16 THE NEW COMPUTING ARCHIPELAGO: INTRANET ISLANDS OF PRACTICE

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Abstract

This paper examines the growth of grass roots intranets as an extension of end-user computing. This perspective helps to characterize the nature of intranet development and use as "islands of practice" and provides a background against which the rapid proliferation of organizational intranets in the 1990s can be compared and contrasted with the explosion of personal computers and "islands of end-user computing" in the 1980s. This retrospective analysis of end-user computing is based on academic and business journal literature. The contemporary analysis of intranet development and use is based upon preliminary results from an ongoing qualitative study of midwest U.S. firms in various industries. These analyses highlight two phenomena that are likely to define the shape of intranets and future computing movements: (1) the integration of "intranet islands," not only within the firm but also across organizational boundaries, and (2) the role changes among IS and business area professionals as they work with intranet technologies. The discussion of these phenomena examines the ways in which intranets present unique opportunities for understanding the initiation and widespread uses of a new technology,

while at the same time illuminating the changes in organizational roles that so often attend technological interventions.

1. Introduction and Motivation

Use of Internet technologies for internal organizational communications, or intranets, has grown rapidly since the mid-1990s. The scope and range of intranet applications extend beyond simply posting information in web pages to include document flow management, workgroup collaboration, and database access and update. According to an International Data Corporation study (quoted in Machlis 1999), U.S. companies spent over \$10.9 billion, or one fourth of web-related project spending, on intranet projects in 1998. More than half of large U.S. organizations had intranets in place, and more than 30 million people used some form of intranet. Some researchers contend that the use of Internet technologies in applications such as corporate intranets represents a radical shift in the nature of information systems (IS) development, IS services, their delivery and associated organizational processes (Lyytinen, Rose, and Welke 1998). We agree that such changes are likely to be dramatic and substantial. However, we also suggest that the rapid adoption and development of intranets is, to some degree, a case of "dejà vu all over again."   There are striking similarities between the introduction and growth of organizational intranets in the second half of the 1990s and the advent of end-user computing (EUC) in the early 1980s. Intranet development is in many ways an extension, albeit in new and exciting technological and content areas, of the end-user computing movement.   There are, of course, substantial differences in these two episodes of computerization that warrant careful consideration.

From this perspective, we propose there are lessons to be gleaned from comparing and contrasting the first decades of end-user computing with intranet development occurring in the mid to late 1990s. Consideration of similarities and differences in these two computerization movements may help us to forecast how intranets will develop and mature in organizations and to suggest appropriate IS support strategies. This paper begins such a discussion. We first take a retrospective look at the early stages of the end-user computing movement and review key findings and lessons from this period. We then consider how intranets are being introduced, developed, and used in organizations. This assessment is drawn from a research study of intranets and supplemented by business press reports on organizational experiences with intranets. In the discussion, we compare and contrast these two computerization movements to highlight issues that may be reoccurring in the intranet movement and to identify new questions to be addressed. In particular, we are interested in the roles and responsibilities of IS services and business area professionals in the management and control, integration, operation, and support of intranets. Finally, we consider implications for IS research and suggest potential areas of study.

2. A Retrospective Analysis of the Advent of End-User Computing

End-user computing (EUC) began in the mid-1970s, as a growing number of non-IS personnel started using mainframe timesharing facilities to develop business applications.

It expanded rapidly in 1982, when knowledge workers of all types initiated a wide-scale adoption of personal computers (PCs) and software packages, such as spreadsheet programs and word processors. This end-user computing movement arose from users' frustration with long backlogs for IS services, their impatience with formal systems development methods, the emergence of a more computer-literate end-user community, development of more user-friendly software, and, ultimately, the introduction of low-cost microcomputers (Carr 1987; Dotson 1982; Kling and Iacono 1989). It resulted in a shift from a systems development paradigm, in which IS professionals managed and controlled virtually all aspects of computerized systems development and use, to a new paradigm in which business area staff played a substantial role in the development and operation of such applications.

In many instances, the organizational introduction of EUC technologies was a grass-roots effort led, not by the IS department, but by early adopters from business functional areas (Brancheau and Wetherbe 1990). Some information services departments actively resisted early organizational forays into EUC, particularly those involving personal computers (Benson 1983). IS managers feared that users would fail to coordinate development activities and thus waste corporate resources by "reinventing the wheel," fail to document systems and programs, fail to adhere to standards and policies enacted for the corporation, or fail to exercise adequate controls over data integrity and security, all of which would increase the possibility of major computer-related disasters (Benson 1983; Davis 1982; Guimaraes 1984; Guimaeres and Ramanujam 1986; Mayo 1986; White and Christy 1987). Both academic researchers and writers in the business press warned of inherent issues with non-IS professionals doing their own computing and suggested that the IS department should manage and control their efforts. For example, an early research article commented, "The organization's hardware, software, and data are valuable resources which can be lost or diminished if not properly developed and protected. End users, acting independently, cannot always be expected to use these resources in ways that are optimum for the whole firm. Since end-user computing bypasses the monitoring and control mechanisms built into MIS department computing, there is no formal check on user behavior" (Leistheiser and Wetherbe 1986, p. 338). While acknowledging that the EUC movement would continue to flourish, writers used such terms as "catastrophe" (Kirkley 1989, p. 96) and "disastrous" (Essex, Magal, and Masteller 1998) and outlined disaster scenarios (Davis 1982) that might occur without the IS department's intervention, guidance, and control over EUC. Not surprisingly, by the early 1980s, MIS managers ranked "facilitation and management" of EUC as the second most critical success factor for their organization (Dickson et al. 1984).

