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Interorganizational Intranets

Access and Management of Information and Knowledge

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Executive Summary

This report presents findings from an ongoing study (1998-2002) of intranet use in mid-west US firms. A discussion of some relevant findings has been tailored to address the concerns of EU SME managers, SME policymakers, and other DEEDS Workshop participants. The report suggests that SME strategists should consider three sets of observations and analyses from the intranet study when forming SME policy and recommending best practices:

Intranet use is an extension of end-user computing...

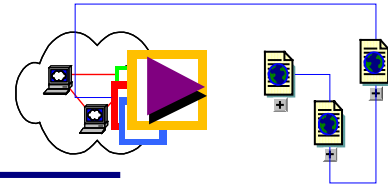
... When people build their own intranets, these resources are used more intensively. Computer-based training extensions to intranets can support EUC evolution, and, employee directories, often including "smart" directory extensions, have become the "killer application" of the intranet.

Integration is optional, in that there are several model options to choose from...

... Transactional integration models support buyers and sellers exchanging goods and services. Project-based integration models support goal-seeking or problem solving exchanges of data and know-how, and structural integration models support hierarchies and policies that govern internal processes.

Informational environments vary by industry...

... Institutional and technical pressures shape intranet use, and online use more generally, at the firm level. Clients, regulators and other industry firms shift their informational load onto other firms when they make choices about value-chain relationships, and publicly-supported and industry-supported infrastructures can shape ICT use, allowing a greater range of choices for SMEs by buffering investments at the firm level.



Intranet Research

My findings about intranet integrations are based on data collected in an ongoing study of intranets in mid-west U.S. companies. The primary objective of the study is to examine the technical and institutional influences that shape intranet use and development, and to compare that data to prior findings in online information services research that indicates interorganizational relationships strongly shape ICT use (Lamb et al., 2003.) To confirm how and when such external influences shape "inside-the-firm" technologies, like intranets, and to situate these influences alongside the internal organizational considerations that are commonly acknowledged as shaping ICT use, I designed a research approach that includes three overlapping phases of data collection and analysis (see Table 1.)

Table 1: Multi-Method Data Collection

| | Survey | Case Study | Network Analysis |
|--------------------------|---|--|---|
| Analytic Focus | Cross-Sectional | Comparative | Traversal |
| Primary Industry | Selected Law, Mfg and RE Firms, Hospitals and Restaurants | Manufacturing Co., Int'l Law Firm, Commercial Real Estate Brokerage, Residential Real Estate Brokerage, Hospital, Restaurant | Multiple Industries, Firms and Agencies |
| Participant Roles | Information Ctr and MIS Mgrs | IC/MIS Dev/Mgrs, Users/Non-Users and ICT Strategists | Firm Contacts and Industry Coordinators |
| Technology Focus | Intranet Status | Intranets and Related ICT | Intranets and Related ICT |

In the first phase, I conducted a cross-sectional intranet status survey within each of five industries (law, hospital care, real estate, restaurants and general manufacturing)¹ to determine which firms have intranets, for how long, and for what general use. To select the sample firms, I used revenue-ranked Dun & Bradstreet listings of law firms, hospitals, chemical and metal products manufacturing companies, real estate brokerages, restaurants and catering services in two major mid-west metropolitan areas. I then developed an interval for systematic sampling of each industry. In law, for example, I telephoned every 3rd firm listed. This survey was followed by site visits to a few firms to view their intranets, and to determine their willingness to participate in an in-depth study. To date, over 250 firms have been queried about their intranet development and use, and over 40 of these organizations have been visited to further examine their intranets (see Table 2.)

What drives intranet use in technical and institutional environments?

In the second phase, I conducted the comparative case studies that form the basis of my intranet findings and recommendations. In-depth onsite studies were conducted at a Fortune 500 manufacturing firm, a prominent international law firm, a large health care services provider, a commercial real estate firm, a residential real estate firm and a national fine-dining restaurant chain (see Table 3.) I spent between 4 and 8 weeks at each organization (often visiting several locations), discussing and observing intranet use, in conjunction with other information systems and information resources that were used for similar purposes.



I collected data from multiple sources within each organization, including intranet content and related documents, usage statistics, observation of intranet use, and semi-structured interviewing.

Table 2. Intranet Study Survey

| Industry | Sample Year | Sample Size (Includes Non-respondents) | Intranets Implemented or Planned | Intranets Not Considered or Not Planned |
|---------------|-------------|---|----------------------------------|---|
| Health Care | 1999-2001 | 65 | 43 | 10 |
| Manufacturing | 1998-1999 | 67 | 29 | 22 |
| Law | 1998-1999 | 61 | 31 | 19 |
| Real Estate | 2001 | 81 | 30 | 24 |
| Restaurants | 2001 | 59 | 19 | 33 |
| Totals | | 333* | 152 | 108 |

*78% Response Rate

As I proceeded from one industry case study to the next, I used constant comparative methods to allow for theoretical sampling. For example, guided initially by an understanding of informational environments (Lamb et al., 2003), I chose sites in four industries that seemed to span the typology of Scott's technical/institutional industry classification. However, after reviewing my real estate industry intranet survey results, and after conducting several interviews at both commercial and residential real estate firms, I realized that the environment of this industry was more institutional than I had originally thought. On this analytical basis, I revised the site sampling approach to include case studies of both commercial and residential real estate firms, and to add a new industry--restaurants--to the study that would satisfy the sampling need for an industry with a low-technical/low-institutional environment.

Table 3. Intranet Study Comparative Case Studies

| Industry | Case Study Year(s) | Interview Participants | Intranets/Extranets and External Sites Implemented |
|-------------------------|--------------------|------------------------|--|
| Health Care | 1999-2001 | 48 | 100+ est. |
| Manufacturing | 1998-1999 | 41 | 15+ |
| Law | 1998-1999 | 47 | 3 |
| Commercial Real Estate | 2001 | 19 | 2 |
| Residential Real Estate | 2002 | 18 | 4* |
| Restaurants | 2002 | 10 | 2 |
| Totals | | 183 | 126+ |

*This total does not include thousands of external web sites hosted for individual RE agents

An important part of the interview process, as I talked to intranet users, non-users, developers, managers and ICT strategists, was our discussions about how they coordinate interdepartmental and interorganizational activities. After each case study was complete, I charted the network of interorganizational relationships that anchor those influences, forming a list of organizational subsidiaries, other organizations and outside agencies that seem to shape each intranet. These relationships constitute the social actor affiliations of the site that channel the technical and institutional influences that shape the environments and contextualize the interactions of its social actors (see Table 4.)

