kuckertz, 2019), we take the view that there is a need for detailed and highly specified definitions (Cavallo et al, 2018). Whereas some of the expansive definitions outlined in Table 1 (see Acs et al, 2014; Spigel, 2017) perhaps erroneously equate the concept primarily with start-ups, others specifically frame the concept as a dynamic one entailing a series of “entrepreneurial processes” such the propensity for new firm formation, numbers of high growth firms and levels of “blockbuster entrepreneurship” (Mason and Brown, 2014). Arguably, this more finely tuned delineation of the concept is better equipped to capture the full gamut of entrepreneurial process and factors shaping regional entrepreneurship.

While Mason and Brown’s (2014) definition provides a good terminological starting point, it fails to explicitly mark out two further aspects of these complex organisms. First, it pays insufficient attention to their relational connectivity. Social capital and networks effectively act as the arteries circulating the lifeblood of information, ideas and tacit knowledge enabling ecosystems to function properly (Malecki, 2011; Spigel, 2017). Definitions of EEs which ignore or downplay these relational connections misconstrue the true systemic nature of the concept. Second, while acknowledging the spatial nature of EEs, the definition fails to elaborate on their “geographically bounded” nature (Audretsch and Belitski, 2017, p. 1031)<sup>9</sup>. Unfixed boundaries make it difficult, if not impossible, to assess and measure EEs effectively (Brown and Mason, 2017). While the optimal spatial scale for

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<sup>9</sup> Interestingly, Malecki (2018) notes that only a handful of empirical studies include spatial parameters (such as a 30-60 mile radius) whilst delineating ecosystems.

examining EEs is yet to be determined (Stam, 2015), as a broad heuristic we would suggest that most ecosystems are spatially localised (van Rijnsoever, 2020)<sup>10</sup>. In line with other scholars, this would suggest that the most appropriate spatial demarcations are the immediate urban or city-region context (Audretsch and Belitski, 2017)<sup>11</sup>.

### **3. Relevant Empirical Literature**

In order to obtain a good grasp of the type of methods and metrics used within the empirical evidence base surrounding EEs, the authors conducted a comprehensive review of the published literature on this topic. Rather than attempting to provide a thematically based or fully systematic review of the literature, our aim instead was to unpack the nature of the research approaches and analytical techniques used to empirically explore EEs. Recognising that the EE literature permeates several research fields (e.g. entrepreneurship, economic geography, innovation etc), our evaluation collected publications from a number of different databases<sup>12</sup>. We used the search term “entrepreneur\* ecosystem\*” and looked at works published between 2001 and 2018<sup>13</sup>. In total this search identified a total of 101 papers. While not exhaustive, we are confident this encompasses the vast majority of rigorous published research on this thematic issue during this timeframe.

#### *3.2 Empirical Studies*

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<sup>10</sup> Isenberg (2016) makes the point that policy makers sometime erroneously refer to national EEs which, except in rare exceptions, is too expansive a spatial unit to function effectively.

<sup>11</sup> These spatial heuristics are likely to be more expansive for smaller towns or more remote locations where EEs are more diffuse and less concentrated (Miles and Morrison, 2018).

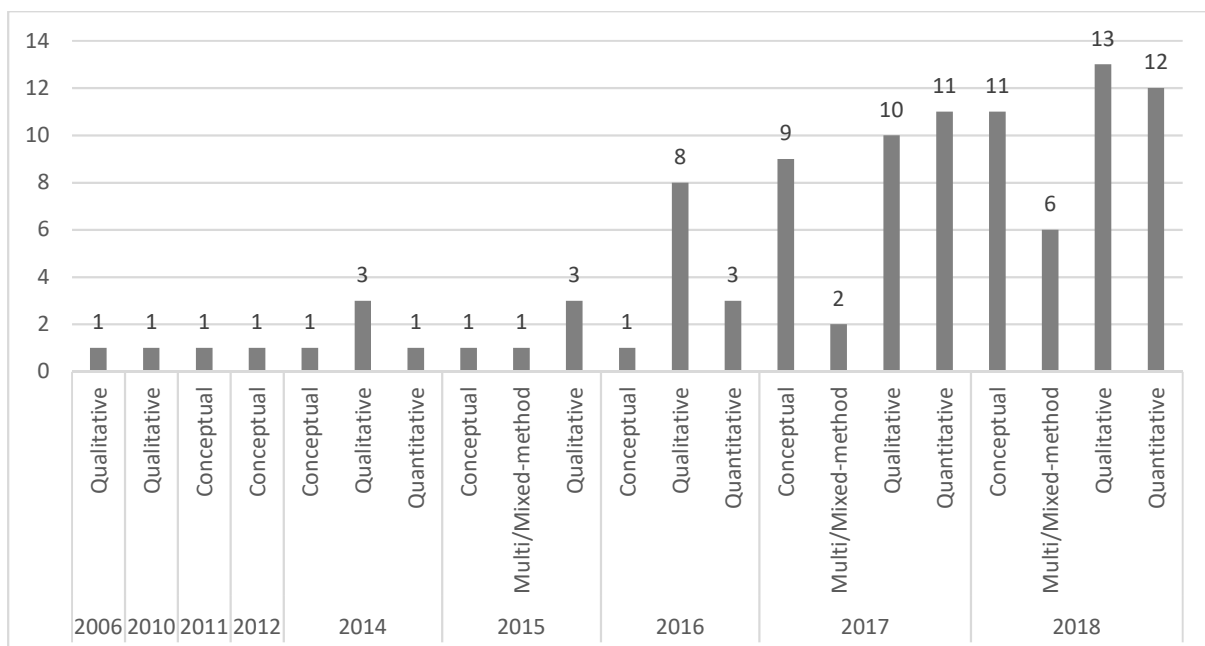
<sup>12</sup> These included EBSCO (Business Source Complete and EconLit), Emerald, ProQuest Business Premium Collection, ScienceDirect, and Web of Science (Social Sciences Citation Index and Emerging Sources Citation Index).

<sup>13</sup> As a measure of quality control, we excluded publications that did not explicitly address the EE concept and those published in outlets not included in the CABS Academic Journal Guide 2015.

Our review of the literature revealed a number of discernible trends.

Entrepreneurship was by far the single largest disciplinary field contributing to this evidence base, with almost half of all the papers emanating from entrepreneurship and small business journals<sup>14</sup>. The other two major disciplinary contributors to the literature were innovation and regional studies<sup>15</sup>. While we examined a relatively long timeframe, it has only been relatively recently that the field has really taken-off, with almost a third of papers published in 2017 and almost half published in 2018 (see Table 2 below). This temporal bias was accompanied by a notable spatial bias, with the US and the UK being the two most prominent locations contributing to this nascent research field. Nevertheless, contributors are now emerging from a wide range of developed and developing economies alike.

**Table 2: Thematic Nature of EE Literature 2006-2018**



<sup>14</sup> The journals featuring the largest quantities of papers on the topic is the entrepreneurship journal *Small Business Economics* and the *Journal of Technology Transfer*.

<sup>15</sup> According to Brown and Mawson (2019), the ecosystems concept is being applied differently by innovation scholars (see Oh et al, 2016) with little apparent intellectual cross-over between this and the use of the concept by entrepreneurship and economic geographers.

Importantly, our review also yielded insights about the literature from a methodological perspective (see Table 2 above). A quarter of papers examined EEs from a conceptual perspective, which is perhaps unsurprising given the field's nascent status. Qualitative research approaches have been by far the most popular approaches for examining EEs, constituting around 40% of the total papers. However, just under one third (27) applied quantitative research methods. The use of mixed methods approaches was quite rare, with just around 10% of studies adopting this approach. Overall, this suggests that much of the literature to date has adopted an inductive approach towards examining EEs (Colombelli et al, 2019; Miles and Morrison, 2018; Miller and Acs, 2017), with many such studies adopting a case study approach to describe either a "particular place" or "particular features" of EEs (Alvedalen and Boschma, 2017, p. 894). Some of these are highly nuanced case histories such as Feldman and Lowe's (2018) detailed study on North Carolina's Research Triangle. In contrast, much of the quantitative empirical literature has tended to either focus on historical GEM data on entrepreneurial intentions (Bruns et al, 2017; Hechavarría and Ingram, 2019; Simmons et al, 2019), or national governmental (Auerswald and Dani, 2017; Ghio et al, 2019; Vedula and Kim, 2019), Eurostat data (Audretsch and Belitsky, 2017; Bruns et al, 2017) and bespoke datasets such as Crunchbase (Nylund and Cohen, 2017). A common feature of these quantitative approaches is the use of static cross-sectional data, which precludes examining EEs from an evolutionary perspective, despite this aspect being crucial when looking at an inherently changing landscape.