IS managers, while doubting end-users' qualifications to manage and control computing activities, faced increased expectations for providing services to this constituency. Early predictions that EUC would reduce the backlog of application development requests and maintenance for the IS department (Leitheiser and Wetherbe 1986; McLean 1980) proved to be unfounded. Instead, EUC addressed the "invisible backlog" for computerized applications (Carr 1987; Garcia 1987) and at times increased the backlog with requests to the IS department for PC-based applications. There was a lack of consensus on whether the IS department's EUC strategy should focus primarily on providing the right information technology tools and training, on actively intervening in EUC activities to enhance organizational productivity, or simply on keeping end users

"out of trouble" (Munro and Huff 1988). Strategy options ranged from a *laissez faire* approach to establishing policies and procedures for EUC and strictly enforcing them (Goldberg 1986; Kirkley 1989; Leitheiser and Wetherbe 1986; Munro and Huff 1988).

By the mid-1980s, IS departments had begun to act on their perceived dual responsibilities to support and encourage EUC as well as to control these activities to ensure the corporate good (Leitheiser and Wetherbe 1986). This commonly involved integrating EUC efforts within the organization by standardizing desktop applications and by networking the separate "islands" of computing that were distributed throughout the firm (McFarlan, McKenney, and Pyburn 1982, 1983). As PCs became workstations on the network versus stand-alone "mini-DP shops," the IS department took a stronger role in selecting the standard PC hardware and software platform which they would support and enforcing operating systems standards compatible with networking technology and devices (Freeland 1987; Guimaraes and Ramanujam 1986). Control tactics included having approval over purchases, negotiating approved vendor lists, and restricting access to mainframe computers (Munro and Huff 1988). As controls increased, so did support for end-users, as general consulting, end-user training, help desks, product and technical support, micro-mainframe communications, and software libraries were added to IS services (Guimaraes and Ramanujam 1986; Leitheiser and Wetherbe 1986).

The organizational structures that emerged as the focus of support and control for EUC were the Information Center (IC) and the "user group." The number of ICs grew rapidly between 1982 and 1984, with the growth rate leveling off by 1987 (Garcia 1987). Initially, ICs took on the task of increasing computer literacy by focusing on end-user training (Dotson 1982). Although IC's were typically perceived to be under-funded (Garcia 1987; Goldberg 1986), their organizational mission grew to include promotion, support, control, and management of EUC (White and Christy 1987). By late 1988, a survey comparing services offered by ICs to services desired by organization members indicated that ICs were giving too much emphasis to training and hardware/software evaluation, installation and support, and not enough to developing PC-based applications and helping people understand data sources and data transfer (Ranier and Carr 1992). User surveys indicated that people were most satisfied when IC staff were located close to end-users and offered a variety of support services, but less so when ICs were large and focused on mainframes, possibly because they exerted too much control over EUC (Bergerson, Rivard, and DeSerre 1990). More sophisticated business personnel, defined as end-users who supported others in their functional department by developing computerized applications, had greater perceived needs for IC services, such as standards and guidelines, support staff, and post-development support, and when such support was provided, they were more satisfied (Mirani and King 1994). Such findings indicated that ICs needed to tailor the type and level of support to each end-user community. A key implication was that when IC staff did not have the requisite skills, they should facilitate the formation of user groups, because end-user developers sometimes had more in-depth knowledge of specific development contexts (Mirani and King 1994). In fact, IC growth and expansion was achieved by decentralizing some support activities to these groups (Magal, Carr, Watson 1988). However, this led to role ambiguity for IC staff who were positioned between the IS department and end-users, resulting in dissatisfaction and turnover within the IC (Gupta, Guimaraes, and Raghunathan 1994). In addition, achieving meaningful participation in user groups proved difficult, and the value that the

IC staff contributed to the process tended to be limited to administrative duties (Alexander 1989).

In less than a decade, the end-user computing movement had transformed organizational IS. Beginning as an insurgent, grass roots action, resisted by the IS department, EUC had become an integral part of the corporate-wide computing environment. The degree of institutionalization and routinization of EUC is suggested by the declining importance of EUC issues in surveys of IS managers' most pressing concerns from second position in 1983 to sixth in 1986 and twelfth by 1989-90 (Niederman, Brancheau, and Wetherbe 1991). By the mid-1990s, "end-users" were computer-literate business area professionals who utilized a variety of information technologies to fulfill their functional responsibilities. They commonly controlled the content and function of their EUC activities. The IS department, or its outsourced counterpart, provided the information technology infrastructure and support services that facilitated EUC activities while controlling standards for hardware, software, and the network.

