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The social shaping of Internet-based information systems in global organizations: an interpretive study

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Abstract: This paper examines multiple interpretations organizational members have of Internet-based information systems (IS) by carrying out an interpretive investigation into the evolution of such systems in a large organization. The findings indicate that exploring *interpretive schemes* relating to the nature and application of Internet-based IS offers a better understanding of the choices made regarding the design and use of Internet-based IS. This paper illustrates that differences in the interpretive schemes of social groups may lead to differences in actions around Internet-based technologies and were also seen as a source of innovation. The implications of the findings for theory and practice are discussed.

I. INTRODUCTION

With the rapid spread of the Internet in recent years there has been an increasing interest in the use of Internet-based technologies for supporting work practices in global organizations and to facilitate business-to-consumer and business-to-business electronic commerce [1]. While Internet-based IS are still in their infancy, there are multiple interpretations on the capability of the technology and their role in organizations. Different interpretations of Information technologies by various groups could, as Orlikowski and Gash [2] argue, lead to unintended consequences of adopting such technologies in organizations.

The main aim of this paper is to examine different interpretations that organizational members have of Internet-based IS by carrying out an in-depth investigation into the evolution of Internet-based IS in a large organization. By drawing on Giddens' [3] concept of interpretive schemes, this paper analyzes and articulates interpretive schemes with regard to the nature and the application of Internet-based IS, which may guide individuals to take action in organizations. The paper argues that such an analysis of interpretive schemes could provide a better understanding of the choices made regarding the design and use of Internet-based IS. This understanding is important for preventing misleading expectations and adverse consequences of implementing Internet-based IS

The paper is structured as follows. The next section discusses the theoretical concepts used in the investigation of Internet-based IS in practice. This is followed by a description of the interpretive research approach employed in

this study along with methods used for data collection and analysis. The main part of the paper discusses the case study of the evolution of Internet-based IS in a large organization and the analysis and discussion of the data. The final section highlights the implications of the findings for theory and practice.

II. THEORETICAL CONCEPTS

Giddens [3] argues that people draw on social structures in their actions and interactions, while such actions in that context serve to produce, and reproduce the social structures. According to Giddens's Structuration theory [3], social structure is therefore taken to be both medium and outcome of action. One of the modalities through which the structure is seen as interacting with people's action of communication is 'interpretive schemes'. Interpretive schemes are standardized, shared stocks of knowledge that people draw on to interpret behaviour and events hence achieving meaningful communication [3]. Giddens claims that the stocks of knowledge which people draw upon in the production and reproduction of interactions are also drawn on to offer reasons or explanation for their actions. From the subjective point of view, interpretive schemes involve sense making and communication of meanings. From an institutional point of view these comprise structures of signification including social rules that enable and disable the sense making and communication process.

Individuals in a social group draw on these shared interpretive schemes to act and thereby help to produce and reproduce a social reality that would reflect their shared assumptions, cultural norms and social rules. Such reality forms the sub-culture of the particular group.

Interpretive schemes implicitly influence individuals' sensemaking [12] and actions in organizations by shaping their interpretations of organizational phenomena. The concept of interpretive schemes therefore closely relates to other concepts such as 'mental models' [4], 'technological frames' [5] and 'paradigms' [6].

Interpretive schemes with regard to information technologies may consist of various assumptions and the knowledge that each social group uses to understand the technologies and their role in organizations [7], [2].

Interpretive schemes with regard to technologies would therefore influence the choices made regarding design and use of technologies in organization.

Orlikowski and Gash [2] argue that the incongruence of such shared assumptions and knowledge would lead to difficulties and conflicts around developing, implementing, and using information technologies. Bijker [7] however argues that such incongruence could lead to technological innovation. Pinch and Bijker [5] therefore argue that technological artefacts are socially shaped and interpreted. In order to understand the effects of technology, the researcher needs to investigate the social processes surrounding its design. Technology is seen as interpretively flexible, by which Pinch & Bijker [5] refer not just to “flexibility in how people think or interpret artefacts”, but also to “the flexibility in how artefacts are designed”.

