2009

Applying theory-building techniques to the design of modelling languages

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ARCHITECTURES OF PARTICIPATION AND EMERGENT FORMS OF INTER-ORGANISATIONAL ACTIVITY: A PRELIMINARY ANALYSIS

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Abstract

This research-in-progress paper explores ways in which inter-organisational networks can fulfil both collective (network) and self-interest (member) goals by implementing architectures of participation that govern and support participant interaction. We draw on recent studies to derive a conceptual framework consisting of technological, legal, economic and social mechanisms in inter-organisational networks, and using initial findings from three case studies of networks in Sweden and Denmark, we illustrate how these architectures operate. Our analysis shows the relative importance of these mechanisms in facilitating individual and collective value creation and we conclude by presenting our ongoing research plans.

Keywords: Inter-organisational networks, Collaboration, Open Innovation, Architectures of Participation

1 INTRODUCTION

Over recent decades organisations have been radically transformed from single location hierarchical structures with well-defined boundaries to more flexibly organised and dispersed configurations. Indeed, arguments for flatter structures (Levitt and Whisler 1958, Snow et al 1992) and flexible forms (Drucker 1988, Starkey et al 1991, Bahrami 1992, Benkler 2002, 2006) have mounted. Advanced information and communications technology as well as an increasingly competitive environment have been cited as the main contributors to this change (Miles and Snow 1986, Peters 1992). Collaboration frequently occurs on an inter-organisational basis, as partnerships with suppliers and customers are critical in many sectors (Cash 1985, Christiannse et al 2004, Tapscott and Williams 2006). Consequently, the boundary between organisations and their partners is becoming even less distinct with interdependencies between them being more important (Gulati and Kletter 2005, Premkumar et al 2005).

Although much inter-organisational activity has been production based, the exchange of specialised knowledge and skills is increasingly important (Bartlett and Ghoshal 1989, Sonnenberg 1992, Chesborough 2003). The image that emerges from these developments is one of an extended or virtual organisation where external boundaries are obscured by inter-organisational dependencies characterised by substantial communication and collaboration. The sharing of information, ideas and expertise becomes central to the success of such extended enterprises (Bartlett and Ghoshal 1989), and there is a realisation that external forces, rather than internal organisational, technological or managerial variables, are the keys to explaining organisational success (Joynt 1991).

Despite the importance of inter-organisational co-operation in relation to servicing consumer needs for products and services (Subramani 2004, Okamura and Vonortas 2006), organisations have been slow to harness the same type of external cooperation in relation to innovation (Lane and Probert 2007). Nevertheless, innovation is the result of combining different knowledge sets (Nonaka et al 2003, Tidd et al 2005), and such knowledge is frequently to be found outside the organisation (Chesbrough 2003, De Wit et al 2007). However, with the exception of notable examples of collective invention (cf. Allen 1983, von Hippel 1987), organisations have been slow to engage in open innovation (cf. Chesbrough 2003). In addition to worries about the quality and suitability of external ideas, organisations have resisted co-operative approaches to innovation due to perceived competitive necessities and issues relating to organisational control (Chesbrough 2004).

This paper presents research-in-progress on inter-organisational networks that aim to facilitate process, product and service innovation rather than just support inter-organisational transactions. The study seeks to establish ways in which inter-organisational networks can fulfil both collective (network) and self-interest (member) goals by implementing architectures of participation that govern and support participant interaction using technological, legal, economic and social mechanisms. Drawing on initial findings from three networks in Sweden and Denmark (a Danish business association, a group of Swedish public authorities, and a Swedish network with private, public and academic partners), we illustrate how these architectures operate and conclude by presenting our ongoing research plans.

2 CONCEPTUAL GROUNDING

The term *open innovation* has been used to describe the shift from a paradigm in which firms exclusively sought to create, improve, and exploit products/services within the boundaries of the firm, to one which "places external ideas and external paths to market on the same level of importance as that reserved for internal ideas and paths to market" (Chesbrough 2006, p. 1). In practice, the open innovation concept can be implemented in many ways, *e.g.* creating new/improved products/services by building on external ideas and innovations, creating new revenue streams by allowing external parties to exploit internal ideas and innovations, and forming alliances with complementary partners to

support ongoing innovation/exploitation processes (Gassmann and Enkel 2004). However, new products are not the only tangible manifestation of open innovation as services and process transformation can also be developed in this manner (Morgan and Finnegan 2008). Such activities require participating firms – whether they act as consumers, producers or partners – to engage with external parties; they therefore depend on the establishment and management of effective inter-organisational networks (Vanhaverbeke and Cloodt 2006).