3. A Contemporary Analysis of Intranet Adoption and Use

The rapid growth of intranet applications during the 1990s was in part an outgrowth of the EUC movement of the 1980s. With wide-scale EUC, there existed a computer-literate base of knowledge workers, a distributed network of desktop computers, and a plethora of PC-based software applications. This provided a fertile organizational setting in which intranets, fueled by the development of low cost Internetworking and browser software, and the glamour and success of the Internet's World Wide Web (WWW), could take root and flourish. Internet technology vendors and IS practitioners expected the growth of intranets to follow the innovation diffusion curve of PCs, spreadsheets, and other commercially successful EUC technologies (LaPlante 1997).

Unfortunately, although the EUC movement has been widely observed and richly commented on in practitioner and academic literatures, few studies have examined the theoretical implications of EUC, and even fewer have used theoretical guidelines to inform empirical research (Robey and Zmud 1992). Brancheau and Wetherbe's (1990) study of spreadsheet adoption is one notable exception. Their application of innovation diffusion theory to EUC research suggests that, contrary to popular expectations, this theoretical approach does not provide a complete explanation of technology diffusion in organizations. Interestingly, it did not predict the failure of IS/IC departments to serve as change agents. In their study, only three of 21 departments were involved in introducing personal computers and spreadsheets into their organizations. Brancheau and Wetherbe's quantitative analysis does not offer an explanation for this phenomenon, but they have recommended that future EUC research should examine the organizational contexts of technology diffusion, interpersonal communication channels among adopters, actual use of the technologies and observation of the processes that reshape the organization as well as the technology.

3.1 Theoretically Guided Qualitative Research

In this section, we discuss results from an ongoing intranet study by one of the authors on intranet initiation, development, and use. The study has been designed to focus on the gaps in diffusion theory explanations by using institutional and constructionist approaches to guide qualitative research. In particular, this research seeks to build a more robust explanation of the ways in which new organizational technologies come to be shaped the way the are, and how differential benefits accrue to different user organizations, by examining the discrepancies between theoretically projected and actual uses of intranets.

The findings presented here are based on preliminary analyses of data collected on intranet use in midwest U.S. companies from various industries. To date, over 100 manufacturing firms and law firms have been queried about their intranet development and use; over 20 organizations have been visited to view their intranets; and in-depth onsite studies have been conducted at a Fortune 500 manufacturing firm and at a prominent international law firm. Data has been collected through interviews, direct examination of intranets (Lofland and Lofland 1995), and examination of intranet logs, usage and development guidelines, intranet page samples, and other relevant documentation (Miles and Huberman 1994). One key objective of this study is to determine the influences that shape intranet development and use, particularly the influences of interorganizational networks (Latour 1987). As the study proceeds from one industry to the next, constant comparative methods are being used to formulate data categories, identify cross-case patterns, and develop theoretical leads for further investigation (Strauss and Corbin 1990). The analyses presented in this paper focus on how intranets come to be developed and used the way they are and the roles firm members take on in development and use. To corroborate these preliminary observations, we have supplemented the findings with anecdotes from relevant business press reports of other organizational intranet experiences.

One of the most striking observations made during data collection and preliminary analysis is the way in which intranet development has mirrored EUC experiences (see Table 1). This finding motivated the preceding retrospective analysis and has lent further insight to the ongoing study. We now examine observed intranet phenomena by adopting this new perspective of viewing intranets as an extension of EUC.

3.2 Initiating Intranets Through Grass Roots Efforts

A number of studies and informal reports confirm that the initial spread of intranets throughout organizations, like the early spread of PCs and EUC in the 1980s, has been largely the result of grass roots introductions (Lamb 1999; Rooney 1997; Scheepers 1999). Individuals or small, ad-hoc teams have crafted a set of web pages that link together documents of local interest or Internet sites for common use and have provided access through the existing organizational networks. People are able to do this, even though their primary organizational role may not involve information systems development, for any combination of the following reasons:

**Table 1. Similarities between Key Phenomena in the
EUC and Intranet Movements**

Key Phenomenon	Early EUC Movement	Intranet EUC Movement
Organizational adoption of technology: grass roots efforts	Motivated business users adopted PCs and relevant software, resulting in multiple, diffuse adoptions.	Savvy business personnel develop intranets for specific needs, resulting in multiple, diffuse adoptions.
Development and support roles: conflated roles, initial lack of MIS support	Business area personnel developed application content, operated systems, and used system outputs. IS departments initially resisted EUC, then jumped on bandwagon to provide training and support.	Business area personnel develop content, sometimes operate servers and manage intranet, and use the system. IS departments frequently decline to support grass roots efforts, while simultaneously planning enterprise-wide intranets.
Technology ownership and control: enterprise-wide applications, standards and integration	Concern about integration led to IS departments taking a strong role in setting and enforcing standards, integrating PCs in networks.	Concerns about wasteful duplication of effort, lack of intranet standards, and enterprise-wide integration motivates IS departments to favor top-down approaches to intranet planning and to curtail grass roots efforts.
IS organization: emergence and decline of formal structures	Information centers emerged from IS group to support EUC. As EUC matured, need for IC training and support roles decreased.	Some organizations are establishing small support groups, or Web services, staffed by consultants or in-house Internet technology experts, to help end-users establish intranet sites.

