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AN EXPLORATORY STUDY INTO IT GOVERNANCE IMPLEMENTATIONS IN LIVING LABORATORY ECOSYSTEMS AND THEIR IMPACT ON OPEN INNOVATION EFFECTIVENESS

Research in Progress

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Abstract

This paper describes a research-in-progress that explores how the information technology (IT) governance mechanisms of Living Laboratories are associated with open innovation effectiveness. In recent years Living Labs, which embody an open innovation milieu and open innovation approach, have gained currency as representing a salient catalyst for Smart City research and development. However, the current body of Living Lab research in conjunction with the fragmented isolated nature of existing Living Labs dispersed across the European Union (EU), indicate that a lack of common standardised IT governance procedures are currently being operationalised. While cross border pan European Living Lab initiatives are emerging to rectify this issue, further research is warranted to identify how varying IT governance mechanisms are impacting the effectiveness of open innovation processes. Therefore, the main contribution of this paper is the development of a conceptual framework that seeks to identify how Living Lab open innovation ecosystems can establish effective IT governance and identify what types of IT governance capabilities are believed to be relevant to Living Lab open innovation effectiveness.

Keywords: Smart city, living laboratory, IT governance, open innovation.

1 Introduction

The concept of a “smart city”, has been lionised as an exemplary example of an initiative which may be operationalised to address the current and future complex challenges of increasing resource efficiency, reducing emissions, sustainable health care services for ageing populations, empowering youth and integrating minorities (Kroes, 2010; Schaffers et al., 2011). In the advancement of smart city research, Living Laboratories (Living Lab) have emerged as an exemplar of an integrated open innovation user-driven ecosystem approach which enables the foundation for the establishment of large, open and federated experimental facilities, which are required prior to the deployment and operationalisation of real-life smart urban infrastructure and services (Ballon et al., 2011; Hernández-Muñoz et al., 2011; Schaffers et al., 2011). Currently, to the best of our knowledge no empirical research exists pertaining to the impact of Living Lab IT governance on open innovation effectiveness. By examining the relationship between governance and open innovation effectiveness, we respond to a need in this research field, which was reported by (Eriksson, Niitamo, & Kulkki, 2005). In their research, the authors affirm that Living Labs require new

forms of IT governance which reflect the characteristics of emerging IT solutions and open source ecosystems that “favour wide knowledge sharing and communication, networking and partnering”. Specifically, our central research questions are:

Q1: How are Living Labs operationalising IT governance?

Q2: How are governance capabilities interacting to impact Living Lab IT governance?

Q3: What is the relationship between Living Lab IT governance and open innovation effectiveness?

This piece of research constitutes an initial step, in a series of planned empirical studies, where we contribute to theory by proposing a research model that can serve as a foundation to elucidate these research questions. As Living Lab IT governance and open innovation have yet to be studied together, their causal pathways and interactions in shaping open innovation effectiveness remain theoretically under developed. In other words, our understanding of how IT governance capabilities interact to establish effective IT governance and the subsequent effect that this has on open innovation effectiveness is embryonic. This research gap is of considerable significance given the salient role Living Labs have been designated in the smart city research agenda. The remainder of the paper is structured as follows: Section 2 builds the theoretical foundation for our analysis while Section 3 delineates the resulting research model and propositions underlying this study. Finally, we outline next steps and present our conclusion in Section 4.

2 Theoretical Underpinning

2.1 Open Innovation

Open innovation has been defined “as systematically encouraging and exploring a wide range of internal and external sources for innovation opportunities, consciously integrating that exploration with firms capabilities and resources and broadly exploiting those opportunities through multiple channels” (West and Gallagher, 2006, p. 82). Moreover, in the open innovation model, the construction of innovation networks and the notion of value ecosystems are considered very significant (Pereira, 2007; Morgan et al., 2012). In the pursuit of external ideas, competences and knowledge, firms should use networks as an external resource pool (Pereira, 2007; Torro, 2007). As Pereira (2007, p. 15) further proposes, “when companies depend on external knowledge and/or support from others to take new ideas to the market, it seems logical that effective collaboration becomes a necessary capability for an open innovation strategy”. The concept of a living lab has been characterised as an open innovation ecosystem of actors collaborating to co-create value and test innovations in real-life settings (Leminen et al., 2012). We also believe that Living Labs provide fertile ground on which to study the impact of IT governance mechanism on open innovation effectiveness.

