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Facilitating Knowledge Exchange and Decision Making within Learning Networks[1]

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Abstract: The new knowledge-based economy necessitates increasingly the collaboration between different organisations. Despite the recent upsurge in knowledge management and decision support systems, the vast majority of these systems focus on individual organisations. This article introduces the concept of the Learning Network - inter-organisational structures, formally established to increase the participants' knowledge and innovative capability - and examines the main functions and roles of a Learning Network. It presents an integrated toolkit for supporting knowledge sharing and decision making in Learning Networks that consists of a software system and a methodology. It also briefly presents how the toolkit has been piloted in an automotive cluster. Finally it provides a constructive set of recommendations for using IT to support learning and knowledge sharing in Learning Networks.

Keywords: Learning networks, Learning Management System, Communities of Practice, Broker
Categories: SD I.2.6, I.2.4

1 Introduction – What is a Learning Network?

The formation of *Learning Networks (LN)* is an innovative scheme that has been introduced recently in several countries in Europe. The term learning network does not refer to networks where learning simply happens as it is the case with Communities of Practice – groups of people who share a concern, a set of problems,

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and who deepen their knowledge and learn by spontaneously interacting on an ongoing basis [Wenger et. al. 2002]. On the contrary, learning networks are *inter-organisational structures, formally established to increase the participants' knowledge and innovative capability* [Bessant and Francis 1999]. Previous research suggests that learning networks [Bessant and Tsekouras 1997]:

- are formally established and defined;
- have a structure for operation with boundaries defining participation;
- have a primary learning target;
- have formally developed processes that can be mapped on the learning cycle;
- have practical learning outcome than can be measured.

Examples of learning networks include professional associations (Institute of Mechanical Engineers, UK), sector based associations of firms with common interests in the development of the sector (Automotive Cluster of Styria, Austria), industry research and technology networks (The Welding Institute, UK), supply-chain initiatives (particular firms supplying to a major customer - e.g. Toyota – Kyokoryku, Japan), region based networks (3rd Italy), government-promoted networks (London Innovation and Technology Counselor's network, UK). A typology of LNs and examples of LNs currently in operation are presented in the Appendix.

Learning networks exploit the widely used approach termed "action learning" [Watkins and Marsick 1993], [ARL-Inquiry 1996]: the active participation, challenge and support of groups of employees facing similar problems. The whole idea of action learning is based on the combination of personal example (the action dimension) with the notion of learning community. This concept stresses the value of experiential learning and the benefits which can come from gaining different forms of support from others in moving around the learning cycle. Self-learning within a group has much to offer to organisational learning and competitive advantage; the experience of regional clusters of small firms provides one important piece of evidence in support of this. It has been increasingly recognised that organisational knowledge results from complex and multi-faceted interactions among different individuals.

Previous research has shown [Bessant and Francis, 1999] that the successful operation of a learning network requires:

- the intensive interaction of the people (from the broker and/or the members) with decision making authority (in order to avoid superficial learning);
- the interaction of the members to share knowledge and exchange experiences;
- the diffusion of captured knowledge within the organisation, by allowing all people to access the learning content in order to benefit a wider set of people and enable the conversion of learning outcome to specific changes in organisational routines.

In the remaining, this article examines the main functions of a LN. It introduces a conceptual model and presents an integrated toolkit for supporting knowledge sharing and decision making in LNs, that consists of a software system and a methodology. It also briefly presents how the toolkit has been piloted in an automotive cluster. Finally it provides a constructive set of recommendations for facilitating the operation of the main functions of LNs.

2 Knowledge Management Activities and the Role of the "Broker" in Learning Networks

[Snow et al 1992] introduced for the first time the concept of dynamic networks. They suggested that a dynamic network needs a coordinator, a net broker. Since the Learning Network concept belongs to the type of dynamic networks, the net-broker is a fundamental part of it. [Reiss 1997] noted that the role of the coordinator of a virtual network is primarily the management of synergy. [Hatch 1995] defined the net-broker as a facilitator and catalyst.

Brokers help companies to identify synergies, organise network activities and identify new business opportunities. Their task is to spread the network concepts, promote cooperation, organise groups of firms; in essence the broker is the organisation with the central responsibility for facilitating the network and the "members", usually but not always private firms, which are the primary beneficiaries of learning taking place within the network.

[Snow et. al. 1992] identified three net-broker roles, the role as architect, lead operator, and caretaker. In the role of the *architect*, the net-broker has to search and select suitable partner companies for the network community. The net-broker, acting as *lead operator*, is primarily responsible for the management and maintenance of the network community. Furthermore, the net-broker is responsible for the overall project management. On the other hand, either a partner company of the network or the net-broker itself takes over the project management of the network on the operational level.

Learning networks require continual enhancement if they are to operate smoothly and effectively. The *caretakers'* main duty is to support the process of 'learn to cooperate and cooperate to learn' [Prange et al. 1996]. Thus, the caretaker is engaged in nurturing and disciplinary behaviour. For example, if the net-broker notices that a member falls behind technologically, or in some other way devalues its usefulness to the network, the net-broker takes appropriate actions to rectify the situation. On the other hand, if the net-broker notes that a web member gains advantages at the expense of other partners, the net-broker's challenge is to point out the dysfunctional effects of such behaviour on the overall system and teach the offending web member how to behave more appropriately for the common good [Snow et al., 1992].

From a knowledge-based perspective, the net-broker acts as the knowledge manager of the LN [Franke 2000]. In order to identify the knowledge management activities of the net-broker it is useful to break down the whole net-brokerage process into the three main LN management processes:

- initiation of the network;
- maintenance of the network; and
- formation and operation of the network.