- Internetworking is already in place. Internet e-mail access is available and is used routinely.
- The need for additional hardware is minimal. Most high-end PCs can act as intranet servers.
- Intranet server and browser software is inexpensive, or free, when servers are bundled with operating systems; browsers are freely downloadable.
- Most people working in organizations are already familiar with an array of desktop applications, from e-mail and word processing to spreadsheets and desk-top databases. A number of these applications make it very easy to convert data and documents into web pages.
- Interest in Internet technologies is high and people are willing to use their own time to learn to build an intranet.

These factors alone, however, do not determine whether or not grass roots intranets will develop. External influences are the critical motivators of grass roots intranet development. Findings from this study show that many well-used intranets are in fact technologies-of-interaction between firm members and the outside world. As we discuss later, this raises questions about what to consider when planning intranet integrations and suggests that, in some instances, we may need to carefully examine what "integration" means and who benefits from it.

3.3 Growth and Spread of Intranets Through Islands of Practice

Despite promises from technology vendors that intranets would seamlessly link organizational units into one holistic knowledge network, many organizational intranets consist of a number of loosely connected sites developed through grass roots efforts (Lamb 1999). Like other innovative technologies, intranets have been adopted into the firm multiple times by different groups. These groups are prompted to develop their local intranets by a combination of internal and external influences. Common internal influences are the need to reduce communication delays and to eliminate printing and distribution costs. Some particularly strong external influences come from customers, regulators, and industry standards bodies. At Fortune Manufacturing,[1] for example, corporate research scientists have built an intranet to help them work with customers to develop new product applications. Quality control managers have constructed a quality documentation system to help meet ISO 9000 certification requirements. The communications department has hired an outside vendor to create an intranet platform for corporate communications. The research and development library has established its own intranet that links research project documents and relevant Internet sites, and these librarians are helping Fortune marketers create new customer-focused databases using Lotus Notes intranetworking tools. In large firms, disparate groups like these may know about each other's efforts, but sometimes they don't. This results in sets of computer-based application and documentation resources that are used by only one group within the firm—a configuration that resembles the "islands of computing" that proliferated in the 1980s with the onset of EUC and personal computing. But even when organizational intranets are linked to one another and easily accessed by all firm members, cross-use is uncommon, resulting in what we have termed "islands of practice."

3.4 Developing Corporate Intranets

In organizations where intranets have been in place for more than one or two years, grass roots developments have been followed by a coordinated, IS-led effort to make useful content more widely available, to eliminate duplication of content and development effort, and to standardize, to some degree, the presentation of content and the appearance of intranet sites within the organization. This is the point at which intranets frequently

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[1]Fortune Manufacturing is an alias for one of the firms studied.

have caught the attention of upper management, who may be struggling to develop a strategy for leveraging Internet technologies, and who then give the go-ahead for further development of enterprise-wide intranet applications. IS department members are enthusiastic about creating these corporate intranets and are encouraged by the show of executive support, which often allows IS to implement some key applications, like enterprise-wide phone directories, and to form Web services groups that will support grass-roots intranet developers.

The expectation that is often set by this sequence of events is that sharing information throughout the organization is mandatory and, therefore, all intranets within the firm should be integrated, even though these corporate intranets often have very different, top-down implementations and communication purposes than the local intranets they seek to integrate. When the organization is comprised of a large number of semi-autonomous entities in various locations, intranet integration becomes problematic. Again, consider Fortune Manufacturing, a parts manufacturer that has grown over the last decade through a series of acquisitions and mergers. At least 15 intranets are currently used in Fortune. Most are linked together and protected by a common firewall. However, a few of the more recently merged firms are still operating on different networks and their intranets are not accessible by others in the larger Fortune organization. A corporate-wide committee was convened in May 1998, to develop an intranet integration plan, but soon afterward, yet another merger was announced. Since then, a few groups have proceeded with limited integration of a small number of closely related intranet projects, but the committee has suspended its corporate-wide effort, waiting for a more opportune and stable time to try again—which may not be anytime soon, given Fortune's current rate and form of growth.

3.5 Enterprise-wide Intranetting and "Killer Apps"

The "killer apps" of end-user computing were word processors, spreadsheets, and games. People worked with these applications on a personal basis as productivity tools, often blurring the line between work and play, bringing work home and personal projects into the office. They shared the documents and files from these applications, first within local work groups and later with remote collaborators through PC networks and email.

