SYSTEMIC SERVICE INNOVATION IN THE SHIPPING INDUSTRY

Abstract:

The paper presents a longitudinal single case study of a company operating and offering energy efficiency and management services for the shipping industry. The paper provides insights on generation of systemic service innovations by looking at the challenges the company has faced in this quest and how it has tackled them. The challenges reflect the competitive forces that affect the parties' willingness to collaborate for systemic innovation. As theoretical starting point the study utilizes the service-dominant logic which gives a structure for discussing the challenges on individual, organizational, industry and meta levels of markets as systems of value co-creation. Challenges related to the technological context are also added to the structure. Based on the analysis a framework is suggested for tackling the challenges. The main components of the framework are: understanding the nature of market co-development, understanding the temporal dimension of different contexts, and communication for collective sense-making. They represent strategizing in a systemic network environment affected by both collaborative and competitive forces. In practice, the development of systemic service innovations in the company is continuous piloting of possible new forms of value co-creation with customers and other stakeholders.

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Competitive paper

INTRODUCTION

As companies develop new products and services both cooperative and competitive forces are in play. The dynamics of these forces is emphasized in large systemic innovations that may be pursued e.g. in order to change the whole competitive situation or in order strive for a more sustainable society. In recent years energy efficiency has been an important societal discussion topic that combines both of these views. Energy efficiency has been seen to promote sustainability, improve profitability and enable new competitive service offerings. Climate change related regulation and raising energy costs have been driving its importance to all stakeholders. Maritime sector has been no exception. International Maritime Organization (IMO) has been promoting energy efficiency activities in shipping for some years now (Eide et al, 2011). Different stakeholders in the sector have approached the challenge from their respective vantage point. One business opportunity for ship technology providers is to provide energy monitoring and management service built on top of their product offering.

For a maritime energy efficiency service business developer and provider the potential customers and users include a large number of very different and only loosely coupled actors (e.g., shipping companies, charters, ship operators, ship management companies, ship crew, etc.). Thus, integrated and sophisticated energy efficiency and management (EEM) systems do not necessarily hold the interest of all of these actors. All of the potential users are highly accustomed to utilising traditional means of managing energy consumption (such as speed reduction). Also, they lack a precise view and knowledge of more sophisticated, integrated and systemic EEM solutions. The attention of potential users is usually focused on local issues which demand immediate attention and can be managed independently. This sets a challenging business environment for a company promoting an innovation which requires changes in several actors' behaviour to be successfully implemented.

The context described above lays ground on the requirement of systemic innovation. A single stakeholder making improvements and autonomous innovations in its own operation does not make much difference considering the efficiency of the whole system (i.e. ship operation). Several different stakeholders need to rethink the way they organize their operations and utilize modern technology in tandem to make the whole system more efficient. At the same time the different stakeholders are competing about the potential new business. The more attractive and likely the different stakeholders see the emergence of the new market becomes, the more serious the competition gets. The aim of the paper is to provide insights on generation of systemic innovations in the coopetitive context of a company operating and offering EEM services. The specific research question is: *How has the company in practice developed systemic service innovations with its customers and other stakeholders, what challenges it has faced in this quest, and how has it tackled those challenges?*

The paper is structured as follows. First, we present the theoretical background for the study which is followed by the description of the research methodology. After that, the case study findings based challenges for systemic service innovation are discussed and approaches to tackle them presented. Finally, as a conclusion, the theoretical and managerial implications of the study are discussed.

SYSTEMIC INNOVATION AS CHANGE IN NETWORKS OF VALUE CO-CREATION

As the general theoretical starting point for the study we utilize service-dominant logic (Vargo & Lusch 2004, 2008). More specifically, we are focused on institutionalized practices on different contextual levels (micro-meso-macro) and the performativity of markets.

Performativity refers to activities, practices, doings and sayings having effects (Austin 1970). Additionally, we consider markets as systems affected by collaborative and competitive forces.

