

# UNDERSTANDING INSTITUTIONAL COMPLEXITY IN SERVICE ECOSYSTEMS – INSIGHTS FROM SOCIAL NETWORK THEORY AND SYSTEMS THINKING

< Service Innovation; The development of Service-Dominant Logic; The role of institutional logics in service research; Networks, interaction and relationships >

## *ABSTRACT*

**Purpose** – The paper aims to synthesize some key insights from social network theory and systems thinking to better understand the existence and dynamics of institutional complexity – the source of institutional change and innovation – in service ecosystems.

**Design/Methodology/approach** – This conceptual paper integrates insights from social network theory (e.g., Burt, 1992; Granovetter, 1973) and systems thinking (e.g. Simon, 1996) to elaborate the service ecosystems perspective on institutional complexity and innovation.

**Findings** – S-D logic and its service ecosystem perspective (Lusch and Vargo, 2014; Vargo and Akaka, 2012; Vargo et al., 2015) imply that value is created by systems consisting of actors who fundamentally do the same thing: cocreate value by exchanging and integrating resources (Vargo and Lusch, 2011). This view results in a systemic notion of value cocreation that highlights the role of institutions as the ‘glue’ of service ecosystems that both enables and constrains value cocreation (Edvardsson et al., 2014; Vargo and Akaka, 2012). In this paper, we extend the service ecosystems perspective on innovation as institutional change in value cocreation by elaborating the dynamics of institutional complexity – the coexistence and interaction of numerous and partially conflicting institutional arrangements – crucial for agency and change in service ecosystems (Sitaloppi et al., 2014). Building on the notions of ‘weak ties’, ‘structural holes’ and ‘near-decomposability’ as well as the triadic view inherent in them, the paper argues that service ecosystems can be seen as complex systems characterized by near-decomposability. This implies that parts or subsystems of service ecosystem(s) interact with one another with varying frequency and tie ‘strengths’ resulting in inconsistencies and incompatibility of institutional arrangements between the subsystems that causes institutional complexity especially as actors can be simultaneously embedded in several subsystems and their respective institutional arrangements.

**Research implications** – The paper highlights the importance of 1) triads as a unit of analysis, 2) complexity in institutional arrangements, actors’ role constellations and mutual interactions, and 3) varying density of interaction between subsystems of service ecosystem for building a better understanding of institutional complexity, change and innovation in service ecosystems.

**Originality/value** – This paper is among the first to integrate insights from social network theory and systems thinking to elaborate institutional complexity in service ecosystems.

**Key words** – Service ecosystems, Institutions, Innovation, Social Network theory, Systems thinking, Triads

**Paper type** – Conceptual paper

## **Introduction**

Understanding how service innovation takes place in complex service systems and networks is considered to be one of the most important research priorities in service research (Ostrom et al., 2015). This paper aims to shed light on service innovation, not as a novel firm produced output, but as an institutional change in how value is cocreated in service ecosystems (Koskela-Huotari et al. 2014; Vargo et al., 2015). Service-dominant (S-D) logic and its service ecosystem perspective (Lusch and Vargo, 2014; Vargo and Akaka, 2012; Vargo et al., 2015) argue that value is created by systems of numerous actors who fundamentally do the same thing: cocreate value by integrating resources through service-for-service exchanges (Vargo and Lusch, 2011). This view results in a systemic notion of value cocreation that acknowledges the importance of both direct and indirect service exchanges (Chandler and Vargo, 2011), and the role of institutions as a glue of service ecosystems that coordinates value cocreation (Edvardsson et al., 2014; Vargo and Akaka, 2012). Furthermore, the service ecosystems perspective portrays innovation as the collaborative recombination of value cocreation practices that provide new solutions to existing problems, and at least partially disrupts existing institutions (Vargo et al., 2015). This view of innovation emphasizes that change in the institutionalized and interrelated rules, norms, meanings and practices of service ecosystems is always a cocreative process in which actors try to resolve the nested contradictions and inconsistencies that are foundational to all institutional arrangements.

