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Title: How Does Innovation Emerge in a Service Ecosystem?

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How Does Innovation Emerge in a Service Ecosystem?

ABSTRACT

To advance the study of innovation in complex settings, this study integrates the innovation, institutional theory, philosophy, and service-dominant logic literatures. Exploring the emergence of innovation and service ecosystem dynamics, researchers take an abductive approach anchored in over four years of case study data regarding a high-technology solution in an Internet-of-Things setting. By framing innovation as a systemic process, the study reveals that 1) institutional reconciliation is an overlooked phase of innovation, 2) ideas are refined by four types of institutional reconciliation pressures (tensions, divergences, expected value, and service), and 3) innovation is influenced by plasticity in four ways (recursivity, temporality, complementarity, and continuity). Based on these findings, the authors outline a research agenda focused on four principles of innovation as a systemic process. The findings suggest that managers should nurture norms, rules, and beliefs through a systemic process that facilitates the emergence of innovation.

INTRODUCTION

Innovation is a priority for service research and practice, especially in complex settings (Bitner et al. 2015; Patrício, Gustafsson, and Fisk 2018). Service researchers in particular seek a better understanding of innovation from a systemic perspective (Ostrom et al. 2015; Wilden et al., 2017). Such an understanding extends prior research focusing on innovation as an idea, product, service, or solution developed either by an individual actor (Garcia and Calantone 2002; Ordanini, Parasuraman, and Rubera 2014; Van de Ven and Angle 1989) or group of actors in networks or business ecosystems (Adner and Kapoor 2010; Clarysse et al. 2014; Dhanaraj and Parkhe 2006; Gawer and Cusumano 2014; Zahra and Nambisan 2012). These researchers generally focus on the outcomes associated with the convergence of disparate ideas (Lee, Olson, and Trimi 2012) and do not focus on the processes by which these ideas come together. Hence, the purpose of this study is to address the research question, “*How does innovation emerge in a service ecosystem?*”

To begin shedding light on this question, this paper explores innovation as a systemic process (Helkkula, Kowalkowski, and Tronvoll 2018; Kurtmollaiev et al. 2018). It draws on extant research regarding service (defined as the application of competencies for the benefit of others) and institutional work (defined as actors’ behaviors, efforts, cognitions, or emotions shaping institutions) (Baron et al. 2018; Lawrence, Suddaby, and Leca 2009; Vargo and Lusch 2016), which draws attention to the study of service ecosystems as self-adjusting systems of actors connected by institutions and service. The proposed framework integrates institutional theory (Lawrence and Suddaby 2006; Lok and de Rond 2013; Scott 2001), philosophy (Malabou 2008, 2010), and service-dominant (S-D) logic (Vargo and Lusch 2004, 2016) with innovation

research to depict the systemic process that enables innovation to emerge within a service ecosystem.

The empirical setting of this study relates to online privacy and data security, and new online services in the Internet-of-Things (IoT) industry. The study follows the development of the Hub-of-All-Things (HAT) platform, a cloud-based personal data service that enables customers to collect, contextualize, visualize, and trade their personal data for benefit in a privacy-preserving, secure way (HAT 2017). Anchored in more than four years of case study data (Yin 2014), the authors adopt an abductive research approach (Dubois and Gadde 2014). This approach is useful for theory development as it allows for iterative cycling between emergent conceptualizations and empirical data (Gioia, Corley, and Hamilton 2012).

The findings highlight the overlooked systemic process that facilitates idea convergence and innovation emergence. Plasticity, or the ability of systems to adapt, take and retake form (Alderson 1957, Nenonen et al. 2014) is revealed as fundamental to innovation because it allows ideas to take root, influence, and possibly flourish as solutions in service ecosystems. By framing innovation as a systemic process, the study reveals that: 1) institutional reconciliation is an overlooked phase of innovation, 2) ideas are refined by four types of institutional reconciliation pressures (tensions, divergences, expected value, and service), and 3) innovation is influenced by plasticity in four ways (recursivity, temporality, complementarity, and continuity). A research agenda is developed, as based on four principles of innovation as a systemic process (Skålén, Aal, and Edvardsson 2015).

The paper begins with a conceptual background, followed by a description of the abductive research approach, research setting, data collection and analysis. Subsequently, the findings of

the study are presented and discussed, and an agenda for future research is presented. The paper concludes with study limitations and managerial implications.

CONCEPTUAL BACKGROUND

Innovation as a Systemic Process

Historically, innovation has been studied as “the generation, acceptance and implementation of new ideas, processes, products, or services” (Van de Ven and Angle 1989, p. 20). Early recognition of different types of innovation – product, process, market, input and organizational (Schumpeter 1934) – splintered research according to different outcomes, including ideas and solutions (Garcia and Calantone 2002). One stream of research emphasizes co-innovation or “coupled open innovation” and the flow of ideas across organizational boundaries (Chesbrough and Bogers 2014). This research tends to focus on actors becoming connected together “where internal, external, collaborative, co-creative ideas can be converged to create organizational and shared value” (Lee, Olson and Trimi 2012, p. 818). More recently, innovation has been emphasized as the “combinatorial evolution of new, useful knowledge” (Vargo, Wieland, and Akaka 2015, p. 63) that can be viewed as both an outcome and a process (Helkkula, Kowalkowski, and Tronvoll 2018; Patrício, Gustafsson, and Fisk 2018).

These studies suggest that individuals become connected as long as they share similar ideas, views or beliefs about solutions (DiMaggio 1988; North 1990). They underscore how institutions or “regulative, normative and cultural-cognitive elements” organize connections among individuals (Scott 2001, p. 48). However, these studies typically do not emphasize situations when institutions compete, or when changes in institutional norms, values, or beliefs disrupt or weaken connections among actors (Siltaloppi, Koskela-Huotari, and Vargo 2016). Despite growing interest in the influence of institutions on innovation (Baron et al. 2018;

Kurtmollaiev et al. 2018), the processes by which institutions influence idea convergence are understudied.

To advance the study of innovation, it is important to note that ideas can change how individuals connect to a particular institutional order (Voronov and Vince 2012). Ideas can incite institutional work or “the purposive action of individuals and organizations aimed at creating, maintaining and disrupting institutions” (Lawrence and Suddaby 2006, p. 215). Institutional work refers to behaviors, efforts, cognitive or emotional investments that create, maintain, or disrupt institutions. Whether institutional work maintains, creates, or disrupts institutions depends on the alignment of individuals and their cognitive or emotional investments with existing institutions; that is, it depends on their “tacit belief[s] that the game is worth playing” (Voronov and Vince 2012, p. 65). Actors that derive value from a prevailing institutional order are more likely to engage in maintenance, while actors experiencing low investments in an institutional order are more likely to engage in disruption or creation work (Voronov and Vince 2012).

