The evolution of intranets: an evaluation of change, implementation strategy and roles in organisations deploying intranets.

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Abstract

Successful management of emerging technologies has been vital in supporting new, emerging management philosophies where focus is on openness and sharing of information, facilitated by simpler and faster data access and the realisation that collaborative effort will harvest improved productivity.

This paper examines the evolution, rationale and development of intranets by considering organisational change, the diffusion of innovation and the differing approaches in implementation strategies. This is supported by reviewing empirical studies of intranet deployment in the mid to late1990s and how they become focal points for end-users.

The paper demonstrates how the traditional roles of developer and user are gradually changing and why the two roles now overlap. The paper concludes that implementations can only be viewed as successful if they break down information barriers and make working easier.

Keywords:

Change Management; Collaboration; Communication; Diffusion; Emergent Technologies; Grassroots, Implementation; Intranet; Roles; Top-down.

1. Introduction

In 2001, Hewlett-Packard asked all employees to take a voluntary pay-cut using the company's "@HP portal", an intranet linking 90,000 employees. On day 1, 10,000 employees signed up; after 3 days 30,000 had followed and within a week 80,000 had agreed. @HP believed the portal played a key role because, instead of finding out numbers of volunteers by word of mouth, employees could view the headcount. As it increased, more people became convinced they should also participate (Duffy, 2001). Jim Barksdale, Netscape CEO, said "the Web's moneymaking potential" was more likely "from cost-savings of 'internal' Webs" than "commerce on the Internet" (TEFATE, 1997). Is this the potential of intranets?

After a brief explanation of intranets in section 2, this paper will study their evolution and rationale in section 3 and how they reflect organisational change in section 4. In section 5 it will identify current implementation strategies and consider changes to the traditional IT department/End-user stereotypes, with a perspective on roles that have evolved in specific implementations. Success criteria will be considered in section 6, with an evaluation of the findings following in section 7. Conclusions regarding implementation strategy, roles and maintenance issues will feature in section 8.

2. Intranet Distinctions

Public Internet sites tend to be open and not explicitly restricted to a particular class of users whereas intranets and extranets are more exclusive (Powell 2002).

An intranet is a shared information resource for employees, within a discrete private network. It employs standard Internet protocols, TCP/IP and HTTP, and Internet technologies (Bansler, 2000 & Karlsbjerg, 2000 & Intranet Defined, 2002). Whereas traditional client/server systems manage multiple applications and have interface issues, intranet protocols use a common language and communicate via a web-browser. Thus they are often referred to as "middleware" or "glueware" (Bansler, 2000 ref Lyytinen, 1998). Many intranets are now considered 3-tier architectures; a thin client, a middleware server and an established database server (Cleary Jennings).

Organisations may operate single or multiple sites, which may feature an Internet interface (portal) and they can contain significantly more pages than corresponding public sites. Sun Microsystems external site has 20,000 pages; the intranet 2 million (Nielsen 2002). IBM's "Dynamic Workplaces" consolidated 11 million web pages and 5,600 domain names within its business.

3. Evolution and rationale

3.1. Evolution

In 1998, 25% of total corporate Internet spending was on intranets represented (Lamb Davidson, 2000 - quote from IDC, 1998). By the end of 1999, 58% of UK business had them (DTI, 2001) compared to two-thirds of U.S. organisations (IDC, 2001). Increasing numbers of smaller companies "of between 100 and 500" are likely to consider them a vital component in their operations and employees in organisations of 25+ feel the need for them (Modalis, 2001).

Intranets became attractive because they offered opportunities to improve communication and collaboration by providing "ubiquity of services" (Bansler, 2001). Their evolution has marked similarities to the early developments in "end-user" computing in the mid-1970s, when non-IS employees "accessed mainframe" facilities to develop their own business applications (Lamb Davidson, 2000). The emergence of a more computer-literate end-user community drew concern amongst IS professionals; fearing system duplication, lack of control, data integrity and security (Rothi, 1989). However, IT departments gradually realised that they had a dual responsibility, to both support end-users and provide the infrastructure.

