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## **The fifth facet: The ecosystem as an organizational field**

**Llewellyn D. W. Thomas**  
Imperial College London  
Imperial College Business School  
llewellyn.thomas@imperial.ac.uk

**Erkko Autio**  
Imperial College London  
Imperial College Business School  
erkko.autio@imperial.ac.uk

### **Abstract**

Although ecosystem research has adopted complementary theoretical perspectives that reflect its emphasis on interdependent networked organizations engaged in value creation, and which have provided a fertile soil for ecosystem thinking to develop, they have not yet coalesced into a coherent theoretical framework. Arguing that ecosystems are typified by explicit focus on collective value creation, we pioneer an institutional approach. Demonstrating parallels between the organizational field construct and the ecosystem, we argue that the organizational field is able theoretically account for collective value creation, and hence provides a sophisticated theoretical perspective to consider ecosystems. Building upon theorizations of the organizational field, we sketch out the contours of an ecosystem construct, suggesting three characteristics: a network of participants, a governance system, and a shared logic. We then discuss the implications of our institutional perspective on ecosystems, specifically noting how institutional and related theories can assist in understanding ecosystem dynamics and boundaries.

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## **ABSTRACT**

Although ecosystem research has adopted complementary theoretical perspectives that reflect its emphasis on interdependent networked organizations engaged in value creation, and which have provided a fertile soil for ecosystem thinking to develop, they have not yet coalesced into a coherent theoretical framework. Arguing that ecosystems are typified by explicit focus on collective value creation, we pioneer an institutional approach. Demonstrating parallels between the organizational field construct and the ecosystem, we argue that the organizational field is able theoretically account for collective value creation, and hence provides a sophisticated theoretical perspective to consider ecosystems. Building upon theorizations of the organizational field, we sketch out the contours of an ecosystem construct, suggesting three characteristics: a network of participants, a governance system, and a shared logic. We then discuss the implications of our institutional perspective on ecosystems, specifically noting how institutional and related theories can assist in understanding ecosystem dynamics and boundaries.

## INTRODUCTION

With increasing competitive pressures related to rapid and continuous innovation and adaption, strategy research has been increasingly (re)considering issues of the relation of the organization to the collectives in which it operates, introducing such concepts as the meta-organization (Gulati, Puranam, & Tushman, 2012) and actor-oriented architectures (Fjeldstad, Snow, Miles, & Lettl, 2012). Earlier strategy conceptualizations of the organization and the collectives in which they operate have included strategic networks (Jarillo, 1988), the value constellation (Normann & Ramirez, 1993) and the value network (Stabell & Fjeldstad, 1998). Others have specifically considered the network of organizations around a focal firm as source of competitive advantage (Dyer & Singh, 1998). One particular metaphor that has been increasingly used in strategy research and practice is the ‘ecosystem’. This rather versatile and loosely defined term was first introduced in practitioner literature in the mid-1990s (Moore, 1993), and subsequently the ecosystem has been increasingly adopted in research journals such as the Strategic Management Journal (Adner & Kapoor, 2010; Kapoor & Lee, 2013; Pierce, 2009; Teece, 2007). The attractiveness of this metaphor rests on its ability to evoke and highlight interdependencies between organizations and their environment, and to provide a fresh way to think about specialization, co-evolution, and the creation of value (Adner, 2012; Ceccagnoli, Forman, Huang, & Wu, 2012; Kapoor & Lee, 2013).

To date ecosystem research has adopted complementary theoretical perspectives that reflect its emphasis on interdependent networked organizations engaged in value creation. In their review, Autio and Thomas (2014) illustrate how existing ecosystem literature has drawn on the notion of networks as a distinct ‘mode’ of organization as compared to markets and organizational hierarchies (Hennart, 1993; Thorelli, 1986); emphasized the social embeddedness of economic action (Granovetter, 1985; Uzzi, 1997); adopted the ideas of ‘network organization’ and ‘virtual organization’ (Miles & Snow, 1986); incorporated value chain, market structure and value appropriation considerations (Jacobides, Knudsen, & Augier, 2006; Porter, 1980, 1985; Teece, 1986); echoed ideas from the resource-based, core competence and relational views (Barney, 1991; Dyer & Singh, 1998; Prahalad & Hamel, 1990); and recognized the differing sources of innovation (Von Hippel, 1988).

Although these theoretical underpinnings have provided a fertile soil for ecosystem thinking to develop, they have not yet coalesced into a coherent theoretical framework. This is a shortcoming, as however useful the ecosystem construct may be, it also has limits, and sometimes the strong mental images evoked by this attractive metaphor may obscure differences between a given phenomenon and the metaphor used to make sense of it. Powerful and attractive metaphors such as the ecosystem do not negate the need for coherent theory that has been explicitly developed to describe the phenomenon of interest and not some analogous phenomenon. As such, it is our goal to sketch out a coherent theoretical basis for ecosystem research, pioneering an institutional approach to ecosystems.

We first emphasize that ecosystems are typified by an explicit focus on collective value creation. By collective value creation we mean that value is created through the interaction of the ecosystem participants (Adner & Kapoor, 2010; Ceccagnoli et al., 2012). We then demonstrate that although strategy and resource dependence theory have considered either the collectives within which organization operate and non-linear value creation, neither has considered these together, nor has the theoretical capacity to do so in a comprehensive manner. We argue that although institutional theory has also not also theoretically considered collective value creation, the organizational field has the theoretical flexibility and sophistication to do so. Developing the notion of the ecosystem as an organization field, we suggest that ecosystems are distinguished – both as a category and as a theoretical concept – from other conceptions of organizational fields by their focus on collective value creation as the recognized area of institutional life (DiMaggio & Powell, 1983). As such, we propose that the ecosystem is a fifth facet of the organizational field, complementing common industries (DiMaggio & Powell, 1983), common technologies (Garud, Jain, & Kumaraswamy, 2002), social issues (Hoffman, 1999), and the market (Beckert, 2010), as the distinguishing areas of institutional life.