Chesbrough and Teece (1996) distinguish between two types of innovation: autonomous and systemic innovation. An autonomous, or stand-alone, innovation can be pursued independently from other innovations. In contrast, a systemic innovation can be benefited from only with related, complementary innovations. Not one, but many complementary innovations have to come together and be applied throughout the whole chain of system elements. Chesbrough and Teece (1996) also suggest that integrating required systemic innovation functions into a single company has the strongest chance to be successful. De Laat (1999) challenges this single-integrated-firm position and proposes instead a networking position, which asserts precisely the contrary; no firm being large enough in either scale or scope, only alliance networks can undertake innovation and standard setting on a systemic scale; moreover, these networks may do so successfully.

Typically, systemic (service) innovations require simultaneous innovations both in technology and markets. As Vargo et al. (2015) discuss, both technological innovations and market innovations are driven by institutionalization. It is just that innovations in technology result in new value propositions, whereas market innovations lead into new institutionalized solutions (ibid.). With the same logic, service innovations can be considered as changes in social structures (and institutions) that allow actors to co-create value, and as resulting in new practices of value co-creation (Edvardsson & Tronvoll, 2013).

Conceptually, markets can be understood in many ways. From the viewpoint of the service-dominant logic and innovation, it is meaningful to consider a market as an institutionalized solution. In this sense, a market does not exist an sich; it is performed, and it becomes institutionalized (Vargo et al. 2015). As Chandler and Vargo (2011) put it, "markets emerge from simultaneous, continuous processes at different levels and layers of context". The systems at micro, meso and macro level change in response to one another, and as Akaka et al. (2013) note, value co-creation takes place through the enactment of practices in these systems. Thus, to understand the value proposition of a systemic innovation it is necessary to holistically approach the dynamic changes this innovation would require on the different contextual levels.

When viewing value co-creation and innovation, service-dominant logic emphasizes social institutions and social systems. Social systems, structures and practices are commonly so complex that changes in them are highly unpredictable. Thus, social institutions can, on one hand, restrict the number of possible development paths, but on the other enable other paths of development. New forms of value co-creation are enabled by the practices and systems at different contextual levels (Akaka et al., 2013). Giddens (1984) calls the most enduring practices and structures institutions.

Although value propositions aim to describe and make sense of new practices and systems for value co-creation, new value cannot be determined or experienced before new systems and practices come to being (Akaka & Vargo, 2013). Incorporation of the issues of idiosyncratic, experiential, contextual, and meaning-laden value and multiple actors to the innovation is central to the most recent discussions on service-dominant logic. Especially in the field of industrial service innovation, there are usually multiple stakeholders and a complicated institutional landscape that affect both the phases of value proposition and value determination.

As such, industrial service innovation can never be one-directional or done by just one individual actor. On the contrary, it is necessarily a co-developmental process between multiple different actors that are linked to one another on one or multiple contextual levels. The previous linkages between actors in the service system make innovation path-dependent

and recursive. Systemic innovations require the creation of new linkages – and often severance of some old ones.

The creation and severance of linkages changes the competitive forces on the market. While collaborative action by various stakeholders is needed in order to introduce systemic innovations and shape markets, the situation simultaneously presents itself as competitive. Therefore strategies of coopetition are needed. Recent discussion on competition has moved from firm level to the network level, yet there is little discussion on coopetition on multiple levels (Bengtsson & Kock 2014). Strategic networks (Jarillo 1988) are seen as competing against each other and business ecosystems (Moore 1996) are seen as bringing an end to competition as previously known. It is also suggested that the efficient management of current business nets, business renewal nets and emerging new business nets differ from each other (Möller & Rajala 2007). From this point of view it is interesting to investigate coopetitive practices in the context of a company developing a service innovation that has the potential of radically changing the systemic market.

THE SHIPPING INDUSTRY CASE

In this section, the studied case and the methodology utilized in its analysis are described. First, we will focus on explaining the methodological choices made in the course of the study. After that, we will move on to the case itself, presenting a short description of the case company, its situation and the general context.

Methodology

The study is a longitudinal single-case study. As Yin (2003) explains, the case study approach should be considered when a 'how' or 'why' question is being asked. Going for case study allows us to study the particularity, complexity and contextuality of the case at hand (Stake, 1995). Single-case study was chosen due to the fact that we were provided access to such a rich variety of data sources within the case company and its customers, and the possibility to follow the development process longitudinally. Collecting data longitudinally allows for looking more closely on the development process that takes place and conditions that make progress in this process possible. Thus, longitudinal single-case study makes it possible to focus on the phenomenon of market creation practices in its own context.