III. RESEARCH SETTING AND APPROACH

The study was carried out in a large manufacturing company (LMC - pseudonym) which is a volume manufacturer of high-value consumer products. LMC has its operations in several countries and employs over 300,000 employees world-wide in 200 countries. LMC is highly structured, has a strong management hierarchy with several layers of senior executives.

The research approach adopted in this study is interpretivism [8]; [9]; [11] with the aim of understanding the Internet-based IS phenomena from the perspective of the organizational members involved in designing and using it in practice. Data collection was conducted through several unstructured interviews with organizational members and by observation of their organizational practices at LMC’s world head quarters in USA and offices/plants in UK and USA from 1996 to 1998.

Interviewees included senior executives who led the technology project from the USA, many information systems and functional managers from the USA and UK. Most of the interviews were tape-recorded and transcribed. Observation of actual practices of developing and using Internet-based IS was carried out by being with participants at LMC and interacting with them over the study period. Documents have also been examined, including promotional documentation, training manuals and Internet-based support documents. Detailed field notes were maintained during the study period to record observations and events during each visit.

During the analysis, the interview transcripts and field notes were examined to identify remarks and actions of the participants that reflect similar views with respect to Internet-based IS [10]. Participants were classified into different social groups which was based on the role they played in the shaping of Internet-based IS at LMC. The iterative examination of interview statements, remarks and observed

interactions of each participant from these groups led to identification of a set of themes that reflected interpretive schemes held by members of each group with respect to Internet-based IS. The analysis encouraged these themes to emerge from the data rather than imposing them on the data. However, following Orlikowski [8] the theoretical concepts were used as sensitizing devices for the interpretive investigation into the application of Internet-based IS in LMC.

IV. CASE STUDY AND ANALYSIS

A. Evolution of Internet-based IS at LMC¹

Internet-based IS began to evolve in LMC during the mid 1990s along with an ambitious restructuring and globalization initiative involving a major plan to merge operations of the company carried out separately in various parts of the world into one giant global company. The proposed organizational structure implied closer collaboration between LMC’s employees in different countries. Implementing new IT that would improve collaborative working was seen as central to the restructuring plan. A dedicated IT Division was therefore formed and given responsibility to implement new network technologies to enable geographically and temporally separated employees to share information. This Division began implementing a standardized network (based on TCP/IP) to link-up every computer within LMC.

Many organizational members from the Product Development Division who were experimenting with the free web browser made use of the newly implemented network, for example, for publishing and accessing technical documents from different sites around the world and tracking project status. Papers and other documents from one of the internal conferences relating to product development was posted on the net during that time to enable the conference delegates and others to access them from their computer by using a web browser. As stories of using the ‘net’ in this way spread in LMC, the senior executives considered strategies for exploiting the potential of Internet technologies to support global processes.

Following this a team was set up to investigate the potential of Internet-based IS as the senior executives had only vague views on the usefulness of such technologies. The team subsequently implemented the first public website for LMC as its competitors already had public websites. Following this, a trade show in which LMC participated was ‘webcasted’. So many of the organizational members outside the US were able to view the events live from the trade show. With the rapidly increasing number of ‘visits’ to LMC’s

¹ Throughout this paper the actual name of the company and name of the divisions have been changed to preserve anonymity

website, the popularity of Internet-based IS also went up.

In response to the growing interest in Internet-based IS within LMC, a new 'Internet Sub-division' was created to steer the direction of the use of such technologies within LMC. It was felt that a wide adoption of Internet was essential to establish it as a serious IS within LMC. The director of the Internet Sub-division therefore gave a number of presentations to promote the application of Internet-based IS at LMC. Other members of the Internet Sub-division also visited many locations around the world and gave presentations on the potential of the new Internet-based technologies at LMC.

During that time the Internet Sub-division bought thousands of licenses for web browsers and LMC employees were allowed to download the browser from the company server. During the propaganda, tens of thousands of browsers were downloaded and deployed throughout LMC. To meet the growing demand even more licenses for the browser had to be purchased.

