

## **Unpacking the Nature of Orchestration Coherence in Entrepreneurial Ecosystems**

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# UNPACKING THE NATURE OF ORCHESTRATION COHERENCE IN ENTREPRENEURIAL ECOSYSTEMS

## 1. INTRODUCTION

Over the last decade, Entrepreneurial Ecosystems (EE) became the dominant analytical approach when it comes to assessing entrepreneurship from a contextual perspective (Lai & Vonortas, 2019; Audretsch & Belitski, 2017; Alvedalen & Boschma, 2017; Stam & Spigel, 2018; Fischer & Nijkamp, 2018). This rationale has gained traction as researchers and policymakers increasingly recognized entrepreneurship as a systemic phenomenon (Cao & Shi, 2021; Malerba & McKelvey, 2020). In turn, conceptual tools that allowed closer inspections on networks oriented towards the promotion of entrepreneurship, as well as the inclusion of myriad agents and institutions involved in these processes, became pivotal in these debates (Stam, 2009; Isaksen & Trippel, 2017; Fischer & Nijkamp, 2018).

Influential literature on the configurations of entrepreneurial ecosystems (EE) has underscored Networks as a ‘Systemic Condition’ – alongside Leadership, Finance, Talent, Knowledge and Support Services (Stam, 2015). More recently, Stam and van de Ven (2021) adjusted this model and identified Networks as ‘Institutional Arrangements’ that enable knowledge flows. In the latter case, Networks are at the same level as Culture and Formal Institutions. While these models have proved to be useful to guide the empirics of EE, they are somewhat in conflict with the notion that entrepreneurial ecosystems *are networks*. If we take Mason and Brown’s (2014, p. 5) definition of what an EE is, this is purposefully stressed: “a set of *interconnected* entrepreneurial actors, entrepreneurial organizations, institutions and entrepreneurial processes which formally and informally *coalesce to connect, mediate and govern* the performance within the local entrepreneurial environment” (our emphasis).

This goes beyond semantic concerns. If we take Networks as yet another dimension of interest, it can be assumed that an ecosystem relies on it as much as it does on other features. But this is not the case: without intense connections (or networks), EE simply cannot exist as such. By not incorporating this idea properly, scholars have often taken the concentration of start-up activity as a marker for EE, thus looking at the outcome as an indication of EE formative processes. In fact, Networks are often taken for granted and remain largely undertheorized in EE literature (Alvedalen & Boschma, 2017). As a result, a substantial gap remains in terms of understanding the dynamics and governance systems<sup>i</sup> operating within the scope of these networks of individuals and organizations (Knox & Arshed, 2022).

Recent studies have started addressing this gap by recognizing that entrepreneurial support organizations that have their own network of relationships can integrate efforts to implement different actions to develop EE’s and pursue opportunities. These studies offer valuable insights on the actions that these network orchestrators (Knox & Arshed, 2022), or EE leaders (Harper-Anderson, 2018; Miles & Morrison, 2020; Roundy & Burke-Smalley, 2022) can take and shed light on the fact that networks matter. Yet, they do not provide a refined view on what such integration is, other than presenting it as an effort between multiple organizations to share information and collaborate in decision making.

This “bird’s eye view” on the nature of such interaction has three main conceptual drawbacks: (i) it overlooks that entrepreneurial ecosystems are not cohesive wholes, but rather ‘nested’ structures that follow independent trajectories (Spigel, 2022) and can, thus, be fragmented (Scheidgen, 2020); (ii) it does not tell much about what the integration between these orchestrators is really made of; and (iii) it sheds limited light on extend to which the nature of such integration can influence EE outcomes. As a result, while we know that such integration might be beneficial to bind networks together and promote positive EE outcomes, its boundaries, implications, and ways to promote it are still unclear.

Against this background, in this article, we take up the challenge of theorizing what the integration between these orchestrators actually is and explore its implications for the ecosystem, trying to answer the following research question: *How do orchestrators in EEs integrate efforts and steer their networks to promote enhanced outcomes in the ecosystem?* To do so, we built on the notion of ‘ecosystem coherence’ (shared goals, rules, logics and values) as a foundational driver of network structuration in ecosystems (Roundy et al., 2018; Roundy, 2022) and conducted an in-depth case study on a scale-up AgTech entrepreneurial ecosystem in Brazil. The sectoral focus was a methodological choice that allowed an inspection of a relatively homogeneous ecosystem in terms of market and technological orientation. Our main analytical focus resided on the relationship between network orchestrators in EEs (that is, EE leaders). We followed the Gioia method to inductively analyze data from interviews, official documents, and events taking place in the ecosystem.

After this introductory section, the remaining of this article is structured as follows. In Section 2 we develop our literature review connecting the concepts of Entrepreneurial Ecosystems, Orchestration of Entrepreneurial Networks and the issue of Coherence as a feature that affects coalescence among actors embedded in EE. Section 3 presents the Methodological Procedures involved in our empirical appraisal. Section 4 brings our main findings and theorizations from the case study. Section 5 concludes with final remarks, limitations, and avenues for future research.

## **2. ENTREPRENEURIAL ECOSYSTEMS**

Innovation-oriented entrepreneurs play a critical role in knowledge creation, diffusion and application within economic systems (Malerba & McKelvey, 2020). By doing so, these individuals use the resources available to come up with new technologies, products, services and business models, thus altering existing patterns of value creation. But literature has increasingly recognized that entrepreneurs are not isolated agents. Instead, they actively pursue complementary resources from myriad agents, as well as are embedded in institutional frameworks that set the rules and incentives for their undertakings (Hervás-Oliver et al., 2021). Accordingly, a shift in the analytical focus – from the entrepreneur to her context – has been observed in scholarly work, managerial practice, and policymaking processes (Stam & van de Ven, 2021; Mason & Brown, 2014; Ács et al., 2017).

Central to this approach is the notion of entrepreneurial ecosystems. Drawing from prior literature on Industrial Districts, Clusters, Innovative Milieus and Regional Systems of Innovation, EE takes a biomimetic stance to embed the entrepreneur in a complex framework of linkages and connections that aim at fostering knowledge-intensive new firms within spatially concentrated settings (Cao & Shi, 2020; Adler et al., 2019; Isenberg, 2010). In this vein, entrepreneurial ecosystems are intrinsically shaped by linkages between individuals, firms (both nascent and incumbent), government, universities, research institutes and investors (Tsouri & Pegoretti, 2021; Stam & van de Ven, 2021; Walsh, 2019; Clarysse et al., 2014). Also, competition plays an important role in establishing constructive environments for startups (Carayannis & Campbell, 2009). Hence, diverse interactions become the main formative process of entrepreneurial ecosystems (Cao & Shi, 2021; Lai & Vonortas, 2019; Stam, 2015; Fischer et al., 2018; Autio et al., 2018; Alvedalen & Boschma, 2017; Carayannis et al., 2016).

Incidentally, the EE rationale suggests that entrepreneurial capabilities go well beyond the boundaries of the firm. Instead, these capabilities emerge from networks, spillovers, asset flows, support structures and policy initiatives targeted at strengthening system-level competitiveness. This happens through the creation of environments conducive to open innovation and value co-creation (Fotopoulos, 2022; Audretsch et al., 2019; Nambisan et al., 2018; Cunningham et al., 2018; Ács et al., 2009). These entrepreneurial contexts are reliant not only on the availability of key dimensions, but also on how they establish networks and nurture synergies between them. Thus, a further comprehension of governance conditions taking place in EE represents a pivotal subject to be explored in this domain. We now dig deeper into two governance-related aspects by addressing the topics of orchestration in EE.

## *2.1 ORCHESTRATION IN ENTREPRENEURIAL ECOSYSTEMS: THE NEXUS BETWEEN NETWORKS AND LEADERSHIP:*

Even though literature highlights the key role played by interactions within the conceptual framework of entrepreneurial ecosystems, governance schemes of such linkages remain relatively uncharted (Colombelli et al., 2019). In fact, influential conceptual models on EE configurations (e.g. Stam & van de Ven, 2021; Stam, 2015) set apart the dimensions of Networks and Leadership, thus creating a split between linkages and their intrinsic forms of governance. In any case, the dominant discourse criticizes top-down initiatives as triggers for EE, sustaining that these are inherently organic structures that cannot be ‘engineered’ (Bresnahan et al, 2001; Chatterji et al, 2013; Stam et al., 2016). Nonetheless, this does not mean that the structure of relationships and collaborations cannot be channeled by the agency of public and private actors. In this respect, networks that compose EEs (Aarika-Stenroos & Ritala, 2017) might benefit from ‘orchestrators’ that steer entrepreneurial agents without any sort of formal hierarchy (Dhanaraj & Parkhe, 2006).