The empirical data for the study was gathered during a one-year period from spring 2011 to spring 2012. The researchers had monthly meetings with key personnel responsible for developing the offering in the energy efficiency area. The meetings typically lasted from two to three hours. Also, a number of customer interviews were conducted, and the researchers were also allowed to passively participate in weekly teleconferences the company had with a customer while piloting the system. Four of the interviews were conducted with the company's personnel, and three with their customers or partners. Although a large number of people from different organizations were interviewed or otherwise discussed with during data collection, the most frequent contacts were representatives of the company. The people that were most closely involved in the meetings and interviews were titled *business manager* and *business development manager*. They had a high degree of freedom in developing the features of the service offering in energy management and energy efficiency in the area of marine solutions.

The data itself contains memos and notes made by three researchers in total of 24 distinct events. Most of these sessions are simply discussions on current issues in energy efficiency solutions. However, semi-structured interviews with company representatives, customers and partners were conducted. Notes from customer teleconferences were also taken. In addition, various brochures, technical specifications and other material on the proposed solution were studied, as well as publicly available sources on the company, the technological platform, and suggested service components.

Analysis was conducted among the researchers during and after the data collection period. Special focus was put on the dynamic changes on the multiple contextual levels (micro, meso, and macro) by identifying the individual, organizational and industry level challenges and solutions in the development, introduction and implementation of a holistic energy efficiency solution. Three researchers took part in the analysis of the collected data as follows. First, the researchers studied the data separately and made markings and underlined important sections of the discussions. After that these markings and sections were discussed in order to reach a common understanding of the critical points in the data set. These points were then classified according to the contextual levels drawn from theoretical work. They were also gathered together and renamed for increased clarity. During the process it became clear that there was a need for an additional level, as not all of the important issues and their solutions had a good fit with any of the levels included in the initial framework of analysis. The added level was that of technological challenges and solutions. Since the different levels in reality are highly intertwined, the positioning of a challenge on a specific level cannot be done in an unambiguous manner. However, carrying out this exercise gave the analysis a structured form therefore helping the researchers to better perceive the interactive dynamics of the system.

Based on the identified and classified challenges and solutions, the researchers were then ready to formulate a new framework for tackling challenges in systemic innovation. This framework was then introduced to various representatives of the case company in order to validate its insights. These discussions led to the discovery of new viewpoints that were subsequently added to the model. This last step was by no means the only time that the company representatives could comment on the progress of the research. On the contrary, preliminary findings and other thoughts were frequently discussed with them so as to validate, refine or reject them.

Case description

The case company is a multinational engineering conglomerate that operates mainly in robotics and power and automation technology. The total turnover of the corporation was $40 billion, and it employed around 150,000 people globally. The study presented here is focused on a business unit that operates in the marine industry employing over 1,000 people in 19 countries. The interviews were conducted in Finland, as the Finnish business unit is responsible for the development of marine solutions on a global level.

We studied the development of service solutions enabled by a sophisticated energy management system for the use of marine industry. At the very core of the offering is the technological solution. The solution enables real-time measurement of a number of variables on a vessel. These variables can be viewed not only in the engine room, but also on the bridge as well as on on-shore fleet management facilities. As data is produced in real-time, the system provides the crew instant feedback on their own actions.

More importantly, the technological solution enables a platform to build a large set of various service offerings on. An extensive set of complementary services brings about new

issues of complexity. This complexity arises from combining a variety of services to meet the needs of each customer, the fragmented nature of large global companies, the complexity of marine industry and regulatory issues. For example, in the marine industry, as ownership structures and management of operations are inherently complex, it is not particularly clear who should make the necessary investments in the technological platform and take responsibility of training the crew to utilize the new solutions effectively. The actual beneficiary of the savings in fuel consumption is most often not the employer of the crew or the owner of the vessel.

Although environmental awareness is so visibly on the rise, entering the market with offerings that directly promotes sustainability and environmental issues is far from straightforward. Instead, sustainability and greenness is seen as interesting but not commercially feasible. Thus, companies keep an eye out for sustainable solutions, but are not ready to take the necessary steps for implementing such solutions. This is true in consumer markets, but especially in industries that do not market their offerings directly to consumers. In industries that only offer products and services for other businesses the value of sustainability is not clear unless it directly leads to economic efficiency via material or energy savings. Greenness, as such, brings little value to most business customers.