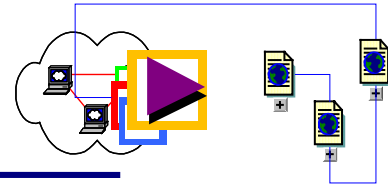


Table 4. Manufacturing Case Study: Traceable Traversal Links*

| Intranet | Organization | Intranet Influence | Link Relationship |
|-----------------------|-------------------|-------------------------------|-----------------------------|
| QualityNet, MergerNet | Boeing | Compliance (Mfg. Processes) | External (Supplier) |
| CustomerLitNet | Abbott Labs | Support (Internet Staging) | External (Customer) |
| R&DNet | MITRE | Implementation (Structure) | External (CoP) |
| Y2KNet | ITT Industries | Implementation (Content) | External (Customer) |
| QualityNet, MergerNet | FAA | Compliance (Regulatory Reqs.) | Industry (Institutional) |
| Health&SafetyNet | Chemical Mfg Assn | Compliance (Safety Reqs.) | Industry (Trade Assn) |
| MergerNet | MC2-MIS | Implementation (Security) | Internal (Division) |
| HRNet | MC1-R&D | Implementation (Look & Feel) | Internal (Department) |
| CorpNet | AOL | Implementation (Look & Feel) | Personal (Prior Experience) |

*These are some of the interorganizational relationships that seemed to shape intranets at the Manufacturing case study site that have been investigated. Network Analysis visits will continue through 2003.

The final phase of my approach allows me to systematically examine these influences as I follow the links in the interorganizational networks that I have charted. I contact people at each organization that seems to have a key relationship with one or more of the comparative case study firms, and I interview them about how information and information systems--including intranets and internet technologies--are used at their firm, and about the nature of their relationships with the comparative case study firms. These relationships are of very different types. They may be formal or informal, and they may fulfill a variety of purposes. For example, some may be supplier-customer relationships; some may be competitor relationships; other relationships may involve regulatory oversight. The contacts and visits in this phase of the study verify which relationships influence intranet use and provide examples of how those firms or individuals use intranets themselves. So far, 32 traversal interviews have been conducted.

Building SME Strategies on Intranet Research Findings

Analyses of this study provide three basic observations that can inform SMEs as they develop strategies to design, build, adapt and use intranets and related ICTs in the emerging digital economy:

*Intranet use is an extension of end-user computing (EUC) ...
 ... and there are several aspects of EUC that SMEs can leverage.
 Integration is optional...
 ... and selective integrations enable interorganizational intranets.
 Informational environments vary by industry...
 ... and SMEs can take advantage of load-shifting arrangements.*



The balance of this report is structured around a discussion of each of these observations that emphasizes ICT *use*. The intranet study was designed to examine use – particularly what drives it. In examining these drivers, I have found it helpful to think in terms of whole industries, even when trying to understand ICT use at the firm level. Therefore, when extrapolating advice from this report, SMEs and SME policymakers may find that firm size is not the best classification for typifying firms and their ICT use – that better classifications may characterize firms in terms of their relationships to other organizations in their industry.

Intranet use is an extension of end-user computing...

End-user computing (EUC) is a phenomenon that was widely observed and documented in the early 1980's. It has continued to grow in reach and scope throughout the intervening decades, and is now gaining momentum with the intranet movement. My study findings indicate that:

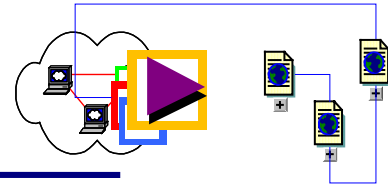
*When people build their own intranets, these resources are used more intensively,
Computer-based training extensions to intranets can support EUC evolution,
And, employee directories, often including "smart" directory extensions, have become the "killer application" of the intranet.*

In terms of providing the "right" ICT infrastructure to guide the firm through new territory in the emerging digital economy, these are the aspects of EUC that SMEs can leverage. A brief discussion of EUC and some intranet-related examples will illustrate this point.

EUC Evolution

I have found it helpful to examine the adoption and use of organizational intranets as an extension of the end-user computing movement. This perspective 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 end-user computing in the 1980s. Intranets share many similarities with early EUC efforts, such as the initial grass-roots, multiple adoption of PC technologies, that were followed by efforts to standardize and integrate technological "islands." However, organizational experiences with intranets diverge from earlier EUC experiences in some key ways -- particularly when it comes to issues related to intranet integration (which I will discuss in a later section) and to the evolving roles of intranet end-users and information systems (IS) professionals (which I want to take up here.)

The EUC movement has contributed to the evolution of organizational systems development from one in which in-house IS professionals manage and control virtually all aspects of computerized systems development and operation (Figure 1), to an emerging paradigm in which IS professionals focus on building and maintaining technology infrastructure, while business area professionals play a substantial and growing role in technology selection, development and implementation (Figure2). In Figure 1, the technical skills needed to develop and use sophisticated computing applications reside with the IS professional. Business professionals communicate application requirements to the IS department and receive computing support for their IS-related functions. In Figure 2, (1) technical skills reside with both business professionals and IS professionals, and some application requirements can be handled by business professionals independently; (2) computing technologies incorporate features that facilitate application



development by end-users; and, in this context, (3) IS professionals concentrate their efforts on technology infrastructure development and maintenance. Adoption, development and use of intranets appear to accelerate this shift.ⁱⁱ

