WHAT DOES IT MEAN FOR AN ORGANISATION TO BE INTELLIGENT?

MEASURING INTELLECTUAL BANDWIDTH FOR VALUE CREATION

SAJDA QURESHI, ANDRIES VAN DER VAART, GIJS KAULINGFREEKS,

GERT-JAN DE VREEDE, ROBERT O. BRIGGS, JAY NUNAMAKER

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Abstract	The importance of electronic collaboration has risen as successful organisations recognize that they need to convert their intellectual resources into goods and services their customers will value. The shift from personal computing to interpersonal or collaborative computing has given rise to ways of working that may bring about better and more effective use of intellectual resources. Current efforts in managing knowledge have concentrated on producing, sharing and storing knowledge while business problems require the use of these intellectual resources to create value. This paper draws upon Nunamaker et. al.'s (2001) Intellectual Bandwidth Model to measure an organization's potential to create value. Following an analysis of initial data collected at the Netherlands branch of Cap-Gemini Ernst & Young, conclusions are drawn with respect to what it means for an organisation to be intelligent and how such organisations can create value through the use of information and collaboration technologies to increase its intellectual bandwidth.	
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What does it mean for an Organisation to be Intelligent?

Measuring Intellectual Bandwidth for Value Creation

Sajda Qureshi
Information and Decision Sciences
Erasmus University Rotterdam
Burg. Oudlaan 50, 3000 DR Rotterdam, The Netherlands
squreshi@fac.fbk.eur.nl

Andries van der Vaart and Gijs Kaulingfreeks
Cap-Gemini Ernst&Young
Insurance and Social Security
Gebouw 2 Daltonlaan 200, 3584 BK Utrecht, The Netherlands
andries.vander.vaart@cgey.nl , gijs.kaulingfreks@cgey.nl

Gert-Jan de Vreede
Faculty of Technology, Policy and Management
Delft University of Technology
The Netherlands
devreede@tpm.tudelft.nl

Robert O. Briggs
GroupSystems.com
1430 E. Ft. Lowell Rd. Suite 301. Tucson, Arizona 85719, USA
bbriggs@GroupSystems.com

Jay Nunamaker
Center for the Management of Information, University of Arizona
Tucson, Arizona 85721, USA
jnunamaker@cmi.arizona.edu

Abstract

The importance of electronic collaboration has risen as successful organisations recognize that they need to convert their intellectual resources into goods and services their customers will value. The shift from personal computing to interpersonal or collaborative computing has given rise to ways of working that may bring about better and more effective use of intellectual resources. Current efforts in managing knowledge have concentrated on producing, sharing and storing knowledge while business problems require the use of these intellectual resources to create value. This paper draws upon Nunamaker et. al.'s (2001) Intellectual Bandwidth Model to measure an organization's potential to create value. Following an analysis of initial data collected at the Netherlands branch of Galaxy Corporation, conclusions are drawn with respect to what it means for an organisation to be intelligent and how such organisations can create value through the use of information and electronic collaboration technologies to increase its intellectual bandwidth.

1. Introduction

For modern organisations, knowledge is increasingly being seen as a strategic resource that needs to be created and harnessed effectively in order for the organisation to survive and achieve competitive advantage. It is believed that managing this strategic resource can enable an organisation to achieve particular benefits such as minimization of costs, innovation of products, product development procedures, improved quality, flexibility in a dynamic market and improved customer service. For organisations to be successful, they must be capable of continuously acquiring, assimilating, disseminating, sharing and using knowledge (Senge 1990, Huber 1991). Knowledge Management Systems (KMS) target professional and managerial activities by focusing on creating, gathering, organizing and disseminating an organization's "knowledge" as opposed to "information" or "data" (Alavi and Leidner, 1999). The term Business Intelligence is lso being used to describe such activities. Information technology which support knowledge management, such as datamining, groupware, document management and search and retrieval applications, are widely available and already exist in many companies (Hibbard and Carrillo, 1998). Organisational memory information systems have been important to organisations because knowledge is a key component to competitiveness (Stein and Zwass 1995).

Efforts in organisations attempting to manage knowledge have concentrated on codifying or explicating knowledge and propose infrastructures for storing knowledge as well as refining, managing and distributing it (such as described in Zack 1999, Hansen *et al.*1999). While these efforts are valuable in themselves, practical considerations such as motivating employees to add to such databases and use them in their "knowledge work" have thwarted the success of such codification strategies. It has been suggested that problems which stem from traditional business environments that hoard knowledge is an obstacle which is preventing knowledge management efforts being a complete success (Hibbard and Carrillo, 1998). In addition, Vance (1997) suggests that the reason information and knowledge may not be easily transferred from the holder to the person needing it may be because much of it is tacit, and therefore inarticulable by the holder.

Despite these problems with knowledge management efforts, many successful enterprises today can be considered "intelligent enterprises" as they convert intellectual resources into

a chain of services in a form most useful for certain customers by selling the skills and intellects of key professionals (Quinn, 1992). The effective performance and growth of knowledge intensive organisations requires integrating and sharing knowledge, which is often highly distributed (Zack 1999). The distributed knowledge is often personalized and resides in the pockets and communities within and outside of the organisation. Tacit knowledge is personal, context specific and therefore hard to formalize (Polanyi, 1966). Personalized knowledge is subjective, experiential and lies in mental models containing cognitive elements such as paradigms, perspectives and beliefs that help individuals perceive and define their world and lies in mental models containing technical elements such as skills and expertise. This knowledge is also seen to form the core competence or intellectual capital of the intelligent enterprise and has to be supported if the intelligent organisation is to remain competitive (Quinn 1992). If this is true, then what does it mean for an organisation to be intelligent?

