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Towards new challenges for innovative management practices

Volume II

Short papers from proceedings of ERIMA07': International Symposium on Innovative Management Practices

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Preface

The global objective of ERIMA (European Research on Innovation and Management Alliance) is to constitute a "Network of European Excellence" in the field of Innovation and Industrial Management (I&IM). ERIMA is currently formed by 13 highly qualified Europeans Universities and Research Centres from 10 countries in Europe. The aim of this network is to promote new theories, methods, and techniques in I&IM issues.

This book titled "Towards new challenges for innovative management practices - Volume 2" is resulting from the scientific and industrial contributions to the First ERIMA Symposium. This conference was held in March 2007 in the ESTIA engineering institute located at Biarritz France.

The ERIMA07 conference had gathered researchers, business leaders of both SMEs and large companies, public sector representatives, and practitioners focused on innovation management. The objective of the conference was to provide an inspiring background and stimulus for a focused, target-oriented discussion regarding the new concepts in collaborative working environment, systematic innovation, and their respective management and support ICT tools and technologies.

The topics of the ERIMA07 were:

- Models, Tools and Methods for Innovation Management
- Fieldwork, Case studies and Storytelling of Innovative Management Practises
- Intra & Entrepreneurship initiatives
- Innovative services
- Creative routines, cultures and behaviours
- Education, learning and knowledge flows in practise
- Professional virtual and informal communities
- Collaborative environment
- Enterprise interoperability
- Combining economic social and environmental objectives
- Innovative sustainable public policies
- Innovative welfare development

Reference to the papers of this book should be made as follows: Initiale(s), Name(s), "Title of the paper", in the book "Towards new challenges for innovative management practices", Vol. 2, Editors: J. Legardeur, J. Martin, ERIMA Publication, 2007.

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Complexity, Innovation and Organizational Form

By Prof Peter M Allen

Complex Systems Management Centre, School of Management, Cranfield University, ENGLAND.

Abstract

Complexity is the science of evolution, and in particular that of the emergence and evolution of structures and organizations. A system is simply the apparent structure of elements and linkages that exist at a given time, but a complex system includes in addition to this, underlying diversity and potential that allows a system to transform and adapt itself over time as the environment changes.

Examples will be presented of complex systems models that can help in the design and operation of real production and supply chains. These will be linked to a view of firms in terms of internal practices, which can be seen as resources, which can play a role equivalent to "genes" in biology. The cladistic evolution of auto manufacturing firms will be presented as a co-evolution of different bundles of combinations of practices, with corresponding capabilities for products desired by the market. The presentation will show how it is complexity, and our consequent ignorance, that allows us the freedom that generates the exploratory, creative evolution that lies behind economic development. It is also this necessary ignorance that makes it impossible to state clearly the importance of "case studies" in management research, as opposed to statistical surveys, since the former tells us about what is happening in a particular case, while the latter merely looks for regularities in the data concerning what has occurred. There is no universal "scientific" way to combine a current experience with prior knowledge, and as a consequence, there are necessarily multiple interpretations of the meaning of events. This generation of diversity is the basis of novelty and of innovation, and successful business evolution depends on generating successful operational structures to produce the innovation successfully.

Keywords: Complexity, evolution, organizational form, cladistics, innovation, creativity, freedom, micro-diversity

CULTURAL VISIONS ON PERSONAL COMPETENCIES IN INNOVATION : *a first case of a measured differences between the SMEs' needs and formulations in France, Spain, Germany and Sweden.*

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Abstract: This paper aims to present what the personal competencies in innovation are and how they are built by the innovators. The hypothesis of a cultural variability in the social representations of what an engineer in innovation is, is proposed. We also suppose that the social representations are supplied by the trainings, which question the trainings' logics.
Our methodology is based on the Social and Human Science theories and tools, in particular a content analysis. Our lexicometric study protocol allowed us to analyse qualitatively and quantitatively more than 300 job offers in Europe. We used a categorisation of terms depending on four dimensions of competencies in innovation : interpersonal dimension, personality dimension (i.e. intrapersonal dimension), cognitive dimension and reflexive dimension. The first analysis revealed a fifth dimension that we called "undefined competencies". We call them "undefined" because these competencies are just generative to the occupation. For instance, we can cite the cases where the candidate "must be charismatic" or " must have a high potential". When the Small and Medium Enterprises' require such competencies, how can they evaluate them ? These kind of requirements are especially interesting especially for the researcher in Educational Sciences to improve Engineers trainings in innovation.

Keywords: Innovation; Skill; Job offers; Training; Europe

I. Introduction

What kind of specific and personal competencies support every innovation? This question aims to improve the correlation between the European Engineers Trainings and the SMEs' needs in innovation competencies. In fact the globalisation context has increased a general need for differentiation by innovations for SMEs, of which the first resource may be the young graduates.
On this subject, our interest lies on two Engineering Schools in France belonging to "Institut National Polytechnique de Lorraine".
The first institute, called ENSGSI (Ecole Nationale Supérieure en Génie des Systèmes Industriels) is specialised in innovation engineering and management of innovation with a curriculum based on a systemic approach to knowledge. Its training is based on the personal development of students.
The second Engineering School, called EEIGM (Ecole Européenne d'Ingénieurs en Génie des Matériaux), is specialised in materials engineering. Its vocation is to develop proficiency in several European languages. This training can be considered very traditional as each scientific field is separated from the others and the acculturation is predominantly based on language courses and three semi-annual courses in France, in Sweden, in Spain and in Germany. The students themselves build their cultural experiment without receiving feed-back.
The students do develop competencies in innovation since they are employed in jobs such as R&D engineers, engineers in conception or project managers., All of these are in a European context. Both of these engineering schools train students to be innovative. In the frame of our survey, we were asked by those engineering schools to define what the personal competencies in innovation are. Answering to this question demands at first to know how the industrials and engineers express the personal competencies that they request.

If a large part of European industrial experts and European recruiters agrees to recognise that the personal competencies in innovation do exist, they experience difficulties in defining and inevitably in expressing them. That does clearly evident that the personal competencies in innovation are essential but difficult to encircle for building a learning within specific engineer training.
In this paper we address this question with empirical investigations based on :

-The results of an expert questionnaire defining and classifying what competencies in innovation are (BARY, 2006)

-A lexicometric analysis from more than 300 job offers issued from four European countries and lighting different social representations and the first case of national differences between the SMEs'needs and their formulation.

II. Defining the personal competencies in innovation

To try to definite what the personal competencies in innovation could be, we asked 27 experts in the field of innovation to complete an expert questionnaire (BARY, 2006). The population-surveyed that we chose was composed of academics, engineers and industrials. The employed methodology laid on qualitative metrology (REGNIER, 1989). We proposed to them 46 no-classified items to which they had to attribute a coloured notation corresponding to their adhesion's gradation. This method is relevant because our aim was to elaborate the most exhaustive list, even if there were several levels of logical reasoning presented. The personal competencies that we presented to the experts belong to four dimensions sustaining every competency and knowledge: the personality dimension, the interpersonal dimension, the cognitive dimension and the reflexive one.
Based on our propositions, the experts classified the items depending on what seems to be the most important for an engineer in innovation. Here are the findings we collected:

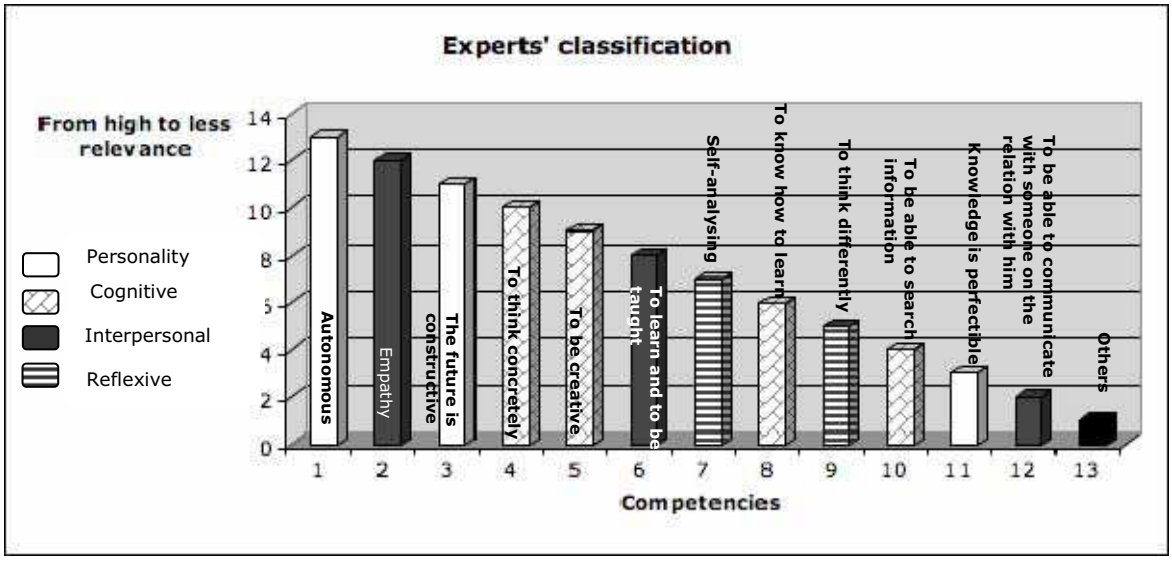


Figure 1

We classified the experts' answers to determinate what could be the most important personal competencies to be able to innovate. Thus, after a compilation of theirs answers depending on each dimension, it clearly appears that personal competencies based on the personality and cognitive dimensions are requested and strongly valorised by the experts. Since our aim is to encircle a core of personal competencies in innovation on which our population-surveyed can agree, we compared the precedent results to the SMEs' speech thanks to an analysis of job offers. We measured by an indicator of the formulation funded on a compilation of four countries' job offers : France, Sweden, Germany and Spain.

III. Analysing the SMEs' speech: different cultural visions of competencies

We studied by an analysis of content (BARDIN, 2003) more than 1000 job offers for engineers in innovation during a year and a half in the European labour market. We limited our choice to 300 homogeneous offers depended on the Labour Market flow.

The population-surveyed: European job offers 2005-2006
(sources : SMEs' websites, National and Private Placement centres)

	R&D Engineers		Conception Engineers		Quality Engineers		Total	
France	31	33%	33	33%	31	33%	**95**	100%
Germany	27	33%	28	33%	28	33%	**83**	100%
Spain	25	33%	22	33%	24	33%	**71**	100%
Sweden	20	33%	15	33%	16	33%	**51**	100%
Total	**103**		**98**		**99**		**300**	**100%**

Figure 2

In order to limit the problems due to translation, we had native bilingual engineers make the translation of the offers. We stabilised this translated vocabulary by codification and categorisation. In every offer, we took into account the order of terms, the relations between terms (recurrences) and we linked them to the findings issued from the experts' questionnaire. In this paper, we chose to focus on the case of R&D engineers, because the weight of the competencies in innovation is as equally as the scientific ones.

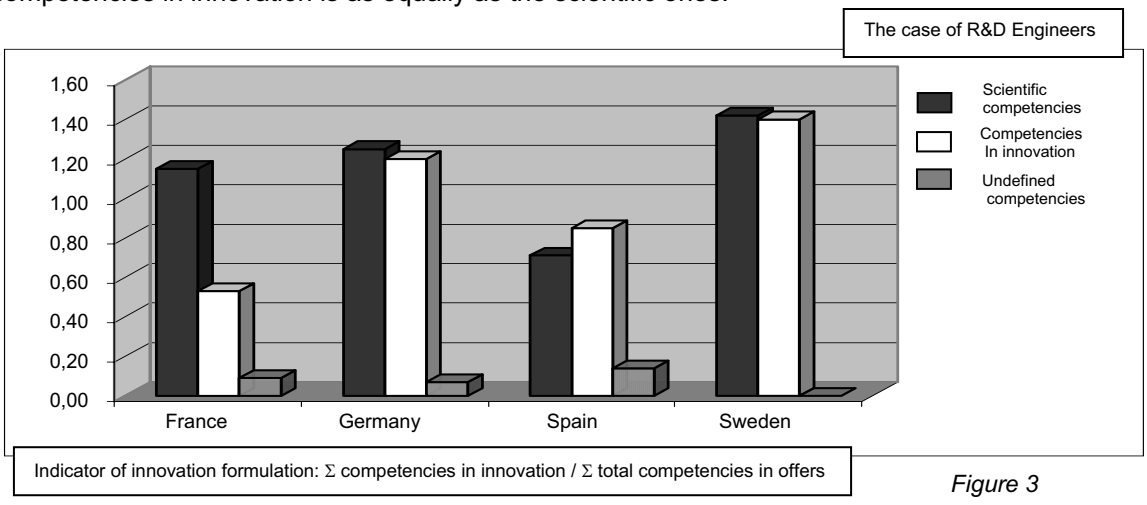


Figure 3

In our investigations, we noticed a fifth dimension required in France, in Spain, and in Germany, but not in Sweden: We called this dimension "the undefined competencies". In all offers except Swedish ones, the candidates must be "charismatic", "must have a high potential", "must be motivated", "must be rigorous", "must be active" and/or "must be dynamic"…. Those seem to be determinant in being recruited because it corresponds to one specific vision of innovation.

We have detailed for each country the required personal competencies in innovation including the undefined-competencies:

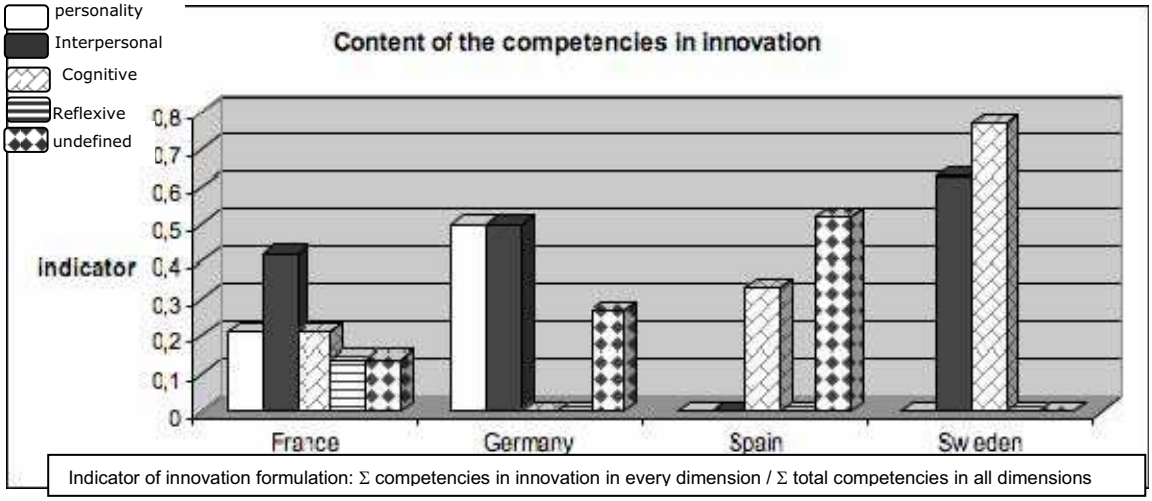
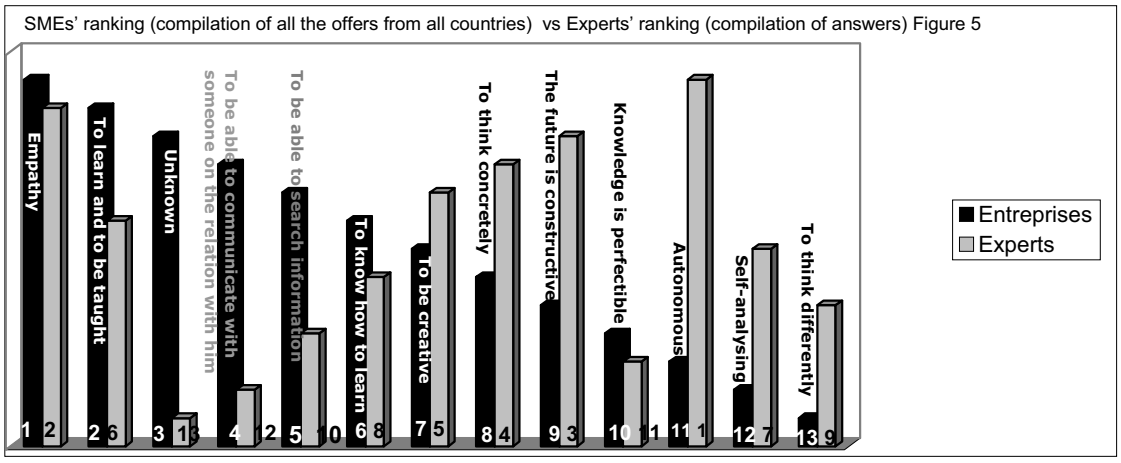


Figure 4

The personal competencies in innovation for an R&D engineer were weighted different depending on the country. The required study level was an engineering master's degree and the required experience for the candidates was between one and five years. Thus we can consider our population as homogeneous. The major hypothesis that we propose to explain such differences is a cultural representation of what an engineer in innovation should be. For considerations of space we are unable to detail our survey about the culture concerned and its training systems.



We also notice that there is a complete distortion between the vision of the experts and the SMEs. The interpersonal dimension clearly appears as a priority in the SMEs ' vision. The common core of competencies in innovation could be the cognitive dimension and the biggest distortion the fifth dimension composed by the unknown competencies.

IV. Perspectives and conclusion

Based on the techniques of explicitation, interviewing European engineers, we will cross our results with the concrete occupations, Thus, our research perspectives from these findings will be used to build a skills framework for the students in the engineering schools in innovation.