To nurture and guide these networks, orchestrators are responsible for connecting the dispersed assets, resources and capabilities of the members embedded in the network (Dhanaraj & Parkhe, 2006; Giudici et al., 2018; Paquin & Howard-Grenville, 2013). In EEs, they do so by offering support to entrepreneurial firms and setting up (formal and/or informal) governance structures (Daymond et al., 2022; Giudici et al., 2018; Tabas et al., 2023). While the orchestrating role is often associated with large corporations, universities (Clarysse et al., 2014; Engle, 2015) and governmental agencies (Daymond et al., 2022; Giudici et al., 2018) might also play the role of startup networks’ orchestrators by establishing socioeconomic targets and promoting events that facilitate the formation of linkages. Also, accelerators and venture capitalists might trigger cooperation among startups with complementary business models (Dutt, Hawn, Vidal, Chatterji, McGahan & Mitchell, 2016; Hurmelinna-Laukkanen & Nätti, 2018).

Closely related to the concept of orchestrators, is the notion of EE leaders – actors that engage in specific actions aimed at developing the EE and its functioning (Miles & Morrison, 2020). These actors go beyond strategies that benefit themselves and the ventures they work with and engage in initiatives to promote ecosystem-level outcomes (Roundy & Lyons, 2023). This involves feeding EE needs into national agendas, connecting local EE’s to international ones (Knox & Arshed, 2021), campaigning for tax reliefs (Miles & Morisson, 2020), creating EE oriented events (Harper-Anderson, 2018), or selecting and attracting new EE members (Roundy & Burke-Smalley, 2022). Such actions can promote the development of EEs, through the creation of new ventures, attraction of companies, generation of income and local jobs (Miles & Morisson, 2020; Roundy, 2019; Roundy, 2021), increase in resource availability, and support for entrepreneurs (Knox & Arshed, 2021).

While such actions can be performed by a single organization, in consonance with what we see in complex innovation networks (Aarikka-Stenroos et al.,2017; Gray, 2008; Klerkx & Aarts, 2013; Ritala, Hurmelinna-Laukkanen, Nätti, 2012), the literature on EE leadership claims that these actors (or orchestrators) can perform such actions collaboratively. Roundy (2020b) offers the notion of EE behavioral integration to represent the degree to which orchestrators “engage in collective interactions based on collaboration, information sharing, and joint-decision making”. In another theoretical effort, Roundy & Burke-Smalley (2022) propose these actors could even form a meta-organization” to coordinate their efforts and facilitate interactions. This aspect remains, however, largely undertheorized in the literature (Roundy & Lyons, 2023) and little is known about how these networks of orchestrators function.

Yet, if we consider that EE governance and orchestration structures requires a balance between generating diversity while maintaining harmony between agents, as this is a requisite to spur entrepreneurial synergies (Sepulveda-Calderon et al., 2022), then it is vital that orchestrators have common orientations and goals and set up a culture based on shared norms, beliefs, and goals (Roundy, 2020; Roundy et al., 2018; Stephan & Uhlaner, 2010). In other words, generating

‘coherence’ among orchestrators is essential as a platform for sharing knowledge. Next, we turn our attention to the concept of coherence.

## 2.2 COHERENCE: WHAT LIES BENEATH NETWORKS AND ORCHESTRATION IN ENTREPRENEURIAL ECOSYSTEMS?

Entrepreneurial ecosystems comprehend a community of multiple coevolving stakeholders, with their own goals and logic. For the ecosystem to thrive, these agents need to join forces to promote better returns for the entrepreneurial environment (Mason & Brown, 2014). However, linkages *per se* do not generate symbiotic relationships that can engender vivacious EE. Although not explicitly, these perspectives resemble the notions of proximity in Evolutionary Economic Geography. This strand of literature defies the notion of traditional economic geography approaches, whereas it argues that geographical proximity *per se* cannot establish interorganizational relationships and interactions (Boschma, 2005). In this case, geography functions as a facilitator for other types of proximity (Broekel, 2015; Caragliu & Nijkamp, 2016; Nilsson & Mattes, 2015), such as cognitive, institutional, organizational, and social (Boschma, 2005; Sternberg, 2007). Combined (although variegated configurations are possible), these sources of proximity can enable the emergence of functional networks.

Hence, in order to strengthen aggregate capabilities in ecosystems, geographical proximity must be matched by other elements (cognitive, institutional, organizational and social) that promote alignment (Knox & Arshed, 2022). Roundy (2020) refers to this as *coherence*, a driving force of shared knowledge in EE. In an earlier paper, Roundy and colleagues (2017, p. 101) defined such coherence as “the degree of association between the components of an EE, which causes them to coalesce into an interconnected group (i.e., the ecosystem)”. In turn, such associations can derive from actors’ shared needs, values, beliefs, and interests (Roundy et al., 2018).

While coherence is an ecosystem level construct, we believe that there is a mirroring effect that would suggest a correspondence between the coherence at the ecosystem level and at the networks of orchestrators. Orchestrators play a central role in promoting coherence, by exposing stakeholders’ to common logics and disseminating values and conventions that guide ecosystem participants (Roundy et al., 2017). Yet, such insights fall short in providing a thorough examination of coherence, often failing to address the full complexity of elements that enable proximity among agents in the ecosystem. We now dedicate attention to these issues.

### 2.2.1 Coherence as a social construct

Coherence in EE includes sociological alignments that need to take place as actors decide on how to cooperate and who participate to cocreate value (Neumeyer et al., 2019). According to Cao and Autio (2019), the presence of a shared community identity and culture that stimulates knowledge sharing, the use of means to promote the identification of EE actors and their socialization, and the valorization of collective gains can promote a community logic that fosters coherence. A key challenge then is one of promoting synergies in an articulated fashion, i.e., it seems paramount to have a governance system capable of balancing the needs and motivations of these different stakeholders (Autio and Levie, 2017; Colombo et al., 2017). Yet, it can hardly be expected that entire ecosystems operate as ‘cohesive wholes’ when it comes to their intrinsic social structure. For instance, Neumeyer and Santos (2018) found the manifestation of multiple, non-overlapping social clusters in the entrepreneurial ecosystems of Chicago and Orlando, demonstrating the existence of rather fragmented communities within the same ecosystem. On the other hand, these communities presented high levels of social coherence in their respective dynamics of relationships.

This social side to coherence has been identified as a pivotal lever for EE growth potential, enhancing access to resources, strengthening relationships, and promoting a sense of complementarity among agents embedded in the ecosystem (Guéneau et al., 2023; 2022; Theodoraki et al., 2018; Hjalager and Kwiatkowski, 2018; Mack and Mayer, 2016). Even before the use of the

entrepreneurial ecosystem concept, Saxenian (1994) has highlighted how dense social networks can have profound effects on economic development in regions. More recently, Feld (2012) made a similar claim drawing from his experience in Boulder, Colorado.

However, we understand that this offers only a partial take on the nature of coherence in entrepreneurial ecosystems. From the concepts outlined above, we see elements that cover both social and institutional sources of proximity embedded within the place/region (geographical proximity). Indeed, it is well documented that Institutional proximity creates a sense of harmony about how agents perceive the underlying conditions of network operations, i.e., the norms and values that apply to relationships (Caragliu & Nijkamp, 2016), both of formal and informal natures (Sternberg, 2007). Also, social proximity can function as a critical trigger for the emergence of open innovation networks (Leckel et al., 2022), although lock-in effects may arise (Huggins & Johnston, 2010). But these components of the coherence construct do not tell us much about cognitive and organizational sources of proximity.

### **2.2.2 Coherence as a phenomenon attached to knowledge and related diversification**

Spigel (2022) offers a rich analysis by assessing whether entrepreneurial ecosystems function as coherent wholes across diverse sectors or if they are composed of sub-ecosystems comprising different economic activities. Through an evaluation of the case of Fintechs in the United Kingdom, he finds substantial evidence pointing towards ‘nested’ EEs, that is, segmented ecosystems taking place within the same geographical area. In this respect, an important driver of coherence – beyond the sole social focus – can be associated with the focus of economic activities taking place in the ecosystem, i.e., elements attached to cognitive and organizational proximities. These two aspects cover the extent to which firms diversify coherently in relation to one another in terms of joint operations (Teece et al., 1994). Together they highlight the criticality of common knowledge bases and coordination mechanisms to foster effective regional innovation networks (Qian, 2018; Huggins & Thompson, 2013; Molina-Morales et al., 2014), and the underlying governance mechanisms on which networks are built upon (Sternberg, 2007; Boschma, 2005).