For all of this to happen, service ecosystems provide time and place, or form and shape, for institutional work to transpire (Baron et al. 2018; Lawrence and Suddaby 2006). Service ecosystems are self-adjusting systems of actors connected by institutions and service (Vargo and Lusch 2016). Because institutional work can uproot or stabilize existing institutions in service ecosystems, the proposed framework articulates innovation as a systemic process by which an idea may either disturb, create, or maintain prevailing institutions (Lawrence and Suddaby 2006; Lawrence and Lorsch 1967). By integrating a process-oriented approach with a systemic perspective, the proposed framework connects the traditional service literature with service science, dynamic capabilities, and open innovation research (Helkkula , Kowalkowski, and

Tronvoll 2018; Wilden et al. 2017). This approach, which is grounded in S-D logic (Vargo and Lusch 2004, 2016), positions innovation as a process that transcends organizational boundaries and is situated in a service ecosystem. This approach resonates with research on innovation in networks, service systems, business and innovation ecosystems (Adner and Kapoor 2010; Clarysse et al., 2014; Dhanaraj and Parkhe 2006 Gawer and Cusumano 2014; Maglio and Spohrer 2008; Zahra and Nambisan 2012). Yet these studies differ in some ways. For example, network views on innovation highlight collaboration and relationships, as well as a linear stage-gate approach to innovation (Godin 2006). Meanwhile, studies on innovation in business or innovation ecosystems focus on the juxtaposition of competition and collaboration, with acknowledgement that complementarity among partners fuel innovation (Valkokari 2015). In contrast, the service systems perspective takes a more holistic approach emphasizing how configurations of people, technology, or information bring about value co-creation (Maglio and Spohrer 2008). A service ecosystems perspective, in turn, emphasizes institutions as the central mechanism binding actors together; however, it also recognizes the many components of a service ecosystem that are jointly influenced by institutions (Vargo, Wieland, and Akaka 2015).

Thus, the influence of institutions and institutional work on different components of a service ecosystem are accounted for in a meta-space (or a meta-layer), the temporal dimension of a service ecosystem (Chandler and Vargo 2011). Because institutional work often involves belief formulation, learning, or knowledge sharing, for example, it is important to account for the time needed for beliefs to change or for actors to learn. A meta-space houses the effects of institutional work and, in some cases, serves as a repository for the changed beliefs, learned behaviors, or new knowledge that emanate institutional change across a service ecosystem over time (Lawrence and Lorsch 1967). Although the meta-space is especially important for

innovation, it is generally overlooked in previous innovation research.

The Influence of Plasticity

Based in philosophy, plasticity is the capacity to receive form, give form, or annihilate all forms (Malabou 2008, 2010). Lok and de Rond (2013, p. 205) argue that “plasticity is accomplished through the construction of hierarchical relationships between different organizing principles.” Plasticity represents a system’s capacity to either drift toward or away from convergence (Friedland 2012; Sterman 2000) and refers to the “capacity [of an entity] to take and retain form” (Nenonen et al. 2014, p. 4). These studies suggest that plasticity depends on the many different social structures, ideas, and resources competing or converging in a particular service ecosystem. These may be either positively influenced by complementary institutions or negatively influenced by competing institutions (Kjellberg, Azimont, and Reid 2015).

The components of service ecosystems coalesce in different ways due to plasticity or the “potentiality for being remolded and responding in a different way thereafter” (Alderson 1957, p. 277). The varying institutions in a service ecosystem affect its plasticity because actors in a service ecosystem may not evaluate value propositions in the same way (Chandler and Lusch 2015). As a result, competing institutions can lead to varying perceptions of value (Akaka, Vargo, and Lusch 2013). Because of these differences, each service ecosystem is unique and can be characterized by a high or low degree of fluidity and stability. Whereas fluidity refers to the capacity to take form or be molded, stability refers to the capacity to retain form or retain changes after molding efforts have subsided (Nenonen et al. 2014). Together fluidity and stability comprise plasticity. Further, fluidity and stability are not opposite; rather, they are interdependent. They influence how systemic components react to new ideas, whether they maintain an existing form or catalyze a different form, and how they give rise to service

ecosystem dynamics (Kjellberg, Azimont, and Reid 2015; Meynhardt, Chandler and Strathoff 2016). If the components of a service ecosystem respond synergistically to an idea, they may begin to interact in a different way and can infuse a different institutional order into the service ecosystem. This is a continuous process by which logics begin and end incessantly (Hayek 1945). Service ecosystems teeter, beginning at and returning to different states of equilibrium, fluidity, and stability. Because of this fluctuation, the evolution of a service ecosystem depends on its plasticity (Poole and Van de Ven 1989; Nenonen et al. 2014).

In short, plasticity influences whether institutional work can root ideas in a service ecosystem, enable them to flourish into solutions, or cause them to wither away. Because plasticity differs in each service ecosystem, it is not always possible to predict which service ecosystems can provide arable space and form for ideas to take root and prosper as a solution. Some service ecosystems may not provide the fertile soil, or plasticity, needed for an idea to flourish. It remains unclear, how the institutional work of disparate actors with varying perceptions of value can influence institutions such that a service ecosystem can be aligned with a particular new idea. A deeper understanding of this question can shed light on how ideas converge to create value and inform a new solution.

METHODOLOGY

Because the roles of institutions and plasticity in innovation are understudied, an extended case study approach was adopted (Langley and Abdallah 2011; Yin 2014). The empirical backdrop is the service ecosystem surrounding a proposed high-technology solution in the IoT, namely the Hub-of-All-Things (HAT). The HAT project started in June 2013 as a United Kingdom (U.K.)-government funded research project. The aim of the HAT project is to empower customers to make better use of their personal data. It initially involved 16 researchers across six

U.K. universities. The HAT platform is a cloud-based commercial platform aiming to provide customers with maximum control, privacy, and security over their personal data, along with a mechanism for monetizing their personal data through secondary services (HAT 2017). Since its first public release in January 2017, the platform has been adopted by over 1300 customers and is currently in preparation for wider public release in 2018 (HAT 2018).

This setting was chosen because service ecosystems in the IoT industry are typically characterized as highly complex, with competing institutions regarding privacy and data security (Scoble and Israel 2014). The industry is composed of competing norms, rules, and beliefs regarding who (i.e., customers, firms, or governmental institutions) should be allowed and enabled to own, access, use, and exchange personal data (Greengard 2015). As illustrated by the 2018 Facebook-Cambridge Analytica data scandal, there are differing opinions across society regarding the boundaries of data and content ownership, and the ability of firms to access, use, and monetize the data and content of customers (Hendrix and Carroll 2018). Therefore, because this empirical setting is characterized by competing institutions, researchers were able to study innovation, institutional work, and plasticity.

The entire research process followed an abductive research approach, which is useful for theory development and the discovery of complementary conceptualizations (Dubois and Gadde 2014). Data collection took place from June 2014 until April 2017, encompassing more than four years of case study data from March 2013 until April 2017. Importantly, all researchers of this paper acted as independent external observers of the HAT project.

In total, the research process included three rounds of data collection and analysis. The *first round* of data collection included six semi-structured interviews with lead HAT developers who were instrumental during the first year of the project. With an average time of 91 minutes,

interview length ranged between 32 minutes and 3.5 hours. Respondents were allowed to speak in an ad-hoc manner when addressing questions, as shown in *Appendix 1*. Data collection at this round also included participant observation of the first two “Mad Hatter’s Tea Party” events as well as a Facebook live chat. Both “tea party” events and the live chat were organized by the HAT project and were oriented specifically toward industry and software developers; the tea parties were similar to press conferences and involved HAT presentations to garner support for the HAT project. All events lasted between 38 minutes to 5.5 hours and were observed by at least two researchers who independently took field notes, photos, and videos (DeWalt and DeWalt 2010). Going back and forth between the relevant literature on S-D logic, plasticity, institutions, and the interview and observation data, initial coding led to emergent themes of ‘institutional dissonance’ and ‘institutional stabilizing efforts’, as can be seen in *Appendix 2*.

As recommended for single case studies, primary data were triangulated with multiple sources of secondary archival data to increase robustness and quality (Yin 2014). Hence, researchers completed a *second round* of archival and secondary data collection and analysis, including text from HAT-related websites, publicly available HAT-related communication material (blogs, press releases, user forum), as well as meeting minutes, notes and other internal documentation. Secondary data included 65 press articles, as well as 10 corporate annual reports. Findings at this stage drew attention to the importance of the ‘meta-space’.

