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Inter-Organisational Network Formation and Sense-Making: Initiation and Management of Public-Private Collaboration

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Abstract

The paper analyses the initiation and management of inter-organisational networks, spanning both the public and private domain. Specifically, bracketing the institutional level and combining literature on communities-of-practice and network management, we turn our attention to managerial activities which are no longer de-contextualized but understood as highly situated activities. By doing so, the paper elucidates the crucial role boundary spanners have in alleviating discontinuities across institutional boundaries. Furthermore, we untangle the temporal process which led to the successful formation of an innovative network, namely stabilising the network, initiating a cognitive shift towards a network strategy, and developing a supportive culture and practices. These ideas are developed by presenting a processual account of an interpretive case study on inter-organisational network formation which was part of a research programme for designing and studying the feasibility and implications of electronic government/industry interaction.

Keywords: inter-organisational networks, boundary spanner, sense making, network management, inter-organisational information systems, eCustoms

1. Introduction

This paper presents research into processes undergone in the attainment of an inter-organisational network in the context of public private collaboration. Inter-

organisational networks are positioned between markets and hierarchies, and within these networks institutional boundaries become more and more blurred (Kratzer et al., 2004) as people team up or collaborate actively with individuals from both inside and outside their own organisations. These networks often lack clear rules of engagement, management or exchange as in conventional markets or industry sectors. The coalescing of inter-organisational networks may likewise ignore inherent ambiguities or contradictions, and so remain largely precarious and under-determined organisational forms (Poulymenakou & Klein, 2006; Roberts & King, 1989). Developing and managing networks can therefore be understood as a "process full of frictions, resistances, surprises and self-momentum, and therefore not steadily controllable" (Sydow, 2005: 225). In this mode networks are complex constructs consisting of multiple organisations and linkages with partly inherent contradictions such as autonomy and interdependency, trust and control, or cooperation and competition.

Extending research on networks, we focus on the development and set-up of IOIS in a cross-network environment. Much research into inter-organisational information systems (IOIS) has been concerned with identifying factors facilitating or constraining the adoption of IOIS, such as the institutional context, power and trust, financial resources (cf. Chwelos et al., 2001; Riggins & Mukhopadhyay, 1994; Teo et al., 2003; Hart & Saunders, 1997). These studies share a focus on the organisational level of analysis and settings with pre-established organisational relationships. They have also focused on the transformation of (inter-) organisational processes and the realisation of efficiency gains brought about by the implementation of IOIS in the business domain (cf. Kaefer & Bendoly, 2004; Chatfield & Bjørn-Andersen, 1997; Holland, 1995). While the majority of these studies investigate the implementation and development of IOIS in the B2B domain, a small body of research attends to the realm of Government-to-business (G2B) of which electronic customs studies comprise an even smaller part, Teo et al. (1997) being one exception worth mentioning. Government-to-business (G2B) eCustoms solutions, however, are positioned both in the business domain (supply chains of business partners) and in the public domain, addressing by definition, issues of international customs collaboration. Challenges to achieve consensus surrounding solutions and their implementation within each of the domains are significant, crossing (and indeed linking) the two domains which are governed by substantially different logics, goals, governance structures, and organisational cultures.

The objectives of this paper are twofold. In the first instance we focus on a setting without pre-established inter-organisational relationships, and study the early phases of inter-organisational network formation spanning both the public and private domain. In the second instance we attempt to refocus research and theory on the actions and agency of individuals in network formation. While much research has been focused on factors facilitating or constraining the adoption and use of IOIS on the organisational level, relatively little attention has been given to human agents' endeavours in network initiation and management. We therefore direct our empirical enquiry on the actor level, whereby the actors are primarily regarded as representatives of their organisations (and networks). To accomplish both objectives, we shall develop a *practice theoretical perspective* so as to scrutinise the interplay between the actors and the institutional practices with their distinct values and norms. Informed by this practice theoretical lens which takes both the processual and contextual dimension seriously, we weave together

literature on communities-of-practice – attending especially to issues of boundary spanning and sense-making within a heterogeneous setting – and the temporal dimension of network formation with the network management perspective functioning as a sensitising device for specific requirements encountered along the network life cycle.

The remainder of the paper is organised as follows: section 2 presents our theoretical lens which will inform the analysis. The research method is briefly covered in section 3 followed by a detailed description of the case in section 4. In section 5 we discuss the case by framing it in terms of a network management perspective. Finally section 6 offers initial conclusions and considers the implications for future research.