This question is investigated in this paper by first understanding how electronic collaboration may be used to harness intellectual capital. To this end, Nunamaker *et. al.* (2001)'s Intellectual Bandwidth Model is introduced. Second, a methodology for measuring Intellectual Bandwidth is developed. Third, the results of a pilot study conducted at the Netherlands branch of Galaxy Corporation are described and analyzed. Finally, conclusions are drawn with respect to what it means for an organisation to be intelligent and how such organisations can create value through the use of information and collaboration technologies.

2. From Collaboration to eCollaboration and Intellectual Bandwidth

I key part of collaboration is the act of constructing relevant meanings that are shared by all parties involved in achieving congruent goals. The act of collaboration is the act of shared creation and/or discovery in which two or more individuals with complementary skills interact to create shared understanding that none had previously possessed or could have come to on their own (Schrage 1990). Collaborative technologies have changed the contexts of interaction completely (Schrage 1990). Many conversations can take place at the simultaneously. Ideas generated by each contributor appear immediately on the screens of all other contributors, inspiring conversations within the group. Ideas are both external and manipulatable. People can

create icons to represent ideas and concepts which others can modify or manipulate until they become both community property and a visual part of the conversation.

Electronic collaboration is the use of networking and collaborative technologies to support groups as they create shared understanding and work to attain their goals. eCollaboration fosters new kinds of collective work made possible with advanced collaboration technologies. The use of collaborative technologies enable conversations with new kinds of properties- these shift from being fixed to being externalized and negotiated (Shrage 1990 p.102). In addition, Nunamaker *et al.* (2001) suggest that there are three levels of Collaborative Effort that may be made more effective through the use of collaborative technologies:

1. With *collective effort*, people work on their own. Group productivity is simply the sum of individual efforts. Technologies such as shared network directories, word processors, and spreadsheets may be used effectively to support collective efforts.

2. With *coordinated effort*, people make individual efforts, but they have critical hand-off points. Productivity depends on the level of individual effort and on the coordination among those efforts. E-mail, team databases, and workflow automation may support coordinated efforts.

3. With *concerted effort* all members must make their effort in synchrony with other members. The performance of any member directly affects the performance of the other members. There are no individual efforts. Collaborative reasoning tools may be used to enhance the value created by concerted efforts. Examples of e-collaborative reasoning tools include electronic brainstorming tools, group outlining tools, and idea categorizers.

Electronic collaboration has made it possible to harness intellectual resources across space and time. It has given the concept of work a new meaning: anytime, anywhere, in real space or cyberspace (Cascio 1999). For many employers the virtual workplace, in which employees operate remotely from each other and from managers, is a reality now and indications are that it will become even more prevalent in the future. Holsapple and Whinston (1987) suggest that as organisations will be increasingly regarded as joint human-computer knowledge processing systems, they will be viewed as a societies of knowledge workers who are interconnected by computerized infrastructures. Indeed Venkatraman and Henderson (1998:34) add that "*information*

technology now enables knowledge and expertise to become drivers of value creation and organisational effectiveness".

Nunamaker *et al.* (2001) suggest that the extent to which an organization can create value from information technology is bounded by its *Intellectual Bandwidth*, which is its collective potential to acquire information, make sense of it, and take action with respect to a goal. *The Intellectual Bandwidth of an organization is its ability to bring knowledge to bear on the task at hand. It is the product of the organization's ability to assimilate available information, and the ability of its available people to collaborate. Information technology and collaborative technology both can enhance the Intellectual Bandwidth of the organization. This model assumes the availability of significantly more information than an individual could reasonably assimilate* (Nunamaker *et. al*., 2001). The Information Bandwidth Model is illustrated in figure 1 below:
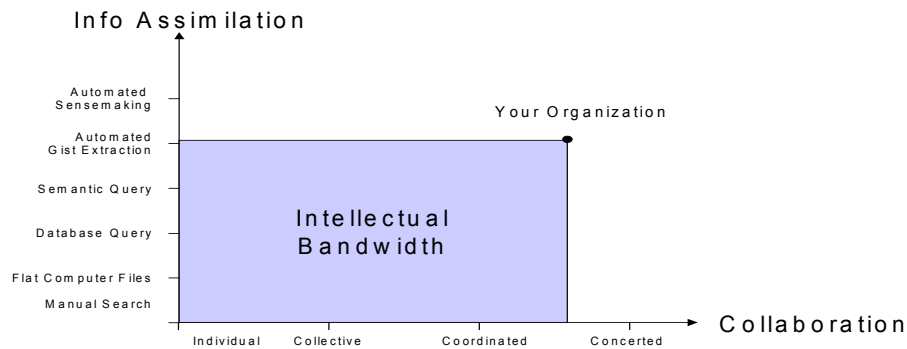
Figure 1: The Intellectual Bandwidth Model *(Source: Nunamaker et. al. 2001)*

The Intellectual Bandwidth model incorporates firstly, the information and intellectual resources available to be accessed and assimilated by the organization's employees and then secondly, the collaborative sense making which may lead to the generation of collective action. An understanding of Intellectual Bandwidth in an organisation can provide valuable insight into the value that could be created from the available information and intellectual resources. This understanding can assist in overcoming many of the problems associated with current knowledge management efforts. In the following section a methodology for measuring Intellectual Bandwidth in organisations is developed.