A *third round* of data collection and analysis specifically aimed at generating insights into how active users of the HAT platform perceived its value and utility. Researchers conducted four semi-structured interviews with beta testers of the HAT platform (average length: 44 minutes) and five in-depth interviews with active HAT users (average length: 40 minutes). Archival HAT-user data, including transcripts of interviews with twelve other active HAT users, were also

collected to ensure validity of findings from a customer perspective. In sum, 324 documents were gathered during data collection, as shown in *Table 1*.

--- *Insert Table 1 here* ---

In line with the abductive research approach (Dubois and Gadde 2014), three rounds of data analysis followed the first-order and second-order analysis guidelines according to Gioia, Corley, and Hamilton (2012). These guidelines entail ongoing “cycling between emergent data, themes, concepts, and dimensions and the relevant literature” (Gioia, Corley, and Hamilton 2012, p. 7). Researchers used MAXQDA 12 software and three members of the research team analyzed the data to increase analytical rigor (Lincoln and Guba 1985). The data analysis process at each of the three rounds was divided into the following four stages.

The *first stage* began with open or in-vivo coding to best represent informant meanings, perceptions, and views, thereby extracting a comprehensive set of first-order informant-centric terms (Langley and Abdallah 2011). In the *second stage*, axial coding unveiled differences and similarities among the first-order terms to achieve a higher level of abstraction (Coffey and Atkinson 1996). First-order terms were summarized in 42 first-order concepts based on informant-based labels. In the *third stage of analysis*, researchers iterated among the data, existing theory and findings (Gioia, Corley, and Hamilton 2012). The 42 first-order concepts were subsumed into 14 second-order themes of ‘tensions’, ‘divergences’, ‘expected value’ and ‘service’ as observed from micro-, meso- and macro-level perspectives. *Appendix 2* provides sample quotes and illustrations. Finally, in the *fourth stage*, the 14 second-order themes were subsumed into seven aggregated dimensions: ‘institutional dissonance’ and ‘institutional stabilizing efforts’ (as observed from the micro, meso, and macro level of the service ecosystem) and ‘meta-space’. *Appendix 3* provides the final data structure.

To secure trustworthiness of the data and results, primary, secondary, and archival data sources were triangulated to ensure that the data were representative. Additionally, findings were triangulated across all members (three women and two men) of the research team to increase credibility, transferability and conformability of the findings by offsetting potential interpretation and reporting bias due to value or gender differences (Wallendorf and Belk 1989). Triangulation of data and findings allowed the researchers to investigate the HAT ecosystem from various perspectives (Yin 2014). For instance, developer interviews and participant observation primarily provided information from micro and meso-level perspectives of the service ecosystem, while press articles and annual reports provided information from a more macro-level view. Moreover, interviews with HAT users corroborated findings from a customer perspective. To further secure confirmability, different members of the research team collected data from different sources while all researchers regularly audited coherence between the data and emerging conceptualizations (Skålén et al. 2015). Researchers ensured credibility through member checks during all rounds of analysis. They resolved discrepancies through discussion (Yin 2014) and safeguarded integrity by protecting the anonymity of respondents (Wallendorf and Belk 1989). Researchers also secured dependability of the findings by engaging with the focal phenomenon (i.e. the HAT service ecosystem) over a prolonged period of time (i.e., over four years) (Wallendorf and Belk 1989).

FINDINGS

By framing innovation as a systemic process, the findings reveal that 1) institutional reconciliation is an overlooked phase of innovation, 2) ideas are refined by four types of institutional reconciliation pressures (tensions, divergences, expected value, and service), and 3)

innovation is influenced by plasticity in four ways (recursivity, temporality, complementarity, and continuity). Overall, these findings are illustrated in Figure 1.

---Insert Figure 1 here---

The first finding highlights an overlooked phase of innovation, namely the institutional reconciliation phase. The findings show that, within a service ecosystem, actors converge ideas by reconciling institutions with the hopes of cultivating a solution to a problem. Sometimes, this recursive process reverts back to the idea phase and may repeatedly cycle through the three phases (idea, institutional reconciliation, and solution). This recursivity occurs because actors within service ecosystems may exhibit varying dispositions about ideas and how to converge these into solutions. They may support prevailing institutions or desire to disrupt these institutions; additionally, they may need to adapt to one another, interrupt the efforts of one another, or garner support from others in the service ecosystem. This process occurs through institutional reconciliation.

Institutional Reconciliation

The data reveal that actors in a service ecosystem often differ in their opinions, beliefs, values, or norms about how to seek solutions; moreover, actors may not uniformly see situations as problems. Despite these differences, each actor goes about planting varying ideas in a service ecosystem and nurturing these ideas in ways that they best see fit. Sometimes, actors knowingly work against one another and other times actors inadvertently work against one another. Similarly, actors sometimes conscientiously support the efforts of others while at other times actors are not aware that they facilitate one another's efforts. Reflecting this variation, the data reveal institutional reconciliation as four types of pressures: *tensions*, *divergences*, *expected value*, and *service*. *Institutional dissonance* manifests as tensions and divergences, while

institutional stabilizing efforts manifest as expected value and service. These findings are summarized in Table 2 and elaborated in *Appendix 2*.

---Insert Table 2 here---

Institutional Dissonance

The data show that institutional dissonance exists because of competing, weakening or dominating institutions in a service ecosystem. Institutional dissonance was found to manifest as (a) tension and (b) divergences.

Tension

Tension refers to an actor's disinvestment (emotional or cognitive) in a current institutional order (i.e., in the prevailing institutions influencing his/her behavior). The data reveal that tension often generates anxiety or cognitive dissonance because actors exposed to tension often report "being pulled" in different directions. Actors doubt that the current institutional order serves their interests, or find that the current institutional order is less appealing because of their investments in rival institutional orders. Tension is therefore an *actor-internal* manifestation of institutional dissonance. It results from high institutional complexity, which indicates high fluidity within a service ecosystem.

From a micro-level perspective, it can be seen that several HAT developers experience tension in their personal dissatisfaction regarding their own "*painfully naïve*" (D 3, 121-129) use of data-driven services. The idea of data security pulls them away from their current usage of online services. This tension also manifests in the developers' negative feelings that the value and use of personal data is underappreciated as illustrated in *Appendix 4a*. In the dominant institutional order, firms (not customers) are able to own, access, and benefit from personal data, and developers do not see this usage of personal data to be in their best interests or in the best

interests of customers. This disagreement triggers emotional disinvestment and developers believe that the ‘game’ is less worth playing. This tension also manifests in their stated reluctance to disclose personal data to the public, as illustrated in *Appendix 4b*. In addition, many of the developers realize that “*privacy*” is not yet a popular idea or institutional norm. As exemplified in *Appendix 4c*, developers struggle with the idea that people generally are not aware of or do not care that their data are tracked, exploited, or archived online. These dissonant norms and beliefs cause mental stress (and hence, tension), generating further cognitive disinvestment in the current institutional order.

Moving to a meso-level perspective of the HAT service ecosystem, organizational tension arises from limited customer awareness about personal data issues. Organizational tension also stems from the need to operate in an “intensely competitive” and “rapidly evolving” industry (*Appendix 4d*). As illustrated in *Appendix 4e*, it is perceived that the dominant institutionalized norms, rules and beliefs of customers scattering and sharing their personal data do not align with the HAT organization’s perception of what is valuable. Organizational collective dissatisfaction regarding the privacy and security of current data-driven services is also reflected in the sense that customers are unable to meaningfully utilize and exchange their personal data (*Appendix 4f*).

