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# Inter-Organisational Network Formation and Sense-Making: Initiation and Management of a Living Lab

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## Abstract

**Purpose** – While Living Labs are increasingly gaining attention as real-life experimentation settings for developing and testing of innovative solutions, research on the social structure and processes that take place within Living Labs is still scarce. Our study aims at extending the empirical basis of Living Lab research and at the same time further refine the conceptual instruments of the analysis.

**Approach** – Based on an in-depth case study, we have reconstructed the initiation and subsequent management of Living Labs as platforms for innovation. The theoretical framework supplements the concept of network practices by drawing upon the literature on communities of practices and sense-making.

**Findings** – The paper provides insights into the social processes which lead to the initiation and management of Living Labs and demonstrates the importance of negotiation, sense-making, and knowledge brokers. Our analysis also presents Living Labs as specific type of networks, marked by distinct characteristics, which differs from inter-firm networks.

**Research limitations** - A single, albeit extensive case study provides only limited empirical evidence.

**Practical implications** - The paper highlights the importance of knowledge brokers and the varying activities which need to be performed at the different stages of the life cycle.

**Value** – The paper makes a conceptual contribution by elaborating the concept of network practices on a social network level. It emphasises the importance of the contingencies of specific network arrangements (Living labs) and indeed the network development over time.

**Keywords** - Inter-organisational networks, sense making, network management, living-labs, knowledge broker

**Paper type** - Research paper

## 1 Introduction

With the increased security threats after the attacks of 9/11, governments have introduced new requirements to international supply chains. This adds layers of administrative burden, inevitably affecting supply chain efficiency. This puts pressure on companies to be innovative in order to counter these negative effects. Information technology is seen as a key enabler: extending the level of informational monitoring, e.g. by building RFID-based infrastructures for real-time monitoring, is seen as a way to increase the level of supply chain control and thus address both the need for efficiency and security. However, as cross-border trade is characterized by a high degree of regulation (Hendriksen et al., 2008), mechanisms to increase control are subject to a broad range of often conflicting informational and technical requirements thus making innovation practices very difficult. In this context, governments have a dual role of safeguarding public concerns by setting tight controls on supply chains, while at the same time facilitating economic activities. A major challenge for both business and government then becomes how to be innovative in such a highly regulated environment. Methodologically this raises the question how to adequately capture both, the complexity of multi-stakeholder environments covering the public and private domain and the conflict of goals and orientations between risk and control on one side and efficiency and facilitation of trade on the other side. We have chosen the emerging concept of Living Labs as framework for the discussions about research design and enquiry, whereas we see potential in Living Labs to act as platforms for innovation facilitation in highly regulated contexts.

Living Labs have increasingly gained attention as real-life experimentation settings in both research and practice. Nevertheless, similar to Eriksson et al. (2006), we found that research on Living Labs is fragmented and immature. The fragmentation of the literature is reflected in the way different authors define Living Labs. For instance, Living Labs were seen as “naturalistic environment instrumented with sensing and observational technologies and used for experimental evaluation”

(Intille et al., 2006, p.350)“, or as a “research methodology for sensing, prototyping, validating and refining complex solutions in multiple and evolving real-life contexts” (definition used by Pierson and Lievens, 2005, Eriksson et al., 2006<sup>1</sup>), whereas Abowd et al.(2000) talk about building and extensively experimenting with prototype environments. Nevertheless, there seems to be a general agreement that Living Labs refer to a real-life, naturalistic setting which can be applied for testing or evaluating concepts and/or technologies. Various uses of the term emphasise the emergent nature of design and innovation processes. They aspire to reveal learning through the unexpected use of space and technology, they use *real world* settings as a bridge between the *in vitro* environments of R&D laboratories and wider or *in vivo* environments encountered in the lived world (Intille et al., 2006, McNeese et al., 2000). Research and experimentation is intended here to be conducted directly in live environments or alternatively in simulated real world settings constructed to provide sites for more controlled experimentation. Consequently, the duration of Living Labs is considered to be open-ended and all stakeholders – such as technology providers, business and public organizations, users, and researchers – are expected to be actively involved during the whole time (Niitamo et al., 2006; Tan et al., 2006). A Living Lab methodology facilitates user involvement more deeply into technology innovation projects with the goal of shortening the time-to-market of new technology projects . The Living Laboratory may, however invert the conventional R&D push-view of technology development and enable control of product development via social demand (Pierson and Lievens, 2005). This view echos Von Hippel’s (2005) democratized innovation – where unstable prototypical technology is adapted and employed by users whose own innovations are then adopted by producers and incorporated in subsequent versions. The human agent is seen as a source of innovation and not just a user, consumer, or object for R&D activities. Thus, Living Labs are seen as user-driven innovations (Eriksson et al., 2006; Pierson and Lievens, 2005; Tan & Henriksen, 2008).

While the literature on Living Labs conveys a first understanding of the concept, the existing research does not analyse the formation and ongoing development of such Living Labs and does not provide an account for how the different stakeholders are brought together and engage to shape the innovation. The goal of this paper, therefore, is to bring an understanding about the processes and

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<sup>1</sup> Pierson and Lievens, 2005 and Eriksson et al., 2006 refer to Prof. William Mitchell from MIT (Boston), Medialab and School of Architecture and city planning as one of the first authors to use the notion of the Living Lab and as a source of this definition.

social dynamics which lead to the initiation and subsequent management of Living Labs as a platform for innovation.