To advance the service ecosystems perspective, we build on a view of change and innovation stemming from institutional complexity, that is, the contradictions and inconsistencies inherent to institutional arrangements comprising service ecosystems (e.g. Sitaloppi et al., 2014). This view explains how actors gain their ability to ‘act otherwise’, that is, to innovate new solutions by disrupting and changing institutions in collaboration with other actors despite the constraining effects of institutions toward conformity and isomorphism (e.g., Powell and DiMaggio, 1991; Sewell, 1992). In service ecosystems, multiple institutional arrangements exist on multiple nested ‘levels’. Actors gain the opportunity for choice and change when they are able to reconcile the

institutional conflicts characterizing the intersections of different institutional arrangements, which elevate reflexive problem-solving and allow actors to leverage the resources they access from different institutional spheres they are connected to synthesize and change existing institutions (Koskela-Huotari et al., 2014; Siltaloppi et al., 2014; see also Greenwood et al., 2011; Seo and Creed, 2002; Swidler, 1986; Thornton et al., 2012).

In this paper, we extend these ideas by looking at the ‘structure’ and ‘linkages’ of actors and institutional arrangements constitutive to the service ecosystems. Building on social network literature as well as systems thinking, the purpose of this paper is to complement the complexity-based view of agency, innovation and change in service ecosystems to account for the differences in actors’ ability to initiate and promote change, participate in innovation, and benefit, directly or indirectly, from the creation of new practices. We draw particularly from the notions of ‘weak ties’ (Granovetter, 1973), ‘structural holes’ (Burt, 1992) and ‘near-decomposability’ (Simon, 1962; 1996), which all point toward similar explanations of agency and systemic change rooted in the structure of the web of connections among actors (see also Callon, 1998; Granovetter, 1985; 2005).

This paper is structured as follows: first, we elaborate the service ecosystems perspective on innovation as an institutional change, review literature on institutional change that points toward the critical role of institutional complexity as a source of agency, change, and innovation in service ecosystems. We, then, draw from social network theory and systems thinking and introduce the notions of weak and strong ties, structural holes and near-decomposability and discuss how these notions can help to better understand the existence and dynamics of institutional complexity in service ecosystems. Last, we conclude with highlighting the implications of the paper for future research.

### **Service ecosystems perspective on innovation**

Service-dominant (S-D) logic (Lusch and Vargo, 2014, Vargo and Lusch, 2004; 2008; 2011) is best characterized as a transcending worldview originally aimed at overcoming the products versus services (or tangible versus intangible output) divide characterizing much of the current research.

This was done by introducing the transcending notion of *service* that focuses on the process of serving rather than on a form of output (Vargo and Lusch, 2004; 2008). In S-D logic, service is defined as the application of resources (such as knowledge and skills) for the benefit of another (Vargo and Lusch, 2004). Furthermore, it is argued that service is always exchanged for service, either directly or indirectly. This means that actors apply their competences to provide service for others and reciprocally receive similar kind of service (others' applied competences or 'rights' for future competences) in return. Conceptualized this way, service becomes the fundamental basis of all exchange, providing a common framework for understanding exchange and human interaction both in the 'economic' and 'social' spheres of life.

Additionally, S-D logic is based on an understanding of the interwoven fabric of individuals and organizations, brought together into networks and societies, specializing in and exchanging service to create value at the context of their everyday lives (Chandler and Vargo, 2011; Lusch et al., 2007). Hence, S-D logic views value as contextual and cocreated through service-for-service exchanges among multiple actors (Lusch and Vargo, 2014; Vargo and Lusch, 2004). S-D logic can be seen as a part of the more general move away from a mechanistic to a systemic worldview (Capra and Luisi, 2014) as it highlights the dynamic and complex nature of value cocreation by arguing that actors constantly apply and exchange their competences and integrate available resources from multiple sources for value cocreation (Vargo and Lusch, 2011). This systemic view is encapsulated in the concept of *service ecosystems*, defined as “relatively self-contained, self-adjusting system[s] of resource-integrating actors connected by shared institutional logics and mutual value creation through service exchange” (Lusch and Vargo, 2014: 161). Hence, the emerging service ecosystems perspective (see e.g. Koskela-Huotari and Vargo, *forthcoming*; Lusch and Vargo, 2014; Vargo and Akaka, 2012) emphasizes the cocreated nature of value, flow of reciprocal service exchange, the dynamic integration of resources, and the importance of institutions – shared rules, norms, values and beliefs, as well as shared language and technologies –

and institutional arrangements – sets of interrelated institutions – as constitutive elements of service ecosystems.