We also sketch out the contours of an ecosystem construct. Emphasizing that participant interdependency drives collective value creation (Adner, 2012; Adner & Kapoor, 2010), we propose three ecosystem characteristics. The network of participants characteristic comprises of participant specialization, complementariness, and co-evolution, emphasizing the technological interdependencies that exists between ecosystem participants. The governance characteristic consists of an authority

structure that underpins task identification and assignment, decision-making, and conflict resolution, membership control that regulates the permeability of the boundaries of the ecosystem, and coordination for task execution to enable smooth operation. The shared logic characteristic considers legitimacy, trust and the mutual awareness between the participants that they are involved in a shared enterprise, underlining the social and cognitive aspects of participant interdependency.

We contribute to the emerging ecosystem literature by facilitating the well-developed and sophisticated theoretical framework of institutional theory for both future theoretical development and empirical investigation. More specifically, we contribute by outlining the additional insight that institutional theory, and the concept of organizational fields in particular, brings to our understanding of ecosystem dynamics and boundaries.

## **COLLECTIVE VALUE CREATION**

The defining characteristic of ecosystems is that they are dynamic and purposive value-creating networks in which these participants co-create value (Adner, 2006; Adner & Kapoor, 2010). Typified by a system-level goal of value creation (Gulati et al., 2012), an ecosystem explicitly and holistically considers the role of complementary asset providers in value creation and appropriation (Teece, 1986). Moving beyond the value chain to consider the wider network of value creating participants, ecosystems extend the concept of a value chain to that of a system, including any organization that impacts the focal organization in some manner (Iansiti & Levien, 2004). In ecosystems contexts value is created through the interaction and combination of the participants in the ecosystem (Adner & Kapoor, 2010; Ceccagnoli et al., 2012). By embedding themselves in a complex set of network relationships (Granovetter, 1985; Gulati, Nohria, & Zaheer, 2000), ecosystem participants combine their individual offerings into a coherent, customer-facing solution. By collectively creating value that would not be possible for a single participant alone, ecosystem participants bind themselves together through technological interdependencies (Adner, 2006; Adner & Kapoor, 2010).

Ecosystems have a logic of mutual exchange that operates differently from that of markets and hierarchies, as collective value creation is driven by both inter and intra-firm relationships (Windahl & Lakemond, 2006), with the actions of individual firms impacting the overall value created. As such

these are not the arms-length or hierarchical transactions of Williamson (1975), as the collective creation of value here relies on investments in relation-specific assets, substantial knowledge exchange, and non-market governance mechanisms (Dyer & Singh, 1998). In order to facilitate collective value creation, the relationships in an ecosystem efficiently move information, innovations and resources around the network (Adner, 2012; Boudreau, 2012; Iyer, Lee, & Venkatraman, 2006). Due to their embeddedness in the network, each ecosystem participant is symbiotic to and co-evolves with other participants (Li, 2009). Symbiosis and co-evolution in ecosystem contexts means that each participant of the ecosystem ultimately shares the fate of the network as a whole, regardless of that individual participant's strength or power (Iansiti & Levien, 2004). Similarly, ecosystems can also be a constraint as they may lock firms into unproductive relationships or preclude partnering with other viable firms (Gulati et al., 2000).

The dynamics of collective value creation mean that opportunities enabled by ecosystems are not necessarily equally distributed amongst participants (Adner & Kapoor, 2010; Burt, 2004). Furthermore, the presence of an ecosystem or network does not necessarily lead to value creation, only to opportunities to do so, and it is how the participants behave and pursues opportunities with other participants that leads to success (Hughes, Ireland, & Morgan, 2007). There is a heterogeneous pattern of relationships, both of strength and number of direct and indirect ties (Adner & Kapoor, 2010; Li, 2009; Pierce, 2009). Often there is a powerful hub firm within the network, providing a coordination role (Gawer & Cusumano, 2002; Pierce, 2009). These hub firms often are at the center of multi-sided markets where value creation is driven by both direct and indirect positive network externalities underpinned by standards and lock-in (Cusumano, 2010; Thomas, Autio, & Gann, forthcoming). Such hub firms are central to the health and stability of an ecosystem, as not only do they drive the collective performance of the network (Pierce, 2009), they also increase the ease with which nodes can connect to each other (Evans, Hagiu, & Schmalensee, 2006). A substantive subset of the literature identifies the 'platform' as the coordinating artefact that a hub firm uses, or the services, tools and technologies that other members of the ecosystem can use to enhance their own performance (Cusumano & Gawer, 2002; Iansiti & Levien, 2004; Tiwana, Konysnski, & Bush, 2010).

Summarizing, ecosystems are typified by explicit focus on collective value creation. In these collectives, ecosystem participants combine their individual offerings into a coherent, customer-facing solution, creating value that would not be possible for a single participant alone. Ecosystems have a logic of mutual exchange that operates differently from that of markets and hierarchies, as the collective value creation relies on investments in relation-specific assets, substantial knowledge exchange, and non-market governance mechanisms. Due to their embeddedness in the network and participant interdependence, each ecosystem participant is symbiotic to and co-evolves with other participants, and ultimately shares the fate of the network as a whole.

## **AN INSTITUTIONAL APPROACH**

In order to develop a coherent theoretical perspective for ecosystem research, a number of existing theoretical perspectives suggest themselves. One potential source of theory is strategy, as not here did the notion of the ecosystem emerge (Iansiti & Levien, 2004; Moore, 1993), but it also includes the majority of ecosystem research to date (Adner & Kapoor, 2010; Kapoor & Lee, 2013). Within organization theory, there has been a long history of the study of the collectives in which organizations operate, particularly within resource dependency theory (Pfeffer & Salancik, 1978) and institutional theory (DiMaggio & Powell, 1983). Each of these theoretical perspectives has considered either value creation or the collectives within which organizations operate, and hence offers potential theoretical frameworks.

### **Strategy research**

In strategy research, there has been a long history of considerations of non-linear value creation as a reaction to the dominant value chain of Porter (1985). One such construct is the ‘value constellation’, coined by Normann and Ramirez (1993), who observed that value occurs not sequentially but as the result of a complicated set of economic transactions and institutional arrangement between suppliers, customers, employees, managers, teams of technical and organizational specialists. Another, notion of collective value creation within strategy research has been the ‘value network’. For Stabell and Fjeldstad (1998), value is created in a value network through the facilitation of a network relationship between their customers using a mediating technology (Thompson, 1967). An alternative

conceptualization of the value network been to integrate value chain and network concepts, rather than using a network concept to replace them. For instance Weiner, Nohria, and Hickeman (1997) has proposed a value network as a disaggregated value chain of independent assets that are connects and exploited by a focal company.