2.2 Smart City

Caragliu et al., (2009) propose a holistic definition for a smart city which embodies a city where “investments in human and social capital, transport and modern IT infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources through participatory government”. Innovative IT can be used by “visionary, innovative leadership to create sustainable solutions that reduce costs, focus resources on issues high on the public agenda and forge connections amongst organisations and agencies with similar goals” (Kanter & Litow, 2009). Cities worldwide are increasingly undertaking the role of facilitators of innovation in critical areas such as business, health, environment and inclusive IT (Kroes, 2010). City authorities are striving to deploy intelligent cost effective IT solutions in their management of everyday public services. In the next section, we introduce the concept of a living lab which represents a salient platform for catalysing the smart city research agenda.

2.3 Living Laboratory

The European Network of Living Labs (ENoLL) represents the international federation of benchmarked Living Labs in Europe and worldwide and currently provisions strategic guidance to over 300 Living Labs. ENoLL define a Living Lab as “an open innovation environment in real-life settings in which user-driven innovation is the co-creation process for new services, products and societal infrastructures. Living Labs encompass societal and technological dimensions simultaneously in a business-citizens-government-academia partnership”. Living Labs, which embody open business models of collaboration, represent a fundamental methodology for the manner in which open innovation user-driven ecosystems should be organised (Schaffers et al., 2011). It is this multi-contextual dimension which accords the Living Lab concept a distinct advantage over traditional user-centric methodologies (Feurstein, Hesmer, Hribernik, Thoben, & Schumacher, 2008). Living labs facilitate the engagement of users to tackle specific salient research and development issues which are relevant to the advancement of smart cities such as multi-stakeholder participation, organisational processes and structures, behavioural change and innovation, IT governance, business modelling change and impact assessment and cultural specificities and are proving to be cogent platforms “to close the gap between innovative research and development in the smart city arena” (Ballon et al., 2011).

3 Research Model Development

In the following section we engage in a process of theory building, which is motivated by the lack of previous research into the focal areas, as proposed by Dubin (1978) and Reynolds (2006) whereby we analyse the extant research and delineate constructs and relationships between them in the form of theoretical propositions. It is envisaged that the resulting research model (figure 1) will provide the foundation for guiding future research into Living Lab IT governance and open innovation.

3.1 IT Governance

Effective IT governance is a critical issue for preventing financial, operational and strategic impairment (Singh, 2009). It is widely recognised that “getting IT right” does not stem merely from the technology, but stems principally from effective (distributed) IT governance (Peterson, 2004). Weil and Ross (2005) proposed a ‘IT governance arrangements matrix’ which delineates five IT governance archetypes (business monarchy, IT monarchy, feudal, federal and duopoly) and five IT decision domains (IT principles, IT architecture, IT infrastructure strategies, IT investment and business application needs) which are categorised into input rights and decision rights. According to De Haes and Van Grembergen (2005) three levels of IT governance exist: strategic level (board of directors), management level (executive management) and operational level (IT and business management). Xue, Liang and Boulton (2008) investigated IT governance from a staged based decision making approach. The authors investigated the lead actors of the initiation, development and approval stages in IT governance at six hospital settings. The authors identified seven IT governance archetypes: top management monarchy, top management IT duopoly, IT monarchy, administration monarchy, administration IT duopoly, professional monarchy and professional IT duopoly. Each IT governance archetype is analysed via four specific factors: IT investment level, external influence, organisational centralisation and IT function power. In terms of defining IT governance, sufficient consensus has not been reached, mainly due to the divergence in IT governance research over the last decade on an accepted definition (Grant et al., 2007). For the purpose of the study, IT governance is defined as “the distribution of IT decision-making rights and responsibilities among stakeholders...the procedures and mechanisms for making and monitoring strategic decisions regarding IT” (Peterson, 2004). We are of the opinion that this definition appropriately embodies the concept of a Living Lab.

