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Jørgen P. Bansler
Technical University of Denmark, BANSLER@tele.dtu.dk

Jan Damsgaard
Aalborg University, damse@cs.auc.dk

Rens Scheepers
Swinburne University of Technology, rens@it.swin.edu.au

Erling Havn
Technical University of Denmark, havn@tele.dtu.dk

Jacob Thommesen
Technical University of Denmark, thommesen@cti.dtu.dk

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Corporate Intranet Implementation: Managing Emergent Technologies and Organizational Practices

Jørgen P. Bansler
Center for Tele-Information
Technical University of Denmark
BANSLER@tele.dtu.dk

Jan Damsgaard
Department of Computer Science
Aalborg University
damse@cs.auc.dk

Rens Scheepers
School of Information Technology
Swinburne University of Technology
rens@it.swin.edu.au

Erling Havn
Center for Tele-Information
Technical University of Denmark
havn@tele.dtu.dk

Jacob Thommesen
Center for Tele-Information
Technical University of Denmark
thommesen@cti.dtu.dk

Abstract

This paper examines the adoption and development of intranets in large business organizations. The authors demonstrate that intranet technology introduces a host of new managerial and technical challenges and requires new approaches to IS development. Evidence from two European corporations indicates that the traditional division of labor and definition of work roles in IS development breaks down. The distinction between developers and users becomes increasingly blurred and new organizational roles and structures associated with intranets are emerging. However, ready-made organizational models for implementing and managing intranets do not exist and the two organizations in this study have followed two different approaches. One organization favors a "planned change" approach, emphasizing management control and careful planning. The other organization prefers an "improvisational" approach, emphasizing experimentation, innovation and local initiative.

Keywords: Intranet, systems development, implementation strategy, support organization, role players and technology adaptation

I. INTRODUCTION

Large organizations—business corporations as well as public institutions—are now adopting internet technologies to improve their *internal* communication and coordination processes. They build their own small-scale versions of the Internet—called intranets[1]— that span the entire organization and connect people and information systems across functional and geographical boundaries.

[1]We define an intranet in the following way: (1) An intranet is a network based on the *Internet protocol suite* TCP/IP. It is thus capable of running common internet applications such as World Wide Web and MS NetMeeting. (2) It is a *private* network, owned by the organization that it serves and only accessible by permission. In general, all members of the organization have access to the intranet, but access to some areas may be restricted, for instance to managers or certain employees. (3) The primary intended use is for *communication and collaboration* among organizational members. Managers and employees can publish, search and retrieve information about diverse topics, and collaborate with colleagues anywhere in the organization.

Intranets are attractive to large, complex organizations because of the opportunities they offer for improving communication and collaboration compared with traditional client/server configurations and network technologies (LANs and WANs). These solutions run proprietary software and use different protocols, which cause problems of interoperability between different systems. Internet protocols and standards, however, are a common language that allows communication across proprietary differences in various operating systems and equipment. This is one of the main reasons why intranets are often referred to as "middleware" or "glueware" (Lyytinen et al. 1998). Intranet technology is the great unifier. It is multi-purpose, richly networked, and offers a seamless way to integrate text, graphics, sound, and video. Thus, an intranet can be regarded as an interactive and reflective medium (Damsgaard and Scheepers 2000; Lyytinen et al. 1998; Markus 1987).

INTRANETS AND IS DEVELOPMENT

Several researchers argue that the introduction of intranets in organizations and the development of Web-based information systems will lead to fundamental changes in the way organizations design and manage their information and communication systems.

Isakowitz et al. (1998) claim that Web technology has matured enough to become an attractive platform for business applications and organizational information systems and that it is quickly becoming a technological platform able to support all facets of organizational work. As a result, information systems efforts are increasingly geared toward developing information systems based on Web technology, called "Web-based information systems" (WISs). Isakowitz et al. believe this type of system will become more pervasive than client/server systems did a decade ago because the Web has "the potential of reaching a much wider audience." They further claim that WISs are different from traditional information systems and that people should "think about them much differently than traditional

systems." These systems require new approaches to design and development and introduce important new managerial and technical challenges.

Turoff and Hiltz (1998) go even further in their assessment of the impact of Web technology on organizations, institutions, and society at large:

> It is unfortunate that old words are frequently used to describe new phenomena (the "horseless carriage" syndrome). The Web might be labeled as a new type of information system, but to us it is fundamentally a new medium of human communication. (p. 116)

They coin a new term—"superconnectivity"—to describe the potential power of the technology. Superconnectivity leads to new kinds of organizations and institutions (e.g., virtual universities) and new ways of interacting within and between organizations. Although Turoff and Hiltz do not specify the content of this newness, others have suggested that IT networks, by supporting lateral communication, are closely associated with the emergence of "virtual organizations" (see Dutton 1999).

In a recent research essay, Lyytinen et al. speculate about how the technologies associated with the Internet will change systems development. They suggest that the new technological frame means a radical break from older technological frames built on mainframes, personal computers, or client-server computing.

According to Lyytinen et al., the new computing platform will result in four major changes in IS services:

- *Ubiquity of services:* Services will be available at any time and at any place.
- *Speed of change:* New technologies (e.g., Web-frames, push technologies, and XML) are being invented and adopted an order of magnitude faster than were earlier platforms. As a result many technologies and related skills will become obsolete overnight.
- *Component-based development:* The new platform is founded on the use of component architectures that will lead to the creation of software

component markets and the delivery of new software components through the network.

- *Media design:* Software development will coalesce with media design. IS services will become media oriented in contrast to computation orientations of the past.

The authors predict that these changes will have deep and pervasive implications for the way organizations will use, manage, and organize their IS resources in the future. First, new skills become critical in developing IS services. These include telecommunications skills, artistic and content skills, as well as broad organizational design and change management skills. Secondly, the organization of systems development will change. Systems development will become more like film production and less like a traditional engineering activity. Traditional distinctions—for example between designers and users—will become blurred and multi-skilled teams that combine high levels of both technical and artistic skills will develop IS services.

EMPIRICAL KNOWLEDGE OF INTRANET IMPLEMENTATION

We agree with all of these authors that internet and Web technologies will dramatically alter how people in organizations interact and communicate, how managers think about IT, and how organizations design and manage their information systems. The nature of these changes, the organizational and managerial challenges involved, and how organizations cope with them in practice, however, are not yet well understood.

Despite the increasing interest in intranets and Web-based information systems, little is known about how organizations actually manage their intranets and organize the associated development and support activities. The business press and popular management books are brimming with “success stories” of how innovative companies have increased their productivity and gained a competitive advantage by implementing intranets and extranets (see Baker 1997; Greer 1998;

Hills 1997). These stories, however, follow the common editing rules of the discourse of technical and managerial fashion (Abrahamson 1996). They are designed to advertise and promote intranets as a progressive new socio-technical concept, which will solve almost any organizational problem: flexibility, speed, knowledge management. They present intranets as a powerful, infallible, and perfect new technology; they contain few details about the actual implementation and the organizational context; and they avoid any serious attempts to analyze the problems and difficulties involved in making the technology work.