2. A practice theoretical perspective

In the following, a practice theoretical perspective on network relations is presented as meta-theory to explicate our ontological perspective and an understanding of how networks might be produced and reproduced over time. We complement this perspective with two further theories which help us interpret the case study, namely communities-of-practice and the network management framework. Communities-of-practice allows us to develop a theoretical understanding of sense-making processes in communities and to sketch the role of knowledge brokers and translators in detail. Being embedded in a practice theoretical understanding and taking the processual and contextual dimension seriously, the otherwise a-contextual network management framework becomes a sensitising device for researchers (and actors) approaching the challenges faced by network managers and the instruments they might apply to accomplish their objectives.

A practice theoretical perspective on network relations

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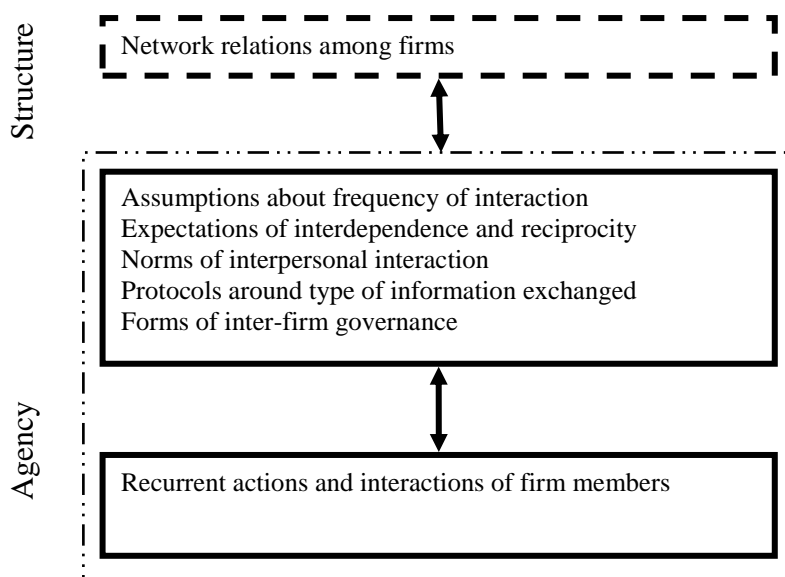
Figure 1: **General view of network relations among firms (adopted from Schulze et al., 2004: 89)**

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.

Sense-making and crossing organisational boundaries in communities of practice

Wenger (1998) describes how constant engagement through 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 aspects of work which may come in the form of temporal, spatial or

organisational discontinuities. However, discontinuities manifest 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 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 knowledgeability of the practices, working culture, 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.

A Network management perspective

We next frame the boundary spanners' engagement with groups involved in these inter-organisational networks by reflecting on the observation that networks are not static structures but instead ensembles of different communities evolving their relations over time and passing through different stages. Inter-organisational networks are therefore not static and so to sensitise us to the stages or phases which resolve over time we refer to the network management framework.

Riemer and Klein (2006) proposed a network management framework (NMF) to sensitise and support the perspective of a network manager. Within the framework, three predominant perspectives are positioned against each other, briefly: the *Firm View*, the *Network View* and the *Context View*. The network view is the key unit of analysis of the NMF. It discusses strategic, organisational and technological aspects which need to be addressed on the network level, and coupled with a life cycle view integrates the temporal dimension with the whole concept.

Generic development stages for a network life cycle are proposed consisting of: initiation, configuration, implementation, stabilisation, transformation, and dissolution. Initiation is about defining an innovation that generates a common purpose, linking institutions and firms together as they go about selecting partners and determining roles and linkages between network members. Network configuration suggests that the network itself is malleable developing an identity, technological infrastructure, exchange relations, and governance modes complemented by social mechanisms of integration. Implementation indicates the assignment of tasks and roles to network members, a process of structuring control, alignment, network identity, strategy and workplace operations (requiring significant effort from network managers to support workers in incorporating new practices in daily routines). During stabilisation the social integration among organisations, groups, and individuals needs to be facilitated to supplement relational contracts. Establishing social ties, mutual understanding and trust

among partner organisations needs to be cultivated, functioning as a prerequisite for effective collaboration. Transformation accepts the dynamic nature of networks as they evolve over time, the quality of their character oscillating between personal and institutional relationships. Finally, the life cycle view of network management concludes with dissolution, which appreciates that networks often address a specific purpose and are wound up after this is achieved.