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Software Agents and ebXML Specifications for a Business Web Service

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Abstract: In this paper, a Business Web service based on the electronic business XML (ebXML) specifications is proposed. It makes use of software agents which can be used for business intelligence, in discovering partners, shopping behavior patterns or service providing patterns and react to pattern change. They can analyze requests and determine how to fit it with a Web service. The proposed Web service permits to promote the interoperability of the business process and could be very helpful to support the B2B life cycle transaction.

Keywords: ebXML, Web service, B2B eCommerce, Agents, Interoperability.

I. Introduction and background

In order to support business collaborations, many standards and information technologies have been proposed. We give a brief overview of some well-known business standards. Historically, at the end of the years 1980, EDI, the Electronic Data Interchange, one of the pillars of e-business, was a standard communication tool between companies. The Electronic Data Interchange is structured data exchanges between partners respecting a standard format. EDIFACT (Electronic Data Interchanges for Administration Commerce and Transport) is a ISO 9735 norm used for EDI. It is a technology maintained and coordinated by the center CEFACT under United Nations aegis[1]. In the middle of the years 1990, XML[2] appears, and with Internet the passage from EDIFACT syntax to XML meta-language becomes a need. A combination XML-EDI based on Internet and XML meta-language has been proposed in order to integrate EDI among communication tools between companies and essentially to open it on new partners on the Web. With the end of 1990, a proliferation of projects using XML was noted. Consequently, standardization was essential to meet the great need of coherence, compatibility, unification and interoperability.

In order to standardize B2B eCommerce (B2B eCommerce is data exchanges inter-enterprises called business- to-business eCommerce), several initiatives have been born. Among them, we mention RosettaNet[3] and ebXML[4] . RosettaNet is a standard proposed in 1998 to formalize in XML all the necessary elements for automating Web services using production and distribution methods. RosettaNet is proposed mainly for Data processing electronic and semiconductors sectors. However, a certain concepts can be applied to the electronic commerce, which explains the link between RosettaNet and ebXML. The electronic business XML (ebXML) framework has been proposed by the United Nations Centre for Trade Facilitation and Electronic Commerce (UN/CEFACT) and the Advancement of Structured Information Standards (OASIS)[5] organizations in 2001. The ebXML provides a complete framework for setting up B2B collaborations. It is a set of documents, with several prototype completed, enabling businesses of any size to do business electronically with anyone else.

[1] UN/CEFACT, United Nations Centre for Trade Facilitation and electronic Business, http://www.uncefact.org

[2] XML,http://www.xml.org

[3] RosettaNet, http://www.rosettanet.org/RosettaNet

[4] ebXML, http://www.ebXML.org

[5] OASIS, Organization for the Advancement of Structured Information Standards, http://www.oasis-open.org

On the other hand, the Web service is a new technology which can be very useful for promoting the interoperability of the business process. A Web service is defined by W3C[1] as "*a software system designed to support interoperable machine-to-machine interaction over a network. It has an interface described in a machine-processable format (specifically WSDL). Other systems interact with the Web service in a manner prescribed by its description using SOAP-messages, typically conveyed using HTTP with an XML serialization in conjunction with other Web-related standards*". In addition, a Web service is viewed by W3C as "*an abstract notion that must be implemented by a concrete agent. The agent is the concrete entity (a piece of software) that sends and receives messages, while the service is the abstract set of functionality that is provided*".

Motivated by both ebXML and Web services advantages, we suggest a business Web service for B2B eCommerce. In addition, the proposed Web service makes use of software agents. The utilization of agents is justified by their capabilities to discover, combine and execute dynamically a business process. The agents can facilitate the communication between the system and the users. The ebXML specifications can be very helpful to support the B2B life cycle transaction.
Several works can be related to this trend of research. Among them, we cite the contribution of (Hofreiter and Huemer, 2005) which extends UMM (UML Meta Model). In (Wu et al, 2003) the authors use DAML-S for Web services descriptions. The agents are used by (Gibbins et al, 2003) for a semantic Web service and by (Boughaci and Drias, 2005) to solve bid evaluation. The central foundation of our work is connecting ebXML, Web service and software agents to conceive a business Web service for the B2B eCommerce.
The rest of the paper is organized as follows: Section 2 proposes the novel business Web service and gives some implementation details. Section 3 concludes the work.

II. The proposed Web service

The proposed Web service uses ebXML specifications and software agents. An agent is a software entity permitting to achieve tasks. It may be autonomous, reactive and able to communicate with the knowledge-based systems. Agents can be used for business intelligence, in discovering partners, shopping behavior patterns or service providing patterns and react to pattern change. In addition, agents can play different roles to accomplish business activities and accommodate change in environments.

The business Web service enables the storing and sharing information between parties to allow e-business collaboration. It stores BPSS (the Business Process Specifications Schema), CPP (the Collaboration Protocol Profile), CPA (the Collaboration Protocol Agreement), UML (The Unified Modeling Language) models and so on which may be needed to support any e-business collaboration. The business Web service (represented by provider agents) is an application that provides services for other client's applications (represented by seeker agents) via the Web. The communication between clients and server of a Web service is realized using XML-based messages.

1. The Proposed Web Service Architecture

The proposed system depicted on Figure 1 is characterized by the following:

- The Provider Agents which represent the Web service: it includes the ebXML registry and repository containing all the necessary information about partners and the business process.
- The ebXML registry permits to store and manage a wide range of electronic trading parameters. The ebXML registry is the registry of B2B, while the Universal Description, Discovery and Integration, UDDI (Bellwood et al, 2003) is the registry for Web services.
- The Seeker Agents which request the Web services.
- The ebXML BPSS and CPP which give it the functionality of the Web Services Descriptions Language, WSDL (Christensen et al, 2001) plus error handling and failure scenarios.

[1] Web Services Architecture, W3C Working Draft 8 August 2003, http://www.w3.org/TR/2003/WD-ws-arch-20030808/

- The service description and semantics are realized by provider and seeker agents according to ebXML Specifications.

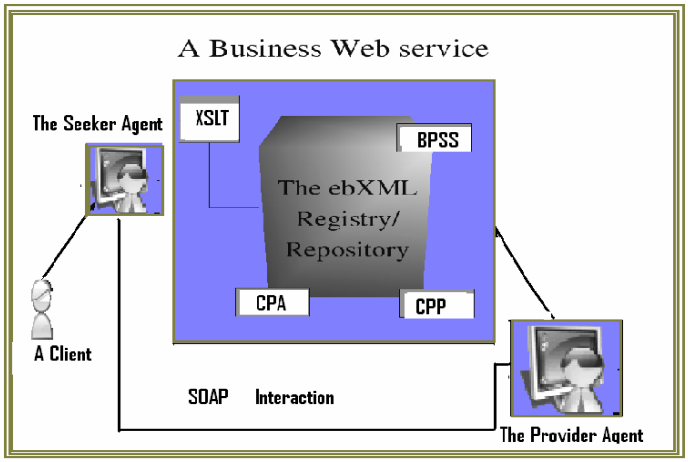

Figure 1. The Business Web Service Architecture

2. Implementation Details

To implement the proposed system on machine, we suggest using JAVA programming language (see, Java Web Site), starting with JDK1.4.0 which interpret well with XML (Javax.xml.* packages for processing XML document for example).

Tools

To implement such application, we need some tools and standards as:

- XML: is used to well structure Data-exchange and describing business documents (CPP, CPA, etc,) and supported by most software and databases.
- SOAP (Simple Object Access Protocol) (Box et al, 2001): is used to exchange XML structured information on Internet.
- Registry/repository where Web service providers can put their services and users can search for desired business Web service.
- JAVA[1] Servlet using the JAVA API for XML messaging to implement the conversion document.
- Oracle[2] as database and Apache Web server. We precise that Oracle has implemented support for XML and the Oracle XML Developer's Kit (XDK) can provide components, utilities and interfaces to take advantage of XML technology in database applications.
- HTTP (Hyper Text Transfer Protocol) for supporting communication between a client and a server. HTTPS is the secure variation of HTTP. It uses Secure Socket Layers (SSL) to set up an encrypted connection. The security level of XML documents can be ensured by using XML encryption and digital signature.
- JAVA Server Pages (JSP) is used for designing the Web Interface.
- The XML generation document is based upon XSLT styles sheets created by an administrator and stored in the registry. The XML parser for JAVA includes an integrated XSL transformation (XSLT) processor for transforming XML data using XSL stylesheets. With XSLT processor, we can transform XML document from XML to XML, HTML or any other text-based format.

The Web Service Implementation

The proposed Business Web service application is depicted on Figure 2. The role of the conversion servlet is processing the conversion request and sends the converted document in the desired format back to the client. First of all, the XML document to be converted is included as SOAP attachment of a SOAP conversion request. The latter is related to the requirement specified in a BPSS document stored on the Web server. The conversion servlet processes the

[1] Java, http://java.sun.com/

[2] Oracle, http.//www.Oracle.com/xml

SOAP conversion request and validates them, then queries the repository/registry in order to realize the conversion using the styles sheets stored in the registry. After that, the ensuring XML document is sent back to the requesting application as a SOAP response. As shown on Figure 2, the client can prepare its XSLT style sheets and formatted it using the mapping functions provided by the Web service. He can also upload it into the registry. The discovery servlet process the SOAP searching request and queries the registry/repository in order to find the appropriate XML business information. The search strategy uses tables of indexes containing key words, utilities (or weight that means a number of frequency of apparition of the keyword in the document) and URL to the XML documents (Content). The ensuring XML document is sent back to the requesting client as a SOAP response.

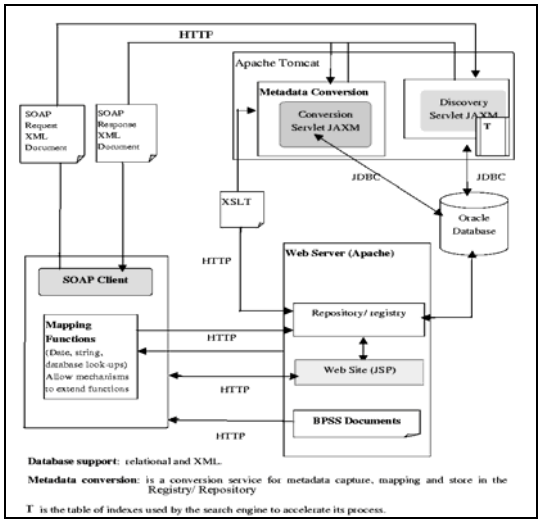

Figure 2. The Business Web Service Application

III. Conclusion and future works

In this work, we have proposed to use ebXML specifications combined with the agents to implement a business Web service to support B2B eCommerce. The proposed Web service merging the ebXML and Web service technologies is an application represented by provider agents for providing services via the Web for other client's application represented by seeker agents. The communication between agents is realized using XML-based message according to ebXML specifications. As future work, we plan to study the impact of mobile agents on our business Web service. It looks important to use ontology for providing additional vocabulary along with a formal semantics.

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Creative routines embedded in Communities of Practice

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Abstract: The concept of routines is helpful to understand the process how productive knowledge is stored in the firm's organizational memory. It also provides the means to analyse how knowledge is integrated into action. The ability of a firm to process information and create knowledge seems to be one of the highest level routines in firms. This process can be seen as a set of routines which are available to acquire, create and exploit knowledge, and together form one Organizational Capability. This paper presents empirical research about how some advanced firms are building this organizational capability. Results will show that firms are still devoting efforts to information acquisition, whereas other routines for knowledge creation and exploitation do not achieve the category of routines.

Keywords: Knowledge management, routines, communities of practice, dynamic organizational capability.

I. Introduction

It was twenty four years ago that Nelson and Winter (1982) proposed routines as the unit of analysis for an evolutionary theory of change. The concept has been widely used in economics and business literature, but many ambiguities and interpretations still remain regarding the concept. (Jones and Craven, 2001)

On the other hand, literature concerning Organizational Knowledge Management is coming closer to the concept of routines when talking about a company's capability to process knowledge. (Nonaka and Toyama, 2002) have used the concept of creative routines to define the time and space where knowledge is processed and created. Seely and Dugid (2000) have successfully promoted the concept of Communities of Practice (CoP) as the unit of analysis to understand knowledge creation processes. This unit of analysis is situated between the concept of whole and individual organization.

Taking into account the apparent conceptual proximity of these ideas, we want to explore the hypothesis that most innovative companies establish creative routines in order to respectively process and create information and knowledge. These creative routines follow complex interactions between their members and CoPs provide the contextual environment for such interactions.

To have a clear picture of the different routines we have established three categories following the concepts of high and zero level routines from Winter (2002). The zero level routines are Operational Routines, for us, which explain activities that are concerned with maintaining and exploiting current business. Improvement Routines are those that are concerned with improving Operation Routines, whereas Creative routines are those concerned with processing information and creating knowledge.

To test the hypothesis, we have conducted empirical research in 85 small and medium sized businesses in the Basque Country (Spain). 21 of these firms were directly interviewed, whereas 64 responded to a web-mail based questionnaire. Results will show that firms acknowledge the importance of information – knowledge processing capabilities, but few are establishing concrete routines for such activities. Most firms use existing activities to process information and create knowledge.

II. Routines and Dynamic Capabilities: The Starting Point

In his literature review about the concept of routines, Becker (2000) states that routines mainly refers to the path of a collective recurrent activity (observable and not observable) as opposed to habits that are paths of individual recurrent activity.

Becker finds that Winter's (1964) first definition regarding repetitive patterns of activity has been subjected to many interpretations when trying to capture the idea of behavioural models. Some interpretations are based on actions (Egidi, 1996) Cohen et al. (1996), others on activities(Winter (1990), Dosi, Nelson, Winter (2000)), or interactions Dosi, Teece and Winter (1992), Teece y Pisano (1994) or behaviour Nelson y Winter (1982) and a large group of authors. In this respect, we can also come across some semantic problems in the use of words by different disciplines. Action and activity can be synonymous, whereas interaction clearly states a collective action. Behaviour means something that is directly observable, but apparently repetitive patterns of activity can be non observable.

According to Becker (2000), characteristics to recognise a routine are as follows:

- Routines are patterns of interaction
- Routines are persistent and repetitive
- Routines have a collective nature
- Routines are non-deliberative and self actuating
- Routines are context-dependent and specific
- Routines have path dependency

Winter defines ordinary or "zero-level" capabilities as those that permit a firm to "make a living" in the short term, and define dynamic capabilities as those operated to extend, modify or create ordinary capabilities. Collis (1994) suggests a hierarchy of high order capabilities. Following these thoughts, Winter (2000) founds the concept of organizational capability on the broader concept of organizational routine as : An organizational capability is a high level routine (or collection of routines) that together with its implementing input flows, confers upon an organization's management a set of decisions options for producing significant outputs of a particular type.

This organizational capability like other dynamic capabilities suggests change and contrasts with ordinary capabilities. Collis (1994) suggest that dynamics capabilities govern the rate of change of ordinary capabilities. But there is no guarantee that this organizational capability exists because is possible to change without having such capability. Many firms respond to ad-hoc problems as soon as the problems arise and are visible, by being merely rational and passive. (Winter, 2000). In any case, there are many forms of reaction between simple and pure improvisation on a close procedure.

The point is that according to Winter (2000) we want to know if firms are investing in building organizational capabilities as a set of routines, in the sense that some personnel are committed to roles of change. If change is continuously destroying internal capabilities, then high order capabilities must be deliberately constructed within firms to maintain, create and recreate new capabilities.

III. Information processing and knowledge creation as Organizational Dynamic Capabilities

The fifth generation innovation process according to Rothwell (1994) is based on interaction between different partners including external partners, such as customers and suppliers. Lundvall and Borras (1997) point out the change from an innovation paradigm based on discovery and invention, to another one based on learning and interactions. Von Hippel (1998) stresses the importance of external knowledge for innovation.

The need for recognizing changes, the ability to react on time and the use of resources to rapidly innovate in collaboration with other partners seems to be a very distinctive organizational capability for competitiveness. To be able to recognize changes, latent markets, low noise

signals of technological change, and to rapidly react and act, is mainly a process involving acquiring information and knowledge creation. Zhara and George (2002) conceptualize this ability as "absorptive capacity". This absorptive capacity is a dynamic capability that evolves over time and it is more focussed on the knowledge processes than on knowledge stocks. This absorptive capacity will be dependent not only of past existing knowledge but on the ability of the firm to process information, learn and create new knowledge.

Most innovation indicators concentrate on inputs regarding investment in the knowledge stock but little attention it is given to the organizational capacity to process information and create knowledge. Knowledge creation, is a set of routines, including information acquisition, internal information gathering, product development, learning processes, information dissemination, etc, that defines the ability of the firm as a whole to create knowledge. It is the information acquisition – knowledge creation capacity of a firm based on different routines in the sense defined above. Teece et al (1997) argue that skills and routines may offer competitive advantages only if it is able to recognize changes, and reconfigure its basic assets and processes continuously. As the environment opens and closes windows of opportunities very quickly, high order capabilities become essential for competitiveness.

IV. Creative Routines and Communities of Practice

We will always have the possibility of establishing procedures for information processing and knowledge creation but with many authors, Nonaka and Toyama (2002) Snoweden (2002), Stacey (2001), Sveiby (2001), we think that knowledge creation is a dialectic process of complex interactions. Within and between organizations, people involve themselves in a dialectic process to synthesize information and create knowledge. Knowledge from this point of view is seen as a relating activity. Seely and Duguid (2000) see this relating activity as natural to communities of practice where people share common understanding due to common practice.