Knowledge management in the initiation phase. [Snow and Thomas 1993] noted that the primary role of the net-broker during the initiation phase is that of an architect. Similar to the design process of a building, the LN architect determines the design and resources needed to build a competitive partnership network. The net-broker searches for suitable candidates and selects those with complementary and competitive resource and knowledge bases. Since mutual trust is key for knowledge transfer, sharing, and generation. [Sydow 1996] stressed the importance to pay attention during the search and selection phase to choose candidates which are somehow similar, but also complementary. Too strong a competition between network members impedes the trust-building process, which would have negative effects on the whole evolution process of the LN.

Knowledge management in the maintenance phase. The maintenance of the learning network is an ongoing process; the net-broker acts mainly as a lead operator and caretaker. The key postulate of the LN is that member companies learn to cooperate with each other and in return that members learn from the cooperation with others. Therefore, the net-broker organises special interest groups where web members can learn and exercise their cooperation skills. Additionally, such special interest groups also provide a forum for members to learn from others or even to generate new knowledge through collaboration. Furthermore, the net-broker acts as caretaker in case a member suffers a lack of knowledge. The net-broker helps and advises the member in order to improve the knowledge base. Another task of the net-broker is to maintain the total knowledge base of the LN. Internally, the net-broker keeps track of the existing knowledge base of the individual partners and the LN in general. Externally, the net-broker observes markets and competitors in order to react to any changes. This could mean that the net-broker realizes that the LN misses knowledge in a particular field, i.e. new technology, new markets, etc. In order to fill the knowledge gap the net-broker could either search for new member companies keeping the required knowledge or the net-broker could organise training or seminars, which would enable existing members to acquire the missing knowledge.

Knowledge management in the formation and operation phase. The primary role of the net-broker during the formation phase is again that of an architect. Having identified an opportunity for sharing knowledge and learning, the net-broker defines a number of tasks, searches for the necessary knowledge within the LN and if it is necessary subcontracts external knowledge, and brings all the knowledge elements together. In case the net-broker also acts as the project manager, s/he takes over the role of the lead-operator. However, from a knowledge management perspective the integration of the dispersed knowledge is the major challenge. [Grant 1996] pointed out that transferring knowledge is not an efficient approach to integrating knowledge. He identified four mechanisms for integrating specialized knowledge [Tab. 1].

Rules and directive	The memorandum of understanding, defined on the LN level, determines the rules, regulations, and technical standards for the smooth operation of the network. The net-broker's duty is to monitor whether partner companies apply to the set of rules and directives and interfere if necessary.
Sequencing	Modular product design and concurrent engineering requires sequencing. The project leader has to determine what and when each expert team has to deliver their results.
Routines	Routines are defined as a complex pattern of behaviour [Winter, 1986], the sort of predictable behaviour of an actor in organisational settings. Trust, organisational culture and experience lead to routines. Basically, it is about knowing each other, the virtual web provides a forum for individuals to meet and to build social relationships before they work together either in special interest groups of virtual corporations. However, special interest groups are an excellent possibility for training and experiencing routines, which facilitate the later collaboration in virtual corporations.
Group problem solving and decision making	Since the net-broker has a neutral position in the acting network, the net-broker acts as moderator between conflicting parties. The net-broker acting as caretaker also supports the decision-making processes if necessary. Even if the net-broker is not involved in the leadership of the network the net-brokers' own best interest that the LN is successful. The net-broker also acts as caretaker during the dissolution phase of the virtual corporation; s/he is concerned with the storage of acquired and generated knowledge (i.e. database) and property rights of knowledge created.

Table 1: Mechanisms for integrating specialized knowledge [Grant 1996]

3 Information Technology Support for Learning Networks

Two fields, which are undergoing major IT-enabled rethinking and innovation are the ones of learning and knowledge management [Angehrn 2002]. Multimedia, groupware and the internet in general are stimulating the emergence of new models and systems aimed at improving the efficiency and quality of knowledge creation and diffusion processes [Angehrn and Nabeth 1997] which are being gradually adopted by educational institutions and corporations worldwide. However, 'globalising' or 'dissembedding' [Giddens 1990] knowledge is a challenge not always successfully met, and failure to consider the higher complexity of, for example, the endemic and existential components of knowledge, lies at the heart of many disappointments in experimenting with new models of technology-mediated learning and distributed knowledge management. For instance, specific IT tools for virtual teamwork offer

great opportunities for collaborative, distributed knowledge diffusion and creation whilst virtual teams are emerging as the favoured organisational arrangement for accessing and melding IT-averse knowledge components. We may distinguish between five different ways through which learning can be enhanced through information technologies within a LN:

Firstly, *decision-making* in LNs is critical for the success of learning since decision-making results to the specification of a variety of issues related to learning process and content. Previous research has shown that the most successful LNs allow a participative decision-making process, to capture the opinion of as many members as possible, with an increased interaction between them before the actual decision-making sessions. A collaborative platform has the potential to facilitate the decision-making process and allow the intensive communication among a large number of individuals and organisations.

Secondly, one of the most usual problems of LNs is the restriction of learning during the formally organised learning sessions of the network. If a manager is unable to follow one learning session due to time, travel or work restrictions, he/she has no way to access the missing part of his learning trajectory. Developing an appropriate Knowledge Management System (KMS) for the network can enable its members to minimize their losses from missing particular sessions.