3.2 Living Lab IT Governance

It has been argued that “emerging paradigms for IT governance, are based on collaboration, not control, where the need for distinct competencies is recognized, developed, and shared adaptively

across functional, organizational, cultural and geographic boundaries” (Peterson, 2004). In a distributed open innovation environment it is important to create a ‘cognitive minimum common denominator’ amongst all the participant stakeholders in order to promote the development of shared values, shared trust and reciprocity (Sawhney and Prandelli, 2004). It is envisaged that Living Lab ecosystems with successful IT governance will have proactively designed a cogent combination of governance mechanisms (e.g., IT organisational structures, committees, monitoring procedures, active stakeholder relationship management, aligned incentives and so on) that stimulate behaviours, which are in keeping with the ecosystem’s mission, strategy, culture, norms and values (Weill, 2004). However, existing European based Living Lab initiatives are largely fragmented, mainly as a consequence of the operationalisation of varying IT governance processes within Living Lab environments which is compounded by language and regional barriers (Ballon et al., 2011). Following a study of 26 living lab projects distributed across Europe, Leminen et al.,(2014) reported that Living Labs differed in terms of (i) lead innovation stakeholder; (ii) coordination of innovation; and (iii) participation in those Living Labs. The cumulative effect of these aforementioned shortcomings are resulting in the failure of Living Labs to not only effectively promote and share innovation across European public sectors, but also to address the ramifications that these siloed IT governance procedures may have on the effectiveness of open innovation processes and on the development of future smart city IT governance policies. There is also evidence to suggest that Living Labs steering committees are failing to engage end-users in the open innovation process. For instance, Almirall and Wareham (2008) reported that user participation in existing Living Labs “is still erratic and lacks structure and governance”. Furthermore, a report by MedLab (2011) on living lab governance issues highlighted the challenges of encouraging active user participation in a living lab where “depending on whether they are individual citizens or professional entities, their role in governance is very different, as it is easier to involve professionals in decision-making processes than individuals”. A recent study by Mulvenna and Martin (2013) highlighted how 27% of the sixty Living Labs surveyed had no evaluation procedures in place to evaluate end-user’s experiences of Living Labs. The study also proposed that embedding user-centric activities in partners represented a significant challenge for the Living Labs surveyed. These research findings would seem to indicate that there are grave failings pertaining to the IT governance mechanisms which are being operationalised within the Living Lab ecosystems. In contrast to rigid ‘closed’ innovation hierarchical governance structures which take place within a firm’s boundaries, a key issue for the management of distributed ‘open’ innovation ecosystems is to establish an effective “governance mechanism that strikes balance between order and chaos” (Sawhney and Prandelli, 2004). However, the process of determining the correct IT governance architecture is a “complex endeavour and it should be recognised that what strategically works for one organisation does not necessarily work for another, even if they work in the same industry sector” (De Haes & Van Grembergen, 2005). It is our intent to portray how Living Labs are operationalising IT governance and elucidate how IT governance capabilities are interacting to impact Living Lab IT governance.

3.2.1 IT Governance Capability Constructs

IT governance capabilities have been defined as the “managerial ability to direct and coordinate the multifaceted activities associated with the planning, organisation and control of IT” (Peterson, 2004). Three widely acknowledged distinct governance capabilities, i.e. structures (connection), processes (coordination) and relational mechanisms (collaboration) have been referred to as a “layered system of successively higher levels of horizontal integration capability” (Peterson, 2000). *Structures* refer to the existence of clearly defined roles and responsibilities and the establishment of steering committees and IT strategy committees (De Haes & Van Grembergen, 2005), and comprise formal and informal mechanisms that “encourage contacts and socialisation between stakeholder groups” (Peterson, 2000). Grant et al. (2007) describes the structures dimension as constituting “tangible planning and organisational elements outlined by high-level governance strategy”. They outline several forms of governance structures which are typically embodied within the structural capability: i) roles and responsibilities, ii) IT organisational archetypes and iii) management and steering committee structure.

The establishment of competence and excellence centres, which enable the pooling of knowledge from different functional areas and enable an increased focus on developing valued business and IT skill sets, constitute a salient dimension of structural capability (Peterson, 2004). Grant et al., (2007) argue that the appropriate operationalisation of “ex post” monitoring mechanisms e.g., IT maturity alignment model, scorecards, cost benefit analysis, charge backs, service level agreements and so on, enables on-going control and evaluation of the IT governance structure. Based on the analysis the first proposition is delineated:

Proposition 1: Effective Living Laboratory IT governance is dependent on formalisation and institutionalisation of a high-level governance strategy, an appropriate IT organisational structure, the formalisation and institutionalisation of appropriate IT monitoring procedures/tools and the predefining of roles and responsibilities within the ecosystem.