3. Method

Research site

The case study presented here is a research and development network (Tan et al., 2006) established within a wider EU funded research programme called ITAIDE[1] for designing and studying the feasibility and implications of electronic government/industry interaction (Tan et al., 2006). The research and development network is referred to here as the *project*. The project addresses the handling (export) of excise goods and their movement in supply networks. Key partners involved are; a large producer of excisable goods (ProductCo), the National Tax and Customs Administration (NTA), a National University (NU) and a main technology provider (TECHPROV). The goal of the project is to use innovative container seal technology and inter-organisational information systems to prototype a redesign of the current procedures for export of excise goods with the goal of reducing the administrative burden for the ProductCo and increased control and security for NTA. As part of the overall research programme, the project serves as a research and development environment which aims to demonstrate how the EU mandated concepts of AEO[2] and Single Window[3] might be implemented in practice.

Research methodology

The case study follows the interpretative tradition (Walsham, 1993; Klein & Myers, 1999; Walsham, 2006), and was guided by seven principles of doing interpretive research set out in Klein and Myers (1999). We employed a process approach (Markus & Robey, 1988) which provides a contextualist analysis of the processes of change (Pettigrew, 1987; Pettigrew, 1990), and builds on vertical and horizontal levels of analysis and the interconnections between these over time.
The field research was carried out over the period February 2006- January 2007. The authors of this paper are all members of the research consortium established to conduct research for the ITAIDE programme. Two of the authors were key actors and stakeholders in the R& D project. They engaged actively in shaping interactions, achieving consensus and generally engaging with the other project

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[1] ITAIDE stands for "Information Technology for Adoption and Intelligent Design for E-Government" and is an EU-funded project from the 6th framework program.

[2] The Authorised Economic Operator (AEO) refers to a status conferred to a business or trader by an EU taxation/customs authority and recognises that the entity has been recognised to conduct safe, secure and compliant international trade.

[3] Single Window (SW) refers to a national government service or portal that provides access to a variety of government agencies and related authorities through a single location such as a web portal.

participants via informal face-to-face meetings, e-mail, telephone and VOIP. One of the authors held a managerial role within the project, while the other concentrated on research related activities. The other three authors were not directly involved in the project but they played a key role in the interpretation and analysis of the case study.

Data were collected from different sources in order to gain a comprehensive picture of the case: participation in full-day brainstorming sessions, individual interviews with the project participants, observations and document analysis. Texts reviewed ranged from EU policy documents, EU documents on export of excise goods, internal reports of NTA, project reports to mention a few. Over the period of data collection, 16 semi-structured interviews were carried out lasting between 1 and 3 hours each. The goal of the interviews was to gain a better grasp of the problem area and situations perceived by the different participants, and to obtain historical data about the earliest stages of the project. Based on the interviews, a report was produced which was sent back to the participants for verification and feedback. In addition 8 general meetings including all the participants were attended, each lasting between half a day to one day. Almost all general project meetings and formal interviews were recorded and meeting notes or minutes of meetings were made. Due to the large volume of recorded material from meetings and interviews, only partial transcripts were made. Partial transcripts of the recorded material were made; these focused on elements of the case which were considered by the authors crucial for its interpretation. The data analysis was guided by the conceptual lens presented in Section two and abstraction and generalization were achieved by linking details revealed from the case to more abstract theoretical concepts. All the authors were involved in interpreting the case material. The authors who were not directly involved in the data collection played a crucial role in the analysis in identifying and avoiding where possible, 'biases' of those directly involved.

Finally, narrative is especially relevant to the study, analysis and presentation of organisational processes (DiMaggio, 1995; Pentland, 1999) and so we have chosen to use a narrative structure to present the case study in the following section.