Tension can also be analyzed at a macro-level perspective. For instance, whistleblowers such as Edward Snowden, a US government employee who leaked classified information regarding mass surveillance programs, generated tension about personal data and related misuse by government authorities (*Appendix 4g*). By acting in opposition to the dominant institutional order, his behavior created significant public cognitive and emotional disinvestment in prevailing institutionalized norms, rules, and beliefs regarding the balance of data privacy and national security. This disinvestment was accelerated by public investment in rival institutional orders

that prioritize privacy; this change is shown in the increase of public support for the legal protection of personal data (*Appendix 4h*). Likewise, HAT beta-users and several active HAT users prioritize the control and privacy of personal data because it is perceived to better serve their interests than the prevailing solutions, laws and institutionalized norms. This shift parallels dissatisfaction regarding limited functionalities of current data-driven services and insufficient coordination of end-user efforts, as illustrated in *Appendix 4i*.

Divergences

The term “divergences” refers to clashing investments (emotional or cognitive) of two or more actors. Unlike tension, divergences are not self-directed and are not concerned with disinvestments in the current institutional order. Divergences reflect high, yet opposing, emotional and/or cognitive investments in competing institutions of two or more actors. Divergences are therefore *actor-external* manifestations of institutional dissonance. Like tensions, divergences are indicative of high fluidity within a service ecosystem.

From a micro-level view, clashing investments in contrasting institutions (and hence, divergences) can be observed when HAT developers display behaviors that contrast with traditional institutionalized norms, rules, or beliefs. For instance, by pioneering a customer-centric personal data platform, HAT developers are highly invested in behaviors that clash with prescriptive behaviors deemed acceptable by established institutions. Using words such as “*revolution*”, “*die*” and “*survive*”, one of the HAT developers explains in *Appendix 4j* that personal data privacy and safety are volatile ideas that are yet too complex and different for customers to understand.

Similarly, divergences can also be analyzed at a meso-level when different institutionalized norms, rules or beliefs compete within the HAT organization (between different work groups or

teams) and blur the direction of the HAT project. While the HAT's development rests upon investments that are generally aligned with one another, the data reveal occasional clashing investments among different parts of the organization. These divergences mostly concern the project's overall goal and nature; for example, it is unclear whether the platform should be treated as public and a freely-available research output that is "*an end in itself (...) [or rather as] a product which is marketable*" (D2, 71-73).

Numerous divergences can also be analyzed from a macro-level perspective. They range from opposing actor investments in competing institutionalized norms, rules and beliefs regarding mass surveillance practices (general public/media vs. government authorities), data ownership and privacy in current data-driven services (industry vs. user of data-services), to calls for industry opposition to government requests for user data. The latter is illustrated in *Appendix 4k*. Together, these divergences make competing institutions salient, reflecting institutional dissonance and a high degree of fluidity within the service ecosystem.

Institutional Stabilizing Efforts

Institutional stabilizing efforts involve convergence of ideas and alignment of competing institutions. The data reveal that institutional stabilizing efforts increase the stability of a service ecosystem and manifest as (a) expected value and (b) service, which are detailed below.

Expected value

The term "expected value" refers to the anticipated outcomes driving the behaviors of both individual and collective actors. Expected value represents the willingness of actors to engage in institutional work and can drive efforts to stabilize emotions, thoughts and even institutions.

Expected value can be analyzed from different perspectives of a service ecosystem.

At a micro-level perspective, it can be seen that each HAT developer's expected value is uniquely based on personally attainable and desirable outcomes. These include, for example, fulfillment of personal goals or professional interests, social recognition and personal fame, or improved career opportunities that stabilize the service ecosystem around the HAT project. In *Appendix 4l*, one of the HAT developers remarks that the project could either yield research or a market to change the world. Such an outcome would stabilize the service ecosystem on the ideas and value of the HAT organization.

Shifting focus to the meso-level, expected value driving the activities of the HAT organization is either internal or external. Internally-oriented anticipated outcomes tend to be operational motivators that stabilize the ongoing development of the HAT project itself (expected value of setting up a qualified team, ensuring continuous funding, increasing awareness about the HAT platform, or establishing a shared vision within the organization). Externally-oriented expected outcomes tend to be stakeholder oriented motivators that stabilize the surrounding service ecosystem on the HAT platform. For instance, the HAT platform is expected to empower customers to “*solv[e] the crises of the mundane*” (COM-BD 1, 7:3269) by using their personal data about everyday things to improve their lives (see *Appendix 4m* for an example of a smart home sensor for toiletries). In turn, this customer empowerment could lead to new business opportunities for firms and inform privacy policies for the benefit of the wider society (COM-BD 1, 3:1112) – all of which would be based on the HAT platform and its corresponding institutionalized norms, rules, and beliefs.

Zooming out to a macro-level perspective of the service ecosystem, expected value can be seen to trigger actors' – sometimes opposed – attempts to center the service ecosystem on ideas that best serve their respective interests. For instance, government-induced mass surveillance

practices were motivated by the expected value of capturing suspected terrorists. Likewise, technology firm investments in smart sensor capabilities were motivated by the expected value of increasing customer trust in data-driven online services (*Appendix 4n*). Active HAT user engagement in the HAT project, in turn, was motivated by the expected value of increased data privacy or better decision making through, for example, more accurate analysis of personal location data (*Appendix 4o*).

Service

Service is the application of competencies by an individual actor or group for the benefit of others (Vargo and Lusch 2004, 2016). Service represents the active doing of actors; that is, their actual behaviors associated with institutional work.

At a micro-level perspective, HAT developers can be seen applying their competencies to benefit personally, such as applying one's abilities to create a desirable public image of themselves as "*knights of shining armor for (...) privacy in data*" (D1, 89). In this way, the stabilizing efforts of some HAT developers were directed toward creating favorable identities and institutionalizing different corresponding norms, rules, and beliefs in the service ecosystem.

Viewed at a meso-level, different parts of the HAT organization can be seen applying their collective competencies for the benefit of the HAT project by building the HAT platform and stabilizing nascent HAT-related norms, rules, and beliefs perceived as dissonant with the prevailing institutional order. Most importantly, organizational members engage in institutional creation work by extensive theorizing and defining including the specification of functionalities and components of the HAT platform. As seen in *Appendix 4p*, this specification entails identifying ways to contextualize personal data such that data is represented in ways that are more useful and relevant for the customer. It also involves constructing regulatory rule systems

that involve “*user-specified permission, corporate policies, and applicable regulations*” (COM-BD 3, 6: 1690). By centering the customer (rather than the firm) in all its design efforts (*Appendix 4q*), the HAT organization attempts to reformulate normative associations to evolve the institution of privacy. The data also reveal embedding and routinizing within the HAT organization, as can be seen in a strong HAT team spirit as well as close cooperation among members. This institutional maintenance work infuses emergent norms, rules, and beliefs into the HAT’s organizational practices and routines. Likewise, mythologizing is evident in the data; in mythologizing, shared stories are created and sustained across the HAT organization, for example, regarding successful prior projects, or the competence and creativity of leading HAT developers. These shared stories cultivate trust and decreases uncertainty, which further stabilizes the service ecosystem (*Appendix 4r*).

From a macro-level perspective, different actors provide service to reconcile competing institutions and stabilize the service ecosystem. More specifically, technology firms work to stabilize and maintain prevailing institutions by continually investing in research and development to strengthen current IoT service. Some political institutions similarly maintain prevailing institutions by establishing barriers to institutional change; for example, the data illustrate that the United States government supported national security agencies to improve their mass surveillance systems. At the same time, however, other political institutions attempt to disrupt the prevailing institutional order through service that disassociates rules or technology from their moral or ethical bases. For instance, they apply competencies (i.e., serve) by suggesting alternative tools and services that ensure data privacy (*Appendix 4g*).