3. Methodology to Ascertain Intellectual Bandwidth

As Intellectual Bandwidth is a theoretical notion with little specific empirical grounding, a qualitative research strategy is deemed appropriate. This phenomenon is also related to the nature of experiences in groups and organisations. The ability of an organisation to harness its intellectual resources to create value is established by measuring its Intellectual Bandwidth. While the Nunamaker *et. al.* (2001) model provides a rich conceptual description of Intellectual Bandwidth, it provides no mechanism for measuring Intellectual Bandwidth in a group or organisation. According to Nunamaker *et. al.* (2001), Intellectual Bandwidth derives from (1) access to the necessary information and communication support to provide content for the reasoning processes, and (2) ability to create, sustain, and then change their patterns of cognition and group dynamics. This definition is used as the basis for our initial conceptualisation of Intellectual Bandwidth.

In order to guide our understanding of Intellectual Bandwidth, theories and concepts are used that relate to a group or organization's collective potential to acquire information, make sense of it and take action with respect to a goal. These may be divided into concepts that enable us to understand 1) information assimilation, 2) collaboration or the creation of shared understanding and 3) collective patterns of interaction. They are described in the following sub-sections.

3.1 Information Assimilation

The level of information assimilation can be ascertained by a usability study of the available information and communication technologies. These technologies may be used to share information through personal communication, documentation sharing, discussion groups and/or project coordination tools. Information may also be assimilated through technologies that enable information to be searched, stored, retrieved, transformed and displayed. These range from automated search facilities to semantic query and automated sensemaking tools and techniques.

3.2 Collaboration

The conditions necessary for the successful creation of shared understanding in electronic environments are described by Scharge (1990), Qureshi and Bogenrieder (1999), Byrne (1993), and Mowshowitz (1997) to be the following:

The existence of a shared space where different perspectives may be shared and shared understandings generated.

There is a congruent purpose (such as to solve a problem, create or to discover something) or goal-oriented virtually organized activity that has to be managed.

Occurs within constraints including limits of expertise, time, money, competition and cultural considerations and there is a need to share these resources.

Collaboration is seen to be a legitimate way of working and forms part of the organization's accepted work practice.

The relationship between these factors is illustrated in figure 2.
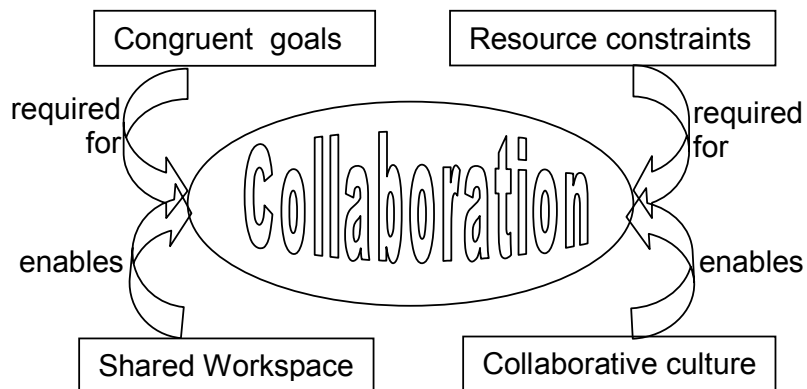
Figure 1: Conditions for Successful Collaboration

Uncovering the above factors in an organisation provides us with a measure of the extent to which the conditions are present for the creation of shared understanding. This provides a means of assessing the extent to which collective, coordinated, and/or concerted collaborative efforts may take place. The creation of shared meaning in organizations is understood to bring about organizational learning (Fiol and Lyles (1985) and Hedberg (1981)). According to Duncan and Weiss (1979) organizational learning consists of producing communicable, consensual and integrated knowledge.

3.3 Emerging Patterns of Interaction: Capitalization of Intellectual Bandwidth

The extent to which intellectual bandwidth is actually used or capitalized should also be ascertained. The extent to which patterns of interaction are actually created, sustained, and then changed to achieve a goal can then be ascertained by considering social interaction. Boland and Tenkasi (1995) adopt the 'symbolic' view of communication (Alvesson and Berg, 1992) in which social interaction is perceived as

the ground on which meaningful information flow takes place. Social interaction also creates meaning from the perceived information (Weick and Westley, 1996) which Boland and Tenkasi (1995) refer to in this context as `perspective taking'. Taken a step further, social interaction may occur within communities bounded by practice or common interests (Lave and Wenger, 1991, Brown and Duguid, 1996). In drawing upon the community of practice literature, emerging patterns of interaction may be measured in terms of the following dimensions (Wenger 1998):

1. Evolving forms of mutual engagement based on shared practice. May be described in terms of reciprocity (Bogenrieder, in press).