Many authors express the space – time idea for interactions to create knowledge. These entities are appropriate environments (Ba in the words of Nonaka, Cynefin in the words of Snowden) to blend and combine concepts, the whole and the parts, order and chaos, where the synthesis is achieved not as the fruit of consensus but as the fruit of creation. It is not one optimization process; it is not a process of problem resolution but a process of problem definition.

Hagel and Singer (1999) believe that firms need "to unpack" the contradictions in organizations and choose between contradictory views, but the view we are following is that capacities and competences can be changed in order to solve these paradoxes. If the environment offers new perspectives, organizations can offer new answers. The process of creation is an appreciative process of recognising, analysing and responding to new circumstances. The environment influences the vision and action, where the opposite is also true. The interdependent nature of environment and organization is well recognised by the evolutionary economy whereas the schools that view organizations as static structures hardly digest these ideas.

The question is that recognising changes is as important as doing something with them. From this perspective, knowledge is close to action as it is the place where synthesis happens. Sveiby (2001) and Nonaka and Takeuchi (1995) define the process of interactions as multiple, transcending the individual level. It is not learning but knowledge creation.

But the nature of these interactions is complex and unpredictable. It is impossible to codify or even map all the situations. It is not personal cognition but something manifested in action. In this sense the concept of communities of practice, expressed by Seely and Duguid (2000) provide a powerful concept to handle these complex interactions of knowledge creation. CoPs seems to provide the energy, the environment, and the experience to embed information and knowledge creation processes. Common practice (action) is the ingredient that allows Cop's member to gain common understanding and produce action.

V. The Research

The main hypotheses to be tested in the research and the subsequent research questions are:

H1. Do advanced firms present organizational routines for information processing and knowledge creation?
H2. Do these sets of routines form a Dynamic Capability based on Knowledge Acquisition, Knowledge Production, and Knowledge Exploitation?
Q1. How are these organizational routines embedded in the organizational chart?
Q2. Do these organizational forms resemble the concept of Communities of Practice?

Model: Following Nonaka and Toyama (2002) and Seely and Duguid (2000) we can see the firm as a community of communities throughout organizational life. Following the hypothesis of the research, our model presents the idea of a basic Dynamic Capability based on three Communities of Practice, one for Acquisition of Knowledge, one for Creation of Knowledge and one for Exploitation of Knowledge.

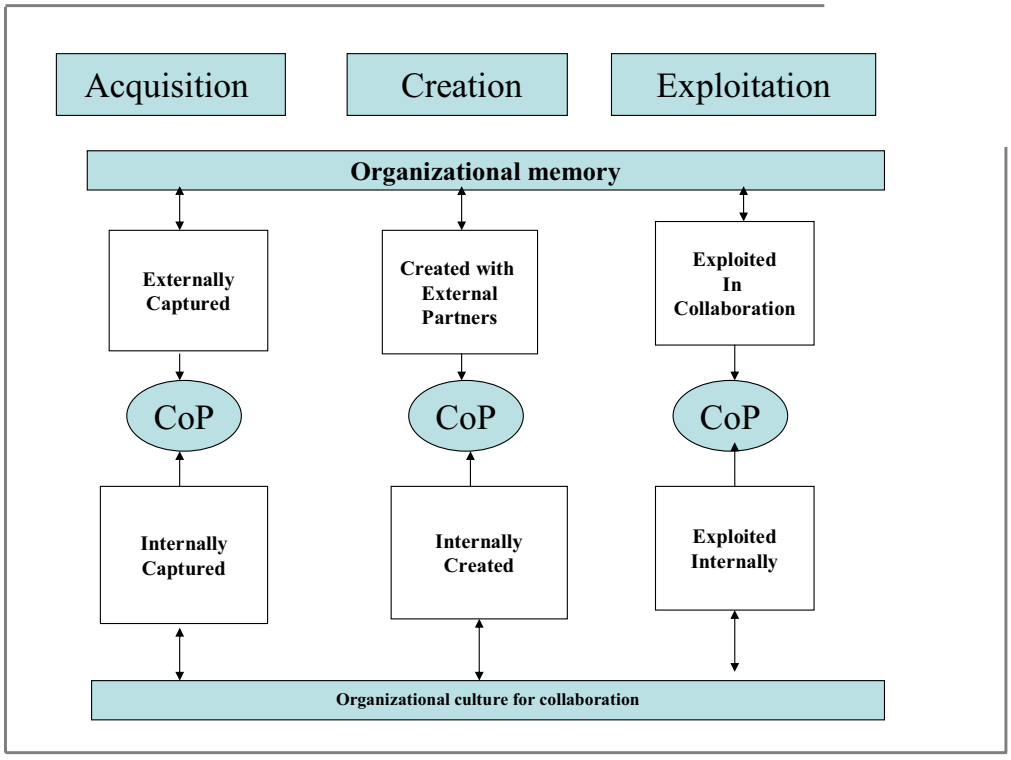

Figure 1. Acquisition, creation and exploitation model

Sample: Firms were chosen following three different criteria to reach Firms Advanced in Management (Prizes, business school case studies, excellence in performing the scheme of the European Foundation for Quality Management)

From a universe of more than 300 firms, finally research has been conducted in 85 firms. 21 of them were directly interviewed and the rest were contacted using e-mail based questionnaires.

VI. Results

Results show that firms start creating routines for information processing and knowledge creation, but are still far from having a set of systematic routines that can be described as organizational capability.

Firms invest heavily in acquiring information, but after this acquisition it is not clear how the information is processed. Few groups seem to have the characteristics of the Communities of Practice for Acquisition and Exploitation. In the creation process some forms of CoPs appear around the new product development processes.

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A competence based view of innovation: interaction of innovative groups

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Abstract: Succesful innovation depends on people. Often the cooperation of few people drive innovation in informal settings. It is the innovation competence of these people in a specific organizational context that makes a difference. We argue that organizations need to learn what are the basic ingredients of a competence based innovation approach.
In the paper we report about the results of a German-Swedish project, in which a model of innovation competence has been developed and partly empirically validated in German and Swedish firms. Our model is based on activity theory and defines distinctive activity levels related to innovation competence.
An internet-based self assessment of innovation competence is one of the results, which particularly might interest enterprises (www.stvg.at/kompetenz.nsf/KompetenzRahmen?OpenFrameSet).

Keywords: Innovation competence, innovative cultures and behaviours, creative routines

1. Introduction

In creating successful innovation strategies there is a tension between two different modes of learning and innovation. Jensen et al (2004) argue that on the one hand there are innovation strategies (**S**cience-**T**echnology-**I**nformation -mode of innovation) that give main emphasis to promoting R&D and creating access to explicit codified knowledge. On the other hand there are innovation strategies (**D**oing-**U**sing-**I**nteracting-mode of innovation) that are mainly based on learning by doing, using and interaction. We agree with Jensen et al (2004) that there still is a clear bias among scholars and policy makers to consider innovation processes largely as aspects connected to formal processes of R&D, especially in the science-based industries (STI-mode). In our paper, however we will concentrate on the DUI-mode as an important part of building innovation competencies of organizations.
The DUI-mode will typically involve organizational frameworks of interaction between employees (innovative groupings) and a competence based view of innovations focussing on implicit knowledge and interactive learning.

Learning in the workplace can be understood in two ways (Lantz and Friedrich 2003): either as essential to the acquisition of those vocational skills and competencies, needed for performing work activities *planned by others and given,* that are more or less complex in the sense of problem-solving; or, as a springboard for innovation change and part of an open-ended developmental process. For developing innovation competencies, a key question is to understand how employees *qualitatively reconstructs objectives.*

According to Engeström (1987), an open-ended developmental process requires individuals who – through reconstruction of the objective(s) linked to their task(s) – construct and perform *qualitatively* different work (Engeström, 1987; Friedrich, 1992; Klemola & Norros, 1997; Norros, 1990; Virkukunen, Engeström, Helle, Pihlaja & Poikela, 1997). It is through a cognitive reconstruction process that work activities are developed into more productive forms and new and more complex work activities defined, and it is via this process that learning and innovation takes place. Work activities are social and intrinsically co-operative. A certain work task can be performed individually, but it is always related to a context in which others are present. When examining learning and innovation, the individual's reconstruction of objectives and the systemic relations between the individual and others involved in the work process both need to be understood.

Frese, Fay, Hilburger, Leng and Tag (1997) and Fay and Frese (2001) present the construct of "personal initiative" as characterised by people taking an active and self-starting approach to work, going beyond what is formally required in a given job (innovative behaviour). Such proactive behaviour presupposes a reconstruction process allowing the definition of extra-role goals that have a long-term focus and lie outside role requirements. The worker translates externally given tasks into internal tasks through reconstruction, and this process allows employees to define extra-role goals (Frese, Kring, Soose & Zempel, 1996).

To bring about innovation it is relevant for employees to learn by doing, using, interacting to develop capabilities to reflect on, question and change current work processes and outcomes. The different forms of carrying-out work can be presented in a hierarchical order from reactive to proactive, change oriented behaviour. Engeström (1987) refers to Leont'ev (1978) and Bateson (1972), among others, when presenting the following hierarchical structure of activity: (1) *operations* as reactions to *conditions* in the surrounding context in the form of behavioural routines, (2) *actions* as related to *goals* in the form of problem-solving in the existing context, and (3) *activity* as related to a *motive* to bring about change through *awareness of contradictions in the present work activity*. It is this third level which is crucial for creating innovations and has not very much been focused on, neither in research or in developmental activities.

Based on the above theoretical framework **we define innovation competences as the knowledge and skills that become manifest in activities which are related to a motive to bring about change through awareness of contradictions in the present work activity.**

2. Evaluating innovation competencies: The ICA approach

Based on Mansfield (1996) the **Instrument for Competence Assessment (ICA)** by Lantz and Friedrich (2003) provides a way of obtaining a general description of the competences that employees in all types of organisations possess to varying degrees. The dimensions are described below.

1. **Functional work task:** Expectations are imposed on the individual with regard to achieving a variety of outcomes on the basis of specific function within the company. For example, being an assembler in industry may involve receiving customer orders, collecting parts, assembling parts, packing, and so on.

2. Managing contingency - Handling unexpected situations: In a modern organisation, skills demands are imposed on members at all levels with regard to discovering risks of disturbances and problems, and actively contributing to their solution.

3. Managing different work activities - To set priorities and co-ordinate: Managing different work activities involves competence in prioritising between and taking

decisions on frequently competing tasks and maintaining a balance between the long-term and short-term goals of work.

4. Natural constraints - Handling the physical circumstances of the workplace : This refers in a broad sense to where work is performed, and what material and equipment are used. The most important competence that can be developed for handling the physical environment lies in simply being aware of its significance to health, safety, and ecology.

5. Quality measures: Different quality demands are imposed in various kinds of organisations, but there is always the expectation that the outcome of work shall be of a certain quality. This requires the ability both to understand quality requirements and to realise that these may vary according to what is to be produced.

1. **6. Work organisation:** The competence lies in understanding the organisational setting's significance to work and in organising so that work performance is enhanced or expanded. This involves skill in handling the demands that the organisation imposes on the performance of work, and also in handling the degrees of freedom offered by the organisation.

7. Working relationships: In most workplaces there are a variety of different relationships both inside and outside the organisation. Having competence in handling relationships at work does not only involve maintaining and preserving relations but also developing them so that they promote effective work and are a means for goal achievement.

2.

3. Different levels of competence

By introducing different levels of competence Lantz and Friedrich (2003) have further developed the above described content of competence. An employee's competence in handling the different work areas is assessed in accordance with a four-point scale that measures cognitive complexity. The scale ranges from no competence (0) to less-to-more (1–3).

0=No task is being conducted (for various reasons).
1=The task is being conducted within the employees own work area but without any relationship to the goals of the task.
2=The task is being conducted within the employees own work area and in interaction with the work areas of other employees within his/her unit/department and in relation to given goals for the work.
3=The task is being developed as a result of the employee, in interaction with his/her own unit/department and other affected parts of the organisation, having contributed to the establishment of new goals for developing the task.

We argue that innovations are likely to happen if employees develop level 3 competences in the above areas.

3. Modelling innovation activities

Innovation activities are guided by a motive, which is the „ideologiacl" basis to inspire people to derive objectives and activities related to change**.** **Motives** can be formulated as a metaphore, e.g. to bridge gaps between optics and electronics, to be the lighthouses in a specific technology . Nonaka and Takeuchi (1995, pp. 64) argue that using an attractive metaphor is highly effective in fostering commitment to the creative process. Innovative firms succeed in creating an attractive motive to bring about change through awareness of contradictions in the present work activity

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The interaction between motive and objectives for change oriented activities characterises innovation work. A main **competence** of innovative groups is the ability **to cope with and overcome tensions** between overall enterprise goals (target orientation) and job related work goals which are object oriented). These competence needs to be learned and developed by "doing, using, interacting". Organisations which want to foster innovation have therefore to be aware to create scope for action and a conducive context. There is a significant difference if groups formulate their own objectives (decision latitude), if they can only prioritise between given objectives or only act within a given goal.

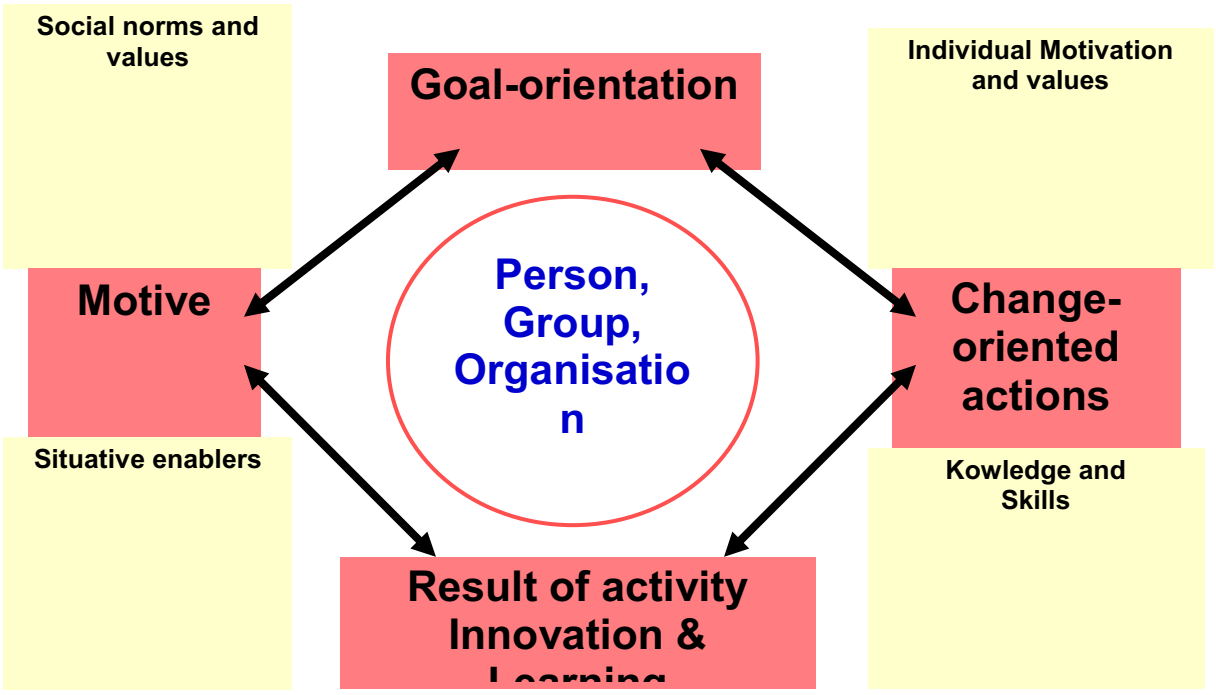
4. Innovation activities are based on an **interplay between individual, group and organisation**

Motive, objectives, and activities are „handled" on several levels in an organization. Activities are of individual nature. Forming objectives is done by the individual in an interaction with the group by interacting with those stakeholders which have power to define the motive. As innovation processes are not deterministic, innovation competence includes also the **capability to orchestrate the innovation value chain** "motive – objective – change oriented activity in an interaction between group/project team and organisation.

In order that this happens a context, which we call **innovation ecology,** needs to be shaped and nurtured. This context consists of four main domains (c. v. Rosentiel 2000) where management may act upon:

- Individual motivation and values,
- Social norms and values
- Knowledge and skills
- Situative enablers (organizational environment)

Innovation activity as selforganized process



4 Conclusion

Based on the discussion above we can conclude that the key aspects of a competence perspective on innovation are:

- Innovation = change or further development of goals. The goal construct (in relation to its importance for understanding and developing human actions) is one contribution of research in competences to innovation
- Innovation = collaborative process; the process of learning should be understood as a prerequisite (for innovation) and also as a result (the innovation itself). That means the prerequisites are the competences and the organisational solution of how to use the competences. Here the contribution from research on group work is very important.
- The decisions about the use of different competences are based on a process which coordinates the effectiveness of the relations between the different levels (person, group, organisation). Due to the openness of the goals in an innovation process there can't be a 'perfect' planning from the beginning to the end. The theoretical implications of the theory of self-organisation gives important inputs here.

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Complementarities between Innovative Activities in Knowledge-Intensive Based Service Firms: Evidence from the Statistics Canada Innovation Survey in Services

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Abstract: A Multivariate Probit model is estimated in order to take into account the fact that KIBS firms simultaneously accomplish many innovative activities. Positive significant correlations between equations suggest that various innovative activities are complementary whereas negative correlations imply that innovative activities are substitutes.