4. The R&D Project

For analytical purposes, key events in the development of the R&D project are roughly subdivided into three stages, namely a *pre-project stage* capturing events preceding the official start of the project, an *analysis and redesign stage*, and finally a *pilot stage* which is ongoing at the time of writing this paper. The first two stages therefore take centre-stage as we present the challenges of engaging in processes of inter-organisational network formation and sense-making.
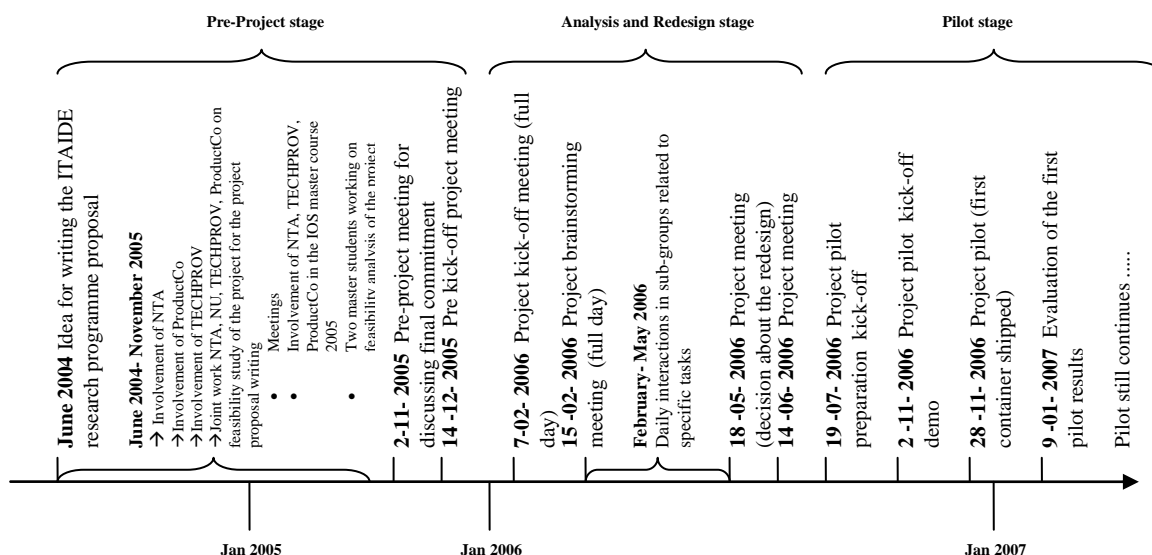
Figure 2. The R&D Project: Sequence of key events

Pre-project stage

The initial idea for the research programme was triggered during a conference in which Pat, a university professor[4] at NU, attended in June 2004. Knowing that Pat was generally interested in aspects of cross-border trade, members of the European Commission pointed out that a call for EU-funded research was open in this particular area. While having a positive outlook towards such an endeavour, Pat knew that breadth and depth of academic expertise was a pre-requisite to establishing a credible proposal and so he identified a group of academic partners with whom he had developed long-term relationships, who were interested in contributing to the research proposal. The idea of the project was to analyse cross-border trade and develop innovative solutions within a living labs setting, composed of businesses, governmental agencies, universities and technology providers. Four living labs were envisioned and Pat took responsibility to set one of them up in his Member State.

Facing the challenge of forming a powerful network and selecting partner organisations for the living lab proposal, Pat decided to involve institutions from three domains: a government agency, a company with frequent cross-border trade, and at least one technology provider. To ensure commitment from the government, Pat got in touch with Ron whom he knew for more than 10 years and who worked for the National Tax Administration (NTA). Ron, had previously worked for the Customs department in the NTA, and had recently moved to the "process improvement group", his main objective was to envision innovative IS solutions for the NTA. Ron reacted enthusiastically to Pat's proposal to join the project not only because he had known Pat for a long time, but also because the project appeared to fit well with his new responsibilities in process improvement group. Pat also discussed with Ron the hot issues of current interest to the EU and the NTA to ensure that the problem addressed in the proposal would be relevant. Furthermore, Pat asked Ron to help him to identify a suitable company with a

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[4] 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.

high volume of cross-border trade. Ron had no direct contact with companies and so he got in touch with a colleague (Steve), who was a client coordinator for ProductCo and was also responsible for leading an e-Business project within NTA. Steve became interested in contributing to Pat's research proposal as it was well aligned with his own e-business interests and Steve then contacted the Customs Manager at ProductCo (James), although it took time before ProductCo finally committed itself to joining the project (this happened at the end of 2005). ProductCo, was already treated by NTA as a reliable trader and was permitted to use trade simplifications. However James and his colleagues at ProductCo were sceptical about additional benefits that could be realised from the project, although they did see it as an opportunity to stabilise and even further develop the important relationship with NTA.

To enrol a technology provider, Pat drew upon his contacts again 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 having a pilot set up under realistic conditions and also saw an opportunity to deepen relationships with NTA to learn more about e-Customs in the Member State.

