

Interorganizational Innovation in Systemic Networks: TELEKAT Findings

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ABSTRACT

This paper presents partial results from a Danish longitudinal case study of ‘Telehomecare, chronic patients and the integrated health care system’ (the TELEKAT project). The purpose of the project as a whole is to develop and test a preventive home monitoring concept across sectors, enabling patients with chronic obstructive pulmonary disease (COPD) to avoid readmission, perform self monitoring and maintain rehabilitation in their homes. The aim of the paper is to identify, analyze and discuss innovation dynamics in the COPD network and, on a preliminary basis, to identify implications for managing innovations in systemic networks. The main argument of this paper is that innovation dynamics in systemic networks should be understood as a complex interplay of four elements or “logics”: (1) Fragmented innovation; (2) Interface innovation; (3) Competing innovation; (4) Systemic innovation. The findings indicate that linear n-stage models, by reducing complexity and flux, end up focusing only on the surface of the network, and are thus unable to grasp important aspects of network dynamics. The paper suggests that there is a need for a more comprehensive innovation model able to grasp the whole picture of dynamics in systemic networks. Such a model must be able to frame a set of processes which continuously monitor, negotiate, combine and balance the four innovation logics.

Keywords: Innovation in Networks, Interorganizational Innovation and Dynamics, Healthcare Innovation, Cross-sector Cooperation, Systemic Network

Introduction

Interorganizational innovation and integrated capability development across organizational borders have become pressing managerial challenges for both private and public organizations. Managers’ mental models, skills and behaviour have not kept pace with the rapidly increasing need for complex, integrated interorganizational value creation (Gustafsson, 2005; Seemann, 2010). Despite an explosion in the literature on networks and cross-border collaboration, theory in the field needs further development (e.g. Alter & Hage, 1993; Alexander, 1995; Huxham, 1996; Oliver & Ebers, 1998; Van de Ven 1989, 1999; Klijn & Koppenjan, 1997; Koppenjan & Klijn, 2004; Dhanaraj & Parkhe, 2006; Provan, Fish & Sydow, 2007; de Man, 2008; Mønsted, 2010; Sørensen & Torfing, 2010).

Continuous innovations across organizational boundaries require that we understand the dynamics of interorganizational networks, and that we develop skills in managing networks and facilitating network processes.

The Need for Integrated Health Care

Health care systems are notorious for their fragmented silo perspectives and silo solutions to problems. We know far too little about the kinds of innovative processes needed to create a more integrated health care system (Omachonu & Einspruch, 2010). Relatively little research has been conducted that explores innovation processes in complex health care networks that are constructed as innovative alliances (Johnsen, Caldwell & Lewis, 2006).

For decades, cross-sector cooperation and integration in health care systems has been characterized by disagreement and discord rooted in conflicts over domain, technology, culture and professional boundaries. Denmark is no exception. Focusing on cooperation and integration within and across the primary and secondary health care sectors, it is possible to examine the logics of many (professional) actors as they are put into play, often under considerable pressure. Even when there is agreement that integration and linkages are needed, different ideologies and philosophies generate considerable tension concerning modes of collaboration (Seemann & Antoft, 2002; Seemann, 2010).

Many, or perhaps even most, international studies of cross-cooperation in health care including those conducted in Denmark have shown how difficult cooperation is. These studies have uncovered a multitude of differing cultures and separate functions which obstruct communication and collaboration (Alter & Hage, 1993; Millward & Provan, 1996; Seemann, 1997; Denis, Lamothe, Lamothe, Langley & Valette, A 1999; Grone & Garcia-Barbero, 2001; Kodner & Spreuwenberg, 2002; Mur-Veeman, van Raak & Paulus, 2008; Wadman, Strandberg-Larsen & Vrangbaek, 2009; Dinesen, Seemann & Gustafsson, 2011).