Participants in inter-organisational networks believe that collaboration will result in adaptive efficiency; "the ability to change rapidly and at the same time provide customized services or products, and at low cost" (Alter and Hage 1993). An inter-organisational network is a social action system as it exhibits the fundamental principles of any organized form of collective behaviour. These include the aim to achieve both collective (network) and self-interest (member) goals, interdependent processes utilized by network members, and the ability of the cooperative entity to act as a unit with a separate identity from its individual members (Van de Ven 1976).

While these activities can be supported by traditional inter-organisational governance structures like hierarchies, markets and brokerages (Feller et al 2008a), many examples of open innovation instead leverage what Benkler (2002, 2006) has described as *peer production*: a model for organizing production that does not rely on markets, hierarchies, property and contracts. Specifically, the collaborative creation of software by development communities (open source software) has been used as a defining example of the peer production model (Benkler 2002, 2006), and the engagement of firms with such communities and the products they create has been identified as a key exemplar of open innovation (West and Gallagher 2006).

Any understanding of open innovation processes must, therefore, not only include inter-organisational interactions embedded in traditional governance structures, but also those embedded in peer production contexts. In such contexts, the tension between the collective goals of groups and the individual goals of profit-seeking participants can be problematic. In the current work, we address this tension through the concept of an *architecture of participation*, which has emerged in the literature with two distinct meanings.

Firstly, an architecture of participation can be understood simply as the "various technologies and activities designed to facilitate and promote participation, communication and the active co-construction of meanings and knowledge" (Attwell and Elferink 2007); in other words, they are collections of mechanisms that allow the members of a community or network to interact. Secondly, and more subtly, the label has been used to describe systems that help transform individual activities into communal resources. Bricklin (2001) observed that the technical characteristics of peer-to-peer music sharing systems like Napster could potentially transform the "tragedy" of the commons into the "cornucopia" of the commons, where adding value to the system is an automatic result of using the system. Building on Bricklin's insight, O'Reilly (2005) has applied the concept to open source software development, where he argues that such architectures "may actually be more central to the success of open source than the more frequently cited appeal to volunteerism. The architecture of Linux, the Internet, and the World Wide Web are such that users pursuing their own 'selfish' interests build collective value as an automatic by-product" (O'Reilly 2005, p. 476). Within the open source context, many different types of architectures have been identified; including *technological architectures* (e.g. collaboration and communication platforms, software development kits and application programming interfaces, etc.), *legal architectures* (e.g. software licences), *economic architectures* (e.g. direct and indirect incentives and rewards for participation) and *social architectures* (e.g. shared cultural values, reputation building through participation, etc.)(Feller et al 2008b).

Thus, the current work seeks to identify the technological, legal, economic and social architectures of participation used within the innovation networks studied, and to understand the roles played by these architectures in both enabling interaction (a la Attwell and Elferink 2007) and transforming individual activities into communal goods (a la Bricklin 2001 and O'Reilly 2005), as illustrated in Figure 1.
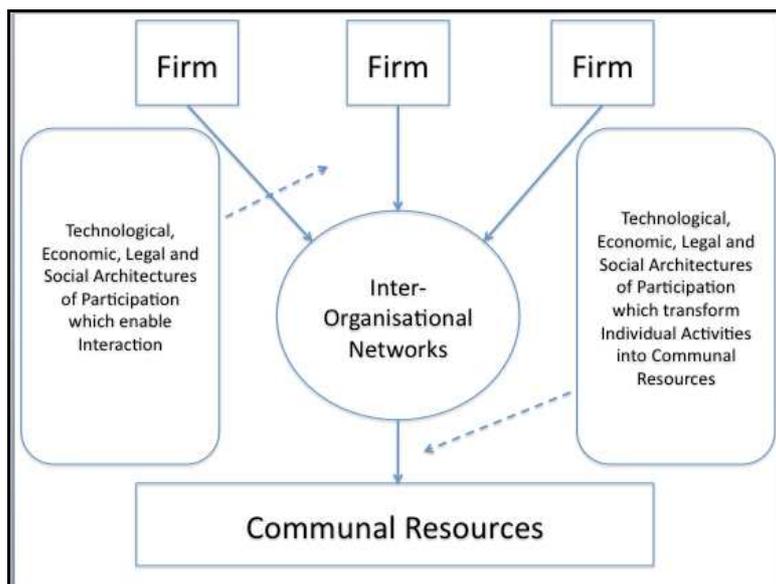
Figure 1. Architectures of Participation in Innovation Networks