In contrast to the business press, only a handful of empirical studies of intranet implementation have been published in the academic press to date (Balasubramanian and Bashian 1998; Bhattacherjee 1998; Cecez-Kecmanovic et al. 1999; Damsgaard and Scheepers 1999; McNaughton et al. 1999; Romm and Wong 1998). These studies analyze intranets from a variety of different perspectives. For instance, Cecez-Kecmanovic et al. studied the impact of e-mail and intranet on communication patterns, power relations, and value systems in an Australian university. Balasubramanian and Bashian describe the software architecture of an advanced authoring and publishing system. Damsgaard and Scheepers (1999) examine the tactics used by management to further the intranet implementation process in two South African organizations. McNaughton et al. provide an overview of intranet adoption among New Zealand companies based on a general survey of about 1,000 companies.

Nevertheless, none of these studies focus on the IS development aspects of intranets. They contain little information about how the organizations studied actually implemented the technology and built up new organizational structures and processes to support the ongoing development of their intranets.

In the study described in this paper, we provide a rich and systematic empirical account of two intranet development processes. We examine how two large European corporations introduced and developed their intranets. Specifically, we focus on the genesis of the respective intranets, how the development and

implementation processes unfolded, and how they transformed aspects of the two companies' systems development practices, organizing structures, and coordination mechanisms to support the intranet development process.

The paper is arranged as follows. First, we describe the study and the research methodology employed. Next, we provide in-depth empirical accounts of the two intranet implementations. In the fourth section, we condense and compare the two cases. In the last section, we discuss implications for research and practice.

II. RESEARCH SETTINGS AND METHODOLOGY

The focus of the field study was to capture the intranet implementation process and the organization of its development and support activities. The data come from two case studies, undertaken by the authors, investigating the implementation and use of intranets in two large business organizations: PharmaCo and PlayCo respectively.[2]

The two sites were selected for the following reasons:

(1) They are large and complex organizations with strong needs for communication and collaboration across functional boundaries.

(2) Both companies have production facilities, sales offices and subsidiaries in many different countries all over the world and thus a need to communicate across distance.

(3) Both companies have invested considerable resources in their intranets and have several years of experience with the technology.

DATA COLLECTION

An interpretive case study approach was used to collect and analyze the data (Klein and Myers 1999; Walsham 1993). Detailed data collection was conducted

[2]PharmaCo and PlayCo are pseudonyms.

through unstructured and semi-structured interviews, review of documents, and examination of the two intranet implementations. A total of 23 interviews were conducted with managers and employees in the two companies. Participants spanned vertical levels and functional groupings and included senior vice presidents, corporate IT managers, IT consultants and project leaders, department managers, content providers, and key users. The interviews lasted from one to two hours each. Each interview was tape-recorded and summaries were written and approved by each interviewee. The materials reviewed included firm documents, such as annual reports and promotional material (used to obtain background information on the firm's size and business), and internal documents, such as company newsletters, corporate IT-strategy, and IT-project model. In addition, we had access to the two intranets and were thus able to get first-hand experience of their structure, design, and content. Data collection at the two companies primarily took place over a four-month period, from August to December 1998. A few interviews were conducted later, in May and June of 1999.

We shared our preliminary findings with key informants in the two companies and they provided helpful comments, which confirmed and elaborated the identified issues and conclusions drawn.

The nature of this case study is exploratory. The objective was to gain an in-depth understanding of the ways in which the two companies develop and use their intranets. We have not assessed the level of user satisfaction with the intranet or, as advocated by Weill and Vitale (1999), the "health" of the intranet as an IS application. Rather, we have focused on the implementation process, the organization of development and support activities, and the outcomes of the process so far.

III. TWO ACCOUNTS OF INTRANET DEVELOPMENT AND USAGE

We present two detailed accounts of intranet development and usage. Each presentation is structured in the following way: First, we introduce the company.

Next, we describe how and why the intranet development project was conceptualized and initiated. To emphasize the IS development aspects, we then carefully describe the intranet support organization and the intranet content. We finish each presentation with a discussion about current intranet development issues and future challenges in institutionalizing the respective intranets.

INTRANET DEVELOPMENT AT PharmaCo

PharmaCo started development of its intranet in 1995 and rolled it out in the spring of 1996. At the end of 1998, the PharmaCo intranet—named the *IntraWeb*—served nearly 11,000 employees at over 100 locations around the world. In general, it is an advanced intranet, rich in content with many experimental IS services and an active user community that supplies content and participates in development projects. The company invests heavily in Web-based applications and services.

Company Background

PharmaCo is a pharmaceutical company headquartered in Northern Europe, with production facilities and research centers as well as sales and client service field offices throughout Europe and the rest of the world. PharmaCo has about 14,000 employees and a yearly turnover of $3 billion. PharmaCo is a knowledge-intensive company with strong ties to universities and research hospitals. More than 3,000 of its employees work in research and development.

PharmaCo describes its own organization as a "global network of autonomous power centers." Not only subsidiaries and divisions, but also individual business units and departments have much autonomy and are loosely coupled with other units and functions. Several key informants have stressed that the company has an "open culture," where employees at all levels are allowed to "try out things."

PharmaCo has a corporate IT department with about 300 employees responsible for the company's IT infrastructure and all major systems. The IT

department operates as an autonomous business unit, treating other departments and business units as their "customers."

Beginnings

The development of the intranet at PharmaCo started as a grassroots initiative. As early as 1994, scientists and researchers in different departments—e.g., the company's Research Library and Scientific Computing Department—began developing an "unofficial" intranet consisting of a few internal Web sites on the corporate network.

The corporate IT department was not part of this early initiative, but quickly picked up the idea and became the major driving force in the development of the IntraWeb. In 1995, the IT department decided to begin establishing the technical infrastructure necessary to implement a corporate-wide intranet by installing browsers on all PCs, increasing the capacity of the existing corporate network, and adding more international connections to the network.

Senior management embraced the intranet concept and allocated resources to its development at an early stage, primarily because they saw the IntraWeb as a way of implementing their new management philosophy that stresses the need for open communication, empowerment, and knowledge sharing across organizational and geographical boundaries.

> *If you want empowerment…then you also have to help people by having some guiding principles, best practices, etc. And if you want people to read them, then they have to be made accessible—and the easiest way to do that? By putting them on the Web.* [Corporate Vice President, September 1998, translated to English by the authors]

In the fall of 1998, it was evident that the intranet initiative had gained many supporters—not only in the corporate IT department—but across the whole organization. People in many different departments and business units were actively taking part in the development of the IntraWeb, as indicated by the rapid

growth in the number of Web sites. In March 1998, two years after the official launch of the IntraWeb, the Web consisted of 67 sites. Only nine months later, the number had grown to 121 sites.

It is official corporate policy that all employees should have access to the IntraWeb. However, for technical and economic reasons, not all of the subsidiaries are connected to the IntraWeb. By the end of 1998, between 80% and 85% of all PharmaCo employees worldwide had access to the IntraWeb via their own PC.