How Plasticity Influences Innovation

In addition to providing a nuanced understanding of institutional influences on innovation, the data also illustrate the influence of plasticity on innovation. Plasticity, or the service ecosystem's capacity to take and retain form, influences how well the meta-space transmits the effects of institutional reconciliation so that the service ecosystem can take and retain different forms. By viewing HAT platform development efforts from an institutional lens, it can be seen that plasticity influences innovation in four ways: (1) recursivity, (2) temporality, (3) complementarity, and (4) continuity. Each of these is detailed below.

Recursivity

Initially, in the idea phase, the HAT developers' efforts to reconcile dissonant institutions regarding privacy prompted their learning about HAT users' beliefs, emotions, and cognitions regarding potential data security risks. While most "*don't see (...) concerns to privacy*" (BT 3, 10) and "*feel very comfortable putting private data on my [the tester's] HAT*" (BT 2, 10-11), other HAT users begin to raise concerns that the HAT platform may "*become a target (...) [for] being hacked*" (BT 3, 9-11) as it could potentially provide an "*attack surface for anyone trying to get my stuff [the tester's data]*" (BT 4, 9). After institutional work toward adapting the platform's security architecture so that users ultimately feel "*the design of the platform has been done [in such ways] to ensure the data is secure*" (BT 2, 11), HAT developers return to the idea phase by adjusting their development efforts to provide greater utility to HAT users. This feedback loop is facilitated by service ecosystem plasticity and illustrates fluidity in HAT development efforts; this fluidity allows the service ecosystem to move toward taking on a new form.

Proceeding toward the institutional reconciliation phase, HAT developers' institutional stabilizing efforts are now directed toward facilitating how users draw on the platform in ways that are meaningful in their own personal contexts (*Appendix 4m*). For instance, they create

awareness that the HAT platform “pulls in [user] data that's already present in other places (Facebook, GCalendar[sic], Dropbox)” (BT 4, 8); they seek to provide users with the ability to reconfigure their data to better match their personal needs and purposes. This feedback loop in the innovation process transpires as a form of learning in that users realize how to better use their data. This feedback loop introduces more stability to the service ecosystem by helping users better appreciate the utility of their data (*Appendix 4s* and *Appendix 4t*) as they come to agree that the exchange of ‘contextualized’ personal data “will be beneficial” (BT 3, 14) to them (also, BT 1, 14; BT 2, 14). This acknowledgement can also be seen in *Appendices 4w* and *4x*.

To further enhance service ecosystem fluidity, the HAT organization also disassociates the moral foundations of prevailing institutions. They attempt to create feedback loops that facilitate knowledge sharing, for example, through press releases and blog posts that are designed to elevate concerns about personal data (mis-)use by current data-driven services (*Appendix 4u*). Continuous feedback loops regarding dissemination and convergence of ideas throughout the service ecosystem is crucial during the institutional reconciliation phase. It temporarily increases the fluidity of the service ecosystem that facilitate disruption of the prevailing institutional order. This influence of plasticity is summarized by the Principle of Recursivity: *An increase in the fluidity of the service ecosystem facilitates the recursivity needed to disrupt the prevailing institutional order with nascent norms, rules, and beliefs during the institutional reconciliation phase.*

Temporality

The HAT platform - initially as an idea – catalyzed institutional stabilizing efforts in a highly fluid service ecosystem. These institutional stabilizing efforts from the past are remembered in the meta-space, although the actual development of a solution (i.e., the HAT

platform) continually returns the innovation process to the idea phase. As the development process of the HAT platform persists over time, the service ecosystem takes different forms and recursively begins to center on evolved institutions of privacy, data security and personal data utility. For example, members of the HAT organization create HAT-related institutionalized norms, rules, and beliefs by continuously exerting social persuasion efforts over time. By mobilizing macro-level support for the HAT platform (including events for potential HAT customers, online forums targeting developers to further collaborate on the HAT platform, an ‘Industrial Advisory Board’, a crowd-funding campaign to gain (financial) support from industry, and media cooperation to increase awareness of the (benefits of the) HAT platform), the HAT organization capitalizes on service ecosystem fluidity. They attempt to disrupt the prevailing institutional order that is perceived to be misaligned with their (and customers’) interests. Although these attempts occurred in the past, their effects are deposited into the meta-space and transmitted through the service ecosystem over time, as more and more users become aware of new norms and beliefs. This process is accelerated by organizational efforts to promote rapid adoption of the HAT platform through mass communications. To disconnect sanctions associated with HAT adoption, for example, a technical feature of the HAT would bypass governmental legislation and regulations by allowing customers to sign up “*to a HAT anywhere in the world (...) and choose where (...) [he/she] wish to have (...) [their] HAT hosted.*” (COM-CF 46, 1: 27). These findings are summarized in the Principle of Temporality: *During the institutional reconciliation phase, the meta-space enables disparate ideas to converge over time.*

Complementarity

In a similar vein, other firms and individuals increased the capacity of the service ecosystem to retain a new form by stabilizing emergent HAT-related norms, rules and beliefs.

This stabilization occurred, for example, when various firms became members of the HAT's 'Industrial Advisory Board' and more than 350 financial supporters contributed financial resources to the HAT's crowdfunding campaign. In shorter feedback loops, these actors became increasingly aligned with the HAT service ecosystem to evolve institutions regarding privacy and data security regulations in the U.K. The HAT organization also gained support from the U.K. government by becoming classified as a government / publicly funded project (*Appendix 4h*). While these efforts stabilized the service ecosystem around the HAT platform, they also facilitated a feedback loop in the meta-space that moved the service ecosystem closer toward the values, beliefs, and policies advocated by the U.K. government. Through this recursive process, other ecosystem actors gradually established mechanisms that helped to stabilize the service ecosystem around the HAT platform. It was learned that HAT users still found the platform confusing (*Appendix 4v*) and remained doubtful that the HAT platform would "fix the problem" (*Appendix 4w*). To move the idea toward the solution phase, institutional reconciliation efforts by members of the HAT organization were complemented by the institutional stabilizing efforts of other actors in the service ecosystem. These efforts were necessary to stabilize competing but still nascent HAT-related norms, rules, and beliefs, and to improve the ecosystem's capacity to retain a new form. These findings are summarized in the Principle of Complementarity: *To move an idea from the institutional reconciliation phase toward the solution phase, nascent innovation-related institutionalized norms, rules, and beliefs need to be supported by complementarity in stabilizing efforts by other actors in the service ecosystem.*

Continuity

HAT developers, realizing that institutional dissonance was not completely reconciled, returned back to the idea phase in order to continue improving the HAT platform. As developers

tirelessly recorded input from active HAT users in their everyday business practices, institutionalized feedback loops catalyzed renewed assemblages of ideas. These ideas then informed subsequent rounds of institutional work. As a result, further institutional work generated different ideas from all over the HAT service ecosystem that were considered and refined. As the ideas propagated outward from the HAT organization, they permeated neighboring ecosystems which then catalyzed similar innovation processes in different places. This dissemination suggests that, most important of all, innovation is a recursive, systemic process that may never end. These findings are summarized in the Principle of Continuity: *Innovation is an ongoing and recursive process that may never end given that complete reconciliation of institutional dissonance may never be achieved.*

DISCUSSION

This study empirically investigates how innovation emerges in a service ecosystem, as shown in Figure 1. By framing innovation as a systemic process, the study reveals that 1) institutional reconciliation is an overlooked phase of innovation, 2) ideas are refined by four types of institutional reconciliation pressures (tensions, divergences, expected value, and service), and 3) innovation is influenced by plasticity in four ways (recursivity, temporality, complementarity, and continuity). The findings show that, within a service ecosystem, actors adapt to or converge ideas through institutional reconciliation. When an idea does not evolve, institutional reconciliation may not culminate in a solution. As a result, the innovation process may return back to the idea phase and begin again. However, as a solution is collaboratively designed in a service ecosystem, institutional reconciliation aligns the service ecosystem with an idea. In other words, when institutional dissonance (tensions and divergences) is reconciled,

institutional stabilizing efforts (expected value and service) reverberate throughout a service ecosystem. This process is how innovation emerges in a service ecosystem.