Developed cultures of individual norms and values are attached to professional identities, to local domains of work, and to common interests and destinies. Solidarity often ceases to exist at the borders of a group or an organization as each of the divisions develops particular and individual perception horizons and obligations which inhibit the ability to think about the totality and to understand and interpret information properly.

Since the health care sector faces an increasing demand for efficiency and integration of care, treatment and rehabilitation, innovation is considered a key instrument for improving the health care system.

Health care innovation can be defined as the process of turning ideas into reality, using a new concept, service, process or product to improve treatment, diagnosis, education, outreach, prevention and research, as well as enhancing quality, safety, outcomes, efficiency and cost (Omachonu & Einspruch, 2010). The catchphrase in Denmark is 'creating innovation through collaboration in networks' between users, public organizations, private firms and universities (Danish Enterprise and Construction Authority, 2007).

The need for more integrated health care systems has especially focused on patients with chronic diseases, as it is these patients who have been especially vulnerable to the fragmented health care systems. One such group is patients with chronic obstructive pulmonary disease (COPD). COPD poses a serious public health problem. It is estimated that 210 million people suffer from COPD worldwide, and that more than three million people died of COPD in 2005, equal to 5% of all deaths globally that year (WHO, 2009). Patients with severe and very severe COPD have a

readmission rate of 63% during a mean follow-up of 1.1 year, with physical inactivity among the most significant predictors for readmissions (Garcia-Aymerich et al., 2003).

The TELEKAT Project

In the Danish research and innovation project, entitled ‘Telehomecare, chronic patients and the integrated health care system’ (the TELEKAT project), we have taken up the challenge of combining interorganizational collaboration, disease management and technology in order to develop an integrated tele-rehabilitation program for Danish COPD patients. ‘Tele-rehabilitation’ can be defined as rehabilitation between the patient’s home and health care professionals with the support of communication and information technology.

The purpose of the TELEKAT project is to develop and test a preventive home monitoring concept across sectors, enabling patients with chronic obstructive pulmonary disease (COPD) to avoid readmission to hospital, to perform self monitoring and to conduct rehabilitation activities in their own homes. COPD patients with severe and very severe COPD are included in the study. The TELEKAT project has been operated from January, 2008 to June, 2011 (www.telekat.dk).

The development of the innovation project of tele-rehabilitation across sectors is based on a user-driven, bottom-up process that includes COPD patients, their relatives, health care professionals and representatives from private firms and universities.

The TELEKAT research project involves: (1) patient perspectives (selfmonitoring, empowerment); (2) technological perspectives (telehomecare architecture); and (3) interorganizational perspectives (interorganizational network dynamics/logics, managerial challenges) (Dinesen, Gustafsson & Seemann, 2011). This paper presents parts of the third, interorganizational perspective in order to expand our understanding of innovation in interorganizational networks.

Theoretical Framework and Aim of Paper

Research in the field of interorganizational cooperation and innovation studies the interaction in a field of various organizations and representatives (Bossink, 2007). Despite a rather extensive literature on networks, important issues remain to be explored. One important but neglected aspect concerns innovation in interorganizational networks at the network level, as most studies are dominated by the organizational level of analysis (Provan et al., 2007). Focusing primarily on the organizations themselves and their interaction with other parties might lead to an overemphasis on the importance of the individual (focal) organization and a neglect of the importance of network or collective behavior.

This paper will focus on innovation in interorganizational network at the network level. By examining the network level, we strive to improve our understanding of interaction and dynamics in creative processes between parties developing new interorganizational services, concepts, technologies, processes and structures, while utilizing existing theories (Bossink, 2002, 2007; Provan et al., 2007; Mandell & Steelman, 2010). The theoretical framework combines approaches from resource dependence perspectives (e.g. Benson, 1975; Pfeffer & Salancik, 1978), interorganizational theory (e.g. Alter and Hage, 1993) and innovation management (Van de Ven et

al., 1989, 1999; von Hippel, 2005). Taking Alter and Hage, (1993, p. 46) as a point of departure, a network is defined as: “the basic social form that permits interorganizational interactions of exchange, converted action, and joint production. Networks are unbounded or bounded clusters of organizations that, by definition, are non-hierarchical collectives of legally separate units”. This definition covers a variety of networks (Alter & Hage, 1993).