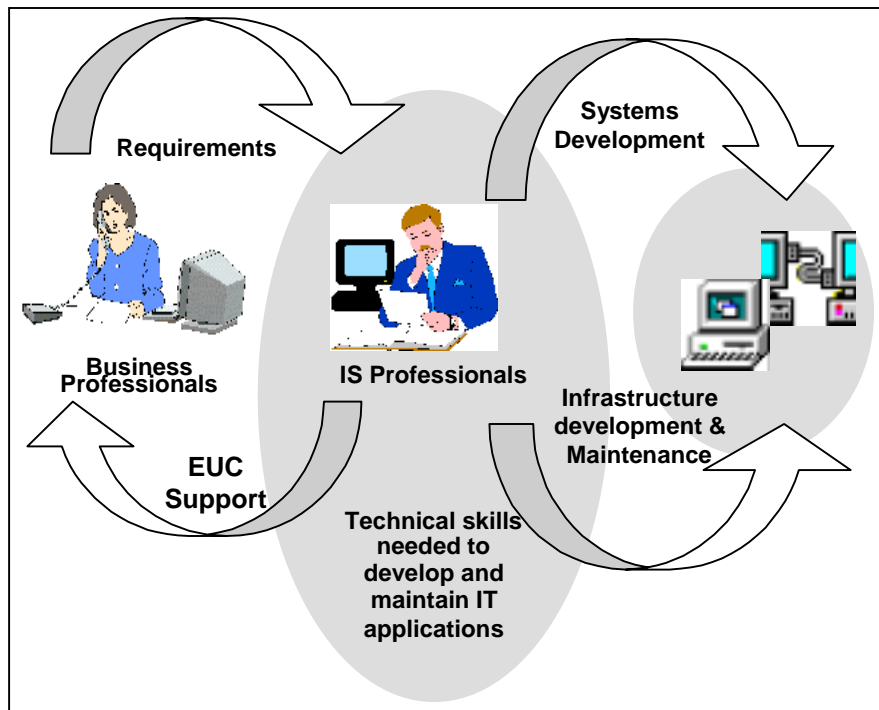


Figure 1. Early 1990's IS/EUC roles in IS Development (Lamb and Davidson, under review)

The IS department's EUC role in the first years of the movement was based, in large part, on the assumption that basic computer literacy training and support were necessary for effective EUC. At that time, IS professionals argued successfully that they could manage and control some aspects of computerization more effectively than business area personnel, and IS departments were able to set and enforce standards for hardware, operating systems, networks, and some application software.

Today, the organizational context for IT development and support is significantly different. Many business professionals have accumulated the skills to become computer-savvy end-users of "smart" IT applications. In some information-intensive industries, like media broadcasting and publishing, there is a growing base of "super users" who can construct and maintain sophisticated websites that utilize a wide range of information and communication technologies. In these industries, and in others like manufacturing and healthcare, firm members have constructed a vast array of "grass roots" intranets that serve the day-to-day information creation and sharing needs of their own work teams and communities of practice. I have seen strong evidence that mixing the roles of content owners, developers, and users allows for the technology to be applied and adapted to local use contexts and is an important ingredient for intranet success. Even though these intranets tend to remain distinct islands-of-practice, many of the most-used intranets in my study are those implemented by content-owners.

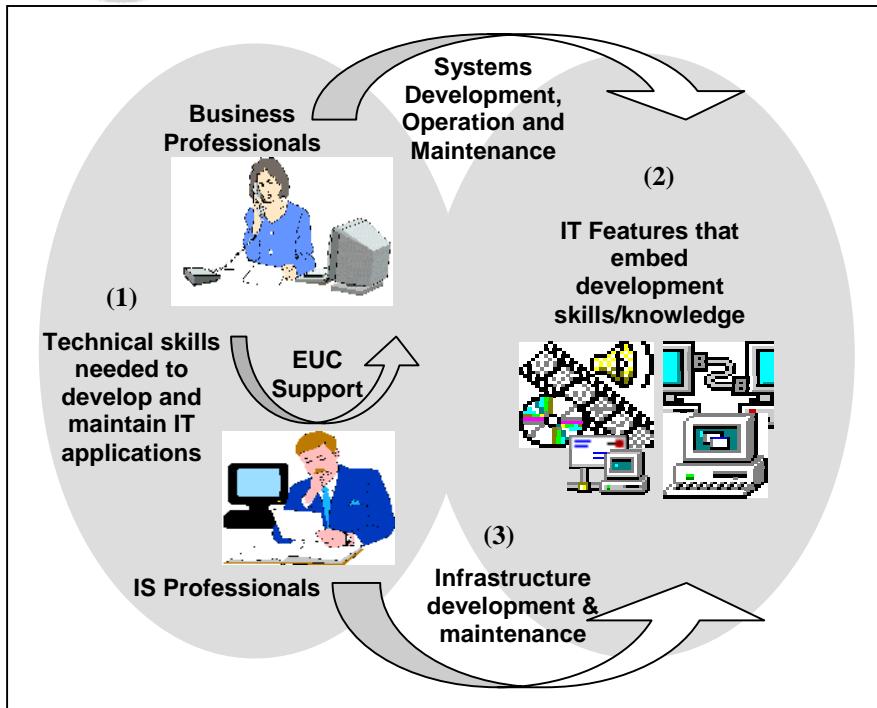
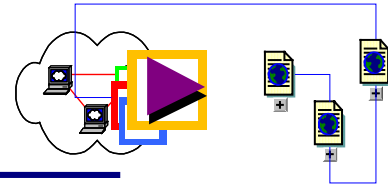


Figure 2. Emerging EUC-Centric Model of Computing (Lamb and Davidson, under review)

The organizational structures for ICT development and support have also changed. A number of internal IS departments have been outsourced over the years, further limiting the ability of IS professionals to intervene or substantially influence organizational ICT activities. In these organizational environments, the feasibility of having IS professionals lead training and support for intranets, whether as part of their traditional institutional roles or as part new groups, like web services teams, is open to question. Information Centers (ICs) were established in the late 1980's to support end-users by raising computer literacy through technical training and by ushering in the "best" hardware and software. Web Services Centers (WSCs) were established in the late 1990's to serve similar purposes. However, unlike the earlier days of EUC, many more technologically savvy business personnel have educational training and experience with ICT-based business applications, as well as superior knowledge (vis a vis IS professionals) of the content needed in intranet applications. These people provide a broad and experienced pool of potential intranet developers, outside the IS department, and their knowledge of intranet technologies may even exceed that of some IS professionals, who are dedicated to supporting legacy systems. However, IS professionals, citing the need to impose order from chaos, secure corporate data, monitor network traffic, reduce duplications of effort, and so on, often voice fears about the ability of non-IS personnel to develop, operate and control intranets. Although, these concerns may more accurately reflect IS experiences with early EUC, rather than with current personnel and current technologies, many firms have been able to allay these fears by purchasing licenses for Computer-Based Training (CBT) of firm personnel and linking these to their intranet infrastructures. In firms where CBT access is provided, people often use their own time to train with the modules, noting that by increasing their ICT-related skills they become more valuable to the firm and to other firms in the industry.



Leveraging Expertise

As noted, development tools and technologies increasingly embed features and functions that reduce required technical skills for a user/developer and make it ever more feasible for non-IS professionals to develop and manage their own intranets.ⁱⁱⁱ My data show how advancing technologies have blurred the lines that separate the roles of business and IS professionals, as Figure 2 depicts. The cumulative increase in "smart" web-enabled technologies has facilitated and accelerated the EUC approach to intranet development, maintenance, and support. Particularly in globally competitive industries such as steel production or chemical manufacturing, where IS departments have been scaled back or outsourced, end-users are taking on the challenge of creating non-mission critical applications without WSC or IS support. In fact, my findings suggest that a critical success factor for intranets may be their development, maintenance, and use by business professionals who take on multiple these roles.