After getting NTA, ProductCo and TECHPROV interested in the project, preliminary studies concerning the feasibility of the project idea were conducted. Pat invited NTA, ProductCo and TECHPROV to participate in a master course on inter-organisational systems, which he was teaching at NU. As part of the course, students carried out research in companies, two of them in particular focusing on the current situation for excisable exports. These interactions between NU, NTA, TECHPROV, and ProductCo provided a feasibility analysis during the proposal writing process and were beneficial for getting an initial understanding of the problem area.

> *"TECHPROV, NTA and ProductCo turned out to be so enthusiastic (we involved them, we had a number of meetings to discuss the proposal) and particularly TECHPROV and NTA. They (TECHPROV and NTA) were the real drivers. So that was for me a fun thing. 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 of NTA and the strategic objectives of TECHPROV. And then the two managed to get ProductCo 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 financing of the project (the rest of the financing was contributed by the partners). Initially the project was planned to start mid 2006 but as the partners were ready they rescheduled to start immediately.

> *"They (TECHPROV, NTA, & ProductCo) felt that we already have so much ideas before we started. Now I remember when we had to make the planning, ProductCo insisted to start sooner than initially planned. They said when the research programme (ITAIDE) started, we don't want to wait for another half a year as was the initial planning but we want to start right away and do the whole information analysis and redesign before the summer." (Pat, NU)*

Analysis and redesign stage

While the interactions in the pre-project stage mainly included people, who operated at a strategic level, after the official start of the project people at the operational level were included in discussions as well. Opening the opportunity to develop social capital and a shared understanding of the problem at hand, at the very beginning of the project, Pat decided to stage two full-day brainstorming

sessions in two consecutive weeks (the project kick-off, which took place on 7 February 2006 and a follow up meeting on 15 February 2006). Pat was mainly involved in organising and coordinating the brainstorming sessions at a strategic level.

During the first meetings, each organisation tried to convey their motivation for joining the network to the other parties. James was very sceptical about the potential improvements of the e-customs processes for ProductCo. TECHPROV showed their expertise in supply chain optimisation and tried to illustrate how they might use the secure container seal technology to help ProductCo optimise its supply chain processes. NTA, on the other hand put very strong emphasis on issues like public-private partnership, AEO, and Single Window. Although Pat was very pro-active in bringing the different parties together, his strategy was to let the business and government participants be the real drivers in the discussions. At this point Ron moved onto centre stage. Being a member of the process improvement group at NTA, Ron took a very favourable view on innovations. Although it was clear that the official policy of NTA was to introduce an EU-wide system for exchanging excise documents (termed EMCS), people from NTA were open to explore alternatives. Ron was a constant source of inspiration during the brainstorming sessions and contributed to discussions by questioning and challenging current procedures and provoking James and his colleagues at ProductCo to think about and imagine potential changes. Presentations given by various actors based on the student research projects functioned as instruments for developing a first understanding and framing of the problem area. During these discussions the parties reached an understanding that the introduction of the EMCS system, as stated by the official EU plans, was seen as an extra burden for ProductCo as it would simply replace the paper-based document flow related to the export of excise goods with an electronic one.

> *"Our only advantage [from EMCS] is that we give information electronically instead of paper, so we loose one paper. For me to control the paper, to check the paper is only 0.2 fte [full time employee]." (James, Customs manager, ProductCo)*

Instead, James raised two more pressing issues, namely the lack of flexibility of current excise legislation to deal with exceptional transactions and the need to always introduce new systems whenever new legislation became law. It became clear that other systems were already in place to report to the authorities (e.g. the VAT system called VIES, a national export system and a system for collecting statistics). The EMCS system was coming as yet another system which did not deliver any commercial benefit for ProductCo but rather constrained the flexibility of doing business. Different legislation in earlier years had already resulted in a fragmented IS landscape. As Ron from NTA explained with a hint of irony:

> *"Separate law developments lead to separate processes and separate systems… If you are "lucky" and you have excise goods and non excise goods in one container, you will have to do different things for the same transport." (Ron, Process improvement group, NTA)*

As several similar regulations resulting in further proprietary systems were mentioned in EU strategic reports (EU-TAXUD, 2004) and planned for future development, participants believed it to be an important issue worth addressing. Furthermore, NTA raised the challenging idea that reliable companies be Customs/Tax audited in an alternate way, without the need to introduce additional systems. However, against the backdrop of existing legislation the NTA felt constrained in giving further simplifications to reliable traders.