Intranet development has encountered similar growth-pains. "Early adopters" were often specialist groups creating "grassroots" intranets i.e. within their own departments (Bansler, 2000, Rooney, 1997 & Wagner, 2002). Technically competent "sub-sets" of organisations innovated, without organisational restrictions, servicing their own requirements e.g. research and development teams (Bansler, 2000 & Karlesbjerg, 2000 & Lamb Davidson, 2000).

3.2. Rationale

Organisations can improve operational effectiveness and productivity by enabling users to access data more easily. Cost savings can be realised simply by moving processes online and reducing paper and distribution costs. Apparently, 18% of corporate printed material becomes outdated after 30 days (Intranet Road Map, 1999).

Changes in corporate management culture, allied with emergent technology, have focused on worker collaboration, information sharing, best-practise and empowering employees to provide faster decisions and improved customer service (Wagner, 2002 & Bansler, 2000 & Kane, 2000).

Web-browsers can access data held on different systems and stored in varied formats, thus providing a single, common graphical interface (Wagner, 2002 & TEFATE, 1997). An organisation can instantly link geographically isolated units with up to date information e.g. procedure manuals containing key operational procedures; these can often be compromised by failure to update them consistently across sites.

Corporate news, internal directories, departmental project and product information have been major targets for information dissemination. Bulletin boards and "net" meetings have improved communication and collaboration (Lamb Davidson, 2000).

What are the potential returns from developing a corporate intranet? IBM's "Blue Pages", an employee look-up directory, has than 1 million hits/day generated by 400,000 users globally. It saves IBM $10 million annually (Intranet Journal IBM). According to Nielsen, "a company with 10,000 employees, that currently has average intranet usability, can gain $5 million in productivity per year" (Nielsen Norman, 2002). US West's "Global Village" identified potential annual savings of $300,000 p.a. simply by issuing salary statements via their employee link and it rationalised internal communications by reducing 13 e-mail systems into 1 (Bhattacharjee, 1998).

4. Technological and Organisational Change

4.1. Cyclical Innovation

Digital networks are dynamic, through a cycle of technological innovation and the inevitability of organisational change (Bloomfield, 1994). A cyclical model of "co-evolution", (Bar, 2000), becomes inevitable as soon as networks are adopted, because new forms of communication and uses for technology are developed e.g. progression from fax to e-mail/bulletin boards. In effect, there is a cycle of automation where new solutions address existing needs, followed by experimentation where end-users develop new functionality e.g. grassroots users using the web to conduct virtual meetings. Finally, reconfiguration occurs, where successful

experimentation is incorporated as a new standard. Thus technological innovation becomes the platform for "next-generation" functionality and future change. Figure 1 symbolises this.

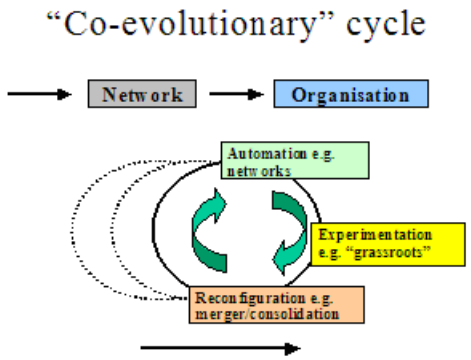

Figure 1: Co-evolutionary cycle (Bar, 2000).

System redesign has often rapidly followed launch e.g. the integration of existing grassroots initiatives: US West's global village intranet was re-designed three times in 4 years and IBM's "e-workplace" consolidated of over 8,000 "local" intranets in 5 years.