2. Creation among participants relations of mutual accountability that become an integral part of the practice.

3. Development of shared communication patterns in terms of repertoire, styles, and discourses.

These dimensions of interaction enable an understanding of how Intellectual Bandwidth may enable value to be created in a group or organisation. The process needed to create value through the minds of a group or organisation's members may be ascertained through these three dimensions.

4. Research Approach

Case study research can enable theory to be further developed through a process of disciplined imagination or Sensemaking (Weick,1989). Building theory from case study research requires a definition of the research question, case selection, instruments for data collection, enter field, analyze data, shape hypothesis, enfold literature and reach consensus (Eisenhardt, 1989). Within a qualitative case study, an investigation of Intellectual Bandwidth lends itself well to a grounded theory approach. A grounded theory approach entails the discovery of theory from data systematically gathered and analyzed from the research process (Strauss and Corbin 1998, Glasser and Straus 1967). Theory generated from data can usually not be completely refuted by more data or replaced by a another theory. Within this approach, theory is discovered first, through conceptual categories and their conceptual properties; and second, through hypotheses or generalized relations among the categories and their properties (Glasser and Straus 1967).

Theoretical sampling is used to collect, code and analyze the data. On this basis, the researcher decides what data to collect next and where to find it in order to develop the theory further (Glasser and Straus 1967). Data is gathered through interviews, observations and transcripts of electronic collaboration. Conceptual categories and their properties are identified in the interviews and transcripts of electronic collaboration using Straus and Corbin's (1998) open coding method. During open coding, data are broken down into discrete parts, closely examined and compared for similarities and differences. Events, happenings, actions and interactions that are found to be conceptually similar in nature or related in meaning are grouped under more abstract concepts.

4. 1 The Research Setting: Galaxy Corporation The Netherlands

The case chosen to measure Intellectual Bandwidth is Galaxy Corporation. This is a multi-national information technology and business services organisation that is the result of a merger between Starnet and Global Consultancy. The concept of an intelligent enterprise rings true to Galaxy Corporation as it provides customized services by selling the skills and intellects of its key professionals. The merged organisation, Galaxy Corporation have a significant presence in 20 countries in Europe, the USA and in Asia. The Galaxy Corporation Group businesses are dynamic ranging from management consulting, information technology consulting, systems integration, to software development, outsourcing and training. By June of 2001 the Group had close to 60,000 employees across the world.

Electronic collaboration at Galaxy Corporation has been well supported in terms of collaboration technologies that run on the company's intranet. The intention of its management is that the collaborative technologies should help professional consultants work across space, time, national cultures and organisations, bringing together their diverse skills and intellects to develop customized products and services. An investigation of Galaxy Corporation's Intellectual Bandwidth, based on electronic colloboration could provide insight into the value that the company can create through the use of its intellectual resources and the collaborative technologies that could support the organisation in its value creation.

5. Results and Analysis

The results are derived from data collected, from May 2000 until December 2000 in the Netherlands, to explore electronic collaboration using Starnet'sintranet facility called CapCom. The data comprising of open interviews and transcripts of electronic collaboration was analyzed using the methodology for ascertaining Intellectual Bandwidth developed in section three. In addition to our data, this analysis also draws upon the results of a usability survey conducted in 1999, by Starnet, prior to the merger with Global Consultancy. This survey evaluates employee satisfaction with respect to information provision, the communication and collaboration facilities available through the company's intranet.

5.1 Information Assimilation

The information and communication facilities available on Starnet's intranet, known as CapCom, are the Knowledgebank which is database of documents and other information, email, newsgroups and homepages relating to various functions, units and training programs. This is not a standard intranet application as more sophisticated tools are available such as the Knowledge Marketplace, Virtual Rooms, and My Galaxy. In addition, Sibylle is a sophisticated natural language query tool available to all the Galaxy Corporation consultants. According to a survey carried out of Starnet's Netherlands employees, 70% of the respondents (i.e. 245 out of 350) use the homepages frequently. 61.5% use email frequently, 44.6% use the newsgroups frequently and only 19.8% use the Knowledgebank frequently. 78% of the respondents said they preferred to search for the information that they need (using Sibylle) and read the newspages/newsfeeds. The electronic newsdesk, the FTP site and the division and unit pages rate higher (average 6,8 out of 10) than the other information and communication tools. The more sophisiticated tools as Knowledge Marketplace and Virtual Rooms were not available at the time of the survey.

An example of how information assimilation can be personalized is through My Galaxy. Accessible through the company's intranet, My Galaxy contains the following items:

- On line newspapers published internally by Galaxy Corporation and publicly available on line newspapers
- Own selection of newsgroups and of intranet and internet sites
- Own address book with phone numbers and e-mail accounts