CHALLENGES FOR SYSTEMIC SERVICE INNOVATION

Following the theoretical discussion within the service-dominant logic of marketing that value co-creation takes place on micro, meso and macro level systems (Akaka et al. 2013), the challenges were studied on individual, organizational and industry levels. Many of the found challenges were actually meta level challenges that affected several of these levels simultaneously. In addition to the individual, organizational and industry level challenges we also came up with a group of challenges that did not really belong to any of these categories. Among them a new category was recognized: the challenges related to the technological context. Challenges in the different categories are shown in table 1. These challenges are described below.

Table 1. Challenges the case company faced in systemic innovation.

Industry level:	Several levels:	Technological context:
- Suboptimization in the value system - Complexity of value sharing in the industry	- Goods-dominant mental frames - Need for behaviour change - Coopetition - Different time windows - Personnel turnover at customers - Variation in reach of power and influence - Ownership and sensitivity of data	- Competing technologies - Incompleteness of remote connection infrastructure - Retrofitting laborious and expensive
Organizational level: - Concepts and vision need clarifying - Incompleteness of organizational skills - Time spent in dealing with large complex organizations		
Individual level: - Personal skills - Personal attention and effort - Personal status		

Industry level challenges

On the industry level a major challenge for systemic innovation has been *suboptimization in a very complex value network*. The players in the shipping industry are often highly specialized and each player optimizes its own profits. Some of the main stakeholders are e.g. ship yards that build the ships, ship owners, ship operators who run the ships, management companies who provide the operators with crew on board, charterers who hire the ships from the ship owners to carry cargo, and brokers who help the charterers and ship owners negotiate. Even when cooperation can be seen as beneficial on the level of the whole industry, the individual actors in the system compete over the value generated by the system and therefore they need to act in a selfish manner optimizing their costs and revenues.The contract system is also very *complex* and it can be laborious to find out who are the relevant parties, like who pays for fuel, who pays for the investments and who gets the profits from fuel saving investments. These often are not the same parties, but it is easier to start working for the systemic innovation from those cases where the situation is clear, where the party paying for the fuel and the investment is the same and where it is easy to find out who that party is. The *complexity of the industry* also leads to the need to cooperate with lots of different partners.

Organizational level challenges

On the organizational level the *vision and concepts in the case company are not completely clear* when developing systemic innovations. Systemic service innovation is about piloting potential new forms of value creation that do not pre-exist. Nobody really knows what is achievable. Therefore aims first need to be set very high and then the vision is clarified as the different goals are tested together with stakeholders. However, it can be very difficult to convince management to invest in something that has not really been conceptualized or taken shape yet.

As the vision and concepts are uncertain and just about to emerge, *organizational skills are not ready* either. It is difficult to transfer the company culture from software oriented to service oriented. Some of the important skills are available on the group level of the case company, but it is difficult to transfer them to the unit in question, where they have not been used before. Also references need to be created from the scratch.

All this *takes time*, not only in the case company but also in its customer companies and other stakeholders. The customers and coopetitive partners have the same problem of not having ready visions and concepts. Also, it is not enough to get one representative of a company to grasp the idea. The discussions need to be carried out at multiple levels and fronts at the customer and partner companies too.

Individual level challenges

A new kind of service system requires people to personally adopt new *skills* and the development of these new skills requires resources. The case company can systematically train its own personnel, but when it comes to the personnel of customers and other companies, it is more difficult to convince them that they need to invest in training their personnel in certain kinds of new skills. The general level of education of ship crew can be very low in some parts of the world and the turnover of such personnel is high. Therefore investments in crew training flow to competitors very quickly. In service development this

problem may be at least partly bypassed by developing smart technology that replaces and supplements the skill of people. It is easier to protect technology investments from spilling to competitors than personnel investments.

The development of new systemic service innovations requires the *personal attention and effort* of many different people. It can be very difficult to get customers or even competitors to put such effort into the development. The changes that the innovation creates can also affect stakeholders' *personal status* positively or negatively and this affects their attitude towards the innovation and its development.