Keywords: Innovative activities, complementarities, substitution, knowledge-intensive based service firms

I. Introduction

The aim of this paper is two-fold. First, complementarities and substitutions between various types of innovation activities are studied in order to see how KIBS firms mix different types of innovation activities to develop or improve their goods and services. Secondly, we explore heterogeneities in the determinants of KIBS firms to choose between six types of innovation activities related to the development and improvement of goods and services.

II. Contribution of the paper

The development and/or introduction of new or significantly improved goods and services result from new combinations of knowledge embodied in people, and knowledge embodied in equipment and machinery. In spite of a vast literature on innovation and its determinants, prior studies on innovation activities have focused the attention on R&D. The other innovation activities and the question of how firms mix different innovation activities have received much less attention. This paper aims to fill this gap by looking at a sample of knowledge-intensive based service firms operating in engineering consulting services, computer system design and management consulting services in order to shed light on how they mix six innovation activities to develop and or improve their goods and services.

While prior studies have examined the determinants of innovation activities in separate models, this paper uses a Multivariate Probit model to reflect the fact that in practice, firms simultaneously consider the contribution of different innovation activities. The Multivariate Probit model includes six equations estimating six innovation activities: internal R&D, external R&D, acquisition of equipment and machinery, acquisition of other external knowledge, training, and marketing activities of innovations. The explanatory variables included in the Multivariate Probit model are the following: knowledge employees, knowledge management practices, knowledge development practices, niche strategy, risk aversion, regulation and standard obstacles, organizational rigidities within the firm, government support, protection of intellectual property, size of firms, and subsidiary firm or not. The results show that there are many differences in the determinants associated with the different types of innovation activities.

III. Data

The data used in this study are the responses of 2625 innovative service firms to the 2003 Statistics Canada Innovation Survey on services. This survey was carried out by Statistics Canada according to the methodological guidelines developed in the OECD'S Oslo Manual (OECD, 1992, 1997). The sample unit comprises firms with at least 15 employees and at least $250000 in revenues. The respondents were the CEOs or senior managers at the firms. The survey was mailed out on September 15, 2003 and data collection closed on January 30, 2004. The response rate amounts to 70.5% of the population of firms. Adjusted weights of respondents were computed by Statistics Canada methodologists to represent non-

respondents. The data analyzed in this paper cover only innovative service firms operating in engineering services (n = 627 firms), computer system design (n =1514 firms) and management consulting services (n = 484 firms). Methodological issues and the overall description of the survey are presented in Lonmo (2005).

IV. The determinants of firms' choice innovative activities

To the extent of our knowledge, the Multivariate Probit model approach to data analysis has never been used to address the issue of how knowledge-intensive based service firms combine different types of innovation activities. The multivariate probit specification allows for systematic correlations between choices for the different types of innovation activities. Such correlations may be due to complementarities (positive correlation) or substitution (negative correlation) between these strategies. The multivariate Probit model used in this study consists of six binary choice equations. These choices are for the innovative activities undertaken by Canadian knowledge-intensive service firms operating in three sectors, namely: Engineering Services, Computer System Design Services and Management Consulting Services. The six innovative activities refer to: internal R&D linked to new or significantly improved products (goods or services) or processes, external R&D activities which are R&D activities performed by other firms or organizations, acquisition of equipment and machinery specifically purchased to implement new or significantly improved products (goods or services) or processes, acquisition of other external knowledge such as patents, non-patented inventions, licenses, know-how, trademarks, software and other types of knowledge from others for the development of new or significantly improved products (services or goods) and processes, internal or external training for your personnel directly aimed at the development and /or introduction of new or significantly improved products (goods or services or processes), and internal or external marketing activities directly aimed at the development and /or introduction of new or significantly improved products (goods or services or processes). The dependent variables of our model are six binary variables referring to six innovative activities that KIBS firms can initiate. Each variable is equal to one if, between 2001 and 2003, the firm has accomplished the innovative activity and 0 otherwise.

The goodness of fit of the multivariate probit model is firstly assessed using McFadden R^2 (Oude Lansink et al., 2003; Veall and Zimmerman, 1996)[1]. A value of 0.17 is found which is quite low, but remains reasonable for qualitative dependent variable models[2]. A second assessment of the quality of the model fit is given by the first reported Likelihood Ratio Index (LR $index_1$) which compares the Log Likelihoods' values related to the unrestricted model and to the ''naïve'' model containing only an intercept for each of the eight equations. The computed value of this first index is much larger than the critical value of the chi-squared statistic with 84 degrees of freedom at the 1 percent level. This suggests that the null hypothesis, that all the parameter coefficients (except the intercepts) are all zeros, is strongly rejected. Consequently, our model is significant at the 1 percent level. The second reported Likelihood Ratio Index (LR $index_2$) compares the Log Likelihoods' values related to the unrestricted model and to the model forcing the correlations between the equations' disturbances to be equal to zero. The computed value of this index is much larger than the critical value of the chi-squared statistic with 15 degrees of freedom at the 1 percent level. This suggests that the null hypothesis, that all the correlation coefficients between the equations' disturbances are all zeros, is strongly rejected. Consequently, the use of the Multivariate Probit model to estimate our system of the six equations explaining the innovative activities included in this study is appropriate. This last result provides evidence, at least for our data, that the use of the separate standard Probit models is not adapted to estimate the determinant of the choice of the firms' innovative activities portfolio. Indeed, the resulting estimators from the standard approach would be inefficient. The last Likelihood Ratio Index reported in table 4 (LR $index_3$) compares the Log Likelihoods' values related to the unrestricted model and to the model forcing the regression coefficients for each of the twelve independent variables to be equal across the six equations. The computed value of this index is much larger than the critical value of the chi-squared statistic with 70 degrees of

[1] McFadden R^2 is calculated as: 1-[log$L$( )/LogL_0] where LogL_0 is the value of log-likelihood function subject to the constraint that all coefficients except the constant are zero, and log$L$( ) is the maximum value of the log-likelihood function without constraints.

[2] According to Sonaka et al. (1989), McFadden R^2, in the range of 0.2-0.4, are typical logit models.

freedom at the 1 percent level. This suggests that the estimated coefficients differ substantially across the equations[1].

Results and possible interpretations regarding complementarities, substitution and independence

The study reports the correlation coefficients of the error terms of the six equations. Most of these correlation coefficients are significant and positive, which supports the hypothesis of interdependence between the different innovative activities. More specifically, the results reveal complementarities between internal R&D, external R&D, and acquisition of equipment and machinery linked to the development and improvement of products and processes. The results also show that external R&D is complementary to the acquisition of other external knowledge linked to the development or improvement of products and processes. Likewise, acquisition of equipment and machinery is complementary to the acquisition of other external knowledge, to training, and to marketing activities related to the development or introduction of new or significantly improved products. Finally, the positive correlation between internal R&D and marketing activities related to the development or introduction of new or significantly improved products suggests that these two innovative activities are complementary. On the other hand, the results show that internal R&D linked to the development or improvement of products and processes is a substitute activity for training activities linked to the development or improvement of products and processes. Furthermore, the results also show that there is independence between internal R&D and acquisition of other external knowledge, external R&D and training, acquisition of other external knowledge and training, acquisition of other external knowledge and marketing activities related to the development or introduction of new or significantly improved products and, finally, between training and marketing activities related to the development or introduction of new or significantly improved products.

In the absence of literature on complementarities, substitution and independence between innovative activities aimed at the development and improvement of products and processes, we are left with an empirical question that can be addressed either at the level of the innovative activities themselves or at the level of the determinants of the innovative activities. The results of this part of our study point to the fact that service firms rely on a large variety of mixes of innovative activities. Why some innovative activities aimed at the development or improvement of products and processes are complementary, while others are substitutes or independent remains a question for discussion and future investigation.

Why do firms undertake different innovative activities? Results and interpretation

Let us now turn our attention to the capacity of the different variables to explain the likelihood that the various innovative activities be undertaken by the firms. The results show that between three and seven variables are significant from 1% to 10% levels in the six equations corresponding to the different innovative activities considered in this study. More precisely, the variety of mechanisms used to protect the intellectual property of KIBS firms is positive and significant in all equations, with the exception of the equation regarding training. The fact that IP mechanisms are not related to training activities aimed at the development or introduction of new or significantly improved products or processes suggests that in the case of KIBS firms, training activities are not related to the acquisition of knowledge that requires protection from imitation by rival firms.

KIBS firms' knowledge development practices have a positive and significant impact on external R&D activities and the acquisition of other external knowledge, which are two complementary activities, but a negative and significant impact on the acquisition of equipment and machinery, and on marketing activities related to the development or introduction of new or significantly improved products, which are also two complementary innovative activities. These results suggest that different innovative activities related to different aspects regarding the acquisition of external knowledge are either positively or negatively influenced by knowledge development practices: they have a positive influence on innovative activities related to the acquisition of knowledge created by other sources (external R&D) or directly provided by other

[1] Hence, for example, a same variable might exert a significant positive impact on some innovative activities, but not on all of them.

external sources, but a negative influence on the acquisition of external knowledge embodied into equipment and machinery acquired from external sources.

As for knowledge management practices, they have a positive and significant impact on the acquisition of equipment and machinery, and on training, but no significant impact on the other innovative activities undertaken by KIBS firms. Again, it suggests that knowledge management practices facilitate the acquisition of knowledge from external sources, whether it is embodied in equipment and machinery or embodied in training activities.

Service firms that have a niche strategy are more likely than other firms to engage in external R&D activities and in training linked to the development and improvement of products and processes. Having a niche strategy exerts no influence on the other innovative activities. It suggests that having a niche provides a focus that facilitates the acquisition of external knowledge embodied in equipment and training activities.

The number of knowledge employees of KIBS firms has a positive and significant impact on internal R&D activities and on the acquisition of equipment and machinery, but no significant impact on the four other innovative activities. It suggests that the knowledge embodied in employees facilitates the creation of knowledge and the absorption of the knowledge embodied in equipment and machinery.

Risk aversion also influences the engagement in innovative activities. Hence, increasing the risk related to the feasibility of innovative projects and the risk related to an innovation's market success increases the likelihood of engagement in internal and external R&D activities, but has no significant impact on the other innovative activities. Not being a subsidiary firm decreases the likelihood of becoming involved in external R&D activities and in training related to the development or improvement of products and processes, but it increases the likelihood of acquisition of equipment and machinery, and the acquisition of other external knowledge. Increasing the size of firms also increases the likelihood of acquisition of equipment and machinery linked to the development or improvement of products and processes, but has not impact on the other innovative activities. Likewise, increasing government support increases the likelihood of KIBS firms to engage in training activities and marketing activities linked to the development or improvement of products and processes. Government support exerts no impact on the other innovative activities. With regard to sector, the results show that the firms operating in the computer system design services are more likely to undertake internal R&D than the firms operating in engineering services and management consulting services. Moreover, the firms operating in engineering and in management consulting services are more likely than firms in computer system design services to engage in external R&D activities. Finally, the firms in management consulting services are more likely than firms in computer system design services to undertake training activities linked to the development or improvement of their products and processes.

V. Preliminary conclusion

The results of this study suggest that various innovative activities are used by firms as sets of complementary innovative activities. These complementarities suggest that some innovative activities that are interdependent and reinforce each other should be considered jointly instead of separately. Conversely, the results show that some innovative activities are independent from each other. Moreover, the results also show that some innovative activities are substitutes for others. These results suggest that firms rely on various mixes of innovative activities in order to develop or improve their products and processes. Finally, the results also show that there are many important differences in the determinants of the different methods of IP protection.

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A Systemic Methodology for Facilitating Service Innovations

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Abstract: In this paper we will present a methodology that provides a framework to facilitate service innovations and to develop services in business to business environments. Service innovations being systemic processes create ripples throughout the organization as well as over organisational borders. Therefore, the complexity of this phenomenon needs to be subdivided into accessible parts of the whole in order to be effectively followed and managed. We have used a common three level model of organisations but based on our case studies identified ten focus areas to manage service innovation process. These areas are (at the strategic level) strategic positioning, co-operation patterning and value constellation, (at the business process level) business process drivers, collaborative business processes and value capturing, (at the operational level) specification, organizing, task flow and value maximization. Business to business services often interconnect organizations' core processes. Tuning this type of service to provide maximum value to the customer is an iterative and cyclic process. Using pilots to develop and test focus areas provides rapid evidence based knowledge and also experience about cooperation between organizations. Using both a focus area approach and pilots provides a systemic methodology to define the actions required to identify and create service business in supplier-customer collaboration.

Keywords: service business, systemic, innovation, development, methodology

I. Introduction

In this paper we outline a methodology for facilitating service innovations and for supporting service business development in a service integrator – customer interface. Herein the service integrator is the service provider towards the customer. Behind an integrator company, there are often a number of other companies that provide their expertise to the service process. The difference between the integrator and these other companies is that the service integrator owns the customership. The methodological approach and framework that we present can also be used to describe the transformation and collaboration between the integrator and other companies if necessary. The described framework is based on research that is conducted in the BeSeL project, where we approach service innovations mostly from business logic, business model, business process and earning viewpoint while the information flow level service process is paid less attention to. The focus of the paper is on business to business services by technology industry companies that enlarge their offerings more towards services.

We first open up the background for our approach from innovation viewpoint and then we describe the suggested framework. Another aim of this paper is to clarify the fuzzy concept of a "service innovation" – a word often used by industry, but only seldom properly defined.

II. Focus of Service Business

Innovations and innovativeness has been in the centre of recent public discussions, where however, the term has often been used quite carelessly without properly defining it. As an example, people often talk about innovations while they actually talk only about ideas. Thus, we would firstly like to state that innovation is a successful idea and with successfulness we understand that the idea has proven commercially sustainable.

In many branches of the technology industry, the products and the technologies underlying the products have become commodities. Differentiation with new technological solutions has become difficult, as it is also difficult to maintain the profits in a product centric business. Providing services instead of products enables taking a larger share in supporting customer

value creation. While in product based business the interaction is limited to sales-purchases transaction, in services the interaction between the customer and supplier is a collaboration process. Thus, many companies have started to search profitable growth from service business.

Depending of supplier (and also market) strategic positioning, the services can be positioned in the product – service continuum, yet companies seldom operate in neither of the ends. However, in order to illustrate the change of the service focus, we identify below five simplified positions (an example of quite similar positioning can be found in Kalliokoski et al. 2000):

1. Product centric support for the products. These services typically exist only to support the product sales for which they are often a must. Examples of such services are spare parts, calibration and training. In some cases (e.g. spare parts) it is often criticized whether these can be considered as services at all.
2. Transactional services that support the installed base over its lifetime. Examples of this kind of services are maintenance projects/tasks, repair, help desk. These services are one-off transactions and thus close to the product centric business model.
3. Offering that is relationship based and has a focus on customer operations. These aim to support value creation on operative processes' level. The emphasis is often on existing processes in contrast to developing new processes in which the value is co-created.
4. Offering that is relationship based that focus on customer business processes. These services aim to support customer business by co-creation of value.
5. Taking over all operations (this can also be considered as a thread by customers).

Positions 1 and 2 represent services near the product centric end of the continuum and the services focus typically on supplier's product and, thus, the direct recipient of the service is the product, not the customer as explained by Mathieu (Mathieu 2001). He also identifies a case where the recipient for a service is the action of the client. In our positioning numbers 3 and 4 can be considered this kind of services, but of course the interaction is in 3 and especially in 4 more wide-ranging than only a single action (or even actions) related to using a product. Prahalad and Ramaswamy, (2004) Grönroos (e.g. 2000) discuss joint processes between the service provider and the customer, that support the customer value creation.

III. Approaches for the Innovations in Practice

There are implications of three basic cases (e.g. Norman 2001, Boyer 2004, Tanayama Tanja 2002, Chesbrough 2003) for innovations, applicable also to developing a new service business. There may be links between the identified cases and the focus of service business: push model and product centric may be a traditional approach in the technology industry, while in service business the pull and interaction models might be more beneficial. The identified cases are:

1. In a *push model* the customer is considered as a recipient. The supplier develops his offering for the market. The model is based on a production centric model (e.g. Pulkkinen et al. 2005), where the productivity and efficiency objectives of the supplier are emphasised. Though increased productivity and efficiency in producing the offering is often seen as the key to customer value creation, the factors which really contribute to the customer value creation are not thoroughly addressed. This model often involves a traditional strategy planning and aims at controllin production and sub-contracting processes.
2. A *demand or pull model* that considers the customer as a source for needs. Suppliers in this model aim at listening to the needs of the customer and to understand the operation of the customer. Often suppliers implement and maintain customer databases and related customer management systems. The strategy work is based largely on certain medium-term (development) projects, which are completed by short-term strategic plans. The model opens up possibilities for interactive strategy planning.
3. In an *interaction model* the customer is considered as a partner co-creating value. Suppliers aim at understanding customer business and at value creating with the customer and to develop offering and solutions (often service processes) that support the customer value creation. The development work also takes place in customer

collaboration. The model emphasises knowledge management and creation, piloting, and utilising knowledge that different actors at the supplier and customer have. Also external actors are often utilised, see e.g. Chesbrough (2003) for more information of open innovations based on interaction of several actors from different organisations.

IV. Systemic and Strategic Nature of Service Innovations

Because services are processes in which the value is co-created with the customer (e.g. Grönroos 2000) they are systemic by their nature as illustrated in figure 1. The service innovations affect the service provider and the customer by changing the processes between these two. Thus, the service innovations affect the value creation, which has an effect on business logic and earning. As a consequence, service innovations are innovations, which renew the businesses of the different interest groups. When this takes place, the service innovations start to renew the markets: in future, the customers only accept e.g. product service combinations because the customers have outsourced some of the processes that they previously had - e.g. maintenance. Innovations have also been identified (Chesbrough 2003, Von Hippel 1998) that actually change the rules of the game and enable increasing value creation opportunities for different actors. These kind of innovations are often referred as strategic.