Following Gustafsson (2007), two types of formal networks are distinguished in this analysis:

1. Isomorphic Networks where similar parties work together to improve their own competencies, processes and services/products. The common activities are focused on creating solutions. Often, each part makes its own separate implementation and directional innovation can frequently be observed.
2. Systemic Networks where different parties with different capabilities work together in a value chain across an interorganizational field. The common activities are focused on both solutions and implementation. Intersectional innovation often occurs.

Here the focus is solely on the dynamics of systemic networks, which include different parties with complementary capabilities working together in a value chain in an interorganizational field, solving a joint task.

The aim of this paper is to identify, analyze and discuss innovation dynamics in the COPD network and, on a preliminary basis, to identify implications for managing innovations in systemic networks.

The COPD Network

The COPD network contains eight major parties, from both the public and private sectors. See figure 1. The public sector parties include: (1) the pulmonary medical clinic at a university hospital, which functions as the regional hospital unit and outpatient clinic for COPD patients with a severe and very severe COPD; (2) the local municipal health care centre, which contains the rehabilitation programs for all patients with a chronic disease, including COPD patients; (3) the local district nursing departments which carry out home treatment of patients; (4) the general practitioners who are the patient’s family doctors at the local level; and (5) along with these four public sector parties is a fifth actor, the patients themselves and their relatives.

In addition to the core groups, the project also includes three other key parties in the interorganizational network, all of which are involved in the innovation process: (6) private firms (in this case those specializing in IT and tele-healthcare solutions); (7) researchers from various university departments, including one researcher who has played a major role in the management of the innovation process as action researcher; and (8) involved parties’ parent organizations and relevant stakeholders, in this case patient advocacy groups and professional societies.

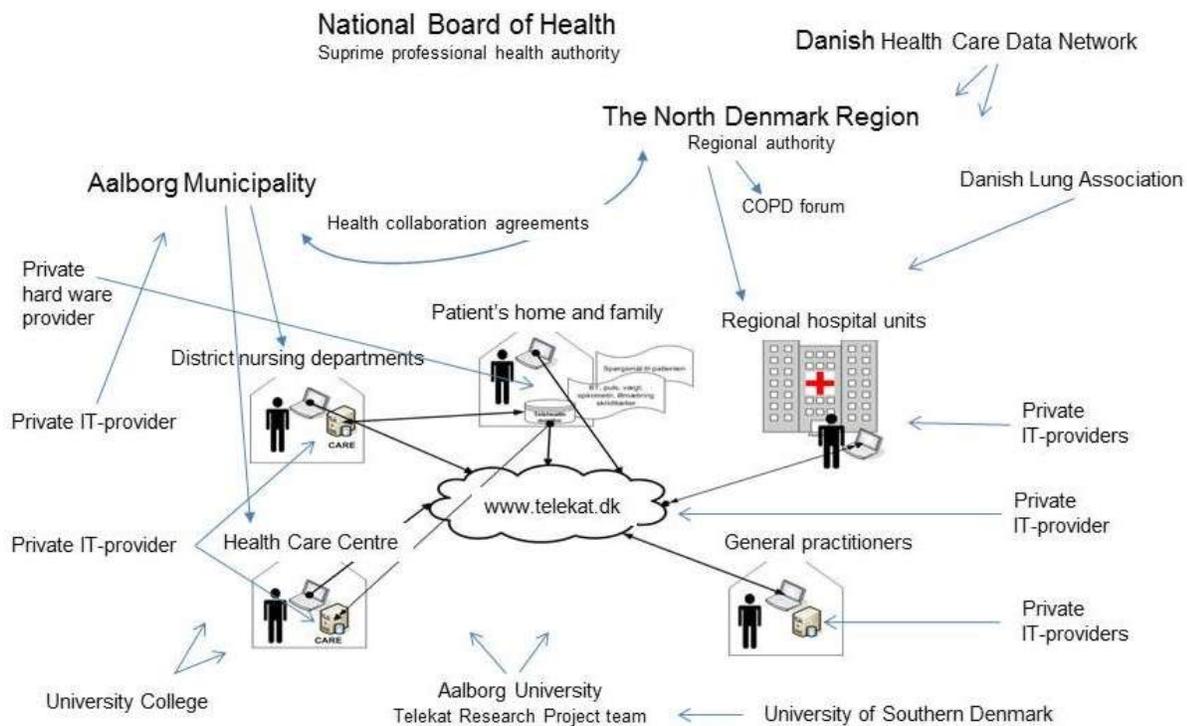
The core COPD network analyzed here is a systemic network that has emerged over many years through path dependence. The institutional context, with regional contracts and additional agreements, defines the overall collaboration mandates, with a main focus on division of work and