> *"If a company is reliable, we want to do as little as possible. Regulations are bothering these kinds of companies. We ask information because we formally have to, but as an*

> *auditor, I don't need this information. (...) ProductCo has to give an electronic message on departure of the goods, and what we do, we give them "ok" in 1 minute. We always do that in one minute. We know that when ProductCo sends the message the information is reliable (because of all the other checks done). Why do we want this message then? We want it, because the system is made that way. This is the system that is made for all companies. But in the situation of ProductCo, it is useless for audit purposes." (Alex, EDP auditor NTA)*

During these early meetings, two possible pilot scenarios were considered, namely to export excisable products from one Member State to another Member State (intra-community supply) or to the US (this is officially referred to as export). Both scenarios pose different requirements, although the appeal of integrating with the US as an important trading partner of the EU was obvious.

These early meetings were crucial for both understanding the concerns of the different parties and for developing personal relationships. At the end of these meetings, key tasks were defined and responsibilities appointed. The division of tasks was assigned according to the expertise of the partners.

After the initial brainstorming sessions, team members formed task specific sub-groups and met frequently on numerous occasions on a smaller scale for discussions, writing reports or gathering of data. In addition to face-to-face meetings there were (daily) interactions via phone, e-mail and VOIP. Most of the time tasks were allocated according to institutional expertise. For example, TECHPROV was responsible for process modelling while NU took the initiative to write reports on the problem definition and redesign. Each organisation taking the lead for a specific task assigned a contact person who coordinated work with the members of other organisations. While an overall resource plan for the project was sketched out, it was the responsibility of each organisation to make people and resources available for scheduled activities. Whenever needed, changes in the work plan were made in accordance with all the partners and internal reallocations were handled respectively. Most of the time tasks and responsibilities were clear but on occasions of vagueness, coordinators met to discuss potential solutions and the reallocation of resources. The working environment in the project was open and friendly and whenever problems occurred the attitude was to solve them as soon as possible rather than to look for someone to blame. A project manager appointed at NU, John, became an operational coordinator of the project. John played a key role as he developed very good personal relationships with all the parties involved and became a central point of contact for handling emerging issues.

In order to integrate the results from the different work groups and proceed toward a decision on redesign, two general meetings with all project participants were scheduled. On 18 May 2006 a full day meeting was held. The purpose of this meeting was twofold. First, to provide a platform for knowledge exchange between the different working groups and additional background information for participants, so that they could engage in informed discussions about the redesign scenarios. Second, to discuss and decide on redesign scenarios that would be executed in the pilot. At the beginning of the meeting Pat made the goals clear to all participants and later steered the discussion to make sure it was aligned with the goals. Members from the different working groups prepared presentations to generate a better understanding of the problem and open avenues for potential process redesign. TECHPROV and NU discussed findings from the information analysis and TECHPROV also explained the technical capabilities of the secure container seal and the role it could play in cross-border transactions. Pat acted as a

moderator and whenever a solution was proposed he referred to James to check whether it would be beneficial for ProductCo. Throughout the presentation of proposals the perceived problems of EMCS remained. For James, any redesign was seen as a compromise as ProductCo saw no value in implementing EMCS. Furthermore, James raised concerns again about problems with the current legislation. During the meeting a number of decisions were made and a set of tasks were defined to further analyse the proposed redesign. A follow-up meeting was scheduled to make final decisions on redesign scenarios and the functional specification for the pilot.

On 14 June, 2006 the follow up brainstorming session was held. Ron played a very active role in discussing the redesign scenarios. They all followed up on redesign options from the previous meeting where EMCS with extended functionality was still a key element in the solution. This was a concern for James from ProductCo.

> *"For us, you understand, it's all extra. For security you want to introduce (the secure container seal and related information systems), for control inspection for movements we introduce EMCS and the only advantage could be that we can report the VAT and excise once a month…We are speaking about Single Window in Europe but why do they build EMCS?" (James, Customs Manager ProductCo)*

Pat interpreted; he listened, translated and rephrased suggestions so that everybody got a clear understanding on what was communicated. As such, he had the role of translator between the parties, for example:

> *"So it would be a recommendation to EMCS from our point of view that they are able to cope with an AIN[5] 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?" (Pat)*
> *"Yes, of course" (James, ProductCo)*
> *"Your real advantage is that you don't have to build yet another system" (Pat)*
> *"The real Single Window. That's really good." (James, Customs manager, ProductCo)*

Finally, a solution was proposed which was not only beneficial for NTA but which was also acceptable for ProductCo.