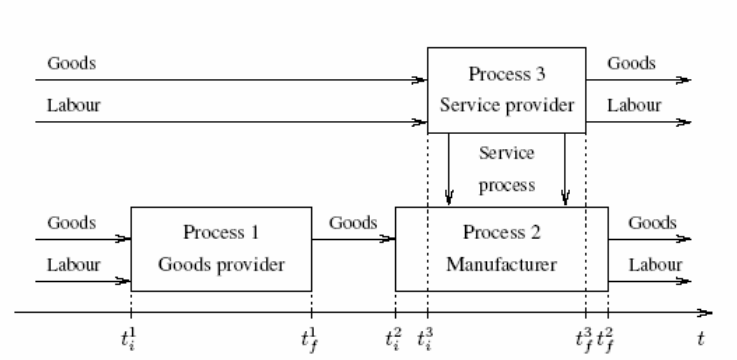

Figure 1. Industrial service process (based on Parrinello S. 2004).

A systemic innovation sets some challenges for companies (Henderson, R.M., Clark, K.B. 1990, von Hippel, E. 1994):

- They need new skills and competencies.
- Because they change linkages between components they may need new organisation structures, practices and processes from companies in order to be successfully analysed / understood.
- Their influences across business levels are often underestimated in a company.

V. A framework for Facilitating Service Business Innovation

Due to its systemic nature, service innovation needs to be addressed from the viewpoints of interest groups: the customer (and the customer's customer) needs to be involved.

Because service innovations change the processes and are the impetus for renewing organisation structures, they involve the different levels of the company. Service innovations can not mainly be conducted in any company level alone. They often require that the management is actively involved – again at both ends: at the customer and at the service provider. All this depends on the positioning of the services in the product – service continuum: if the service provider, the customer and the markets are very product centric, and there are no aims to change this status quo, then the systemic nature is lesser. In this case the service is often designed in push-mode and the emphasis is on effective in-house value chain (e.g. Pulkkinen et al. 2001). However, if one aims at moving towards a value shop approach, then either demand pull or even interaction based models are more commonly applied. In these

cases, the service provider and the customer are in practice often developing relationship based services. The implication of this kind of development is an increase in the share in which the service supplier is involved in the customer value creation.

Thus to co-create value the integrator and the customer need to develop their businesses and collaborate on different business levels. We consider this kind of service business transformation as systemic (crosses company borders on several levels). In Figure 2 we depict a framework to facilitate systemic service business innovations in a service provider - customer relationship: the elements of the model are opened at the integrator and at the customer.

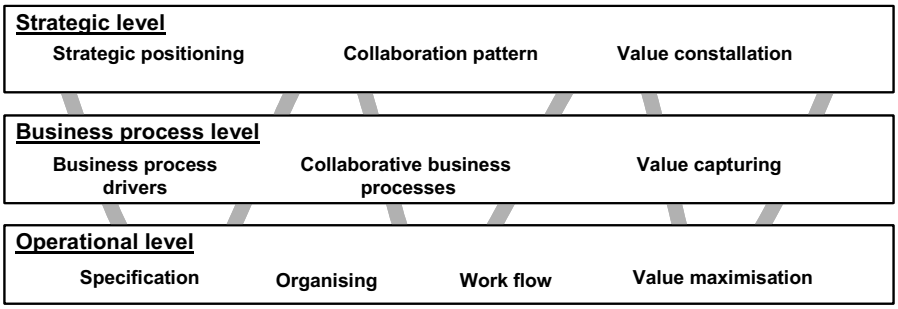

Figure 2. A framework for describing a service business innovation over the phases.

The levels described in the framework need to be addressed during the different phases of the service innovation, although different elements may take a larger importance depending on the phase. In short the phases are: analysis of opportunities; service concept, system and process development; implementation; and market introduction.

VI. Conclusions

In this paper we first defined service innovation and then we described a methodology that facilitates creation of a successful service business. The methodology has been tested in some cases. The aim is to develop the methodology further to enable also assessment of service business transformation on individual, (IT) system and work process performance. This kind of assessment would open up more views other than business viewpoints, on evaluating the successfulness of a service business that is innovative.

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From management of innovation to management by innovation? A question to small and medium companies.

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Abstract: This paper aims to discuss management of innovation in small and medium-sized enterprises (SMEs). Indeed, it is a great challenge to transform these very often traditional companies into technological leaders on their markets. According to various collaboration with SMEs on several topics and discussions with people from interfaces agencies working with this kind of companies, several questions arise. Our aim in this paper is then to tackle these questions and to lead a reflection on the meaning of management of innovation in SMEs. This led us to wonder about their reason for being. We conclude that small and medium-sized enterprises are complementary to big companies, but they are totally different. Thus we can't manage them in the same way, and especially we can't deal with innovation in SMEs in the same manner we do for big companies. That is why we propose to see innovation as a resource to create new companies, but also as a resource to perpetuate existing SMEs. This conducts us to defend the idea of a "management by innovation system" as an alternative way to manage small and medium enterprises.

Keywords: Innovative organisation, SME, Management of changes, Problem solving, Management of innovation

I. Introductive remarks

In the context of today's industrial organisation, collaboration between big and small and medium companies becomes more and more emblematic. Especially because more than 90 % of companies in Europe and in a lot of other countries are small and medium-sized enterprises. SMEs need to do so as well as big companies. It seems to be the rule. But how is it possible to be sure that the rule is the same for big and small companies? We propose to go answer this question with the means of innovation management.

Faced with high speed changes and an increase in of all kind of complexities, big companies have today a great challenge: to innovate. But why is it a challenge, whereas numbers of companies are already innovative? And why do small and medium companies have to take up this challenge? Is it also a challenge for them? If yes, is the challenge formulated in the same terms? Can it be taken care of with the same solutions?

One important question is to be able to characterise the need of small companies according to this question of innovation. Is it possible to define a general goal, and then to built a general answer to this question? The more frequent answer is no: characteristics of SMEs are so different that it is difficult to give a general representation of their evolution according to their very different goals.

Despite this, we heard everywhere that it is important to increase innovation of small and medium companies. But according to what has been said previously, it seems to have no sense: how is it possible to help a group of heterogeneous companies to reach such a generic goal? What does "increase innovation" mean for this kind of companies, especially if a great deal of them is currently non innovative?

II. Disadvantages of big companies vs SMEs

When we speak about innovation, we speak about a lot of different things. There is no chance that the topic we have to treat is the same for all small companies. We propose a first step in this paper. Our aim is to characterise why companies and especially the ones with a small numbers of employees begin to integrate changes, and especially inventive ones, in their organisations, or at least in their products.

The first question we want to ask is: why do we need to push small and medium companies to make changes and to be able to manage changes. According to the concepts of economies of scale and economies of scope, it seems to be more interesting and more profitable to develop big companies. To answer this question, we propose to describe the disadvantages of big companies and to describe the comparing advantages of SMEs.

So, several answers can be formulated to this question.

1. Cost of the structure

First of all, big companies are faced with an increasing cost of their structure. Indeed, to develop several units through the world, organise them in such a way as to be efficient requires on the one hand to rationalize the work and the functional organisation (for example with a few number of specialised team in R&D distributed among the world or at least among a large geographic area), and on the other hand to develop the coordination between the units. This need of coordination can cost a lot because of at least three distinctive dimensions. The first one, which is well known, is linked with the functional differentiation; it is needed to coordinate Marketing and R&D for example. The second one is linked with the number of specialised units and their geographical distribution; it is needed to coordinate R&D team on engine block in France with the R&D team on brake in England for example. The third one, which exacerbates the two first ones, is the different languages used in the different teams, and their associated cultural effects; how to be sure that the French and the English teams are able to communicate, to work together, do they use the same tools, the same method of working … In response to this coordination problem, big companies set up processes. But it takes times and money. Moreover, it rigidifies companies because there are unavoidable committees, needed for commitment, flashes back, increase of time, of money … According to this formalised coordination, big companies become more and more bureaucratic.

So coordination in big companies has a major cost, which doesn't exist in such a form in small ones. Coordination is more based on personal relationships and more informal commitments.

2. Lack of flexibility

Costs of the structure and unavoidable need for coordination induce lack of flexibility in big companies. This lack of flexibility drives the company to a lack of reactivity. Indeed, big companies are not so reactive to the occurrence of internal or external shocks.

Small companies have the capability to catch more quickly information. But there is still a question: do they have the knowledge and the skills to integrate it? We will approach this question in paragraph 3.1.

3. Labour cost

In big companies, the labour cost is a big part of the global costs. Then, they are more sensitive to the evolution of this cost and then to the globalisation. To relocate some of the units, especially in low labour cost countries, can decrease dramatically their costs.

When the labour cost has a lower weight in the global costs of a company, it becomes less interesting to relocate activities. So to develop and to be sure that SMEs can survive in a given geographic area could be a way to protect local employment.

4. Distance with customers

According to the necessity to have an international structure, big companies are often obliged to localise some of their units (R&D teams or production units for example) far from the customers. So it increases delay in the introduction of coming-from-customers information to R&D activities according to re-design of products, evolution of production process or design of totally new products. Moreover, it can create misunderstanding between needs or wishes of customers and useful information for design activities.

SMEs are closer to their customers. They can be more reactive and they have ability to develop relations through building networks with other companies.

So we describe briefly some of the advantages of SMES vs big companies. It is clear that these advantages can also be seen as disadvantages if your aim is to explain why an economy needs big companies. In fact, for the same reasons we need a global industrial organisation based at the same time on big and small companies. Because the two opposite characteristics (centralised and decentralised teams, reactivity and bureaucracy …) are needed to be sure that customers can be satisfied in quality, in quantity and in price wishes.

In this paper, we would like to focus on the necessity to develop the industrial network of SMEs at a local level. One of our major conclusions is that we have to develop small nearness companies in two directions: it is needed to encourage the creation of new companies and it is needed to perpetuate existing small companies. It is then necessary to link these two directions with the will of local public institutions to develop innovation in such companies.

Our point of view according to this is that innovation (even if we have to define clearly what it means) can be a resource for this or a more efficient way to manage the company .That is what we will present in the next part.

III. Management by innovation

Our purpose in this article is to defend the idea that innovations can't be considered as a final goal but more as a way to help company to succeed. In fact, instead of managing their innovation, a lot of companies want innovation to guide them in their management processes: they want to transform a "management of innovation system" to a "management by innovation system". But SMEs don't know clearly what shape the "management system" can take.

In the two next paragraphs, we propose a way to use innovation to reach the goals we identified previously: perpetuate and create small companies.

But before that: it is needed to explain more precisely what we mean by "innovation". From a general point of view, innovation is considered as the introduction of novelty in something (product, process, organisation …) which is then adopted by users. But there is an important question linked to the novelty: it is the level of novelty. We can answer this question by the distinction between breakthrough and incremental innovation. But it doesn't fit with the need to manage SMEs in a complex environment. That is why we propose innovation as a way to deal with all kind of problems small companies have to face with. So innovation can be considered as a process to identify and to formulate problems the company has to solve. In this way of thinking innovation becomes more a way to manage a company than a resource or a process to lead to a new product or to a new process.

Considering innovation this way, we can look at the two reasons why an economy needs to develop small companies.

1. Innovation as a way to perpetuate SMEs

Innovation becomes today one of the most important way to elaborate and to implement cost and/or differentiation strategies and to build and sustain competitive advantages. SMEs are in the same situation. They hope that innovation will solve most of their problems. But in order to be "management by innovation oriented", companies have to change significantly their management processes. Indeed, they have to better synchronize their different functions, to solve the right problem at the right (hierarchical) level, to be sure that each sub-(hierarchical) level is able to manage its own problems derived from the decisions of the upper levels and to succeed in solving them, and to be able to forecast most of the future problems.

But SMEs have a big handicap: most of the small organisations don't really have strategic management processes. They are more focused on current problems. They often don't have time to deal with the future. So innovation can be seen as a resource or as a way to solve problems only if small companies are able to change their way of working. Every kind of evolution needs time. Nothing can be done in few days. So small companies have to be able to

introduce characteristics of what will be the future to help them to define what to work on today, with which goals and which way to take. But this can't be done without strategic management. So the very first element which has to be checked in small companies is that they really have a strategic management. It is unavoidable.

Furthermore, as we have seen in the paragraph 2, small and medium companies have a lot of advantages. But they have to be able to use them to really create competitive advantages. And they are faced with a major disadvantage: a lack of resources. In fact, small companies don't sometimes have time to develop the needed knowledge or competences: they don't have specific R&D resources or specific resources to deal with problems, really formulate and solve them. Even if they are very close to the market, and they are able to catch a lot of interesting and strategic information, they are faced with two difficulties. They have sometimes a lack of knowledge, of competence, of strategy or simply a lack of time to integrate them in their decision processes. If they have technical competences, they sometimes don't have the capability or the network to identify what are the new knowledge and/or the new competences they need. In this context, companies need not only technical innovation but also other kind of innovation, and especially organisational innovation, to be able to grab interesting knowledge and competences wherever they are.

That is why we defend the idea that better than "managing innovation", SMEs need really to be "management-by-innovation oriented".

2. Innovation as a way to create new companies

The rate of creation of new companies is very important. At the same time, the rate of death is also important. What is sure is that this rate of death is less important when the new company comes from a new idea and is able to develop innovative activities or innovative products. The purpose here is that the entrepreneur is in position to develop competitive projects. That means that he is an inventor, but that he is also a businessman.

What we describe here could be considered as very close to the previous situation. This kind of company is in another stage of its lifecycle, the development stage. The company we described in previous paragraph is more in shakeout or in maturity stage, looking for a new idea or at least something which will boost the company. So new companies face with the same questions about knowledge management, about increasing competences, about networks … The entrepreneur faces also a management problem. An important difference is that he is more or less alone, and he has to build everything, and especially the strategy, based on his current knowledge and skills, to be able to launch his company.

IV. Conclusive remarks

As seen before, most of the SMEs want to transform their more or less "innovation by chance system" which is risky to a more "systematic innovation system". That is why we propose to see innovation as a resource to create new companies, but also as a resource to perpetuate existing SMEs. This conducts us to defend the idea of a "management by innovation system" as an alternative way to manage small and medium enterprises. This kind of system can allow small and medium-sized enterprises to generate new knowledge about solving problems, managing changes and then introducing innovation in their organisation.

Tales from the battlefield: Three case studies of innovative virtual management structures

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Abstract: Since virtual management is a relatively new organisational form, little research has been done on structure, performance, managerial practices… This paper provides insights of three experiences of MCC virtual teams, detailing their different organisational structures, their dynamics to achieve higher performance, and suggesting practices towards common drivers for virtual management.

FAGOR ELECTRODOMESTICOS S. Coop. is one example: "Want to work with the best, but they aren't usually nearby". Since 2001, Rubén participates in virtual teams contributing to forge a new organisational model. Conceptually, teams have Spherical structure: "Similar to movie industry: Director, actors… get-together, work jointly and then part to other projects."…

MAIER S. Coop. has five production plants. "First virtual teams were born spontaneously to connect diverse national and international plants arousing from the need to coordinate people". Conceptually teams have Spiral structure "Characterised by being made-up of members who cyclically go-in, do their job, and leave in order to successfully carry-out projects"…

MCC GRAPHICS S. Coop. isn't a typical case: "It isn't a reactive response to reality but a conscious gamble on management brought by virtuality". Conceptually the structure compares to an atom: the nucleus are the joint productive structure of the companies, and around, virtual teams (neutrons) orbit providing services to this productive structure.

Keywords: fieldwork; virtual; teamwork; management; innovation

1. Introduction

"Surfing papers, folders and electronic devices, travelling miles with nothing more than the click of a mouse and a tiny web-cam presiding over his desk, and chatting with Ian: 'How do you fancy this idea ... I like it a lot... could you develop this part further while I check with Karl how things are going with the offshore team... and later we'll all meet on the Chat platform at 14:00 GPM and discuss the next steps".

This *'modus operandi'*, which we may think is far ahead of everyday practice and reserved solely for top executives spread out across the four corners of the globe, in charge of technological mega platforms, is nevertheless becoming an increasingly regular picture in all companies. Due to such factors as the internationalisation of business, the externalization of non-core activities, and the inclusion of suppliers and customers in projects, companies need to get together and redesign their creative processes so as to actively take part in the age of globalisation.

This is the case of MCC – the Mondragón Cooperative Corporation, the largest cooperative conglomerate in the world, founded at Mondragón (Basque Country North of Spain) in 1956. For each experience presented, an overview of the company's main activity will be presented together with the needs and opportunities behind the decision to set up the virtual team; the organisational structure adopted in each case; the dynamics to support virtuality and the best and worst practices as related by people closely involved in these virtual teams.

2. Research fieldwork

FAGOR ELECTRODOMESTICOS S. Coop. (HOUSEHOLD APPLIANCES)

Fagor Electrodomésticos is a prime example of the internationalisation process undergone by companies at MCC, consolidated as one of the major companies in the global home appliances market, operating in eight different business areas and six countries across Europe.

In order to analyse the organisational revolution brought about by Virtual Teams, we met Xabier Elizetxea, Research and Development Manager for the baking area and Rubén Igual, Project Manager. Rubén is one of the people involved in the everyday functioning of Virtual Teams and he

remembers his first experience dating back to 2001: “We want to work with the best, and they are not usually by your side. We need to integrate them at earlier and earlier stages of engineering, design, marketing, and of course, accomplish all this efficiently and cost-effectively.”