The transcending notion of service, combined with the institutional and systemic view embedded in the service ecosystems perspective, points toward a broader conceptualization of (service) innovation, not as new products or services, but as change in how value is cocreated in service ecosystems through resource integration. Ultimately, this view suggests that innovation is driven by the collaborative efforts of various actors to find or develop new ways to cocreate value within service ecosystems by changing the institutional structure that enable and constrain their actions (Koskela-Huotari et al., 2014; Siltaloppi et al., 2014; Vargo et al., 2015). Hence the nature of innovation changes drastically from novel outputs to the process of institutionalizing new value cocreation practices in a service ecosystem. Compared to the traditional views on innovation, the service ecosystems perspective not only removes the distinction between “producers” and “consumers” in value cocreation (Vargo and Lusch, 2011) and blurs the line between ‘economic’ and ‘social’ innovation (Koskela-Huotari et al., 2014), but also eradicates the distinction between “innovators” and “adopters” and argues that all actors participate in innovation with a fundamentally similar way by creating, maintaining and disrupting institutions (Vargo et al., 2015).

### **Institutional complexity as a prerequisite for institutional change in service ecosystems**

The basic premise of institutional literature is that in social conduct, actors tend to institutionalize certain practices for solving problems, which together with the associated rules, values and meanings provide stability and meaning to social life (e.g., Scott, 2014). With origins in understanding the formation and persistence of institutions (Ebbinghaus, 2009), more recent research on institutions has sought to understand institutional change. Dacin et al. (2002), for example, suggest that institutional change can proceed from the most micro interpersonal and sub-organizational levels to the macro-level of societies. It can take place in relatively brief and concentrated periods, or over time measured in decades or centuries. In other words, institutional

change can take place incrementally, so that observers and participants are hardly aware of any change, or abruptly, in dramatic episodes that present large discontinuities with former patterns.

According to Dacin et al. (2002), actors who give meaning and life to institutions derive this diversity from both exogenous sources and endogenous perceptions, interpretations, and enactments of institutional logics. The observation that multiple institutional logics exist and compete for attention points to the importance of examining the institutional arenas or relational contexts wherein such contents get played out (see also Friedland and Alford, 1991). In these institutional arenas, such as organizational fields or industries, institutional change is often portrayed as processes by which fields move from one “dominant” logic to another (Greenwood et al., 2011). In other words, these ‘field-level’ studies display a periodic form of change, whereby a “jolt” (Meyer, 1982) ushers in a new dominant logic, such disruptions effectively separating one relatively stable period of beliefs and practices from another. Hence, for the most part, the assumption has been that any contradiction between logics is transitional with little suggestion of the possibility of ongoing complexity (Greenwood et al., 2011). Recently, however, a number of scholars have begun to highlight the coexistence of multiple logics over extended periods of time (e.g., Dunn and Jones, 2010; Jarzabkowski, Matthiesen and Van de Ven, 2010; Reay and Hinings, 2009), marking an increasing acknowledgement of the ongoing struggles to reconcile different institutions into arrangements conducive to improved forms of value creation. Even so, these recent treatments and discussions of the coexistence of logics have tended to be framed as competition between two logics, rather than, inconsistencies between “constellations” or “arrangements<sup>1</sup>” of logics (see e.g. Goodrick and Reay, 2011).

The S-D logic views institutions and institutional arrangements – sets of interrelated institutions – as constitutive elements of service ecosystems that enable and constrain resource integrating actors in the effort of cocreating value (cf. Lusch and Vargo, 2014). Drawing from institutional theory, we have argued elsewhere (Koskela-Huotari and Vargo, *forthcoming*; Siltaloppi

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<sup>1</sup> We prefer to use the term institutional arrangement referring to sets or assemblages of interrelated institutions, that is, institutionalized practices, norms, rules, meanings etc.

et al., 2014) for the importance of institutional pluralism and complexity in explaining reformation and innovation in service ecosystems. Value co-creation in service ecosystems is framed by multidimensional institutional context(s) that bring forth institutional complexity (see e.g. Chandler and Vargo, 2011; Koskela-Huotari and Vargo, *forthcoming*; Lusch and Vargo, 2014).