Thirdly, even if somebody has been in the relevant learning session he/she has no way to *re-access the content of the learning session once he/she goes back to his/her organisation*. The development of a KMS can help the network to increase both the duration and the efficiency of learning. For instance, an appropriate system can help with preparing better and follow-up more sufficiently the actual learning sessions. Furthermore the exchange of knowledge can be expanded through a system in between the learning sessions increasing the efficiency of learning.

Fourthly, a very important barrier for increasing the efficiency of LNs is related to the difficulty of the individual managers who participate in the learning sessions *to pass the captured knowledge in the rest of the organisation*. A KMS which would allow more people from the organisations to access the issues discussed during the learning sessions can reduce significantly the diffusion barrier.

Finally, members that join a LN at a certain time cannot benefit from previous learning that had been taken place in the network, missing a valuable part of the learning trajectory. An appropriately developed system can provide training services to lately joined members enabling them to cover part of the lost ground. The system can incorporate functions to keep related documents and other material (e.g. training courses etc.).

The aforementioned issues are addressed by the Knowlaboration project [Knowlaboration 2002], a European research effort supported by the European Commission's IST programme, started in February 2002 and finishing in March 2004. The Knowlaboration project examines the business issues, the related concepts and the necessary technology for inter-organisational LNs. *The aim of Knowlaboration is to develop, apply, validate and exploit a dynamic tool-set (software platform and methodological guidelines) that will assist European inter-organisational learning networks to empower their members and the involved individuals to define, develop and manage the content and the process of their learning*.

4 A Conceptual Model for Learning Networks

The proposed conceptual model comprises of the key concepts, assumptions and terminologies that have been developed within the project.

The conceptual elements of a typical learning network are defined as follows: *organisational levels, activities/ processes , roles, resources and systems.* These five concepts are regarded as components of a relationship that are equally important and are dependent on each other as shown in [Fig. 1].

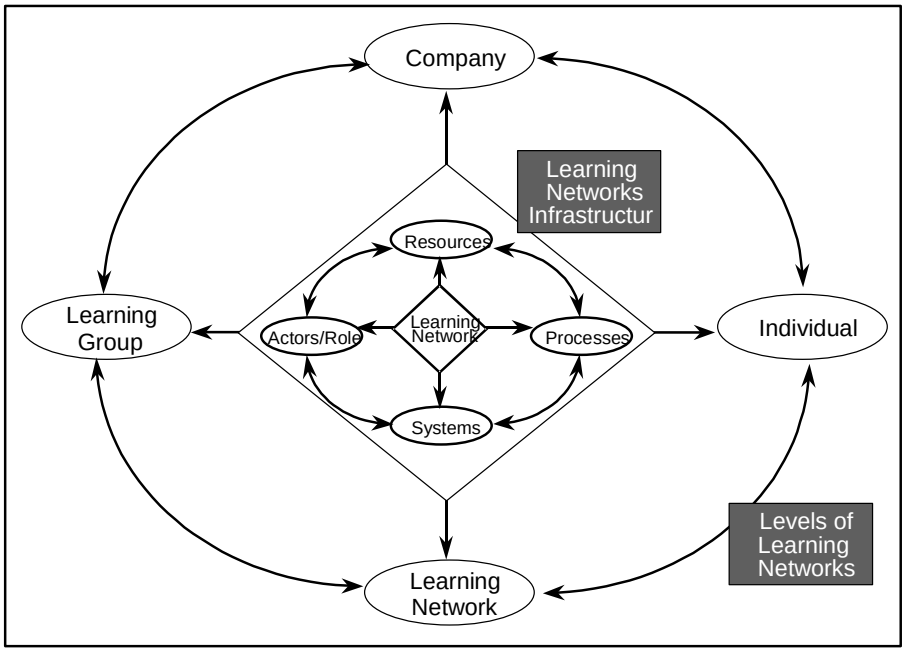

Figure 1: Knowlaboration Conceptual Model of Learning Networks

4.1 Learning Network Organisational Levels

As portrayed in [Fig. 1], LN activities take place at three different *organisational levels:*

- The first level is the level of a single actor (a *company* or an *individual* representing a company) taking part in the various activities of the network in order to satisfy some learning needs.
- The second level of analysis, the *learning group* represents the core of the LN because it is where actors commit themselves into the core learning activities.

- The third level is the *Learning Network* as a whole representing a dynamic entity, that consists of various learning groups.

4.2 The Learning Network Organisational Processes

Four key organisational processes are identified [Fig. 2] as vital in all LNs although the significance attached to each could differ between networks, or could even differ for the same network in different points of time.

These are: Decision Making Process, Collaborative Learning, Learning Dissemination and Harvesting Learning