Challenges affecting several levels simultaneously

The *mental frames* in the industry are goods dominant in the industrial, organizational and individual levels. This hinders the systemic change. It is also very difficult and slow to change these mental models one person at a time. Coordination of collaborative activities also requires that parties share roughly similar mental frames.

Changing the system requires that individual people, organizations and the industry as a whole also *change their behavior*. Systemic change does not take place by just adding some product if the actors keep doing the same things that they have always done.

Changing the system requires *coopetition*, i.e. cooperation from parties that simultaneously compete with each other. There are lots of different stakeholders whose offering is necessary in the operation of ships. These offerings are partly overlapping and competing. Yet, no one has such a wide offering that could solve the whole systemic problem and therefore cooperation is needed. It is especially demanding to collaborate when the whole system is in a state of large structural change as everyone would like to get a large share of the new developing business.

As different parties forward their own agendas they have *different time windows*. What customers and coopetitors are (or are not) willing to do today does not represent their aims tomorrow. Being able to hit the right time windows is essential for succeeding in the systemic change. This issue of time windows also applies to individual people whose careers change. The gradual systemic change is often highly dependent on certain individuals in customer companies and at coopetitors. Especially *personnel turnover at customers* can abruptly stop development that might so far have been progressing smoothly.

The coopetitive nature of the development work also affects parties' power and ability to make changes. The *reach of power and influence* can be quite good in areas where there are strong synergies and no conflicting interests. On other issues the conflicts of interests may be substantial or there may be just lack of sufficient synergies. It can be very difficult for a party to influence these issues.

A strategic issue where different parties easily have conflicts of interest is the *ownership and sensitivity of data*. Ownership and access to data is crucial for power and competitiveness in knowledge based value creation. Even when it is possible for the parties to give access to data to each other, it may be crucial to protect the data from ending into the hands of third parties.

Challenges related to the technological context

As the socio-technical system is changing there are lots of different *competing technologies* available in the market and it is not sure yet which technology will in the end receive most support and win the competition. Investing in loosing technology is money wasted and it also

slows down the adoption of the winning technology reducing competitiveness. Therefore coopeting parties wish to advance the technologies that best support their own offering and the technologies they themselves have invested in.

The kind of systemic change promoted in the case could really benefit from combining onshore data and data from different ships in a fleet in real time. As the ships travel the uninhabited seas *incompleteness of the remote connection infrastructure* becomes a problem.

It is much easier and cheaper to include the needed technology in newbuilds than to make retrofits in old ships. *Retrofitting is laborious and expensive*. As a large part of world shipping fleet is old ships the larger systemic changes may take a lot of time to take place.