Institutional complexity in service ecosystems is in continual flux, meaning that over time it unfolds, unravels and re-forms, creating different circumstances to which resource-integrating actors must respond (cf. Greenwood et al. 2011). Hence, the consequence of institutional complexity is that actors often encounter situations in which many institutions and institutional arrangements offer contradicting and conflicting interpretations and prescriptions for action (Sitaloppi et al. 2014; cf. Friedland and Alford, 1991; Thornton et al., 2012). The intersecting and overlapping institutions can, for example, create conflicting views on what value is, and how the 'resourceness' of resources is perceived (Koskela-Huotari and Vargo, *forthcoming*; Vargo et al., 2015). These conflicts and contradictions in institutional arrangements are the sources of choice, synthesis and change (Friedland and Alford, 1991; Seo and Creed, 2002; Thornton et al., 2012) and can be seen as prerequisites of innovation (Sitaloppi et al., 2014). However, the dynamic patterns of institutional complexity that confront actors require more elaboration (Greenwood et al., 2011).

According to Greenwood et al. (2011) two facets of institutional complexity have been implicitly touched upon in prior research. These are 1) the number of institutional logics or institutional arrangements and, 2) the degree of incompatibility between them (see also Besharov and Smith, 2014). The former implies that the number of coexisting institutional arrangements determines complexity. In other words, the higher the number of arrangements, the greater will be the complexity facing resource-integrating actors in service ecosystems. The latter implies that complexity is amplified by the divergence between prescribed goals and means, and by their relative specificity. While extant research has highlighted the presence of multiple institutions and institutional arrangements, Greenwood et al. (2011) suggest that future research should delve deeper into the dynamic patterns of complexity that confront actors, arising from the multiplicity of

institutional arrangements to which actors must respond, and the degree of incompatibility between them.

Hence, current research lacks insight into the formation of opportunity and actors' resourcefulness in initiating and promoting change as a result of institutional complexity. Specifically, this literature inadequately considers the basis of opportunity and agency for actors in the nexus of multi-layered institutional context that both pre-exists and emerges through the relational ties between actors and systems of actors. We argue that these questions are essential for clarifying the relationship between ecosystems, institutional arrangements and actors, and the dynamics of value co-creation within service ecosystems characterized by institutional complexity. In effort to extend the service ecosystems perspective on innovation, we draw from both social network theory and systems thinking. In the following, we synthesize insights from the notions of weak ties, structural wholes and near-decomposability, to better understand how institutional complexity exists and emerges in service ecosystems as the resource integrating actors interact with each other through service exchanges and simultaneously connect multiple institutions and institutional arrangements enabling and constraining value cocreation.

### **Insights from social network theory and systems thinking to institutional complexity**

#### ***Weak and strong ties***

A stream of research that strongly correlates with institutionalization and the dynamic nature of institutional complexity in service ecosystems is Granovetter's (1973; 1983; 2000) work on the 'ties' and their strength in social networks. To bridge micro-level interactions with macro-level patterns, Granovetter (1973, p. 1360) focused on interpersonal social network as "it is through these networks that small-scale interaction becomes translated into large-scale patterns, and that these, in turn, feedback into small groups". In his analysis Granovetter (1973, p. 1361) especially focuses on the "strength" of an interpersonal tie that he defines as "a (probably linear) combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the tie". According to Granovetter (1973; 1983) the stronger the tie

connecting two individuals, the more similar they are. In other words, if strong ties connect A to B and A to C, both C and B, being similar to A, are probably similar to one another, increasing the likelihood of a friendship once they have met. Applied in reverse, these two factors – time and similarity – indicate why weaker A-B and A-C ties make a C-B tie less likely than strong ones as C and B are less likely to interact with each other and less likely to be compatible, if they do interact with one another. In his work, Granovetter (1973) also distinguished between weak ties that might exist within a social group and bridging weak ties that connect otherwise separate social groups together – arguing for the importance of the latter in connecting actors even more significantly different from one another.

According to Granovetter (1973) indirect and therefore, dissimilar contacts are thus typically reached through ties in the ‘weak sector’, making weak ties the channels through which ideas, influences, or information socially distant from an actor may reach him/her. This implies that the fewer weak ties and indirect contacts an actor has, the more encapsulated he will be in knowledge of his own ‘friendship’ circle. Equally, information can reach a larger number of people, and traverse greater social distance when passed through weak rather than strong ties (ibid., see also Granovetter 1985). Hence, though making individuals similar within a group, the absence of weak ties creates fragmentariness between groups of actors and makes the diffusion of new knowledge and ideas difficult.