responsibilities concerning ongoing routine operation. Policies and regulations about interorganizational exploration and innovation are weak and open for interpretation.

There are many perspectives and logics on COPD treatment in the field. The parties in the COPD Network have:

- Different mandates, goals and tasks;
- Different core competences and technologies;
- Different cultures, structures and systems;
- Different power;
- Different institutional contexts;
- Task interdependence.

Figure 1: The Parties Involved in the COPD Network



Source: Janne Seemann, Birthe Dinesen, Jeppe Gustafsson

As a consequence, it is essential to explore the many logics in play in the network. However, the primary focus of this paper will be the interaction between the public parties at the operational level, where each of these parties has its mandated function.

The literature reports several n-stage models for interorganizational innovation, from two-stage to eight-stage models (Kreiner & Schultz, 1993; Ring & Van de Ven, 1994; George & Farris, 1999; Bossink, 2002, 2007; Bland et al., 2010). They all contribute to laying the groundwork for management of innovation in systemic networks, but they do not seem to fully grasp the specific flux and complexity in systemic networks.

Data Collection and Data Analysis

The case study method was applied (Yin, 2009). A triangulation of data collection techniques was used in order to provide multiple sources of evidence in the case study.

- Documents (Bowen, 2009): e.g., public reports, rehabilitation plans, and documents related to the project such as notes from meetings in workshops, working groups etc.
- Participant-observation (123 hours) (Kristiansen & Krogstrup, 1999): conducted at meetings in working groups, workshops, the network laboratory forums where the different participants were represented in the co-innovation process. The observations also took place while accompanying nurses and doctors at work in the hospital, in patients' homes and at the health care centre. Observation checklists were used and field notes were taken.
- Qualitative single interviews (n=32) (Kvale & Brinkman, 2009): respondents were Principal participants from the parties in the TELEKAT network; representatives from the district nursing unit, the hospital, the health care centre, the GP and private firms; managerial staff from the pulmonary medical ward at the hospital, district nursing and health care centre; principal participants from the IT- and administration in the municipality and region.

To facilitate the co-innovative process, action research (Kemmis, 2000; McNiff & Whitehead, 2009) has been carried out (e.g., when discussions among the parties reached a deadlock).

The findings presented suffer from the well-known limitations of single case studies (Yin 2009). Discussions of these limitations (e.g. unwarranted generalization) and more information and discussion of the methodology are reported in Dinesen, Seemann & Gustafsson, (2011).

Interorganizational Innovation: An Uphill Battle

The findings from the TELEKAT project indicate that interorganizational innovation is an uphill battle. As in other health care contexts, the parties in the TELEKAT project focused their energies primarily on innovations in their own domains. Many other projects and other initiatives competed for their attention. To kick-start the project, "outsiders" were needed. In this case, the outsiders were a team of researchers from four different university departments. The researchers mobilized the participants and raised funds to pay some of the participants' project costs.