TACKLING THE CHALLENGES OF SYSTEMIC SERVICE INNOVATION

The practices the company had adopted in tackling the challenges were grouped under three larger headings as seen in Figure 2. These major insights were 1) understanding the nature of market co-development, 2) understanding the temporal dimension of different contexts, and 3) communicating for collective sensemaking. They describe strategizing in a systemic competitive business environment. We will now discuss them one by one.
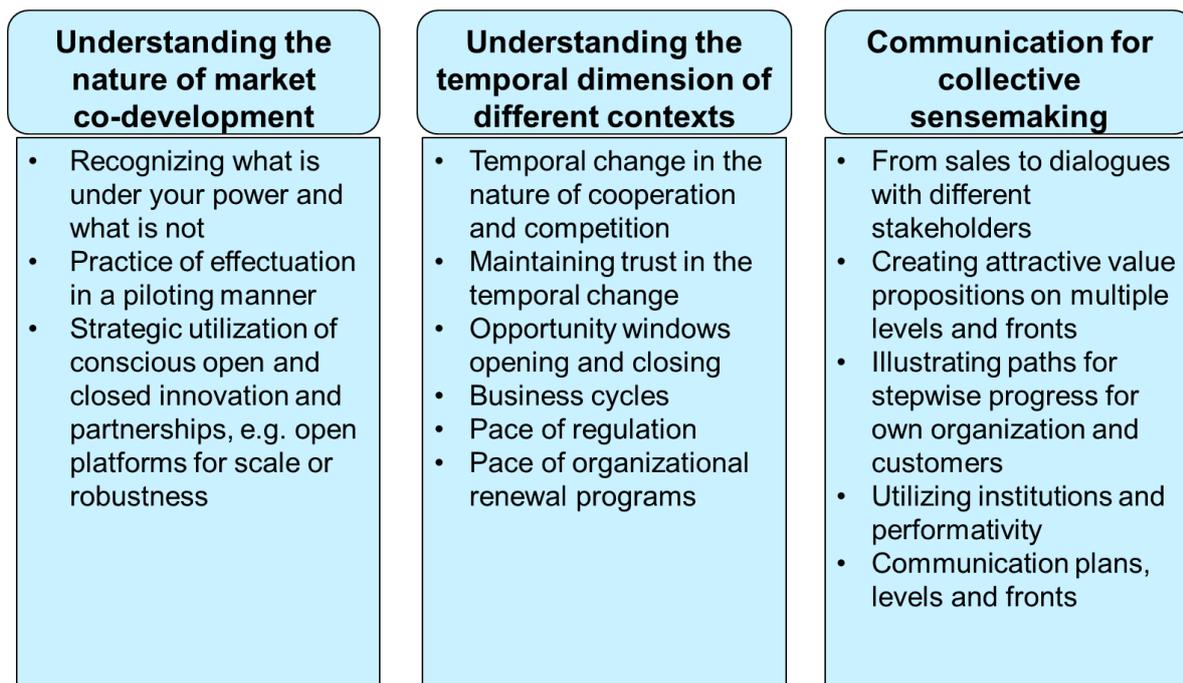
Understanding the nature of market co-development	Understanding the temporal dimension of different contexts	Communication for collective sensemaking
• Recognizing what is under your power and what is not • Practice of effectuation in a piloting manner • Strategic utilization of conscious open and closed innovation and partnerships, e.g. open platforms for scale or robustness	• Temporal change in the nature of cooperation and competition • Maintaining trust in the temporal change • Opportunity windows opening and closing • Business cycles • Pace of regulation • Pace of organizational renewal programs	• From sales to dialogues with different stakeholders • Creating attractive value propositions on multiple levels and fronts • Illustrating paths for stepwise progress for own organization and customers • Utilizing institutions and performativity • Communication plans, levels and fronts

Figure 2. Framework for tackling the challenges of systemic innovation

Understanding the nature of innovation as coopetitive market co-development

It is important to recognize that markets are not stable but they evolve. Further, market evolution is not passive flow of events. Instead, markets are co-developed by different parties acting on multiple systemic levels what leads to evolution. This is the true nature of innovation. Understanding that innovation is about active co-development of markets in a coopetitive manner opens up novel possibilities for strategizing.

When driving the systemic change in a coopetitive environment there are some things where the company can have more influence and others where its influence is much smaller. It is very important for the company to recognize in which category different issues belong to – *what is under your power and what is not*. This allows for better strategizing and finding the parties with whom to cooperate in order to proceed.

The business risks caused by the complexity of the business environment can be reduced by *practicing effectuation in a piloting manner*. When piloting, companies proceed in small steps with well tolerated risk. Crucial partners for piloting are customers, the stakeholders that ultimately decide whether the new business will fail or succeed. Piloting also has the ability to make more visible the value as well as possible disadvantages of the new service.

The cooperative nature of systemic innovation calls for open innovation processes. Yet, due to the competitive forces there is a need to keep part of the innovation process closed. Therefore, *strategic utilization of conscious open and closed innovation and partnerships* is needed. This could mean e.g. partnering for open innovation of joint platforms. Increasing the number of parties utilizing the platform brings economies of scale and it also makes the platform more robust due to the dynamic forces in the network.

Understanding the temporal dimension of different contexts

Also, it is necessary to take into account the *temporal change in the nature of cooperation and competition*. While you collaborate at one point in time, you may be competing at another time. Further, it is important to constantly *maintain trust during the temporal change* with different stakeholders, even though they may be competitors at times. The next moment they may be needed for collaboration.

There are always *opportunity windows opening and closing* in the systemic change. Strategies cannot be made fixed since the coopetitive arena is evolving as if it were alive. Opportunities need to be seized quickly. On the other hand, if progress cannot be made in some issue at some time, it does not mean that the road would be blocked permanently. It is good e.g. to discuss the possible service offerings with customers even if they are not at the moment looking for such services. They may find the offering tempting at some later time. *Business cycles* also affect the kind of services that customers are interested in and may open or close opportunity windows.