Through Granovetter’s (1973) work it is possible to see how the “strength” of ties between resource integrating actors is essential in explaining institutional complexity that exists in service ecosystems, as well as the incompatibility between institutional arrangements of actors lacking bridging weak ties between them. Actors that interact frequently with each other in service ecosystems build stronger ties and are/become similar also in terms of the institutions and institutional arrangements they share. At the same time, weak ties in service ecosystems result in connections between different kinds of institutional arrangements, as the actors connected with each other through weak ties are more likely members of different social groups and have dissimilarity in

their respective institutional arrangements. Contrary to communities tied together by strong ties, such as families or tight organizations, examples of actors connected through weak ties include people working together over national, cultural, and corporate boundaries. In addition, bridging weak ties are more likely to connect individuals who are significantly different from another (than other weak ties) and for this reason lead to complex role sets and the need for cognitive flexibility (Granovetter, 1983), that is, the capability to reconcile between conflicting institutions and institutional arrangements and bringing forth opportunities for broader institutional changes and innovation.

### ***Structural holes***

Whereas Granovetter (1973; 1985) focuses on how actors belonging in separate networks/social groups are connected via bridging weak ties, Burt (1992) examines how they are disconnected and how actors can strategically use such disconnects for their advantage through the mechanism of 'brokerage'. According to Burt (1992), contacts are redundant to the extent that they lead to the same people. In Granovetter's terms, strong ties make contacts more likely redundant. Non-redundant contacts, on the other hand, signify 'structural holes', or the absence of ties between actors. In other words, non-redundant contacts are disconnected in some way. Hence, weak ties are essential to the flow of information that integrates otherwise disconnected social structures into a broader society (Burt, 1992, 26).

Essential to Burt's (1992) notion of structural holes is the mechanism of brokerage, which concerns the position of an actor across a structural hole, that is, between two otherwise disconnected groups of actors. Because of this disconnect, the broker gains information from one party or side of the network before the actors on the other side, and is able to leverage this information asymmetry for controlling the other party in a manner beneficial to the broker. Hence, the notion of structural holes signify the structure-deriving opportunities for individual actors to benefit from the disconnects between actors and tighter networks.

Besides Burt's view of brokerage as 'the third who enjoys' (*tertius gauden*), research has identified the non-interfering conduit and 'the third who connects' (*tertius iungen*) as alternative orientations to brokerage (Obstfeld et al., 2014). Combined, these three orientations resonate well with S-D logic perspective as they enable a view of actors having the opportunity to influence change in service ecosystems by 'brokering' between other actors and the disconnected parts of the service ecosystems. Resting on institutional literature, the broker has several alternative institutional arrangements available to her and is therefore less affected by the constraining pressures of only one social group and the related institutional arrangement.

While insightful, both Granovetter (1973) and Burt (1992) have assumed as the basis of their models the assumption that actors have only one network position or role, and one type of tie connecting them to other actors. The service ecosystems perspective, on the other hand, builds on the generic actor-to-actor (A2A) conceptualization of S-D logic and implies a more complex view on actors, roles sets and linkages between the actors (see e.g. Lusch and Vargo, 2014; Vargo and Lusch, 2011). The basic notion of the A2A conceptualization is that actors that are involved in a dynamic, reciprocal market activity do not fit neatly into categorical roles (such as consumers and producers) with different motives, needs, and desires, usually assigned to them (Vargo and Lusch, 2011). Similarly, Padgett and Powell (2012) argue that individuals are complicated role ensembles such as "businessman-farther-politician", having goals that are influenced by all the different roles. Thus, to expand the view of weak ties and brokerage, we must embrace the fact that actors belong simultaneously to multiple social groups, and continually enact various roles. As a result, the ties between actors exist on multiple layers depending on the 'content' and context of the relationship (i.e., tie multiplexity), with the possibility of two actors being connected by strong ties in one context, and a structural hole in another (Shipilov and Li, 2012). This multi-layered view also points toward the plentiful opportunities for brokerage.

In addition to acknowledging the multiplicity of roles and ties between actors, Granovetter (1983, 229) has argued that "the most pressing need for further development of network ideas is a

move away from static analyses that observe a system at one point in time and to pursue instead systematic accounts of how such systems develop and change”. In service ecosystems, this underscores the importance of focusing on how the nature of the ties between resource integrating actors in service ecosystems change over time as actors interact with each other through new service-for-service exchanges. To add such dynamism over time in our understanding of institutional complexity in service ecosystems, we also draw from the notion of ‘near-decomposability’ (e.g. Simon, 1962) that stems from systems thinking.