Processes refer to the “integration of business and IT decisions, or the alignment of strategic IT investments with the strategic goals and objectives of the firm” (Peterson, 2004). He outlines four levels of IT decision making process integration: administrative, sequential, reciprocal and full integration. The underlying principle of the process view is “the recognition that IT governance is based on lateral decision making that extends beyond the walls of the traditional IT function into all parts of an organisation.” (Grant et al., 2007). Weil and Ross (2004) argue that IT governance should not only consider stakeholders who possess decision rights but also those stakeholders who have input into IT decisions across IT decision domains. Based on the analysis the second proposition is delineated:

Proposition 2: Effective Living Laboratory IT governance is dependent the distribution of strategic IT decision making amongst stakeholders who possess decision rights and also stakeholders who possess input into decisions.

The *relational mechanisms* capability dimension represents the requirement for the operationalisation of suitable mechanisms for ensuring effective relationship management amongst principal stakeholders. Relational mechanisms are “crucial in the IT governance framework and paramount for attaining and sustaining business-IT alignment, even when the appropriate structures and processes are in place” (De Haes & Van Grembergen, 2005). Feurstein et al. (2008) posit that further research is warranted to determine how best to integrate society and citizens into Living Lab open innovation ecosystems. They argue that “as private persons become a source of ideas and innovations, an appropriate rewarding and incentive mechanism needs to be put in place which simultaneously secures pay-back to all the actors involved whilst adopting fair and suitable mechanisms for the handling of IPR (Intellectual Property Rights) and other ethical issues”. In a distributed open innovation environment, it is important to create a ‘cognitive minimum common denominator’ amongst all the participant stakeholders in order to promote the development of shared values, shared trust and reciprocity (Sawhney & Prandelli, 2004). Based on the analysis the third proposition is delineated:

Proposition 3: Effective Living Laboratory IT governance is dependent on appropriate relational mechanisms which facilitate internal and external relationship management.

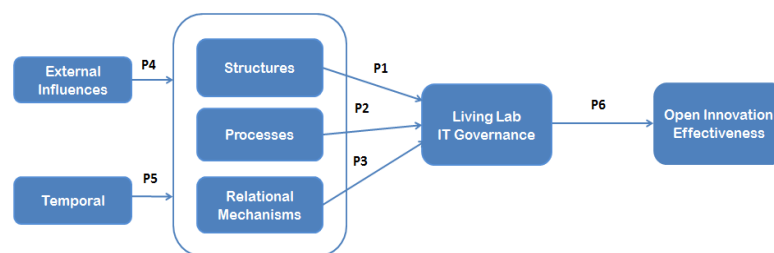


Figure 1. Research Model of Constructs and Relationships

Given the constant evolving nature of the smart city technological landscape we argue that two further dimensions are also warranted in the context of a Living Lab technological open innovation ecosystem. Thus, we also analyse two further IT governance dimensions: temporal and external influences, as proposed by Grant et al. (2007). The *temporal* dimension considers IT governance as a dynamic and continually evolving mechanism which must be continually monitored, controlled and evaluated to ensure that the IT governance remains aligned with the overall objective of the Living Lab initiative (Grant et al., 2007). According to Grant et al., (2007), the *temporal* dimension contains three separate elements: maturity, life cycle and rate of change. IT governance “develops over longer periods of time and credibility accumulation of experience and learning. Interpersonal relationships, coalitions through between stakeholders may take years to develop, to be able to effectively exploit information technology” (Peterson, 2000). For example, relational mechanisms may be more influential at the initiating stages of IT governance (De Haes & Van Grembergen, 2009), however there is no extant longitudinal research to confirm whether individual IT governance mechanisms have a more prominent role to play than others over time. The *external influences* dimension is the manner in which the dynamics of environmental factors (e.g., socio-cultural, technological, legal/regulatory, political, economic, organisational and so on) mould IT governance arrangements and execution in real-world settings (Grant et al., 2007). The most cogent IT governance architecture for a given organisation is contingent on a variety of factors (Brown & Magill, 1994; Brown, 1997). Early research exploring how contingencies actively influenced IT governance arrangements identified factors such as corporate governance, economies of scope and absorptive capacity (Sambamurthy & Zmud, 1999). It is important to note that when designing a Living Laboratory IT governance architecture, comprising structures, processes and relational mechanisms, that these mix of mechanisms may be dependent on a number of externally influenced contingency factors which can influence the shaping of these mechanisms and subsequently impact on the IT governance outcome (De Haes & Van Grembergen, 2005). Xue et al., (2008) identified that strong external influencers resulted in quick decision making processes which were facilitated by an appropriate IT governance archetype. These IT governance archetypes were extremely effective in high velocity environments. Currently, to the best of our knowledge no previous research has explored the nature of IT governance archetypes which are operationalised within the context of a living laboratory environment. Given the absence of research in the area of Living Lab IT governance temporal mechanisms and external influencers, it becomes important to provide salient insight into not only the manner in which governance mechanisms have been moulded by contingency factors and the subsequent impact on the governance outcome, but also elucidate how IT governance has evolved over a period of time. As such, two final propositions are presented.