The Internet Sub-division also gradually started playing a major role in helping other divisions to develop Internet-based IS. However people in other divisions also started developing and implementing Internet-based IS without any help from the Internet Sub-division. The Internet Sub-division therefore required other divisions to place the data content of these independently developed Internet-based IS in computers located in the world headquarters which were then managed centrally by the Internet Sub-division. Following the move to centralize the Internet data, the Internet Sub-division also started to provide guidelines and standards for developing Internet-based IS and also reviewed the applications developed by the other divisions before allowing them on the central servers.

About one year after its formation, the Internet Sub-division, along with the dedicated IT Division became part of the traditional Systems Division because it was felt that the same dedicated IT services were not necessary any longer. Many of the technologists from Internet Sub-division were disappointed with the new conservative systems environment, which imposed various restrictions on their future plans for Internet-based IS.

B. Social groups formed around the Internet-based IS

Based on their role in the shaping of Internet-based IS at LMC, four relevant social groups were identified in this context: Network Technologists, Early Users, Potential users and IT managers. Members of these groups also belonged to formal groups such as Product Development Division. Most of these social groups comprised both users and designers of Internet-based IS so that the division between designers and users was very blurred in this context.

1). *Network Technologists (Network Nerds)*: This group included technologists mainly from network operations and from Product Development Division at LMC. Network Nerds were unhappy with the various proprietary networks that existed at that time for each division at LMC. This group sought to implement a global standardized network, connecting all the computers at LMC. The restructuring initiatives gave them the opportunity to realize this.

2). *Early Users (Evangelists)*: Early users included various senior executives, functional managers, engineers and systems analysts from different divisions such as Product Development and Manufacturing Divisions and from traditional Systems Division. Many of the early users used browsers for accessing and publishing technical documents and tracking project status. The senior managers from this social group were also technological evangelists, who promoted the use of Internet-based IS.

3). *Potential users (Followers)*: This group consisted of plan managers and engineers. Although members of this group were aware of the existence of Internet-based IS most of them did not make use of it.

4). *IT Managers (Enforcers)*: This group consisted of technologists from both the traditional Systems Division and Internet Sub-division (who later became part of traditional Systems Division). IT Managers sought to centralize the web content and to enforce guidelines and standards for developing Internet-based IS.

Although many of these groups co-existed, over time the constitution of these changed. For example as the Internet-based IS became established at LMC, many of the network nerds became early users, as the nature of their role of shaping the IT had changed.

C. Interpretive Schemes

As discussed earlier we can consider interpretive schemes for the above social groups of organizational members, who interpreted the evolving Internet-based IS differently. The interpretive schemes articulated (see Table 1) relate to two dimensions: nature and capabilities of the Internet-based IS; and approaches for designing and implementation of such systems in an organizational context.

1. *Nature and capabilities of the Internet-based IS*: The network technologists acquired the knowledge about the Internet-based IS when they were experimenting with the browsers. They perceived Internet-based IS as a "standardized network" that provided a means to transfer files and exchange technological ideas. They saw the value of the Internet-based IS as 'connecting people' and thereby helping to sustain LMC's emerging global structure. The network technologist therefore wanted the TCP/IP network to rapidly "reach virtually every desktop [computers] in the

company”.

Many of the early users heard about Internet-based IS from the company’s trade shows and the conferences. Early users focused on the browser which provided a standardized interface for many of their internal computer systems. The network architecture however was taken for granted. Many early users from Product Development Division claimed that the Internet-based IS saved travel costs as they were able to share engineering drawings and visual images with team members in other countries without the need for travelling. Many of them felt that Internet-based IS would be a useful technology for LMC, as one of the engineers stated: “I played with it and found immediate use of the technology”. Many senior managers within this social group began to see the potential of the Internet in terms of marketing the company’s product as well as improving internal processes. They believed that Internet-based IS can change the company. For example, the Internet Sub-division manager claimed that leading the division was:

“..an opportunity to truly change the business ..for myself and the people I’m immediately involved within my team were just tremendously excited by the opportunity it [developing Internet-based IS] involves.”