3 RESEARCH CONTEXT AND METHOD

The objective of this study is to explore architectures of participation in inter-organisational networks. Given the exploratory nature of this research, and the need to obtain rich data in a complex inter-organisational context, a case study approach, with embedded units of analysis, was considered appropriate. 'A case study examines a phenomenon in its natural setting, employing multiple data collection methods to gather information from a few entities. The boundaries of the phenomenon are not clearly evident at the outset of the research and no experimental control or manipulation is used' (Benbasat et al 1987). Cases are most appropriate when the objective involves studying contemporary events, without the need to control variables or subject behaviour (Yin 2003). Our method is consistent with the case study approach of Benbasat et al (1987) and Yin (2003) in that we study the phenomenon in its natural setting, employing multiple data collection methods to gather information from a few entities, without employing experimental control or manipulation. We follow in the tradition of Eisenhardt (1989) and Madill et al (2000) by seeking to reveal pre-existing, relatively stable and objectively extant phenomena and the relationships among them.

Data gathering activities to date have focused on three networks with different characteristics and aims. The first is a Danish business association of private companies active in the open source software market. The second is a group of Swedish public authorities that cooperate in procurement processes. The third is a network including partners from the Swedish public sector, private sector and academia that focus on co-creation of public e-services.

The researchers first conducted an archival search of public domain material on the networks and their participants, including web resources and articles in the public press. Based on this preliminary analysis a case study protocol (cf. Yin 2003) was prepared in order to ensure the consistency of data gathered. Interviews with key informants were conducted during 2008 (see Table 1). The interviews, which followed an interview guide (cf. Patton 1980), were of 30-60 minutes duration and conducted in Swedish and Danish both in person and by telephone.

The interviews were transcribed and translated (by one of the authors), and follow-ups were made by e-mail and telephone to clarify and refine issues that emerged during the transcription/translation process. The interview transcripts were supplemented with 15 official documents provided to the researchers by the interviewees. The documents included policy statements, bylaws and project reports

published by the networks or its member. Content analysis was then carried out on both the interview and document data sets. A coding system was derived using the conceptual framework illustrated in Figure 1, and a two-phase coding process was employed (c.f. Miles and Huberman 1994). During the first-level coding phase, each segment of the interview/documentation data was summarized and labelled. This was followed by a pattern coding process in which the segments of data were organized, analyzed and synthesized within the themes/concepts embedded in the conceptual framework. While the emphasis of the first-level coding phase was on description, the pattern coding process focused on explanation.

Network	Interviewees
OSL	1. Chairman 2. Board member 3. Board member
Environmentally Procurement in County Västernorrland	1. Project Leader
The Sundsvall Group	1. Researcher 2. CIO

Table 1. Key Informants Interviewed

4 FINDINGS AND ANALYSIS

4.1 Network, dynamics, composition and goals

The initial analysis of the three networks involved characterising them based on their dynamics, member composition, and goals (both individual and collective). Table 2 summarises these characterisations, which are discussed in detail below.

	OSL	Procurement	Sundsvall Group
Dynamic	Association	Cooperation	Collaboration
Composition	Homogenous (private companies)	Homogenous (public authorities)	Heterogeneous (private/public/academia)
Collective Goal	Build collective brand and influence	Implement public policy and stimulate "green" manufacturing	Product development
Individual Goal	Develop individual business opportunities	Lower costs	Various

Table 2. Network, dynamics, composition and goals

The Danish Open Source Business Association [*Open Source Leverandører i Danmark*], or OSL, was founded in 2003 by five companies active in the open source solutions business sector. The members of OSL are a relatively homogeneous group of private sector organisations, all Danish-based companies that deliver solutions and services based on open standards or open source software. At the time of writing, OSL comprises 30 'full member' companies and an additional 31 'supporting member' companies. Most of the member companies are small (5-20 staff), but there are also a few multinationals with Danish headquarters (e.g. IBM, Sun and Oracle). The key dynamic evident in OSL is one of *association,* in which the network acts to provide a unified voice for its member companies. The member firms are motivated to participate in the network by a desire to develop individual business opportunities; however, the network acts as a lobby group for all of its members, seeking to enhance awareness of open source software in the Danish market and influence Danish IT policies. Specifically, the goal of OSL is *"to promote a genuine market-based choice between different types of*

software development and licensing in order to make the choice of open source software based on quality, price, usability and suitability ... The association will work to secure a genuine choice of IT-architecture in the public as well as the private sector" (OSL 2008). Thus, the network's effectiveness as a brand building and policy influencing mechanism is enhanced by the active participation of individual companies, who in turn benefit from these activities.