The extension of end-user computing into the intranet realm also spans work and play, as well as personal and organizational use. And, despite the prevalence of local use models, a few intranet applications have begun to emerge as the killer apps of corporate intranets: custom portals, compliance systems, and enterprise-wide directories. The use of these applications becomes central to strategic daily operations and generates widespread and heavy daily use: when they come online, overall intranet use skyrockets.

Custom portals, like some of the earliest intranet navigation pages, are filled with links to Internet sites and other firm intranets. These links are specifically relevant to the daily concerns of the individual, or group, that uses them; they typically access sites for customers, news, industry research, baseball scores, local restaurants, travel, stock quotes, and other sites of personal and professional interest. Custom portals constitute a highly specialized "view of the world" and people usually configure their browsers to use these pages as the "home" or startup page, rather than using the one-size-fits-all corporate

intranet home page. A few firms have followed Yahoo!'s model for allowing people to configure their own pages through the addition of an unlimited number of links and by adjusting a set of parameters that customize the page layout. At firms that have not provided configurable portals, people often create a personal page on Yahoo!'s site to achieve the same result.

Compliance systems intranets are highly strategic to the firm. Among manufacturing firms, the most common are quality management document systems that adhere to ISO 9000 and QS 9000 standards, Y2K databases that track the status of Y2K compliance throughout the firm, and health, safety, and environment systems that report statistics that government agencies require or industry associations monitor. Quality management intranets, for example, are becoming more prevalent in the process for achieving ISO certification. ISO auditors regard these intranet documentation systems as highly effective ways to ensure that plant operations follow the stated processes, that process changes are quickly disseminated to people that need to know about them, and that the confusion of multiple or outdated paper documents is avoided. Although ISO auditors do not make recommendations about how compliance should be achieved, key customers, like Boeing, Ford, and GM, do; these companies have pushed their suppliers to both achieve compliance and to use intranets in the process.

Portals clearly reflect the influence of interorganizational relationships, as do compliance systems, which specifically focus on meeting the requirements of customers and outside agencies and on making that compliance visible. Enterprise-wide directories, on the other hand, connect people *inside* the firm. People interviewed in a variety of organizations frequently mentioned the online phone directory as the application they use most, particularly when a search engine is integrated into the directory application or when people are working in remote sites of the organization. Some firms have linked these phone directories to human resource and work project databases in a way that profiles the expertise of people in different departments and locations. These enterprise-wide directories help people find experts within their organization, providing a way to navigate between the islands of practice.

3.6 Combining Development, Operational, and Use Roles

Although one might guess that the most intensively used applications would be enterprise-wide applications, local applications are just as likely to receive heavy use. The greatest use seems to happen when intranet developers, in the role of sophisticated end-users, are also content developers, as well as content owners and content users. Scheepers (1999) has identified several key roles that firm members take on when implementing intranets. Some are the familiar "sponsor" and "champion" roles, but a few, like the intranet coordinator, intranet developer, and content provider are new and research confirms their importance to intranet success. However, the findings of this study show that intense use of intranets occurs most regularly when these roles are conflated—that is, effectively combined into one role. Conflated roles emerge when two or more intranet-related roles are all assumed by *one* person, who also uses the content, and also when the responsibilities of one or more roles are shared *among* those who use the content. Such

role changes emphasize the local and somewhat isolated nature of intranet development and use.

Conflated roles can be critical to grass roots intranet success, but a merging of roles is not always feasible. Related studies of online service use have shown that innovative uses of online technologies are often tied to knowledge workers' ability to assume dual roles, and that professional hierarchies, like those found in law firms, discourage this type of role conflation (Lamb 1997). Law librarians and other firm staff frequently launch their own intranet sites, and even cater their intranet offerings to firm attorneys. But few attorneys use the sites regularly, and even fewer contribute content or launch their own sites. Because large law firms are actually designed as islands of practice, one might expect each of these practice areas to be fertile ground for grass roots intranets, although it is rare for associate attorneys to be given the time or the encouragement to develop new information systems. However, results from a recent study of Norwegian law firms (Gottschalk 2000) suggest that attorneys are slow to adopt and use intranets, even in firms that encourage cooperation and provide time for knowledge sharing.

3.7 The Role of the IS Department in Supporting and Managing Intranet Development

While grass roots intranets were spreading, most IS departments were preoccupied with upgrading and maintaining desktop computers and the corporate network, dealing with the Y2K bug, and implementing enterprise resource planning packages such as SAP. As a result, they had little attention to devote to local intranet developments. As noted earlier, analogous circumstances prevented IS departments from responding to the computing needs of business professionals during the advent of end-user computing. Beyond these issues of time and resources, there are questions about strategies for supporting or controlling EUC-type activities and appropriate roles and responsibilities.