We analyse Living Labs as a particular kind of network for facilitating IT-enabled innovation. Our theoretical framework builds on the perspective of network practices which are produced and reproduced over time; we supplement this perspective by drawing upon the literature on communities of practices and sense-making. Using an in-depth case study, we investigate an innovative development project called “The Beer Living Lab” (BeerLL) where government, technology providers, businesses and universities are brought together to develop innovative concepts for cross-border trade. We apply our theoretical framework to explore the challenges of how the initiative arose and took place within a multi-stakeholder environment.

From a theoretical point of view, our study brings new insights into the social processes which led to the initiation and management of Living Labs. As such, this paper can be seen as a contribution to the literature on networks in general, as well as the literature on Living Labs in particular. This paper can be also of value for practitioners, as it provides insights on how to set-up and manage Living Labs.

The remaining part of this paper is structured as follows: In section two and three we present our theoretical framework and research methodology respectively. A detailed description of the BeerLL case is provided in section four. Discussion and conclusion follow in section five.

## **2 Theoretical Framework**

### **A brief overview of the network literature**

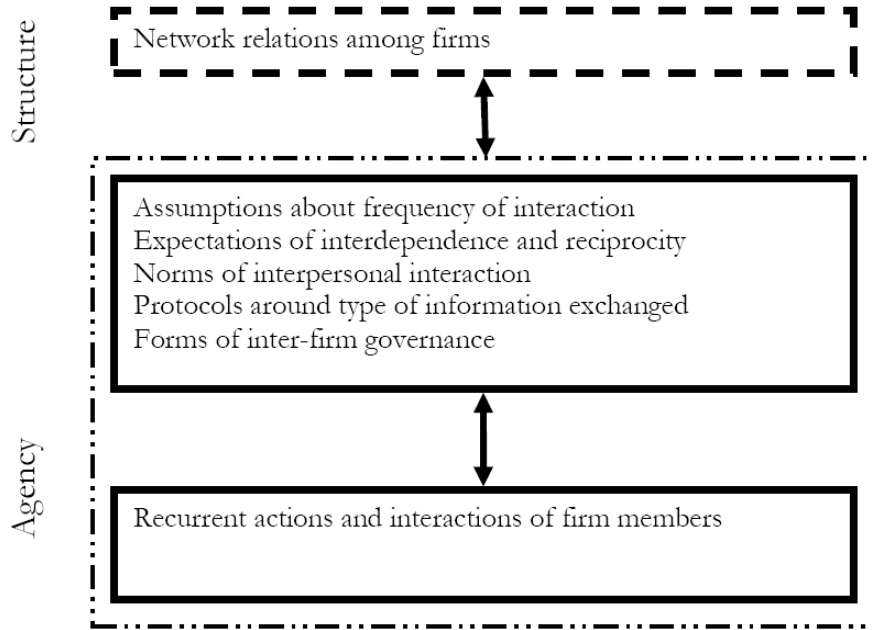
In a general sense, the term network can be used for describing the structure of ties among actors in a social system (Nohria & Eccles, 1992, p. 288). Research on networks has been focused on different kinds of networks (e.g. industrial networks (Anderson et al., 1994; Gadde et al., 2003); strategic alliance networks (Doz & Hamel, 1998; Parkhe, 1993; Badaracco, 1991); value added partnerships (Johnston and Lawrance, 1988) and R&D networks (Mahnke et al., 2006; Tijssen, 1998)), on the evolution of networks over time (Doz et al., 2000; Riemer and Klein, 2006), and on factors facilitating or constraining the adoption and use of IOIS within networks (Chwelos et al., 2001; Riggins & Mukhopadhyay, 1994; Teo et al., 2003; Hart & Saunders, 1997). Regardless of the type of

network, the impulse to set-up such a co-operative venture is the intention to realise strategic opportunities which go beyond the individual companies' capabilities (Bleicher 1999, p. 546). Thus, despite the various kinds of networks, they share and are driven by clear objectives and goals. Even in the R&D networks the goals can be clearly defined (e.g. to develop a new product), even though the outcome of the collaboration may not be clear from the outset.

Most of the network studies share a focus on the organisational level and relatively little attention has been given to human agents' endeavours in network initiation and management. We therefore direct our theoretical enquiry on the actor level, whereby the actors are primarily regarded as representatives of their organisations (and networks). We shall develop a *practice theoretical perspective* as a meta-theory, complimented with perspectives on communities of practice and sense-making, so as to scrutinise the interplay between the actors and the institutional practices.

### **A practice theoretical perspective on network relationships**

Schultze et al. (2004) argue that although more and more research on network relations recognises the complementary character of studies on rational actor relations and relational theories, such work mainly concentrates on the macro-, inter-firm level. In so doing, macro analysis neglects the practice of individual members of organisations entering into boundary spanning activities at the micro level and accomplishing joint exchanges or transfers on behalf of their company. Instead, Schultze et al. suggest a 'practice theoretical' approach to understand the dynamics at work in the formation, production and reproduction of network relations (see Figure 1).