When talented, multi-faceted people begin to take on multiple roles, it is no longer sufficient to have an organization chart and an auto-dialer to reach the "right" person. Online phone directories have taken the place of printed books and condensed extension lists in many firms, with some unexpected results – skyrocketing intranet usage rates. Nearly every firm that has implemented an intranet-based employee directory has reported that it is one of the most-used applications in the firm. Most directories are based on a small database of information about each employee, like name, title, phone number, email address and location. But at some firms, like MITRE, have begun to augment that database in ways that allow for the location of expertise within the firm (see Figure 3.) These intranet applications construct profiles of firm members and related associates that go beyond organizational roles and titles and begin to characterize their multiple talents.^{iv}

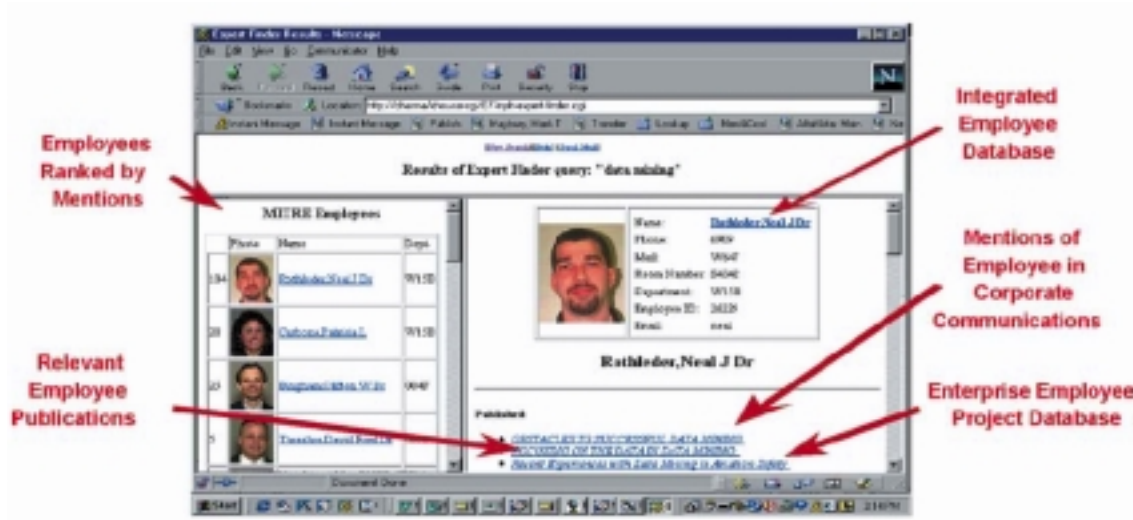


Figure 3. Expert Finder Machine Translation Example (Maybury, 2002.)^v

Of necessity, firm members in SMEs “wear many hats,” so implementing and enhancing humble phone directories can have important payoffs in helping people work together within the firm and even



interorganizationally within industries and communities of practice. Firms that have begun to enhance directories to profile employee talents have indicated that the next goal for these applications is to extend them into the larger community or industry.

Integration is optional...

One of the “problems” with EUC growth is the uncontrolled proliferation of multiple intranet islands. The “solution” is often intranet integration. However, there is a tendency to see integration, particularly structural, ERP-like integration, as a universally “good” approach without considering use, and without an awareness of other models of integration that may be appropriate. Analyses of intranet integration successes and failures, indicate that integration is optional in the sense that there are several options to choose from when developing integration strategies:

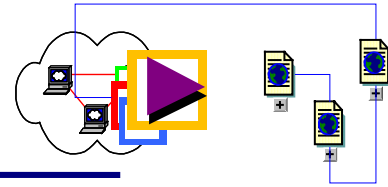
- Transactional integration models support buyers and sellers exchanging goods and services,
- Project-based integration models support goal-seeking or problem solving exchanges of data and know-how,
- And structural integration models support hierarchies and policies that govern internal processes.

In this section, I discuss how paying attention to intranet boundaries can give SME managers a better understanding of what drives intranet use and intranet island proliferation, and can help them develop selective integration strategies that enable interorganizational intranets.

Intranet Islands

After “islands of computing” began to proliferate in the 1980s, IS departments stepped in to standardize application platforms and to integrate PCs via local area networks. These steps reduced costs by limiting the number of technologies that IS staff would need to support, and also helped staff to manage use within the technical limitations of the selected ICT infrastructure. Within early EUC contexts, standardization and integration were strategic practices that many organizations learned to adopt when implementing new information and communication technologies.

During the intervening years, these institutionalized practices have shaped the contexts of organizational ICT adoption and use. Most firms routinely exchange email, files and other information formats via existing corporate networks, using standard TCP/IP protocols. Grass roots intranets have grown rapidly within these environments, and their selectively-connected use and uncontrolled growth of content raise concerns that echo early EUC managerial problems. (See Figure 4 for an example of the archipelago of intranet, extranet and Internet islands hosted by Fortune Manufacturing circa 1999.) These new concerns elicit familiar responses from IS staff and business managers – integrate and standardize! However, my data show that intranet integration may often be impractical, particularly in rapidly-growing or changing organizations. Beyond the first or second intranet web page level, where the use of common graphics, logos and layouts can convey a common visual theme, there may be limited value to integration and standardization. This thin veneer of commonality can actually mask the highly varied, unique uses that a single firm may make of intranet technologies. More importantly, many unintegrated “islands of practice” -



- in which intranet technologies are developed, operated, and utilized within a community of practice, sometimes within and sometimes across organizations -- are highly effective and well-utilized.