Literature has increasingly recognized potential conflicts associated with agglomeration economies arising from entrepreneurial diversity or specialization (O’Connor & Audretsch, 2022). While diverse sectoral profiles are attached to access to broader networks (Ortega-Argilés, 2022; Fritsch & Kublina, 2018), cities and regions still tend to evolve along trajectories close to the set preexisting capabilities (Pinheiro et al., 2022). Accordingly, although entrepreneurial capabilities have a lot to gain from knowledge variety, the existing dynamics are essentially associated to *related* variety (Auerswald & Dani, 2021; Boschma et al., 2022; Boschma, 2021; Henry et al., 2021; Fritsch & Kublina, 2018). Following these reasonings, EE can likely benefit from achieving common targets that look not only to short-term gains related to static capabilities in agents, but also to long-term evolution based on acquiring and developing dynamic capabilities (Sepulveda-Calderon et al., 2022). In other words, some level of overlap in economic activities seems to be essential for agents to engage in the knowledge-sharing networks mentioned by Roundy (2020) – although without devoting attention to the specific matters of economic specialization. In this respect, cognitive and organizational elements are likely moderators of knowledge creation and knowledge flows that lead up to network formation – and their level of coherence – within the dynamics of EE.

Informed with these two perspectives on EE coherence and assuming it as an interesting perspective further explore the way orchestrators in EEs integrate efforts and steer their networks to promote enhanced outcomes in the ecosystem, we conducted an in-depth case study of a scale-up AgTech entrepreneurial ecosystem in Brazil, as described next.

## **3. METHOD**

To answer our research question and move forward in our theoretical comprehension of linkages and networks in entrepreneurial ecosystems, we conducted a single case study on an

entrepreneurial ecosystem comprising the city of Piracicaba, Brazil. This location demonstrates strong specialization in the development of innovation and entrepreneurial activity related to agricultural technologies, thus allowing a straightforward inspection on the dynamics playing out in terms of social and sectoral/technological levels of coherence. This EE received the name of AgTech Valley, in an allusion to the Californian Silicon Valley. In this section, we first introduce the research setting and justify the selection of the case. Then we present the data collection and analysis procedures.

### *3.1 RESEARCH SETTING: THE AGTECH VALLEY*

Brazil occupies a leading position in agricultural production, being a lead producer and exporter of soybeans, rice, cotton, to mention a few. The country's expertise in the sector derives from the availability of natural resources, presence of established supply chains, multiple universities, and research institutes, as well as dedicated research policies (Pavão, Jesus & Martins, 2015). This context combined with the need to improve productivity in the sector created fruitful conditions for the emergence of Agtechs, new technological ventures that use technology to enhance efficiency in agricultural production. In 2019, about 6% of all new technological new ventures in Brazil were Agtech (Dias et al., 2019). Brazil also counts with 14 EEs specialized in the agricultural sector, with the AgTech Valley being considered one of the most representative in terms of maturity and concentration of new ventures (Dias et al., 2022).

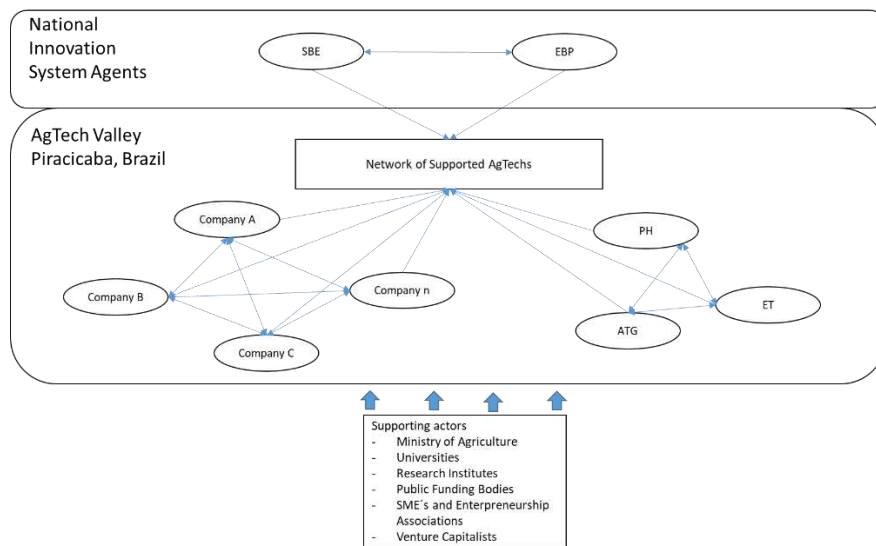
Piracicaba is home to ESALQ, the leading research-oriented Higher Education Institution in the country dedicated to Agriculture, and an important productive hub of sugar cane. Large agro-industrial corporations have long established operations in the city. The AgTech Valley emerged in 2016, when a business executive founded ATG, an innovation hub, and gathered forces with two directors of ET, the incubator of ESALQ, to promote entrepreneurial activity in the region (Almeida, 2022). This initiative gave force to Piracicaba's technological park (founded in 2012), providing office space, tax incentives, training, lab services to the companies operating there. In 2017, PH, the innovation hub resulting from a joint venture between Royal Dutch Shell and a national Brazilian sugar cane producer started operating in the EE.

The EE then quickly attracted different players. Large corporations either established relationships with actors located there or opened office positions in innovation hubs. Venture capital funds not physically located in the city assumed an essential funding role in the region. National agencies, and entrepreneurship and small business associations created programs and funding opportunities that benefited the region. For instance, the National SME's Support Agency (SBE), and the Brazilian Agency of Industrial Development (BAID) have specific programs that reach the Valley's startups. The Brazilian Research Institute for Agriculture (EBP) also supports the AgTechs with meetup initiatives and technical services provision. Finally, the National Association of Research and Development of Innovative Companies (NARDIC), the National Association of Incubators and Accelerators (NAIA), and the National Association of Innovation and Technology Transfer (NAITT) and the Secretary for Open Innovation of the Ministry of Agriculture (MAOIS) monitor initiatives of the EE to understand trends and identify eventual needs they might address.

### *3.2 CASE SELECTION AND UNIT OF ANALYSIS*

AgTech Valley is a valid laboratory to investigate our research questions for two reasons. First, the AgTech Valley is known for being a cohesive community specialized in fomenting AgTechs, capable of promoting connections, supporting new ventures, and attracting external investments (Almeida, 2022). ET, PH and ATG and large corporations with a specific interest in the EE all mentor, accelerate, or incubate a pool of AgTechs, promote connections, and attract investments to stimulate entrepreneurial activity. EBP and SBE, in their turn, also created acceleration programs dedicated to AgTechs that benefit new ventures from the region. Over the years, these actors

assumed a leadership role in the EE, steering their networks to promote entrepreneurial activity of AgTechs without using hierarchical control (c.f. Dhanaraj & Parke, 2006). As such, they can be considered orchestrators of their networks. These actors do not operate in isolation but keep connections between them. Therefore, this case is representative of our phenomenon of interest, allowing an in-depth assessment of this network of orchestrators, its potential coherence, and the outcomes for the ecosystem and the organizations operating in it. Figure 1 represents the orchestrators and the structure of relationships between them in the AgTech Valley, which was our unit of analysis.



**Figure 1.** Structure of orchestrators relationships in the AgTech Valley

### 3.3 DATA COLLECTION

We obtained data from interviews with orchestrators, AgTechs, and supporting actors, available online documents, and participated in two events of the EE. After reading internet articles about the AgTech Valley, we identified PH and ATG as relevant orchestrators in the ecosystem and contacted them through LinkedIn. In these two initial interviews, we initiated a snowball process to identify the other actors in the EE that could be considered as orchestrators. To do so, at each interview, we asked who the actors steering a network of startups were and stopped the interviews when no new names appeared. This effort led us to identify the 11 orchestrators that we managed to interview. The snowball process also indicated other five actors involved in the ecosystem that we should interview because of their involvement in events and activities happening at the ecosystem. We contacted them through LinkedIn but one showed no interest in participating. We also asked orchestrators to indicate AgTechs in different development stages (c.f. Baraldi et al., 2018) and interviewed nine of them. Table 1 provides a list of the interviews conducted.