**Figure 1:** General view of network relations among firms (adopted from Schulze et al., 2004: 89)

They argue that individuals, during recurrent actions and interactions, draw upon a variety of assumptions from which they constitute their practices for example; frequency of interaction, expectations of interdependency and reciprocity, norms of interpersonal interaction, protocols around types of information exchanged and forms of inter-firm governance. These inter-organisational practices in turn constitute networks (considered to be network practices); understood as repeated recursive instantiations of the structural properties of networks performed by knowledgeable network agents (Sydow & Windeler, 1998). However, agents such as managers do not refer solely to structural properties of networks but also to rules and resources of broader social systems, expressed by governmental agencies and society. By applying all these institutionalised practices, members constitute and re-constitute the inter-firm network structure with its particular network characteristics (Schulze & Orlikowski, 2004).

Rather than limiting the analysis to the inter-firm level, a theoretical approach informed by structuration theory appreciates that it is individual members of organisations who enter into boundary spanning activities. Thus, the focus shifts from abstract organisational entities to individuals with their assumptions, norms, expectations, protocols and routines. Concentrating on processual and contextual aspects encountered and performed by individuals with their interpretive schemes, norms, and power relationships allows structuration theory to explicate contradictions,

conflicts and dynamics in networks. In the following, we shall extend the practice theoretical perspective by referring to the communities of practice literature. We elaborate on sense-making processes within communities and the role of human agents in facilitating knowledge exchange across different communities.

Wenger (1998) describes how constant engagement through the production and reproduction of practice renders the world as meaningful. Meaning is continuously negotiated over time as people experience the world and their engagement in it as meaningful. Wenger uses the term negotiation to emphasise the productive process of meaning construction which is historical, dynamic, contextual and unique. Members from diverse organisations who engage in the same practices may perceive themselves as a network-of-practices (Brown & Duguid, 2001), a shared identity arising from common, overlapping or similar practices. Although the connections within a network-of-practices are less intense than those within a community, they do share commonalities allowing knowledge to circulate. In these networks, diverse practices challenge each community's beliefs. Organisations, consisting of multiple communities of practices, can use the myriad of beliefs as impetus for creativity and innovation if they succeed in tapping or utilising the diverse practices of the communities (cf. Brown & Duguid, 1991). However, new communities may derive from networks-of-practices if one succeeds in facilitating sources of coherence, namely joint enterprise, mutual engagement, and shared repertoires (Wenger, 1998).

Watson-Manheim et al. (2002) define discontinuities as gaps or lacks of coherence in different aspects of work which may come in the form of temporal, spatial or organisational discontinuities. However, discontinuities manifested during collaboration among different communities are balanced against attempts to create continuities which bridge existing differences. For example, by clarifying mutual expectations continuities may be brought about and mitigate potential issues introduced by discontinuities. The pro-active engagement of human agents as knowledge brokers has proven to be positively related with attempts to bridge discontinuities between organisations and communities. Knowledge brokers can help to create a tacit understanding among communities (Walsham, 2005) and increase awareness of other functional areas' working practices (Hayes, 2000). But in order to acquire legitimacy, such brokers need a sufficient level of knowledgeableability of the practices, working cultures, and discourses of each group if they are to become a trusted party and to phrase and frame the interest of one community in a way which is understood by another (Brown & Duguid, 1998). A



high level of legitimacy then enables agents to facilitate transactions and learning by way of linking and combining practices. In addition to knowledge brokers, delegations may also become an influential instrument for negotiating meaning among members from different communities in which several participants from the involved organisations mutually engage with each other (Wenger, 1998). If enacted on a regular basis, these engagements may become institutionalised and give rise to practices specific to the delegation and its participants.

Based on the discussion above, our combined theoretical lens for analysing innovation in the BeerLL consists of the following components. First, we use the practice theoretical perspective as a meta-theory which allows us to look at networks at both the practice as well as individual level. The communities-of-practice literature helps us explain the interaction processes that we observe between individuals.

### **3 Method**

#### **Research site**

This case study presents the Beer Living Lab (BeerLL) pilot project which is part of the ITAIDE<sup>2</sup> program (Tan et al., 2006). Four Living Labs are set up as part of ITAIDE as real-life experimentation platforms and the BeerLL is one of them. The BeerLL addresses the handling (export) of excise goods and their movement in supply networks. Key partners involved are: a large Beer producer (BeerCo), the Dutch Tax and Customs Administration (Dutch TCA), a National University (NU) and a technology provider (TechProv). In addition, several other parties were also involved in some of the BeerLL activities, including a Sea Carrier, UK Tax and Customs Administration (UK TCA), and a second technology provider (TechProv2). In the BeerLL innovative container seal technology and inter-organisational information systems are used to prototype a redesign of the current procedures for the export of excise goods. As part of the overall ITAIDE research programme, the BeerLL serves as an innovation platform which aims to demonstrate how it becomes possible for the government to grant reliable companies trade

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<sup>2</sup> ITAIDE stands for “Information Technology for Adoption and Intelligent Design for E-Government” and is an EU-funded project from the 6<sup>th</sup> framework program.

simplifications and reduced the administrative burdens, while still preserving the required levels of control and security.

## Research methodology

The case study follows the interpretative tradition (Walsham, 1993; Klein & Myers, 1999). We employed a process approach (Markus & Robey, 1988) which provides a contextual analysis of the processes of change (Pettigrew, 1987). The field research was carried out over the period February 2006- October 2007. Data were collected from different sources in order to gain a comprehensive picture of the case, namely participation in full-day brainstorming sessions, individual interviews with the project participants, observations, and document analysis. The documents which were reviewed ranged from EU policy documents, EU documents on export of excise goods, internal reports of Dutch TCA, or project reports. 25 semi-structured interviews were carried out lasting between 1 and 3 hours each. Interviews were conducted at the beginning of the project, as well as at the end of the project to evaluate the results.