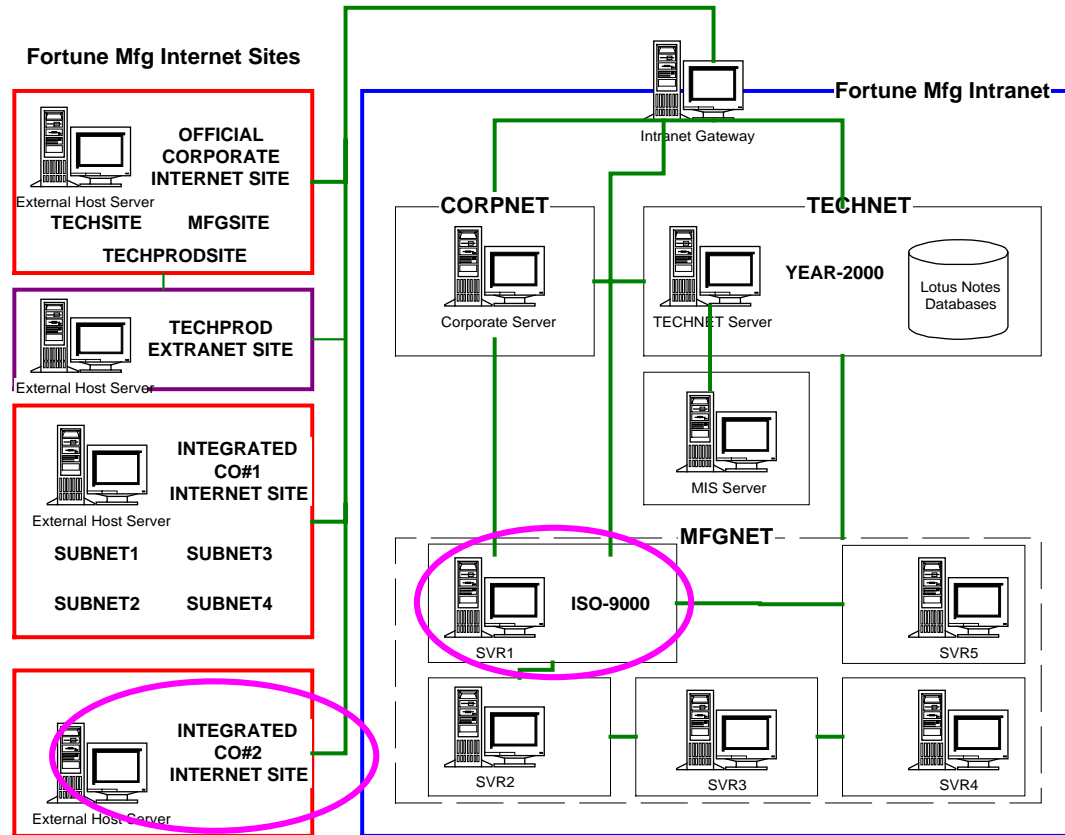


Figure 4. Intranet islands at Fortune Manufacturing (a pseudonym for a mid-west US manufacturing firm) (Lamb, 1999.)

For many managers and researchers, however, standardization and integration of intranets is a “higher” stage of technological maturity that they believe the firm should vigorously pursue. Some IS researchers have suggested that integration is necessarily an organization-wide condition: "we propose that the intranet cannot be pervasive unless the whole organization has been penetrated by the intranet. In this sense, it is like a chain that is just as strong as its weakest link (from an organizational perspective)." vi

Our data show that managers have benefited from adopting this kind of advice in the past, and have institutionalized organizational integration processes. But they have also applied enterprise-wide integration solutions to intranet “problems” often without considering what integration means for the various stakeholders -- management, the IS department, content providers, and end-users. They have not yet adopted good models that identify what types of integration are likely to add true value to intranets, or that help them to determine the degree of integration that can be sustained, or that help them to assess the costs in terms of innovation and the fall-off in use that forced integration and standardization may entail.



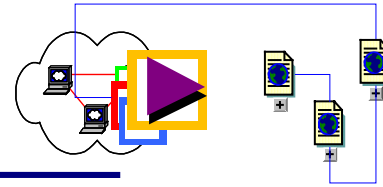
Integration Options

The fact that grass roots intranets may not be easily integrated into a corporate intranet structure, and that fully enterprise-wide-integrated intranets might be designed in ways that make future interorganizational integrations difficult, tells me that we need better strategies for integration – ones that are based not only on transactional exchanges, or organizational structure, but also on cross-functional projects and interorganizational communities of practice.^{vii} Some degree of control and stabilization of intranet infrastructure is helpful, but my data suggest that content, management, and operation of intranets can continue to grow very effectively within locally focused, specialized islands of practice; and that these could provide a basis for future integrations within interorganizational communities of practice once better models for integration emerge.

Table 5. Models for Intranet Integration (Lamb, 2003 forthcoming.)

| SOCIAL ACTOR INTERACTION CHARACTERISTICS | TRANSACTION | PROJECT | STRUCTURE |
|---|---|--|--|
| Organization members seek to communicate in legitimate ways | Quick, efficient, multiple communications | Time-limited, complex, multi-party communications | Regular, detailed, proprietary reporting communications |
| Organization members build, design, and develop interactions that facilitate “flow” changes | Buy-sell exchanges of goods and services | Goal-seeking or problem solving exchanges of data and know-how | Hierarchies and policies that govern internal processes |
| ICTs become part of the interaction process, (“interaction technologies”) as people transform and embed available informational resources into connections and interactions | POS systems, accounting DBs, B2C websites | Email, FTP sites, CAD/CAM systems, grass-roots intranets | Automated processing, document management systems, corporate intranets |
| As firm members, people perform socially embedded (role-based), highly specified actions on behalf of the firm | Customer and vendor relations | Research and development partnering relations | Executive, managerial and staff relations |

Systems integrations (SI) have been examined from two main vantage points. External B2B SI has focused primarily on transactional interactions between customers and suppliers in the value chain. Internal intra-organizational SI has focused on structural interactions between functional units of the firm. Both approaches present problems for intranet integrations that serve communities of practice and formal project teams which cross organizational boundaries. In ongoing analyses, I have examined the non-transactional intranet integrations of the firms in my study, using a model of social actor interactions, affiliations, environments and identities, to delineate integration types (Lamb and Kling, forthcoming.) This model



characterizes people and their technologies, and provides a way to examine social actor interactions in detail. By treating integrations (whether successful or not) as a form of social actor interaction, and typifying integrations based on four interaction characteristics, I have identified an alternative, project-based integration approach that may be more appropriate for intranets shared by interorganizational teams and communities (see Table 5, particularly column 3.) These characteristics help to tease out the kinds of exchanges that integrations support, and the full analysis begins to suggest when one type of integration might be more appropriate than another. Furthermore, the model-driven evaluation demonstrates how practitioners can take advantage of pre-integration intranet boundaries by using them as guidelines for selectively implementing the three integration approaches: transactional, structural and project-based.

Transactional interactions as usually multiple, small and of short duration. They often involve the exchange of goods and services, and have come to include ICT systems as a fundamental part of external customer and vendor relations. Project-based interactions are also multiple, but somewhat larger, often longer term (but not always.) They usually involve goal seeking or problem solving exchanges of data and know-how, using ICTs like email and FTP sites to coordinate the work of internal organizational work groups and their external collaborators. Structural interactions, in contrast, are regular and semi-permanent. They often involve the adoption of policies and the construction of organizational hierarchies that depend on automated processing and enterprise-wide systems to manage intrafirm relations.