Given the empirical focus of this paper, of significant interest is the nature and types of measurement techniques and metrics adopted by scholars when examining EEs. Overall,

what we see is that the field of EE scholarship is characterised by a distinct lack of methodological pluralism, which has arguably hindered our comprehension of this complex empirical issue. As we shall see, this is particularly important from a policy perspective. While traditional metrics used to measure entrepreneurial activity such as number of jobs created, levels of new firm creation and levels of equity investment provide a baseline, they do not fully capture the nature of health of EEs (Roundy et al, 2017). Indeed, due to their inherent complexity EEs “cannot be effectively assessed using such simple “count-based” metrics” such as the number of start-ups (Roundy et al, 2017, p. 103). Critically, these metrics fail to inform public policy makers about how best to intervene to make ecosystems function more effectively. Furthermore, traditional datasets and industrial classification schemes rarely consider the full complexities of the “relationships among diverse organizations across space” (Feldman and Lowe, 2015, p. 1793).

Recently, two main forms of measurement techniques have been advanced within the literature. One “top down” approach devised is the “entrepreneurial ecosystem index” (Stam, 2018). This approach appraises a range of different metrics using a set of proxies to assess the vibrancy of localised EEs and is very similar to the approach adopted by scholars examining national systems of entrepreneurship using the Global Entrepreneurship Index (Acs et al, 2014)<sup>16</sup>. Vedula and Kim (2019) propose a similar composite index of ecosystem quality which assesses different EEs with five key variables: supportive entrepreneurial culture, access to finance, availability of human capital, innovative capacity and support organisations. Again, this is a composite index based on measurement of various proxies for each of these key variables. While clearly issue could be taken with the validity of proxies

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<sup>16</sup> This comprises formal institutions, entrepreneurship culture, physical infrastructure, market demand, networks, leadership, talent, finance, new knowledge, and intermediate services.

used, they do enable EEs to be classified against other spatial areas on a broad range of ecosystem performance indicators. These approaches will probably hold traction with national policy makers who often like to monitor regional differentials across their respective economies. However, by the authors' own admission, they do not offer local policy makers much that is particularly meaningful in terms of how they could "change specific components of the EE" (Vedula and Kim, 2019). Overall, these types of aggregate approaches examining different regions do not yield practicable policy insights.

Alternative "bottom up" approaches towards measurement are using different tools, especially SNA, to assess the nature of networks and social capital within EEs. While these types of studies have been a relatively novel addition to the EE literature, as a methodological technique they feature widely across a range of social sciences (Payne et al, 2011). Adopting a social network lens, research is starting to yield interesting and important insights into the nature of intra-ecosystem connectivity within different EEs. Examining the nature of networks within Chicago and Orlando, Neumeyer et al (2019) found stark differences between male and female high growth entrepreneurs, with the latter exhibiting a much lower degree of bridging social capital than male entrepreneurs. Similarly, Motoyama and Knowlton (2017) discovered that the way in which entrepreneurs interact and form relationships is substantially influenced by the way support organizations interacted with them. Utilising novel mapping software, Pittz et al (2019) found that the relational connections of "dealmakers" are configured very differently across EEs, displaying



strong connectivity within a dynamic EEs such as Seattle and weak connectivity in weaker EEs such as Tampa<sup>17</sup>.

Some of the newer “bottom up” approaches outlined above appear to be of strong potential for policy makers; the use of SNA in particular seems a valuable technique for analysing and dissecting the complex relational dynamics underpinning EEs. That said, the EE literature has not produced a “comprehensive network approach” and a key “research challenge” facing EE scholars is how to best explore how these different networks and “subnetworks” connect to each other and to what extent overlap exists between different networks (Alvedalen and Boschma, 2017, p. 894-896). For example, the nature of the underlying data in some studies (i.e. one-off interviews) means that these studies can only provide static “snapshots” about the functioning of social capital within EEs (Neumeyer et al.,2019). While of academic interest, this information is less relevant for EE policy makers charged with the responsibility of better understanding, improving and tracking connectivity within their respective jurisdictional boundaries. For these types of observers, capturing “real-time” data (Brundin, 2007) about the changing nature of social capital within ecosystems would potentially be of much greater value. Ostensibly, in order to provide information on the temporal dynamics of these social structures much more in-depth and temporally sensitive data is required.

Another limitation of these approaches is a lack of detail about the nature of relationships. While these techniques can shed light on the type of ties between different actors within different EEs at a given point in time, they cannot specify the nature of the

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<sup>17</sup> Dealmakers are former entrepreneurs and serial entrepreneurs who “glue” EEs together (Napier and Hansen, 2011) by connecting people throughout their network (Feldman and Zoller, 2012).

connections or “topics of conversations” taking place. Conversations are intentional ongoing forms of knowledge creation between individuals, which help entrepreneurs’ source new ideas (Lester and Piore, 2004; Rutten, 2017). Research shows that tacit knowledge sharing and a deepening of social relations emanate from a shared conversational space (Lowe and Feldman, 2008). It is through such interactions that “problems are framed, choices get made and the rationales underpinning them developed” (Uyarra et al, 2017, p. 833). Whilst conversations appear crucial for the promotion of entrepreneurship, it is of critical importance to unravel the socio-spatial nature of the conversations taking place within EEs. In other words, gaining a greater understanding of the nature of the interactions taking place is needed if policy makers are to make better sense of the underlying relational dynamics and interconnections underpinning EEs. However, to date, the methodological tools (and associated data) utilised by EE scholars have not been able to adequately capture and decipher these conversations.

#### **4. Data and Methods**

To empirically examine the nature and the locations of “conversations” and relational connectivity in the city of Edinburgh’s EE a multi-method research approach was designed to assess the nature of these conversations at a macro (i.e. the entire EE), meso (i.e. the meet-up groups) and micro-levels (i.e. individual entrepreneurs). In order to measure these connections at the macro and meso levels, we utilised data capturing the existence of “Meetup” events organised via an online event website (described below). In order to understand how entrepreneurs within the Edinburgh EE exchange knowledge when attending network events, and how the network structure is shaped by a digital platform, we collected data via interviews to better understand the rationale and benefits of engaging

in these conversations. This twin-pronged research design enabled us to gain a good picture of the nature of these conversations from a variety of different levels. A mixed methods research design also ensures important triangulation concerning the veracity of the data (Molina-Azorín et al, 2012).

As noted above, the digital platform used was Meetup.com, the world's largest digital platform for local communities who organise offline events. This is a "live" data set which is continually updating and therefore provides "real-time" information. Real time information entails the collection of data and/or empirical material instantaneously at the same time as events are unfolding (Brundin, 2007). This platform has more than 40 million members, 320k+ active meetup groups and 12k meetup events happening every day<sup>18</sup>. Utilising online sources of data on entrepreneurial events plays to those who suggest that the rapid evolution of technologies and infrastructures is creating "digital affordances" that innately affect the organisation of economic activity within EEs (Autio et al, 2018). This data was analysed using different techniques to dissect the nature of the networks identified at their relevant scale (macro and micro). At a macro level, the data was analysed to enable geolocation tagging while at the meso level SNA software was used to undertake modularity tests and network density calculations. More detail on the different data and different analytical techniques adopted within the study is provided in Table 3 below.

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<sup>18</sup> These figures were from March 2019 but will now have increased due to the live nature of the dataset.