### *Near-decomposability*

Capra and Luisi (2014) argue that a large paradigmatic change – that of moving away from a mechanistic worldview towards a systemic worldview – currently characterizes sciences and society. This ‘systems thinking’ entails thinking in terms of relationships, patterns and context, and fully embracing the interconnected and interdependent nature of the studied phenomena. Aligned with this view, S-D logic and its service ecosystems perspective argue that individual actors can be understood as parts of continually evolving exchange systems (see e.g. Lusch and Vargo, 2014; Vargo and Lusch, 2011). The service ecosystems perspective enables a deeper understanding of value cocreation and resource integration by allowing researchers to zoom both in and out to see actors, not in isolation, but in all of their dependencies and interdependencies generated by the web of service-for-service exchange relationships (Lusch and Vargo, 2014).

As one of the pioneer of systems thinking and complex systems, Simon (1996, 165) argues that in systems “the more complex arise out of combinatory play upon the simpler”. The larger and richer the collection of building blocks that is available for construction of a system, the more elaborate are the structures that can be generated. A complex system is “one made up of a large number of parts that interact in a nonsimple way. In such systems, the whole is more than the sum of the parts, at least in the important pragmatic sense that, given the properties of the parts and the laws of their interaction, it is not a trivial matter to infer the properties of the whole” (Simon, 1962, p. 195). In their dynamics, complex systems have the property of near-decomposability that greatly

simplifies their behavior. According to Simon (1962) near-decomposability implies that a complex system comprises of a number of interconnected subsystems in such a way that elements within any particular subsystem interact much more vigorously and rapidly with each other than do elements belonging to different subsystem. In near-decomposable systems failures may be contained as local events, without disastrous system-wide consequences (Simon, 1996). Yet, the system as a whole can cumulate the benefits of ‘learning’ over time, as the sub-systems are not completely decomposable.

The notion of near-decomposability simplifies the description of a complex system, and makes it easier to understand how the information needed for the development or reproduction of the system can be stored in reasonable compass. Simon (1962) argues that near-decomposability is a pervasive feature of the architecture of the complex systems that we find in the world, both inorganic and organic, ranging from elementary particles to social systems. Hence, service ecosystems, resulting from reciprocal service exchanges between numerous actors, can also be seen as complex systems made up by numerous nested subsystems. This means that building on top of an individual resource-integrating actor are structures composed of interrelated actors, such as families, firms, industries and nations, themselves composed of many parts and, in turn, parts of still larger structures (cf. Ostrom, 2005). What is a whole system at one level is a part of a system at another level.

Furthermore, the notion of institutions and institutional arrangements as the ‘glue’ and coordination elements in service ecosystems (see e.g. Lusch and Vargo, 2014) enable to ‘decompose’ service ecosystems from merely looking at them as actors and linkages between the actors, to understanding ecosystems as complex collections of interrelated institutions, that is, institutional arrangements, that both provide the context as well as continually get reproduced as actors interact with each others through service-for-service exchanges. Hence, service ecosystems can be conceptualized as having multiple nested ‘levels’ or subsystems of context(s) composing from institutional arrangements that frame and guide actors in resource integration, service

exchange and value cocreation (cf. Chandler and Vargo, 2011; Koskela-Huotari and Vargo, *forthcoming*). In other words, the service ecosystems perspective emphasizes the multidimensionality of institutional arrangements and illustrates the embeddedness of simple micro-level actions and interactions within more complex meso- and macro-level systems and structures (Akaka *et al.*, 2013; Lusch and Vargo, 2014).

The notion of ‘near-decomposability’ implies that subsystems within service ecosystems are simultaneously both partially independent and interdependent. The partial independency of subsystems, collections of actors and institutional arrangements, within service ecosystems can help to explain institutional complexity – the coexistence of multiple institutional arrangements – as the elements within any particular subsystem interact much more vigorously and rapidly with each other than do elements belonging to different subsystem. Hence, subsystems are characterized by ‘strong ties’, which makes actors and their institutional arrangements belonging to a same subsystem to be more similar than actors and their institutional arrangements belonging to a different subsystem. The partial interdependency of subsystems, that is, the existence of weak ties or ‘brokers’ of structural holes between subsystems, on the other hand, explain how different and possibly incompatible institutional arrangements can interact/conflict with one another and how institutional complexity, enabling change and innovation, emerges in service ecosystems. In other words, institutional transformations occur in service ecosystems due to institutional complexity that emerges as a consequence of near-decomposability of service ecosystems, that is, varying density of interaction and ‘strength’ of ties between the parts or subsystems of the service ecosystem(s).