The TELEKAT project's focus on telehomecare technology and horizontal patient courses in the network created uncertainty about many issues for the parties. There was uncertainty about the aim of the project, the selection of network members, their respective turf boundaries and role demarcations, the established routines for day-to-day collaboration and professional competence, responsibility, treatment standards and concepts. Several of these uncertainty issues became obstacles which were difficult to manage (Dinesen, Seemann & Gustafsson, 2011). Some obstacles,

in particular the health care professionals' mindsets, interprofessional relations and competing visions remained throughout the innovation process.

On the other hand, the TELEKAT project generated a lot of energy and commitment throughout the network. Several ideas concerning technical issues, treatment, patient life and organizational matters were generated and discussed in extensive collaboration between the actors and with patients. Ideas about patient courses and coordinated rehabilitation programs evolved into different treatment concept scenarios that were launched as prototypes. One prototype design was based on hospital logic, where the patients were monitored by the COPD ambulatory unit at the hospital. Another prototype was based on the district nurse systems logic and monitored by a nurse team in the district. A third prototype was monitored by the health care centre and based on their logic. A fourth prototype was monitored by the patient's general practitioners. And finally, in a fifth scenario, an interorganizational team of nurses was responsible for the coordination and monitoring of the COPD patients.

The private firms joined the network with enthusiasm. Some firms invested considerable time in the project, while also trying to avoid the most time-consuming activities of user-driven innovation and network collaboration. The technical telehomecare solution was developed on a platform from one of the companies' already existing home monitors, which was constructed to send digital data from measurement equipment in the patient's home to servers in health care systems. The technical challenge was to create standards, to adapt the monitor to COPD treatment and to connect and integrate the monitor to the different software systems used by the health professionals.

The companies focused on the technical challenges and joined in activities where their specialized competences were needed, but without pushing the network visions toward any kind of front technological "dream solution". Some firms even tried to restrict the technological ambitions from a commercial point of view, being under pressure to focus on the bottom line. Hence, the companies were not in the driver's seat, but they nevertheless fueled the network dynamics, pushing for speed and scale and initiating competing offers from other companies which wanted to provide services to the network. The technical challenge, despite its difficulty, was not especially sophisticated, and the parties managed to create a technical solution on schedule, a solution able to act as pilot infrastructure and provide support to the whole range of scenarios.

Challenges to established power relations and the present order of costs, risks and benefits were underlying issues throughout the entire project period. Power plays and cost-benefit moves were part of the game, and fueled the multiple prototype initiatives and other policy processes. At present, it is too early to draw conclusions as to the cost-benefit balance in TELEKAT; but, it is likely that there will be different perceptions of the balance, as often occurs in interorganizational collaboration, despite a collaborative spirit in the bottom-up process.

On the TELEKAT project's surface, the innovation activities were orchestrated by the project leader, located in the research team, followed a detailed project plan accepted by all parties, and were closely monitored by the founding authorities (Dinesen, Seemann and Gustafsson, 2011). Below the TELEKAT surface many other activities took place within the network which directly or indirectly influenced the development of the COPD treatment in the network. The researchers had no chance to trace and report this multitude of activities. We were only able to explore the tip of the iceberg, with priority given to activities and ideas that directly supported, challenged or impeded the

TELEKAT innovation processes. One example was a local health innovation initiative challenging TELEKAT by promoting a similar treatment concept based on a different IT system and network hub architecture, but involving several of the same participants as TELEKAT and competing for the same human and financial resources. After some disagreements and power play, the initiative proved unable to create the necessary support from key parties and died. Later in the process, one of the TELEKAT parties tried to launch its own independent COPD project, detached from the TELEKAT network. This venture also failed for want of financial support. A second competing activity was interorganizational patient course standardization based on national isomorphic network collaboration between the regional health authorities. A third type of impeding activities involved adaptation to budget cuts in several of the parties' organizations.