Support Organization

As part of the intranet initiative, PharmaCo has built up a new support organization to cope with the ongoing development of "content" and IS services. The new support organization consists of a new section in the corporate IT department—the Web Competency Center (WCC)—together with a set of new organizational roles including Webmaster, Information Owner, and Web Super User (see Figure 1).

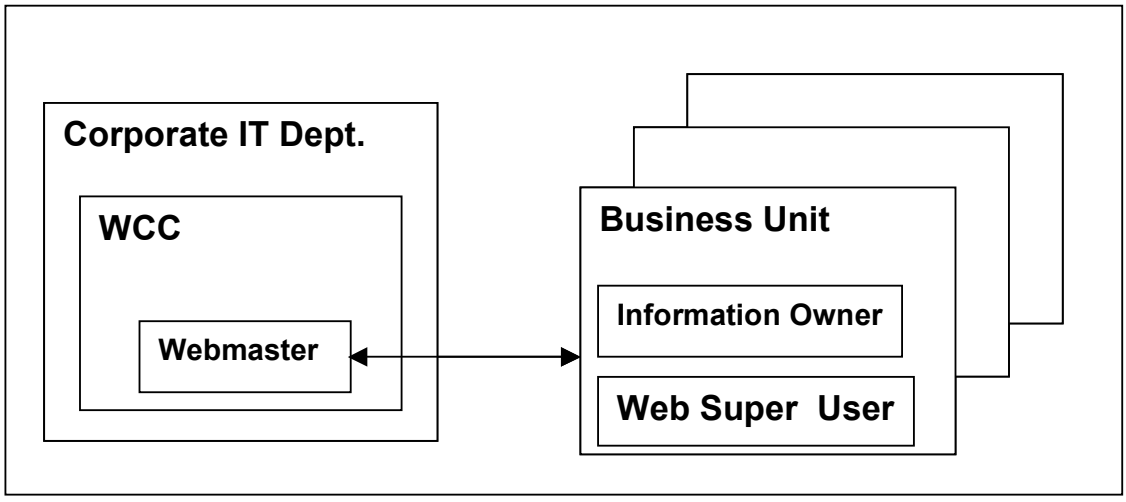

Figure 1. Intranet Support Organization at PharmaCo

The *Webmaster* is responsible for issues concerning overall IntraWeb policy and coordination. The Webmaster also supports and helps Information Owners and Super Users (see below) and is in charge of maintaining the "home page" of the IntraWeb. The Webmaster is located in the WCC.

All Web sites and services belong to an *Information Owner*. In general, Information Owners come from outside the IT department and are usually senior managers or department managers. The Information Owner must, for instance, ensure that published information is valid, that it is up to date, and that no confidential information is published without proper access restrictions.

Every Information Owner appoints a *Web Super User* who is responsible for setting up and maintaining Web sites on a day-to-day basis. Super Users are usually office workers who have received special training in Web design.

While departments and business units as a rule develop and maintain their own Web sites, the development of more advanced services, such as the corporate telephone directory, typically involves the *Web Competency Center*. WCC specializes in solutions based on Web technology and focuses on "total product delivery," including hardware, software, installation, training, and user support. In December 1998, the center employed about 25 software developers and was still expanding rapidly. It is interesting to note that the center has recently also started to employ graphic designers and specialists in organizational communication and knowledge management. All activities are organized in projects carried out by multi-skilled teams. The duration of individual projects is usually relatively short (between three and six months).

The corporate IT department is responsible for managing the basic infrastructure in terms of firewalls, network connections, and desktop configuration (including browser and e-mail client). The desktop is highly standardized and virtually all PCs connected to the IntraWeb have the same standard configuration: Windows 95, Office 95, and Internet Explorer. In this way, the IT department can manage a large network with minimal resources spent on maintenance and support.

In principle, everybody in PharmaCo—departments, project groups, subsidiaries, interest groups, and local trade unions—can set up their own Web site and publish whatever they want or offer other kinds of services. The only requirements are that they appoint an Information Owner and a Super User and that they purchase the so-called *Web Starter Kit* from the corporate IT department (price about US $4,000). The Web Starter Kit comprises software tools for constructing and maintaining a Web site, a two-day course in Web design, space at the official PharmaCo Web hotel, and five hours of consultation from WCC. The Web Starter Kit was launched by WCC in February 1997 and one year later more than 100 kits had been sold.

The IntraWeb support organization will probably continue to evolve and change in the next couple of years as more experience with intranet management is gained and as different organizational actors are vying to influence the development of the IntraWeb. For instance, people in the corporate Communications and PR Department find that they should have a bigger say in the design and management of the IntraWeb. When interviewed, the person responsible for internet and intranet activities in the Communications Department openly criticized the IT department for trying to dominate the IntraWeb:

> *The corporate IT department had no interest or incentive to let anyone else get involved in the development [of the IntraWeb]. I've seen this in a number of other corporations where the IT department confuses the network, which they very much own, with the content that flows over it. So they will want to be setting standards, setting the training standards, deciding who can have access, who couldn't have access.* [Communications Consultant in the Corporate Communications and PR Department, September 1998]

Content and Services

The PharmaCo IntraWeb is like a small-scale Internet, for better and for worse. It shares many of the Internet's strengths—rich content, an active user community, constant innovation and change—but also some of its weaknesses—such as a sense of "chaos," outdated information, and broken links.

The Web sites and services vary considerably with regard to layout, design, quality, sophistication, and content. At one extreme, one finds very professional corporate sites and services. At the other extreme, one finds local sites with a distinctively "do it yourself" look. This striking variation has to do with the way Web sites and services are being developed at PharmaCo. The WCC has developed the more advanced corporate sites and services while most of the sites owned by individual departments, projects, or interest groups have been designed by the Super Users themselves.

The IntraWeb comprises a range of applications and services with different scope and functionality. The majority of the Web sites are simply used for publishing information. The Trademarks Department, for instance, provides access to a database of all PharmaCo trademarks and the Human Resources Department publishes information about benefits, current salary agreements, etc. Local trade unions, the golf club, and various interest groups (e.g., "animal ethics" and "Word super users") have also set up Web sites with information and discussion forums.

PharmaCo has, however, also developed a number of more advanced Web-based services. Examples include a *knowledge management system,* designed to facilitate sharing of best practices across the organization and stimulate discussions about common problems and opportunities; a *document management system,* used to store and distribute formal documents (e.g., ISO 9000 documents) via the IntraWeb; as well as a number of simple *workflow applications* that allow employees to order laboratory materials, office supplies, business trips, library books, etc.

These more advanced IntraWeb services can best be conceptualized as "experimental" systems implemented to explore the potential of the technology. The

development cycles for these services are short and new, improved versions typically appear once or twice a year.

The Web sites and services on the IntraWeb not only vary with regard to their functionality, but also in their organizational scope. Some sites and services are "global" in the sense that potential users are all employees, regardless of what part of the corporation they belong to, while others have a much more limited scope and a much smaller "audience." Some sites have a purely "local" scope, limited to a department or project group. For instance, the Super Users in one of the manufacturing plants have developed a site for internal communication among managers and workers. The site contains messages from the plant manager, minutes from local committee meetings, discussion forums, etc.