These models can help SME managers selectively integrate their intranets, and can also suggest how to think about developing integration strategies that can enable interorganizational intranets. In Figure 4, for example two of the intranet islands (circled) contained ISO 9000 documentation management systems that were developed, in large part, to meet the quality control mandates of the Boeing Company. These systems were used regularly by the local manufacturing teams, and they were also used by Boeing personnel (when onsite at the two different Fortune locations.) In fact, Boeing inspectors had requested remote access to the sites at Fortune and other firms, so that they could work more efficiently. But during my study at Fortune, this sort of integration was never considered – neither was an integration of the two separate ISO 9000 intranets (a limited value option.) Fortune managers only considered the one type of integration they knew about – structural integration – although a project-based integration would have been more appropriate. When a structural integration could not proceed, due to a flurry of mergers and acquisitions that made the structural environment very unstable, they abandoned the idea of intranet integration altogether, having no other integration models to guide them.

Informational environments vary by industry...

The rationales that drive intranet use and guide integration strategies in one industry, may not have the same degree of force in another industry. However, firms have ways of shifting the pressures that shape ICT use onto other firms in their industry – and to organizations in other industries, as well. Results from this study and a prior related study (Lamb et al., 2003) indicate that:

Institutional and technical pressures shape intranet use, and online use more generally, at the firm level,

Clients, regulators and other industry firms shift their informational load onto other firms when they make choices about value-chain relationships ,

And, publicly-supported and industry-supported infrastructures can shape ICT use, allowing a greater range of choices for SMEs by buffering investments at the firm level.

Therefore, intranet use needs to be understood not only at the organizational level, but also at the functional organizational field level.^{viii} By understanding the pressures at work in their own informational



environment, SME managers can better gauge the value of specific ICT investments, and can take conscious advantage of load-shifting opportunities.

Load Shifting

Before the Web, the story of online information services was largely one of over-estimates and unmet expectations. In prior research, I examined sustained use and non-use of online services, like DIALOG and Lexis/Nexis, within organizations in three industries: law, real estate and biotech/pharmaceuticals. I was able to go beyond the limitations of the traditional analytical approaches that repeatedly led to exuberant usage projections (and then unmet expectations), by adopting an open-systems view. I found that firms in highly technical and highly institutional environments have many more incentives to gather data and go online than do firms in low-tech, unregulated industries. But firms make important choices about partnering and outsourcing that can shift informational activities across organizational boundaries.

For example, even though an industry like biotech/pharmaceuticals is highly regulated, not all firms in that industry adopt the intensive data gathering practices needed to interact directly with regulators. Many biotech firms distance themselves from regulators by outsourcing, partnering or coordinating their activities with other firms. In the process, they shift data gathering incentives, information packaging responsibilities and the consequent use of online information resources across organizational boundaries. They also work with regulators through their law firms, diffusing the institutional pressures of regulatory policy into the wider organizational community. That kind of diffusion can account for some of the intensive information use that I found in less heavily regulated industries, like real estate. Commercial realtors compile detailed investment packages in response to a complex set of incentives that coordinate the practices of financial creditors and their borrowers in ways that seek to minimize institutional risk.

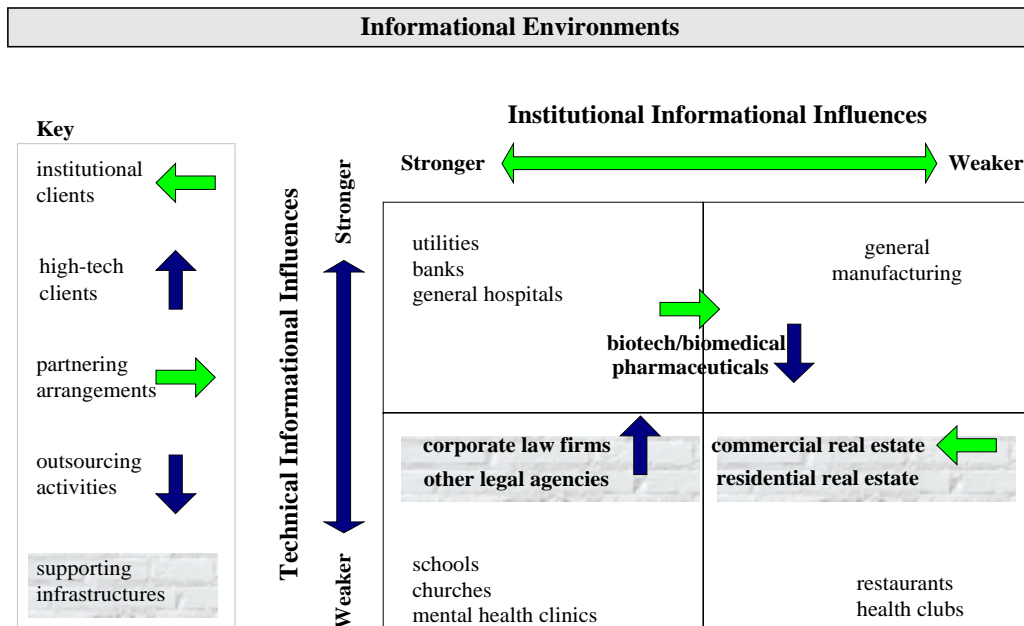
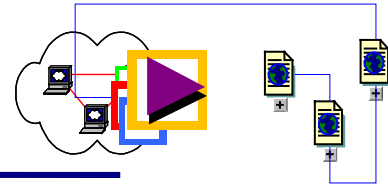


Figure 5. Load shifting in Informational Environments (Lamb et al., 2003.)



These interfirm coordinations shift data gathering incentives and activities across organizational *and* industry boundaries. Influences build upon one another to create a rich informational environment that shapes online use (see Figure 5.) In an industry where firms interact with regulators and shift data gathering responsibilities in various ways, industry information infrastructures can provide additional options and incentives for using (and not using) online information resources. Subsidized access to print materials, such as that provided through staffed law libraries, may make more expensive online services seem unattractive. Free web-based distribution of legislative materials can encourage online use without creating any incentives to use fee-based services. Conversely, the exclusive provision of critical industry information through fee-based, member-supported online resources, like multiple listings services for realtors, can create huge incentives for going online.