These teams, called Operational Virtual Teams (OVT), aim to gather the best human team, regardless of their geographical location, and to develop a given task in an innovative way within a fixed deadline. “It is something similar to the way the movie industry works: the director, the actors, the technicians and the producers get together to carry out a common project, work together sharing their creativity for a while, and then part to start up new projects.”

From a conceptual point of view, the structure of an OVT is similar to that of a sphere, see Figure 1. In an OVT there is only one boss, called the leader, and a base team that is usually formed by between ten and twelve people working in concentric spheres of three to four people each.

Figure 1, Operative Virtual Team: Spherical Structure

These concentric spheres are determined by the fields of knowledge which are necessary to develop the assigned task. As a general rule, in Fagor Electrodomésticos these spheres of knowledge usually correspond to the Engineering, Design, Production, and Marketing Departments of the different plants they have throughout the world. The first important feature of OVTs is that they are multidisciplinary: “This prevents them from being formed solely of experts in just one area who may set out looking at the problem from just their own point of view. As they work with experts belonging to other fields, they can look further to more daring solutions.”

The triggering factor of an OVT coincides with a meeting, ideally face to face…: “…with all the members of the team, not just with those responsible for each sphere. Having some prior physical contact is a determining factor when it comes to working virtually. It allows people to get involved in the task, creates empathy among the different members, and makes them proactive and creative in problem solving.”

These leaders are not chosen because they are particularly communicative or skilled in new technologies, but because they know a lot about the specific field they will develop, they have organisational and consensual skills, and because they are able to unify expectations and get the best out of the different team members. In this way the OVT is launched, and in its conceptual structure the leader is seen as the nucleus of the sphere and the concentric spheres are the different departments involved in the team.

Apart from the permanent members of the OVT, in this spherical structure we also find the figure of the “satellite”. The satellite, a political position within each organization, is the member that orbits outside the spheres. He or she does not take part in the OVT itself but plays two main roles: “First, in monitoring meetings he or she supervises the development of the project and might play an important role in the creativity aspect as he or she has non-technical training which might help pose interesting and different points of view. He or she will benefit from having, at the same time, a global view of the organisation and the skill to look for synergies.”

The ‘political aspect’ enables him or her to strike up conversation with other ‘satellites’ responsible for the rest of the organisations taking part in the OVT and to take decisions at the highest level; “…Resorting to political means is very rare; you are not supposed to do so unless it is a real emergency and only the leader is entitled to take this course…”

MAIER S. Coop.
Maier is part of the Automotive Division of MCC, set up in Gernika (Spain) in 1973, it manufactures plastic injection parts and groups of parts mainly for the automotive industry, but also for household

appliances and consumer electronics. Nowadays Maier has five production plants, sales of € 220 million and a workforce of nearly 2,200 people.

Given this complex, highly-competitive sector, Maier set up the MTC (Maier Technology Centre) at their headquarters in Gernika. MTC is designed to be the centre for virtual teams structuring and to coordinate the great quantity of research and development activities carried out among the five manufacturing plants distributed across three European countries

In order to get to know the organisational structure of Virtual Teams in Maier, we met Álvaro Páramo and Eneko Santiso, a Studies Manager and Systems Engineer respectively, who are involved in the everyday functioning of virtual teams: "…First virtual teams were born spontaneously to connect the diverse national and international plants and arose from the need to coordination. Things were usually coordinated over phone or e-mail, but one had to travel whenever the issue was something important"

Formally, virtual teams are framed within the structure of Project Planning Management at Maier, which specifies the people, positions and responsibilities in those groups "…which are characterised by being made up of members who cyclically go in, do their job, and leave, in order to successfully carry out projects that take an average of two years from the elaboration of the initial viability studies and the offer on the contract, to the testing of the necessary equipment prior to the mass production."

Figure 2, Operative Virtual Team: Spiral Structure

Conceptually, the organisational structure of the standard virtual team at Maier looks like a spiral, see Figure 2, which has a beginning (the initial bid for a contract) and an end (the manufacturing of the contracted parts in the plants). The person in charge throughout the whole of the project is the Project Leader (who is also the team leader) and the members of the team are determined by the different stages (or 'spiral phases') that the project goes through: "…As a general rule, all the departments in the different plants collaborate in some way at some stage of a given project, which is a practice we have found especially satisfactory as it favours the transmission of knowledge and encourages creativity within the company…"

As a result of this 'in and out' rotation in the virtual team, coordination work has to be more structured and organised than in ordinary groups. Moreover, it is difficult to gather the whole team due to dissimilar timetables in the different regions and the members' availability, among other things, which is why: "…one has to make the most of those video-conferences in which all the members of the virtual team take part, respect rules on punctuality, get to the point, don't beat about the bush, and so on. It can be compared to a "long-distance romance" in that you have to pamper and look after it much more carefully than normal if you want to "keep it alive".

Collaboration among members of the team is 'cyclical'; that is to say, each member works locally on his or her own part and shares his or her progress with the rest of the team members. It is a process we could call constructivist, moving forward along the spiral. As the project moves forward in time and completes this stage, it goes towards a follow-on phase in which some of the members of the virtual team stop or reduce their involvement while other departments from the plants join in to contribute their knowledge to the next stages of the project.

Leaders of virtual teams at Maier have long been working with this structure and agree that it works for the profile of the company and type of activity entrusted to the teams. However, they have noticed that performance and creativity fluctuate according to activity, stage, experience of the team and so on

MCC GRAPHICS S. Coop.

MCC Graphics, the graphic services division of MCC, was set up in the late 1990s as the commercial and marketing image of two already established cooperatives: Elkar and Danona. Later on, under this

virtual ‘umbrella’, they were joined by Rotok in 2001 and by Evagraph in 2005, establishing a major group in the commercial printing and publishing market. With 40% of production exported to France, the United Kingdom and Germany and total sales expected by the end of 2006 to reach €30 million, the group employs nearly 150 people.

To talk about this virtual cooperative we met Javier de la Fuente, Export Manager and Ignacio Varona, Head of Technologies, who are involved in the organisation of virtual work and technological support for the teams: “MCC Graphics is a completely different case from other companies: It was conceived to be absolutely virtual as a proactive response to reality, as a conscious gamble on creativity brought out by virtuality as opposed to the homogeneity generated by hierarchy and presence; in favour of collaboration between teams rather than competition among parallel productive structures. It is a unique new form of organisation needed to face up to the complex scenarios that dominate the sector more efficiently than would four autonomous and distributed realities.”

Figure 3, Operative Virtual Team: Atomic Structure

Conceptually (Figure 3), the structure of MCC Graphics can be compared to that of an atom, with the nucleus (protons), the joint productive structure of the different companies, remaining mainly static. Around it, the virtual teams (neutrons) orbit and provide services to this productive structure. These virtual teams can be of two different types:

- Stable Virtual Teams (SVTs) are formed by people who share the same function in each of the four different plants, along with the international branches. These people share knowledge, a common language and insight, and utilise a restricted area on the technological platform, work according to predetermined team events, etc. These stable teams are Commercial, Offers, Coordinators, Plant Managers and Production Managers.
- Project Virtual Teams (PVTs) are born of the ‘virtual resources’ of MCC Graphics and combine groups of seven to eight people, each of whom belongs to a stable virtual team with their own particular field of knowledge, goals, tasks to develop and so on. These PVTs, together with occasional contributions from other experts, “... are able to provide, in a creative way and in a very short time, solutions to problems of logistics, supplies, resource availability, etc. so as to meet orders in due time and live up to the high standards demanded by our customer.”

The first essential feature that differentiates both types of team, and which provides the PVTs with a fundamental part of their creative muscle, is that they are both emergent and ad-hoc. No meetings are held either to launch the virtual team or to get members together. On the contrary, when faced with the need to produce, let’s say, an estimate, they burst onto scene and under self-management, evolve towards their goal: “…not in a chaotic way or by defending the particular interests of their respective plants, but with all the generosity, professionalism and commitment infused by the cooperative spirit, as well as all the richness and creativity this entails.”

Another characteristic that should be pointed out is that teams neither follow an obvious leader nor select their members beforehand. On the contrary, they are teamed up through natural selection…

Finally, according to Javier:
“MCC Graphics is characterised by two key factors; firstly, by the fact that it is a cooperative and secondly, by its virtual condition. We have had to deal with distance using work routines and communication tools which are different from the traditional chats around the coffee-machine or at a desk. In this way you encourage values like generosity both at an individual level and on a team basis when it comes to the point of taking decisions that may minimise benefits to your plant in favour of another plant; values like the creativity to develop virtual tools and means of coordination with your colleagues. It also promotes a higher level of personal professional expectation to assume tasks that, due to virtuality and the lack of a rigid hierarchy, are not defined by the duties of different posts but are none the less essential to allow the project to reach a satisfactory conclusion and the virtual structure to go on.”

Integrating Innovation in the Regional and Inter-regional Oil and Gas Supply Chain: case studies from a trans-regional research network

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Abstract:

Keywords: supply chain integration, value-adding partnerships, innovation, inter-regional networking

I. Introduction

The paper provides examples from a distributed action research based project on the integration of SMEs in the larger supply chain, highlighting an evolution in the view of regional SMEs as a potential source of value-creation. The examples are taken largely from the oil and gas regions of Western Australia and the UK, and from the automotive industry in Germany and Brazil. Experiences from these regions suggest current approaches have moved from an emphasis on cost-efficiency savings, to an emphasis on value-creation through innovation, based on the application of local knowledge and expertise that SMEs can provide. The presentation will outline the role of a collaborative action research-based initiative that has acted as a catalyst in identifying the issues, and fostering benchmarking between organisations in the UK North Sea oil and gas region and their counterparts in the Western Australia oil and gas region, and in the German/Brazilian automotive supply chain (Jaegersberg et al, 2005). Parallels are also drawn with other distributed networked sectors in e-business and in e-health that appear to validate some of these outcomes.

A recent report to the European Community on R&D and Innovation in Europe (Aho, 2006) underlines the perception that while more resources for R&D and innovation are a necessity, they are in themselves insufficient as a means of achieving the goal of an innovative Europe leveraging the diversity of local, community based knowledge to competitive advantage. The authors argue that e-business and regional supply chain clusters are now providing examples of how better coordination of a diversity of local knowledge and expertise can provide good models for this in the regional supply chain, giving examples from a trans-regional project on the automotive and oil ad gas supply chain.

II. The Australian Example: benchmarking innovation strategies

The Australian Pilot study is in one of a number of regions where researchers and students on placement have used collaborative action research with a range of stakeholders in the supply chain to identify (a) gaps in practice (b) rewards, penalties and barriers (c) stakeholder requirements (d) opportunities for supporting SMEs as a source of innovation in the regional supply chain. Often crucial gaps and opportunites are not transparent, and can be addressed by better communication and alignment of existing regional resources. One gap identified, for example, was the difficulty of securing funding and support for field testing of innovative developments. Another was lack of prior knowledge of future requirements for large operators, such that SME innovations were in line with regional needs. Equally, there was a lack of awareness among large and medium sized operators of technical innovations by SMEs in the region which could address operational problems they were encountering.

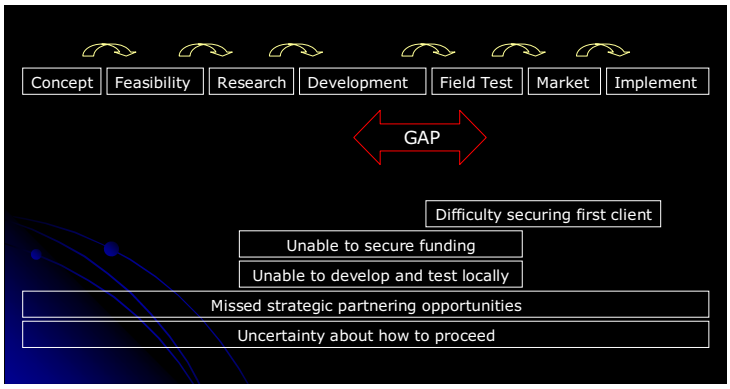

Fig. 1 Final Report Tabara S. (2006) Identifying Barriers in the WA Oil and Gas Supply Chain

The research has been extended to different sectors and with a range of reference groups, moving from open ended interviews and observation studies, to validation with further reference groups, and wider, more formal validation by questionnaire based on the issues derived from this initial phase. In some cases. This has facilitated collective understanding of the barriers faced by SMEs with regard to innovation, and provided a template for development.

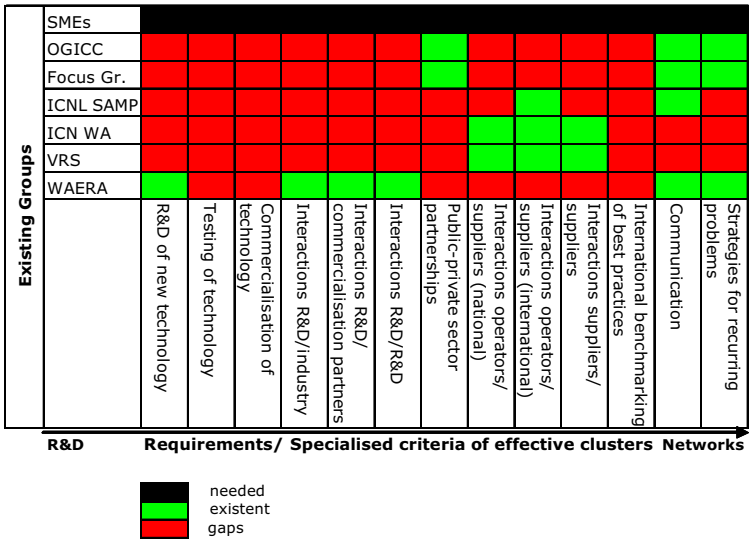

Fig. 2 Final Report Tabara S. (2006) Identifying Gaps in the WA Oil and Gas Supply Chain)

III. Other Sectors and Studies

Interestingly, many of the problem: solution scenarios were similar across regions where this work has been done, both in the automotive and the oil and gas sectors in Brazil and Germany (Jaegerberg et al 2003; Ure et al 2005). The role of this trans-regional project has been to allow regions at different stages in the supply chain life-cycle in these industries to benchmark experiences, and support the integration of SMEs in ways which foster and highlight their role in adding value to the supply chain through targeted innovation, and highlight their role in contributing to the economy of the region as key source of employment as well as knowledge transfer.

IV. From cost-cutting to value-adding: the UK example

The UK North Sea oil industry supply chain has provided an opportunity for benchmarking approaches to competitiveness for other regions in different ways, at different stages in the lifecycle.

1. Phase 1: Competitiveness through cost-efficiencies

The initial approach to competitiveness is epitomised by the CRINE[1] initiative. This provided a flagship example of cost-efficiencies based on standardisation, scaling, and strategic alliancing of resources to common ends. This was seen as a major initial success in reducing costs to allow UK company consortia to compete, however a number of aspects of these lean strategic alliances combined to undermine many regional SMES (Gray 1995).

- SMEs often absorbed higher levels of risk, and had to cut costs and profit margins to unsustainable levels within the supply chain
- Outsourcing to other countries meant many local SMEs were excluded
- Standardisation constrained innovation, and added costs for SMES in new software and hardware

Many local SMEs disappeared, together with much of the local and the specialist technical knowledge associated with deep sea drilling technologies, and undermining the ability of the region to achieve a knowledge-based advantage in a very knowledge-based market. It has also been noted that a great deal of the innovative advantage is also derived from the adaptation of existing technology to suit local conditions and requirement, and where local knowledge of

2. Phase2: Competitiveness through innovation

The PILOT initiative http://www.pilottaskforce.co.uk/ moved the emphasis to adding value through SME led innovation when cost-efficiencies and standardisation efforts had progressed far enough to mean that other factors such as innovation were becoming more significant differentiators. This was most evident in the development, adaptation and use of technology in the difficult environment of deep sea drilling. Local SMEs have a crucial role here, not only in leveraging their local knowledge and expertise, but in sustaining regional employment, in supporting LMEs and MLEs in the region, and in the attractiveness of that region as a base for these companies. The percentage of local SMEs now in the regional supply chain is around 80:20, compared with a low of 20:80 in the CRINE era. The PILOT organisation itself also acts as a high level broker for negotiating agreements on shared practices that can facilitate fairness as well as efficiency, such as contracting practices and the speedy payments of invoices, both of which penalised SMEs heavily in the past.

V. Support Strategies for SME-based Innovation in the Regional Supply Chain

The collaborative action research process has facilitated opportunities for collaboratively identifying and sharing evidence of barriers and gaps, as well as benchmarking strategies used in other regions at different points in this process. These have included:

- The communication of future development plans of large and medium sized operators in the region at Share Fairs with coordination of direct contacts and support from funding agencies and knowledge transfer partnerships with regional Universities.
- Good practice in contracting and payment that do not penalise SMEs
- Opportunities for brokering and coordination of the efforts of education, industry and government

1 Cost Reduction in the New Era

- Opportunities for collaborative identification and alignment of requirements across regional stakeholders
- Opportunities for benchmarking across clusters and regions sharing problem: solution scenarios.

VI. Conclusion

1. Reuse not Reinvention

Most recently the experience of supply chain enhancement in Aberdeen (Cattanach 2007) has been the basis of collaboration with the agencies involved in the study in Western Australia addressing common issues, but at different stages in their respective supply chain lifecycle. One of the issues apparent from different studies of technology-based development in business, education, engineering and health projects has been the recurring socio-technical nature of many problem: solution scenarios in the design of ICT supported systems, and the potential for benchmarking in these contexts.