- NetMeeting with video conferencing or on-line talk
- All the events organized by Galaxy Corporation
- Entrance to the knowledge bases available within Galaxy Corporation
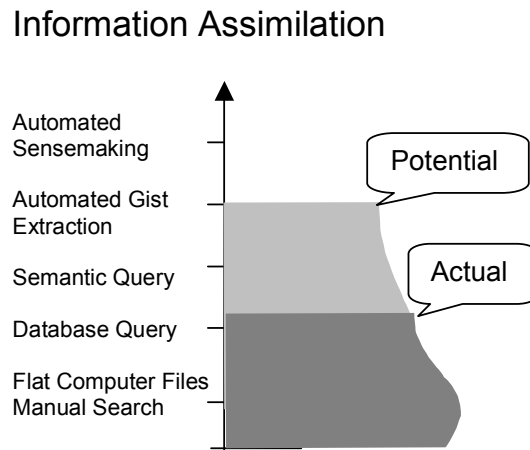- Entrance to the virtual project spaces that the consultant is working on
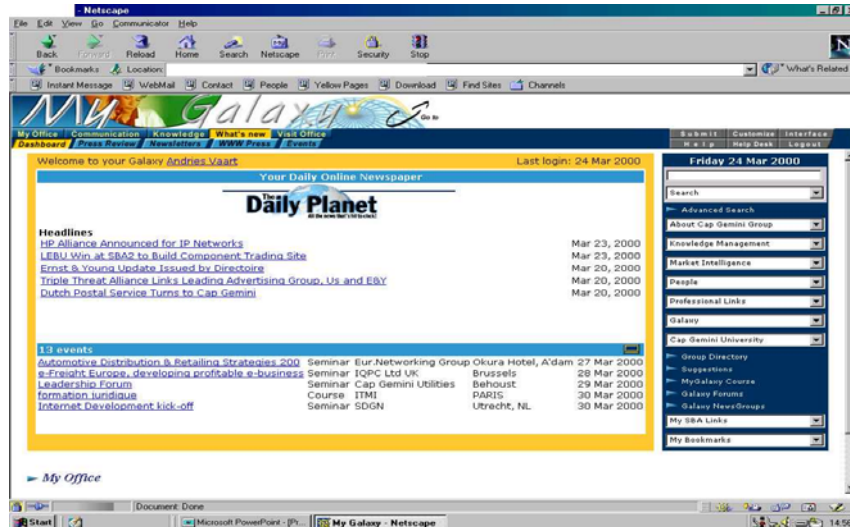
Figure 3: My Galaxy's Personalised Information Space

Consultants can make My Galaxy fit their personal information and communication needs. An example of a personalized virtual workspace using My Galaxy is illustrated in figure 3. For every functionality that is available on My Galaxy, consultants can customize the way in which it is used. The appropriation of this technology leads to the emergence very personalized workspaces. Consultants make their own selection of on line newspapers (a few are standard), own newsgroups, Internet and Intranet sites and choice of communication and collaboration tools. Once a consultant has configured My Galaxy, he or she can work at *any place, at any time, on any computer* in the world (an Internet connection is all that is needed to find his or her galaxy). The configuration of every personalized workspace is stored on the My Galaxy server in Paris.

Measuring information assimilation at Galaxy Corporation requires an assessment of the technologies available for information assimilation. Both technologies for personal information sharing and the extraction of relevant information are available. There is also a degree of gist extraction in the natural language query tool known as Sibylle. However, a large amount of mental effort is required for organizational

members to find and understand needles of information buried in haystacks of vast data stores. This is because despite the availability of the above technologies for information assimilation, employees complain that they regularly loose themselves in mass of information available on the internet. This suggests that actual information assimilation at Galaxy Corporation, in the Netherlands appears to be low. However, the potential for information assimilation is much higher. This is illustrated in figure 4.

Information Assimilation

Automated Sensemaking
Automated Gist Extraction
Semantic Query
Database Query
Flat Computer Files Manual Search

Potential

Actual

Figure 4: Information Assimilation at Galaxy Corp.

5.2 Electronic Collaboration

The potential for collaboration may be measured by extent to which there are conditions for the creation of shared meaning. As the focus of this paper is electronic collaboration, the conditions for the creation of shared meaning through the use of electronic communication technologies are measured. These conditions are described in the following paragraphs.

1. *The existence of a shared space where different perspectives may be shared and shared understandings generated.* Virtual Office is an electronic shared space used by Galaxy Corporation professionals who work on large projects that span a number of different sites in one country or the world. Virtual projects is a web enabled communication tool accessible at the project level. It is combined with my Galaxy and contains several levels of information relating to the project(s) being undertaken,

workpackages or workstreams, and personal information relating participants within projects; and several information ordering tools known as news, notes, files/documents, events, activity/to do list and forums. A special project administrator makes a list of members on the project. These may be Galaxy Corporation professionals and also members of the Galaxy Corporation's client organisation. They all receive an identification and a password in order to access Virtual Projects. Through an Internet connection they can access and put information on to the virtual project site.
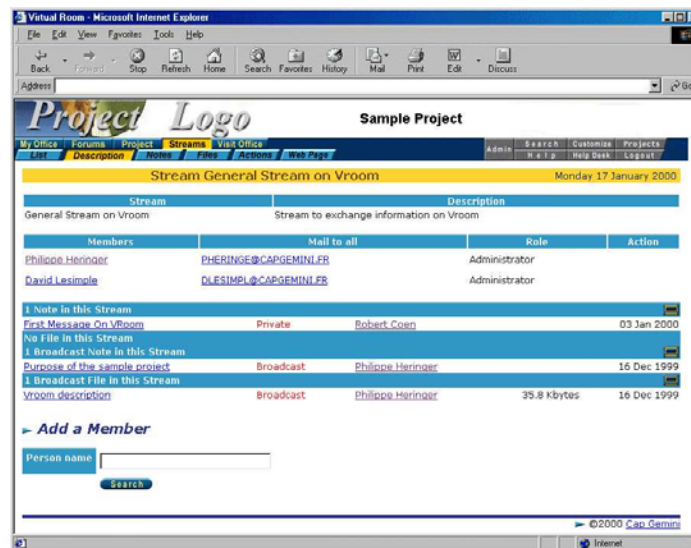
Figure 5: Sample Project: Workstreams.