For the interviews, we created a research protocol based on our research question and the theoretical concepts supporting it (Gioia et al., 2013). See Appendix A. This research protocol was used in all interviews, with adaptations in the wording depending on the interviewee. To minimize the risk of guiding interviewees towards our research interests, we did not directly pose questions related to coherence, orchestration, or ecosystems outcomes, as recommended by Gioia et al. (2013). Rather, we asked interviewees about 1) who they saw as leaders in the EE, 2) on the extent to which they worked together, how they coordinated efforts, if there were shared knowledge bases, responsibilities, interests, and goals, if collective actions in the EE, and 3) on the benefits and downsides they saw associated with such modes of interaction, since these topics would enable us to understand our phenomenon of interest.



**Table 1** – Summary of interview data

Role	Name	Organization	Interviewee	Duration
Supporting Actor	BAID	Brazilian Association for Industrial Development	Innovation Analyst	54 min
	MAOIS	Ministry of Agriculture, Livestock and Supply	General Coordinator of Open Innovation	56min
	NAIA	National Association of Incubators and Accelerators	Corporate Director	1h28min
	NAITT	National Association of Innovation and Technology Transfer	Director	1h15min
Orchestrator	EBP	Brazilian Research Institute	R&D manager 1	1h07min
		Brazilian Research Institute	R&D manager 2	1h11min
	SBE	National SME's Support Agency	Commercial Manager	1h20min
	PH	Innovation Hub	Innovation Manager	1h01min
	ATG	Innovation Hub	Co-founder	1h20min
	ET	Incubator	Executive Manager	1h11min
	Company A	Seeds & Crop protection	Project Scoping Manager	1h27min
	Company B	Fertilizers	Innovation Scouter	50 min
	Company C	Farming Machinery	Business Development Manager	42min
	Company D	Financial Solutions for Producers	Innovation Hunter	52min
	Company E	Irrigation Solutions	Executive Assistant	34min
	Company F	Fuels for Agriculture	Project Manager	59min
AgTechs	JBio Solutions	Early-stage venture	Founder	35 min
	KRN	Early-stage venture	Co-founder	49 min
	NatPlant	Early-stage venture	Founder	34 min
	Ktech	Consolidated venture	Co-founder	59 min
	Trace	Consolidated venture	Co-founder	54 min
	AMT	Consolidated venture	Managing Director	64 min
	Solin	Stabilized venture	Chief Financial Officer	50 min
	DSL	Stabilized venture	Co-founder	38 min
	TRN	Stabilized venture	Marketing Director	61 min

The following measures were adopted to assure the consistency of our data collection (c.f. Yin, 2009). We used an interview protocol to guarantee the consistency in the data collected. These interviews were recorded and transcribed to increase construct validity. We also triangulated the data collected from interviewees from diverse backgrounds (orchestrators, supporting actors, and Agtechs) to capture different perspectives and identify inconsistencies. Many orchestrators also mentioned conducting events and programs, so we searched for additional information about them online, and participated in two events, taking notes of relevant aspects. Finally, to increase the validity of our findings, we discussed our preliminary findings with a researcher specialized in Brazilian entrepreneurial AgTech ecosystems.

### 3.4 DATA ANALYSIS

We started our data analysis in an inductive manner, following the Gioia methodology (Gioia et al., 2013) by coding pieces of text that could represent coherence between orchestrators or the lack of it. During this effort, we also identified pieces of text representing the benefits and downsides observed by the interviewees. After this effort, we named these codes according to what they

represented and then combined concepts and eliminated duplicated ideas. This effort led to the identification of 33 first-order categories. To increase the internal validity of our findings (Yin, 2009), we cross-checked the data structure. The second and third authors reviewed the quotations allocated in the first-order categories that the first author categorized. We then discussed the results to create a mutual understanding of our outcomes and identified seven second-order categories.

During our discussions, we could see the notions of organizational, cognitive, social, and institutional proximity (Boschma, 2005) reflected in the first-order categories. According to this reference, cognitive proximity refers to the extent to which actors share similar knowledge bases and, thus, are capable of sharing information, while organizational proximity involves the capacity to coordinate the exchange of these complementary knowledge bases. Social proximity, in its turn, captures if relationships between actors are based on trust, friendship, and kindness, while institutional proximity represents if actors are guided by common habits, cultural norms, values, and beliefs. As Boschma (2005) states, the former two are intrinsically related, as are the two last. As such, we grouped them further in two main concepts relevant to answer our research question "Capabilities coherence" to represent the fact that actors have coherence between knowledge bases and routines and "Relationship coherence" to capture the nature of social relations between actors.

Our analysis also led us to identify three different types of ecosystem-level outcomes in the view of interviewees. One type captures outcomes related to the availability (or not) of resources to support the entrepreneurial process (resource availability). Another type of outcomes encompasses the ability to create connections and benefit from them (partnerships promotion) and the third – ecosystem development - represents the ability of the ecosystem to develop and change. Our discussions led us to group these three second-order categories into the aggregated concept of "Ecosystem health" that captured positive and negatives aspects of the ecosystem dynamics in the perception of interviewees. The idea to name this aggregated concept "Ecosystem Health" came from the work of Stam (2015), which argues that leadership is critical to build and maintain a healthy ecosystem.

Figure 2 presents the outcome of our data analysis. The final data analysis effort consisted in looking the dual nature of coherence and the extent to which it related to the health of the ecosystem.

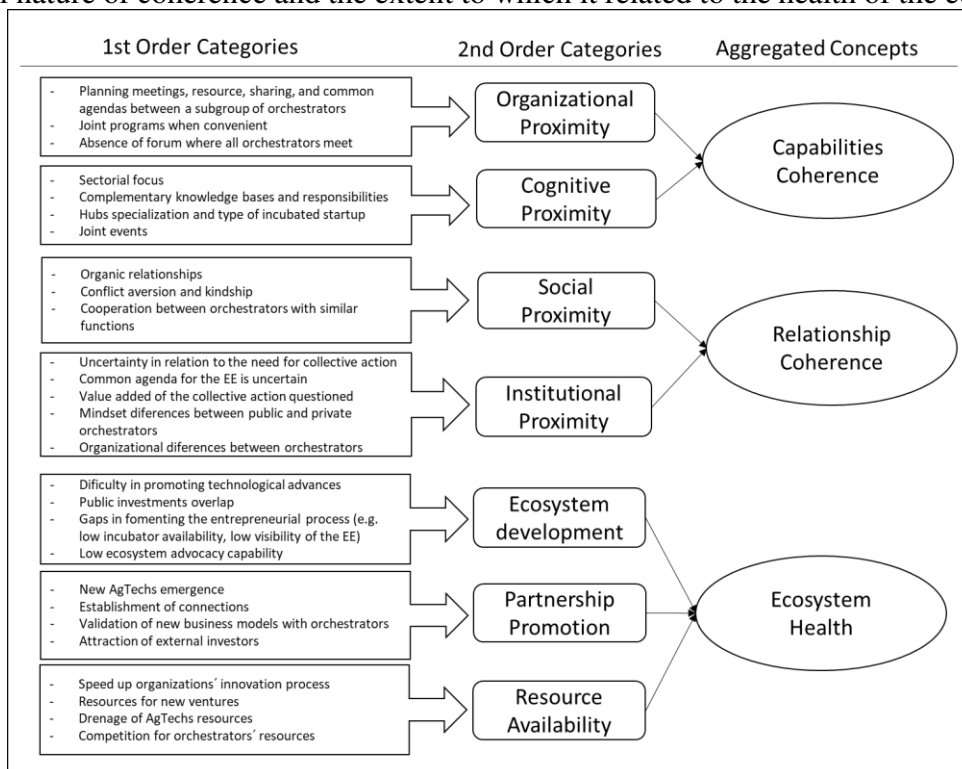


Figure 2. Data Structure

## 4. RESEARCH OUTCOMES

Our inductive approach suggests there are two sides to orchestrators coherence: capabilities coherence and relationship coherence. In this section, we first show the extent to which orchestrators in the AgTech Valley displayed coherence in their capabilities and explain their relational coherence. Then we explore the extent to which these two aspects of coherence interrelate and their implications to the ecosystem health.