**Table 3: Methodological Approach and Data and Data Analysis Sources**

<b>Level of analysis</b>	<b>Nature of data</b>	<b>Data source</b>	<b>Data analysis</b>	<b>Form of Data presentation</b>
<b>Macro</b>	<b>Spatiality</b> (conversation locations; hot spots; frequency; changes over time) <b>Total activity</b> (number of participants)	Meetup REST API	Descriptive statistics Geolocation tagging	Heat maps
<b>Meso</b>	<b>Nature of conversations</b> (topics/key words) <b>Nature of conversation groups</b> (number of groups and sub-groups; affiliations) <b>Nature of relationships</b> (co-affiliation of groups; network density)	Meetup REST API (Gephi and UCINET for SNA)	Modularity tests Network density calculation	Group network structure
<b>Micro</b>	<b>Participant information</b> (socio-demographics; nationality; current entrepreneurial activity; perceived support needs) <b>Nature of Edinburgh EE</b> (reflections on local EE; opportunities; challenges; gaps)	Semi-structured interviews (23)	Descriptive statistics Thematic coding	Participant quotations

The meetup data was collected for Edinburgh between October 2007 and October 2018. The use of Meetup.com has risen exponentially over the last decade within the Edinburgh EE, from a figure of 41 meet-up events in 2008 to 593 in 2018. In 2018, Edinburgh had around 148 meetup groupings categorized as Tech (103) and Career & Business (45) with 313 members on average in each type of group. Groups have different “join modes”, with 126 being open to all and 22 requiring approval (prospective members need to request approval for group membership). Edinburgh’s meetup groups have 21,612 unique members (note that one member can be part of more than one meetup group) and each member has joined on average 2.139 groups. There were 2,232 meetup events

organised between October 2007 and October 2018 with 20.73 members on average confirming attendance and lasting 2.69 hours on average (based on 1,217 meetups that provided specific duration). These 2,232 meetups generated 53,820 RSVPs (confirmation of attendance).

The data gathered provided an exploratory dataset for the analysis of network structures among thematic groups and their relationships. The network data was extracted through Meetup REST API and manipulated using the programming language Python.<sup>19</sup> We used the software tools Gephi and UCINET for the SNA. SNA software is designed for qualitative and quantitative analysis of social networks, where information about network structure (including network statistics) and visualisation can be used to examine social connections. Data extracted was composed of affiliation information for each meetup group from our sample (2-mode network with groups and members). Co-affiliation provided the conditions for the development of social ties of various kinds and information about flow of knowledge (Parker et al, 2016).

The qualitative research examined the micro-level aspects of networks from the perspective of entrepreneurs themselves and comprised 23 semi-structured interviews with attendees of the meet-up events. To avoid biases associated with specific types of meetup events, interviewees were randomly selected from different groups and events. The sample of interviewees comprised 6 females and 17 males, a gender split broadly in line with the overall population at these groups. The average age of the respondents was between 35-

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<sup>19</sup> Web scraping/harvesting is a well-known practice to digitally extract data from websites, retrieving data using REST API. Several platforms have their own REST API methods, including Meetup.com, LinkedIn, Twitter, etc.

40. Interestingly, only 6 were native Scots, with the remainder coming from a variety of countries such as Germany, Italy, Chile, Singapore and the US, demonstrating the strong role of transnational entrepreneurs for many EEs (Schäfer and Henn, 2018; Brown et al, 2019).

The interviews were designed to inquire about their rationale for interaction with such networking events, the kind of knowledge and information sought, use of the digital platform and general interaction with the ecosystem. Questions were crafted in a way to extract information about how people use this specific digital platform to seek out relationships, knowledge, information and also to ascertain the benefits entrepreneurs derive from these relational connections. To do that, interviews were targeted at active and/or prospective entrepreneurs and other actors comprising the EE. The interviews were taped and transcribed to enable the use of direct quotations within the paper.

## **5. Deciphering Ecosystem Conversations: Insights and Implications for Policy Makers**

We now present some of the empirical evidence emanating from this novel data collection approach by examining conversations at three different analytical levels as noted in our methodology. As noted at the outset of this paper, our express intention is not to provide an exhaustive empirical treatment of the relational connections within this specific ecosystem, but instead to demonstrate how some of the potential insights from this novel methodological approach can yield specific insights for local policy makers and other ecosystem actors. For this reason, interwoven within these indicative findings are key messages for policy makers emerging from the findings at each of the analytical levels examined.

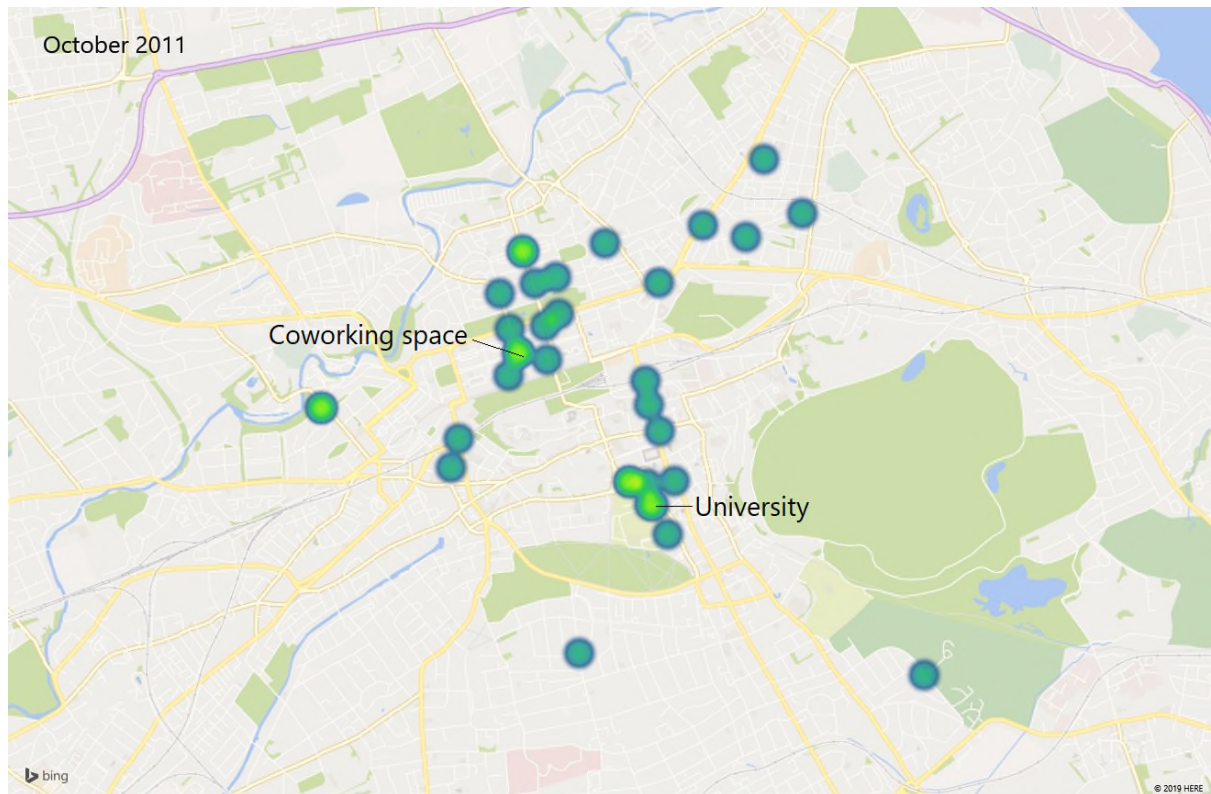
### *5.1 Macro-Level Conversational Analysis*

The nature of the Meetup data enables us to graphically portray the spatial and institutional nature of the relational connections and landscape underpinning the Edinburgh EE and (perhaps most crucially) how this evolves over time. The networking events organised, promoted and hosted take a variety of forms but all located within the city's spatial boundaries<sup>20</sup>. The heat maps produced are based on the density of meeting events (based on a total of 2,232 meetup events), with the light green and red elements depicting areas of high activity while the dark green areas denote lower levels of event activity (see Figure 1 and Figure 2). We can see in 2008 that the main spatial focal point of these relational connections centred on two main geographical nodes within the heart of the city centre and within close spatial proximity to the city's main research-intensive university (i.e. the University of Edinburgh).