### **Understanding institutional complexity in service ecosystems – An integrative view**

A better understanding of institutional change and its drivers are needed in order to further shed light on innovation in service ecosystems. Institutional literature argues that institutional conflicts that result from institutional complexity are crucial for institutional change (see e.g. Greenwood *et al.*, 2011; Seo and Creed, 2002; Thornton *et al.*, 2012). This insight has been previously applied in the service ecosystems perspective to argue for institutional complexity to be a prerequisite for

innovation in service ecosystems (see e.g. Siltaloppi et al. 2014). In this paper, we further develop the notion of institutional complexity in service ecosystems by arguing that institutional change occurs due to the institutional complexity inherent to service ecosystems that results from their complex and near-decomposable nature. This means that the parts or subsystems of a service ecosystem interact with one another with varying frequency and through different ‘strengths’ of ties, making the overall ‘fabric’ of service ecosystems partially denser and partially sparser. As the strength of the ties between subsystems decrease, they become less similar in terms of the way the institutional arrangements within the subsystems transform and develop. This creates a potential for challenges in future service exchanges between the subsystems caused by the inconsistencies arising from the incompatibility of institutional arrangements. Hence, we argue for the importance of three key issues 1) triads as a unit of analysis, 2) complexity in institutional arrangements, actors’ role constellations and mutual interactions, and 3) varying density of interactions between subsystems of service ecosystem and discuss how these notions can help to better understand the dynamics of institutional complexity that drives change and innovation in service ecosystems.

### 1. Importance of triads as the unit of analysis in service ecosystems

The first insight concerns the inherently triadic formulation of social network theories which focus not on isolated ties between two actors (i.e., dyadic relationships), but on the structure of multiple ties which, depending on an actor’s position with respect to two (or more) others, infer different abilities for actors to access and utilize diverse information for the reconstruction of solutions (e.g., Burt, 1992; Granovetter, 1973; Simmel, 1950). In comparison to dyads, triads reveal simultaneously the direct and indirect ties bearing on the actor (Chandler and Vargo, 2011), helping to understand both the constraints on and opportunities for action (Simmel, 1950). In this sense, triads are the fundamental building blocks of a network (Choi and Wu, 2009). Also, the multi-actor view inherent in systems thinking is essentially triadic. Hence, the triadic view enables drawing insights from both social network theory and systems thinking in order to better understand the existence and nature of institutional complexity in service ecosystems.

## 2. Importance of embracing complexity in institutional arrangements, actors' role constellations and mutual interactions in service ecosystems

To further understand institutional complexity in service ecosystems, it is important to highlight that actors are simultaneously members of multiple social groups or subsystems and continually enact various roles set guided by different institutional arrangements. Hence, in this context, networks must be considered with an eye on multiplexity, that is the overlapping existence of multiple ties between actors: structural holes may exist between actors who know each other (but not in a specific way or context), and the dynamic evolution of networks may depend on actors' having many kinds of relationships to different actors, the 'net sum' of these relationships determining the ability of particular actors to engage in innovation, for example (e.g., Shipilov and Li, 2012).

Hence, service ecosystems can be viewed as having multiple nested 'levels' of contexts that frame resource integration, service exchange and value co-creation (cf. Chandler and Vargo, 2011; Koskela-Huotari and Vargo, *forthcoming*). One way to conceptualize these different levels or frames is to conceptualize them as different institutional arrangements, i.e. sets of interrelated institutions (cf. Thornton et al., 2012). A mechanism by which institutional arrangements exert their effects on actors is when the actors identify with the collective identity of a social group related to an institutional arrangement (Thornton and Ocasio, 2008). These social groups can be seen as subsystems of service ecosystems and their relationship with each other is characterized by near-decomposability and varying tie 'strengths'.

## 3. Importance of acknowledging higher and lower density of interaction between subsystems within service ecosystems

Literatures on near-decomposability, weak and strong ties, as well as structural holes suggest that higher density of interaction among actors in the subsystems of service ecosystems will lead to increased similarity of institutional arrangements within a subsystem, whereas lower density of interaction allows the emergence of different institutional arrangements to evolve between

subsystems characterized by ‘absence of ties’ or structural holes. As subsystems are near-decomposable, there still is opportunity for actors to build bridging weak ties or to ‘broker’ structural holes that will allow different and inconsistent institutional arrangements to overlap and co-exist in ways potentially seeding the generation of new combinations of resources integrated by actors positioned in the nexus of multiple institutional arrangements.