2. Unity in Diversity

Sawhney and Parikh (2001) highlight the competitive advantage afforded by leveraging the knowledge and resources of local communities in distributed networks, as Napster or Amazon do. The Report of the Independent Expert Group on Research, Development and Innovation to the European Community, (Aho, 2006), suggests that a paradigm change is needed in which EU values are preserved in a new social structure. We argue that the models of innovation and competitiveness in the regional and trans-regional supply chain and in e-Business provide good examples of such a paradigm - leveraging the diversity of local knowledge in regional SMEs in ways that enhance the competitive advantage of regional and trans-regional clusters.

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Staffing by Explicit References

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Abstract: To use explicit references in planning and assessment has specific advantages. It is a way of controlling the entirety of overviews and it helps co-operation and participation in complex bureaucracies. It is a way of organizing setting priorities so that the alternatives eliminated become visible.

In a recent study for the Swedish defence a series of references were applied for the composition of different competences in urgent staffing missions: James Miller (1978), de Raadt (2000), Elliot Jacques (1996), Eric Albert (2005), Marion Saumonneau (2006) and of course the HR-XML. We made taxonomy for the competences required but we also found that an iterative procedure with more than one taxonomy would be a preferable method.

Keywords: Competence, staffing, templates, systems science

1. Innovative Management Practice

I perceive innovative management practice as a kind of procedure where thinking is joined with action and communication. Most innovation comes from thinking but not all. You discover when you do. You have good and bad surprises. You have the devil in the details someone said. I had my latest surprise when I used James Miller's input-output model to classify competences. The model did not work as it had done many times before and as the client had expected. We should not have been surprised though. Philosophers like Bordieu (1992) and Luhman (2003)are clear enough about the limitations of simple branching taxonomies. Anyhow after a brute effort trying to specify in James Millers framework we tried a multi perspective methodology.

But was this *innovative practice*? Surely it was not the kind of brilliant solution or combination that is the mirage of Edward de Bono (1973), of Martin Gardner (1970) or of the charming French Eureka (1979). In my project it was rather a *take care of* ex post and it came by work, not by brilliant thinking. But there was innovation also. It came from Brussels and it was founded on a new vision of the world. Defence and diplomacy had to be integrated for new security policies. Europe integrates. Sweden no longer has got any problematic borders. Precaution became pro-action and the latter consists in launching troop when Brussels calls. Moreover we do not know many weeks in advance which troops are to be sent. Sweden does not send trained battalions. It sends trained people who are to be selected and put together according to specific needs expressed each time by the European Commission and the Swedish Government

There is innovation on two levels: in the general world-view and in each call from Brussels. And each time it is urgent. So structures and routines for the nation who responds must be prepared. Participating countries are not given many weeks for recruitment and training. Here, if ever, we see that innovation is not just the idea. My project had a very small role in making Brussels innovations real but I felt that we were doing innovative management *practice*.

2. The mission and its context

My project, as many others, started with a precise question: "Make us a taxonomy for competences!" Thinking about Jean Louis le Moigne's projectivity concept (1995) I asked about uses and contexts for this taxonomy: It should be there for a sequence of functions:

Recruitment, formation, staffing, reorganization, action, follow-up.

These functions in their turn are composed of the following activities:

Requirements specifications, their translation into formal criteria, shaping and update of databases, matching persons with jobs, negotiations and employment decisions.

Our linguistic taxonomic efforts had a major focus of translating Brussel requirements into troop requirements. The subsequent matching of individual requirements into database and search engine language was another issue with some commitments already done. A soft-ware, Match-IT, could search in many ways including by free text.

3. The project

The client's earlier established requirements specification for competences, including a use of the well established HR-XML structure, survived a matching with the systems model of James Miller. That model then became a framework for a taxonomy of all the competences needed. However, further testing of our a priori requirements with other models showed that lots of psychological qualities were missing. This subsequent testing led to substantial amendments of the Military HQ's language for personnel specifications. More general human qualities were added in a vein of Peter Senge, Eric Albert and Marion Saumonneau.

The subsequent matchings also led us to a revised methodology. We came to question the idea of one single taxonomy as a language for competencies. We started instead the design of a multi perspective procedure. It could start with any kind of a pragmatic or theoretical setting, but it must continue and be modified by theories from systems science and from the human sciences. It is likely that we will end up with a very flexible methodology neither stating a fixed taxonomy nor a fixed sequence of perspectives. The latter could be chosen according to the intentions of the troop to be designed. If a troop is to have qualified coordinating roles for example, the taxonomy of Elliot Jacques would be useful. For many military missions it might be enough to run two perspectives, a professional/technical one and another more psychological one.

The amendments of the old menue of competencies came as no surprise to my client, but he was pleased to have explicit suggestions of perspectives and of a method. Those will be brought forward to a handbook for staffing in international missions. In this way our project conforms to the general HQ rule that flexibility shall be designed by *Network Centric Enabeling Services*.

As a menu of guiding perspectives we first suggested James Miller and Stafford Beer (1974) who design coherent structures of connected flows and transformations. John P van Gigch (2003) also offered this kind of organic coherence, but in a metaphysic world view. He sees and draws the process of building knowledge.

The organic flow models guarantee a certain completition in the overview, but the level of abstraction is not really convenient for our staffing work. Something generic, more scholarly and more generic is needed as a complement. So, Albert, Jacques and Saumonneau were tested. Other authorities were discussed but not explicitly used. You may find this discussion in the complete consultancy report (in Swedish) by the web link www.agrell.info. However, most of all the non-organic models offer a pragmatic rather than a systemic overview, which is less easy to pin-point and explain to partners and stakeholders in the personnel management process.

So what is new enough for a scientific audience in this paper?

- We have a Cartesian (1637) explicitation of a competence management process.
- We have gathered a set of relevant systems structures for competence descriptions in personnel management.
- We have made an experiment in using systems structures to test and supplement an older view on competences. This experiment initiated amendments. The experiment is then suggested as an archetype for a regular procedure mixing intuition and patterns. This procedure is a specification of the principle of multiple perspectives, which too often is expressed only as a pious wish.
- We see that you discover by known patterns, not only by experience, intuition and pragmatics,
- We offer a philosophy about using patterns for discovery, co-operation and democracy.

4. A client's reaction

There was complete agreement about a need to improve the existing conceptual framework for personnel requirements specifications. We also had a common hesitation over whether the need for multiple perspectives could be reduced to just one or two taxonomies.

My immediate client was pleased to apply systems thinking both as patterns and as something to relate to in different ways. This general enthusiasm spread over into recommendations for the military academy's attention to modelling and systems science.

Another interesting reaction was the willingness to discuss different taxonomies. Abstractions of that kind are not always so popular in spite of all management science recommendations to bring problems to generic levels. It remains to be seen however how willing the real hands on personnel managers are to discuss their basic assumptions in this way. The latter will also have the question about how to handle the necessary multiple perspectives: in one, two or more iterations. The goal is to agree, write and teach a handbook of personnel management.

How to learn, develop and teach abilities of crisis management will be developed in other projects in collaboration with civilian authorities and research establishments. The projects multi-perspective view on competence will be used in those. My client is pleased that the project is presented at the ESTIA and he encourages me to listen carefully to critics and comments.

5. A discussion

Jean-Michel Larrasquet (2007) writes about *prison langagière* and *illusion ontologique* quoting Michel Foucault. These expressions describe accurately the state of affairs before our project started and they also say that care must be taken not to go into another linguistic prison by producing a ukase and by having it transmitted through the military hierarchy. So three things may seem impossible: to keep an obsolete view of competence, to impose a conceptual framework on the real personnel managers and to discuss abstractions such as world views beyond their feelings of relevance. The abstract dialogues are not so easy in real management though authorities like Checkland (1985) and Larrasquet (and myself) plead for it. The imposition by the hierarchy is not as easy as it used to be, not even in a military organization. However, an agreed need for computer support in the new situation of world security and preparedness for rapid reaction may still make a conceptual change possible.

My client was a group of planners from the central headquarters. They were not the ones to really do the staffing job in the future and we had surprising difficulties to capture the latter into our project. One of my major tasks, I found, was to persuade my client that those have to be involved even before any conceptual taxonomy or main line of staffing method could be settled. This does not mean that we should strive for a pure consensus procedure and product. That would have been to return to an earlier state already falsified and rejected. Our systems and science results really had to be transmitted into practice – to conform to Brussel's new urgencies and to assure a modern competence profile including human qualities for our troops. We must launch a new conceptual worldview of competences and we must be prepared to modify by dialogue. We must also discuss the concrete method of introducing new relevant perspectives into the language of requirements specification.

What I am less willing to question is the need for explicit transparent structures both for the views on the concept of competence and for the steps in the personnel employment procedure. I see the following reasons:

- To have an overview of a kind that can be defended and explained to others,
- To be able to approach an exhaustive completeness by the use of a series of explainable patterns,
- To enable better presentations to partners and politicians
- To open up to criticism and further developments by transparency and traceability,
- To help setting priorities and to enable the demonstration of both accepted and discarded options,
- To reduce lobbyism and local logics to defendable roles,

- To make consensus procedures honest with responsible world views and defendable foci,
- To make defendable links in a chain of requirements specifications containing both human and computerized nodes,
- To make comparisons fair,
- To capture the relevant competences,

So far this is for staffing procedures, but I have also earlier experience with this kind of explicitation. It works sometimes and sometimes not. From a method's development point of view I think it is important now to describe situations to see how they differ and to see their specific methodological requirements.

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High performance collaborative networks: a realistic innovation or just an academic desire?

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Abstract: This paper presents the preliminary findings of a research project aiming at the definition of the conditions required for the creation and management of high-performance collaborative business networks in Northern Portugal. Given the industrial context of the region the emergence of such networks would be innovative in itself. The project adopted a multiple-case study research strategy, based on data from 40 semi-structured interviews. The preliminary results of the study include: 1) operational definitions based on an extensive literature review; 2) a conceptual framework for the analysis of high-performance collaborative networks; and 3) recommendations for the creation and on-going management of such networks.

Keywords: business networks, collaborative technologies, network performance evaluation

I. Is there such a thing as a Collaborative Network?

The term "network" is widely employed and researched across scientific disciplines and professional fields. In social sciences several schools of thought can be identified whose research focus is the network. Araujo and Easton (1996:65), for instance, compare 10 such schools of thought, whereas Oliver and Ebers (1998:556) compare 17 of such schools. In addition to schools of thought, these articles identify key elements of networking allowing a systematic comparison of those networks and schools. The present paper is based on the results of the RCED project (High-Performance Collaborative Networks), whose ultimate goal is to support the creation and on-going management of collaborative business networks, by proposing innovative ways of fostering networking and collaboration. Most of the project analysis was performed in Northern Portugal.

Although forged recently, the term "Collaborative Network" can have several interpretations according to the context in which is being used. It is often used to refer to any kind of network where some form of interaction exists, from virtual professional communities to supply chains. This broad interpretation is useless if we want to study the implementation of networks of SMEs and to contribute for some kind of innovation in this area. A more precise definition can therefore be much more useful: a "collaborative network" is a set of independent organisations which cooperate through ICT-based collaborative processes (collaborative technologies). This definition is, in turn, closely related to two other definitions: "cooperation" is "the articulation of strategies and activities of two or more organisations in order to achieve commonly set objectives"; "collaboration" is "the process by which two or more organisations perform tasks together in order to obtain collective results". Understandably, this definition of "collaborative network" is based on insights from several schools of thought. In terms of "cooperation" the key insights are: *need for mutual trust, division of labour*, and *adoption of common practices*. Concerning "collaboration" the key insights are: *shared tasks* and *impossibility of achieving collective results individually*.

It should be noted that when trying to build up a precise definition of collaborative network, we could only find a few cases where collaboration is the cornerstone (Wong, 2005; Forfás, 2006).

Although being an area of research for many years, collaboration between organisations is still an innovation topic, with ongoing research work, both in informatics and in organisation science.

II. How to understand Collaboration and Networks?

The RCED research project was designed to ensure a coherent relation between: a) the theoretical and practical contributions of the study, b) the adopted research method, and c) the sources under analysis. In particular, RCED's contributions can be framed in terms of the following research questions: 1) What are the best academic and empirical theories of high-performance collaborative networks? 2) What elements of networking best describe collaborative networks? 3) What is the current status of collaboration in Northern Portugal? and 4) How should collaborative networks be created and managed?

Based both on theoretical and empirical roots, the RCED project has defined a conceptual framework that includes five conceptual modules:

1) an analytical grid of business networks, considering six elements of networking (see below) to allow the description and the analysis of colaboration networks;; 2) a business network typology, defining nine types of networks; 3) a list of favourable conditions for higher levels of performance in collaborative networks; 4) a methodology for performance evaluation of collaborative networks; and 5) a typology of collaborative technologies (based on the dimensions and level of collaboration).

RCED thus proposes an "analytical grid" that specifies and analyses collaborative networks in six dimensions. These dimensions are the "context" (information about the network's outer-environment), the "actors" (type of network nodes), the "motivation" (network's strategic aim), the "activities" (value-added activities performed by the network), the "resources" (content of connections between network nodes) and the "relationships" (type of connections between network nodes). In addition, RCED proposes a "network typology" that considers nine types of networks: *distribution network, production network, extended enterprise, virtual enterprise, research network, supply hub, innovation network, cluster,* and *virtual breeding environment*. The "favourable conditions" are the most relevant pre-conditions for higher levels of performance in collaborative networks, for each type of network. Such conditions are grouped according to five types of resources: *human, financial, social, infrastructural* and *organisational.*

A "methodology for performance evaluation" of collaborative networks was developed in the RCED project since no such type of integrated methodology was found in literature. Such a methodology recognises that performance evaluation of a particular enterprise network is strongly dependent on its objectives and type. From the perspective of individual participants, performance can be assessed with a comprehensive set of evaluation criteria and indicators. From a global perspective, network performance can be assessed using a multi-criteria approach. The fifth and final module of RCEDs' conceptual framework is a "typology of collaborative technologies" that classifies the available support technologies in a matrix with the "dimensions and level of collaboration". Collaboration dimensions include communication, information sharing, and coordination. The collaboration level can be defined as basic, medium, and high.

III. And when Collaborative Networks are not in line with SME's strategies...?

The cases analysed suggest a low level of "high-performance collaborative networks" adoption among businesses. In theory each company possesses specialised knowledge, experiences, and talents that, combined with other companies, form a whole that is far more valuable than the sum of their individual parts. However, in practice huge limiting constraints could be found and very few businesses were embracing collaborative networks that are able to reap these benefits. Collaboration can be time-consuming, challenging and difficult to implement, yet the rewards often outweigh the costs. The following two cases taken from the RCED field research illustrate these difficulties.

The first case is a failed implementation of a supply hub. This supply hub was sponsored by a sectorial association of SMEs and was viewed as an opportunity to be competitive against large

groups, by lowering the procurement costs. The motivation of participant companies was mainly related to the possibility of having access to special materials and components, and of lowering purchasing prices. The necessary IT platform was set in place to support both the supply hub and also an e-marketplace. Most of the people participating through their companies had only co-membership relations in the scope of the association. In other words, they were competing companies that recognised the need to cooperate, in order to be more effective towards their clients. The management of the association was fully committed and professional managers were hired for the project. In addition, every member had to pay a fee to be part of the hub, thus further signing commitment to the network. What went wrong then? Apparently, cultural and social factors, namely the lack of enduring trust between companies as well as questionable ethical conduct from some companies (there was no control of the entrance of new companies). These two factors were, in turn, reflected in increased difficulties for some network activities such as knowledge sharing, joint training, etc. It seems that a wrong partner selection was the main reason for this failure, probably related to the fact that the negotiation power with suppliers was quite unbalanced among the different network members.

The second case is an electronic commerce distribution network, created to join producers of regional quality food products in the North-Eastern part of Portugal. It was initiated by the technology transfer unit of a polytechnic institute that has created the business model and set up the IT infrastructure. The fundamental activities of the network were commercialisation, marketing and distribution. The basic network rules were that each producer should maintain minimum levels of stock and quality of the supplied products. This was object of a contract. The network leader was the technology transfer unit. This network failed apparently due to lack of commitment and strategic consensus. The leader and some of the members were not able to develop sustainable marketing activities (due to financial difficulties), while other members did not comply with the contracts. Others demanded exclusivity on some products. In other words, an effective collaboration aiming at joint strategy was never achieved.

IV. What to do then?

The strategy followed by RCED to foster collaborative business networks is anchored on the concept of Collaboration Breeding Environments (CBE). The creation of a highly trustful business environment may be supported by cooperation agreements, transversal business processes and technology infrastructures. Such a breeding environment enables businesses to reap the emergent market opportunities related to the “networking effects” (value chain cooperation, shorter lead times and quick response). The main drivers of CBE are Collaboration Research Practice; Collaboration Training; Collaboration Knowledge and Collaboration Labs.

- Collaboration Research Practice – To develop studies of socio-economic and technology issues in combination with academia researchers and practitioners. This practice could improve the quality of research and help create theory grounded in social experience. It requires mutual respect, trust and appreciation among the individuals involved, and a willingness to learn from each other through formal and informal means.

- Collaboration Training – To place real world experience into knowledge; It means to transfer real time collaboration experiences to businesses, ensuring that knowledge is captured and avoiding pitfalls; employing collaboration training technologies (web conference, b-learning and simulation engines).

- Collaboration Knowledge – To create an on-going collaboration database; to form Communities and Special Interest Groups around the collaboration issues. Employ software to develop a web-based workspace that combines the best of collaboration, knowledge management and document management technologies into a single solution for enterprise collaboration.