Preliminary results of the intranet study indicate that IS specialists are often conflicted about their role in intranet development. In some firms, they spearhead the corporate intranet effort. At the same time (and in some of the same organizations), IS managers have tried to squelch or delay the grass roots intranet projects, either by refusing to provide hardware, networking, and software support, or by trying to homogenize all the intranets within a firm. The reasons, expressed in interviews and reiterated in business publications, are varied, multiple, and often easily understandable (Lamb 1999; McCrory 1997; Rooney 1997). Some MIS groups already have an intranet project planned that is more comprehensive and useful to more groups within the organization. They, therefore, view the existing ad-hoc intranets as poorly designed, repetitious, or counter-productive. They express fears that servers not under MIS control could allow for a breach of security and a loss of proprietary information. They also worry that new intranet servers and applications will add to the already heavy MIS burden of computing support. Unfortunately, few of these IS developers have a deep understanding of the content of grass roots intranets to build useful, specialized intranets. In contrast, the grass roots developers are savvy domain experts, with a robust set of technical skills resulting from years of "end-user computing."

4. Discussion: Lessons to Learn and Unlearn from the Past

The end-user computing movement has developed and matured over the last two decades. The intranet movement, and indeed the whole paradigm switch to Internet technologies as the basis for the design and delivery of information services and products, has just begun (Lyytinen, Rose, and Welke 1998). We have tried to illustrate in the preceding sections (and summarized in Table 1) substantive similarities between these two movements to support our argument that lessons learned from the early days of EUC may provide insights into the trajectory of intranet adoption and assimilation processes within organizations. Also important are contextual differences between these two movements (see Table 2) that suggest there may also be lessons to unlearn as we apply the experience gained during the 1980s EUC movement to this new technological development. Our discussion in this section centers on two primary topics: first, the feasibility and the desirability of intranet integration, and second, the roles and responsibilities of various organizational groups, particularly the IS department in fostering and managing the use of intranet technology.

**Table 2. Differences between Key Phenomena in the
EUC and Intranet Movements**

Key Phenomenon	Early EUC Movement	Intranet EUC Movement
Integration	Stand-alone PCs inhibited sharing of data files and communication technologies like e-mail; network integration was highly desirable.	Intranets are already built on corporate networks and standard file transfer and networking technologies facilitate information exchange.
Standardization	Multiple hardware and software platforms limited file exchange and complicated desktop support; standardizing PC platforms reduced costs and improved support.	Intranet technologies already adhere to a range of technical standards.
Role Changes	Few end-users were computer literate; a large-scale training program was needed in the first years of EUC.	Many users are computer literate and are able to utilize intranet development software without formal training or support.
Organizational Changes	The need for IS departments to manage and control security and integrity of computer operations was widely acknowledged.	IS departments have often been outsourced , diminishing their organizational power and influence.

4.1 To Integrate or Not to Integrate?

Grass roots efforts are typical during the initial spread of a new technology (Iacono and Kling 1995), but as the technology matures, a different, often more centrally controlled, approach prevails. This was the case with EUC and the introduction of personal computing. However, with intranets, we may see a different pattern emerge, as the grass roots approach is being refueled by vendors packaging "instant intranet" products expressly geared for deployment by organizational "renegades" (LaPlante 1997). If this grass roots pattern of intranet development is sustained, then perhaps we should pay more attention to its dynamics and motivating factors than we might if we considered it to be just a passing phase in the maturation of this technology.

Soon after islands of computing began to proliferate in the 1980s, IS departments stepped in to standardize applications and to integrate PCs and EUC via local area networks. The islands thus became connected, allowing for more controlled growth. Disconnected use and uncontrolled growth is a problem that currently raises IS managers' concern. Of greater concern is the fact that most grass roots intranets are not integrated and are often designed in a way that makes future integration with other organizational intranets difficult. Although the perceived need for full integration across intranets is common across firms, in fact it is hard to achieve, even in slow-growth organizations, beyond the first or second intranet web page level, where the use of common graphics, logos, and layouts may convey a common theme. Furthermore, this thin veneer of commonality can actually mask the highly varied, unique uses that a single firm may make of intranets. "Integration" can have a unique meaning for the various organizational stakeholders: management, the IS department, content providers, and end-users may each hold very different ideas about what makes a useful intranet "better."

Swanson and Ramiller (1997) have examined the ways in which new technologies, such as intranets, are applied and diffused among organizations. They suggest that an "organizing vision" guides technology use within a community and that each firm is influenced by this vision. Some organizing visions *do* appear to motivate intranet applications and uses, but such visions do not guide actions at the firm level. There are multiple sources and targets of influence within an organization. These spheres of influence are often the source of competing visions held by members at different levels of the firm and we suspect that they may be synonymous with communities-of-practice. With intranets, the visions that matter aren't restricted to the IS/IT professionals and *their* interorganizational contacts, as Swanson and Ramiller imply. Corporate scientists have a vision for intranet use, quality control managers have a vision, communications officers have a vision, industry marketers have a vision, and corporate librarians have a vision. Within a firm, these visions may all compete, but they don't easily merge into one vision, and the intranets that are created to serve each vision don't easily converge to form one system. As Iacono and Kling have observed, the influences that spur technology adoption may be widespread movements, but their effects are distinctly local. Thus, we may have to re-examine whether or not integration is the universal "good" that it often is thought to be. Alternatively, we may need to consider the need for new types of integration: those that integrate intranets across organizational boundaries, as well as those that remain behind the firewall.