Current Issues and Future Challenges

PharmaCo has adopted an improvisational approach to intranet implementation, characterized by an exploratory attitude toward the technology, a commitment to learning by doing, and—perhaps even more important—openness toward local initiatives. This liberal, "free-for-all" or "laissez-innovate" approach has stimulated creativity and helped create a large community of active users.

The downside of this approach is a lack of overall structure and coordination. The policy of letting all departments and other entities create their own Web sites makes the IntraWeb somewhat chaotic and confusing to navigate. Several users have complained about the difficulties in finding specific information on the IntraWeb and in navigating and surveying the Web in general. Furthermore, the quality of many individual Web sites is relatively poor. As one critical manager succinctly summarized the situation:

> *On the whole, I would say that the IntraWeb is too anarchic and out of control. Anybody who has US $4,000 can go out and buy a "Web Starter Kit" and make a couple of homepages. It has to be cleaned*

up, but we still lack a process for that. [Director, June 1999, translated to English by the authors.]

INTRANET DEVELOPMENT AT PlayCo

The development of the intranet at PlayCo began in 1996 and was introduced in the summer of 1997. At the end of 1998, the PlayCo intranet—named the *PlayCo Web*—served nearly 4,000 employees all over the world. It is an advanced intranet with rich content. It is well structured with a unified and professional "look and feel" and the information is generally reliable and up-to-date.

Company Background

PlayCo is a large, international toy manufacturer with headquarters in Northern Europe. It has 50 companies and branch offices in 30 countries on six continents. In 1996, PlayCo had about 8,200 employees worldwide and a yearly turnover of $1 billion. PlayCo provides creative experiences, construction toys, educational materials, lifestyle products, and media products for children all over the world.

PlayCo is in the midst of a major restructuring and repositioning of the company. Since the spring of 1995, senior management has been preoccupied with implementing a new management philosophy and practice. The goal is to change the organization from a traditional division of functions to one that focuses on core business processes and enables the company to react more quickly and efficiently to changing demands of its markets and consumers. The company strives to focus on core processes and skills and to reduce those costs and investments that have no direct influence on the attainment of its central business objectives. An important part of the transformation is to remove barriers to information sharing and improve communication and collaboration across functional and hierarchical boundaries.

The reason for these initiatives is that the character of the global toy market has changed significantly in the 1990s. It is becoming a fashion market with short

product life cycles and fast innovation. Also, new computer games and media products increasingly attract buyers' attention and are becoming strong competitors to old-fashioned physical toys. PlayCo has thus been forced to launch products at a faster pace and develop entirely new digital products.

PlayCo has a corporate IT department with about 250 employees, responsible for the company's IT infrastructure and all major systems. The IT department operates as a cost center and its primary function is to service the rest of the organization.

Beginnings

The intranet at PlayCo started as a top-down initiative. It began as a spin off of the company's WWW project. After the launch of the PlayCo Web site on the Internet in early 1996, the senior vice president responsible for IT started a project to develop technical specifications for an intranet. This project was carried out by the corporate IT department.

The project resulted in a proposal to build a corporate intranet, which was presented to top management at a board meeting in August 1996. The proposal was very well received and the board gave its approval to start building a corporate intranet. One reason for top management enthusiasm was that the intranet proposal augmented the introduction of PlayCo's new management philosophy a few months earlier. Management believed that the intranet would support the new philosophy by breaking down existing "information fortresses" and promoting openness and sharing of information and ideas. As the Corporate IT Manager remarked:

> *This is probably one of the most important aspects: that we brought in the technology in a structured way together with the implementation of a new management concept. And this technology could perfectly support the new management concept. But, it wasn't so that the intranet was developed in response to [the new management*

philosophy]; the intranet just luckily coincided with it. [Corporate IT Manager, interview conducted in English, October 1998]

In the fall of 1996, the Corporate IT Manager visited universities and companies that had experience with implementing intranets. The IT Manager identified two opposing approaches to intranet implementation: The so-called "Sun approach" was an unplanned, grass-roots driven, "bottom-up" approach—much in line with what we observed at PharmaCo. In contrast, the "Ford-approach" was a structured, "top-down" approach emphasizing careful planning and management control. PlayCo decided to adopt the latter approach because it was more in line with PlayCo's traditions and culture.

PlayCo, however, soon realized that the top-down approach created a marketing problem: they had to "sell" the intranet to the organization and convince people to use it. The answer at PlayCo was to bootstrap the intranet by appointing a number of *content providers* (see next section) who could compile the necessary content and thus make sure that "there was some 'real stuff' on the web from the beginning" [Corporate IT Manager, October 1998]. This strategy succeeded and, by the end of 1998, the PlayCo Web had become an important means of communication in the company.

The PlayCo Web is open to all employees with access to a PC. Workers in production do not have access to a PC, but there are initiatives on the way to install PlayCo Web kiosks with touch screens on the shop floor.

Support Organization

PlayCo's intranet has from the outset been planned and implemented in a top-down fashion. This is also reflected in the structure of the support organization: One of the company's senior vice presidents acts as the organizational *intranet sponsor* and has the overall responsibility for the intranet initiative. In addition, three new organizational roles, namely Web Coordinator, Web Developer, and Content Provider have been created (see Figure 2).