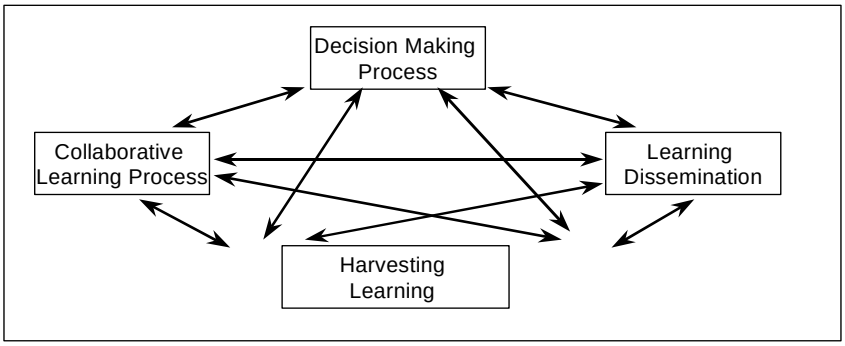

Figure 2: Learning Network Key Organisational Processes

- *Decision Making Process:* decision-making is a key process for LNs; understanding the network structure and decision making process is vital to understanding the network's operation.
- *Collaborative Learning Process*: during the collaborative learning process the network members engage in a peer learning/teaching process, which allows real issues to be addressed, in real time and all members are aiming to learn and share ideas and experiences.
- *Learning Dissemination*: this process involves the transfer of knowledge and learning taking place among the members of the learning groups to the rest of their organisations, the other network members as well as the outside world in order to attract new members.
- *Harvesting Learning* is a process that first aims to ensure that the learning in the network is harvested in the medium to long term in terms of practical benefit (for example application of the individual learning to the company level) and secondly aims to improve the operational processes of the groups and the network as a whole.

4.3 Learning Network Roles

In all networks, specific roles are defined among their members, in order to ensure the network's smooth operation. In a typical LN a set of common roles/actors can be identified as follows:

- *Network member:* a network member refers to the individual member or person representing their organisation in a LN.
- *Guest / Expert*: a guest is a non-network member who has been invited to participate in the network for a specific reason (such as presentation of a topic) and for a set period of time.
- *Group member:* a group member is a network member who belongs to a learning group of the network.
- *Group facilitator:* the group facilitator is a group member whose responsibility is to facilitate the learning activities of a learning group. In some networks, this role is referred to as Group Champion, or Group Leader.
- *Network moderator*: this is the network's manager or person who has been assigned to co-ordinate & manage the daily operations of the network. In some networks, the same role is referred to as Network Manager or Network Facilitator.

4.4 Learning Network Resources

In order to execute the processes and activities of a LN, we need people and means or resources. Resources refer to all necessary material or non-material inputs that are required in order to perform an activity within a LN. The most common resources that are essential in LNs are: learning/teaching material, different forms of presentations (formal or story telling), background/literature documents, member contact information / company profiles, audio & visual resources etc.

4.5 Learning Network Systems

Learning Networks adopt various technological /IT systems & infrastructures in order to support their activities. These range from the use of electronic mail & mailing lists, the use of websites, to document management systems, knowledge management systems.

5 An IT Platform and a Supporting Methodology for Learning Networks

In this section we provide an overview of the Knowlaboration toolkit, developed specifically to support the operation of LNs, and in particular the roles and processes at the discrete organisational levels outlined in [Section 4]. The Knowlaboration tookit comprises an IT platform and a supporting methodology aiming to help the customisation, deployment and operation of the IT platform in real-world environments.

5.1 The Knowlaboration IT Platform

The Knowlaboration IT platform comprises an internet-based portal that supports the management and planning of learning activities, collaboration via on-line workspaces that allow people to communicate and exchange information from different locations, the collection and categorisation of internal and external information, the re-use of stored knowledge and advanced search mechanisms.

5.1.1 Functional Features of the Knowlaboration IT Platform

From a functional perspective, the Knowlaboration IT platform is designed to support the:

Organisational levels/ structures of a LN: the Knowlaboration online platform is organised in different pass-word protected spaces/ areas that reflect the typical organisational layers of LNs: i.e. a network level area, group areas and a personal area for the individual network members.

Key roles involved in a LN: i.e. Network Member, Guest/Expert, Group Member, Group Facilitator, Network Moderator (for their description see [Section 4]). Each role has specific system rights & permissions that can be selected and modified by the network moderator, who has the sole authority to do so. Moreover, the network moderator can create new roles as required.

Key processes / activities of a LNs as follows:

- *Decision-making*: the system supports decision-making through forums, chats and voting forums. For example network board members can create a private group area and take decisions through group forums & chats. Network members can also participate in decision making through voting forums. For example, the network moderator or a network member can suggest a new learning event. The network members post their votes for this suggestion and the system automatically generates the results.
- *Collaborative learning:* the Knowlaboration system supports collaborative learning by supporting both online learning sessions as well as offline/physical learning sessions (in this case the pre-session & post-session activities). In the first case, the system enhances sharing of experiences, knowledge and resources through the document management , dynamic search , forums, chats, instant messaging, sms, e-mail & /mailing lists
- *Learning dissemination*: the Knowlaboration system support the dissemination of learning & knowledge to the other network members as well as non-network members through the: network news section, network calendar (where events are published), forums, chats, instant messaging, sms, e-mail & /mailing lists
- *Harvesting learning*: the Knowlaboration system supports the assessment of the learning impact on the network and its members with voting forums (as

presented above) and an online Evaluation tool through which the network moderator and group facilitators can post questions and see the aggregated results.

Key resources of LNs: the Knowlaboration system provides an online document management system for the organisation of documents as well as audio & visual resources. Moreover the system provides a members' contacts directory that is organised in a tree-like structure of all the companies/organisations involved in the network.

5.1.2 Technical Features of the Knowlaboration IT Platform

[Fig. 3] shows the several subsystems that constitute the Knowlaboration IT platform which are described in [Tab. 2]. [Fig. 4] presents the functionalities that the toolset provides to the five categories of users.