The findings show that plasticity influences whether and how institutions, along with other components of the service ecosystem, jointly evolve. They suggest that plasticity facilitates the recursive process by which ideas may rearrange institutions and emerge as solutions.

Complementing extant innovation research, the findings illustrate how innovation emerges in volatile as opposed to stable settings (Adner and Kapoor 2010; Gawer and Cusumano 2014; Ordanini, Parasuraman, and Rubera 2014; Skålén et al. 2015). Because of the interplay between fluidity and stability, complete reconciliation or comprehensive stabilization may never be achieved, especially in volatile settings. By showing that innovation is an ongoing reconciliation of competing institutionalized norms, rules, and beliefs, the findings complement research outlining innovation as firm-centric and linear, particularly for innovation in networks (Dhanaraj and Parkhe 2006) and business or innovation ecosystems (Adner and Kapoor 2010; Clarysse et al., 2014; Gawer and Cusumano 2014; Zahra and Nambisan 2012). This continuity is especially important for transformative service environments centered on societal impact since complete alignment of a service ecosystem may not be necessary for an innovation to emerge (Baron et al. 2018).

On a separate note, the proposed framework also extends research that explores innovation from a service ecosystem perspective (Koskela-Huotari et al. 2016; Siltaloppi, Koskela-Huotari, and Vargo 2016; Baron et al. 2018). The proposed framework broadens the study of innovation to comprehensively include institutions, and explicitly articulates how the service ecosystem itself influences innovation. Because multiple actors in a service ecosystem influence the innovation process, innovation is difficult to control by any single actor. The findings also

suggest that the “upframing” of service design requires closer investigation of the various perspectives that refine an idea during institutional reconciliation (Patrício, Gustafsson, and Fisk 2018). Disentangling how institutional reconciliation transpires at different levels of the service ecosystem corroborates the work of Baron and colleagues (2018) and points attention to institutional complementarities and tensions across a service ecosystem. Finally, by emphasizing institutional reconciliation as an underlying mechanism of innovation, the proposed framework affirms the importance of institutional reconfiguration processes (Koskela-Huotari et al. 2016) and empirically substantiates how institutionalization (Vargo, Wieland, and Akaka 2015) and institutional complexity (Siltaloppi, Koskela-Huotari, and Vargo 2016) influence innovation in a service ecosystem. This research hence bridges among fragmented innovation research streams across the service and management fields.

Interestingly, the data show that, despite their best efforts, actors may never fully reconcile competing institutions. Especially when existing solutions are insufficient for solving problems, actors may initiate new ideas or work with others to develop different or improved solutions. They begin to formulate organized ways of activity according to a principle or institution that may depart from a dominant institutional order. These findings extend the work of Kurtmollaiev and colleagues (2018) who illustrate how inconsistencies between the micro and the macro level trigger the emergence of novelty and institutional change. Nevertheless, the findings show that only some actors will attempt institutional reconciliation simply because they may not see a situation as problematic. Depending on their investment in a prevailing institutional order, some actors may engage in creating a new institution or disrupting prevailing institutions, while others may work toward their very maintenance. These differences have been highlighted in research on service ecosystem transformation (Skålén, Aal, and Edvardsson 2015), which draws on the

theory of strategic action fields (Fligstein and McAdam 2011, 2012). System transformation often results from conflict primarily between two actor types, namely incumbents (i.e., those actors who strive to maintain the system's constitution) and challengers (i.e., those actors who seek to change and disrupt the current constitution of the system). The findings extend this research by characterizing innovation as a dialectical process by which viable service ecosystems emerge. In these ways, innovation is a systemic process propelled by institutional reconciliation.

Research Agenda: Four Principles of Innovation as a Systemic Process

The findings point both innovation and service scholars toward future research regarding four principles of innovation as a systemic process. As detailed below, the study reveals that innovation is influenced by plasticity in four ways: recursivity, temporality, complementarity, and continuity. These four principles outline a research agenda for the study of innovation as a systemic process, as shown in Table 3.

---Insert Table 3 here ---

Recursivity refers to the feedback loops that transpire in meta-spaces during innovation. The plasticity of a service ecosystem influences recursivity, or the number and magnitude of feedback loops. Particularly in service ecosystems characterized by competing institutions, the behaviors, values, norms, ideas, and beliefs of actors can vary. However, as these actors intermingle, they may influence one another and change the nature of the service ecosystem. Changed beliefs, learned behaviors, or new knowledge often emerge from feedback loops. The formulation of habits, emergence of culture, and persistence of attitudes are outcomes of feedback loops, which play a fundamental role in converging ideas and institutions during the innovation process.

Temporality refers to the time that lapses in the meta-spaces of a service ecosystem during

innovation. The plasticity of a service ecosystem influences temporality, or the episodes of time, in an innovation process. The temporal nature of innovation emphasizes that institutions are not always aligned over time, and that service ecosystems are in a constant state of change. The fluidity and stability in a service ecosystem affect how much time is needed for each phase in the innovation process. Thus, the influence of institutions and institutional work on different components of a service ecosystem over time reside in a meta-space of a service ecosystem. Belief formulation, learning, or knowledge sharing, for example, require time for beliefs to change or for actors to learn.

Complementarity refers to the harmony among institutional reconciliation pressures in a service ecosystem during innovation. The plasticity of a service ecosystem influences complementarity in an innovation process, particularly with respect to how inherent characteristics of a service ecosystem may influence innovation (Johnson and Powell 2017; Padgett and Powell 2012). For example, high degrees of fluidity accelerate the need for institutional reconciliation in order for innovation to emerge. Stabilizing efforts can possibly lead to viable service ecosystems (Skálén, Aal, and Edvardsson 2015). These findings coincide with the findings of Kurtmollaiev and colleagues (2018) who identify that organizational context can considerably influence innovation efforts.

Continuity refers to the constant institutional reconciliation pressures in a service ecosystem during innovation. The plasticity of a service ecosystem influences continuity in an innovation process because the fluidity and stability of a service ecosystem produce an ongoing dialogue among actors. In turn, innovation is like a dialectic that, typically, is neither won nor lost by either side. Rather, innovation tends to be a honing process by which messy piles of disparate ideas become finely shaped into viable solutions. Innovation and institutional reconciliation are

not necessarily sequential progressions; rather they are spiral-like processes. They are akin to the process of a diamond emerging, amidst pressure, from graphite: in the same way that dark black graphite takes on the form of a bright white diamond, volatile, erratic service ecosystems can become stable and peaceful. The meta space is where “the dialectical interplay between market [or service ecosystem] stability and fluidity does not lead to circular change or pendulum movements but to spiral-like development, where the opposing forces eventually lead the entire market [or service ecosystem] to take on another form” (Nenonen et al. 2014, p. 12).