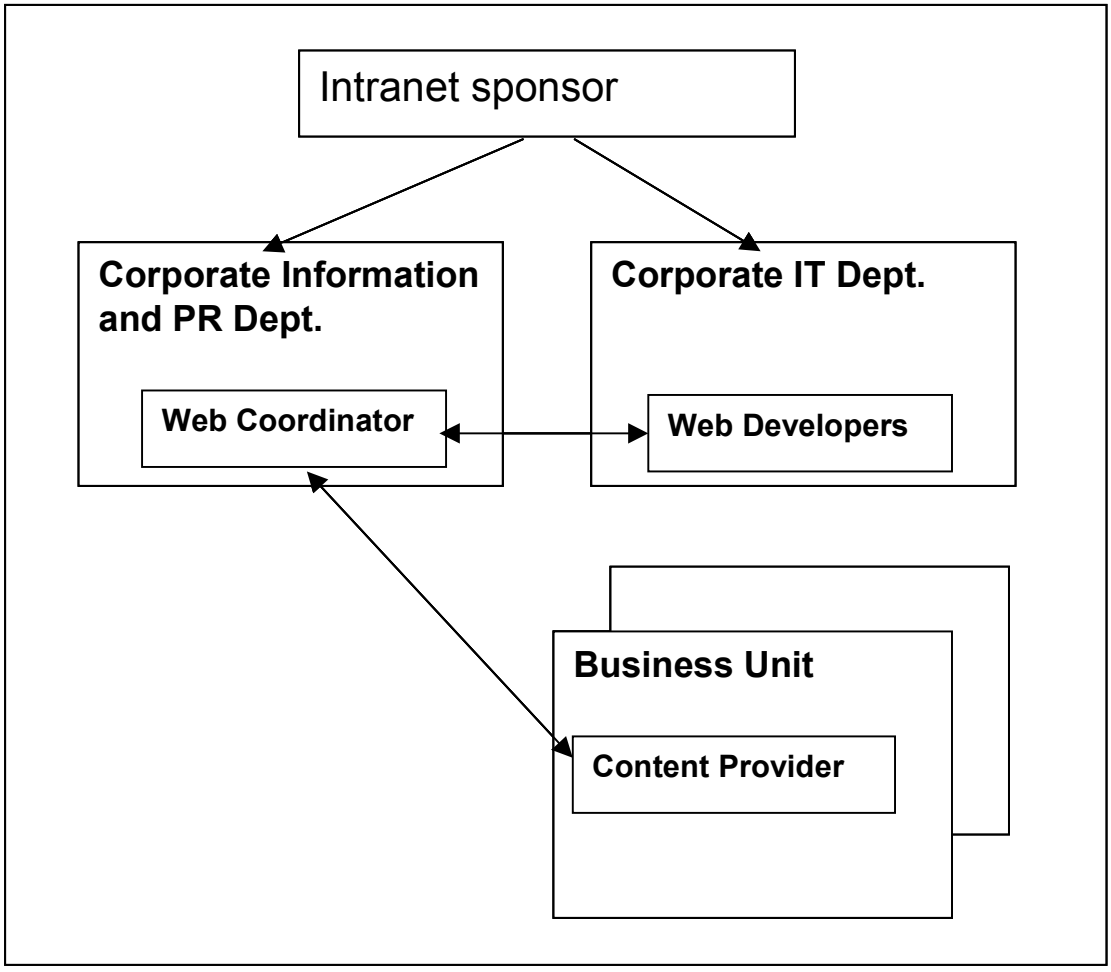

Figure 2. Intranet Support Organization at PlayCo

The *Web Coordinator* is responsible for the structure and general design of the PlayCo Web. An important part of her work is to promote use of the intranet and urge departments and business units to provide content for the Web. The coordinator is in charge of designing the basic framework of the Web in terms of information structures and navigational aids. In addition, she issues detailed guidelines for the layout and graphical design of individual Web pages. These guidelines specify what color schemes, type fonts, buttons, etc., one is allowed to use on the PlayCo Web. The Coordinator reviews Web pages produced by Content Providers (see below) before they are published. The purpose of the review

procedure is to make sure that all Web pages conform with the design guidelines, that all links are valid, etc. In other words, the Web Coordinator acts as QA and gatekeeper of the intranet. The position of Coordinator belongs to the Information and Public Relations Department and not the IT department. This was a deliberate decision made by the sponsor. Only the Web Coordinator and the principal Web Developer have the formal authority to publish on the intranet.

Content Providers are responsible for producing the content of the PlayCo Web. When designing Web pages, the Content Providers must follow the guidelines stipulated by the Web Coordinator. After preparing a set of pages, Content Providers forward the pages to the Web Coordinator who reviews and publishes them. At the end of 1998, there were between 60 and 80 Content Providers worldwide. Existing liaison officers usually undertake the job of Content Provider.

The corporate IT department has established a group of four technical *Web Developers* who are responsible for developing and supporting intranet services. The principal Web Developer has been with the company for many years and knows the culture and traditions in PlayCo well. She works closely with the Web Coordinator and when necessary acts as her substitute.

The corporate IT department is in charge of the technical infrastructure of the intranet, including the PlayCo PC. As in PharmaCo, the PC configuration and desktop are highly standardized (Microsoft Office and Internet Explorer).

In general, all departments and business units at PlayCo are encouraged to have a presence on the PlayCo Web. The emphasis is on advancing inter-departmental communication and not on intra-departmental communication. Inter-departmental communication has in the past been very sparse and restricted to facts and general information with little interaction. The departments perceive the intranet with some reluctance because they do not have any traditions or incentives to share information

Content and Services

The PlayCo Web is a well-polished information service. It has a clear structure and all Web pages are designed according to the guidelines. The result is a consistent and homogeneous design throughout the entire Web. It is relatively easy to navigate, there are no outdated links, and the content is generally valid and up-to-date.

The PlayCo Web is primarily used for publication of official information from Corporate Headquarters as well as individual departments. For instance, most of the internal newsletters are published on the Web. Other examples include:

- *The telephone directory.* This is the first integrated, worldwide employee and telephone directory within PlayCo. The directory integrates telephone numbers and e-mail addresses with various information from existing HR systems and in some cases even pictures of people.
- *Product information*. Information about the current product range is periodically extracted from the company's legacy systems and published on the PlayCo Web (together with high-quality, full-color pictures).
- *Sales reports.* The Sales and Marketing Department maintains a restricted access site with the latest statistics on sales. Information can be downloaded in spreadsheet form for further analysis.
- *The Logo Manual.* A very practical feature is the Logo Manual, with downloadable logos ready for insertion in Power Point presentations and publications.

The Web Coordinator has also tried to set up various *discussion groups* to encourage debate about current issues across functional and hierarchical boundaries. So far, however, the activity level in these groups has been minimal. Despite the limited success with the discussion groups, PlayCo intends to focus more on using the intranet to promote sharing of information, ideas, and knowledge in the future.

Current Issues and Future Challenges

PlayCo has adopted a structured, top-down approach to intranet implementation, characterized by a strong emphasis on careful planning and a cost conservative attitude toward the technology. The result is a well-structured intranet with a professional design and a focus on efficient dissemination of "official" information.

However, this approach leaves little room for local initiatives and informal experimentation with the technology. It tends to reinforce traditional communication patterns and power structures and impede more informal sharing of information and knowledge, giving rise to a paradoxical situation: The way in which the technology is implemented is in sharp conflict with the intentions behind the company's new management philosophy.

IV. COMPARISON OF PharmaCo's AND PlayCo's INTRANETS

Both the PlayCo Web and the PharmaCo IntraWeb are advanced, corporate-wide intranets with many users. The two intranet implementations are, however, remarkably different in a number of important aspects (see Table 1).

Initiative. The PlayCo Web was a top-down initiative while the PharmaCo IntraWeb was the result of a bottom-up process, subsequently supported by top management. Top management at PlayCo initiated the implementation of the PlayCo Web as part of a major ongoing restructuring and repositioning of the company. The initial focus was to improve and open up interdepartmental communication, thereby seeking to break down "information fortresses." At PharmaCo, the process started as a grassroots initiative from researchers and scientists. Top management and the corporate IT department, however, soon realized the potential benefits of a corporate intranet and decided to invest time and resources in developing a full-fledged intranet.