'Environmentally Procurement in County Västernorrland' is an initiative, established in 2006, in which eight Swedish public authorities (the seven municipalities and the County Council in the county of Västernorrland) and the Association of Local Authorities in Västernorrland, have established a network for joint procurement activities. Other partners include the Swedish Road Administration ('Region Mitt'), the Västernorrland Administrative Board, the Swedish Agency for Economic and Regional Growth and the Swedish Environmental Management Council. The network is thus a homogenous grouping of public authorities, in which the key dynamic is *cooperation* in the form of joint procurement activities. Individual authorities are motivated by a desire to lower costs by leveraging the negotiating position that comes from aggregating demand across the county. The network, in turn, seeks to implement public policy favouring "green" products (like low-energy lightbulbs and hybrid automobiles), which it can do through the joint purchasing power of its collective members.

'The Sundsvall Group' [no official name exists] is a network, established in 2005, to support collaborative software development activities amongst its members, who include Swedish public authorities (Municipality of Sundsvall), private firms (Logica), non-profit associations (Åkroken Science Park) and academic institutions (the CITIZYS Research Group at Mid Sweden University). The network was originally established with the aim of carrying out a single joint project (the development of a municipal e-service in the municipality of Sundsvall, ECHOES (Everyday Communication Home School)) but has evolved to support other projects. Because this collaborative network is heterogeneous in composition, the individual goals of the members vary considerably from member to member; e.g., the municipality delivers e-services at a lower cost, the academic partner enjoys access to research opportunities in an applied setting, the private company gets a new business opportunity, etc. Collectively, the network seeks to develop e-services that improve the quality of life for individual citizens through easier access to public information and services.

4.2   Architectures of participation

We found that the different kinds of networks have different sets of architecture of participation. We refer to the components that form the architecture of participation as the technical, legal, economic and social architectures.

	Association	Cooperation	Collaboration
Technical architectures	Tools for communication	Tools for communication Tools for coordination	Tools for communication Tools for coordination Tools for co-development
Legal architectures	Identity	Identity Process	Project Identity Ownership
Economic architectures	Fees	Fees Projects	Projects
Social architectures	Shared views Trust Reputation Networking Collective sanctions	Shared views Trust Reputation Networking	Shared views Trust Reputation Networking

Table 3. Architectures of participation

4.2.1   Technological architectures

All three networks were analysed in order to identify the technological architectures that enabled interaction between members and/or acted to transform individual activities into communal resources. Across all three networks, technologies such as email, web sites and telecommunications were used to communicate within the network. In the procurement and software development networks, these same technologies were also used to explicitly coordinate activities as well as for communication. In the procurement network, such co-ordination activities were limited to specific procurement activities, while in the software development network longer term coordination took place. Finally, within the Sundsvall group, additional technologies supported the distributed collaborative development of software. These included version control tools, issue tracking systems, etc. Additionally, the software products created by the network were themselves architecturally designed to support future participation; i.e. the way in which ECHOES was developed meant that the code base could be largely reused in future projects. It is worth noting that with the exception of this final point regarding code reuse, the roles played by technological architectures in all networks appeared to be limited to enabling interaction, not transformation.

4.2.2   Legal architectures

Within OSL, where the primary collective goal was the creation of a joint voice for marketing and lobbying, the dominant legal architectures focused on the management of the association's identity and of member behaviour through formal bylaws. For example, all potential members must demonstrate that their commercial activities are in-line with OSL's intentions (i.e. the promotion of open source solutions). Furthermore, to become a full member, the applicant must be a company and be able to prove that during the last financial year they employed the equivalent of more that one full time employee. Smaller companies, and even individuals, are also entitled to membership but as supporting members without a vote in network level decisions.

Within the procurement (cooperative) network, legal architectures exist not only to manage network identity but also to ensure that the members are able to engage in procurement activities following agreed upon procedures. A complex system of agreements governs the joint procurement processes, including, national regulatory and legislative frameworks, local policy decisions made by public authorities, and purchase-specific agreements between the network members.