	Organization	Interviewees roles	Number of times interviewed
	Dutch TCA	BeerLL coordinator for DTCA, member of the process innovation group of DTCA	4
		Tax auditor from DTCA for BeerCo	3
		Auditor DTCA, Statistical auditing	2
		Customs and excise auditor, BeerCo	3
	BeerCo	Customs manager, BeerCo NL	3
		Tax auditor at BeerCo	1
		Logistics manager, BeerCo	1
	TechProv	BeerLL coordinator for the technical demonstrator of the BeerLL pilot	1
		BeerLL coordinator for Techno Prov, expert in Customs matters	1
	TechProv2	BeerLL coordinator for Techno Prov 2, focus on standards	1
	NU	Strategic project manager BeerLL	2
		Operational project manager BeerLL	1
	UK TCA	Customs officer, UK Customs	1
	Sea Carrier	Manager executive application services	1
<b>Total</b>	<b>Organizations</b> 7	<b>People</b> 14	<b>Interviews</b> 25

**Table 1.** Overview of the conducted interviews

Based on the interviews, reports were produced. These reports were sent back to the participants for verification and feedback. In addition, the researchers attended 8 general meetings and brainstorming sessions, each lasting between half a day to one day, as well as numerous working sessions. Almost all general project meetings and formal interviews were recorded and meeting notes or minutes of meetings were drawn up. The data analysis was guided by the conceptual lens presented in section two and abstractions and generalizations were achieved by linking empirical details from the case to more abstract theoretical concepts. Specific attention was paid to the analysis of both organizational and individual level as well as the negotiation and sense-making processes. Finally, a narrative approach is especially relevant to the study, the analysis and the presentation of the organisational processes (Pentland, 1999). In order to make the analysis more manageable, for analytical purposes the case study was split in several stages; however these stages are inherently intertwined and interlinked.

## 4 The Beer Living Lab: Case Description

Figure 2 below maps key stages and activities that took place during the BeerLL.

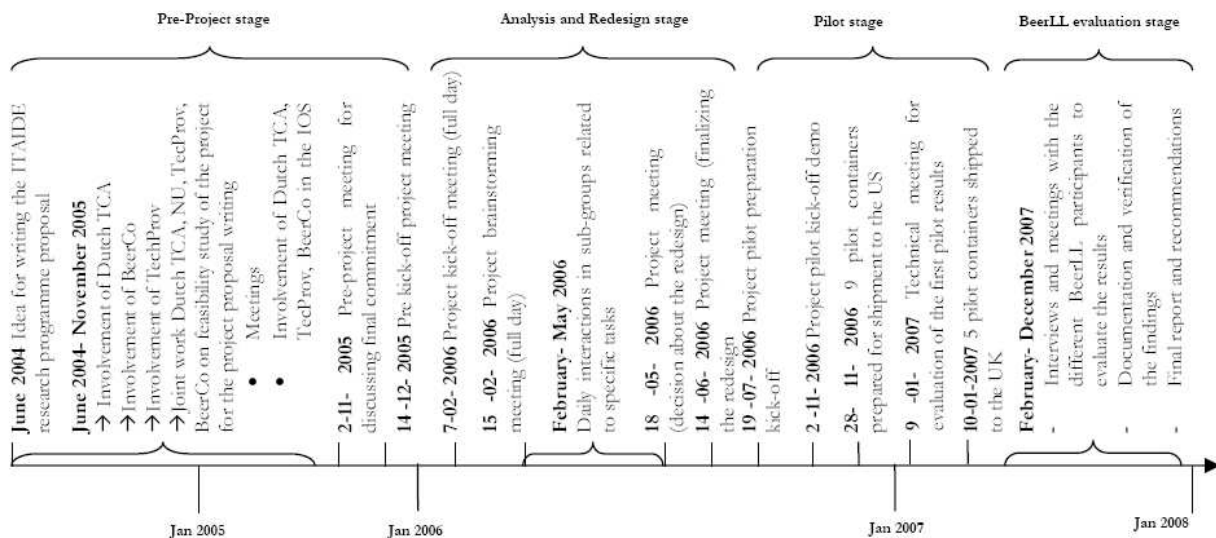


Figure 2. The R&D Project: Sequence of key events

## Pre-project stage

The idea for the research programme was triggered during a conference which Pat, a university professor<sup>3</sup> at NU, attended in 2004 where a members of the European Commission pointed out to him that a call for EU-funded research was open in this particular area. Pat knew that breadth and depth of academic expertise was a pre-requisite to establishing a credible proposal. He identified a group of academic partners with whom he had developed long-term relationships and who were interested in contributing to the research proposal. The idea of the project was to analyse cross-border trade and develop innovative IT-based solutions within a Living Labs setting, composed of businesses, governmental agencies, universities and technology providers. Four Living Labs were envisioned and Pat was in charge of the BeerLL in the Netherlands.