The pilot stage

After the redesign scenarios had been agreed, pilot preparations commenced in July 2006 (the pilot stage is on-going at the time of writing this paper). There were several general meetings (see figure 2) followed by a number of separate working-group meetings and interactions. During the pilot stage, US customs became more and more involved in the project which required further adjustments and investment of resources and it is clear that the broader political domain has influenced decisions relating to the design of a solution over the whole duration of the project.

5. Discussion

Networks are precarious organisational forms positioned somewhere between markets and hierarchies whose formation and stabilisation poses particular requirements and demands special attention. We have employed Riemer and Klein's (2006) network management framework (NMF) to sensitise us to the

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[5] AIN is the digital version of the paper-based Single Administrative Document (SAD) used in Europe. The SAD is a document that covers a number of customs procedures related to import, export and transit.

challenges related to network management as experienced by boundary spanners, and knowledge brokers. The application of this kind of synthesis is seen to be deeply informative although it is accepted as necessarily incomplete because it is impossible to draw final boundaries between who is involved and who is not, for example; actors who are not present or visible in the immediately accessible setting, actors from the broader context or present notionally as institutional entities (such as "the US") may indeed be implicated in the decisions of those who are local.

Initiating a network

As illustrated in the case study, the initial impetus for setting up the project did not primarily originate from governmental legislations, rather it was initiated by Pat, mobilising his existing social network, consisting of academics, political decision makers, and business people. After having heard about the EU-funded research, Pat developed the preliminary concept so as to attract potential partner organisations. 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. However, at this early stage, instead of being closely aligned, the actors' and their organisations' interests and motivations for participating in the project differed fundamentally, ranging from: desiring to strengthen relationships, performing high quality scientific research, through to piloting new technical devices.

New drivers for stabilising the network

It was only during the process of mutual engagement that partner organisations started to grasp the full potential of the project and become enthusiastic about it. The work of the master students in 2005 created the basis for the discussions which followed. During the process of proposal writing the actors involved were required to engage intensively with each other and to form an initial understanding and common outlook. By doing so, NTA and TECHPROV realised how the objectives of the project overlapped nicely with their own agendas. This created a sense of momentum as they consequently became more and more the main drivers of the project. While at the beginning, the whole set up was brittle, by and large depending completely upon Pat and his existing social network, subsequent mutual engagements generated momentum which stabilised the network as partner organisations aligned with its objectives.

Re-framing organisations' strategic perspectives

Rather than being held together by shared interests, the network prior to the first brainstorming sessions was merely a collection of stakeholders attempting to pursue and maximise their own self-interests. The brainstorming sessions were crucial to bringing together delegations from the organisations, socialising them and in so doing socially integrate and stabilise the network. During these sessions, Ron functioned as a knowledge broker by questioning people's existing interpretations and re-framing the problem area. But although they fostered a culture of openness and trust during the brainstorming sessions, the initial outlook for the initiative lacked promise or significance. Without a synthesis acceptable to broader institutional and organisational contexts, the collage of initially proposed

solutions was not broadly acceptable for all stakeholders. It was only through mutual engagement and discussions that stakeholders reflected on their own roles and started to consider themselves as having become members of another community, a newly formed network encompassing the public and private domains, juxtaposing businesses, their supply chains and governmental agencies. Thus, during these early sense making exercises, members of each organisation had to perform a cognitive shift away from the traditional perspectives of their own institutions (with their respective notions of service, clients, competitors or customers) towards the formation of a new perspective in which each institution played a crucial role in the overall network. It took some effort to learn to think in terms of a network rather than, for instance, single supply chains. However, the issue was not only about forming a coherent network vision, but to also continuously adjust the vision as requirements from the broader socio-political context of the network were taken into account. Many scenarios at this stage were influenced by national, EU and international politics, for example, it became necessary to consider US Customs within the business processes.

Establishing network practices

After the brainstorming sessions, the network matured and moved into the next phase as key tasks were defined and allocated to the different players. During that stage the network was further stabilised as network practices developed, and assumptions and expectations about communication and interaction were established among the sub-teams. During this important stage, a sense of community took root among the participants. The participants began to feel that they were part of the R&D project, developing a shared jargon with terms and abbreviations. There was a sense that the project could make a difference. Furthermore, each organisation was facing the challenge of aligning the project's network requirements with their own daily intra-organisational operations. Surging conflicts about resource allocation were addressed in a culture of openness and flexibility, which illustrated the high priority the project enjoyed at this stage among the participants.