4.2. Diffusion of Innovation

New practices and technological change require "behavioural change" by both the organisation and end-users (Bhattacherjee, 1998 & Lamb Davidson, 2000). Whether the change agent is corporate policy or "innovators" within a business, "diffusion" of both awareness and innovation is likely to follow a predictable pattern.

Diffusion is a process where innovation is communicated over time, whereas innovation is the initiative that is perceived by others not yet involved (Kautz, 2000 & Payson, 2002). It refers to the diffusion model developed by Rogers (Rogers, 1983 & 1995).

The likelihood of change is affected by the "innovation-decision" stage, whereby awareness of innovation is translated into a "decision to adopt", dependant on needs. Rogers' model proposes that awareness and innovation can be demonstrated by an "S" curve - see Figure 2 - where initially, development of group/organisational awareness and acceptance progresses slowly. An accelerated and steeper climb follows depicting both collective awareness and organisation-wide implementation and concludes in a reduced communication and implementations as "saturation" is achieved. The decisive point, early in the process, is called "*take-off*", i.e. "where forward-thinking change agents have adopted the innovation; they work to communicate it to others" (Payson, 2002).

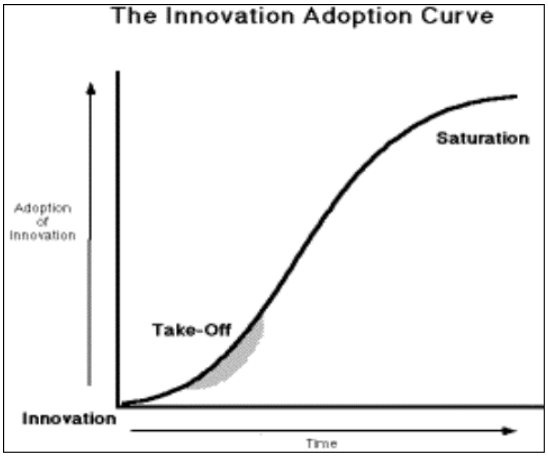

Figure 2: Adoption of Innovation Curve (Payson, 2002).

The growth in development of both the Internet and the spread of grassroots intranet sites within organisations reflects this "adoption" process (Lamb Davidson, 2000 & Bhattacherjee, 1998, Bansler, 2000 & Cumming 2001).

An organisation seeking to implement cultural or operational change should be more receptive to innovation but there are many instances where information technology (IT) department professionals have resisted acting as change-agents for their organisations and where end-users have forced the pace of change. Their concern has been based on the risk of potentially multiple, "diffuse" systems that could compete with organisation-wide proposals (Lamb Davidson, 2000).

4.3. Planned and Emergent Change

Networks represent not just a user resource but also organisational change itself. Change in operational practices or in management philosophy can be demonstrated by intranet implementations (Bar, 2000). New management philosophy of openness, communication and collaboration, achieved via a top-down implementation strategy, can be termed "planned change" i.e. it is the realisation of a deliberate strategy. Whereas innovation, driven from grassroots initiatives, can be classed as "emergent change" i.e. innovation realised without prior intention (Bansler, 2000).

The success of change is inevitably determined by how well planned change is managed and, where

innovation is initiated at grassroots level, whether or not an organisation is receptive to such initiatives. Therefore we could say a planned change demonstrates management control and top-down processes, whereas emergent change demonstrates improvisational philosophy, encouragement of end-user innovation through sharing of best practises and successful self-organisation (Lamb Davidson, 2000 & Bansler, 2000).

5. Implementation Strategies

IT departments have historically viewed grassroots initiatives with concern, yet "grassroots" also offers a pool of expertise that the organisation can exploit. Should organisations adopt a top-down implementation to ensure corporate direction, control, consistency of presentation and enterprise-wide availability or should it encourage local innovations and then integrate them? Is outsourcing appropriate?

Facilitating a grassroots approach can help to overcome end-user resistance and achieve significant system usage, particularly where the intranet developers are also content developers, owners and users (Bhattacherjee, 2000 & Bansler, 2000 & Lamb Davidson, 2000 & Wagner, 2002).