Institutional reconciliation can emerge service ecosystems from opposing forces and evolve them to take on entirely different forms once the opposing forces become annihilated.

Limitations

This study adopted a single case study approach, aimed at gaining an in-depth understanding of how innovation emerges in a service ecosystem. One limitation is therefore that the findings of this study are solely grounded in one empirical context, namely the IoT. Future research could examine other contexts such as the development of novel mobile applications, e-commerce business models, or other domains that are highly dynamic. Additionally, the investigation is generally confined to the U.K. Future research could examine underlying norms, rules, and beliefs across different countries and cultures.

Another limitation of this study is that it is based on a single qualitative study. While single case designs do not allow for statistical generalization, they allow for analytical generalization (Yin 1984). By using an abductive research approach comparing emerging conceptualizations with extant theory, some degree of analytical generalization can be achieved. Nevertheless, future research using quantitative approaches such as surveys, experiments, or statistical modeling can improve the generalizability of the findings. Finally, because of the exploratory

nature of this research, concepts are not measured or evaluated. As described in Table 3, future research could develop measurement instruments for fluidity, stability, institutional dissonance or stabilizing efforts.

Managerial Implications

Innovation as a systemic process includes three phases: 1) idea, 2) institutional reconciliation, and 3) solution. The depth and complexity of innovation are captured in the four principles of recursivity, temporality, complementarity, and continuity. Each principle can inform how managers lead innovation processes.

Rather than focusing solely on research and development during the idea phase, managers should also focus on revising norms, rules, and beliefs that support new ideas. Furthermore, these efforts should not only be directed toward potential customers, but also towards other private, public, and market-facing actors. Although it may begin in a laboratory, innovation transpires outside of a laboratory beyond the confines of a sole organization. It is important for managers to be actively involved in their communities and professional networks so that their ideas can be planted in different service ecosystems. It is not always immediately clear which ecosystem can provide fertile soil for an idea to be designed into a solution.

Managers should also recognize that innovation is often recursive and iterative. They should be patient and comfortable moving back and forth from the idea phase to the institutional reconciliation and solution phase, and back again. Innovation is continuous, although the effects of institutional reconciliation can linger into the future and positively (or negatively) influence subsequent phases of innovation. Conscientious managers should facilitate feedback loops that promote learning and knowledge sharing. Importantly, managers should not only disrupt and change institutions, as this disruption might accelerate institutional dissonance within a service

ecosystem. This dissonance can, in turn, counteract the emergence of innovation. While change and disruption are important, managers should discriminate among the norms, rules, or beliefs that should be maintained or nurtured. Garnering widespread support from other actors in the service ecosystem is key to refining ideas into solutions.

Finally, managers must recognize that innovation is in the eye of the beholder. While one beholder can view an issue as a problem, another beholder can view the same issue as a solution. Managers should acknowledge different perspectives and acquire the necessary orchestration skills to coordinate institutional stabilizing efforts. Innovation is thus a journey, rather than a destination. It remains the responsibility of managers to lead the institutional journey from idea to solution to ensure innovation.

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Figure 1. Innovation as a Systemic Process

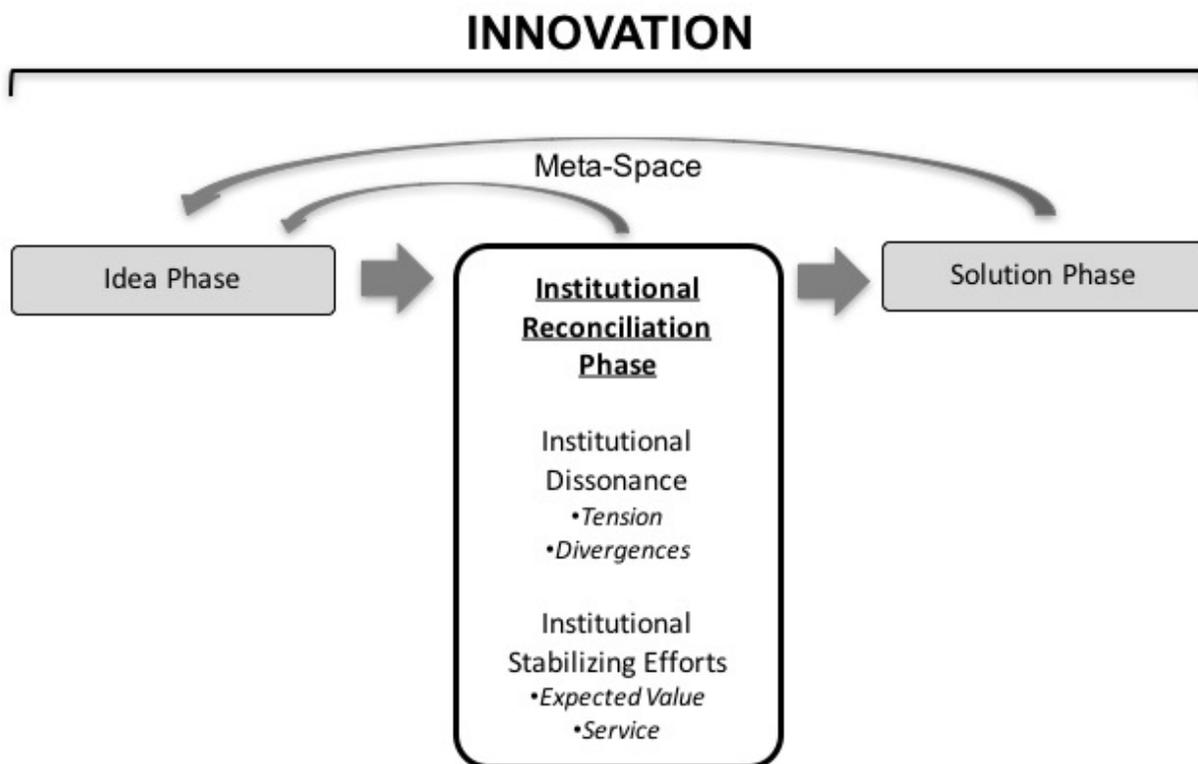


Table 1. Overview of Data Sources, Documents, Codes, and Abbreviations

Data Sources	#Documents	Abbreviations
Primary Data Sources		
Interviews with six leading HAT developers (6/2014; average interview length 90.8 minutes)	6*	D 1-6
Interviews with four beta users (9-10/2016; average interview length 44.3 minutes)	4*	BT 1-4
Interviews with five active HAT users (3-4/2017; average interview length 39.8 minutes)	5*	AU 1-5
Participant observation first Mad Hatter's Tea party (7/2014, duration: approx. 3.5 hours)	7	OD-MH1 1-7
Participant observation second Mad Hatter's Tea Party (11/2014, duration: approx. 5 hours)	8	OD-MH2 1-8
Participant observation Facebook live chat (8/2016; duration: 37.5 minutes)	2	OD-FB 1-2
Archival and Secondary Data Sources		
Transcripts of interviews with 12 HAT users (2/2017)	12	COM-UI 1-12
Briefing documents HAT (7/2014-6/2016)	9	COM-BD 1-9
Website HAT (6/2014)	10	COM-WS1 1-10
Website HATDeX (8/2016)	15	COM-WS2 1-15
Blogposts HAT/HATDeX (9/2015-8/2016)	5	COM-BP 1-5
HAT community forum (10/2015-8/2016)	49	COM-CF 1-49
Press releases/news HAT/HATDeX (3/2013-7/2016)	14	COM-PR 1-14
Social media HAT posts (1-8/2016)	1	COM-SM
E-Mails to HAT beta users (7/2016)	3	COM-EM 1-3
Beta HAT screenshots (8-9/2016)	19	SS-Beta 1-19
HAT Indiegogo campaign (4/2016-8/2016)	4	IC 1-4
HAT project team meeting minutes (3/2014-9/2015)	15	AD-TM 1-15
HAT project planning documentation (4/2014-8/2015)	7	AD-PP 1-7
HAT Industrial Advisory Board (10/2013-11/2015)	12	AD-IAB 1-12
Singapore Mad Hatter's Tea Party (2/2015)	3	AD-MHSIG 1-3
U.S. Mad Hatters' Tea Party (7/2015)	1	AD-MHUS
University lecture about the HAT (11/2015)	1	AD-LEC
Additional archival data (2/2014-11/2015)	19	AAD 1-19
Media coverage about the HAT (4/2013-7/2016)	18	MC 1-18
Popular press articles (7/2013-7/2014)	65	PA 1-65
Industry reports (12/2013)	10	IR 1-10
TOTAL	324	