In this way project members can manage their project information and share questions, documents, answers, and news items. Consultants and the members of Galaxy Corporation's client organisation can use different levels of functionality within the virtual project site. The project manager or consultant responsible for the project will make sure that all the necessary information is visible at the top project level. At the same time the different consultants can work in one or several workstreams at the same time. This means that each consultant has access to the workstreams in which he or she participates and has access to all the related information modules, contained in files, notes, news and so forth, for his own stream. But he can also make a special project site for himself where he can put personal activities, files, his personal address book and links to sites and newsgroups he or she uses. In this way every project member gets his own project administration and will be part of several communities within the project. The added advantage is that every

consultant using the virtual project space is in communication with the others. This is illustrated in figure 5.

2. *There is a congruent purpose (such as to solve a problem, create or to discover something) or goal-oriented virtually organized activity that has to be managed.*
Consultants within Galaxy Coorporation have the purpose to develop and deliver solutions for clients problems. For developing solutions there is always a team of different disciplines and in the teams there are very often client's people involved. Therefore there must be a high grade of cooperation between the consultants of Galaxy Coorporation but also between consultants and clients people. E-colloboration tools as Virtual Project Room makes these cooperation efficiently and effective.

Textbox 1: Interaction on the Virtual Project Room

Alan is working in a project for a client organisation. The software developed within this project will be used in five other organisations also involved in this project. In addition, the project members from Galaxy Corporation are working at several places in the Netherlands. Communication and knowledge management is essential to the success of this project. The Virtual Projects facility is used as an integral feature of this project. This is how Alan uses the Virtual Projects facility:

Alan is working at home today because he has to write a final report. When he starts in the morning he logs in at his Virtual Project Room to check the latest news and download a draft of the final report he started on yesterday. He finds the latest news on the program dashboard and finds his document in the developing workstream. He downloads the document on which his colleagues have been working and begins finalizing it. At the beginning of the afternoon he has some queries about the data in the report and he posts these in a note on his workstream. Within half an hour one of his colleagues responds with a review of the data in a new note. Alan does not understand the review and starts a NetMeeting session with this colleague. On-line the consultants discuss the data, the review and come to a solution. At the end of the afternoon Alan puts the finalized document back in the virtual office so that the other members of the project can read and review the document. It is especially important that the project members who are part of the client organisation read it. In this way, Alan feels that he has been able to work more effectively at a distance.

People can work together and efficiently and effectively. An example of what was intended by a goal-oriented virtually organized activity is illustrated in textbox 1.

3. Occurs within constraints including limits of expertise, time, money, competition and cultural considerations. While collaboration does take place within these constraints, the extent to which these constraints effect the need for successful collaboration has yet to be ascertained. However, there is a feeling within Galaxy Corporation that one must not become too dependent upon the technology. As stated by one consultant "You cannot do everything through this contraption [MyGalaxy and the Virtual Project Room] !!". At the same time it is a fact that use of the technology described above has meant that consultants have free access to each others expertise and are not bound by organisational walls (departments, divisions) and they are no longer restricted to working on projects that fall within their own departments. Consultants feel that they can move through the organisation more freely and hybrid

Textbox 2: Example of Interaction on the Knowledge Marketplace

Martin is working at a client site and is looking for a search engine for searching in directories and CD Roms for special documents. In order to find an answer he logs in through the Internet to the Galaxy Corporation's Knowledge Marketplace and drops the following question on the marketplace:

> Martin: *"I am looking for a standard software component with which you can search through documents with several formats (Word, Powerpoint, etc.). The documents are on a CD Rom so the search engine must be server independent. It must be simple and straightforward."*
>
> Alan: *"You can use Alta Vista, freeware for searching and indexing documents. Works specially for Word and Powerpoint. Within our group we have very good experience with the tool."*
>
> Peter: *"You can use MS Index Server for building an automatic index"*
>
> Janis: *"MS Index Server does not work with cd-rom. You have to think about ActiveX control as a plug in , in your browser for making an index. That is a lot of work. Other possibilities you find on www.progressivelogic.se, www.netresults-search.com or www.astaware.com."*
>
> Sandra: *"MS Index server can not be used with cd-rom. Another solution is verity, but that is very expensive. "*

From these responses Martin decides to contact Janis by telephone. They discuss the matter and the possibilities. In the end Martin is able to follow an informed course of action based on his assessment of the information and personalized exchange that has taken place.

projects have become more commonplace.