By further developing this environmental model, I have been able to form richer conceptualizations about the use of ICTs in general, and better projections about intranet use in my current study. Firms in high-technical/high-institutional pressure industries, like health care and aerospace manufacturing, use intranets much more intensively and extensively than firms in low-technical/low-institutional pressure industries, like restaurants and some residential real estate firms. Regulatory compliance is often the reason for intensive intranet use, and influential client demands and interorganizational interactions are pushing the boundaries of intranet systems integration. Some very interesting instances of load shifting related to intranets are tied to the flexibility of intranet integrations (i.e. some merging firms can give up existing intranets and off-load those informational practices, but others cannot.) In addition, the publicly-supported Internet serves, not only as the backbone for interorganizational communication and exchange, but also as a platform for *intra*organizational exchange. Several firms in my study have deployed their “intranets” on the Internet itself – relying on the multitude of pages to provide some de facto anonymity for their sites, and on the good judgment of firm members to ensure that proprietary materials are not inadvertently shared with the rest of the world. The Internet infrastructure strongly shapes intranet use, and sometimes mitigates the need for ICT investments in intranet technologies.

Interorganizational Opportunities

As noted earlier, some of the more interesting opportunities for intranet integration involve other organizations – not simply as transactional agents in B2B exchanges, but as partners in product development and quality control. One particular type of intranet – the compliance intranet – often signals the potential for such interfirm opportunities, and it may also be a precursor of the project-based interorganizational intranet. Compliance intranets serve to enforce industry standards, to measure the performance of a company against industry or governmentally established standards, or to establish standards within the organization or within a larger domain. These intranets may be quality management systems used to achieve ISO 9000 certification; health, safety and environmental regulation support systems used to furnish data to OSHA, EPA and other agencies; or (until recently) Y2K status tracking intranets. They differ in important ways from high profile intranet applications, such as knowledge management systems, most notably by enabling collaboration *across* organizations, industries and institutions. Compliance intranet applications are shaped largely by external, interorganizational influences and informational environments; but internal considerations regarding available skills and support also guide intranet choices. Interestingly, a compliance intranet’s extent of use often indicates the appropriate boundaries for integration, whether internal and external to the firm.

Some particularly strong external intranet shaping influences come from customers (Boeing), regulators (FAA), and industry standards bodies (ISO). One of the most important intranet shaping influences is regulation. This is true for both law and manufacturing, but it influences intranets in very different ways in



each industry. Industry (and even global) standards shape ISO 9000 intranets in an obvious way. When firms adopt intranet technologies for quality control management systems, like Fortune Manufacturing's BQS intranet, this sends an important signal to customers, suppliers and regulators.

To use an earlier example, Fortune's BQS intranet is shaped by its informational environment (see Figure 6.) Three external influences, in concert with some local contingencies, guide the choice of intranet tools and intranet content. In an interesting way, the resultant intranet enables a powered interorganizational collaboration, even though it is used *only* within the organizational boundaries of Fortune. This collaboration spans organizational divides via procedure and quality standards, and in the process shapes intranet development and use. But the extents of use of the BQS, and its similarities in use and scope with another (newly merged) part of Fortune Manufacturing, also suggest that a project-based integration might be extended to include not only Boeing, other regulators and similarly regulated suppliers, but also the ISO 9000 compliance intranet of Fortune's Integrated Co #2 (see the circled entities in Figures 4 and 6.)

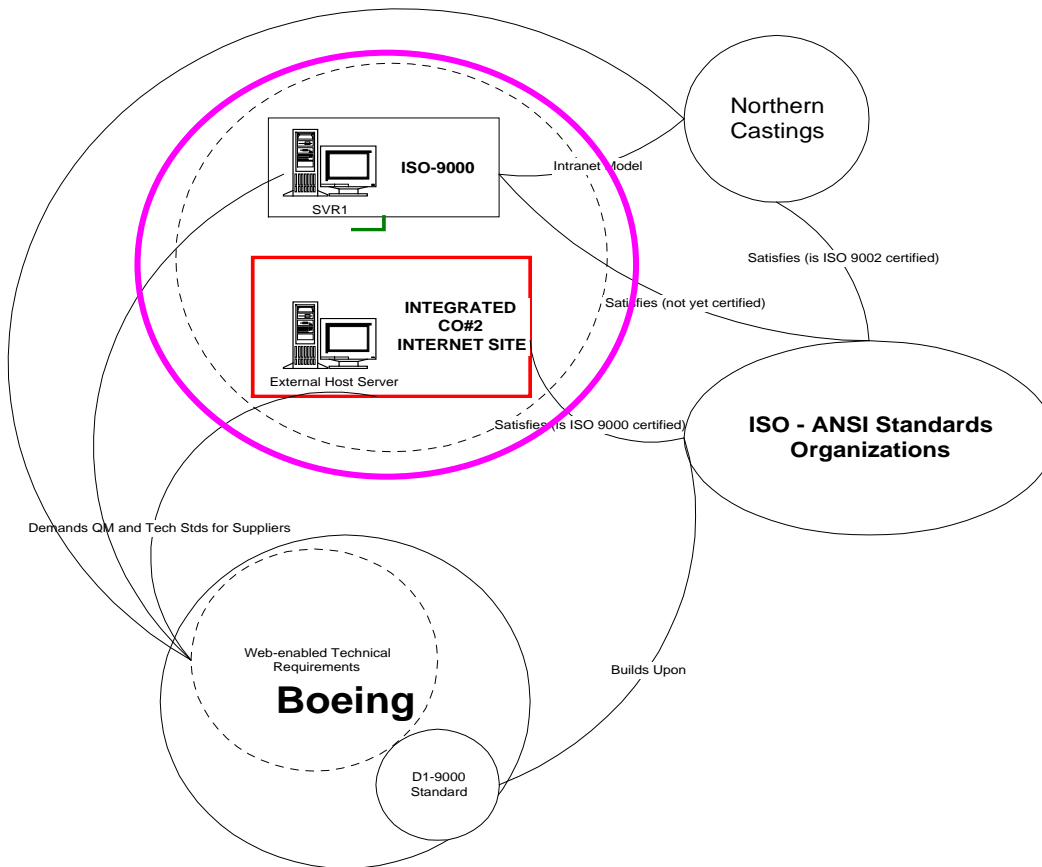
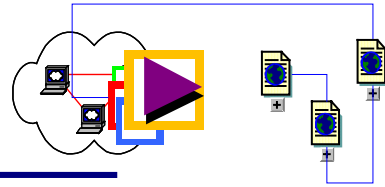


Figure 6. Compliance Intranet Influences at Fortune Manufacturing (Lamb, 2000.)