An important contextual factor affecting systemic change is regulation. It is good to understand the *pace of regulation*. There may be high confidence that regulation proceeds into some specific direction. Yet the speed of regulation is often more uncertain. Markets may not be ready to accept offerings for which their value is realized only after decades.

Customers' *organizational renewal programs have a specific pace*. It is often necessary to hit that specific time window in order to succeed with the service development project. Customers' time windows are often also affected by their personnel's career moves as collaboration often is very person specific and innovation adoption often does not proceed without a champion in the customer company.

Communication for collective sensemaking

Since this kind of service innovations are actually created through a joint process, it is necessary to understand the need for collective sensemaking that is only enabled through communication. With customers as well as other stakeholders it is essential to proceed *from sales to dialogues*. This dialogue takes place through making and discussing value

propositions. *Attractive value propositions need to be created on multiple levels and fronts*: with customers and other stakeholders; with different kinds of people in stakeholder organizations; on personal and organizational levels and on the level of the industry.

Even though the future is uncertain, it is important to discuss together about possible scenarios. Collaborative efforts in an uncertain landscape become more meaningful with attractive scenarios and convincing roadmaps. This accentuates the need *to illustrate paths for stepwise progress*. This is important in internal work for making the vision better understandable for own organization as well as in external work when showing attractive value propositions and roadmaps for customers.

It is the jointly shared institutions that both enable and restrict different paths of systemic change. Understanding the institutional landscape allows the service developer to *utilize institutional inertia*, sort of ride the wave of institutions. Simultaneously this understanding is useful for avoiding a strong clash with strong institutional forces.

Inertia of the system manifests itself also in such a way that it is often difficult for customers and other stakeholders to see the service and the role of the service provider as different from what they have previously been. However, it is the actions and the narrative that define the service provider and its service. This *performativity* can be used for recreating expectations. Care needs to be taken that the actions and narratives are aligned on different levels and fronts in order to create a strong message. *Communication plans* can be used as practical tools for the alignment.

DISCUSSION

The research question of this paper was: How has the company is practice developed systemic service innovations with its customers, what challenges it has faced in this quest, and how has it tackled those challenges?

In practice, development of systemic service innovations in the company is continuous piloting with customers and other stakeholders. It is important for the company to develop its services in close interaction with its customers to ensure their fit to the customers' operations, their commercial and technical feasibility and attractiveness. The service also needs to fit the general market structure and therefore co-development with other stakeholders is important as well. Service innovation is not just something designed in-house. The more systemic the service, the more stakeholders need to be considered in the design. This type of design does not follow the waterfall model. Instead it is highly iterative, cyclical and effectual activity. Yet, there need to be visions as guidelines to follow and as something to discuss on and to work on with the stakeholders. The company has found in its service development that it is useful to have a long term plan or a map of future service development that can be discussed with customers and other stakeholders even though only some of the planned services could be delivered in the closest future.

In a previous section, we have discussed the challenges of systemic service innovation on different levels: individual, organizational, industry, and meta levels. We also found challenges related to technological context. The challenges reflect the competitive forces that affect the parties' willingness to collaborate. Based on our analysis, we created a framework for tackling the challenges of systemic service innovation. The main components of the framework are: understanding the nature of market co-development, understanding the temporal dimension of different contexts, and communication for collective sense-making.

Both challenges of systemic innovation and solutions for tackling them are systemic. A holistic approach is needed for systemic innovation that simultaneously takes into account the multiple levels and fronts and the temporal change. The approach needs to be based on

understanding the value dynamics of the system and an ability to utilize institutions and performativity and illustrate paths for progress. There are important managerial applications for the approach in strategic innovation, opening up new markets and in the transformation of industry towards sustainability.

The trustworthiness of a qualitative study should be evaluated using measures that are designed for qualitative studies, not those predominantly used for the evaluation of quantitative studies. So, we adopt the terminology proposed by Guba and Lincoln (1994) for the quality criteria of qualitative research: credibility instead of internal validity; transferability instead of generalizability; dependability instead of reliability; and confirmability instead of objectivity.