Pat needed to involve a government agency, a company, and a technology provider. To ensure commitment from the government, Pat got in touch with Ron whom he knew for more than 10 years. Ron, who had previously worked for the Customs department in Dutch TCA, recently moved to the “process improvement group” whose objective was to envision innovative IS solutions for the Dutch TCA. Ron reacted enthusiastically to Pat’s suggestion to join the project because the project appeared to fit well with his new responsibilities. Pat discussed with Ron topics which were currently of interest for the EU and the Dutch TCA to ensure the relevance of the problem definition in the proposal. Pat asked Ron to help him to identify a suitable company with a high volume of cross-border trade transactions. Ron had no direct customer contact but he got in touch with a colleague (Steve), who was a client coordinator for a large beer producer (BeerCo) and was also responsible for leading an e-Business project within Dutch TCA. Steve became interested in contributing to Pat’s research proposal as it was well aligned with his own e-business interests.

*“But we were enthusiastic [about getting involved in ITAIDE]. ... on a higher level looked like a new concept and we thought it is good also for the tax office to think about it.” (Steve, Dutch TCA)*

Steve contacted the Customs Manager at BeerCo (James), however, it took time before BeerCo finally committed itself to joining the project (this happened at the end of 2005).

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<sup>3</sup> Pat is both the leader of the project and the overall coordinator of the whole research programme comprising 4 separate research and development projects. The other R&D projects are lead by different members of the research consortium.

*“BeerCo was not very enthusiastic at the beginning, they had to look at their costs, so they said, what’s our benefit? So, we convinced them that benefit is a lot longer term. And they said, ok, we do it”*(Steve, Dutch TCA)

To enrol a technology provider, Pat drew upon the existing institutional link between NU and TechnoProv and established a relationship with a board member of TechProv. At that time TechProv was conducting R & D into secure container seal technology with communication and sensor capabilities. TechProv was interested in setting up a pilot under realistic conditions and additionally saw an opportunity for strengthening the relationship with Dutch TCA as to learn more about e-Customs in the particular country.

After getting Dutch TCA, BeerCo and TechProv interested in the project, preliminary studies were conducted concerning the opportunities for improving cross-boarder trade. These interactions between NU, Dutch TCA, TechProv, and BeerCo were beneficial for getting an initial understanding of the problem area.

*“They (TechProv and Dutch TCA) were the real drivers. I only had to align the interests and to coordinate the whole thing but at any moment in time I did not have to push anything. Because it was so much aligned with the strategic objectives...And then the two managed to get BeerCo involved but also to drive the process.”*  
(Pat, NU)

At the end of 2005 the research contract with the European Commission was finally signed thereby ensuring the partial funding of the project (the rest of the funding was contributed by the partners). Initially the BeerLL was planned to start mid 2006 but the partners urged to start immediately.

In the initiation stage Pat functioned as a knowledge broker to initiate the network, in that he created a setting for attracting organisations which were generally interested in the topic. The BLL provided credibility and the interested organisations believed that Pat would be able to kick-off the project. Selecting the right partners proved to be crucial for the later success of the network and it was due (in large measure) to Pat’s existing relationships, his constant ‘networking’, serendipitous events and coincidences that strong players became interested in the initiative.

## **Analysis and redesign stage**

In the pre-project stage, rather than being held together by shared interests, the network was merely a collection of stakeholders attempting to pursue their own self-interests. During the analysis and

redesign stage, three key processes were essential for engaging the wider network of actors in the project and making the network work. These include 1) general meetings for establishing initial social capital and shared understanding; 2) work group meetings with a specific sub-set of people focussing on specific tasks; 3) general meetings for integrating the results of the sub-groups and for negotiating the innovative redesign.

During the general meetings, Pat and Ron acted as knowledge brokers in their different roles and were very instrumental for the processes that took place. Pat's activities were focussed on *mediation* and *translation* between the network actors, who had different interest and different understanding of the problem domain. While in the initiation stage, only limited number of people were involved in setting-up the project, when the BeerLL started, the different organizations sent delegations of representatives and the sense-making processes needed to start again, now involving a larger group of people. This made the role of the initial general meetings crucial for creating a shared understanding and mediation and translation that Pat performed were essential in that processes. This also holds true for the later stages when the redesign was negotiated, where Pat again took a very active role in the negotiation of the redesign solution, making sure that the interest of all the parties are considered. For example, when BeerCo was still sceptical about the proposal of Dutch TCA about the redesign, Pat interpreted, listened, translated, rephrased suggestions and tried to find acceptable solutions.

*Pat: "So it would be a recommendation to EMCS from our point of view that they are able to cope with an AIN<sup>4</sup> message. Basically, instead of imposing another message AIN is already in place and if the EMCS can be designed in such a way that it can take in an AIN message as input that will be a benefit for you?"*

*James: "Yes, of course"*

*Pat: "Your real advantage is that you don't have to build yet another system"*

*James: "The real Single Window. That's really good."*

In such a way, Pat continuously made sure that the BeerLL remained aligned with the higher strategic objectives of the organizations involved, in order to maintain commitment.

During the general meetings, Ron also functioned as a *knowledge broker* to stimulate *innovation* by questioning people's existing interpretations and re-framing the problem area.

*Ron is the key person when it comes to bringing innovation to the BeerLL.... He was breaking taboos in the sense of questioning the traditional ways of working and assumptions underlying these ways of working (John, operational manager BeerLL, NU)*

*Ron has a long-term view. He is able to distance himself from the specific pilot and provide a long-term perspective, which compelled BeerCo to go along (Rolf, BeerLL Pilot coordinator, TechProv)*

With respect to the work groups that were formed, most of the time tasks allocation emerged naturally in the sense-making process in accordance to existing institutional expertise. While an overall resource plan for the project was sketched out, it was the responsibility of each organisation to make people and resources available on time for scheduled activities. This was not always an easy task, as there are inherent differences in practices, such as perception of time and speed of work.