Focusing on the collectivity rather than value creation, theorists have also considered the 'strategic network' as the collective environment within which organizations operate. For Jarillo (1988), strategic networks are long term, purposeful arrangements among distinct but related organizations that allow participants to gain or sustain competitive advantage vis-à-vis their competitors outside the network. Building on this early view is the strategic network of Gulati et al. (2000), who take a relational approach to understanding the network (Dyer & Singh, 1998). For Gulati et al. (2000), strategic networks encompass the firm's set of enduring relationships, both horizontal and vertical, be they suppliers, customers, competitors or other entities, including relationships across industries and countries.

Although value constellations and value networks have been enthusiastically adopted by strategy practitioners, they have not been well theoretically developed and instead have remained isolated reactions to the linear and sequential dominant paradigm of Porter (1985). In contrast, although the strategic network provides more theoretical depth than the value constellation and value network, it does not theoretically consider value creation. Instead the strategic network has focused more on the competitive advantage the focal firm and on the nature of the relationships between the participants. In particular, a transaction cost approach (Williamson, 1975) underlies much of this theorizing, focusing on distribution of activities to the most efficient supplier and on comparative advantage. As such, strategy only offers limited theoretical depth with which to consider the collective value creation in ecosystems.

### **Resource dependency theory**

Resource dependency theory is based on the notion that an organization's pattern of dependence on environmental resources results in external constraints and control (Pfeffer & Salancik, 1978). There have been a diverse collection of conceptual models that consider the collective in which an

organization operates, such as the ‘organization set’ (Evan, 1966; Thompson, 1967), the ‘interorganizational field’ (Litwak & Hylton, 1962; Warren, 1967) and the ‘interorganizational collectivity’ (Van De Ven, Emmett, & Koenig, 1974). Perhaps the dominant model of organizational collectives in resource dependency theory is the ‘interorganizational network’. The interorganizational network considers how technical (and to a lesser extent social) interdependence influences the relationships and specialization of organizations, and how differentially powerful constituent organizations interact in pursuit of scarce resources (Astley & Van De Ven, 1983; Benson, 1975). Resource dependence theorists have tended to focus on the genesis and nature of the relations within the interorganizational network, rather than the network itself. For instance, Oliver (1990) proposed six determinants which drive the establishment of interorganizational relationships – necessity, asymmetry, efficiency, stability and legitimacy – and Harrigan and Newman (1990) noted that cooperating partners must have an unusual mix of propensity, power and persistence. Others have noted the importance of the social context of prior alliances which provide valuable information about the specific capabilities and reliability of the potential partners (Gulati, 1995; Gulati & Gargiulo, 1999). Yet others have focused on the nature of the interdependence, noting that there are two main dimensions of resource dependence – power imbalance and mutual dependence – which have opposite effects on an organizations ability to reduce dependencies (Casciaro & Piskorski, 2005).

Although resource dependency theory has rich theorizations on the relationships between organizations within a collective, the underlying logic of the theory is on power relationships and access to resources. This limits its ability to address notions of collective value creation that typify ecosystems, although Van De Ven et al. (1974) began to consider this through their notion of collective attainment of goals (which has not been subsequently developed). These limitations restrict resource dependency theory as a comprehensive framework to approach ecosystems.

### **Institutional theory**

Institutional theory emphasizes cultural rather than technical and economic forces in organizational change. In particular, institutional theory posits that the institutional environment leads to the development of organizational collectives that conform to institutional rules (Meyer & Rowan,

1977; Meyer, Scott, & Deal, 1981; Scott, 1983). Although there have been a number of conceptions of the collectives within which organizations operate, such as the societal sector (Scott & Meyer, 1983), industry system (Hirsch, 1985), business system (Whitley, 1992), interorganizational domain (Trist, 1983), the dominant model of the organizational collective is the organizational field (DiMaggio & Powell, 1983).<sup>1</sup> In their seminal paper DiMaggio and Powell (1983) defined the organizational field as “those organizations that, in the aggregate, constitute a recognized area of institutional life: key suppliers, resource and product consumers, regulatory agencies and other organizations that produce the similar services or products” (p. 148).

Beyond a network of organizations, an organizational field also has a set of institutions (Lawrence & Phillips, 2004). This set of institutions has regulatory, normative and cognitive dimensions (Scott, 2008). The regulative and normative dimensions are reflected in a governance system that consists of the established rules, role and assumptions that govern the interaction among participants of the field (Garud et al., 2002; Scott, 2008). The cognitive dimension reflects “a mutual awareness among participants in a set of organizations that they are involved in a common enterprise” (DiMaggio & Powell, 1983: 148). This was elaborated by Friedland and Alford (1991) who, introducing the symbolic element to institutional theory, noted institutions have a central logic – a set of material practices and symbols – which constitutes its organizing principles and which is available to organizations and individuals to elaborate. Put differently, institutional logics are the belief systems and associated practices that predominate and which reflect a field’s shared understanding of the goals to be pursued and how they are to be pursued (Battilana, Leca, & Boxenbaum, 2009; Scott, Ruef, Mendel, & Caronna, 2000). In doing so, institutional logics define and stabilize the identities and interactions of the institutional actors (Scott, 2008).

The ecosystem construct has many parallels to the organizational field. Both comprise of the ‘totality’ of actors in the network, including suppliers, complementors, customers, competitors, universities, regulators, judiciary, and standard setting bodies (DiMaggio & Powell, 1983; Iansiti &

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<sup>1</sup> Although the term ‘institutional field’ has also been used in the past, it has been replaced by the term ‘organizational field’ (Wooten & Hoffman, 2008); following Davis and Marquis (2005) we consider the two terms interchangeable.