5.1. Top-down versus Grassroots (Bottom-up)

A review of empirical studies into intranet implementations at "PharmaCo" and "PlayCo", both pseudonyms for two global companies, demonstrated polarised approaches in effecting cultural and operational change (Bansler, 2000). The empirical study of US West offers a further comparison (Bhattacherjee, 1998).

PharmaCo initially identified several grassroots, "unofficial" web sites and, although not involved at the outset, the IT department seized the opportunity to drive them forward as "IntraWeb", encouraged by a prevailing management culture of "openness, empowerment and knowledge sharing". PharmaCo's strategy was for IT to manage system infrastructure and provide business-user support via a "web competency centre" that was both co-ordinator and policy developer. Business users became "information owners", accountable for information "validity" and "super-users" were responsible for web-site set-up and daily maintenance. Each interested business area purchased a $4,000 "intranet starter kit" and the centre provided training.

PlayCo's intranet evolved following the company's Internet project and a new management philosophy seeking to remove "information fortresses". However, PlayCo's approach was hierarchical, being an executive sponsored "top-down" deployment strategy that, in conflict with the new philosophy, offered less local initiative than at PharmaCo and effectively reinforced the "information fortresses". Their web-coordinator controlled the business-area content providers and reported directly to executive management.

Whilst PharmaCo and PlayCo were successfully implemented, they experienced differing issues. PharmaCo's emerging grassroots approach contained actively supported, rich-content sites but had mixed quality design, broken and outdated links and an unplanned appearance. PlayCo's planned change approach demonstrated better design consistency and more efficient navigation enabled by valid and up to date links, although content was less "feature-rich". Interestingly, PlayCo had to promote the concept more aggressively by appointing "information providers".

In the US West case the initiative started in 1994 as a small experiment, based on the vision of one employee who promoted awareness and innovation by giving browser CDs to interested employees, "on condition they promoted it to 2 others". This grassroots approach generated significant interest throughout the organisation, with at one stage 5 intranets being developed a week. In 2 years, page hits increased from 14,000 per month to 200,000 thus demonstrating diffused innovation and adoption through emergent change.

US West learned that cultivation of grassroots interest produced benefits in terms of improved decision-making and productivity and enthusiastic teams that became empowered. A key approach of US West was to separate ownership of the network and the content - as they termed it "publishing and operations".

Whilst these studies highlighted bottom-up versus top-down development issues, they also identified that the traditional roles of "developer and end-user" are less distinct (Cumming, 2001 & Wagner, 2002 & Bansler, 2000 & Lamb Davidson, 2000).

5.2. In-house versus Outsourcing

70 percent of small and medium-sized U.S. businesses consider an intranet important for

communicating with employees. However, almost half preferred outsourcing the project because they considered it a daunting proposition (Intranet Journal, 2002).

Whilst smaller organisations often lack the in-house IT resource, significant "supply-side" development has produced a variety of site developer tools, putting implementation capability within the reach of smaller businesses (Karlsbjerg, 2000). Also, "intranet-in-a-box" or "groupware" solutions provide basic folder, bulletin board and virtual meeting rooms, requiring little in-house expertise (Smith, 2002). Nielsen considers that "there is nothing to stop a small or medium sized company from developing their own intranet" (Nielsen, 2002). In a study of Danish organisations the majority of implementation strategies were in-house (Karlsbjerg, 2000).

6. Defending against Failure

"Lack of strategic planning, inadequate executive sponsorship, waning financial support or inconsistent content management can spell disaster" (Duffy, 2001). In the same article, Nielsen was quoted as saying that "inefficient search and retrieval", multiplied by the number of users was "a $1 trillion problem". So what are the drivers for success?