There is a need to share skills, costs or access each other's resources. This is why the division and unit homepages are more often accessed in comparison to the other facilities. Only 10% of the employees have trouble sharing knowledge. The rest do so regularly in various ways. A once popular site at the Starnet prior to the merger, is the knowledge market place where consultants put up a question of a special matter to which others within the organisation may provide answers to. When someone puts in

a question or an answer in his or her marketspot, the consultant whose marketspot has been queried then receives an email. Consultants can also see short biodatas of the other consultants that are described in a marketspot. In addition, the consultant can also view the colleagues that have special experience on the subject of the market spot (in this way colleagues find colleagues). Shown in textbox 2, is the way in which the knowledge marketplace is used to share knowledge. A screen shot of this knowledge marketplace is illustrated in figure 6.
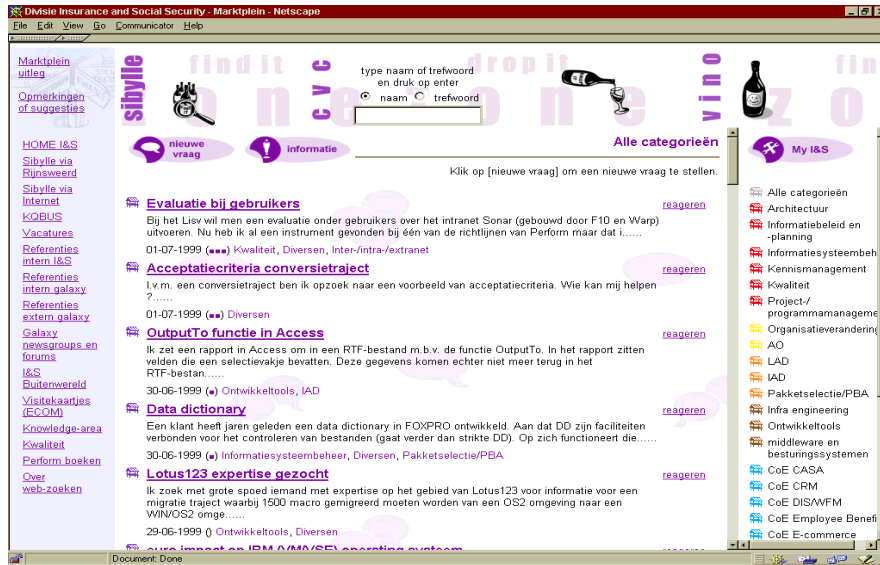
Figure 6: The Knowledge Marketplace

4. Collaboration is seen to be a legitimate way of working and forms part of the organisation's accepted work practice. Ever since the merger, Galaxy Corporation's accepted work practices are in a state of dynamic redefinition. In general, collaboration with clients appears to be a legitimate way of working while the extent to which there is collaboration among employees varies between units. From reading through the transcripts, it is clear that a repertoire of technical jargon used in the consultants' work environments is also being used in the electronic communication. Shared communication was mostly related to software and technical system development issues.

5.3 Emerging Patterns of Interaction: Intellectual Bandwidth Capitalization

The above results suggest that the electronic collaborative effort at Galaxy Corporation, NL has the potential for <u>concerted</u> collaboration. While there appears to

be support for <u>coordinated</u> effort through the Virtual Project Office, it is not clear to what extent these tools are actually used. Through an analysis of a selection of electronic transcripts on the knowledge marketplace, evolving forms of mutual engagement have appeared. The types of mutual engagement or interaction that emerged from the transcripts with respect to collaborative effort are illustrated in the following labels: sharing of advice, clarification, thoughts, references to sources and training programs. These represent <u>collective</u> effort. In a some interactions, people meet electronically and then continue interactions through a face to face or telephone communication. This suggests that electronic collaboration is dependent upon the types of tasks being undertaken collectively, the nature of the goals that have to be collectively achieved and the type of project work that is being undertaken to achieve these goals.

There is an extent to which there is the creation of relations among participants of mutual accountability that become an integral part of the practice. The Knowledge Marketplace is seen to be a serious space on which no idle chats are allowed. The shared spaces on the knowledge market place are divided into consultant defined subjects known as "marketspots." A consultant, known as the "Kraambeheerder" or the person who manages the maternity ward. This consultant is responsible for a market spot and ensures that the facility is used to share relevant information. In addition, expectations of almost immediate response have also become a reality. This is illustrated in the following quotes:

> *It [the Knowledge Marketplace] works. Five different people reacted to my one question !*

Another consultant remarked:

> *Suppose the same question was put on the newsgroups and the knowledge marketplace. In my experience my question on the marketplace would be answered faster even though the number of potential respondents is ten times higher in the newsgroups.*

Although the organisational culture is Galaxy Corporation is open, consultants do like to keep important knowledge and information to themselves. The reason for this is if particular business development or information system development techniques are made available electronically, the main concern is, how will they be used? The

integrity of information and appropriate use by other consultants are seen to be very important.