Levien, 2004; Scott, 2008; Teece, 2007). Moreover, for both constructs these participants are viewed as being embedded in a network which influences the power of each participant to capture or direct the actions of the organizational field or ecosystem (Adner & Kapoor, 2010; Beckert, 2010; DiMaggio & Powell, 1983; Fligstein, 1991; Iansiti & Levien, 2004). Similarly, both ecosystems and organizational fields have governance systems which consist of regulative and normative elements (Adner, 2012; Garud et al., 2002; Gulati et al., 2012; Nambisan & Sawhney, 2011; Scott, 2008). Both the ecosystem construct and the organizational field construct also have a cognitive element – a central logic which constitutes its organizing principles and which is available to organizations and individuals to elaborate (Friedland & Alford, 1991; Gulati et al., 2012; Scott et al., 2000). This central logic emphasizes the importance of a shared understanding of the goals to be pursued and how they are to be pursued (Adner, 2012; Battilana et al., 2009; Gulati et al., 2012).

### **The fifth facet**

These similarities between the organizational field and ecosystem mean that the organizational field holds promise as a sophisticated theoretical framework for ecosystem research. However to do so, it needs to be able to support theorizations of collective value creation, which to date has not been developed. That said, the organizational field is a flexible construct, and collective value creation is able to be accommodated through extending its analytic focus. In its initial formulation, the analytic focus of the organizational field construct has been on a common industry: ‘those organizations that in the aggregate ... *produce similar services or products*’ (DiMaggio & Powell, 1983: p. 148; emphasis added). As theorizations of the organizational field have developed this analytic focus has extended (Wooten & Hoffman, 2008). Thus a second analytic focus is on common technologies, as no technology exists in a vacuum (Garud et al., 2002; Garud & Karnoe, 2001). In particular, a technology requires a defined institutional space with rules that govern the production, distribution, and consumption of associated artefacts (Dosi, 1982; Garud et al., 2002). A third analytic focus considers social issues, with the organizational field as “the center of common channels of dialogue and discussion” (Hoffman, 1999: 352). A fourth analytic focus considers the market to be an arena of social interaction for the exchange

of goods and services, and that cognition occurs through the creation, distribution, and interpretation of a web of information about the ‘market’ (Anand & Peterson, 2000; Beckert, 2010).

These differing analytic foci underpin the recognized area of institutional life to which the organizational field relates, and which demarcates its boundary (DiMaggio & Powell, 1983). As an organizational field only exists to the extent that it is institutionally defined by its constituent members (Fligstein, 2001; Friedland & Alford, 1991; Lounsbury, Ventresca, & Hirsch, 2003; Scott, 2008), to be a *recognized* area of institutional life a domain must be acknowledged as such by the constituent actors. This acknowledgment is not an objective recognition by an impartial observer but instead a subjective recognition by the field participants. Consequently, the formulation of an institutional field does not exclude the possibility that other areas of institutional life can be considered organizational fields, so long as the constituent members recognize it as such. Each of the analytic foci identified above – common industry, common technologies, issues and markets – considers that organizational fields are networks of organizations which share a set of institutions; however, for each the participants have differing subjective recognized areas of institutional life. Therefore, rather than consider these as different types of organizational fields, these extensions should be considered as different facets (or aspects), with each aspect addressing a different recognized area of institutional life. Put differently, an organizational field is a multi-faceted construct that applies to heterogeneous recognized areas of institutional life (Wooten & Hoffman, 2008).

Recognizing each of these four facets, we suggest that the ecosystem should be considered a fifth facet of the organizational field construct, where collective value creation acts as a recognized area of institutional life. Driven by the explicit recognition that they are members of an ecosystem, there is a distinctive institutional logic and collective identity based around collective value creation. As a result, an ecosystem can also be considered as having a discrete recognized area of institutional life – that of collective value creation. This emphasis on collective value creation means that the ecosystem area of institutional life differs from each of the four already identified facets.

## AN ECOSYSTEM CONSTRUCT

In the section above we have argued that the organizational field provides a sophisticated and comprehensive theoretical perspective to consider ecosystems. Building upon this insight, we now sketch out the dimensions of an ecosystem construct, maintaining both the core institutional understandings of the organizational field within the context of an ecosystem as well as the importance of participant interdependency in driving value creation (see Figure 1).

[Insert Figure 1 around here]

There are three characteristics of an ecosystem. The network of participants characteristic comprises of participant specialization, complementariness, and co-evolution, emphasizing the interdependencies that exists between ecosystem participants. In particular, participants are specialized in that each provides a particular input that makes up the system, and complementary in that add value through synergistic, cumulative interaction. Moreover, over time, driven their interdependency, participants co-evolve, growing and developing in ways to maintain the stability of the ecosystem. The governance characteristic consists of the authority structure that decision-making, membership control that considers the ecosystem openness, and task coordination to enable smooth operation. Together these governance attributes enable collective value creation and the ongoing stability and evolution of the ecosystem by providing for participants to coordinate their interdependencies. The shared logic characteristic considers legitimacy, trust and the mutual awareness between the participants that they are involved in a shared enterprise, underlining the social and cognitive aspects of participant interdependency. These attributes provide the cognitive glue that binds the participants together in understanding their interdependency.

### **Network of participants**

The first characteristic of an ecosystem is that it is comprised of an interdependent network of participants (Adner, 2012; DiMaggio & Powell, 1983; Lawrence & Phillips, 2004). Within this network of participants, participants are specialized, in that each provides a particular input that makes up the system. In addition, each participant is complementary, in that they are not only heterogeneously specialized and evolve together, but also add to the value creation through synergistic, cumulative

interaction. A final element is that the participants co-evolve, in that they grow and develop in ways to maintain the stability of the ecosystem.

**Specialization.** Specialization is a feature of modern economic organization (Nelson & Winter, 1982; Smith, 1994; Stigler, 1951). Specialization in ecosystems emanates from the need to provide particular inputs into the ecosystem that are integrated so as to create value synergies. For instance, in telecommunications contexts, specialization often consists of new technology, customer relationship management and infrastructure management (Li & Whalley, 2002). Within ecosystems specialization drives the performance of the ecosystem (Normann & Ramirez, 1993). Specialization also enables each organization to provide the best inputs into the ecosystem that they can supply, and in doing so play to their respective strengths (Bresnahan & Greenstein, 1999). This participant specialization enables the lowering of the final total cost and leads to the economic feasibility of the ecosystem. From a resource perspective, specialization enables performance as each participant contributes only what it regards as its core competencies (Christopher & Gaudenzi, 2009), and this collaboration between participants and their core capabilities drives value creation ability of the network (Bovet & Martha, 2000).