### 4.1 CAPABILITIES COHERENCE

Capabilities refer to a general reliable capacity to bring something about as a result of an intended action (Dosi et al., 2000). As the knowledge, experience and skills inside and outside of organizations, capabilities often explain the nature of cooperative activity among organizations and industries (Richardson, 1972). Capability coherence describe the extent to which activities among ecosystem's agents relate to each other creating technoeconomic synergies and allowing for coherent diversification (Teece et al, 1994). Capability coherence in entrepreneurial ecosystems is described in two dimensions: *Cognitive proximity* refers to the extent to which knowledge bases in the EE are complementary and actors join efforts to integrate them (Huggins & Thompson, 2013; Molina-Morales et al., 2014). *Organizational proximity* captures actors' ability to coordinate their efforts to the exchange of knowledge and achieve common goals as well as the mechanisms used for this purpose (Boschma, 2005; Sternberg, 2007).

Our data suggest the existence of cognitive proximity between all the orchestrators studied in the AgTech Valley. All actors have a strong focus on entrepreneurial activity related to agricultural technology, even though they are specialized in different parts of the entrepreneurial process. All multinational companies (A to F) operate in different fields in the sector, focusing on seeds and crop protection, fertilizers, irrigation, machinery, fuel, and financial solutions. These companies help new ventures understand market needs, while the ATG, PH, and ET provide advisory work on how to create sustainable business models through acceleration and incubation programs.

EBP, the research institute, provides technical knowledge on the use of agro-related technologies, while SBE (the National SME's Support Agency) supports startups overcoming the challenges of opening and managing a small business in the country through an internal area dedicated to the agricultural sector. ET is an incubator located within ESALQ, the leading research-oriented Higher Education Institution in the country dedicated to Agriculture, and as such, only incubates AgTechs.

There is specialization and complementarity in the services of ATG, PH, and ET. Given the nature of their activities, the former two are focused on accelerating new ventures, while the latter is specialized in incubating early-stage ventures. PH is more focused on stabilized new ventures that develop energetic solutions from sugarcane. ATG, on the other hand, accelerates consolidated startup in a broader range of agricultural areas. According to the R&D Manager 2 of EBP, the focus on the agricultural technologies and specialization of actors facilitates the interaction with the ecosystem because everyone knows who to talk to.

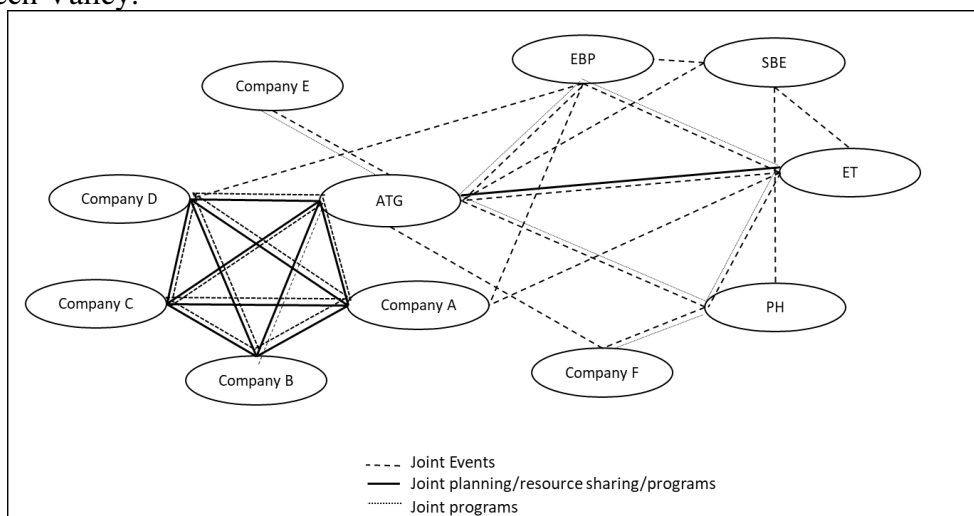
Orchestrators then create joint events, like workshops, meetup session, and acceleration programs, in which they can share their knowledge between them and with startups. All the orchestrators analyzed executed at least one of these initiatives with another partner or group of partners. Supporting actors, such as NAIA, venture capitalists, and the Ministry of Agriculture, are also commonly involved in them. Our analysis of the interviews led to the identification of 21 events involving at least one of these orchestrators. Some of these events take place on a frequent basis, like the "ET day" – an annual workshop organized by ET to discuss innovation and technological trends in Agrobusiness that counts with the participation of ATG, PH, and Company A (ET website, 2022). EBP also works with ATG and companies A and D to run its annual meetup event to connect AgTechs

with investors. Other events, like the ones named Agrotech Skyup and Innovation journey (our translation), happened only once to address a specific topic of interest of PH.

We did not observe *organizational proximity* between all the orchestrators but rather the presence of a group of actors working in a more coordinated manner and other orchestrators uniting efforts when convenient. ATG and companies A, B, C, and D form the group with closer organizational proximity. They organize joint planning initiatives, share information and resources, and have common agendas and are co-located in the ATG office, have many opportunities for informal interactions. For instance, they all have access to an AgTech database, compiled by ATG. ATG considers these companies “Innovation Partners” and looks for ways to add value to these partners, by promoting brainstorming session to understand their pains and what can be done to support them. The companies also contribute to the strategic positioning of the innovation hub. The co-founder of ATG explained that before past strategic decisions, like investing in AgTechs, internationalizing the hub, or establishing a partnership with a venture capital fund, they interacted with the “Innovation Partners” to capture their perspectives, discuss if it made sense, and assess the alignment with their common agendas.

Every month, they sit together to discuss what they believe is missing in the EE, share experiences (pains and needs), and exchange information (c.f. interviewee of company B). In one of these meetings, they discussed the need to further understand the challenges associated with the adoption of modern technologies and digitalization in the field and then organized sessions in the “Agro Innovation week” to discuss the topic. This group also run annually a mentoring program for new ventures named “Intensive Connection”, a mentoring program run by (ATG website, 2022).

We did not observe common agendas and regular joint planning mechanism between other orchestrators in the EE. Rather, they tend to unite efforts to create joint programs when they see the need, like the innovation challenge organized ATG and Company E to identify technological irrigation solutions, or the Hackathon that PH and Company F created to identify new payment mechanisms for logistics providers. SBE also organizes annually an acceleration program, in which ET, ATG, PH and EBP provide support. The interviewee from company C also mention that ET and ATG have an initiative to foment some themes that are of interest to the ecosystem, like funding for agricultural production or public policies to foment sustainability in the field. Figure 3 captures all the connections between the orchestrators, mapped in the data collect, in terms of joints events, programs, and planning, providing a visual representation of the orchestrators’ capabilities coherence in the AgTech Valley.



**Figure 3.** Elements of capabilities coherence between orchestrators

Our interviews also revealed the inexistence of a forum or meeting in which all orchestrators met to discuss what the ecosystem needs. Many interviewees (e.g., R&D manager of EBP research

institute, representatives of Company B, C and D) declared they were unaware of such an initiative. According to the R&D Manager of EBP and Innovation Manager of PH, for a while there was a meeting in which all participated, but slowly people stopped to engage. As a result, ecosystem-level discussions happen but without clear planning initiatives and in a decentralized way, as explained:

*“We are frequently invited, together with other companies, to join different events and talk about specific topics. So, these higher-level debates end up happening, but more in an expositive way rather than “let’s create an initiative to collaborate and see how we can work together” (Business Development Manager, Company C)*

This point became very clear in the “Agro Innovation Week”, event we participated in. In this event, the orchestrators were present and explored the need to increase connectivity in farms to enable a wider adoption of new technologies. Yet, no clear goals and actions were established to achieve this objective. When probed further on why such common forum did not exist, different orchestrators suggested the way their organizations operated prevented the engagement in such initiative. For instance, one interviewee explained that Company C is very traditional and averse to sharing information, restricting the engagement in collective actions. Three of companies interviewed (Companies A, B, and C) also highlighted they leave advocacy efforts to their public affairs departments, suggesting that issues that would require the involvement of multiple orchestrators to be solved are not in their radar.