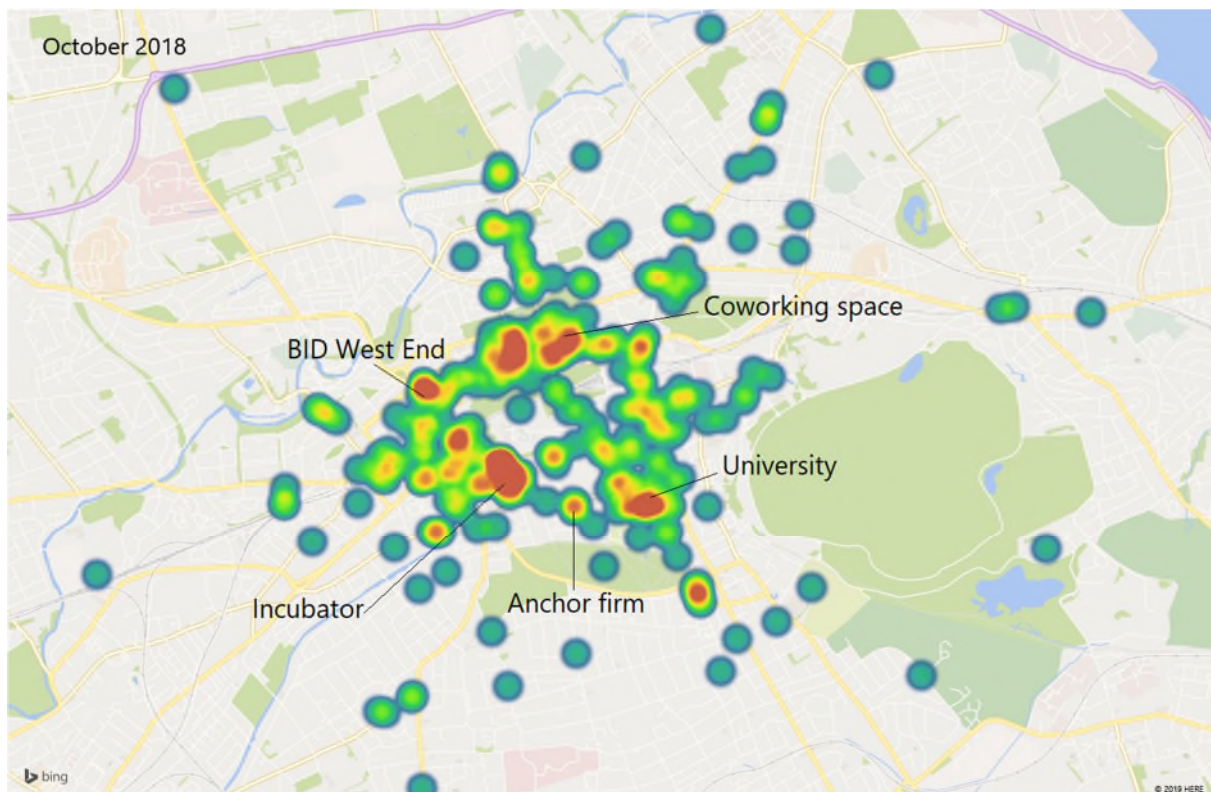
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<sup>20</sup> It should be noted however that around a third of Meetup participants reside outwith the city of Edinburgh.

**Figure 1: Map of the Spatial Concentration of Meet-Up Events in Edinburgh, 2008**



**Figure 2: Map of the Spatial Concentration of Meet-Up Events in Edinburgh, 2018**





Part of the geographic concentration in the central business district of the city possibly owes to the establishment of an important catalytical co-working and incubator organisation called the “Melting Pot” which was originally established in 2007 and received support from the Scottish Government and the City of Edinburgh with the specific focus to help promote social entrepreneurship within the city (Scottish Government, 2018). Since its inception its remit has expanded considerably and it now hosts events, provides co-working space, free incubation and accelerator services<sup>21</sup>. The Melting Pot quickly became a core geographic node for “hosting” entrepreneurial networking conversations within the Edinburgh EE<sup>22</sup>. The other main node hosting conversations was the University of Edinburgh. Likewise, this also acted as an important fulcrum for academic and entrepreneurial communities in the city. In this particular location there is a centre called ‘Creative Informatics’ which is linked to the world-leading Centre for Informatics at the University of Edinburgh and Napier University. This body aims to accelerate ideas and transform them into innovative data-driven products and promotes these synergies via networking events<sup>23</sup>. This demonstrates the “strategic leadership for the ecosystem” provided by universities by helping promoting networking and localised knowledge spillovers (Heaton et al, 2019, p. 935).

Looking back, it becomes vividly apparent that the conversational geography within Edinburgh’s EE has evolved remarkably during the intervening ten-year period examined (see Figure 1 and Figure 2). Two main issues become immediately apparent from the data. First, the volume and density of conversations taking place within the EE has become much

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<sup>21</sup> <https://www.themeltingpotedinburgh.org.uk/>

<sup>22</sup> According to the founder of Melting Pot, Claire Carpenter: “I wanted to bring together interesting people who do interesting things, and to develop a dynamic and diverse community that shared a sense of collective purpose and reach. Ultimately, it’s all about a place where the sum of the parts was greater than the whole”.

<sup>23</sup> <https://creativeinformatics.org/>

thicker over this ten-year time period. The volume of events rose dramatically, especially between 2014 and 2018 when the numbers of meet-up events rose fourfold (See Figure 3 below)<sup>24</sup>. This means the amount of conversations and connectivity appear to have increased markedly during this time and is a sign the ecosystem is becoming denser and better developed. Part of this upsurge of interest in entrepreneurship possibly owes to the booming interest in entrepreneurship during this time linked to the “demonstration effects” from the success achieved by two local companies (Skyscanner and Fan Duel) which achieved the holy grail of unicorn status. This type of “blockbuster entrepreneurship” has a very important catalytical effects and offers strong opportunities for entrepreneurial spin-offs and entrepreneurial re-cycling. As research strongly shows (Clayton et al, 2019), new ventures rarely start “from scratch” but instead often emerge from other pre-existing firms local unicorns or anchor firms such as Skyscanner and Fan Duel. It appears, in Edinburgh these success stories have simultaneously inspired and helped mentor numerous new ventures (Sheppard, 2016)<sup>25</sup>.

Second, while conversations have become much denser, critically the geographic centre of gravity of events across the city has also undergone significant transformation during this period. This reconfiguration owed to a major westward expansion of these networking events across Edinburgh. While existing hot spots or nodes highlighted above are still central points in the ecosystem, there appears to be a much richer geographical composition of events across a wider spatial area across the city. The benefits of this data

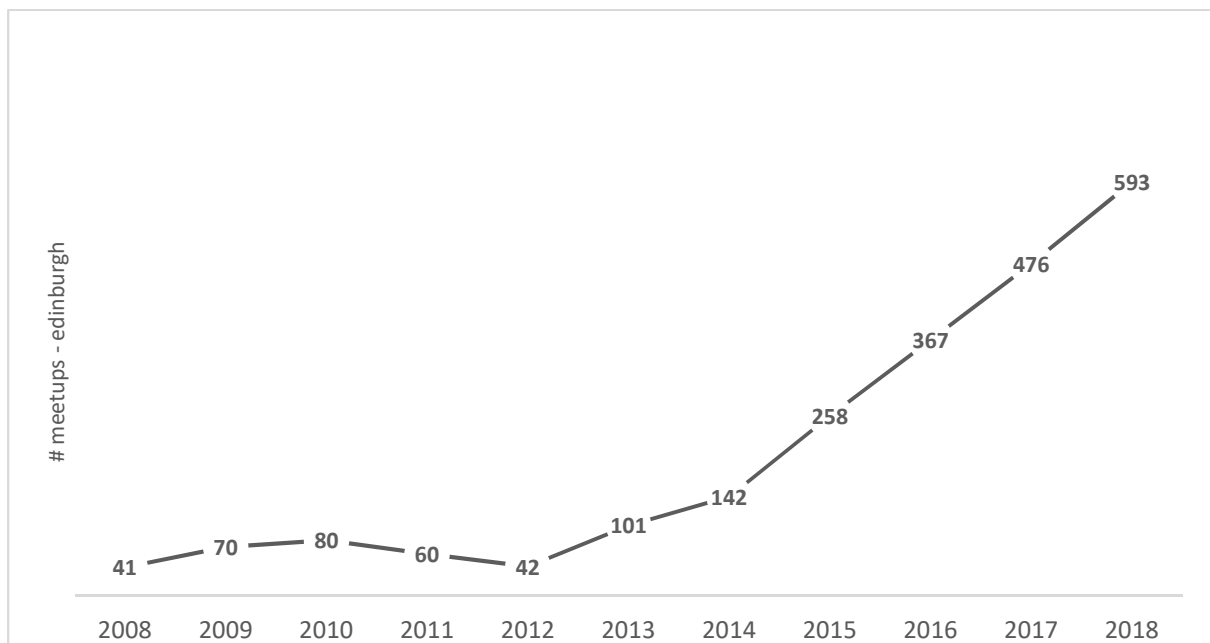
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<sup>24</sup> Interestingly, there seems to be a correlation between the numbers of events and the economic cycle with a post financial crisis dip between 2009-2012 when the economy in the UK suffered a major economic dip.