At the end of the formal funding period for the TELEKAT project, the pilot tests proved very successful from a treatment perspective, and showed a cost-reduction potential in COPD processes. There was no final conclusion with a "winner" in the prototype contest, but the game was narrowed down to two or three models. We must still wait to see if the project survives beyond the funded project period and whether it will be transformed into a large-scale operation. Much depends on the parties' ability to balance their different perceptions and vested interests, and to agree on a COPD model for the network. In this process, it is necessary to connect the bottom-up innovation strategy with top-down policies and strategies in the field (Sørensen & Torfing, 2010). This process is complicated, as it includes management of legal issues and other potential roadblocks in the wider institutional context which penetrate the network and reinforce the status quo, thus limiting the innovation window.

Four Logics in Play in Systemic Networks Driving Complex Innovation Dynamics

To understand the complex, multiple and competing processes in the COPD network, we have developed a four-field framework using two key factors for innovation in interorganizational systemic networks as framework dimensions: (1) the professionals' mental models, and (2) perceived performance pressure from parent organizations. These factors simultaneously act as foundations and barriers for innovation. In this way, the two factors become keys to understanding important aspects of the complexity in the innovation processes in systemic networks.

The first dimension, "the professionals' mental models," contrasts mono-professional thinking devoid of vision of integration of knowledge and treatment concepts with interdisciplinary thinking containing a vision of integrating knowledge and treatment concepts.

The second dimension, "perceived pressure from parent organizations," contrasts the actors' focus on pressure to defend their own turf and to deliver on their own bottom lines versus actors' focus on pressure to deliver on their own bottom line and a horizontal integration.

Figure 2: Four Logics in Play in Systemic Networks Driving Complex Innovation Dynamics

<p>Perceived pressure from parent organizations</p> <p>The professionals' mental models</p>	<p>Actors focus on pressure to defend own turf and to deliver on own bottom line</p>	<p>Actors focus on pressure to deliver on own bottom line <i>and</i> horizontal integration</p>
<p>Actors think mono-professionally without vision of integration of knowledge and treatment concepts</p>	<p>1. Fragmented innovation</p> <p>Each party innovates alone with own isomorphic network relations</p> <p>Insignificant innovation at systemic network level</p>	<p>2. Interface innovation</p> <p>Interface collaboration, logistical improvements</p> <p>Organizing relations at systemic network level</p>
<p>Actors think interdisciplinarily with vision of integrating knowledge and treatment concepts</p>	<p>3. Competing innovations</p> <p>Competing network solutions, strong parties try to dominate the network and create solution based on their logic</p> <p>Flexibility with adaptation and influence at systemic network level</p>	<p>4. Systemic innovation</p> <p>Collaboration toward a common vision of integrated COPD treatment concepts and processes</p> <p>Significant innovations at systemic network level</p>

Source: Janne Seemann, Birthe Dinesen, Jeppe Gustafsson

Figure 2 illustrates the framework of four types of interorganizational innovation logics based on the two dimensions.

Quadrant 1 represents situations where the actors focus on their own sub-discipline and where the actors accede to pressure from their parent organizations to deliver on their own bottom lines and to defend their turf. The outcome for each party is directional innovation (Johansson, 2004), tapping their sub-discipline's world-class knowledge development and their collaboration with professionals and units of their own kind in isomorphic networks (Alter & Hage, 1993; Gustafsson, 2007). This is a very strong innovation basis for the subtasks at hand, but the weakness is that it leads to fragmented innovation at the network level, because of the different parties' focus on their own bottom line and turf; as a result, the integration challenge is left to the patient himself.