We also observed that some orchestrators assume specific roles, perhaps creating the impression that some collective actions are not necessary. For instance, PH plays an important advocacy role to promote public policies for the sector, as this hub counts with backup from its shareholder, the national Brazilian sugar cane producer that has strong connections sectorial associations and governmental representatives. EBP, the research institute, and company D represent the ecosystem in Ministry of Agriculture and at the innovation committee organized by the federal government to discuss the implementation of the Agro 4.0 paradigm in Brazil. ET, in its turn, has frequent interactions with the local government to discuss tax benefits and the need to create media exposition to attract external stakeholders’ attention to the Valley.

#### 4.2 RELATIONSHIP COHERENCE

This dimension was named Relationship Coherence to represent the fact that relationships are forged within specific social contexts. *Social proximity* captures if the closeness between actors derives from the trust, friendship, kindship, and positive experiences between the parties (Huggins & Johnston, 2010; Crescenzi et al., 2016; Fontes & Sousa, 2016), while *institutional proximity* is associated with the extent to which actors share common habits, beliefs, and values (Caragliu & Nijkamp, 2016). Our data suggests the presence of social proximity between all orchestrators in the AgTech Valley. For instance, the executive director of ET explained that relationships emerge organically between them and without vested interests:

*“The Silicon Valley is an organic system where relationships naturally develop. This is the model I believe in and what happens here too. Each actor, e.g. ET, AGT, PH, Animal Hub, looks for what is best to meet its goals and end up attracting positive thing to the ecosystem... everyone is a protagonist... no one is jealous of anyone.”*

Moreover, parties display a cooperative spirit and tendency to avoid conflict, creating a sense of kindship. For instance, there is tacit agreement of not competing for AgTechs, as explained by the Innovation Hunter of Company D. Another issue raised in the interviews was that orchestrators do not want to engage in difficult conversations (Commercial Manager SBE, R&D Manager 1 EBP). These aspects suggest a tendency to avoid conflicts and a sense of kindship between actors. This sense is corroborated by the “win-win” spirit represented in the words of the innovation manager at PH.

*“it is not like that, ‘to enter in this initiative you have to pay’. No, we say: “we will help you access the ecosystem. You advertise in your social networks and bring a list of startups. Then you can participate on my pitch day, sit in the selection committee, help select the startups, and mentor them during the program”.*

The data also shows a cooperative relationship between ATG, PH, and ET. Although they all have an intermediation function and, thus, compete for similar resources, like connections with AgTechs, angel investors, and media exposition, these players try to avoid engaging in actions that might affect each other negatively, like having events on the same day. They also coordinate efforts when actors external to the EE want to visit and understand better how the AgTech Valley works. The co-founder of ATG explained:

*“We have a good relationship, so we do not compete directly, but we have our own agendas and, when it makes sense, we are together. When it does not, each one does its own thing.”*

Our data, however, suggests that there is limited *institutional proximity* between the orchestrators as they seem to have different beliefs, values, and mindsets. One evidence in this sense are the different opinions in relation to the need for an initiative to promote collective actions in the ecosystem. Some orchestrators think that there is no need to have one single organization or common effort to govern the ecosystem. In this vein, the Executive Director of ET shares a similar view to the one expressed by the co-founder of AGT below:

*“I do not have this vision that we need a leader, someone to orchestrate and coordinate the EE...Actors will interact and make things happen...So much so that things are happening here.”*

Questions emerged in relation to which common agendas these diverse orchestrators could have, as they have different demands (R&D Manager, EBP), to the added value of this initiative, and on how to organize and lead it. Both the Innovation Hunter of Company D and the Corporate Director from NAIA (National Association of Incubators and Accelerators) mentioned that it is difficult to make agents see the value of engaging in such initiative.

Other orchestrators, however, believe it would make sense to have a forum where all actors unite efforts to address issues that require multi-stakeholder collaboration (e.g., interviewees from PH, SBE, and Company B). Some interviewees see public actors as potential leaders to stimulate collective action (Innovation Manager, PH) and the use of multiple forums to address specific topic, but there is a fear that actors may lose interest and focus (Business Development Manager, Company C). The innovation scouter of company B also highlights that actors in the ecosystems come from different industries and have different ways and abilities to deal with the ecosystem. As such, it seems very challenging to integrate their actions. Another aspect that indicates an institutional distance between actors is that public and private actors have difficulties working together because of their different mindset and ways of doing business as explained below:

*“Nothing against any specific institution, but the interaction with public actors is complicated. We (private actors) do not have time to waste. So, if something does not work as planned, we cannot wait. We said to one public actor once, look this is what I have to offer. I can put you in contact with my AgTechs. You can look for new AgTechs in Latin America and put us in contact with them. They said, this is great, it works. But then the job does not get done. I see a big mismatch in timing, speed, and bureaucracy in terms of how we work.”*  
(Co-founder, ATG)

#### 4.3 THE REINFORCING NATURE OF CAPABILITIES AND RELATIONSHIP COHERENCE

Our data suggests that capabilities and relationship coherence are intrinsically related. On the one hand, interview data suggests that the fact that orchestrators are specialized in specific and complementary roles (cognitive proximity) creates a collaborative spirit because they need to work together to meet their targets. The executive manager of ET explained:

*“When someone comes to visit ET, we presented the entire Valley because I know that alone I cannot meet the demand for innovation in a systemic way. This is my policy, my way of working is meeting the demands of the ones that come looking for help and alone I cannot do that.”*

On the other hand, the actors suggested that the collaborative spirit leads them to engage in joint events and programs (capabilities coherence). For instance, the business development manager at Company A explained that he does not believe in competition and aims to cooperate. So, when the company joined the ecosystem, it started working together with ATG on mentorships. Similarly, the interviewee from company B reported that the collaborative spirit speeds up her work, because she knows she will deliver and the other party too. Yet, the organic relations and tendency to avoid conflicts, traits of social proximity, seems to influence the lack of a collective action between all the orchestrators analyzed (organizational proximity). The innovation hunter of Company D mentioned that in his view “everyone has the liberty and autonomy to do as it pleases” and so there is no meeting or forum in which the orchestrators meet to define what should be done. The R&D manager 1 at EBP also explained:

*“No one wants to engage in difficult conversations... For instance, let’s strengthen our ecosystem. How do we do that? Who will do this? How will we do that? Someone has to do this. These are difficult conversations to have.”*

The fact that orchestrators also have different opinions in relation to the need for an initiative to promote collective actions in the ecosystem and the actual absence of such forum further corroborates the idea that institutional proximity is related to organizational proximity. We also did not find evidence of an event that all orchestrators organize together. Furthermore, one interviewee highlighted that companies have different perspectives and interests that prevent such initiatives.

*“It is a behavioral aspect. There are people and organizations that want to be ‘owners’, references in the ecosystem... It can be easily identified. I believe this aspect prevents the development of such an initiative”. (Commercial Manager, SBE).*

#### 4.4 ECOSYSTEM HEALTH AND ORCHESTRATORS COHERENCE

By looking at the benefits and downsides of being in the AgTech Valley in the perception of the interviewees, we identified three types of outcomes that indicate the health of this ecosystem. We could observe that the ecosystem is **promoting partnerships**. New AgTechs are constantly emerging and establishing relationships with big companies (c.f. ATG Co-founder) and financing agents. Executive Assistant of Company E also added that the new ventures also have the possibility to validate and improve their business models by interacting with orchestrators. The AgTechs interviews corroborate this finding. The founder of NatPlant mentioned that his company gained visibility since he joined the EE. ET helped them have access to many opportunities, establish connections with three companies, and maintain constant contact with new investors. The co-founder of DSL, a more mature AgTech, expressed a similar perception, emphasizing the importance of the EE for the creation of new connections.

The ecosystem also seems to be able to promote the **availability of resources** to its participants. The AgTechs interviewed also were unanimous in highlighting high availability of events, e.g., workshops, meetup sessions, and acceleration programs, in the ecosystems. According to them, the events and programs that happen in the ecosystem also provide new ventures with the resources and connections needed to overcome challenges of the entrepreneurial process. The big

companies interviewed also highlighted their gains, adding that participating in the EE as “innovation partners” improved and speeded up their open innovation process (Companies A and B). Such data suggests that important elements of capabilities coherence promote resource availability and partnerships. However, there seems to be redundancy in these events due to the absence of a more centralized coordination effort and the presence of distributed goals between orchestrators (trait of lack of stronger organizational proximity), leading to inefficient resource use.