<sup>25</sup> For example, the CEO of a cyber security start-up claims: “We’ve got Skyscanner and FanDuel leading the way. In terms of the quality of mentoring support, you have got a lot of people who have started and exited their businesses and still live up here ... [and] you’ve got people who’ve made some cash, who are interested in seed or angel investment.”

enable us to explore how this growth connects to other components parts of the EE which may explain this changing conversational landscape. For example, in 2015 an important entrepreneurial initiative was instigated to improve networking and mentoring within the Edinburgh called the Business Improvement Districts (BID), West End (Business Support and the Entrepreneurial Ecosystem, 2017). We can see from Figure 2 that this sparked a dense focal point for conversations within the local EE.

**Figure 3: Numbers of Entrepreneurship Meetup Events 2008-2019**



The prestigious business incubator Codebase also opened up in the western part of the city centre in 2014. This is now one of the largest technology incubators in the UK and acts as a host for a number of networking events within the city. Since new entrepreneurs lack credibility and a track record, incubators allow them to overcome this liability of newness by providing a “networking infrastructure” (Rice, 2002; van Rijnsoever, 2020). Relatedly, the aforementioned unicorn, Skyscanner, is also located in the western side of

the city centre and this also hosts a large number of networking events within their premises. This demonstrates the pivotal role played by network anchors for aiding relational connectivity within EEs (see Figure 2).

So how can this evidence be interpreted by public policy makers? *Prima facie*, it appears governmental bodies can initiate and nurture conversations by providing support for the types of conversation spaces (such as Melting Pot and BID) identified above. Within the Edinburgh context the state already plays a strong and highly proactive role within the local EE (Spigel, 2016). Crucially however, the mere presence of networking organisations and incubators alone is insufficient for EEs to work effectively (van Weele et al, 2018). What is crucially important for policy makers is that they carefully select where publicly-funded organisations are located. Close proximity to other entrepreneurs is often a key motivator to attract individuals motivated to contribute to the ecosystem and coworking spaces physically drive these connections impacting entrepreneurial activities (Thompson et al, 2018). Therefore, by examining the spatial nature of these conversational spaces within an ecosystem, policy makers can build upon existing relational connectivity when deploying new actors such as coworking spaces, incubators, accelerators and so on, to ensure that they are appropriately spatially targeted.

The crucial importance of the choice of geographic location was underlined from our event attendee interviews, with one person specifically stating that they avoided attending events more than a “10 to 15 minute walk” from their regular working location. Therefore, staging events or deciding on where to locate a new institutional actor, such as an incubator or coworking space, could have vital ramifications for the success of these activities. Often the public sector is guilty of using existing property assets when designing such

interventions. Our work suggests the success or failure of such initiatives crucially hinges on their spatial location in relation to other parts of the ecosystem. This aligns with other recent work examining the nature of the build environment and how this crucially impacts on the connectedness to other parts of EEs (Johnson et al, 2019). This data provides policy makers with key insights into changing spatial patterns of conversations and network activity within the local EE. It also enables insight into where business activity and regeneration is needed (or working) and where policy intervention may benefit specific locations and communities.

Another valuable lesson for local policy makers is the need to adopt a systems-wide perspective when designing initiatives. The important role identified by the universities, incubators and local unicorns in shaping the geography of conversations demonstrates the importance of existing actors within the ecosystem who act as important “conversational spaces” within Edinburgh’s EE. This shows the “boundary spanning” nature of key entrepreneurial actors such as large existing firms and universities often act as important relational bridge builders within EEs (Heaton et al, 2019). This is especially important as one of the most common features hard-wired into most EE policy frameworks is the lack of genuinely systemic policy initiatives which span multiple parts or actors across EEs (Brown and Mawson, 2019).

## *5.2 Meso-Level Conversational Analysis*

We now turn our attention to the “meso-level” to examine the dynamics and composition of the meetup groups themselves and their associated “topics of conversation”. Although the data was officially restricted to two topic categories under Meetup.com typology (*Tech* and *Career & Business*), our analysis detected that a wider

range of thematic groups existed within the ecosystem. Our data analysis pointed out the existence of hidden topical categories that re-organise and create categories based on different structures and sub-networks which are more densely connected. Identified communities within a network means that members within each community have a higher chance to exchange knowledge with each other. Thus, when communities are recognised within a network, actions may be taken to engage with each other and/or develop their activities.

In the case of Edinburgh's meetup groups, modularity tests indicated the presence of different set of topic groups clustered together<sup>26</sup>. These tests showed that the network taxonomy had a partition with optimized modularity score ( $Q=.173$ ) which re-dividing the network into three main clusters. To understand the underlying meaning of why groups were clustered in three sub-networks, further analysis on each group description using word frequency and critical analysis stipulated why they were clustered together. The first community (*Tech*) was formed by groups with a high focus on technology related terms (e.g. data, code, programming). The second community (*Business*) gathered mainly groups covering subjects closer to business discussions (e.g. finance, start-up). And finally, the third community (*Hybrid*) concentrated groups dealing with a mix of business and technology themes. Interestingly, this third community organised several events dealing with entrepreneurial activities. This hybrid grouping proved very interesting because our interview data detected that these individuals were often the most focused on new venture formation and those most seeking information, resources and assistance. By identifying the

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<sup>26</sup> Modularity tests performed used the algorithm for community detection based on modularity optimization (Blondel et al, 2008). This test allows detection of compartmentalized sub-networks that might underlie real-life meaning of why some nodes are more attracted to each other.

different nature and structure of these networking events it could potentially present clues how policy makers can potentially offer more tailored forms of support.

To be specific about the implications for policy makers, this type of thematic analysis means that conversations can also be captured in different stages such as topic formation, transformation or even when topics are in decline. Often a clear problem facing entrepreneurs is informational asymmetries and the need for advice rather than the desire for transactional forms of support. In other words, business support organisations may wish to attend these events so they can showcase the types of support they can offer nascent entrepreneurs/start-ups. Furthermore, given the thematic and topic-based nature of some conversations, policy makers can offer bespoke forms of advice and support to target these specific audiences and communities of practice. For example, if an event is discussing Artificial Intelligence (AI), local policy makers may wish to engage with other ecosystem actors such as local universities, potentially enabling other parts of the ecosystem to directly feed into the conversations based around these thematic topics. Plus, if there is a concentration of conversations happening in a specific area about a specific technology like Fintech, policy makers can help build connections between different players within those communities.

A key issue for policy makers to consider when exploring the relational connections within EEs, is to identify the areas where networks are strongest and where they are more nascent. Structural knowledge about networks allows further analysis on knowledge flow, both in terms of direction and intensity. Analysis of our data enables us to interpret network density results to compare different networks both as a whole, or by each thematic sub-category identified above. The concept of density refers to possible ties within a

network reached when dividing the number of existing ties by the total number of potential ties (Borgatti et al, 2013). A network with high density suggests an elevated number of connections and hence indicates higher potential for knowledge exchange enabling information to flow easily. Data analysis on co-affiliation networks (such as meetup groups membership) also allows us to capture insights about levels of information flow thereby potentially signalling groups with different stages of knowledge exchange.

Measuring the distinctive density allows comparability across different networks and importantly this kind of information may indicate communities in need of some sort of intervention. Our data on meetup communities shows small differences on levels of cohesion amongst the three identified sub-networks ( $TECH_{density} = 0.883$ ;  $BUSINESS_{density} = 0.863$ ;  $HYBRID_{density} = 0.857$ )<sup>27</sup>. Even though these densities imply only a marginal variation, the *Tech* community reveals greater levels of connectivity amongst its members than the other two. While the causal reasons for these variations cannot be detected from the data, they do nonetheless present policy makers with valuable insights.

Being able to identify networks with higher or lower levels of density might lead to interventions to exploit advantages or develop initiatives to enhance knowledge exchange. In an ecosystem with a community with higher density levels initiatives aiming to increase linkages between entrepreneurs with potential sources of capital (e.g. business angels, venture capitalists) might perform better in these groups compared with communities with lower levels of connectivity. Additionally, policy makers may wish to invite key dealmakers to these events to help bolster their nuanced networking capabilities. On the other hand,

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<sup>27</sup> The network's density is the number of connections divided by the number of possible connections. A completely linked network has a density of one, while other networks will have a decimal value representing the percentage of possible links that are actually present.



communities with lower levels of connectivity might need interventions concentrated in developing their networking events. In this case, policy makers should identify constraints preventing these groups from thriving. As an example, these groups might be struggling with physical space for meetings, so interventions could be aimed at helping with the provision of facilities where these meetings could occur. In both scenarios, interventions are deployed in a bespoke and temporally changing fashion as the nature of network density alters over time.