*Here the number of documents refers to the number of transcripts (one per interview)

Table 2. Four Institutional Reconciliation Pressures during Innovation

	Definition	Sample Data Quotations	Relevant Literature
Institutional Dissonance			
Tension	An actor's disinvestment (emotional or cognitive) in the current institutional order	<p>"Since then, Edward Snowden's revelations about the mass surveillance activities of the National Security Agency (NSA) have made folk even warier of anything that could result in more information ending up in the hands of government" (PA 5, 1:878)</p> <p>"That's why I keep having iPhones, because it actually -- the iOS stops -- well I [can] turn off location services, (...) I turn off all the location-based adverts (...)" (D 3, 349-355)</p>	Voronov and Vince 2012; Lawrence and Suddaby 2006
Divergences	Clashing investments (emotional or cognitive) of two or more actors	<p>"Detlef Eppig, head of Verizon Germany, told Reuters: 'Verizon Germany is a German company and we comply with German law,' (...) 'The U.S. government cannot compel us to produce our customers' data stored in data centres outside the U.S., and if it attempts to do so, we would challenge that attempt in a court.'" (PA 51, 1369-1712)</p> <p>"...what do you think Google's business model is? And my answer is actually robbery. (...) So Google paid us by giving us a free search, and everybody seems to be quite happy with it, (...) the amount of data provided (...) may actually worth almost nothing. But again that's my fundamental problem. Something worth almost nothing is not equal to something worth definitely nothing." (D 5, 165-167)</p>	Voronov and Vince 2012; Lawrence and Suddaby 2006; Siltaloppi, Koskela-Huotari, and Vargo 2016
Institutional Stabilizing Efforts			
Expected Value	Anticipated outcomes driving the behaviors of both individual and collective actors	<p>"And also it's a large consulting grant, which looks good on my CV -- six big universities which give me access to, you know, making contacts in other universities. So those were the reasons." (D 4, 60)</p> <p>"In most developed nations, home consumption accounts for 60% of the country's GDP. With individuals in control of their own data, they can make more informed decisions on the way they purchase. In addition, wellbeing concerns can be addressed with the collection of personal data by the individual over time, resulting in more robust and accurate analysis of health concerns." (OD-MH1 5, 2028-2421)</p>	Chesbrough et al. 2014; Kruglanski et al. 2014
Service	Application of competencies by an individual actor or group for the benefit of others	<p>"...because I knew instinctively that this was something I had to start a revolution on, so I wanted every one of the investigators to be given that prominence of, here we are, seven champions of your rights. I wanted to -- I had this idea of promoting all seven of us as your, sort of, knights in shining armor for private -- privacy in data." (D 1, 89)</p> <p>"The team have worked tirelessly to get the HAT beta out by 1 July 2016 but while it's almost there (...) I know many of you are eager to get your own HAT and it shouldn't be long before you will but a few last minute touches could make it smoother for everyone so bear with us for a few weeks. We're getting there!" (IC 1, 6: 713)</p>	Vargo and Lusch 2004, 2016; Nenonen et al. 2014; Meynhardt, Chandler and Strathoff 2016

Appendix 1. Interview Protocol

DEVELOPERS

1. Where did the HAT idea come from?
2. How did it get to this point or emerge to the place where it is now?
3. How did you become involved in this project?
4. Why did you become involved in this project?
5. What is your role in the project?
6. Why do you continue to be involved in this project?
7. From your perspective, what problems are solved by this project?
8. From your perspective, what solutions are offered by this project?
9. What is your opinion on personal data and privatization of personal data?
10. Do you think most people would agree or disagree with your opinion? Why or why not?

USERS

11. How did you become involved in this project?
12. Why did you become involved in this project?
13. What is your role in the project? – How do you use the HAT? Can you tell me about your experience with using the HAT?
14. Why do you continue to be involved in this project?
15. From your perspective, what problems are solved by this project?
16. From your perspective, what solutions are offered by this project?
17. What is your opinion on personal data and privatization of personal data?
18. Do you think most people would agree or disagree with your opinion? Why or why not?

EXECUTIVE SUMMARY

Developing a better understanding of innovation in complex dynamic settings is a priority for service research and practice. To navigate such settings, this study suggests that innovation should be managed as an institutional reconciliation process by which ideas become solutions. In pursuit of innovation, managers should seek the alignment of necessary norms, rules or beliefs by actively engaging beyond their departments, to their wider organizations, communities, and professional networks. Because an idea may be better received in one service ecosystem than another, it is important for managers to understand institutional influences across different service ecosystems. An idea can be accepted in service ecosystem but rejected in another. This depends on the plasticity, or ability to take different form, of varying service ecosystems.

For these reasons, innovation requires system-level feedback loops that promote learning and knowledge sharing to cultivate the norms, rules, or beliefs that allow an idea to prosper. Moreover, the findings show that innovation requires continuous engagement (despite setbacks or disagreements) because of its recursive nature. Persistence is key to ensuring the iterations needed to refine ideas into solutions. Innovation often cycles back and forth from the idea phase to the institutional reconciliation phase, through to the solution phase, and back again.

This study underscores that managers should engage with current and potential customers, as well as other private, public, and market-facing actors. Managers must recognize that innovation is in the eye of the beholder. While one beholder can view an issue as a problem, another beholder can view the same issue as a solution. Managers should acknowledge different perspectives and acquire the necessary orchestration skills to coordinate institutional stabilizing efforts. Innovation is thus a journey, rather than a

destination. It remains the responsibility of managers to lead the institutional journey from idea to solution to ensure innovation.

Exploring how innovation emerges within a service ecosystem, researchers take an abductive research approach anchored in over four years of case study data regarding a high-technology solution in an Internet-of-Things setting, namely the Hub-of-All-Things (HAT) platform. The HAT platform is a cloud-based personal data service that enables customers to collect, contextualize, visualize, and trade their personal data for benefit in a privacy-preserving secure way. It also provides a mechanism for monetizing personal data through secondary services. Because of the public debate surrounding privacy and data security at the time of the study, this empirical setting provides the complex and dynamic conditions needed to investigate service ecosystems characterized by competing, sometimes conflicting, institutions.

By framing innovation as a systemic process, the study reveals that 1) institutional reconciliation is an overlooked phase of innovation, 2) ideas are refined by four types of institutional reconciliation pressures (tensions, divergences, expected value, and service), and 3) innovation is influenced by plasticity (the ecosystem's capacity to take and retain form). Based on these findings, the authors outline a research agenda focused on four principles of innovation as a systemic process (recursivity, temporality, complementarity, and continuity). Each principle informs how managers can lead fruitful innovation processes.