4.2 Who Can Best Develop, Operate, and Manage Intranets?

IS departments are engaged in the same type of debate between their perceived need to support and encourage EUC in intranets and their responsibility to control and manage computer and network-related activities as they were fifteen years ago (Keen 1997; Ouellette 1999; Sliva 1999). The IS role in the first decades of the EUC movement was based on the assumption that IS professionals could manage and control some aspects of computerization more effectively than business area personnel, for example, ensuring the security and integrity of data and networks and taking into consideration the needs of the whole organization, particularly for future integration of EUC applications. As the perceived need to connect PC islands through a corporate network and to corporate data sources arose, and as the cost and difficulty of supporting a varied technological infrastructure increased, IS departments were able to set and enforce standards for hardware, operating systems, and some application software. Today, IS professionals are voicing similar fears about the ability of non-IS personnel to develop, operate, and control intranets, citing the need to impose "order from chaos," secure corporate data, monitor network traffic, set limits on what employees can do on an intranet, ensure documentation and continuity of user-developed intranet sites, reduce duplications of effort, and so on (Rooney 1997; Sliva 1999). Although some IS departments are attracted by the glamour and success of intranets and would like to lead their organization's efforts, many IS managers are wary of the demands intranet development could place on their departments, as they were with EUC. They do not want to "be in the content-creation business" (LaPlante 1997). Furthermore, they are aware of the delicate balance between necessary controls and stifling entrepreneurial spirit, which feeds intranet growth (Sliva 1999).

Despite these similarities, careful thought should be given to applying lessons learned in the early days of EUC to EUC in the era of intranets. Intranets are already built on standardized, corporate-wide networks and employ industry-wide standards for network protocol and multi-media data display and manipulation. Furthermore, if local intranets are not integrated with other organizational intranets, the need for the IS function to manage and control intranet development and operations may be even less compelling. One might argue that IS departments are still responsible for ensuring that computing resources are used in ways that contribute to the overall corporate good. However, their ability to take on such a role has been weakened since the early days of EUC. Many MIS departments have now been outsourced, limiting the ability of IS professionals to intervene or even influence EUC activities (Markus 1999; Markus and Benjamin 1996).

The question of how IS departments can add value to EUC efforts in the intranet era must also be carefully considered. The mission of information centers established to support end-users in the early days of EUC was to raise computer literacy through training and to usher in the best hardware and software. ICs were slow to give up this mission and to customize their services to accommodate more sophisticated application developers in the EUC community. In the intranet era, "end users" cannot be treated by IS professionals as low-level, computer-fearful, data-entry staffers who don't know what they want or need in computerized applications. Instead, many are technologically savvy and have far superior knowledge of the content needed in intranet applications. Furthermore, as the study cited in this paper suggests, conflated roles of developer/user

may be a critical success factor in intranet use. Such a role is not unique to the intranet movement. This was true in the era of EUC: business personnel developed the content of applications and, even after standardization of hardware and software platforms, they continued to act as end-users **and** developers. Given these contextual factors, the mission, tasks, and activities of an IS department in support of intranet development may be substantially more limited than those of the information centers of the past.

5. Opportunities for Further Research

The foregoing discussion raises some interesting questions about the nature of intranet development and use, its support for interorganizational coordination, and the role challenges it presents to IS professionals and business area professionals alike. Based on this analysis and the differences we see between early EUC and current intranet phenomena (summarized in Table 2), we have identified two key areas where we believe a program of research could sharpen our understanding of how end-users and their intranets alter the dynamics of knowledge work.

5.1 Can Intranet "Integration" Cross Organizational Boundaries?

Intranets can be effectively designed to support communities of practice as well as interfunctional corporate communications. Although study data provides ample evidence for both types of intranets, we have chosen to emphasize the less often reported findings that highlight the role of intranets in support of interorganizational interactions. This focus has prompted us to re-examine what "integration" means within intranet contexts. We have suggested that many intranets may be more effectively integrated *across* organizational boundaries rather than just *within* them. In organizations where intranet use is intense, multiple intranets commonly coexist—each one created and used by a separate group in the firm. Although management may want to facilitate integrated intranets, deeply integrating these islands of practice, beyond the infrastructural components needed for interoperability, may not make sense within the firm.

The fundamental question becomes one of defining what we mean by integration and what it means to "integrate intranets across organizations." This concept could be articulated further, based on an examination of the interactions among members of communities of practice that use intranets. A closer look at intranet implementations could help identify how they are shaped by interorganizational interactions and where opportunities for integration might be found. As the current intranet study proceeds, these interactions and their influences on intranet development will be examined. We expect, based on the institutional and constructionist perspectives that guide this research, to find that different firms will find different types of integrations to be more effective, and that the degree of integration will vary with the degree of intranet institutionalization.