*“For us this project was different than what we are used to. In this case [the BeerLL] sometimes we had to work fast to produce deliverables and sometimes we had to wait too long till the next phase”. (General BeerLL coordinator, TechProv)*

John in his role of an operational project manager was very important to coordinate the efforts and facilitate the mutual adjustment of the partners. As John remarked in retrospective:

*“It worked well; TechProv realized that it will work, but not the way they are used to.”*

During this important stage, a sense of community took root among the participants. The participants began to feel that they were part of the BeerLL, developing a shared jargon with terms and abbreviations. There was a sense that the project could make a difference.

## **The pilot stage**

Shifting from the conceptual phase to the actual development of a pilot required further interaction and negotiation among the participants in order to decide on the scope of the pilot and the subset of information that was feasible to exchange in that setting.

*One of the main issues we encountered was to have BeerCo produce the correct files and help to interpret these files. This required close collaboration between TechProv and BeerCo (Rolf, BeerLL pilot coordinator, TechProv)*

After an agreement was reached, TechProv, Dutch TCA and BeerCo had to line-up resources. TechProv had to ensure that the back-end systems and the smart-seals, which were used to monitor the shipment, were operational. BeerCo had to provide containers with real goods that ought to be shipped to the US and UK. Dutch TCA had to train personnel to perform inspections according to the new procedures. Dutch TCA had to include UK customs as to guarantee that the necessary checks of the cargo were carried out in line with the new procedures. For the preparation of the pilot, BeerCo, TechProv, and Dutch TCA also worked closely together. In particular, a meeting was set up to provide a holistic view of the pilot in order to develop a shared understanding of the pilot. A separate meeting intended to train and to provide instructions for the people who would be working with the new system in the field. The start of the pilot in November 2006, when real containers were shipped to the US and the UK therefore opened up a new realm which once again required the participating organisations to engage in sense-making activities.

## **The evaluation stage**

The evaluation stage consisted of a general technical meeting and several interviews with various stakeholders. While the technical meeting intended to discuss issues that occurred during the pilot and to identify areas for improvement, the interviews aimed, among others, at reflecting upon the negotiation and sense-making process as well as the outcomes of the BLL.

In general, all stakeholders argued although there are a lot of technical and legal issues that remained to be solved, from the point of view of the innovation and collaboration processes the BeerLL seemed to be perceived as a great and for some even unexpected success.

*“The process went very well. We were lucky to some extent; TechProv came at the right time with the innovative technology... for them the BeerLL was one of the first test sites of the smart seal. Dutch TCA needed a test case for AEO and SW and they wanted to try out these concepts; we (the university) provided fertile ground (Pat, Strategic Manager BeerLL, NU)*

*“When we started, my expectations were very low... During the project things became clearer and I became more positive... I think that the ideas and the BeerLL concept are very nice and I am enthusiastic about*



*them. If it depends on me, this is the future. I cannot be more positive than that!” (James, Customs manager Heineken NL)*

*“The change in mindset is the most valuable achievement from the BeerLL, the innovation lies in the major shift in thinking”. (Customs auditor, Dutch TCA)*

In addition the BeerLL was conceived as a platform for ongoing innovation among equal partners.

*“In Living Lab you as government are not in a position to exercise power. You need other mechanisms to drive people. Companies will do something only if the return on investment is clear.” (Ron, BeerLL coordinator for Dutch TCA)*

The final outcome of the Living Lab could not be understood as an isolated event or finished system. The processual perspective taken in this paper helps us untangle the crucial steps which led to this point. These processes include; stabilising the network, initiating a cognitive shift towards a network strategy, and developing a supportive culture and practices (among others). Through their continuous engagement over time and against their particular historical and contextual backgrounds, the participants started to appreciate the fresh view the network offered. Understanding themselves as members of this network with its own unique identity brought about a joint enterprise with its own distinct understanding of the problem area. Based on such a common understanding, the creation of an innovative redesign scenario became possible.

*“Living Labs really require a lot from everybody...if you have a relationship based on friendship, people will help each other; if they become very formal and calculate everything, then the whole thing will stop. In the BeerLL, all the partners made the extra mile to get the extra resources that were needed.” (Pat, Strategic manager BeerLL)*

While the project fulfilled its obvious objectives with the pilot and evaluation stage, the BeerLL did not cease to exist at this stage. Rather, the network moves into a much more fluid state.

*“The BeerLL provides a good starting point for discussions of how things could be done differently ” (Customs auditor, Dutch TCA)*

The actors continued engaging in sense-making processes by taking the lessons learned from the BeerLL to the next level, in pursuit of their own and other societal goals. For Dutch TCA, the proof-of-concept from the BeerLL provided instruments to engage in political discussions and sense-making of how things can be done differently. Thus, although the BeerLL as a temporal

project is over, it remains a living thing. The sense-making processes are now taken on a higher level, engaging a larger network of actors, very loosely-coupled and fluid, to address higher level concerns and goals.

## 5 Discussion and Conclusions

Studying the set-up and development of the BeerLL over time yielded both, a sense of support that our chosen conceptual perspectives provided helpful and insightful for the analysis but also led to a sense of alienation, realising that the BeerLL in core aspects is distinct from inter-firm networks and prominent examples of Living Labs.