Table 1. Comparison of PharmaCo IntraWeb and PlayCo Web

	PlayCo Web	PharmaCo IntraWeb
Initiative	Top-down	Bottom-up
Scope	Corporate-wide	Corporate-wide
Focus	Interdepartmental communication	Intra- as well as inter-departmental communication
Users	Managers and employees at all levels	Managers and employees at all levels
Control and Ownership	Centralized	Decentralized
Standards	Common design guidelines	No common standards
Resources	1 Web coordinator 4 programmers 80 content providers	1 Web master 20 programmers 140 super users
Content and Services	Orderly Polished content, fancy design Well-structured	Unruly, very dynamic Mixed quality content and design Chaotic

Scope, focus, and users. Both intranets have a global, corporate-wide scope and, in principle, all employees have access to the Web. The two intranet implementations differ a little with regard to their focus. The PlayCo Web aims at improving inter-departmental communication, while the PharmaCo IntraWeb is used for communication within individual departments as well as between different departments.

Control and ownership. Ownership of the intranet is centralized at PlayCo while it is decentralized at PharmaCo. The PlayCo Web is carefully planned and managed by corporate headquarters. The Web Coordinator in the Information and PR Department is responsible for the overall structure and design of the PlayCo Web. She has the authority to publish information on the PlayCo Web and all Content Providers report directly to her. In contrast, at PharmaCo ownership and publication rights are delegated to individual departments, business units, and subsidiaries. Any department or project can set up a site on the IntraWeb and

publish what they like—as long as they appoint a responsible Information Owner. Super Users report to their local Information Owner. In both companies, the corporate IT department is responsible for building and maintaining the basic IT infrastructure.

Standards. While PlayCo has instituted a set of standards and guidelines for design of Web sites and services, PharmaCo has no common standards for Web design. At PharmaCo, the various departments are allowed to use whatever design style, color scheme, or structure they choose. In both companies, however, the underlying infrastructure components are highly standardized.

Resources. PharmaCo has invested considerable resources in the development of their intranet, while PlayCo has decided on a more cost conservative approach. The IT department at PharmaCo has, for instance, created the new WCC. In addition, many departments outside the IT department have dedicated substantial resources to designing and maintaining their own web sites.

Content and services. Not surprisingly, the outcome in terms of content and services on the two intranets are quite different. The PlayCo Web is much more streamlined, polished, and orderly than the IntraWeb at PharmaCo. Compared with the PlayCo Web, the PharmaCo IntraWeb is somewhat chaotic and unruly, but also more dynamic and richer in content. In addition, PharmaCo has spent significant resources on experimenting with more advanced applications such as document management, workflow, and knowledge management.

In sum, the two companies have tackled intranet implementation very differently. PlayCo has preferred a *planned change* approach, emphasizing management control, careful planning, and top-down processes, while PharmaCo has adopted an *improvisational* approach, emphasizing innovation, improvisation, and self-organizing (Orlikowski 1997). The implementation of the intranet at PlayCo was part of a deliberate organizational change aimed at transforming the company from a traditional functional hierarchy to a process-oriented organization. In other words, top management at PlayCo saw the intranet as an *instrument* to change the

organization. In contrast, the intranet implementation at PharmaCo may better be described as *emergent* change. Where deliberate change is the realization of a new organizational pattern according to a plan, emergent change is the realization of a new pattern of organizing in the absence of explicit, a priori intentions (Orlikowski 1996).

V. DISCUSSION AND CONCLUSIONS

Most accounts of IT-based innovation in organizations assume that "designers and implementors have a clear view and stance with respect to what a system should or should not do, and that the system itself will behave to the rule" (Ciborra and Lanzara 1994). We agree with Ciborra and Lanzara that, in general, this is a rather naïve and unrealistic assumption—and we would like to add that it is even more illusory and misleading when we talk about the design and implementation of systems based on Internet and Web technologies. These technologies are novel and virtually unknown to most organizations and, in addition, they are in a state of flux, with competition among alternative products and standards and among shifting coalitions of actors. The potential uses and limitations of these new technologies in organizational settings are still to a large degree unknown and organizational models for implementing and managing intranets are emergent, but not yet established. Thus, organizations implementing intranets have to invent their own technological and organizational solutions, more or less from scratch. In other words, they basically have to improvise (Weick 1998)—even when they, like PlayCo, are aiming to implement the technology in a carefully planned and controlled way. (Remember the remark made by the Corporate IT Manager at PlayCo that the introduction of the intranet "luckily coincided" with the implementation of their new management concept.)

In order to better understand how organizations design and manage their intranets, we have to acknowledge that IT-based innovation and change is simultaneously ambivalent, untidy, and often unpredictable (Ciborra and Lanzara

1994). Organizational and technological change unfold as a result of ongoing interactions among multiple networks of actors, inside as well as outside the organization. Existing technologies, institutional arrangements, and cognitive frames constrain the actors, but they are also actively using them as resources in their efforts to influence the development of new technologies and organizational forms, in accordance with their own values and interests (Ciborra and Lanzara 1994; Orlikowski 1992; Poole and De Sanctis 1990).

The cases reported here show that radically different approaches to designing and managing intranets exist and that the technology—at least at the present stage of its evolution—has a high degree of "interpretive flexibility" (Bijker et al. 1987, Orlikowski 1992). It is a highly malleable and open-ended technology, subject to many plausible interpretations (Weick 1990). This open-endedness offers benefits of flexibility and enables organizations to design and structure their intranet in accordance with their own specific circumstances and needs. The intranet will, in each case, "bear the imprint" of those conditions (Orlikowski 1992).

Ciborra and Lanzara introduced the notion of *formative context* to capture the social and cognitive embeddedness of technological innovation in organizations. The formative context is "the set of the preexisting institutional arrangements, cognitive frames and imageries that actors bring and routinely enact in a situation of action" (Ciborra and Lanzara 1994, p. 70). The context is "formative" because it shapes the ways people make sense, perform, and get organized in a specific situation.

The two companies in our study constituted very different formative contexts for the design and implementation of intranets. PlayCo is a traditional manufacturing company and the type of context that influenced managers and employees of PlayCo can be characterized as *hierarchical.* PharmaCo, on the other hand, is a research-based, knowledge intensive company with a culture that values experimentation, autonomy, and innovation. This context, which can be described as *networking,* is characterized by working and bargaining in a network and by

intense lateral communication. These differences in formative context explain why the dynamics of intranet implementation in the two companies differ so markedly and why the two intranets evolve in different directions, following radically different trajectories.

To take these general remarks further, we will explore three questions in more detail. First, we expand upon the implications of intranet technology for the way in which organizations manage and organize their IS resources. Second, we address how organizations can facilitate the evolution and adaptation of their intranets to changing contexts of use. Third, we focus on the issue of control and the extent to which organizations should implement and maintain centralized control mechanisms to manage the use and evolution of their intranets.

CHANGES IN IS ORGANIZATION AND SKILLS

The two cases show that the introduction of intranets leads to substantial changes in the way IS services are organized and delivered, as predicted by Lyytinen et al. (1998) and other researchers. It should be noted, however, that the two organizations studied have only recently introduced intranets and the implementation process is still evolving. Thus, it is still too early to draw definitive conclusions about the long-term impact on IS development.