Research can also examine interfirm intranets that already exist. Such studies could indicate how collaborations are currently extending islands of practice into their communities of practice. Data from this study indicate there are at least two ways in which integration with other communities is beginning to happen outside the firm. Both

of these involve highly selective access. One example involves direct extension of the intranet infrastructure: the office of a corporate attorney is physically wired to the intranet of their client, a large metropolitan newspaper. Another example uses a new technology called "tunneling": members of a government agency can view limited portions of a research firm's intranet.

It might also be advisable to extend the scope of typical IS research projects to capture the characteristics of intranet collaborations that take place in 24-by-7 "Internet time" as well as the characteristics of the communities of practice these collaborations support. Social constructionists have suggested that the locus of technological innovation often lies within communities of practice (Brown and Duguid 1991; Constant 1987), but the kinds of studies that can effectively investigate the whole community are often beyond the means of individual researchers. We agree with Lyytinen, Rose and Welke (1998), who have suggested that, in order to study networking technologies, IS research studies need to change. Researchers must be prepared to work on long term, large scale, distributed research projects. The one site, in-depth organizational studies that most of our networking knowledge derives from have been insightful in many ways, but will be inadequate in the ever-expanding universe of Internetworking. Even within one nominal organization, an intranet research project more and more often becomes global in scope.

5.2 How Do Intranet-related Roles of IS and Business Area Professionals Need to Change?

We have argued here that the intranet movement of the mid-1990s is an outgrowth of and similar in many ways to the EUC movement of the 1980s, but there are important contextual differences that should give IS departments cause to pause and rethink their role in managing and supporting intranet activities. Prior research on EUC and information has not yet been updated to include the intranet phenomenon. Organizational experiences with intranet development are just now developing (approximately four years from earliest use) to the point where different models of support are emerging and patterns of failure and success may now be evident. A research program to help identify and evaluate potential strategies for providing effective support for intranet development and use could address questions such as these:

*   What are the support services most desired and needed by intranet developers? How can these services be structured to accommodate varying levels of business developer sophistication?

*   How do IS departments and non-IS professionals view their roles and responsibilities for intranet development? What organizational structures will best fit support needs? Where in the organization should intranet support be located and how should it be organized?

*   What are the strategies and tactics that organizations could use to achieve a balance between encouraging and controlling intranet development? Do IS departments still have sufficient credibility to take an active role in this area, or will they be limited to providing and managing the network utility on which non-IS professionals develop intranets?

As previously noted, much of the early research on EUC was a-theoretical, reducing its value in predicting outcomes in this new context. As these topics are addressed, a suitable theoretical lens should be employed, both to re-examine the past and to investigate evolving trends (Robey and Zmud 1992).

Beyond the specific empirical questions posed, questions about IS support in the intranet era point to the larger question of the role the IS department may play in organizations in the future (Markus 1999). Markus and Benjamin (1996) have suggested that IS departments as well as individual IS professionals should expand their understanding of their organizational role from agents of technology change to include roles as facilitators and advocates of technology-enabled organizational change. They recommend a research approach that would address descriptive, explanatory, and prescriptive questions such as those we have posed above. We concur that such an approach would be beneficial when focused on the phenomenon of intranet development and that answering these questions in this context will help us to understand the larger questions about the future of the IS department in organizations.

In addition, we suggest that research attention should be given to the role of end-user developers and the organizational contexts in which they can be most productive and effective in their conflated roles of content owners, developers, and users. In a study by Yates, Orlikowski, and Okamura (1999), the successful use of a networked newsgroup application was attributed to a few members of the software development team who introduced, supported, and used the application themselves. In that study, role conflation provided some basis of credibility for the new application (i.e., the credibility of the developers introducing it), and helped encourage use by others. Yates, Orlikowski, and Okamura concluded that "the use of a new electronic medium within a community is strongly influenced not just by users but also by those individuals who implement the technology, provide training, propose usage guidelines, and alter the technology to adapt it to changing conditions of use" (1999, p. 83). This may help to explain why the most-used intranets are those implemented by content-owners, and why these intranets tend to remain distinct islands-of-practice. There are indications, however, that institutionalized constraints may hinder widespread and sustained development of such roles in some organizational contexts. Conflated roles may also heighten stresses between specialists in the IS department and non-IS employees over access to and proficiency in this glamorous new technology and limit the ability of these groups to collaborate.

These proposed areas of study—intranet integration and the co-evolution of the roles of IS and business area professionals—touch on just a small set of the research questions that the organizational use of Internet technologies presents. But we believe that a focus on intranets could reward researchers with some unique opportunities for understanding the initiation and widespread uses of a new technology, while at the same time illuminating the changes in organizational roles that so often attend technological interventions.

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