6.1. Building for Success

"Usability" has now become important, with eye-catching style being superseded by simplicity and productivity, through the provision of "killer" applications that motivate people to frequently visit the intranet homepage (Coyne Nielsen, 2001). IBM employed such an approach: their Dynamic Workplace contains "Blue Pages" an employee lookup directory, "Instant Messaging" identifying currently on-line users and "e-Meetings" delivering reduced travel and meetings costs.

The most productive intranets focus on news provision, enterprise-wide directories with associated search facilities, custom portals and compliance systems that focus on ISO/Quality and legislative issues (Lamb Davidson, 2000). These facilities generate widespread and frequent/daily usage because end-users use them as virtual libraries.

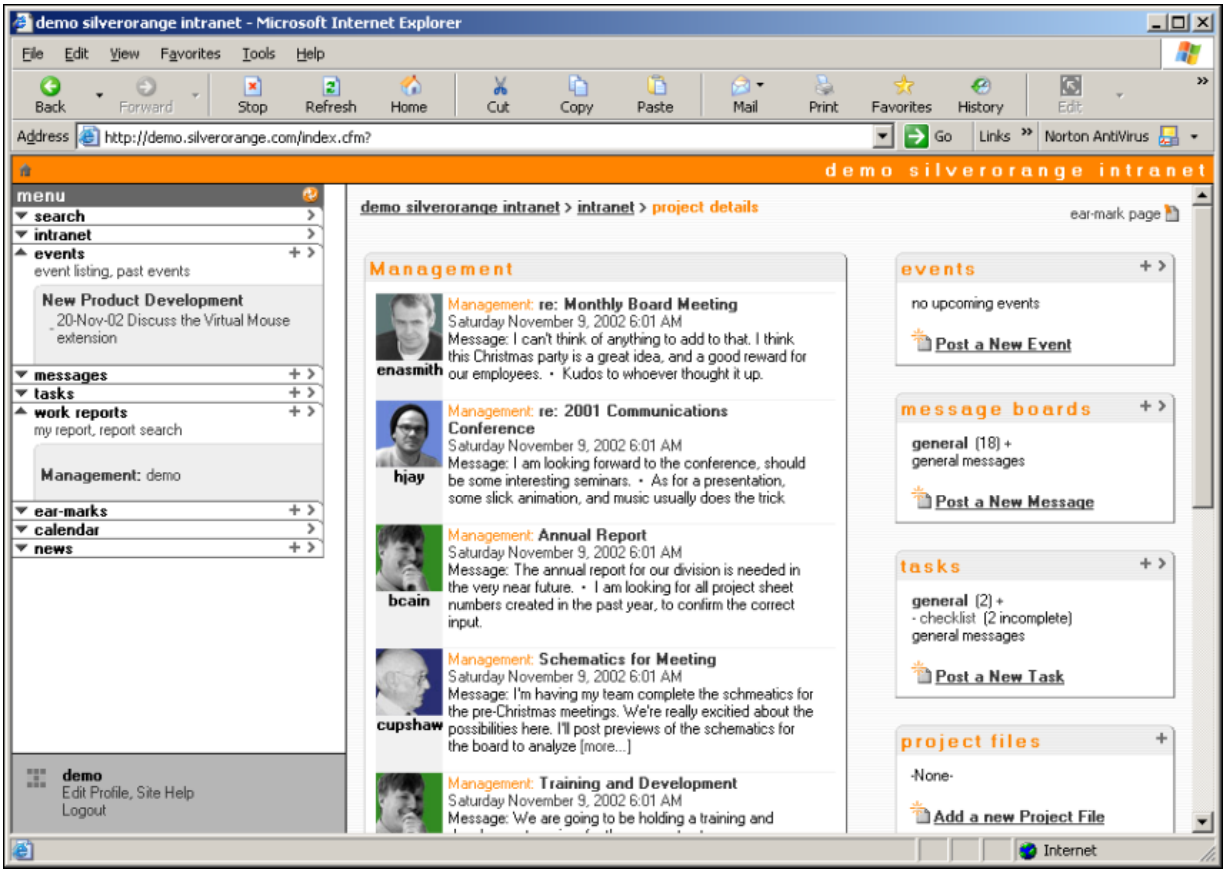

Figure 3: Silverorange - Nielsen Norman Group's 2001 Intranet Design Winner.