Proposition 4: IT governance capabilities are susceptible to external influences which can impact on the effective implementation and subsequent institutionalisation of Living Lab IT governance.

Proposition 5: IT governance capabilities are time and context dependent as stakeholder experience, perceptions and expectations can lead to a realignment of these capabilities and thus impact on the effective implementation and subsequent institutionalisation of Living Lab IT governance.

3.3 Open Innovation Effectiveness

Research surrounding open innovation effectiveness has focused on activities including vertical cooperation (Tomlinson, 2010); resource endowments of partnering organisations (Dahlander and Gann, 2010); cost of openness and impact on firm performance (Laursen and Salter, 2006). However, it has been implied that the effectiveness of open innovation is context dependent (Huizingh, 2011).

Recently, researchers have “started to look at the governance implications of open innovation...findings suggest that increased linkages to and knowledge flows from various external partners, particularly in uncertain environments lead to improved innovation outcomes” (Felin and Zenger, 2013 cf. West and Bogers, 2011). While it may seem paradoxical to suggest that effective IT governance can lead to open innovation effectiveness, it has been argued that “good IT governance can achieve a management paradox, simultaneously empowering and controlling ...effective IT governance encourages and leverages the ingenuity of all enterprise personnel in using IT, while ensuring compliance with the enterprises overall vision and principles” (Weil and Ross, 2004). Additionally, we argue that whereas the structures and processes of IT governance capabilities working in tandem are not suited, given the mandatory tangible nature of both capabilities for the design of effective IT governance architectures in dynamic and complex environments such as Living Labs, the operationalisation of these capabilities in tandem with the intangible and tacit nature of the relational mechanisms, external influences and temporal capabilities can be quite cogent. Living labs involve the collaboration of multiple stakeholders and thus, the governance of these relationships constitutes an essential component in the successful implementation of open innovation processes (Feller et al., 2009). Consequently, we present our final proposition:

Proposition 6: Living Lab open innovation effectiveness is dependent on the implementation and subsequent institutionalisation of an effective IT governance architecture.

4 Next Steps and Conclusion

The research is in its early stages and to date has focused on theory building. However, we are in the process of conducting a single, exploratory pilot case study. The pilot study has been designed to explore how Living Lab open innovation ecosystems can establish strong IT governance and identify what types of IT governance factors are believed to be relevant in the effectiveness of Living Lab open innovation processes. The primary data collection sources will entail the use of face-to-face semi-structured interviews, questionnaire, documentary evidence and observation of work practices. We have prepared an interview protocol based on all of the elements of research model proposed in Figure 1. The theme of the semi-structured interviews will concentrate on an interviewee’s experience of the Living Lab environment and their perceptions of the existing IT governance structure on the effectiveness of open innovation processes. Topics discussed will encompass such areas as: the existing IT governance structure, benefits derived, challenges encountered, knowledge transfer procedures, managerial approach, tools utilised, and the stakeholder engagement process. Interviews will be recorded and transcribed with the consent of each interviewee. The interview transcripts will be proofread and annotated by the researcher and the coded using nVivo. The coding approach will use techniques as proposed by Corbin and Strauss (1990). Given the importance of IT governance in contemporary Living Lab initiatives, steering committees are faced with the challenge of how best to operationalize an IT governance mechanism that will facilitate effective open innovation processes. This paper develops a research framework that builds a basis for executing research on how Living Lab ecosystems are implementing IT governance and elucidate on the relationship between IT governance and open innovation effectiveness. When completed the research hopes to make a number of contributions. Firstly, it will provide an empirically validated version of the research model proposed in this study, stipulating whether each dimension of the research model is applicable and can be substantiated. Moreover, an empirically validated research model can assist existing and new Living Lab initiatives reduce the risks encountered and support the management of emergent pathways that result as a consequence of operationalizing a particular IT governance mechanism.

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