The introduction of intranets in the two companies is associated with the creation of *new organizational structures and processes* to support the ongoing development of content and services. At the same time, old distinctions between developers and users tend to become blurred as new organizational roles are created and new skills become important (see also Scheepers 1999).

The most important new roles are the position of central coordinator of the intranet (called Webmaster at PharmaCo and Web Coordinator at PlayCo) and the positions as Super User (at PharmaCo) and Content Provider (at PlayCo).

The Webmaster/Web Coordinator has the overall responsibility for the design, implementation, and daily operation of the intranet. She coordinates

activities across the organization, issues policies and guidelines for design and publication of information, defines quality standards, etc. While the position as Web Coordinator at PlayCo is a powerful position, the position as Webmaster at PharmaCo is more technical-administrative in nature and less influential.

The Super Users and Content Providers are responsible for producing the "content" of the intranet. They gather information, design Web pages and ensure that published information is always up to date. While the Super Users at PharmaCo have a high degree of autonomy and discretion to design Web content, the Content Providers at PlayCo must follow the standards and guidelines laid down by the Web Coordinator.

The introduction of intranets and the creation of new organizational structures associated with the technology challenge the traditional role of the corporate IT department. Its dominant position is contested by other organizational actors, who see the intranet as a communications technology rather than a technology for information processing. At PlayCo, for instance, top management decided right from the beginning that the influential role of Web Coordinator should belong to the Information and Public Relations Department and not to the IT department. At PharmaCo, the IT department has been a major driving force in the introduction of the intranet and the position as Webmaster belongs to the IT department. However, the corporate Communications Department is openly criticizing the IT department's dominance.

Changes are also taking place within the boundaries of the IT department. Web-based development requires new skills, methods, and project management techniques. Technical skills must be combined with "artistic" skills in areas such as graphics design and the development organization must be able to handle the rapid technical change associated with the Web technology. Typically, Web-based services are developed an order of magnitude faster than with earlier platforms and development cycles are very short. At PharmaCo, for instance, it is not unusual that new versions of a Web service are released once or twice a year. In order to cope

with this new situation, the IT department at PharmaCo has set up the Web Competency Center. The WCC primarily recruits graduates in computer science and software engineering, but has recently begun to employ graduates with expertise in (graphics) design, communication, and organization. The IT department at PlayCo has also created a special Web development group to support the intranet, but it is not a standing organizational entity.

In several instances, the two companies have sought assistance from external specialists in Web design. They were primarily brought in to help with page layout and graphics design. At both PharmaCo and PlayCo, there seems to be an increased focus on the aesthetic aspects of Web design and a perceived need to improve the "look and feel" of the intranet.

TECHNOLOGY-USE MEDIATION

The new organizational roles of Super User and Content Provider deserve special attention. We suggest that local support staff of this kind are particularly important in increasing the effectiveness with which intranets are adopted, implemented, and used over time. There are two reasons for this.

First, intranets—and the Web in general—as a media of human communication are dependent upon users to provide "content." Without interesting, high-quality and up-to-date information, intranets are worthless. The Super Users at PharmaCo and the Content Providers at PlayCo play the role as content providers or *editors*—either directly by authoring and publishing information themselves or indirectly by encouraging, asking, helping, and supporting others to publish relevant information on the net. They can help address the critical mass issue by promoting the intranet locally and by encouraging people (through peer-to-peer networks) to publish information that others can use.

Second, the technology is more open-ended, generic and customizable than traditional mainframe or client-server systems. Intranets are general-purpose media that may facilitate a range of possible types of interactions (for a taxonomy of

intranet use modes, see Damsgaard and Scheepers 2000). Orlikowski et al. (1995) stress that such open-ended communication technologies require ongoing adaptation to particular contexts and local work practices to make them useful and effective.

> This open-endedness offers benefits of flexibility but also creates the possibility that—without adaptation of the technology to the context and vice versa—the technology will not reflect local conditions or communication norms and hence will be underutilized or inappropriately utilized. (Orlikowski et al. 1995, p. 424)

Such adaptations and accommodations cannot be known up front and typically have to be enacted *in situ*.

The Super Users at PharmaCo act as *mediators* of the technology-in-use. Okamura et al. (1994) define mediators as "individuals who intervene deliberately and with organizational authorization in the ongoing use of…technology within its context of use." The Super Users adapt the technology to the local context, modify existing work practices to accommodate use of the technology, and support ongoing changes in the technology and work practices over time. In many cases, Super Users have come up with innovative ideas on how to design and use the technology—for instance, to support communication and collaboration in large research and development projects—and they have also, in many cases, taken an active part in the actual implementation of their ideas.

The Content Providers at PlayCo play a similar but significantly less prominent and active role. The reason is that they have less discretion and fewer resources at their disposal (in terms of time, training, and technical support).

Because the Super Users and Content Providers are themselves users and thus have intimate knowledge of local work practices as well as credibility with the (other) users, they can have a profound effect on how usable, appropriate, and relevant the technology is (and remains) in particular local contexts of use (Okamura et al. 1994).

POWER AND CONTROL

The different approaches followed by the two companies highlight the issue of power and control. Salient differences between the two approaches have to do with the distribution of power and the degree of control over publication and development activities that the organization tries to exercise. At PlayCo, top management has opted for a relatively high degree of centralized planning and control over the implementation of the intranet. The Web Coordinator in the corporate Information and Public Relations Department plays a central role in the development of the PlayCo Web and has significant influence on the overall design and structure of the intranet. At PharmaCo, the situation is almost the opposite. The Webmaster in the corporate IT department has relatively limited influence on the structure, design, and content of the IntraWeb because the Information Owners and Super Users have the full authority to decide what to publish as well as how to design their own Web-sites.

The distribution of authority among different organizational actors has major implications for the design, usefulness, and ongoing evolution of the respective intranets. When power is centralized and the degree of organizational control and planning is high, there is little room for experimentation and learning at the local level. There is a risk that the design of the intranet will not reflect local conditions and that the organization will miss opportunities to apply and leverage the capabilities of the technology in ways that were not anticipated or planned at the outset. The result may be that the intranet will simply manifest itself as a new channel for top-down, official communication from management. It will thus be assimilated into the status quo and consolidate the existing hierarchy and distribution of power and influence in the organization. It may rationalize the communication system and make it more efficient, but it will not lead to organizational innovation, new work practices or novel ways of using the technology.

When power is distributed to local actors and management eases central control and planning, ongoing and iterative experimentation, adaptation, and

learning at the local level is facilitated. This may enable the organization to take advantage of the evolving capabilities, emerging practices, and unanticipated outcomes that accompany the introduction of the intranet. Thus, the intranet has the potential to become a new interactive medium that transcends existing hierarchical and functional boundaries, encourages collaboration and knowledge sharing, and leads to innovative ways of organizing work. There is, of course, no guarantee that this will happen. It depends on the willingness and ability of organizational actors to engage themselves in an ongoing process of experimentation and learning where local adaptations and accommodations of the technology and its use play a central role. It is a risky and uncertain course upon which to embark. It may be costly, the potential benefits may not materialize, and it may even breed conflict if established positions of power and privilege in the organization are threatened.