Finally, within the collaborative network, there is less evidence of legal architectures governing behaviour or identity. Instead, network identity is fluid (re-established with each new project), "rules" for behaviour are informal or absent, and the primary emphasis is on legal mechanisms to prevent conflict over the ownership of the collaboratively created software product (e.g. licensing decisions and sub-contracts with service providers, etc.).

In contrast with the technological architectures previously discussed, the legal architectures evident in the networks more directly support the transformation of individual efforts into communal resources. For example, in OSL the bylaws ensure that the membership act and speak with a cohesive voice; in the procurement group they are able to act as a single purchasing agent; and in the Sundsvall group there are clearly defined rights of collective and individual ownership.

4.2.3   Economic architectures

In OSL, annual fees provide a financial mechanism to support the day-to-day administrative activities of the network and also act as a signal of a firm's commitment to the collective goals of the network. Annual fees are also used in the procurement network to offset administrative costs (primary the salary of the overall project leader). Additionally, financial agreements are made between a subset of the network membership for each specific purchasing event. Within the collaborative software development network, financial agreements are limited to specific aspects of projects (e.g. the

management of a specific project budget or sub-contracting of a particular activity). As with the technological architectures discussed previously, the economic architectures evident appeared to be focused more on enabling interaction than transformation.

4.2.4   *Social architectures*

Within OSL the formal bylaws governing member behaviour are complemented by several informal social mechanisms that both enable interaction and help ensure that the network as a whole benefits from individual activities. For example, the members of the association share a common goal (the expansion of the market for open source products and related services) and share the belief that they can all benefit from this expanded market without needing to directly compete with each other. There is also a shared ethos that the members should focus on winning customers from the proprietary software companies, not from each other. Although the association does not explicitly seek to facilitate cooperation between the member companies, many of the companies have formed relationships through the association, which can lead to exchanges of knowledge, contacts, etc. Interpersonal trust and knowledge about other actors were seen to play an important role in such interactions. Rumours about 'bad' jobs or 'bad' behaviour spread quickly, which effects decisions regarding potential cooperation or sourcing of competencies, but could also lead to collective sanctions e.g. exclusion.

Within the cooperative network the members also share a collective vision and a common goal of effectively implementing environmental procurement policies. Personal relationships and networking between the participants play an important role in building trust and sharing knowledge. Periodic meetings and workshops reinforce such relationships. As with the OSL, informants highlighted the importance of reputation in choosing procurement partners/leaders.

Finally, in the collaborative network, social architectures were seen to play an important role, particularly in the absence of written rules, bylaws, etc. Specifically, personal knowledge, trust, and a common view on the future of public e-services act as the uniting 'glue'. There are no regular meetings; instead, new ideas and projects emerge from frequent contacts and discussions. Through the personal networks of the 'core' project members, new members are invited to participate in projects when there is a need for external competencies or expertise.

As with the legal architectures evident in the networks, the social architectures play a key role in the creation of communal resources. In all three networks, a shared worldview and an implicit acknowledgement of acceptable behaviour enable members to pursue individual goals while creating/preserving communal resources.

5   CONCLUSIONS

This paper has explored two connotations of *architectures of participation* in the association, cooperation and collaboration networks studied (see Figures 2, 3 and 4); as mechanisms for enabling interaction and as mechanisms for transforming individual action into collective resources. Both connotations are critical to the successful implementation of open innovation strategies.

First, open innovation activities are, by definition, extra-organisational and require mechanisms that facilitate interaction between participants. This study has given us insight into the wide variety of mechanisms employed by open innovation networks to meet this need; the use of technological, legal, economic and social architectures were all visible. The demonstrated use of a variety of mechanisms has implications both for practitioners and future researchers. For practitioners, this study suggests the need to move beyond a narrow technological viewpoint, and to consider all four types of architectures in managing network activities. For future researchers, including ourselves, there is a need to develop a better understanding of the interaction and interdependencies between the various mechanisms.

Second, as noted at the outset of the paper, issues of trust, control, and the potential "tragedy of the commons" can all play a role in dissuading organisations from participating in open innovation.