Therefore we propose:

*Proposition 1: Value creation in ecosystems is more likely in situations where the ecosystem participants are specialized.*

**Complementariness.** Whereas specialization describes the need of organizations to provide specific inputs, Complementariness, or the synergistic and cumulative interaction between participants, is an important dimension on the symbiosis that exists between participants. As participants are heterogeneous, the creation of synergies is not achievable without complementarity (Iansiti & Levien, 2004; Moore, 1993) and where each participant is individually significant and interdependent on the other (Mouzas & Ford, 2009). Complementariness is not only expressed through the functional characteristics of each participant, but also through their obligations to the ecosystem and the product or service co-production lifecycle (Agerfalk & Fitzgerald, 2008). The complementariness and interdependence among participants is often driven by customer dynamics, competitive dynamics and

technology dynamics (Pagani & Fine, 2008). Without complementariness, the specialization of the participants is not sufficient for the ongoing creation and appropriation of value in the ecosystem. This is due to the fact that complementariness ensures that the competences and capabilities of the individual participants are cumulative and synergistic. Hence the complementariness between the participants provides the substance from which value is co-created (Adner & Kapoor, 2010; Gulati et al., 2000).

However, this complementariness needs to be additive, in that the ecosystem participants to add value to the ecosystem offering above and beyond activities performed by others. Additivity enables the efforts of multiple participants to be cumulative and not duplicative. For instance, Boudreau (2012) has shown that there is a direct positive relationship between the number of app developers and the variety of applications available in the handheld computer market. In this example, each participant is additive in that they add functionality to the ecosystem offering without duplicating the efforts of other app developers. Together with the technical design feature of complementarity, additivity allows the proliferation and readjustment of product and system features for alternative uses (Gawer & Cusumano, 2002; Spinello, 2005).

As such, we propose:

*Proposition 2: Value creation in ecosystems is more likely in situations where the participants are complementary and additive.*

**Co-evolution.** The participants within the network also co-evolve, as they need to develop over time sympathetically with the other participants in order to maintain stability and health of the ecosystem in the face of change. Co-evolution is the corollary of both the specialization and complementariness in that ecosystem participants necessarily need to continue to provide the specialized and complementary inputs that enable the collective creation of value. As market and technological conditions change, in order to continue the collective creation of value, they need to change in harmony with the changing ecosystem. Thus when technological change renders obsolete the capabilities of other ecosystem participants, in that they were not able to co-evolve, the other non-affected participants also have a performance decrease (Afuah, 2000). Similarly, the timing of a technology entry is important in maintaining ecosystem stability so that the other participant firms have

an opportunity to evolve in response (Afuah, 2004). In order to maintain specialization and complementarity in the face of ecosystem hazards, only some complementary firms possess the knowledge or related experience necessary to adapt to this changing ecosystem, meaning that those that do not evolve, perish (Pierce, 2009).

As such, we propose:

*Proposition 3: Value creation in ecosystems is more likely in situations where the participants co-evolve.*

### **Governance system**

A second characteristic of the ecosystem is a governance system that coordinates the activities of the participants (DiMaggio & Powell, 1983; Gulati et al., 2012; Lawrence & Phillips, 2004; Tiwana et al., 2010). Governance consists of the authority structure that underpins task identification and assignment, decision-making, and conflict resolution, membership control that considers the permeability of the boundaries of the ecosystem, and coordination for task execution to enable smooth operation.

**Authority structure.** The relations between participants in an ecosystem reflect both the direct and indirect ties between the participants, as well as positional similarity, leading to “interorganizational structures of dominance and patterns of coalition” (DiMaggio & Powell, 1983: 148). These interorganizational structures influence the power of an organization or set of organizations to capture or direct the actions of the ecosystems (Fligstein, 1991). Ecosystems are therefore have an authority structure resulting from the power differences between firms (Beckert, 2010).

Although ecosystem participants are bound by complex relations that involve mutual interdependence, the degree of stratification between participants can vary (Gulati et al., 2012), reflecting power differentials between the participants. This stratification often naturally emerges in networks, regardless of the nature of the networked system, the participants, or the specific nature of the connections (Barabási, 2002; Cohen, 2002; Newman, 2001). Stratification can occur through ownership, such as through the provision of a stable and predictable set of common assets (Gawer &

Cusumano, 2002; Iansiti & Levien, 2004), through being a fundamental technological element of the ecosystem (Gawer & Cusumano, 2008), or through leveraging a brand (Pierce, 2009). Stratification can be also be purposefully introduced into ecosystems, through tiering in task assignment or administration, which can complement other mechanisms of stratification. Gulati et al. (2012) note that in situations of higher stratification through design, a degree of hierarchical decision-making is possible because of defined roles and normative expectations. In situations of low stratification, where the power afforded is limited, hierarchical decision-making is often impossible. In these situations roles and normative expectations emerge around a peer-based approach (Gulati et al., 2012), and self-enforcing governance is required (Dyer & Singh, 1998; Gulati, 1995; Larson, 1992; Powell, 1990).

Thus, in ecosystems, although the authority that results is often limited in scope, especially in open-membership contexts, stratification creates the social structure that can guides the allocation of the decisions as to what the ecosystem does, how this purpose should be done, and who coordinates specific aspects (Scott & Meyer, 1983; Tiwana et al., 2010). Stratification provides a useful symbolic tool to draw attention to which issues are important and which competencies and behaviors are valued (Gulati et al., 2012).

As such, we propose:

*Proposition 4: Value creation in ecosystems is more likely in situations where there is an authority structure.*

**Membership control.** As all ecosystem boundaries are permeable to some extent, an important governance function is determining how open the ecosystem is to new members (Gulati et al., 2012; Lawrence, 1999). In particular, the rules of membership delineate both the exclusionary boundaries of the ecosystem, and the space within which participants can operate (Lawrence, 1999). Given that membership of ecosystems is to the most part voluntary, the application of these rules of membership are often expressed as the level of openness of the ecosystem (Boudreau, 2010; Eisenmann, Parker, & Van Alstyne, 2009).