In most cases, resistance from groups of managers is likely to be the major obstacle to this kind of organizational innovation. As Zuboff (1988) has pointed out, the "informating" capacity of new computer-based technologies—such as intranets—contains a threat to traditional sources of managerial authority, which depend in part upon control over the organization's knowledge base. Facing this threat, managers will struggle to retain their position in the hierarchy and seek ways to protect their power base. They will oppose innovative ways of using the technology and instead try to structure the use of the technology in ways that help defend and reproduce the legitimacy of their managerial authority. In other words, there is always the risk that "the hierarchy will use technology to reproduce itself" (Zuboff 1988).

IMPLICATIONS FOR PRACTICE/MANAGEMENT

The discussion above makes it clear that attempts to create unified, universally applicable models or "best practice" guidelines for designing and implementing intranets are futile. Instead, we have to recognize organizational

diversity and that the technology is embedded in, and shaped by, its social context.[3] Nevertheless, we can identify a number of central issues that organizations should deal with explicitly and deliberately when they introduce intranets.

First, our findings suggest that the influence and action of *mediators* can play a critical role in the successful implementation of intranets. They may actively promote the use of the intranet, adapt the technology to its local context, and shape the way other users adopt and use the technology. Organizations should, therefore, carefully consider how to define the mediator role and how many resources to spend on mediation activities. As Okamura et al. point out, the extent and effect of mediation depends on the authority granted and resources made available to mediators. The Super Users at PharmaCo, for example, have more autonomy than the Content Providers at PlayCo and are thus in a better position to influence the development and use of the intranet. The experience from both PharmaCo and PlayCo also points to the importance of adequate technical and organizational training of mediators to make them as effective as possible.

Second, our comparison of the organization of intranet activities in the two companies suggests that issues of *power and control* are crucial to intranet implementation and evolution over time. The distribution of authority among organizational actors and the degree of management control have decisive impact on the intranet's development. Who has the authority to create new Web sites, publish information, and develop new IS services on the net? These are issues of utmost importance for the effectiveness and usefulness of the intranet. Consequently, senior management should carefully consider the design of the support organization and the delegation of power.

In particular, senior management must consider whether authority to publish information and implement new services should be centralized or decentralized and

[3]This observation, of course, does not preclude that one can identify certain general development patterns when organizations introduce and implement intranets. See, for instance, the model of intranet implementation and management proposed in Damsgaard and Scheepers (2000).

to what extent organizational controls and standards should be enforced. There is no easy answer to this question, which in many cases will place the organization in a dilemma.

On the one hand, decentralization and efforts to stimulate local initiative and creativity may result in:

- *Information overload,* caused by an uncontrolled proliferation of Web sites and services. Lack of standardization and coordination may lead to chaos on the intranet and make it virtually impossible to navigate.
- *Low quality of information,* caused by the distribution of responsibility for the quality and updating of information among many local actors. It is much more fun to create a new Web site than to "maintain" an existing site. Maintenance is often perceived as a time consuming and rather boring task, and thus only carried out if one is forced to do it.
- *Uncontrolled costs,* caused by the difficulty in managing how much time local actors (business units, departments, or projects) spend on developing their Web sites.

On the other hand, centralization and a strong emphasis on organizational control and planning may result in:

- *Underutilization* of the technology because it does not reflect local conditions and needs. Users may perceive the intranet as a top-down initiative, not very useful, and "not their business." It may thus become difficult to reach a critical mass of both users and content.
- *Lack of innovation,* caused by centralized decision making, organizational control mechanisms, and bureaucratic planning procedures that stifle new ideas, experiments, and learning at the local level.
- *"Partisan activities"* by displeased decentralized actors who, for instance, may set up "underground" intranets out of reach from the central Webmaster. See Markus (1983) for an excellent description of such activities.

The challenge is to strike a balance between centralization and decentralization of power and to devise organizational structures and processes that encourage improvisations, experimentation, and learning and, at the same time, avoid confusion, chaos, and runaway costs.

FURTHER RESEARCH

Further research is needed in this area. The most obvious route is to follow the evolution of intranets over an extended period of time in order to get a better understanding of what strategies yield which results in the long term. We suspect, however, that there is no dominant design or optimal strategy for intranet implementation. In the future, when the technology has matured and more standard Intranet packages have become available on the market, one interesting avenue of research will be to assess the differences between "home grown" and purchased intranets and how they may manifest themselves differently according to the organizational context. The two described intranets are relatively young. Currently both PlayCo and PharmaCo are in the midst of launching more advanced intranet applications with a clear focus on support for knowledge management. How knowledge management may influence the use and intranet implementation tactics may also prove to be an interesting research topic.

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VIII. ABOUT THE AUTHORS

Jørgen P. Bansler is an associate professor in the Center for Tele-Information at the Technical University of Denmark. His research interests include intranet development and use, knowledge management, and new organizational forms. Bansler has a Ph.D. in computer science from the University of Copenhagen, Denmark. He has published in such journals as *ACM Transactions on Information Systems*, *Industrial Relations*, *Information Technology & People*, *New Technology*, *Work and Employment*, and *Scandinavian Journal of Information Systems*.

Jan Damsgaard is an associate professor at the Department of Computer Science, Aalborg University, Denmark. His research focuses on the diffusion and implementation of networked and standard-based technologies such as intranet, e-commerce, EDI, WAP, extranet, and Internet technologies. He has presented his work at international conferences (ICIS, ECIS, PACIS, HICSS, IFIP 8.2. and 8.6) and in international journals *(Information Systems Journal, Journal of Strategic Information System*s, *International Journal of IT*, *Journal of Organizational Computing and Electronic Commerce, Information Technology and People*, and *Information Infrastructure and Policy*). He holds visiting positions at University of Jyväskylä, Finland and Copenhagen Business School, Denmark.

Rens Scheepers is a senior lecturer at the School of Information Technology, Swinburne University of Technology, Victoria, Australia. His present research interest is the business use of Internet technologies in general, and specifically intranet and extranet implementation and management. He has

presented his research at international conferences in Europe and the U.S. and in a number of international journals.

Erling Havn is an associate professor at the Center for Tele-Information, the Technical University of Denmark. He holds a Ph.D. in Cultural Sociology from University of Copenhagen, Denmark, and he has done many years of research in information systems, organizations, and social practice. His current research focus on collaboration and communication within geographically dispersed organizations and the use of intranets in these organizations. He has published in such journals as *Computer Integrated Manufacturing Systems*, *Artificial Intelligence and Society*, and *International Journal in Human Factors in Manufacturing*.

Jacob Thommesen is a doctoral student at the Center for Tele-Information at the Technical University of Denmark. He has a Master's degree in Computer Science from the University of Copenhagen. He is now preparing his thesis on intranet-based knowledge sharing in virtual organizations. His work is inspired by German philosophy and critical theory. Since Spring 2000, he has been associated with the ikon (Innovation, Knowledge and Organisation Network) group based in Warwick Business School.

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