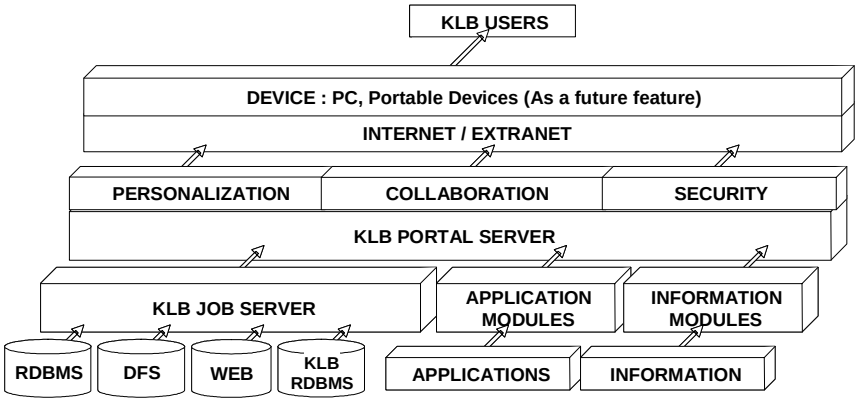

Figure 3: General Architecture of the Knowlaboration IT Platform

Subsystem	Description
1. Knowlaboration Portal Server	This is the core engine of the system. The Knowlaboration Portal Server provides Content Management facilities, Document Management facilities, a Personal File Manager, a Project Workspace, Search Facilities and a Reporting and for auditing the usage of the system.
2. Knowlaboration Job Server	Manages all the system's content by accessing different data sources. It also performs standard jobs in order to update the contents and the index that will be later used for searching the system.
3. Knowlaboration Security Engine	Manages all the system's security.
4. Collaboration Tools	These tools allow the collaboration of the users in several ways (synchronous / asynchronous) The Collaboration tools are: Mail, Forums, SMS messaging, Chat engine, Instant messaging, Video conferencing / Audio conferencing.
5. Personalization Engine	This engine allows the filtering of information to the user in such way that it meets personal criteria given by him/her. The personalization can extent to user groups (channels) or each user according to the level of IT knowledge each one carries.