Furthermore, it is argued that the macro ‘level’ of service ecosystems emerge from the micro ‘level’ interactions and service exchanges between the actors (Lusch and Vargo, 2014) and in turn provide the context(s) by which the micro level exchanges are framed (Chandler and Vargo, 2011). Hence, multiple levels of institutional arrangements simultaneously manifest themselves in value co-creation and as the actors connect with one another through their service-for-service exchanges, they ultimately join their partially different and partially shared institutional arrangements together bringing forth increasing institutional complexity.

## **Conclusion**

Previous research in the service ecosystems view to innovation emphasizes that the maintenance, disruption, and change of institutions (i.e., institutionalization) is always a cocreational process in which actors try to resolve the nested contradictions and inconsistencies that are foundational to all institutional arrangements (see e.g. Lusch and Vargo, 2014; Siltaloppi et al., 2014; Vargo et al. 2015). In this paper, we have explored this view further based on social network literature and systems theory, which point to similar conceptualizations of change but which introduce new insights to the emergence and dynamics of institutional complexity inherent in service ecosystems.

All in all, we argue that social network theory, systems thinking and institutional perspectives point toward similar explanation of agency, innovation and change in service ecosystems. Our central argument is that focus on local relationships of actors, in a manner which embraces the view of institutional complexity and inherently triadic local network arrangements, sensitizes analysis to the local conditions (arrangements and strength of ties, positions across holes etc.) which constitutes the basis for an actor to find and forge new resource combinations that seed

change in service ecosystems. This perspective also helps to tie in the nested ‘levels’ of service ecosystems as, in reference to near-decomposability, there must be actors between ‘sub-systems’ to ‘mediate’ or ‘translate’ from one part to another, potentially causing conflicts or discontinuous steps within service ecosystems and the inherent institutional complexity they comprise of.

This paper opens up several interesting avenues for future research. For example, there are many opportunities for deeper exploration of how actors resolve the contradictions and inconsistencies in institutional arrangements. Vargo et al. (2015) suggest that the linkages between, or relationships among, various levels (micro, meso, and macro) of institutions are important components of this exploration and therefore encourage both conceptual and empirical investigations of these linkages. To this end, the current paper argues that by focusing on the density of ties and the existence of structural holes within service ecosystems, and the dynamic evolution of these ties and their arrangements over time, are important for building theory on institutional complexity, change and innovation in service ecosystems.

Another interesting theme, which we only implicitly touch upon in this paper, is the mutual constitution or duality of networks/systems of actors and institutions (cf. Giddens, 1984; Owen-Smith and Powell, 2008). According to Owen-Smith and Powell (2008, 605), understanding “how networks and institutions co-evolve to shape social and economic arrangements requires us to attend to the myriad ways that relationships and categories influence each other”. Hence, it is important to further refine understanding of the ways in which relationships between actors, and the institutionalized categories based on which information is interpreted and utilized in action, evolve in a mutually constitutive relationship.

Third, despite the growing importance of the A2A view in service ecosystems (Vargo and Lusch, 2011), the notion of ‘actor’ has received relatively little attention within S-D logic beyond the emphasis of actors as resource integrators. Hence, additional insights into the construction of actors’ identities in the social processes unfolding in service ecosystems call for further attention. One starting point to such elaboration could be the individualism paradox introduced by

Granovetter (1983) suggesting that exposure to a wide variety of different viewpoints and activities, is the essential prerequisite for the social construction of an individual.

Finally, the more detailed nature of institutional change in service ecosystems also requires further research. According to Padgett and Powell (2012), the more systemic view suggests a modification in how social-network analysts should conceptualize and measure network ties in autocatalytic networks, which are networks of transformations and not networks of mere transmission. The important insight of their view is that diffusion should be conceptualized not as mimicry but as chain reactions. This means that social networks and systems don't just pass things; they do transformational work (*ibid.*). This idea also closely connects with actor-network theory and its focus on translations (see e.g. Callon, 1986; 1998), and starts to build a bridge between actor-network theory and the service ecosystems perspective.

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