*“Today we have several acceleration programs happening at the same time. Why can’t we see who is doing what and ask to support initiatives already in place? Why do I need to have my own version? Because interests, motivations are different and so results end up being different. But then questions arise. Is it good for the ecosystem? Am I having the biggest impact possible?” (R&D Manager 1, EBP)*

In a similar vein, the EBP interviewee complemented saying that this situation generates competition between programs for new ventures, money, and time. The multiplicity of programs can also create a prejudice in the farmers that support proof-of-concept trials for new products and solutions because many disperse initiatives do not generate concrete results for them (Innovation Hunter, Company D). It could be inferred that such redundancy on programs and event derives from a sort of “ecosystem buzz”, in which actors fearing to miss out on the opportunity to engage in the ecosystem create initiatives without much concern for their outcomes. Such behavior can, however, be detrimental to the new ventures. One of the co-founders of a startup pointed out their difficulties in dealing with these multiple events:

*“It is difficult because it is just too much to manage. It is so much new knowledge, information, and recipes of success that we ask ourselves: what do I do now? If I could give my humble advice to someone starting today, I would say - choose wisely the programs you will take part in, or you are going to go crazy and get nowhere”. (Co-founder, KRN)*

The main limitations identified in the interviews, however, related to the difficult to promote the **ecosystem development**. For instance, to implement new technologies in farms, there is the need to increase connectivity in the field. Yet, although there have been events to discuss how to implement the Agro 4.0 paradigm, there is little effort in the ecosystem to enable the access to 4G and 5G networks to small and medium sized producers (Innovation Hunter, Company D). There is also overlap in the public funding coming from the Federal Government. The interviewee of Company A pointed out that the EBP and ABDI acceleration programs could be combined to create a more robust initiative. Yet, the Valley also does not have a strong representation in the Federal Government (ecosystem advocacy) that would help address these issues, or the creation of tax benefits for startups and regulatory frameworks, as can be seen below:

*“If we had someone doing this intermediation, it would be great. Someone understanding our demands and how the government works... There is room for someone to do that, a company, a person, an association, there is room for the macro-level coordination. No doubt.” (Co-founder, ATG)*

The AgTech Valley also seems to have difficulties in improving aspects that are central to promote the entrepreneurial process. For instance, we observed a bottleneck in terms of incubation capacity. Not only there was a limited early-stage ventures incubation capacity, but also the only local incubator had plans to become an innovation hub. Both the innovation manager of PH and the researcher specialized in the Brazilian entrepreneurial AgTech ecosystems criticized this fact. In the eyes of the R&D manager 1 of EBP, this difficulty to address gaps in the ecosystem is associated with the lack of forum or common initiative in which all orchestrators work together to address the needs of the ecosystem.



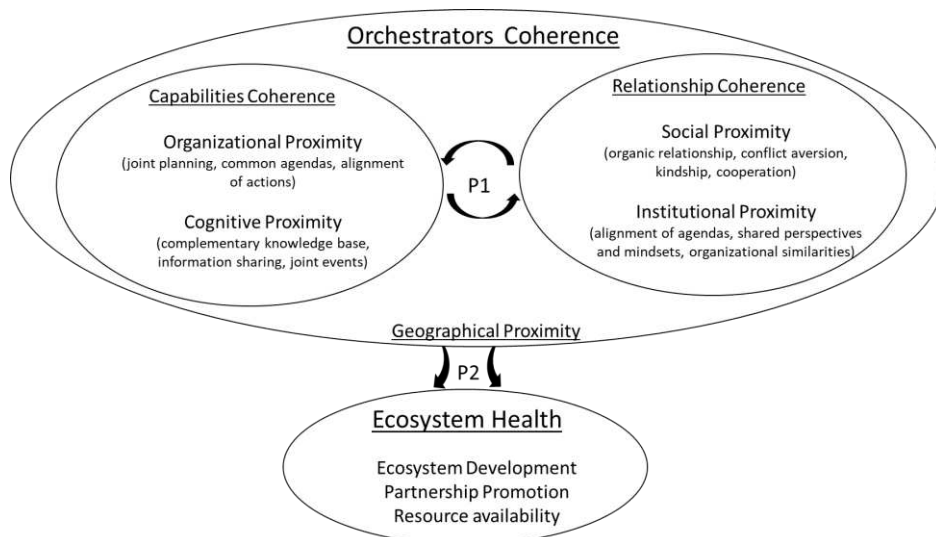
*“There needs to be something like this. We understand that there is a gap here, we lack an accelerator. Let’s chase after one to strengthen the EE. So, the collective governance effort needs to have this bird’s eye view of the ecosystem... So, what you are looking for is still a fragility of the EE.”*

**5. DISCUSSION**

While recent literature raises the need to theorize further on the role of networks in EE’s (Alvedalen & Boschma, 2017) and their governance structures (Brown et al., 2023), recent studies have advanced more on understanding the actions specific EE actors take to promote ecosystems’ development (Knox & Arshed, 2021; Miles & Morisson, 2020; Roundy, 2019; Roundy, 2021). Little was known about what leads actors responsible for steering entrepreneurial oriented networks, i.e orchestrators, to integrate efforts and the potential implications to the EE. Our study allowed us give one step in this direction and infer that the integration between orchestrators lies in the coherence existing between. Based on our in-depth analysis, we propose a framework to represent the foundational elements of the coherence between these orchestrators and the way it can enhance the health of the ecosystem (Figure 4).

The framework shows that Orchestrators coherence exists when these actors have coherent capabilities (i.e. share information, plan joint events, have common agendas, display complementary knowledge bases, plan actions together and display common agendas) and coherent relationships (i.e. organic interactions based on kinship, limited conflict, and cooperation, as well as, aligned agendas, perspectives, mindsets, and organizational similarities). The relational coherence is vital to nurture the coherence in capabilities, which in turn reinforces the coherence in the relationships. Geographical proximity functions as a background enabler of these features by representing the co-location of agents in geographical space (a reference to the locally/regionally bounded nature of EE). Hence, we propose:

**Proposition 1. Orchestrators coherence in Entrepreneurial Ecosystem emerges from the interplay between Capabilities coherence and Relationship coherence. The former is derived from cognitive and organizational proximities, while the latter is a function of social and institutional proximities. These dynamics take place within a context of geographical proximity representing the ecosystem itself.**



**Figure 4.** Elements of capabilities coherence between orchestrators

Our findings also suggest that, by working together, orchestrators lay the foundations to bring resources to the EE, promote partnerships, and develop the EE. Yet, lower levels of capabilities and

relationships coherence can generate overlapping initiatives that drain resources from EE actors and lead to difficulties in executing activities that are essential to minimize gaps in the EE, promote its development, and shape its evolutionary trajectory. We thus state:

**Proposition 2. Orchestrators coherence is positively associated with the ecosystem health, which can be assessed in terms of resource availability, partnerships promotion, and ecosystem development and evolution.**

These propositions and the framework help answer how do orchestrators in EEs integrate efforts and steer their networks to promote enhanced outcomes in the ecosystem. Next, we detail the theoretical and practical implications of this inductive exercise.

### 5.1. THEORETICAL IMPLICATIONS

Following Brown’s et al (2023) reflection, we embraced the complexity of EE’s and their multifaceted network governance structure. This is a critical issue in these debates, considering that Networks represent the formative core of EE. Furthermore, while EE can hardly be thought of as ‘engineered’, top-down structures (Stam et al., 2016), they also should not be understood in the same organic way of natural ecosystems. Instead, the volition of individuals (or agency) and organizations is inextricably associated with why and how networks appear and evolve. Incidentally, splitting Networks and Leadership in different dimensions can be misleading. And that is why looking into EE orchestrators can be particularly insightful.

In doing so, we complement the existing literature in the following ways. First, by understanding the nature of orchestrators coherence through the identification of two dimensions of coherence, we provide a finer understanding of relevant aspects necessary for the integration of EE leaders or orchestrators, an aspect that was still undertheorized (Roundy & Lyons, 2023). As such, we extend existing studies that started exploring this subject (Harper-Anderson, 2018; Roundy & Burke-Smalley, 2022).

A direct implication of this interplay between Capabilities and Relationship coherence lies in understanding the complementary nature of these constructs. While they can be deemed as interconnected to some extent, they present distinct dynamics – as empirically demonstrated in this article. From this we can theorize about some archetypical configurations concerning Coherence within networks of orchestrators in EE. Table 2 presents this combinatory structure.