### *5.3: Micro-Level Conversational Analysis*

Entrepreneurs are the “micro-level” actors who engage in networking-related conversations. It quickly became apparent from the interviews that there were a range of perceived benefits from these relational interactions. It was also evident that the entrepreneurs themselves display strong levels of “self-efficacy” demonstrated by their innate belief they could achieve the desired outcomes through their relational interactions. What was interesting was that some of the participants noted how their perceptions of the whole ecosystem in Edinburgh had evolved over the years owing to the growing role of the Meetup community. This indicates that the relational connections between different entrepreneurial actors are now perceived as being of great importance especially as this adds to the sense of “community building” within the EE. As one attendee noted:

*“20 years ago or so they [meet-up events] didn't seem to be the same level of kind of venues like the meetup community. But I still see people that I've known for 20 or 30 years sometimes at some of these events. So I think that the meetups are valuable in the sense of providing the opportunity to kind of engage and meet with people in a way that was perhaps not so obvious in the past.”*

More specifically for policy makers, meet-up events enable and facilitate the ability of entrepreneurs to undertake tacit knowledge sharing. As numerous studies have evidenced, entrepreneurs highlight why “face to face” interactions allow quicker access to local knowledge and opportunities which are crucial for alleviating informational asymmetries confronting nascent entrepreneurs. As two different participants explained:

*“I’m an entrepreneur, I’m looking for opportunities and the only way that I can get access to local data and information is through meeting and speaking to people, you know, face-to-face. You can’t get that through social media, through primary sources of data and market reports, articles, and so on and so forth.”*

*“I think the best thing is because I’m really interested in technology, science and technology, I really like the, you know, expand my knowledge. So my primary goal is just go see what people are doing, where technology is going.”*

Importantly, these connections enable entrepreneurs to undertake “vicarious learning” opportunities which is often crucially important for developing new ideas. This is vital because it helps to inculcate and instil a culture of experimentation within the entrepreneurial community, a critical facet for promoting a culture conducive to the creation of new ideas and *de novo* ventures. As one entrepreneur noted:

*“It’s really nice to just test an idea... someone trying something out and it might work, it might fail completely, but it’s a very safe environment just to try something new instead of, you know, starting your project that might cost you thousands”.*

Plus, fostering such a safe environment can also help overcome feelings of stress and alienation within prospective entrepreneurs:

*“The most intense resource or the resource that I was using it was probably my emotions... it’s quite draining to put yourself out there and have all those conversations and make sure that you are making progress. Maybe learning to be more self-confident and talk to people and representing myself and defending myself and engaging with colleagues and superiors became easier.”*

A final issue which was strongly detected within the local entrepreneurial community were also more practicable benefits from attending meet-up events. Indeed, quite a number of attendees were quite instrumental in their rationale for attending which often hinged on their desire to acquire “fresh talent”. This illustrates the fact that participants in meet-up events are not just comprised of budding entrepreneurs: many attendees are employed in various actors across the EE such as anchor firms. This is very important for the local Edinburgh ecosystem given the nature of the local labour market which is very tight, especially for skills software engineers and coding skills.

*“The market for software developers is quite difficult. So when you're a product manager you want to have a really good team of developers. Sometimes it's challenging because, you know, there's only that many developers on the market and companies fighting for them. So sometimes you can learn about some those developers, thinking about changing the company. So you just need to jump and try to innovate there.”*

We have illustrated with some of excerpts from these conversations that entrepreneurs find meet-up events a crucial mechanism for aiding their entrepreneurial endeavours. This clearly demonstrates the need for policy makers to help foster these conversations within their respective jurisdictions to help tacit knowledge sharing, peer-

based learning and opportunities for “vicarious learning”. This can be done by launching networking events, the provision of accommodation and connecting up different actors within their respective EEs. The attraction of these types of policy initiatives is their relative simplicity to enact and limited expenditure incurred.

However, by listening into these conversations policy makers are also able to better understand some of the potential “pinch points” within their respective EEs. This information can then be translated into smart policy interventions. To give a few brief illustrative examples, close relational integration with entrepreneurs within these conversational spaces enables policy makers to become aware of emergent growth bottlenecks such as skills gaps and skills shortages long before official evidence such as government surveys capture these trends. For example, if there is a skill shortage for certain types of computer software coding skills, policy makers can work with local universities to help build appropriate new course provision. Likewise, if there are discernible funding gaps for new ventures, policy maker may seek to better connect these entrepreneurial communities with sources of entrepreneurial finance such as business angels. This could be particularly salient for start-ups who often face the greatest problems securing finance due to their opaque nature and weak financial support networks (van Rijnsoever, 2020).

## **6. Conclusions and Implications**

### *6.1 Key Contribution*

Our study reveals that traditional measurement tools and approaches dominating the literature have, by and large, failed to yield satisfactory (or actionable) insights for policy makers in various EEs. We set out to rectify this omission by undertaking a novel form of

empirical analysis using a multi-method research approach and unique dataset. The key contribution of this paper is the novel methodological approach deployed which generated rich empirical insights into the social networks and connections within Edinburgh's ecosystem. By literally "capturing conversations" at different analytical levels (macro, meso and micro-levels) taking place within this ecosystem we are able to offer policy makers a novel new set of "relational metrics" with which to assess and measure the relational connectivity within their local EEs. In turn, this provides vital insights with which to help guide and inform policy. While this research does not address causal relationships it does provide strong suggestive evidence of the powerful role networks play in shaping (and re-shaping) the nature and structures of EEs. Importantly, it also provides indicative evidence of how certain institutional actors within EEs disproportionately contribute to the formation of networks and where weaknesses may occur within entrepreneurial networks.

### *6.1 Theoretical Implications*

Whilst this is a methodologically driven paper, our work also has clear theoretical implications. A common lament made by numerous scholars examining EEs is the lack of theoretical development around the concept. Despite this, social network theories have been heavily invoked recently by researchers examining the relational dynamics underpinning EEs (Motoyama and Knowlton, 2017; Spigel, 2017; Neumeyer et al, 2019). Entrepreneurship scholars have long recognised the crucial role and value that social networks and social capital have in stimulating the entrepreneurial process (Stuart and Sorenson, 2005; Kemeny et al, 2015), especially at times of uncertainty (Engel et al, 2017). A crucial, but sometimes overlooked, element underpinning social networks is the medium of conversational narratives. What this paper has sought to explicate is the crucial role

“face-to-face” “conversations” play as a catalyst, and in some cases a necessary pre-condition, for nurturing entrepreneurial activity within EEs.

Capturing conversations at different structural levels (macro, meso and micro levels) provides scholars with unique insights into the evolutionary nature of how ecosystems adapt, change and re-configure over time. New digital sources of data such as the novel Meetup data utilised within this paper enables scholars to further unpack the role of these conversations and conversational spaces within ecosystems. By mapping and recording conversations we can literally visualize and join the invisible dots together which bond different entrepreneurial actors together within EEs across time and space. While the analysis of “conversations” and “conversational spaces” was initially deployed to examine tacit knowledge sharing around innovation (Feldman and Lowe, 2008; Uyarra et al, 2017), this paper demonstrates the concept has equal applicability for exploring the locally embedded nature of entrepreneurship within EEs.

## *6.2 Practical Recommendations*

Throughout the paper we have drawn important messages for local policy makers from our approach, however we also wish to augment this with a wider set of more generic policy recommendations. This is crucial because research on EEs strongly suggests that where insufficient meetings and networking (either random or formal) take place so-called “network failures” occur (van Rijnsoever, 2020). Network failures are ubiquitous and persistent and often arise when a more or less idealised set of relational-network institutions fail to sustain desirable activities or to impede undesirable activities (Schrank and Whitford, 2011). Eradicating network failures and “promoting inter-actor relational connections” should be given a much stronger prominence within policy frameworks

(Brown and Mawson, 2019, p. 361), especially as this can help build community logic and ultimately in enhance resiliency within an ecosystem (Roundy et al, 2017).

Another central message from this study is the strong value in using unique datasets such as the one examined. The primary benefit of this data source is its pervasiveness and the fact that policy makers literally anywhere can access this dataset to examine the relational connectivity within their own EEs<sup>28</sup>. Importantly, this can enable policy makers to measure and monitor a series of “relational metrics” which captures networking levels within their EEs. It may be particularly beneficial to examine this kind of data in weaker EEs with low levels of network connectivity. It can also help policy makers identify network failures and then design initiatives accordingly to redress these problems. This may take the form of the provision of new incubators, co-working spaces or more prosaic initiatives to help increase networking within their local context. Another crucial benefit of this data source is its ability to probe temporal aspects within EEs and map how networks change and unfold over time. This can also help monitor the effectiveness of policy initiatives which are specifically designed to stimulate networking such as Melting Pot initiative in Edinburgh. In turn, this offers policy makers vital opportunities for “strategic policy intelligence” to help inform future public policy frameworks.