Openness in ecosystem contexts can consist of powerful central participants, such as platform owners, deciding on who can join driven by rules considering specialization and complementarity (Boudreau & Hagiu, 2009). More commonly, openness is driven by varying the levels of openness of the standards required to interoperate within the ecosystem (West, 2003). These can range from the use of open industry standards, to varying levels of openness relating to proprietary standards. Industry standards can ease both the decision to participate by reducing the investment required, as well as the ongoing burden of participation, leading to greater value creation (Baldwin & Clark, 2000; West, 2003).

Decisions about boundaries and the relative openness of membership fundamentally alter the dynamics of collective value creation within an ecosystem (Gulati et al., 2012). For instance, when the ecosystem is fairly open, network effects can drive value creation as each new participant provides the impetus for new participants to join (Eisenmann et al., 2009; Rochet & Tirole, 2006). However care needs to be taken on how open the ecosystem is. If participation is widened to include similar sub-system varieties that already exist within the ecosystem, collective value creation can be depressed due to competitive crowding (Boudreau, 2012). In addition, the relative openness an ecosystem drives the amount of innovation in the ecosystem and hence potential for value creation (Boudreau, 2012; Gawer & Cusumano, 2002, 2008). Specifically, the more open the ecosystem is, the greater variety participants and resulting greater variety of components within the ecosystem (Boudreau, 2010). The relative openness of the ecosystem also moderates the value that can be created by individual participants (Eisenmann, 2008; Gulati et al., 2012; Nambisan & Sawhney, 2011).

As such, we propose:

*Proposition 5: Value creation in ecosystems is more likely in situations where membership is controlled.*

**Task coordination.** Coordination is necessary for task execution in ecosystems to enable smooth operation. All ecosystems have rules and standards that cover interactions between the participants, as these collaboration processes enable ecosystem functioning and survival (Adner, 2012; Gawer & Cusumano, 2002; Iansiti & Levien, 2004; Nambisan & Sawhney, 2011). These collaboration processes provide the ‘rules of the game’ within the ecosystem. For example, to participate within an ecosystem,

such as developing specific software for a platform such as SAP, participants generally need to agree to a common contract which provides the regulations that govern collaboration. Even for those ecosystems that are more open, such as open source projects, during the registration participants generally also agree to a limited set of legal requirements. More specific operational coordination processes include the management of offering coherence, knowledge flows, network membership, network stability, and appropriability (Nambisan & Sawhney, 2011). Depending on the size of the ecosystem community and the degree of stratification, coordination mechanisms can range from top-down, hierarchical direction through established lines of command to lateral and informal coordination, for example, through the communication of technological trends and the propagation of social roles and behavioral norms (Garud, Kumaraswamy, & Sambamurthy, 2006; Gawer & Phillips, 2013; West, 2003).

Coordination can be exercised through technological means such as varying the modularity of the product and service (Cusumano & Gawer, 2002; Gawer & Cusumano, 2008; Weiss & Gangadharan, 2010), the standardization of interfaces (Gawer & Cusumano, 2008; Li, 2009; Tilson & Lyytinen, 2006; Weiss & Gangadharan, 2010), or restricting access (Gulati et al., 2012; Hardy & Phillips, 1998). Where there is a platform, coordination is achieved through rules, roles, and procedures embedded in the platform itself and communicated to ecosystem participants (Bakos & Katsamakas, 2008). These standards and rules reduce complexity (Weiss & Gangadharan, 2010) and also facilitate network relationships (Stabell & Fjeldstad, 1998; Thompson, 1967).

As such, we propose:

*Proposition 6: Value creation in ecosystems is more likely in situations where there is task coordination of the participants.*

### **Shared Logic**

A third characteristic of ecosystems is the importance of a shared logic that consists of legitimacy and meaning (Battilana et al., 2009). Closely related to discursive practices (Levy & Scully, 2007; Phillips, Lawrence, & Hardy, 2004), this shared logic is are symbolically grounded, organizationally

structured, politically defended, and technically and materially constrained (Friedland & Alford, 1991). As such they define and stabilize the identities and interactions of the ecosystem participants (Scott, 2008). Providing for a functioning and stable ecosystem, a shared logic enables differing participants to co-exist with minimal friction, as individual participants may have institutional logics that are specific to their particular industry organizational field (Adner, 2012; Iansiti & Levien, 2004). There are three components to the shared logic characteristic: legitimacy, trust, and a mutual awareness between the participants that they are involved in a shared enterprise.

**Legitimacy.** Defined as the “*generalized perception or assumption that the actions of an entity are desirable, proper or appropriate within some socially constructed system of norms, values, beliefs and definitions*” (Suchman, 1995: 574), legitimacy reflects perceived consonance with relevant social and behavioral norms and established rules, laws, and regulations (Scott, 2008). Ecosystems need to manage legitimacy both internally and externally (Gawer & Phillips, 2013; Iansiti & Levien, 2004). Embedded in a wider socio-economic context, ecosystems as a whole need external social acceptability, plausibility, and credibility beyond their material resources and instrumental technical capabilities (DiMaggio, 1988; Scott et al., 2000). Internally, to effectively coordinate an ecosystem, the ecosystem facilitator needs social acceptability and legitimacy to gain and maintain a leadership position (Adner & Snow, 2010; Gawer & Phillips, 2013). External and internal legitimation challenges reflect the distinction between socio-political and cognitive legitimacy in the institutional literature (Aldrich & Fiol, 1994). Socio-political legitimacy is crucial for gaining acceptance and support within the wider society in which the ecosystem resides, whereas cognitive legitimacy is important to attract participants into the ecosystem and ensure that their activities are coordinated.