A focus on the informational environment helps to ground the local actions of networked individuals and the interactions of organizations in a larger industry context. Moreover, at the global level, Fortune's ISO 9000 intranet can be seen a part of a worldwide trend toward ISO standards adoption.^{ix} This example shows how it can be helpful to consider intranet use needs not only at the organizational level, but also at the functional organizational field level.



In addition, there may be some lessons to learn from compliance systems about knowledge management. It could be argued that process documentation and quality control specifications are a critical form of knowledge management. If so, it might make sense to model knowledge sharing across communities of practice within the firm on compliance collaborations that span firms, agencies and industries, so that SME managers can better gauge the value of specific ICT investments, and can take conscious advantage of load-shifting opportunities.

SME Policy Implications and Recommendations

This concludes my discussion of the intranet study analyses that I believe can helpfully inform SME managers and policymakers. I will continue analyzing this data throughout the coming year, and I hope to have an opportunity to present any subsequent insights to you on a future date. Although you did not ask for them explicitly, I would like to end this report with a few recommendations for shaping SME policy and for promoting best practices and measures among SMEs in the emerging digital economy.

Promoting Best Practices and Measures

Integration and Maturity

- Intranet integration level is not a proxy for technical capability or process maturity, because integration stage models are too simplistic. Integration measures that reflect the full range of integration options and the appropriate mix of strategies *by firm* should be developed and promoted.

Development and Use

- Intranets are most used when they are an integral part of the work that people do, especially when firm members construct intranets themselves. Related research indicates that this is true for other collaboration-related ICTs, as well. Management policies should encourage end-user involvement and support their efforts by providing training resources.

Infrastructures and Flexibility

- Public and industry information infrastructures give SMEs choices in responding to informational demands. The Internet provides a critical backbone, but supplemental infrastructures should be developed at the industry level to provide, for example, industry-relevant CBT, or secure networks for non-transactional inter- and intra-organizational exchanges.

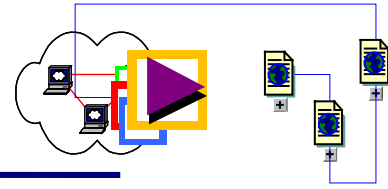
These findings and recommendations are based solely on data collected at US firms, and some may be inclined to dismiss them as unrepresentative of EU firm experiences. However, I have vetted these analyses with European colleagues at conferences^x and through international journal review, and I feel



confident that they reflect observations about the access to and management of information and knowledge that will prove valuable to SME managers and policymakers in a globalizing economy.

Thank you for this opportunity to present my research.

Roberta Lamb



Related Material

- Lamb, Roberta (1999). Using Intranets: Preliminary Results from a Socio-technical Field Study, *Hawaii International Conference on Systems Sciences* 32.
<http://lamb.cba.hawaii.edu/pubs/inwis03.html>
- Lamb, Roberta (2001), Tracing Influence through Intranets of Compliance, *Hawaii International Conference on Systems Sciences* 34.
<http://lamb.cba.hawaii.edu/pubs/HICSSCompNet.pdf>
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<http://lamb.cba.hawaii.edu/pubs/IJECIB07-Post.pdf>
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Other Publications

- Lamb, Roberta (1998). Inside Out, Outside In: Do Interorganizational Relationships Shape Intranet Use?, *Proceedings of the 1998 Americas Conference on Information Systems*.
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<http://lamb.cba.hawaii.edu/pubs/socialactors.pdf>
- Lamb, Roberta and Mark Poster (2002.) Transitioning Toward an Internet Culture: An Interorganizational Analysis of Identity Construction from Online Services to Intranets. *International Federation of Information Processing 8.2 Conference*, Barcelona, Spain, December, 2002. <http://lamb.cba.hawaii.edu/pubs/InetCulture.pdf>



Biographical Statement

Roberta Lamb is an assistant professor of Information Technology Management at the University of Hawaii, Manoa. She has been researching online technology use for the past 10 years, initially in California, and more recently in the mid-western U.S. She is presently engaged in two studies of ICT use: a 4-year study of intranets in commercial organizations, and a 3-year study of collaborative networking among university and industry scientists. Roberta received her Ph.D. in Information and Computer Science at the University of California, Irvine, in 1997. Previously, she designed software systems and directed the development of software products at two southern California firms. For recent publications and details on her current research, visit Roberta's home page at <http://lamb.cba.hawaii.edu>. She can be reached by e-mail at lamb@cba.hawaii.edu.

Endnotes

ⁱ The industries under study span the range of industry environments dimensioned by Scott. (Scott, W. R. (1987). *Organizations: Rational, Natural, and Open Systems*, Second Edition, Englewood Cliffs, NJ: Prentice Hall.)

ⁱⁱ Here, we are focusing on intranets and other forms of EUC as a growing proportion of organizational IS activities, rather than applications such as enterprise resource planning where end-user involvement may be less evident.

ⁱⁱⁱ Technical skills related to "free" Internet technologies like HTML, CGI or Perl scripts are more programmer-oriented compared to low-cost end-user –targeted packages like MS Front Page.

^{iv} In a prior study, profiling was found to be the major use of external information services, like DIALOG, in all industries of the study (Lamb et al., 2003.) The intranet study suggests that profiling has become standard practice for firms and their members (cf. Lamb and Poster, 2002.)

^v The MITRE organization has done some innovative work with "smart" employee directories. (See: Maybury, M., R. D'Amore and D. House (2001.) Expert Finding for Collaborative Virtual Environments, *Communications of the ACM*, Vol. 44 (12).)

^{vi} Damsgaard, J. and Scheepers, R. (2000). "Managing the crises in intranet implementation: a stage model," *Information Systems Journal*, 10: p. 144.

^{vii} See Lamb (forthcoming) and Lamb (2002) for an extended discussion of this proposal for extending conceptualizations of systems integration to include project-based integrations within communities of practice.

^{viii} An organizational field is defined as: "those organizations that, in the aggregate, constitute a recognized area of institutional life: key suppliers, resource and product consumers, regulatory agencies, and other organizations that produce similar services or products." (DiMaggio, P. J. and W. P. Powell (1983.) "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields," *American Sociological Review*, 48:147-60.) Functional organizational fields are industries, broadly construed - i.e. organizational systems that are isolated for analysis based on functional rather than geographic criteria. (Scott, 1987:124.)

^{ix} Castells has described this kind of action as part of the way in which strong multi-national companies control the flows of resources and information in a global economy. (Castells, Manuel (1996.) *The Rise of the Network Society, Volume I of The Information Age: Economy, Society and Culture*. Malden, MA: Blackwell.)

^x My manuscript won the Outstanding Paper Award at the 15th Bled Electronic Commerce Conference last year. (Lamb, 2002.)