## References

Acs, Z. J., Autio, E., & Szerb, L. (2014). National systems of entrepreneurship: Measurement issues and policy implications. *Research Policy*, 43(3), 476-494.

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<sup>28</sup> Importantly, this can enable cross-city or cross- country comparisons.

Alvedalen, J., & Boschma, R. (2017). A critical review of entrepreneurial ecosystems research: Towards a future research agenda. *European Planning Studies*, 25(6), 887-903.

Audretsch, D. B., & Belitski, M. (2017). Entrepreneurial ecosystems in cities: establishing the framework conditions. *The Journal of Technology Transfer*, 42(5), 1030-1051.

Audretsch, D. B., Cunningham, J. A., Kuratko, D. F., Lehmann, E. E., & Menter, M. (2019). Entrepreneurial ecosystems: economic, technological, and societal impacts. *The Journal of Technology Transfer*, 44(2), 313-325.

Auerswald, P. E., & Dani, L. (2017). The adaptive life cycle of entrepreneurial ecosystems: the biotechnology cluster. *Small Business Economics*, 49(1), 97-117.

Autio, E., Kenney, M., Mustar, P., Siegel, D., & Wright, M. (2014). Entrepreneurial innovation: The importance of context. *Research Policy*, 43(7), 1097-1108.

Autio, E., Nambisan, S., Thomas, L. D., & Wright, M. (2018). Digital affordances, spatial affordances, and the genesis of entrepreneurial ecosystems. *Strategic Entrepreneurship Journal*, 12(1), 72-95.

Blondel, V. D., Guillaume, J. L., Lambiotte, R., & Lefebvre, E. (2008). Fast unfolding of communities in large networks. *Journal of statistical mechanics: theory and experiment*, 2008(10), P10008.

Borgatti, S. P., Everett, M. G., & Johnson, J. C. (2013). *Analyzing Social Networks* (1st ed.). London: Sage Publications Ltd.

Brown, R., & Mason, C. (2017). Looking inside the spiky bits: a critical review and conceptualisation of entrepreneurial ecosystems. *Small Business Economics*, 49(1), 11-30.



Brown, R., & Mawson, S. (2019). Entrepreneurial ecosystems and public policy in action: a critique of the latest industrial policy blockbuster. *Cambridge Journal of Regions, Economy and Society*, 12(3), 347-368.

Brown, R., Mawson, S., Lee, N., & Peterson, L. (2019). Start-up factories, transnational entrepreneurs and entrepreneurial ecosystems: unpacking the lure of start-up accelerator programmes. *European Planning Studies*, 27(5), 885-904.

Brundin, E. (2007) Catching it as it happens. In H. Neergaard & J. P. Ulhoi (Eds.), *Handbook of qualitative research methods in entrepreneurship* (pp. 279-307). Cheltenham, UK: Edward Elgar

Bruns, K., Bosma, N., Sanders, M., & Schramm, M. (2017). Searching for the existence of entrepreneurial ecosystems: a regional cross-section growth regression approach. *Small Business Economics*, 49(1), 31-54.

*Business Support and the Entrepreneurial Ecosystem*. (2017). Retrieved from [http://www.edinburgh.gov.uk/download/meetings/id/53183/item\\_92\\_-\\_business\\_support\\_and\\_entrepreneurial\\_ecosystem](http://www.edinburgh.gov.uk/download/meetings/id/53183/item_92_-_business_support_and_entrepreneurial_ecosystem)

Cavallo, A., Ghezzi, A., & Balocco, R. (2018). Entrepreneurial ecosystem research: present debates and future directions. *International Entrepreneurship and Management Journal*, 1-31.

Clayton, P., Donegan, M., Feldman, M., Forbes, A., Lowe, N., & Polly, A. (2019). Local Prior Employment and Ecosystem Dynamics. *ILR Review*, 0019793919836756.

Cohen, B. (2006). Sustainable valley entrepreneurial ecosystems. *Business Strategy and the Environment*, 15(1), 1-14.

- Cohen, S., Fehder, D. C., Hochberg, Y. V., & Murray, F. (2019). The design of startup accelerators. *Research Policy*, *48*(7), 1781-1797.
- Colombelli, A., Paolucci, E., & Ughetto, E. (2019). Hierarchical and relational governance and the life cycle of entrepreneurial ecosystems. *Small Business Economics*, *52*(2), 505-521.
- Engel, Y., Kaandorp, M., & Elfring, T. (2017). Toward a dynamic process model of entrepreneurial networking under uncertainty. *Journal of Business Venturing*, *32*(1), 35-51.
- Feld, B. (2012). *Startup communities: Building an entrepreneurial ecosystem in your city*. John Wiley & Sons.
- Feldman, M., & Zoller, T. D. (2012). Dealmakers in place: Social capital connections in regional entrepreneurial economies. *Regional Studies*, *46*(1), 23-37.
- Feldman, M., & Lowe, N. (2015). Triangulating regional economies: Realizing the promise of digital data. *Research Policy*, *44*(9), 1785-1793.
- Feldman, M., & Lowe, N. (2018). Policy and collective action in place. *Cambridge Journal of Regions, Economy and Society*, *11*(2), 335-351.
- Feldman, M., Siegel, D. S., & Wright, M. (2019). New developments in innovation and entrepreneurial ecosystems. *Industrial and Corporate Change*.
- Flanagan, K., Uyarra, E., & Laranja, M. (2011). Reconceptualising the 'policy mix' for innovation. *Research Policy*, *40*(5), 702-713.
- Garud, R., & Giuliani, A. P. (2013). A narrative perspective on entrepreneurial opportunities. *Academy of Management Review*, *38*(1), 157-160.

- Ghio, N., Guerini, M., & Rossi-Lamastra, C. (2019). The creation of high-tech ventures in entrepreneurial ecosystems: Exploring the interactions among university knowledge, cooperative banks, and individual attitudes. *Small Business Economics*, 52(2), 523-543.
- Heaton, S., Siegel, D. S., & Teece, D. J. (2019). Universities and innovation ecosystems: a dynamic capabilities perspective. *Industrial and Corporate Change*, 28(4), 921-939.
- Hechavarría, D. M., & Ingram, A. E. (2019). Entrepreneurial ecosystem conditions and gendered national-level entrepreneurial activity: a 14-year panel study of GEM. *Small Business Economics*, 53(2), 431-458.
- Hochberg, Y. V. (2016). Accelerating entrepreneurs and ecosystems: The seed accelerator model. *Innovation Policy and the Economy*, 16(1), 25-51.
- Johnson, D., Bock, A. J., & George, G. (2019). Entrepreneurial dynamism and the built environment in the evolution of university entrepreneurial ecosystems. *Industrial and Corporate Change*.
- Kemeny, T., Feldman, M., Ethridge, F., & Zoller, T. (2015). The economic value of local social networks. *Journal of Economic Geography*, 16(5), 1101-1122.
- Kuckertz, A. (2019). Let's take the entrepreneurial ecosystem metaphor seriously!. *Journal of Business Venturing Insights*, 11, e00124.
- Lester, R. K., & Piore, M. J. (2004). *Innovation—The missing dimension*. Harvard University Press.
- Levie, J., & Autio, E. (2013). Assessing regional innovative entrepreneurship ecosystems with the global entrepreneurship and development index: the case of Scotland. In *Global Entrepreneurship Monitor Research Conference*.