*Socio-political legitimacy* considers how key stakeholders, opinion leaders, and wider society accept and endorse the ecosystem as appropriate and proper (Aldrich & Fiol, 1994; Scott, 2008). One element of socio-political legitimacy is ensuring that the ecosystem in question has been established by and operates within relevant legal and quasi-legal requirements (Scott, 2008). A more salient mechanism by which an ecosystem can gain socio-political legitimacy is how an ecosystem is accepted by salient external stakeholders (Sine, David, & Mitsuhashi, 2007). For instance, institutional

intervention, such as government regulation (Holm, 1995), government purchases of a product (Suarez, 2004), large and powerful users requesting a particular product design (Tushman & Rosenkopf, 1992), or being accepted as members of private institutions such as industry associations or standards making bodies can signal socio-political legitimacy (Suarez, 2004; Tushman & Rosenkopf, 1992). A further source of socio-political legitimacy is through endorsement, such as through authorization from authorities (Sine et al., 2007), endorsement by key stakeholders and others by addressing the external environment through social movement-like activities (Rao, Morrill, & Zald, 2000; Swaminathan & Wade, 2001), and including high-status participants (Battilana et al., 2009; Gulati et al., 2012; Maguire, Hardy, & Lawrence, 2004). The activity of competitors can also enhance socio-political endorsement by driving market take-off, technological improvement, and awareness of the ecosystem (Agarwal & Bayus, 2002), as well as triggering certification competitions which highlight the ‘best’ service or product (Rao, 1994).

*Cognitive legitimacy* refers to a shared understanding of what the emergent ecosystem is about and what it seeks to achieve. Cognitive legitimacy is established through active sense-making and occasional controversy, as ecosystem participants establish a shared understanding of how the ecosystem functions and what the roles of various participants are within it (Adner, 2012; Aldrich & Fiol, 1994; Munir & Phillips, 2005; Phillips et al., 2004; Suddaby & Greenwood, 2005). Sense-making is facilitated by shared narratives, appealing rhetoric, and culturally powerful analogies, promoted through shared texts (such as white papers) and field-organizing events such as conferences and workshops (Etzion & Ferraro, 2010; Lampel & Meyer, 2008; Oliver & Montgomery, 2008; Suddaby & Greenwood, 2005; Zilber, 2007). This discourse is complemented by intense experimentation and search for good practices, as participants adopt, adapt, and implement new technologies in the emerging ecosystem (Garud & Rappa, 1994; Kaplan & Murray, 2010; Kaplan & Tripsas, 2008; Tushman & Rosenkopf, 1992). Together, these activities support the formation of a shared field-level identity among the ecosystem participants (Lounsbury et al., 2003; McAdam, Tarrow, & Tilly, 2001; Rosenkopf & Tushman, 1998).

As such, we propose:

*Proposition 7: Value creation in ecosystems is more likely in situations where there is both socio-political and cognitive legitimacy.*

**Trust.** Early on in ecosystem research, Iansiti and Levien (2004: 208) underlined the importance of trust in ecosystem operations, noting that “*trust is fundamental ... [as] ... ultimately it decreases operating costs and risk exposure. A well-trusted marketplace will need to spend less in attracting customers and in managing their relationships.*” Others have also acknowledged the importance of norms of openness, trust, tact, and professionalism in facilitating collective value creation (see for instance Agerfalk & Fitzgerald, 2008). As noted above, stratification can vary within ecosystems, as often roles and normative expectations emerge through a peer-based approach to coordination (Gulati et al., 2012). Much ecosystem coordination is based on self-enforcing governance mechanisms (Dyer & Singh, 1998), such as goodwill, trust, and reputation (Gulati, 1995; Larson, 1992; Powell, 1990). As informal governance mechanisms reinforce adherence to shared behavioral norms, they contribute to ecosystem participants’ belief in enhanced value creation and equitable value capture, while reducing distrust and suspicions that the hub firm may suddenly undermine others.

As such, we propose:

*Proposition 8: Value creation in ecosystems is more likely in situations where trust exists between the participants.*

**Mutual awareness.** Beyond legitimacy and trust, within ecosystems there is also a mutual awareness of participants that are engaged in a common enterprise of system level collective value creation, with a shared understanding of goals and how they are to be pursued (Adner, 2012; Gulati et al., 2012). In ecosystems the conversation between organizations changes from a firm-centric to an ecosystem perspective, as participants discursively confront the challenges that lie beyond their own immediate responsibilities, consider how they want to organize and address the risks of organization, and how to act proactively in the future (Adner, 2012). As a consequence, the mutual awareness of common enterprise is more than a simple awareness that each participant is collaborating with others. It extends not only to include norms of behavior and the goals of collaboration, but also to a common understanding of the logic of value – what and how value is to be collectively created. This mutual

awareness of collective value creation results in a collective identity that is embedded in the shared logic, which can be actively supported by the actions of the hub firm (Gawer & Phillips, 2013). Moreover, being the center of the common channels of dialogue and discussion around which issues of collective value creation and sharing arise and evolve (Gawer & Cusumano, 2002; Iansiti & Levien, 2004), means that hub firms can guide ecosystems through, for example, influencing the on-going discourse and sense-making processes and through the subtle exercise of power (Weick, 1995).

The mutual awareness of participants is also reflected within the construction of an ecosystem identity, where participants advertise their inclusion in the ecosystem as well as their level of participation through logos and other insignia. Some go as far as to reflect the ecosystem identity within their corporate brand and identity. Ecosystem participants also gather together physically, share their experiences and to debate and agree practices, norms and meanings (Lampel & Meyer, 2008). Much effort is often expended in aligning the perspectives on the future success of the ecosystem, in the process constructing an ecosystem level frame in the same manner as a 'field-level' frame (Lounsbury et al., 2003) and legitimating the collective identity (Gawer & Phillips, 2013). In doing so the identities and interactions of the ecosystem participants are defined and stabilized (Scott, 2008).

As such, we propose:

*Proposition 9: Value creation in ecosystems is more likely in situations where there is a mutual awareness between ecosystems participants that they are engaged in a common enterprise of collective value creation.*

## **DISCUSSION AND CONCLUSION**

We have argued that an ecosystem is typified by a logic of collective value creation, but which does not currently have a coherent theoretical framework. Building upon this, we demonstrated that the strategy literature has developed some useful notions of collective value creation but which have not been theoretically developed, and that resource dependence theory has some useful theorizations of organizational collectives, but which do not theoretically account for collective value creation. Pioneering an institutional approach to ecosystems, we then argued that the organizational field

construct has similarities with the ecosystem, as well as being able to theoretically account for collective value creation. In doing so we argue that the ecosystem is the fifth facet, where collective value creation acts as the common recognized area of institutional life. Building upon theorizations of the organizational field, we have sketched out the contours of an ecosystem construct, suggesting three characteristics: a network of participants, a governance system, and a shared logic.