Table 2: Knowlaboration Subsystems

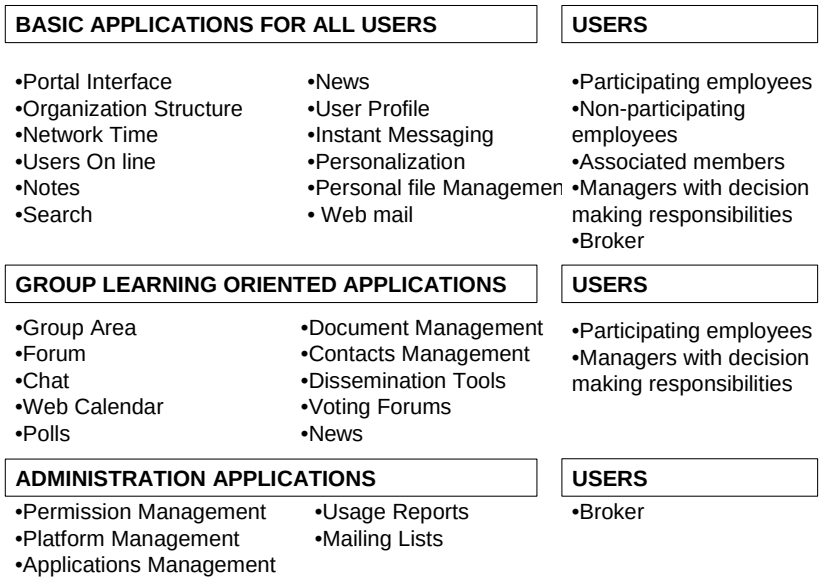

Figure 4: Knowlaboration Functionalities Supporting the Five Categories of Users

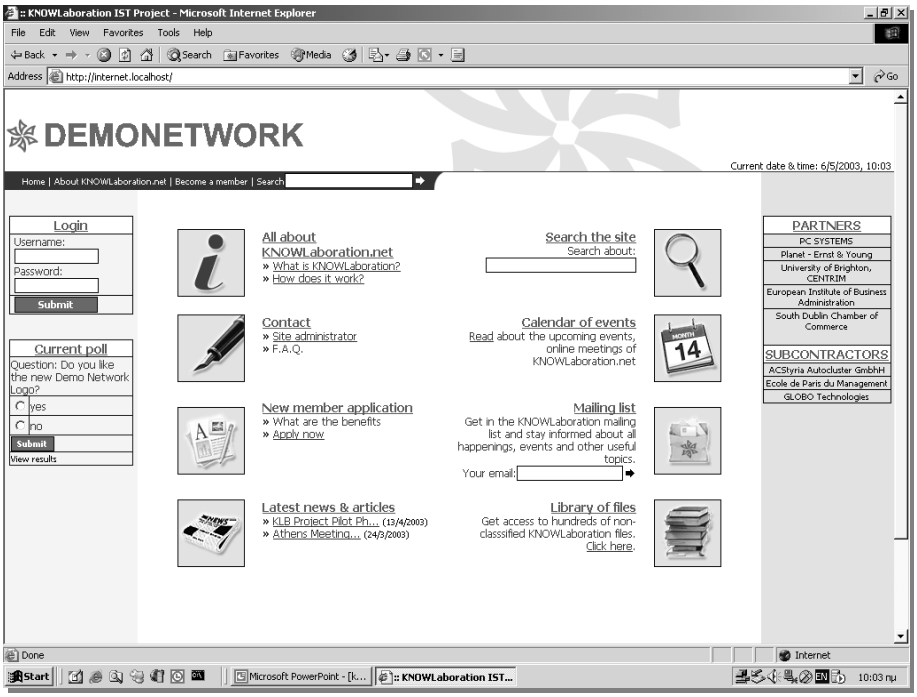

Figure 5: Knowlaboration Home Page

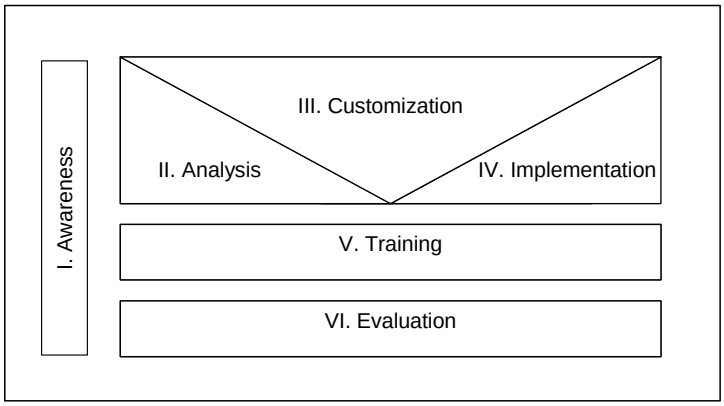

Figure 6: Phases of the Knowlaboration Methodology

5.2 The Knowlaboration Methodology

The Knowlaboration methodology incorporates guidelines for deploying the Knowlaboration system in a LN. It intends to assist the external consultant, network manager or appointed change agent (within a LN) to plan and successfully deploy the Knowlaboration system in a network.

The methodology is structured in a phased approach, comprising in total six phases as shown in [Fig. 6]. Moreover, the guide is designed to be modular so that a network can choose to start at different levels depending on its readiness and requirements.

The basic phases of the Knowlaboration Methodology are the following:

- Phase I - Awareness & Understanding: This phase is the starting point prior to any engagement to deploy the Knowlaboration system in a LN. Its main purpose is to create awareness about the Knowlaboration system and its value to LNs. A complementary objective is to develop a common understanding on the concepts and terminologies used throughout this Methodology.
- Phase II - Organisational Analysis: this is a critical preparatory phase for understanding the LN's specific needs/requirements and its readiness to introduce the Knowlaboration system. This analysis is performed in terms of the network's processes & activities, structure, actors/ roles, resources and organisational culture. The scope of this analysis is two-fold: (i) to collect the necessary data for customizing the Knowlaboration system based on the specific needs of the network, (ii) to identify a case-study within the network for pilot-using the Knowlaboration system prior to the roll-out of the system in the entire network.
- Phase III – Customisation: this phase refers to all the steps needed for customising the Knowlaboration tool for the specific network. The customisation of the tool will be based on the identified network needs & requirements derived from Phase II. Specifically, the Knowlaboration system will be tailored to support the processes & activities of the LN, its actors and roles.
- Phase IV – Implementation: this phase involves the deployment of the Knowlaboration system throughout the network. This deployment is carried out in a step-wise approach, starting from the pilot-use of the tool by a selected case-study within the network, which has been identified in Phase II. Subsequently, additional pilot case-studies are developed. Once the pilots are considered to be successful and fully operational, the Knowlaboration system is ready to be rolled-out and fully deployed throughout the network.

Two additional phases run horizontally throughout the previous three stages. These are the following:

- Phase V -Training: this phase includes training guidelines for the external consultant /LN change agent / LN moderator. The approach considered is based on the "train-the-trainer" philosophy whereby the LN moderator and LN Facilitators will subsequently train the network's members on how to use the system.
- Phase VI- Evaluation: this phase includes guidelines for evaluating the impact of the Knowlaboration tool on the LN. A number of evaluation schemes are proposed that can be applied at any phase of the deployment of

the Knowlaboration tool, e.g. in order to evaluate the tool prior to customizing it, evaluate the initial case-study, evaluate the tool's impact after its full deployment.

5.3 Relationship Between the Methodology and the IT Platform

[Tab. 3] and [Tab. 4] present how the Methodology is related to the Knowlaboration IT platform.

Phase	What is it used for?	Which are the prerequisites?	Relation to Knowlaboration IT platform
Awareness & Understanding	1. To create awareness about the Knowlaboration system and its value to LNs. 2. To develop a common understanding on the concepts and terminologies used throughout the Methodology.	There are no prerequisites.	Provides the terminologies used throughout the Knowlaboration system and the basis for adapting them if required based on the needs of the specific LN
Organisational Analysis	1. To collect the necessary data for customizing the Knowlaboration system based on the specific needs, roles and processes of the network. 2. To identify a case-study within the network for pilot-using the Knowlaboration system prior to the roll-out of the system in the network.	A sound understanding of what the Knowlaboration system offers and the concepts & terminologies used (from Phase I).	1. Provides requirements for the customisation of the Knowlaboration system in terms of actors & roles, suitable functionalities to meet the LN's needs, user interface and content. 2. Provides requirements for setting up a virtual group area in the system based on the needs of the selected pilot case-study.

Table 3: Relationship between the Knowlaboration System and Methodology

Phase	What is it used for?	Which are the prerequisites?	Relation to Knowlaboration IT platform
Customisation	To customize the Knowlaboration system according to the identified network needs & requirements derived from Phase II.	A set of clearly identified network needs & requirements derived from the Organisational Analysis (Phase II).	Customisation of the Knowlaboration system to support the network's processes (through the selection of specific functionalities), structure (network and group spaces/areas), and the system's roles (matching actual network roles).
Implementation	To deploy the Knowlaboration system throughout the network.	Customisation of the tool based on network's needs.	The actual usage & running of the customized system by the network members.
Training	To train the external consultant, LN change agent or LN moderator on how to use and deploy the Knowlaboration system in the network.	Complete customisation of the tool based on the needs of the network.	Training is supported by user manuals per each system role, which are are available online in the Knowlaboration system (as well as hard-copy in the Methodology).
Evaluation	To evaluate and measure the impact of the Knowlaboration system on the LN.	To have started implementation & running of the tool.	Evaluation is supported by an online evaluation tool that is incorporated in the Knowlaboration system, as well as the functionality of voting forums.