- Lowe, N., & Feldman, M. (2008). Constructing entrepreneurial advantage: Consensus building, technological uncertainty and emerging industries. *Cambridge Journal of Regions, Economy and Society*, 1(2), 265-284.
- Lowe, N. J., & Feldman, M. P. (2017). Institutional life within an entrepreneurial region. *Geography Compass*, 11(3), e12306.
- Lounsbury, M., & Glynn, M. A. (2001). Cultural entrepreneurship: Stories, legitimacy, and the acquisition of resources. *Strategic management journal*, 22(6-7), 545-564.
- Lundvall, B. Å., Johnson, B., Andersen, E. S., & Dalum, B. (2002). National systems of production, innovation and competence building. *Research policy*, 31(2), 213-231.
- Isenberg, D. (2011). The entrepreneurship ecosystem strategy as a new paradigm for economic policy: Principles for cultivating entrepreneurship. *Presentation at the Institute of International and European Affairs*, 1-13.
- Isenberg, D. (2014). What an entrepreneurship ecosystem actually is. *Harvard Business Review*, 5, 1-7.
- Isenberg, D. J. (2016). Applying the ecosystem metaphor to entrepreneurship: uses and abuses. *The Antitrust Bulletin*, 61(4), 564-573.
- Malecki, E. J. (2011). Connecting local entrepreneurial ecosystems to global innovation networks: open innovation, double networks and knowledge integration. *International Journal of Entrepreneurship and Innovation Management*, 14(1), 36-59.
- Mason, C., & Brown, R. (2014). Entrepreneurial ecosystems and growth oriented entrepreneurship. *Final Report to OECD, Paris*, 30(1), 77-102.

Miles, M. P., & Morrison, M. (2018). An effectual leadership perspective for developing rural entrepreneurial ecosystems. *Small Business Economics*, 1-17.

Miller, D. & Acs, Z. (2017). The Campus as Entrepreneurial Ecosystem: The University of Chicago. *Small Business Economics* 49 (1), 75–95.

Molina-Azorín, J. F., López-Gamero, M. D., Pereira-Moliner, J., & Pertusa-Ortega, E. M. (2012). Mixed methods studies in entrepreneurship research: Applications and contributions. *Entrepreneurship & Regional Development*, 24(5-6), 425-456.

Motoyama, Y., & Knowlton, K. (2017). Examining the connections within the startup ecosystem: A case study of St. Louis. *Entrepreneurship Research Journal*, 7(1).

Motoyama, Y., Goetz, S., & Han, Y. (2018). Where do entrepreneurs get information? An analysis of twitter-following patterns. *Journal of Small Business & Entrepreneurship*, 30(3), 253-274.

Napier, G., & Hansen, C. (2011). Ecosystems for young scalable firms. *FORA Group*.

Neck, H. M., Meyer, G. D., Cohen, B., & Corbett, A. C. (2004). An entrepreneurial system view of new venture creation. *Journal of Small Business Management*, 42(2), 190-208.

Neumeyer, X., Santos, S. C., Caetano, A., & Kalbfleisch, P. (2019). Entrepreneurship ecosystems and women entrepreneurs: A social capital and network approach. *Small Business Economics*, 53(2), 475-489.

Nylund, P. A., & Cohen, B. (2017). Collision density: driving growth in urban entrepreneurial ecosystems. *International entrepreneurship and management Journal*, 13(3), 757-776.

- Oh, D. S., Phillips, F., Park, S., & Lee, E. (2016). Innovation ecosystems: A critical examination. *Technovation, 54*, 1-6.
- Parker, A., Halgin, D. S., & Borgatti, S. P. (2016). Dynamics of social capital: Effects of performance feedback on network change. *Organization Studies, 37*(3), 375-397.
- Payne, G. T., Moore, C. B., Griffis, S. E., & Autry, C. W. (2011). Multilevel challenges and opportunities in social capital research. *Journal of Management, 37*(2), 491-520.
- Pittz, T. G., White, R., & Zoller, T. (2019). Entrepreneurial ecosystems and social network centrality: the power of regional dealmakers. *Small Business Economics, 1-14*.
- Rice, M. P. (2002). Co-production of business assistance in business incubators: an exploratory study. *Journal of business venturing, 17*(2), 163-187.
- Roundy, P. T. (2016). Start-up Community Narratives: The Discursive Construction of Entrepreneurial Ecosystems. *The Journal of Entrepreneurship, 25*(2), 232–248.
- Roundy, P. T., Brockman, B. K., & Bradshaw, M. (2017). The resilience of entrepreneurial ecosystems. *Journal of Business Venturing Insights, 8*, 99-104.
- Schäfer, S., & Henn, S. (2018). The evolution of entrepreneurial ecosystems and the critical role of migrants. A Phase-Model based on a Study of IT startups in the Greater Tel Aviv Area. *Cambridge Journal of Regions, Economy and Society, 11*(2), 317-333.
- Schrank, A., & Whitford, J. (2011). The anatomy of network failure. *Sociological Theory, 29*(3), 151-177.

Scottish Government (2018) Scotland's Entrepreneurial Ecosystem Guide, Scottish Government, Edinburgh. <http://cando.scot/wp-content/uploads/2019/02/V3-Scottish-Entrepreneurial-Ecosystem-Guide-Feb-2019.pdf>

Sheppard, E. (2016) Seat of Enlightenment: How Edinburgh became startup city of the year, The Guardian, 20/12/16. <https://www.theguardian.com/small-business-network/2016/dec/20/startup-edinburgh-city-entrepreneur>

Shepherd, D. A. & Andrew Zacharakis, A. (2001). Speed to Initial Public Offering of VC-Backed Companies. *Entrepreneurship Theory and Practice* 25 (3), 59–70.

Shepherd, D. A. (2015). Party On! A call for entrepreneurship research that is more interactive, activity based, cognitively hot, compassionate, and prosocial. *Journal of Business Venturing*, 30(4), 489–507.

Simmons, S. A., Wiklund, J., Levie, J., Bradley, S. W., & Sunny, S. A. (2019). Gender gaps and re-entry into entrepreneurial ecosystems after business failure. *Small Business Economics*, 53(2), 517-531.

Spigel, B. (2016). Developing and governing entrepreneurial ecosystems: the structure of entrepreneurial support programs in Edinburgh, Scotland. *International Journal of Innovation and Regional Development*, 7(2), 141-160.

Spigel, B. (2017). The relational organization of entrepreneurial ecosystems. *Entrepreneurship Theory and Practice*, 41(1), 49-72.

Spigel, B., & Harrison, R. (2018). Toward a process theory of entrepreneurial ecosystems. *Strategic Entrepreneurship Journal*, 12(1), 151-168.

- Stam, E. (2015). Entrepreneurial ecosystems and regional policy: a sympathetic critique. *European Planning Studies*, 23(9), 1759-1769.
- Stam E. (2018) Measuring Entrepreneurial Ecosystems. In: O'Connor A., Stam E., Sussan F., Audretsch D. (eds) Entrepreneurial Ecosystems. International Studies in Entrepreneurship, vol 38. Springer, Cham
- Stangler, D., & Bell-Masterson, J. (2015). Measuring an entrepreneurial ecosystem. *Kauffman foundation research series on city, metro, and regional entrepreneurship*, 16.
- Storper, M., & Venables, A. J. (2004). Buzz: face-to-face contact and the urban economy. *Journal of Economic Geography*, 4(4), 351-370.
- Stuart, T. E., & Sorenson, O. (2005). Social networks and entrepreneurship. In *Handbook of entrepreneurship research* (pp. 233-252). Springer, Boston, MA.
- Szerb, L., Lafuente, E., Horváth, K., & Páger, B. (2019). The relevance of quantity and quality entrepreneurship for regional performance: The moderating role of the entrepreneurial ecosystem. *Regional Studies*, 53(9), 1308-1320.
- Thompson, T. A., Purdy, J. M., & Ventresca, M. J. (2018). How entrepreneurial ecosystems take form: Evidence from social impact initiatives in Seattle. *Strategic Entrepreneurship Journal*, 12(1), 96–116.
- Uyarra, E., Flanagan, K., Magro, E., & Zabala-Iturriagaitia, J. M. (2017). Anchoring the innovation impacts of public procurement to place: The role of conversations. *Environment and Planning C: Politics and Space*, 35(5), 828-848.
- van Rijnsoever, F. J. (2020). Meeting, mating, and intermediating: How incubators can overcome weak network problems in entrepreneurial ecosystems. *Research Policy*, 49(1), 103884.



van Weele, M., van Rijnsoever, F. J., Eveleens, C. P., Steinz, H., van Stijn, N., & Groen, M. (2018). Start-EU-up! Lessons from international incubation practices to address the challenges faced by Western European start-ups. *The Journal of Technology Transfer*, 43(5), 1161-1189.

Vedula, S., & Kim, P. H. (2019). Gimme shelter or fade away: the impact of regional entrepreneurial ecosystem quality on venture survival. *Industrial and Corporate Change*, 28(4), 827-854.

Wright, M., Siegel, D. S., & Mustar, P. (2017). An emerging ecosystem for student start-ups. *The Journal of Technology Transfer*, 42(4), 909-922.



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