In quadrant 2, the actors acknowledge and address parent organizations' expectations and demands for horizontal coordination across organizational boundaries in the network, while the actors' mental models have the same characteristics as in quadrant 1, with a strong, narrow focus on world-class knowledge in their own sub-disciplines. In this situation the innovations at the network level become improvements of the interface between the parties, with increased organizing of the relations, more efficient logistics and administration of handover from one party to another, without collaboration concerning the individual parties' treatment concepts and internal processes. The patients benefit from this kind of innovation by obtaining time-coordinated patient courses, but they obtain little or no integration of the substantive content of the different treatment activities, as in the quadrant 1 situations.

Quadrant 3 represents situations where actors think in an interdisciplinary fashion and have visions of integrating knowledge and treatment concepts as well as drawing on the world-class knowledge in their own professional disciplines and domains. At the same time, they act according to the parent organizations' silo expectations and protect and promote their own turf. The individual parties create network solutions from their own professional points of view, trying to influence other parties to buy in to their picture of a network solution and to adapt to this solution. The result is competing innovation solutions at the network level. Strong parties try to "win the battle," but the distributed power pattern fuels continuing influence and adaptation processes, resulting in fluidity, shifting patterns of network solutions and high cost levels. The temporary character of quadrant 3 innovations is due to the parties' inability to maintain a dominant position, and force their logic on the other parties so that they will change and develop their internal capabilities and processes to fit the dominant party's expectations and assumptions.

Finally, actors in quadrant 4 think interdisciplinarily, with a vision of integrating knowledge and treatment concepts in combination with a strong focus on the parent organizations' expectations and demands of horizontal coordination and integration across organizational boundaries in the network. This involves comprehensive collaboration on innovations within both intra- and interorganizational processes and treatment concepts, including all aspects of patient flows throughout the network. By exploring intersections of organizations and professional disciplines and cultures, systemic innovation has potential for a large number of extraordinary new ideas (Chesbrough & Teece, 1996; Johansson, 2004; Senge, 2010). From an integration perspective, it is tempting to see innovations in this quadrant as the blueprint for successful interorganizational innovations. No doubt, this perspective has many advantages; however, it would be wrong to consider quadrant 4 innovations as the ideal situation type. The strong and narrow focus on horizontal integration at the network level might impede important world-class directional innovation in the separate professions and organizational silos. Moreover, quadrant 4 innovations might represent weak compromises with embedded instability because of attacks from the parties' directional innovation in quadrant 1 and from competing network solutions in quadrant 3.

We have argued that innovation dynamics in systemic networks should be understood as a complex interplay between all four logics. If left alone, without systematic interorganizational leadership, it is most likely that a balance will be reached at the network level, around continuous quadrant 1 and 2 innovations, with periodically recurring flux and shifting patterns from quadrant 3 and 4 innovations, initiated by interorganizational innovation projects with vision of integrating knowledge and treatment concepts such as those in the TELEKAT project. Even seriously interorganizationally based pilot projects end up as "death by delivery," and never manage to

survive the critical transformation to large-scale routine operation if they fail to bridge the four logics.

Managerial Implications

The findings indicate that linear n-stage innovation models have severe limitations as a framework for capturing the entire range of innovation dynamics in systemic networks. By reducing the complexity and flux to successive stages such as: (1) recognition, (2) research, (3) relationship set-up, (4) ramp-up, and (5) ongoing management (George & Farris, 1999), the n-stage models present a tunnel vision, with a narrow focus on the project at hand. This limits the picture of the network dynamics to the surface of the network, and fails to capture the many other initiatives influencing horizontal processes in the network.

A second limitation of n-stage innovation models is that, by assuming a hub or the possibility of finding a balance between competition and cooperation in the network, the n-stage models underestimate the contradictions and fundamental dilemmas in systemic networks, which make it very difficult to reach compromises concerning network solutions.