Therefore, mechanisms for transforming individual action into collective resources (i.e. enabling all participants to benefit from the collaboration) are critical. The study showed that although all four types of architectures have a function in enabling interaction, only the legal and social architectures have a strong role in transforming individual action into collective resources. It is noteworthy that informal/social mechanisms and formal/legal mechanisms both play a key role in the networks studied. For practitioners, this suggests the need to take into account both formal and informal mechanisms in making governance decisions and in dealing with issues of appropriation and sharing. For researchers, the findings signal the need to reconsider the formal/legal-centric view of inter-organisational networks dominant in extant literature, and contribute to the emerging characterisation of networks based on the interplay between formal and informal mechanisms (c.f. Feller et al 2008).
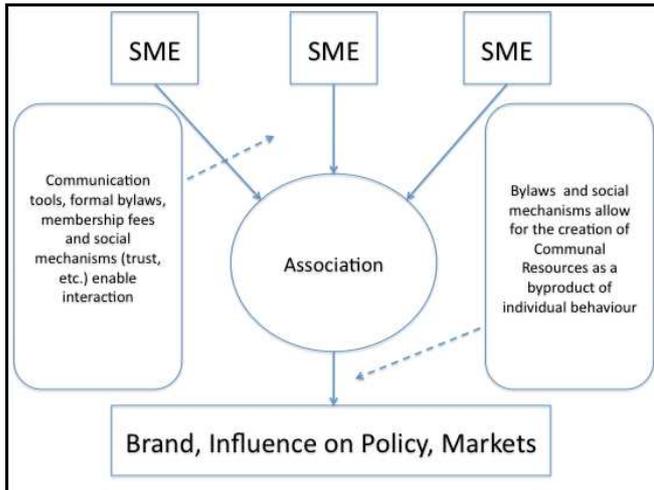

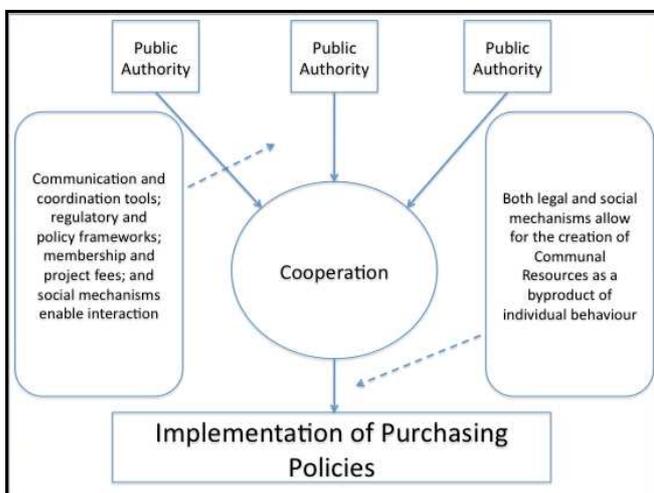*Figure 2. Architectures of Participation (Association)*

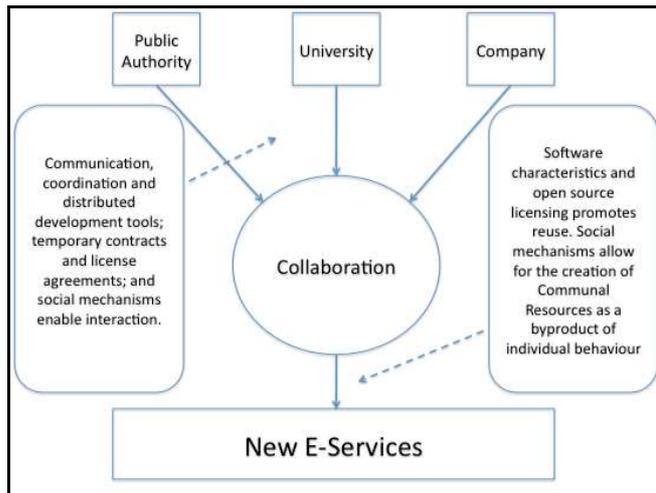*Figure 3. Architectures of Participation (Cooperation)*

Figure 4. Architectures of Participation (Collaboration)

The analysis of technological, legal, economic and social architectures of participation described above provide us with an initial set of models for understanding the interplay between individual and collective value creation. By treating the three networks as abstract types (Association, Cooperation and Collaboration), we hope to stimulate related research focused on networks with similar goals/characteristics in other contexts. The work reported is research-in-progress, and our own plans for future research activity include (1) the identification of additional open innovation network types, (2) further data gathering in the existing networks (both through interviews with a wider range of stakeholders and the administration of a survey to network participants), and (3) focusing on additional embedded units of analysis (projects). In doing so, we aim to uncover a more exhaustive inventory of the various architectures of participation in use, and also develop a more sophisticated set of models for understanding how these architectures enable interaction and support transformation.

Acknowledgements

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