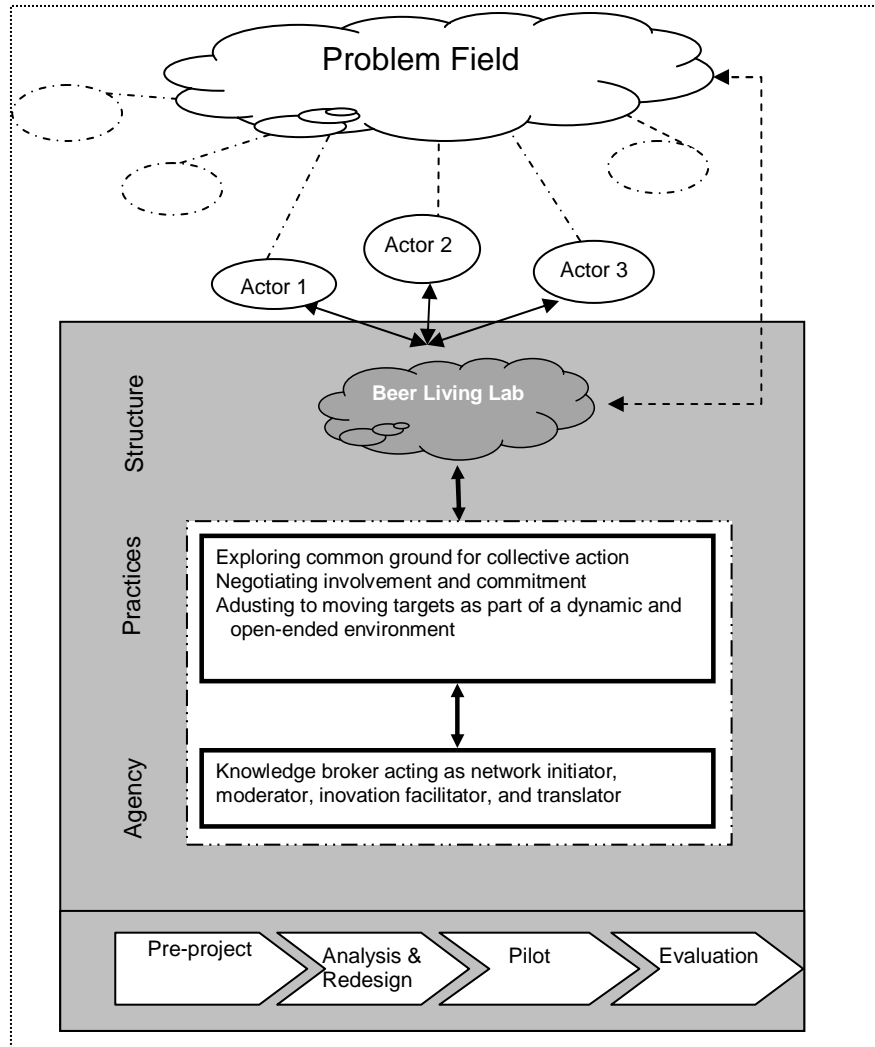
### **BeerLL as a particular instance of a network and a Living Lab**

The BeerLL falls under the broad definition of network as “structure of ties among actors in a social system” (Nohria & Eccles 1992). However, it is distinct from inter-firm networks, such as strategic or R&D alliances, as it involves a heterogeneous *set of actors* from different domains, notably the private and the public sector, which do not share a common goal (as is the case in strategic alliances, value-added partnerships) nor do they form a partnership. Rather, the BeerLL is seen as a specific instance of a much broader political agenda and innovation environment with numerous, at times at best peripherally involved organizations or institutions. The broader agenda makes it difficult to draw clear *boundaries* of the BeerLL. Moreover, in absence of an overall strategy and related governance structures, other sources of *legitimacy* and a mandate are needed. Consequently, more emphasis has to be put on the early phases of setting-up the network in terms of developing a joint agenda (sense-making and negotiation) as well as designing the joint activities.. Given the experimental nature of the joint activities, processes of *reflexive monitoring* have to be established in order to facilitate learning and requisite adjustments to the structure (and possibly agenda) of the joint activities. While the BeerLL fits some of the general descriptions of Living Labs well, it lacks the stability of existing communities (family, local community). It rather forms a temporal collection of actors. Moreover the negotiation of the project scope as part of the BeerLL is also quite distinct. Yet it provides space for unexpected opportunities and areas of innovation. Along the next sections we will discuss the implications of the identified structural properties in the development and management of the BeerLL.

***The BeerLL as a constellation of players with different goals within a broader problem field***

In the BeerLL context, the goals are not at all clearly defined. Key issues in the early stages are how to select partners and how to negotiate their involvement. While the amount of ambiguity and openness provide flexibility, they complicate negotiating involvement and commitment. Furthermore, the BeerLL is initiated to serve some higher goals of the organizations involved and the proof-of-concept achieved in the BeerLL pilot is only an intermediary result in pursuit of these higher goals. As much as the outcomes are quite open, it is difficult to steer the process and measure the outcomes. Thus in the BeerLL we were confronted with moving targets concerning the clarity of goals, actors and results.

For the core part of the BeerLL, consensus among the participants had been achieved to do a proof-of-concept study for a particular device under real world conditions. Yet, most of the involved parties would not regard their relationship as partnership as they pursue different individual goals, which are somehow related to a broader problem field (see Figure 3).