An implication of our institutional approach is that existing research into organizational fields provides useful insight into the dynamics of ecosystems. Theorizations of how dominant organizational arrangements reproduce themselves through the distribution of rules and resources, and the ability of skilled actors to use these to reproduce their power (Fligstein, 2001), assist the scholar in appreciating similar dynamics in ecosystem contexts. Moreover, theorizations of the organizational field also offers a sophisticated understanding of how these power structures are created, sustained and transformed, which external forces are at work, and the conditions for change (Fligstein, 2001). The attention to legitimacy and the institutional logic in theorizations of organizational fields are also relevant to understanding the dynamics of ecosystems. Understanding the sources of legitimacy (Deephouse & Suchman, 2008; Meyer & Scott, 1983; Suchman, 1995), legitimation processes (Deephouse & Suchman, 2008; Greenwood, Suddaby, & Hinings, 2002), as well as the consequences of legitimacy (Deephouse & Suchman, 2008; Meyer & Rowan, 1977), offers the potential to advance research into ecosystem dynamics. Some ecosystem scholars are already adopting such approaches. For instance, analyzing the emergence of Cisco as a platform leader, Gawer and Phillips (2013) expound upon the differing legitimacy and practice work a hub firm undertakes in order to become and remain a platform leader in an ecosystem.

Existing institutionally oriented research into collaboration also holds promise for research into ecosystem dynamics. As organizational fields act as sources of rules and resources for collaboration, often collaborating parties draw from their 'home' organizational field in order to agree the terms of the collaboration (Phillips, Lawrence, & Hardy, 2000), underscoring the potential of collaborative research in ecosystem contexts. One potential approach is negotiated order theory, which holds that organizations can collaborate in constructing their organizational field by agreeing on the 'rules of the

game' for their interactions with one another (Day & Day, 1977; Gray, 1989; Nathan & Mitroff, 1991). Hardy and Phillips (1998) differentiate differing types of conflict and cooperation that occur within organizational fields. For instance, cooperation can be distinguished between reciprocal collaboration where there is a probably change to the ecosystem, and compliance typified by high dependency on, and regulation by, a central authority which results in a reduced likelihood of change within the ecosystem. Conflict can morph into contention where there is a significant likelihood of change within the ecosystem and contestation where there is only limited possibility of change. Taken together these theorizations of collaboration suggest a more nuanced understanding of how ecosystem participants interact.

Another implication of an institutional approach is that existing research into organizational fields provides useful insight into ecosystem boundaries. Ecosystem boundary definition is complex, as the boundaries are usually considered to be fairly open and permeable (Gulati et al., 2012; Iansiti & Levien, 2004). This difficulty is reflected in the different attempts to operationalize ecosystem boundaries. As an example, in their value-based model, Adner and Kapoor (2010) operationalized an ecosystem as consisting of only those participants (suppliers, complementors, customers) that were only one network link away from the focal firm or customer. In contrast, other boundary definitions are not as clear. Iansiti and Levien (2004) emphasize participant identification with ecosystem membership and argue that ecosystem boundaries are hub firm specific, drawn through the identification of ecosystem participants with the wider ecosystem membership. Boundary definition has been directly faced by institutional theorists when considering theorizing the organizational field. Specifically, the boundaries of an organizational field are generally defined through the dominant institutional logics (Scott, 2008; Zietsma & Lawrence, 2010) and shared cultural-cognitive, normative or regulatory frameworks (DiMaggio & Powell, 1983; Scott, 2008). Boundaries have also been defined through the extent of the adoption of institutional practices (Zietsma & Lawrence, 2010), as well as seen as truce-making in a process of contestation, in that they only become established only when the ecosystem participants coalesce around a frame that organizes activities (Rao et al., 2000). These institutional theorizations should enable ecosystem boundaries to be drawn with reference to the participants of the ecosystem.

This is a potentially powerful approach as it moves the referent by which a boundary is defined from an ecosystem participant (the hub firm), to the ecosystem as a whole.

Although we have argued that the ecosystem construct should be considered through the lens of the organizational field, we do not intend to foreclose the application of other theoretical approaches to understand ecosystems. Indeed, as many approaches that have been labelled institutional have implicitly been organizational ecology and resource dependency arguments clothed in the language of institutionalism (Wooten & Hoffman, 2008), an analysis of ecosystems using these arguments may indeed be fruitful. For instance, the focus on technological interdependence in ecosystem contexts underscores the salience of resource dependency theory logics to ecosystem research (Pfeffer & Salancik, 1978). All participants in an ecosystem, including the hub firm, are dependent on each other for the co-creation of value, and also jointly dependent on the environment external to the ecosystem. Although the types of control strategies that are used in ecosystems are being systematically analyzed in the strategy (see for instance Gulati et al., 2012; Nambisan & Sawhney, 2011) and industrial economics literature (see for instance Boudreau & Hagi, 2009), a resource dependency view which incorporates the influences of multiple dependencies on an ecosystem participant could shed light on these interdependencies. Similarly, given the importance of participant diversity in ecosystem contexts, an organizational ecology approach (Hannan & Freeman, 1977) could provide a useful lens to study homogeneity and heterogeneity in ecosystems contexts. For example, the application of a variation and selection logic driven by technical interdependence has the potential to shed light on participant heterogeneity. Furthermore, this approach could enable an analysis of the dynamics of participant symbiosis, providing a framework to consider the process of how new populations branch out from established ones to take advantage of new ecosystem niches.

In conclusion, in this paper we have pioneered an institutional approach to ecosystems, and deepened and extended ecosystem research through the definition of an ecosystem construct. The existence of the mature and empirically rich institutional literature should aid in the operationalization and further empirical investigation of ecosystems. We sketched out three common characteristics which provide the contours of the ecosystem construct, which also emphasize the interdependencies that exist

between the participants. We also discussed the implications of our institutional perspective on ecosystems, specifically noting how institutional and related theories can assist in understanding ecosystem dynamics and boundaries. We hope that this is a more coherent means of understanding ecosystems, and that this paper will inspire researchers to continue to develop the construct in a meaningful way.

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**FIGURE 1 – THE ECOSYSTEM CONSTRUCT**