The potential user group was skeptical about the capabilities of the system. For example, many of the managers from assembly plants felt that the Internet was not useful to their work. They felt however that it was inevitable that everyone would eventually be forced to use Internet-based IS.

The IT Managers on the other hand had a clear vision of the nature and value of Internet-based IS. Many of them considered the Internet-based IS as providing standardized interfaces for all computer-based IS at LMC. These systems were seen as credible applications which improved the business processes. They assumed that Internet-based IS would reduce systems development cycle, cut cost and waiting times, and standardize development efforts as well as the technical infrastructure. They therefore actively encouraged/ promoted Internet-based IS at LMC.

2. *Approaches for designing and implementation of Internet-based IS:* Network technologists developed standardized procedures to rapidly implement the network for

hundreds of divisions around the world. Such procedures included standard installation practices and solutions to work within the rigid corporate security rules and budget. They focused on the technological capabilities of the network and assumed that any users could transfer files and browse information once the network was in place, with ease and without any training or special skills.

Early users also liked to see the Internet-based IS used widely in the company. However they had a broad view of what their role was. For example, a senior executive claimed that :

“.... part of our mission is to be technology advocates and evangelists; part of our mission is to be educators; part of our mission is to be developers; part of our mission is to be infrastructure developers. We have, you know, quite a mixed bag of things that we’re responsible for.”

Many of the senior executives reiterated similar views of their responsibility. As the advocator of Internet-based IS and early users, the Internet Sub-division provided assistance for other users to implement Internet-based IS. They also implemented systems for users on their request. Members of this group gave many presentations to the LMC employees on how Internet-based IS can be applied to their work.

The potential users felt that the initiative to promote the Internet-based IS at LMC was enforced by the head office.

The IT managers sought to manage the Internet-based IS development centrally. They therefore reviewed the applications developed by the other divisions and requested that data content of all Internet-based IS should be placed in central computers located within the headquarters. A systems executive recalled:

““what we didn’t want to happen is....like technology companies that we visited.... you know they had a couple of thousand web servers....we could just easily see [LMC] getting into that situation and that would be just such a blatant waste of resources. So, we said look let’s centralize it... right, and make it very easy for people to use it. Take away all the arguments: cost too much; too long; not secure; all those things. We addressed those on a centralized basis... we also wanted some centralized control.”

TABLE 1:
INTERPRETIVE SCHEMES

Social groups	Interpretive schemes with regard to Internet-based IS in LMC	
	Nature/capabilities of Internet-based IS	Approaches to design/ implementation/ use
Network Nerds (network technologists)	<ul style="list-style-type: none"> - it's a standard "TCP/IP network" - it's a way of "connecting people" globally - provide standardized technological infrastructure with more connections 	<ul style="list-style-type: none"> - to provide standardized solutions and procedures - to execute "rapid implementation" - focus on technological capabilities (and disregard for local conditions)
Evangelists (early users)	<ul style="list-style-type: none"> - it's a "global client" - it saved travel costs - "found immediate use of it" - it's an "opportunity to change business" - "changing the way we did business" 	<ul style="list-style-type: none"> - to educate the value of Internet-based IS - to tell people "how to apply it [Internet]" to business - to provide support for users to apply the technology - driven by hype and excitement
Followers (potential users)	<ul style="list-style-type: none"> - "not really useful to my work" - they are a set of "web pages" - "we will probably be on the web, eventually" 	<ul style="list-style-type: none"> - "we are not the innovators for [LMC], we do what the head office dictates"
Enforcers (IT managers)	<ul style="list-style-type: none"> - "ubiquitous interface" for all applications - they are "serious systems, not just web pages" 	<ul style="list-style-type: none"> - to manage development centrally - to implement standardized procedures - to prove users the value of Internet-based IS - no specialized training needed for users - to influence technology direction - "within 8-16 weeks we could put something together at a relatively low cost" - "technology is so rich in terms of how it can help you solve the problem that .. we are pushing it"

D. Social shaping on Internet-based IS

Although interpretive schemes are held by individuals, and are subject to change over time, the individuals in each of the above social groups shared much of the stocks of knowledge. While drawing on interpretive schemes individuals also helped to produce and reproduce a group sub-culture which consisted of particular assumptions, understandings and norms of behaviour within LMC. For example, the network technologist group created a technology sub-culture which was less restrictive in terms of trying out new design concepts which were different from that of the traditional Systems Division.