Galaxy Corporation's Intellectual Bandwidth appears to be high. This is illustrated in
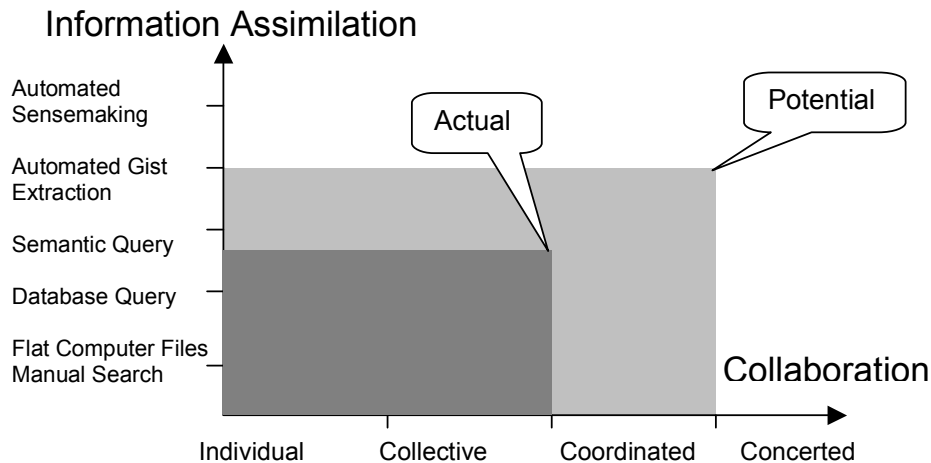
Figure 7: Intellectual Bandwidth Capitalization at Galaxy Corp.,NL.

figure 7. There this the potential for concerted effort. However, the level of intellectual bandwidth actually used on the electronic spaces provided for collaboration is lower and varies between collaborative applications and type of work being supported through the technology. On the whole there is evidence of coordinated effort supported electronically. The gains from coordinated collaborative appear to be in the process of being reaped through the use of electronic collaborative technologies.

6. What it means for an Organisation to be Intelligent.

In order to create value, people must go through a *value creation process* where they become informed, reason together, make a plan, and take action (Nunamaker *et. al.* 2001). For an organisation to be intelligent means that it should be able to create value collaboratively. In order to create value an intelligent organisation's employees should become informed, reason together, make a plan, and take action towards the achievement of congruent goals. In doing so, an intelligent organisation can convert its intellectual resources into a chain of services in a form most useful for certain customers by selling the skills and intellects of key professionals. The above analysis has ascertained that while an organisation's employees may become informed, reason together, plan and take action, the organisation's Intellectual Bandwidth is restrained.

This is restrained by 1) the availability of information and the extent employees are able to make sense of the information, and 2) the ability of employees to collaborate electronically towards joint effect. This means that Galaxy Corporation's ability to create value through its information and collaboration technologies is restrained.

Nunamaker *et. al.* (2001) suggest that it is the *work process methodology* that leverages available Intellectual Bandwidth to create value. Information is an input to the work process and collaboration provides the building blocks of the work process. In order to leverage its Intellectual Bandwidth, Galaxy Corporation requires a work process methodology that makes use of information relevant for certain work processes that bring together the skills expertise of employees.

7. Conclusions

This paper has investigated what it means for an organisation to be intelligent. It has done so by measuring Intellectual Bandwidth in an organisation that provides services to customers by selling the knowledge and expertise of its employees. Intellectual Bandwidth Model was valuable in enabling Galaxy Corporation's potential to create value through the use of its information and collaboration technologies to be measured. An additional measure used to ascertain Intellectual Bandwidth Capitalization or the actual use of an organisations potential to create value through the use of its intellectual resources. This was done by drawing upon the community of practice literature. An analysis of the results suggest that Galaxy Corporation has different levels of Intellectual Bandwidth Capitalization depending upon the type of tasks being accomplished, type of goals, and projects being undertaken collectively. Galaxy Corporation, NL's potential is concerted collaborative effort but its electronic collaborative effort is collective.

7.1 Limitations of this Study and Lessons Learned

The research was limited in scope as the data was collected from before the merger. Only electronic collaboration was ascertained. Only the electronic tools and not the not electronic techniques which were in use in the company were investigated. Information assimilation was measured by looking at use of particular types of technology. Ability to process this mass of information may not necessarily be affected by the available technologies. An organisation's philosophy (or lack of),

structure and work practices may disrupt the use of information even though the technologies for information assimilation and collaboration are available. Electronic collaboration was measured in terms of the types of collaborative effort that was taking place electronically while the transcript analysis gave rise to other forms of electronic collaboration. This suggests that there are forms of electronic collaboration that should be discovered from further analysis of the electronic transcripts.

The concept of Intellectual Bandwith has implications for an organisation's potential to create value that may not neccessarily be connected to that organisation's use of e-colloborative tools. Often there are many other forms of collaboration. Within Galaxy Coorporation the ways of working and interaction not connected to e-collaboration also contribute to collaboration and value creation. Preparing business and account plans, brainstorming techniques, team discussions, community development with knowledge transfer through seminars, presentations and software demonstrations are very common daily activities.

7.2 Directions for Future Research

This paper has only considered electronic collaboration at Galaxy Corporation, NL prior to the merger. In order to assess its Intellectual Bandwidth in full, research into the other forms of collaboration within Galaxy Corporation in its new merged organisation should be carried out. Future research should consider how Intellectual Bandwidth may be increased in an organisation. A related question that should be considered is what processes can an organisation put in place to leverage its Intellectual Bandwidth? In the case of Galaxy Corporation, the merger has had certain effects of the Intellectual Bandwidth. Its potential pitfalls, areas for improvement and new intellectual capital need to be carefully investigated. Similar studies should be carried out in other organisations that fit the criteria for being intelligent organisations.

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