**Figure 3:** Conceptualization of the BeerLL

***Coalition building as a prerequisite for collective action***

So rather than developing collaborative relationships, the BeerLL aims at exploring common ground for collective action under the conditions of mutual dependencies of stakeholders who operate in separate domains (private vs. public sector) and often have a rather antagonistic relationship, which is characterized by mutual suspicion rather than trust. Yet, the BeerLL explores ways how to achieve (systemic) benefits for the private and public sector as a result of coordinated action. While networks are often portrayed as win-win constellations, the BeerLL rather seems to be closer to a coalition, where the partners have had to find a consensus (for the common good) which might involve even compromising some of their own interests.

During the subsequent stages, the initial legitimacy of the project was used to establish a more specific agenda for the Living Lab in the broader context of the problem field. To deal with this very dynamic, open-ended environment, individual actors were very instrumental for driving the processes in the BeerLL. For these actors social capital was critical in order to drive the negotiations and motivate the heterogeneous group of actors to provide resources and commitment to the joint activities. This reinforces our conviction that it is of key importance to capture the behaviour of individuals as well and to zoom in on the negotiation and sense-making processes that take place.

### ***The BeerLL life cycle***

#### *Factors affecting the initiation*

Although the BeerLL is an experimental setting, rather than a full-scale implementation, it is at the same time real-world project in which resources are spent to make it happen. Given the lack of a unifying goal, the question is, how can participants be mobilized to invest their own resources to engage in this initiative, when a more likely response is to wait until the initiative has shown credible results? We regard three aspects as crucial for the actual initiation of the BeerLL. First, the ITAIDE consortium (including international standardization bodies; large-scale technology providers, Tax and Customs Administrations in several member states) created the perception of credibility and the expectation that something would happen. Second, the funding that the EU provided turned out to be critical as it helped to initiate joint activities and provided reasons for parties to come together and to discuss how to engage in collective action (eventually, parties invested many more own resources). A third element which we found crucial for the initiation of the BeerLL is the role of the knowledge broker as an initiator (which we discuss in more detail in the next section), who took the initiative, came-up with ideas and started the process of engaging the partners.

#### *Network activities and practices*

Unlike inter-firm networks where roles are made explicit from the beginning, role taking and role assigning in the BeerLL was highly dynamic and the BeerLL operated without a clear governance structure. Responsibilities emerged as a result of actors own initiative or as a result of negotiation and sense-making, rather than being formally assigned from the beginning; even the leadership shifted throughout the phases. The BeerLL initially was a fragile network which could in principle break at any stage. Retrospectively, the roles of knowledge broker and operational manager emerged

as key in keeping the network together during the whole process and we discover (yet again) the key role of knowledge brokers and their involvement in overcoming discontinuities (Watson-Manheim et al., 2002) within the network.

In the BeerLL two people, Pat and Ron, acted as complementary knowledge brokers and carried out different activities throughout the whole process. Pat, through his activities of *initiation*, *mediation* and *translation*, was instrumental in the negotiation and sense-making processes and this was crucial for keeping the fragile network together. Pat was able to assume and maintain this role, as he had the status to do that (being a professor, as well ITAIDE project coordinator) he was politically sensitive and neutral, constantly searching for the common denominator. These characteristics made the others accept him in his role as a knowledge broker. Ron was also very active as a knowledge broker; in the early stages of the project he was fundamental in framing the initial problem of the BeerLL; as he had a very in-depth knowledge of the domain; and in the analysis and redesign phase, he focussed on *innovation facilitation*. In addition to the knowledge broker role, the role of an *operational manager* (played by John) also emerged and was instrumental in keeping the network together.

### ***Tolerance towards ambiguity and an open-ended dynamics***

In traditional networks there is usually an expectation that the network will stabilize for a period of time and function steadily (Riemer and Klein, 2006). This is not the case in the BeerLL setting, which is open-ended and dynamic. It is not the goal of the BeerLL to achieve a stable state of operation of repetitive activities for a number of years until the desired result is achieved. Rather, the short term aim is the proof-of concept (a process, which occurs only once and does not need to be repeated and sustained for years), after which the network proceeds to a next (much more fluid state) where the learning are taken to pursue some higher level goals (e.g. changing existing legislation). The experimental character of the Living Lab can also be seen as strength, because it allows for trial and error. Mistakes are seen as an inevitable part of the learning rather than something that has to be avoided in the first place.

### **Concluding remarks**

So far, research on Living Labs has concentrated on the objectives of such projects but has neglected to reveal its structural properties and the social processes underlying their formation and management. Our research has identified Living Labs as a specific type of network whose

characteristics decisively differ on several dimensions from classical networks. Practitioner and researchers should be sensitised to the specific characteristics of a Living Lab setting. Lacking boundaries and not clearly defined goals require from participants the willingness for continuous sense-making and negotiation. Rather than being limited to an early stage of the project, the fragile state of Living Labs remains throughout the life cycle. Practitioners should be aware that the success of the Living Lab is never secured. Rather, they are the result of a continuous effort to engage in sense-making activities and knowledge brokers play a key role in that process.

We are conscious that a single case study provides an insufficient basis for wider generalisation. Therefore, future research is needed to extend this analysis to additional cases in different yet related stakeholder constellations. Nonetheless, we hope that this work has shed some light on the social mechanisms regarding the initiation and management of Living Labs.

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