We suggest that the credibility of our findings is particularly strong. Peer debriefing was a method that was used extensively during data collection and analysis. Also, preliminary findings were openly discussed between researchers and representatives from the case company. Researchers and company representatives were free to comment all the findings, not only findings on those events they themselves participated in. Unfortunately, the discussions and teleconferences were not recorded. We were slightly worried this might have adverse effects on the content and openness of the discussions. Also, the amount of recorded material would have grown to massive proportions.

To strengthen transferability, we collected rich contextual data. By carefully documenting the overall situation of the company in the new business area, we can avoid making non-transferrable conclusions of observations made in unique circumstances. So as to ensure dependability, we looked into the public information available on the case companies. Moreover, the researchers analyzed the data individually before moving on to comparing and combining the findings.

When assessing the interpretations that we can actually make based on the data, we have to take into account the fact that the views we have gathered are the views of the interviewees and not of the companies. In large organizations, different or even conflicting viewpoints could have been found.

For future research we suggest that the issues related to systemic service innovation should be studied in other sectors and contexts in order to better cover the different practices in different kinds of companies. Our study viewed the development of a systemic service innovation predominantly from the viewpoint of the service provider; it would be interesting to study the phenomenon of systemic innovation from a more balanced viewpoint covering more extensively the various stakeholders involved. We would also like to see studies of how the process of collective sense-making needed for complex systemic change can be facilitated effectively.

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BIBLIOGRAPHY

Akaka, M. A., and Vargo, S. L. (2013). Technology as an Operant Resource in Service (Eco)systems. Information Systems and e-Business Management, 1–18.

Akaka, M. A., Vargo, S. L. and Lusch, R. F. (2013). The Complexity of Context: A Service Ecosystems Approach for International Marketing. Journal of International Marketing, 21(4): 1–20.

Austin, J. L. (1970). Performative Utterances. In Austin, J. L. Philosophical papers. London: Oxford University Press.

Bengtsson, M. & Kock, S. (2014). Coopetition – Quo Vadis? Past Accomplishments and Future Challenges. Industrial Marketing Management 43, 180-188.

Chandler, J.D. and Vargo, S.L. (2011). Contextualization and value-in-context: How context frames exchange. Marketing Theory, 11(1): 35-49.

Chesbrough, H. W. and Teece, D. J. (1996). 'When is Virtual Virtuous? Organizing for Innovation', Harvard Business Review, 74, 1, January—February 1996, pp. 65–73

De Laat P. B. (1999). Systemic Innovation and the Virtues of Going Virtual: The Case of the Digital Video Disc. Technology Analysis & Strategic Management, Vol. 11, No. 2, 1999, pp. 159-180

Edvardsson, B. and Tronvoll, B. (2013). A new conceptualization of service innovation grounded in S-D logic an service systems. International Journal of Quality and Service Sciences, 5(1): 19-31.

Eide, M. S., Longva, T., Hoffmann, P., Endresen, Ø., & Dalsøren, S. B. (2011). Future cost scenarios for reduction of ship CO_2 emissions. *Maritime Policy & Management*, *38*(1), 11–37. doi:10.1080/03088839.2010.533711

Giddens, A. (1984). The Constitution of Society: Outline of the Theory of Structuration. Cambridge: Polity.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y.S. Lincoln (Eds.), Handbook of qualitative research (pp. 105-117). Thousand Oaks, CA: Sage.

Jarillo, J. C. (1988). On Strategic Networks. Strategic Management Journal, 9, 31-41.

Möller, K. & Rajala, A. (2007). Rise of Strategic Nets – New Modes of Value Creation.

Moore, J. F. (1996). The Death of Competition. New York, NY: HarperBusiness.

Stake, Robert. (1995). The Art of Case Study Research. Thousand Oaks, London, New Delhi: Sage.

Vargo, S. L. & Lusch, R. F. (2004). Evolving to a New Dominant Logic for Marketing. Journal of Marketing, 68, 1-17.

Vargo, S. L. & Lusch, R. F. (2008). Service Dominant Logic: Continuing the Evolution. Journal of the Academy of Marketing Science, 36, 1- 10.

Vargo, S.L., Wieland, H. and Akaka, M.A. (2015). Innovation through institutionalization: A service ecosystems perspective. Industrial Marketing Management, 44: 63-72.

Yin, R. K. (2003). Case Study Research: Design and Methods (3rd Edition). Thousand Oaks, CA: Sage.