Table 4: Relationship between the Knowlaboration System and Methodology

6 Experiences and Lessons-learned from Piloting Knowlaboration

In this section we will briefly describe the characteristics of one LN studied within the project and the lessons learned from pilot testing the Knowlaboration platform in this network.

6.1 General Information on the ACStyria Network:

Network Identity: Auto Cluster (AC) Styria, is an organization of some 180 small to medium sized automotive suppliers in south central Austria who have come together to support the region and themselves.

Network Set Up: The Styrian government and the local business promotion agency co-financed and created the auto cluster in 1996. Their idea was to establish an independent association that would market with one voice the automotive skills and talents located in Styria. The main interests of the four main companies consist ACS were to improve the climate for inward investments, improve the performance of their supplier, improve the network between themselves, create network-qualified companies and finally improve the possibilities of a successful and reliable outsourcing.

Joining the Network: ACstyria serves as an information broker. Cluster managers sold the concept by outlining the four major areas of support they would provide: communication and information, cooperation, inter-organizational learning and public relations/marketing.

Funding orientation: ACS network is an organization that is not focused on profit; the main focus is to provide services to their members. The ACstyria worked with local universities and local government to create a junior college that reduces the time of study and emphasizes the practical application of knowledge.

Network management: Four full-time employees manage the work at ACstyria. If partners ask for a new product or service and it makes sense financially the cluster will respond.

6.2 Knowledge Exchange and Learning Activities in ACStyria:

ACStyria uses formal and informal communication and functions mainly as an inward looking network in the sense that it mainly addresses knowledge sharing within its members. Nevertheless, it also imports knowledge from outside the network and then transfers it to the network members.

In what is essentially a classic inter-organizational learning model, ACstyria facilitates learning by bringing together people who deal with the same problems but in different contexts. There are different kinds of learning subjects and members reduce the cost because they get experience from other companies.

In ACStyria learning takes place primarily through *face-to-face meetings/sessions organized* by the cluster. Member companies organize sessions through ACstyria in order to present their products and possibly to sell them to other network members. *Learning sessions* focus either on an individual company and/or direct suppliers of a big company. In these sessions knowledge exchange occurs primarily in an informal way (tacit to tacit knowledge).

Other learning mechanisms include *factory visits, seminars* and *workshops.* Currently ACstyria is exploring as a way of generating income and meeting customer needs through *training.* Training, in fact, appears to be one of the most pressing issues for partners who are mainly concerned with practical issues, such as: value analysis, storage logistics, general survey of the logistic systems, e-procurement, future of virtual engineering, benchmarking lack of IT-specialists and customer – supplier contracts.

Moreover, ACStyria has created *special working/learning groups* to further segment companies by their major concerns. Examples of such working groups are the Automotive Quality Management Club (members of which get together to discuss quality management developments in the automotive industry), the Controller Group (who discuss automotive control issues), the Human Resources Club and the Future Factory Club (discuss new products). These learning groups meet on a regular or ad hoc basis, in order to discuss a specific topic and exchange ideas. Moreover, in some meetings, external experts are invited to make a presentation on specific topics.

6.3 ACStyria's Pilot Use of Knowlaboration

In order to pilot test the Knowlaboration platform in the ACStyria network, a pilot group was selected in order to develop a focused and measurable pilot.

Information on the pilot group selected: The Controller Group was selected as the pilot group for Knowlaboration, due to the representative size and activities of the group. The Controller Group comprises of 15 members and its activities are organized/coordinated by a Group Leader. All members of the group are in the position of Controller in their respective companies. The members of the group meet on a monthly/bi-monthly basis, in order to discuss common problems faced related to automotive control issues. The aim of their meetings is to solve problems of individual members through the transfer of knowledge among members. Occasionally experts are invited to present specific topics.

How the Knowlaboration platform was used: The Controller Group members have used the online Knowlaboration platform for a period of 3 months (at this stage of the project). The platform has supported the planning and evaluation of their monthly meetings/learning sessions mainly through the platform's dynamic calendar (that can make a link to meeting agendas and presentations), the news section and to a less extent through the online forums.

Specifically, the members have used the platform in order to learn about forthcoming meetings, propose topics for a meeting and obtain meeting agendas. After a meeting took place, members have access to the presentations made during the meeting (from the documents library) and have the possibility to evaluate the meeting (through the online forums).

Another platform tool that is often used by the Group Leader, are the mass mailing lists, in order to inform all members on a topic or new event.

Insights & lessons learned from the pilot: The insights & lessons learned from the pilot use of the Knowlaboration platform by the Controller Group are as follows:

The group members used the platform mainly near (before and after) the scheduled group meetings took place in order to obtain relevant information. In other words, the Knowlaboration platform can effectively support the organization and planning of events.

Moreover, the platform offered effective communication tools (mass mailing lists, instant messages) for the Group leader as well as among group members.

Another tool that met the needs of this group was the documents library functionality. The Group leader was able to publicize documents produced in the meetings (presentations etc) in an organized and easily accessible manner.