**Table 2 – Entrepreneurial Ecosystem Coherence Matrix**

		Capabilities Coherence	
		<i>Low</i>	<i>High</i>
Relationship Coherence	<i>High</i>	Unrelated Coherence	Effective Coherence
	<i>Low</i>	Incoherence	Opportunistic Coherence

In this respect, Relationship Coherence without Capabilities Coherence will lead up to *Unrelated Coherence*, a situation in which actors are socially cohesive but lack the complementarities to generate effective flows of information and knowledge that make up for aggregate competitiveness in the ecosystem. In turn, Capabilities Coherence in the absence of Relationship Coherence will likely generate *Opportunistic Coherence*, that is, loose networks based on short-term relationships that fail to trigger dense linkages that are necessary for the ecosystem to evolve. Only in the presence of both Relationship and Capabilities Coherence will *Effective Coherence* emerge. Alternatively, when both

Relationship and Capabilities Coherence are lacking, networks in the ecosystem can be deemed as *Incoherent*. This tentative taxonomy offers a nuanced comprehension of EE coherence as a mechanism shaping the dynamics of networks. Although our empirical appraisal has been oriented towards linkages between orchestrators, its composing features – we hope – can be transposed to EE connections writ large.

Our second theoretical contribution concerns how coherence elements can affect the trajectory of ecosystems. While previous studies showed that specific activities of EE orchestrators led to gains in the ecosystem (Harper-Anderson, 2018; Knox & Arshed, 2022; Miles & Morrison, 2020; Roundy, 2019; Roundy, 2021), we provide evidence that the type of coherence between orchestrators that shape the structure of their relationships also influences these outcomes. We also provide empirical evidence on how leadership in networks that compose EE's have the capacity to build and maintain ecosystems healthy, a theoretical argument made by Stam (2015). Combined these two aspects provide a deeper comprehension of the governance structure taking place within EEs (its formative 'core' based on the structure of linkages, networks, and balances of power), a call made by Colombelli et al. (2019).

Finally, we show EE orchestrators value other types of outcomes than measures of resource availability and new venture creation, that have been traditionally used in the literature (Thai et al., 2023). They also see the creation of partnerships and actions to eliminate gaps in the EE to promote its development as vital outcomes at the ecosystem-level. Our study, thus, helps give further meaning to the concept that Stam (2015) introduced and gives one step further in relation to the one of Shi & Shi (2022) that started refining the concept of ecosystem health by showing the need to look at the resource dynamics within the ecosystem.

## 5.2. PRACTICAL IMPLICATIONS

Beyond the theoretical set of contributions derived from our research, some implications for policymakers, managers and other decision-makers associated with entrepreneurial ecosystems emerge from our assessment. First, policies targeted at nurturing entrepreneurial ecosystems need to take into account the complex nature of coherence. From our analysis, coherence emerges as a foundational feature of networks. Accordingly, it is unlikely that 'incoherent' linkages will endure and create dense ties among orchestrators, entrepreneurs and other actors. This comes as a criticism to shortsighted approaches that just aim at creating entrepreneurial buzz.

Second, and as a complement of our first practical implication, ecosystem orchestrators need to develop clear views on the possibilities to create synergies in entrepreneurial ecosystems. Although entrepreneurial 'fads' can be highly attractive and generate visibility to the ecosystem, if they are detached from pre-existing capabilities and relationships in the ecosystem, they will likely fall under the 'incoherent' ecosystem category. This does not mean predetermination of trajectories. Rather, it suggests that path-defying approaches cannot emerge from scratch. Third, as our analysis demonstrated, orchestrators can have significant multiplying effects in the ecosystem. This happens because of their role as EE Leaders and enablers of networks. Hence, engaging these actors of multiple natures in EE initiatives – be they of top-down or bottom-up nature – can be critical in structuring entrepreneurial networks.

Fourth, and last, managers shall benefit from our exposition on the nature of coherence. By internalizing the knowledge on the complexity of coherence and its simultaneous association of multiple forms of proximity – well beyond the sole focus on the geographical scope – firms ought to address their embeddedness in entrepreneurial ecosystems as a strategic position, not simply as a short-term opportunity to be seized. This is so because of the evolutionary nature of social, organizational, institutional and cognitive proximities, making them constructs that can take long time to mature and become consolidated. Ultimately, such long-term engagement with the formation of networks will shape the context for healthy entrepreneurial ecosystems.

## 6. CONCLUDING REMARKS, LIMITATIONS, AND FUTURE RESEARCH

By unpacking foundational elements of network dynamics embedded in EE, our research represents a step forward in building a theoretically robust perspective on such ecosystems. Furthermore, it generates insights for scholars, managers and policymakers concerning the key factors that enable and hinder emergence and evolution of coherence through orchestration. We expect these elements to open up new avenues of investigation in the field of EE studies.

Despite our efforts to guarantee the quality of our research, there are inherent limitations to this study. Our assessment is limited to a case conducted in a geographically bounded EE focused in fomenting AgTechs that has a certain level of development. This context may have influenced the nature of the cognitive and social proximities observed and number of orchestrators in the EE. For instance, in EEs without sectorial focus, we may see less complementarities in the technological knowledge bases. EEs localized in larger cities, the lack of proximity may also reduce the social proximity, as lower levels of co-location may inhibit informal meetings that reinforce trust and friendship bonds. Younger ecosystems may also display less dense networks and a smaller number of orchestrators (Miles & Morrison, 2020). In such case, the need for orchestrator coherence may be less significant. Finally, the fact that we observed only one case limited our ability to see the variance in types of orchestrators coherence, which would have revealed more information on the interrelation between capabilities and relationships coherence.

In face of such limitations, future research could explore the notion of orchestrators coherence in other EEs to promote comparisons and see conditions that could influence our findings. In this respect, our coherence taxonomy (Table 2) can provide useful guidance to observe contrasts across entrepreneurial ecosystems. Moreover, future studies could extend our efforts to understand the dynamics of networks in EE with different trajectories and at distinct evolutionary stages. Complementarily, evidence that can generate clarity on the connections between different types and profiles of network coherence and the multifaceted nature of ecosystem health is due. In this respect, we ought to move past the frenzy over extraordinary cases of success to turn entrepreneurial ecosystems into more adaptable promoters of regional development.

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## Appendix A. Interview protocol

Link to research question and theoretical lenses	Questions
Orchestrators in the EE	<ul style="list-style-type: none"> <li>Who do you see as the main actors involved in the articulation of the EE?</li> <li>Do you consider any of these actors as partners? Why / Why not?</li> <li>Do you see any of these actors assuming a leadership position in the EE?</li> </ul>
⇒ Actors that steer entrepreneurial agents without any sort of formal hierarchy to create and extract value (Dhanaraj & Parkhe, 2006)	
⇒ Single/Lead x multiple orchestrators (Collombelli et al., 2019)	
Coherence between orchestrators	<ul style="list-style-type: none"> <li>What is your role in the EE? What are your main interests?</li> <li>How do you coordinate efforts with these partners?</li> <li>Are there shared knowledge bases, responsibilities, interests, and goals?</li> <li>Do you see your relationship with these partners as collaborative or competitive?</li> <li>Is there a forum where all actors meet to discuss critical aspects to the EE?</li> <li>If yes, what is it that you discuss?</li> <li>If not, why? Which would be the pros and cons of such initiative?</li> </ul>
⇒ Knowledge variety and related variety (Boschma et al., 2022; Boschma, 2021)	
⇒ Coordination efforts, based on information sharing and joint actions (Roundy, 2020a)	
⇒ Presence of shared needs, values, beliefs, and interests (Roundy et al., 2017)	
Ecosystem level outcomes associated with orchestrators coherence	<ul style="list-style-type: none"> <li>What are the benefits of this mode of interaction between the EE actors (orchestrators) for your organization? And the downsides?</li> <li>What are the benefits of this mode of interaction between the EE actors (orchestrators) for the ecosystem? And the downsides?</li> <li>How does this mode of interaction affect the AgTechs?</li> </ul>
⇒ outcomes that increase the value participating in the ecosystem for all members (Miles & Morisson, 2020)	

<sup>i</sup> It is rather surprising to see that EE models (Stam, 2015; Stam and van de Ven, 2021) detach Leadership from Networks. This creates a situation in which the governance of linkages becomes a different dimension than that of the networks themselves. In this article we argue in a different direction, one in which Networks and Leadership (a governance structure) are not just intertwined; they are essentially inseparable.