Promoting a shared understanding

With sub-teams being established to work on different parts of the scenario redesign, in May 2006 it became necessary to integrate the different work packages. A full day meeting was staged during which Pat took on an influential role. Not only did he explicitly communicate the objectives of the meeting and aligned the discussions accordingly, but as a moderator of the meeting he aimed for integrating the different proposals. At the beginning of the meeting, the EMCS solution was still highly valued by NTA and TECHPROV was absorbed by the technicalities of their secure container devices and related sales potentials. Functioning as a knowledge broker, Pat checked with James to make sure that the proposed solutions were offering real improvements for ProductCo. Seizing his opportunity, James reiterated his understanding (as he had already done during the brainstorming sessions in February) and concluded that in its current form the redesign would not bring any major benefits. It was only during the next meeting in June when Pat was able to translate the different perspectives and form an understanding that they agreed upon an optimal plan for the pilot stage.

The solution they finally arrived at 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 a truly innovative redesign scenario became possible.

6. Conclusions

Conceptually we have linked the community-of-practice literature with an applied concept for network management, reflecting management issues contingent in dynamic networks. The unit of analysis for our study were the actual individuals involved in the initiatives, as they acted on behalf of their organisations, interacting and extending personal networks from within their local institutional constraints. Our analysis has shown how their constraints were sometimes overcome or alleviated in consultations towards a joint collaboration. In particular we have illustrated the crucial role of (cross community) boundary spanners and network brokers in a setting where the public and private sector partners own separate building blocks of the solution.

Theoretical and conceptual contribution

The paper makes a contribution to the literature by providing empirical support for the utility of the NMF as a sensitising instrument for use by both practitioners and researchers for shaping action and interpreting the field respectively. Rather than adhering to the NMF slavishly, we used the framework to inform and steer our discussion to aspects of network formation and stabilisation. By doing so, we showed that even at the earliest stage of a network, elements of later phases of the NMF are relevant. Not only did we identify aspects of network initiation and configuration (e.g. initiating a network, re-framing organisations' strategic perspective), but we also found evidence of network implementation in new work practices which began to manifest. We conclude that the NMF is a useful analytical aid and provides a viable framework for researchers to impose conceptual order on the complex and messy interactions observed in the field. Although this order comes at the cost of perhaps imposing a retrospective distortion on the actual course of these settings (Law, 2004), it satisfies our requirement to make sense of and interpret the complex. Importantly, combining the NMF with the community-of-practice literature enabled us to understand the instruments suggested in the NMF, not as de-contextualized but rather as highly situated managerial activities influenced by the local context and resources at hand (Whittington, 2003).

Practical contribution

At a practical level we have also highlighted the power of a more human and personal analysis of network formation for IOS implementation. By emphasising interpersonal interaction rather than the more commonly used institutional approach we have concentrated on actors' motivations and behaviour rather than resorting simply to institutional logic to explain events and outcomes. The paper

has also explored innovation processes at the overlaps between three distinct communities; companies (and their suppliers), public sector institutions, and ICT providers attempting to serve multiple others. These communities are characterised by profoundly different operating logics and institutional constraints, but in this case of inter-organisational network formation centred on public-private collaboration we find the boundary spanner (importantly) was neither a member of industry or of the government sector. We discover (yet again) the key role of knowledge brokers (or boundary spanners) and their involvement in practices forming and shaping inter-organisational networks. Pat's involvement for example appeared to be crucial at key sense making moments over the history of the project. Pat was an academic, embedded in the discourse of academic excellence, academic freedom and scientific knowledge. Further research is therefore required as to better appreciate the role academic partners play in overcoming discontinuities (Watson-Manheim et al., 2002) in inter-organisational networks. Additionally, research needs to appreciate the role of interdisciplinary R&D projects as facilitators of collaboration by bringing different communities together. Research collaboration provides an institutional context and legitimacy for cooperation in that the representatives of the project members are expected to interact and engage regularly for project meetings.

We are conscious that a single case study provides an insufficient basis for wider generalisation, and therefore plan to extend this analysis to additional cases in different yet related stakeholder constellations. We hope that this work has shed some light on the mechanisms of joint sense making in an inter-organisational setting.

Acknowledgements

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