On the other hand, the forum and chat functionalities did not become part of the users' "habits". Perhaps, this was due to the lack of time to invest in such activities or even the lack of interest to interact in an online manner.

In conclusion, the key lesson learned is that the Knowlaboration platform in order to be effectively deployed in a network, has to meet the needs of the specific network. In some networks, certain aspects of the platform are destined to be used more or less than in another network. The crucial factor is to identify the specific needs of a network and customize the platform in a way that meets these needs. This is why the customisation of the Knowlaboration platform constitutes an important phase and element of the Knowlaboration Methodology (as presented in [Section 5]).

7 Conclusions and recommendations

From our experience and interaction with LNs in the Knowlaboration project we have derived a constructive set of recommendations for effectively deploying IT in networks. These design principles are not recipes, but rather embody our understanding of how modern IT can help LNs.

The first recommendation highlights the need to support the three main LN management processes:

- The *initiation phase, that* concerns itself with the setting up of the LN. The IT tools should provide: a detailed checklist with which potential community-initiators, mechanisms to identify the type of members that such a community would require and planning facilities to ensure the workability of the community.
- The *maintenance and improvement phase, that* concerns itself with sustaining the momentum of the community that has been set up and sustain active knowledge sharing within the community. The IT tools should provide: facilities to support the maintenance and growth of the network and member management facilities that will help users integration for the main activities of the network. Typical features of the kind include synchronization of calendars and synchronous events. Other useful facilities aiming at promoting and marketing the network to relevant stakeholders include invitations, minutes of recent events and hot topics.
- Facilities during the *operation phase* should monitor if the individual members can see benefits for themselves and their business.

The second recommendation refers to the integration of the system with existing business processes. Participation in a LN usually competes with other priorities in the lives of members. It is crucial to make participation as easy and efficient as possible. IT therefore should make participation easy, provide time and attention management, through functionalities such as personalized knowledge/application portals, subscriptions, tours of new activity and archiving of interactions, integration with work systems.

The third recommendation clarifies that the LN system should address the issues of presence, visibility and motivation. Personal identities are a crucial aspect of participation. Members bring their identities to the community and their participation both develops and shapes their identities. IT can help with features such as member profiles, ranking and preferences and presence awareness. A collaborative community such as a LN has also a sense of communal identity that is primarily formed by cultivating "alive and real" relationships between the members. The use of personal profiles in the IT system can reveal relationships, support private interactions and interpersonal and mentoring relationships.

Fourthly, a LN should thrive to deliver value both to their members as well as to the stakeholders and the network as a whole. In the short-term, members need to find immediate value in their participation. Preserving the time of experts within the network is for instance an important concern. The IT system should provide mechanisms for asking questions, lists of Frequently Asked Questions, databases of answers, intelligent access to experts and brainstorming facilities. The value that the network delivers also has a long-term dimension. It derives from a sense of accumulation over time. In order to define ''best practises'' the IT system should provide repositories for artefacts, taxonomies, search mechanisms and learning agenda.

The value of belonging to a LN derives not only from having access to peers, but also from having access to the leading edge in the broader world. Therefore as a fifth recommendation, we stress the need for IT facilities that assist in the direction of providing connections to the world include: what is happening, what is hot in the field, new developments, new technologies, evaluation and reviews, external experts, reference material, news and announcements of external events, directory of external experts, links to other sites and library of references.

LNs usually have members who take an active role in cultivating the community and may participate in the decisions that affect the operation of the network. The sixth recommendation is about offering a variety of administrative tools to monitor and configure the use and effectiveness of the network space. Typical features of this kind include: logs and statistics for monitoring, polling and voting facilities, assessment tools and surveys, performance indicators and finally switches and policy enforcement algorithms.

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Appendix: A Typology and Examples of Learning Networks

A typology of Learning Networks is presented based on the "learning focus" or learning target of a network, which is the most "evident" feature of networks. Moreover, for each type of network, examples of learning networks in operation across Europe are provided.

Type of learning networks	*Learning focus*	*Examples*
Individual development networks (topic based)	These are the most common form of networks. They consist of individual persons who have voluntarily set up a network in order to enhance their knowledge and exchange ideas on topics of common interest.	Ecole de Paris (France) World Association for Online Education CIRCA (UK)
Professional development networks	Offer training or learning relevant to people's professional development, knowledge and skills. Their members are individual persons (professionals) or companies.	Mechanical Engineers' Associations Accountants' associations Chambers of Commerce and Industry London Innovation and Technology Counsellor's Network (UK)
Corporate learning networks	Inter-organisational networks within multinational or large corporations / group of companies that promote the transfer of know-how and training of employees. Usually consist of subsidiaries or branches of multinationals located in different countries or different regions within a country.	Rolls Royce General Motors AirBus British Airways
Sector / Industry based networks	Network of firms with common interests in the development & competitiveness of a sector or industry, such as trade associations, industrial clusters, and supplier development clusters (firms in the same industry supplying to a major customer) and sector-based research organisations.	Trade associations (e.g. Swedish Trade Council) Automotive Cluster of Styria (Austria) World Bank Financial Sector Learning Program Toyota Suppliers Club (South Africa)
Region-based networks	Network of firms or organisations with common interests in the development & competitiveness of a region. Aim to enhance knowledge around themes of regional interest. Note: many regional networks can also be sectoral or professional development networks.	Rotherham Manufacturers Group (UK) Automotive Cluster of Styria (Austria) Kent Senior managers' network (UK)