Over time, therefore shared interpretive schemes were institutionalized as cultural norms and social rules. Such externalized and established forms of interpretive schemes inhibited certain interpretations while enabling others.

Differences in the interpretive schemes of each of the above social groups may be seen as leading to differences in actions around the Internet-based technologies. For example, the early users group assumed that the Internet-based IS such as instant messaging and newsgroup would promote closer collaboration and communication between plant engineers - who belonged at the time to the potential user group - in

different divisions across the world. The early users therefore focused on promoting and implementing Internet-based IS for application within the plants. They expected engineers to use them to support their work and to change work practices. Many of the plant engineers (belonging to the potential user group) in contrast had limited understanding of the capabilities of the Internet-based IS and assumed that these would require learning different skills and that the systems may not be beneficial. They were suspicious about the intentions of the headquarters for promoting the Internet so vigorously.

These two groups of people acted upon their interpretation of the Internet-based IS at LMC. The head of Internet sub-Division recalled with frustration that:

"...we actually have tried a couple of times with true collaboration like news groups and stuff like that. It hasn't been as successful - it's a cultural thing. I think there's a tremendous amount of value in a newsgroup ... facilitating a newsgroup, but our culture is just that they just weren't very well accepted. Part of it's a typing things. Part of it's we get a lot of middle aged and above people; some of them aren't comfortable with it. The secretaries tend to use it pretty well and those are good. But, well, we've had at least two attempts to try to get that into the

engineering community. It just hasn't been real successful."

The differences in interpretive schemes between these two groups resulted in frustration and suspicion and the intended benefits of introducing Internet-based IS never materialized. However such incongruence of interpretive schemes was also a source of innovation at LMC with regard to Internet-based IS. In the above example, in response to rejections of the Internet-based newsgroup system, the Internet Sub-division constructed a more user-friendly system for sharing and exchanging ideas and expertise, which was driven by interface features such as pull-down menus and required only little typing. Thus choices made regarding the design and use of Internet-based IS were guided by the differences in interpretive schemes. This new Internet-based IS could also be seen as being socially shaped because it emerged from the interactions between two social groups drawing on interpretive schemes, during their efforts to reach closure in the controversy over technological features.

V. IMPLICATIONS

The findings indicate that exploring the interpretive schemes relating to the nature and application of Internet-based IS offers a better understanding of the choices made regarding the design and use of Internet-based IS. Giddens' [3] concepts of interpretive schemes offer a useful sensitizing device for analyzing multiple interpretations of Internet-based IS that the different social groups had and their effects on their actions and interactions. These concepts provide a means to systematically trace the relationship between different interpretive schemes and the production and reproduction of a group sub-culture that inhibit certain interpretations while enabling others. The findings indicate that over time shared interpretive schemes institutionalized as cultural norms and social rules.

The paper illustrates that differences in interpretive schemes of each social group may be seen as leading to differences in sense making and actions around Internet-based technologies. Such differences may also result in frustration and suspicion and lead to absence of benefits intended by introducing Internet-based IS. However such incongruence of interpretive schemes may also be seen as a source of innovation, for example resulting in new Internet-based systems emerging from the interactions between social groups drawing on incongruent interpretive schemes.

Integrating Internet-based IS into work practices is problematic. The theoretical insights discussed above may be of value to practitioners in understanding the evolution of Internet-based IS in organizations. Tracking groups' interpretive schemes over time could provide insights into reasons for different actions by key players. Articulation of interpretive schemes and identification of inconsistencies and

incongruences may lessen the chance of misleading expectations, failure of implementation and unanticipated organizational consequences. For example, sources of inconsistencies may be dealt with through clarifying or alignments of people's understanding.

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