The ideal innovation strategy in systemic networks should be a dynamic model capable of grasping the whole picture of the dynamics in systemic networks, and framing a set of processes which, on a continuous basis, monitor, negotiate, combine and balance the four innovation logics. Our literature study has revealed two cyclical interorganizational innovation models. Ring and Van de Ven (1994) describe a cyclical model with three-stages: (1) negotiations, (2) commitments and (3) executions. Bossink (2002) proposes a cyclical four-stage model: (1) autonomous strategy, (2) cooperative strategy, (3) organization for co-innovation and (4) innovation realization. Both add cyclical aspects to the stage design by connecting the end of the process to a new process. Hence, when the last stage ends, the organizations re-enter the first stage, and so on. The models are certainly capable of grasping important dynamics; however, they, like the linear models, also underestimate the complexity, flux and dilemmas in the systemic network.

Building on the cyclical models, we suggest a dynamic innovation model, designed as a learning process based on continuous learning loops. In each loop the actors deal with issues from all four logics and “all phases in the innovation process”. Each loop takes the actors understanding of interplay in the field one step further, thus pushing the innovation process and the network solution to a higher level.

In particular, two dilemmas are important throughout the innovation process. One concerns the network's ability to learn about renewal at the network level. This dilemma is represented in the diagonal between the quadrant 1 and 4 (figure 2). The network's ability to learn depends on the ability of managers and employees to create a continuous balance between, on the one hand, world class learning in a sub-discipline through their respective isomorphic network with peers outside the systemic network and on the other hand, interdisciplinary learning through common sense-making in the systemic network. In this case, the network learning concerns learning about the local integration of the parties' professional knowledge. Hence, it is crucial that the parties keep abreast of world-class knowledge developments and at the same time learn how their specialized knowledge is brought into other academic contexts and adapted to horizontal task flows.

The second dilemma concerns the network's ability to organize operations at the network level. It appears in the other diagonal between the quadrants 2 and 3 (figure 2). The network's ability to organize the horizontal operation processes (patient care and patient treatment) depends on the ability of managers and employees to create a relatively stable balance between a structure in which the parties follow their own logic, only temporally coordinated with other parties in the network and a structure in which one party in the network manages the overall course of the network. In other words, the dilemma is one of balancing a timely coordinated patient course and a conceptually integrated patient course, embedded in a temporarily coordinated network management.

Taken together, the two dilemmas represent a race against the development of knowledge and stakeholders' expectations. However, it is a race without a finishing line. Knowledge and demands continually evolve. Network parties are unable to find a stable level with long-term control over processes, systems and structures.

Hence, we suggest that over the long term, success in systemic network development depends on the network leaders' ability to identify and facilitate dynamic balances under conditions of ever-changing power-knowledge structures (Strauss 1982; Jorgensen 2007). These power-knowledge structures regarding patient treatment and patient care are constantly developing in line with complex interactions inside and around the network's innovation logics. As a consequence, innovation at the network level can be seen as continuous learning processes.

Conclusion

The TELEKAT study suggests that interorganizational innovation in systemic networks is an uphill battle. Despite motivated people and appropriate project resources, the project is influenced by numerous contextual factors, as well as complexity and flux.

We have determined that four different innovation logics are operating: 1) Fragmented innovation, 2) Interface innovation, 3) Competing innovation and 4) Systemic innovation. The interplay of these four logics, framed as a four-field framework, enables us to understand the complex innovation dynamics in the systemic network.

The framework highlights the shortcomings of linear n-stage models. These models fail to capture, much less manage, the complexities and dilemmas of innovation in systemic networks. A few cyclical models bring us a step further, but there is still a need for more dynamic innovation models able to grasp the whole picture of dynamics in systemic networks. Our study suggests the utility of using a dynamic innovation model designed as a learning process and based on continuous learning loops. Each loop represents issues from the four identified innovation logics. Each loop goes one step deeper in the understanding of dynamics in the field, thus pushing innovation processes and network solutions to higher levels.

The dynamic interorganizational innovation model and the managerial challenges will be elaborated and discussed in our future research.

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