- Collaboration Labs – To enable trials and take-up of cutting edge applications carried-out by global ICT suppliers; Intellectual property protection is needed. A virtual science laboratory could also be also included.

RCED will carry out a set of dissemination activities for promoting CBE. These activities include

Collaboration Workshops and the Collaboration Kit and should be implemented by a team with specific competences in collaboration issues, management and technology, dissemination and transfer of knowledge;

- Collaboration Workshops will be used to promote the exploitation of results, to kick off technology initiatives or to solve stand-alone business problems. They aim at building consensus among parties by bringing together all the key members within an organisation and facilitating them through a series of collaboration tasks.
- The Collaboration Kit will include freeware software applications (focused on collaboration); collaboration self assessment tools; knowledge management; performance criteria; best practises; action plans for executing technology initiatives.

V. Conclusion

A political perspective on organisations tends to emphasise the lack of consensus in such entities whether they are private, public or not-for-profit. In the case of collaborative networks, this lack of consensus is further aggravated by the scope and scale of interests involved. One can thus refer to the political challenge of networking which is well illustrated by the two cases in section III.

As a multifaceted phenomenon, networking additionally poses economic and technological challenges. In particular economic issues are directly reflected in network participants' motivation, which is often business related. This involves the dilemma between costs and benefits of networking. More often than not, such costs and benefits are unquantifiable and unpredictable. This, in turn, raises the issue of performance evaluation as a crucial aspect of networking for both the participants and the whole network.

In practice, however, the political and economic challenges of networking are rarely dissociated from technical issues. In other words, the practical implementation of collaboration in general and of collaborative networks in particular results from technical arrangements that further reinforce political and economic consensus among participants. The project findings also reinforce the idea that the adoption of collaborative technologies is viewed by companies as a means to enhance their own competitiveness.

Finally it should be noted that the RCED project has clearly acknowledged the multidisciplinary nature of networking by analysing both organisational and technological issues. Its conceptual framework tries to clarify the business rationale of cooperation as well as the notion of collaborative technologies. In particular, the concept of collaborative breeding environment aims at supporting the concrete application of such framework.

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What bananas and Albert Einstein have to do with reliable, consistent innovation

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Keywords: Innovation, reliable, bananas, Albert Einstein

Abstract:

What do bananas have to do with Albert Einstein? More than you think.

I'd like to suggest Dr. Sam Kogan of GEN3 Partners, a product innovation consultancy, as a speaker at ERIMA '07. Jérémy Legardeur suggested that Dr. Kogan's presentation might be suitable during a 20-minute session at ERIMA or during the "Next challenges for innovation" workshop. Dr. Kogan believes that companies today need to think about innovation in a new way to survive and thrive.

The need to innovate is more important than ever. Globalization has flattened the playing field, weakening the value of brand names and forcing U.S. businesses to look to innovation for a competitive edge. To thrive, they must be able to consistently innovate. However, most businesses think of innovation as a creative process by which new ideas spring from brilliant people like Albert Einstein or even Bill Gates. As a result, they invest millions on creative consultants to jumpstart the innovation process, with uneven results.

Companies today can't sit around waiting for lightning bolts of inspiration. A one-time flash of creativity might grab headlines for a day or boost sales for a quarter, but long-term business success requires a process of innovation that is reliable and consistent.

Dr. Kogan believes companies need to look at innovation in a new way. By identifying the features of a product that customers want and are willing to pay for, companies can set up processes that produce consistent, predictable innovation – not a one-time burst of inspiration.

Here are reasons why this new approach to innovation is needed:

- Companies in lower-wage economies have huge advantages over European and U.S. firms including lower labor costs and government subsidies. The only way Western companies can compete is to be consistently more innovative.
- Innovation spreads rapidly around the world now. A company that comes up with an innovation may make a one-time splash, but before long everyone else has adopted that innovation. The company has to keep innovating consistently and predictably.
- Brands aren't all powerful any more. The Internet allows people to share experiences about a company with millions of others. People now choose the best, most innovative products, not just the best-known brands.

Dr. Kogan has been working in innovation consulting for more than 25 years. He holds a Ph.D. from the Institute of Macromolecular Science, Leningrad, Russia and a Master's degree from Polytechnic University in Leningrad. His work to bring about predictable product innovation has been adopted by some of the world's best-known companies including Proctor & Gamble, Honda, Motorola, Chiquita and Alcoa.

In fact, Dr. Kogan and GEN3 Partners are working right now on an innovation project that will be of practical interest to every one of your conference participants – or at least, every one who has ever eaten a banana.

Chiquita, the world's largest banana distributor, is redefining its image. For 107 years, its bananas have been sold in bunches at supermarkets to appeal to families. Now for the first

time, they're being sold individually at convenience stores and gas stations to appeal to single "on-the-go" people. These "Chiquita-to-Go" bananas will be sold in 7,500 convenience stores across North America by next month. A traditional family staple is now a quick-pick convenience item.

GEN3 Partners made the change possible, helping a traditional fruit distributor become an innovative, forward-looking company. After Chiquita presented its innovation challenge, GEN3 scoured dozens of industries and found a new plastic packaging that allowed Chiquita bananas to "breathe" and stay ripe for a week instead of three days. GEN3 found the packaging in the pharmaceutical industry, of all places.

In the past, convenience stores typically did not carry Chiquita bananas because they did not sell enough of them before the bananas grew overripe. Thanks to the new packaging discovered by GEN3, the change allowed these stores to store bananas at the perfect ripeness for longer. That created a new sales channel for Chiquita bananas in a venue in which they had never been sold before. Selling them individually instead of in bunches allowed Chiquita to charge twice as much per banana, increasing the company's profitability and providing access to an untapped market of "on-the-go" convenience store consumers who previously had bought mostly candy bars and cupcakes.

This real-life case study provides proof of Sam Kogan's philosophy that successful innovation today doesn't derive from a genius like Albert Einstein. Instead, long-term business success today requires a process of innovation that is reliable and consistent.

IMP³rove[1]: a *European project to develop and to test better services in support of innovation management in SMEs*

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Keywords: innovation management, self-assessment tools, innovation performance, innovation benchmarking, innovation experience sharing, Small and Medium sized Enterprises (SMEs)

I. Abstract

For the past 15 years of intensive public support towards Innovation Management Techniques (IMT) has raised four major challenges in the European Union, in line with the conclusions of the VERITE network[2]:

- *Does it make sense to measure innovation management performance in enterprises by using self assessment tools (SAT)?*
- *Will comparisons, at managing innovation processes between peers, give Small and Medium Enterprises (SMEs) more autonomy at improving their innovation processes?*
- *Can public and private innovation facilitators benefit from such innovation metrics to provide services more effectively, in order to create a sustainable increase in innovation management performance?*
- *What is the adoption model required for building a "Sustainable Community" of innovation intermediaries sharing the project results (SAT and consulting services)?*

The IMP³*rove* consortium[3] aims at responding to the above challenges: the answers are based on worldwide past experiences at measuring innovation performances and providing innovation support to a very wide spectrum of enterprises (in terms of industry sector and company sizes).

Firstly, SME managers are aware of the complexity of innovation processes. Yet, they very often lack techniques in tracking their innovation management performance due to several root causes:

- *In private enterprises, there is no correlation between R&D investments and innovation successes[4], thus showing the complexity in bringing novel ideas to market applications*
- *Innovation is indeed a complex today still unstable process, when compared to more stable manufacturing, marketing or sales activities*
- *Innovation is a process which requires more and more cross functional team work and interactions/collaborations through the whole value chain*
- *The apparent randomness of idea generation brings people to consider innovation failures as just a consequence of risk taking and consider success as being, very often, out of the enterprise's control*
- *The dynamics of research and innovation processes show that "speed", from invention to, at least a financial break-even, remains a key success factor still[5]*

The IMP³*rove* consortium is convinced that European SME managers will adopt a European system for innovation metrics, provided that they feel confident in a so-called "benchmarking approach", such as, the one implemented by large industrial groups within the European Foundation Quality Management (EFQM) model. During 2007, 1500 SMEs managers are scheduled to join the IMP³*rove* project in combination with pioneering innovation management consultants (IMC).

[1] The present work is fully funded by the European Commission (DG Enterprise service contract ENTR/05/003)
[2] " Virtual Environment for Innovation Management Technologies" , Final Report , 2004
[3] The *IMP³rove* consortium is led by AT Kearney with Advansis, APRE, Fraunhofer IAO, IAGO Ltd, i.con. innovation GmbH, IpL, Logotech, Technofi, Zabala
[4] *B.Jaruzelski et al., Strategy+ Business, Issue 41, Winter 2005, p 40*
[5] P.Devalan « L'innovation de rupture, clef de la compétitivité » Hermés Lavoisier (2006)

Secondly, measuring the performance of innovation management remains a controversial issue. Single innovation projects encompass indeed several processes of a company, e.g.: innovation strategy development, idea generation, RTD tasks to reach demonstration prototypes, manufacturing validation, launch or after sales support including the continuous improvement of the innovative products or services. The Innovation management process must, therefore, be approached **within a holistic framework.**

The IMP³*rove* consortium has developed a European Self Assessment Tool, combined with an integrated consulting process that involves innovation management techniques (IMT), available via a unique Web Based platform (www.europe-innova.org and www.improve-innovation.eu). Both set of tools rely on:

- *past expertise gained in this area in Europe and beyond,*
- *probing techniques combined with a holistic, pragmatic framework that addresses the real life issues of industry players*
- *an open architecture with harmonized contents describing innovation methodologies*
- *preventing rather than curing innovation management process defects, which require making enterprises become more aware of the main innovation barriers in a global economy*

Thirdly, the long term adoption, by intermediaries **and** enterprises, of the integrated, holistic consulting approach using the SAT requires the build up of a critical mass of service providers in Europe: it is this critical mass of expert users that will generate a pull by communicating positive results with sustainable economic impacts originating from the IMP³*rove* initiative. However, SME managers remain reluctant to call for outside expertise on innovation, as shown by the EOS Gallop Innobarometer 2004 (EC DG Enterprise):

- *only 26% of the innovative enterprises in the EU have used external services for their innovative activities in the past two years,*
- *among those who used external services, 60% took advice exclusively from private consultants, 20% exclusively from players supported by public funds, and 20% from both with little differences in company size.*

The adoption model for the IMP³rove approach relies on a train-the-IMC approach, delivered to candidates willing to participate as innovation facilitators. Constant monitoring of the new service effectiveness is performed and creates **"Learning by Doing"** open communities of innovation service providers. Such communities will increase their capabilities at addressing the many facets of innovation management processes throughout Europe. They are capable to customize the solutions to be implemented by SMEs, based on referenced tools and methodologies available on the Web platform: they can face the diversity of industry sectors with their specific competitive environments, company sizes, regional cultures and languages.

In this present paper, a description of the whole new consulting process involving the SAT is given, together with the preliminary results of a field test involving more than 70 SMEs that took place in Finland, France, Germany and Romania on early 2007. It is shown that the development work will lead to operational tools likely to overcome three of the main expected barriers at the beginning of the IMP³rove project:

- *The **rejection** of a European tool by national or regional experts: an expert panel assisting the consortium has helped built a collective European conviction at improving innovation processes using the proposed tools,*
- *The **difficulty** of measuring innovation performance in SMEs: the ones joining the project are selected on a size and sector basis, allowing innovation indicators to be used effectively*
- ***Possible barriers** in transferring innovation management tools to innovation facilitators, since they may be reluctant to interact with SMEs without using their own specific approach. The Web platform uses an open architecture able to exchange lessons learnt and the best in class experiences under the umbrella of an integrated modular consulting methodology suited for SMEs*

More SMEs and innovation management consultants are, of course, invited to join this large scale European approach dedicated to developing and testing better services in support of innovation management in SMEs

Worker's Commitment and Manufacturing Innovation

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Keywords: Innovation, Complexity, Learning, Autonomy, Dialogue

I. Abstract:

The presentation will describe how workers' commitment and participation has been secured in the re-organisation of a previously centralised manufacturing unit in autonomous production units.

This reorganisation was part of the implementation of a new strategic managerial system decided after a merger. The merged companies were equivalent in size, were situated in two different regions of France, comprised 4 distinct manufacturing plants, and had very different cultural, managerial and ownership roots. The merged group totals 800 people.

After the merger three main concerns were addressed:

1. Aligning the merged group on a shared vision: this was obtained through a democratic process to which the whole workforce was invited to participate. Working groups representing the workforce diversity were in charge of the process' organisation and with synthesising, liaising with management, and communication of the outcomes. The process resulted in the formulation of purpose, core values, long term vision and strategy, and was then translated with everyone's involvement into a specific identity and objectives for each production unit.

2. Reflecting and deciding a company-wide innovation strategy in order to ensure the sustainability and performance of the group and its entities. The innovation was prioritised and situated at three levels:

    a. Innovating in managerial strategy and business model;

    b. Defining 5 key competences and setting up 5 multidisciplinary and cross-functional autonomous working groups for targeting, achieving and maintaining long term excellence in each of these key competences;

    c. Defining 5 distinct strategic businesses and appointing pairs of Directors to define dedicated strategies and ensure implementation in each of these Strategic Business Units, in the medium and long term.

3. Reorganising the largest and most ancient factory of the group around the key concept of "sustainability and performance through autonomy"

It is the launch of this third intervention, currently in implementation phase, which will be described in more details. The link to the overarching change strategy and with the prior actions will be described. The importance of grounding such a profound and radical change in shared vision, shared values and purpose will be shown. In addition, the key role played by Mental Models in the successful implementation of profound change will be highlighted.

A Methodological note:

1. **Working with outsiders and co-creation of the interventions:** The interest of continuous co-creation of the intervention, with all parties interested, will be explained. Concentrating on the process, and adapting this process to changing circumstances, has been a key to overcome several unexpected events that inevitably occur as a result of, and independently from, the change process. The value added of neutral outsiders in accompanying such processes and the different roles such outsiders can/are required to play will also be shown.

2. **A learning intervention:** Such intervention is destined to ensure that the organisation evolves sustainably and positively. The importance of actively involving all persons affected by the process will be shown. In order to allow every person to project and position himself into the new organization it is of uttermost importance to combine the intervention with an action learning process. Such action learning processes should be voluntary, autonomously managed, strategically conceived and designed in teams. It is based on the theories of Nonaka & Takeuchi, Cunningham and Senge & Scharmer.

3. **Organisation as a living system:** The organisation is viewed as a complex, dynamic, non linear system. It is also interacting with an equally complex environment. Hence any intervention, even the most trivial, comprises imprevisible, sometimes hidden and delayed effects. Sustainable organisations are considered to be those able to sense and integrate weak signals and quickly and flexibly exploit for the better the ever changing circumstances. Such an organisation develops itself by ensuring value to all interested parties. The methodologies used are inspired by complexity theory (see for example Tracey, Shaw and Griffith)

4. **Large Scale Interventions and worker's involvement:** Commitment and participation of all actors is obtained by integrating the philosophical underpinnings of Appreciative Inquiry (Cooperrider) and several Large Scale Interventions Methods (i.a. World café, Open Space, Future Search)

5. **System Intelligence and overcoming systems of holding back:** It will further be shown how overcoming organisational barriers can be achieved by revealing and relying on the systems intelligence of all people involved according to the breakthrough thinking of Raïmo Hämäläinen and Esa Saarinen.

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The European project SMMART (System for Mobile Maintenance Accessible in Real Time)

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Abstract:

1. Purpose and objectives

The SMMART integrated R&D project was launched in November 2005 and is planned to run for 3 years with an overall budget of around 25 millions €, co-funded by the European Commission.Coordinated by TURBOMECA, the project involves 25 companies and institutions from across Europe. The participants includes industry leaders (VOLVO, TURBOMECA, EUROCOPTER, SNECMA SERVICES, THALES), Small & Medium Enterprises who contribute 38 % to the project, and 6 research centres.

The SMMART project aims at defining a new integrated concept to answer the maintenance challenges of the transport industry – aeronautics, road transport, marine transport:

- To reduce the time and cost for scheduled and unscheduled maintenance inspections of increasingly sophisticated and complex products.

- To remotely provide the adequate up-to-date information to assist the mobile workers in all their tasks wherever they operate.

- To minimise the cost penalties of unscheduled downtime on large transport fleets.

2. Project key challenges

- To monitor in real-time the usage and maintenance data throughout the lifecycle of critical subassemblies of a vehicle.

- To optimise maintenance management through a world-wide network.

- To provide new services: advanced troubleshooting tool, global configuration control, resources planning tool.

- To remotely exchange information between all life-cycle stakeholders in a timely, secure and trusted environment.

- To provide end-to-end visibility of the logistic supply chain.

- To improve industrial and logistic traceability.

- To optimise maintenance and logistic planning.

- To further improve transportation safety.

Project technical approach

The innovative approach of the SMMART consortium is based on the combination of new technology wireless sensor network and smart tags capable of operating and communicating wirelessly in the harsh environment as on a vehicle's propulsion unit to monitor the usage and maintenance data throughout the life-cycle of critical parts and provide secure end to end visibility of the logistics supply chains.

Data are then processed in a database.

Innovative software functions associated with business process change will enable European companies to offer new, more flexible and customised support and logistics' services for the transport industry.

This approach implies the development of a multidisciplinary approach combining technological, organisational, management and social aspects in order to propose a global business process reengineering for the SMMART solutions implementation within the end-user community.
End-Users companies of the consortium are representative of the aerospace, automotive and marine sectors. These companies participate to general specification, project design reviews and evaluation of the developed solutions so as to ensure that the outcomes of the SMMART project are reused and become a normative solution.