Enterprise-wide telephone directories and search facilities are critical where an organisation has either disparate groups or where the business is extensive. A typical example is the Silverorange interface shown in Figure 3.

A well-designed intranet should make productivity easier whereas poor design can be an obstacle course that hides useful applications and information; a view reflected in the IBM's e-workplace:

"there were far too many sources of information to search through. And to know where to start looking, an employee had to know the organizational structure of the company in advance. Key to our success … was the goal of rendering the complexity of the organization irrelevant" (Smeaton, 2002).

Nevertheless, an organisation faces key considerations: firstly, defining the scope of the intranet i.e. striking a balance between design ambition and the size of the business. Secondly, it should be consistent with the company's core objectives. Thirdly, to ensure effective productivity, it should be easy to use (Nielsen, 2002).

6.2. Securing User Acceptance

Whilst smaller companies often have fewer resources, they can be more focused in the purpose of their intranet and can more easily involve all parties in the design process to ensure usability (Lamb Davidson, 2000 & Nielsen, 2002).

Developers need to understand the daily needs and concerns of end-users by securing end-user acceptance e.g. Lulea University of Technology underwent 50 "iterations" before achieving their "required level of usability" (Coyne Nielsen, 2001). Intranet development has provided a collaboration tool, where users can exchange information via discussion groups e.g. IBM's e-workplace system has over 65,000 e-meeting users spending 47,000 person-hours in e-meetings every month. This feature, alone, has saved IBM over $4 million/month in meeting expenses. (Smeaton, 2002 & Coyne Nielsen, 2001).

Whilst improve speed of information access and productivity are major objectives, there will inevitably be resistance to removal of traditional paper-based messaging. Change management strategies, involving both negotiation & reconciliation of interests, will therefore play an important role in intranet implementation (Bhattacherjee, 1998 & Mumford, 1995).

7. Key Issues

7.1. Organisational Alignments

An organisation's primary objective must be to win and retain customers, both internal and external, cost-effectively through service excellence that secures customer satisfaction. An organisation should try to achieve an optimal balance between the needs of the organisation and its employee stakeholders. However, business design is often aligned such that employees become more focused in overcoming and enduring systems deficiencies than being systems-supported to achieve work objectives – see Figure 4.

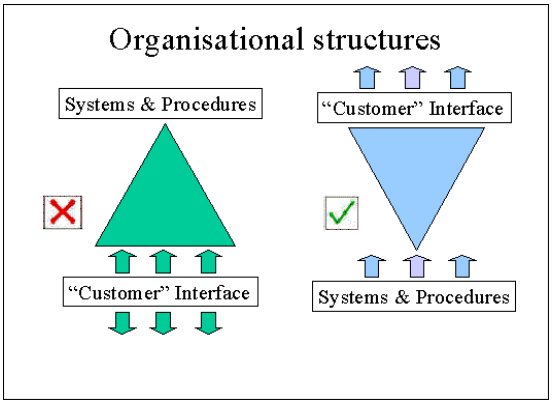

Figure 4: Organisational structure model (D. George).

Organisations should therefore be proactive enablers rather than just controllers and yet few have developed effective business-wide systems support; many legacy systems endure for end-users.

7.2. Change Management

Whilst change is inevitably viewed with suspicion, the success of change depends on how working practices are changed. Planned change is vital for controlled progression but that does not preclude planned change embracing the rich potentiality of end-user innovation through emergent change. Emergent change can serve both as incremental and throwaway prototyping, bringing increased likelihood of end-user acceptance and ownership.

In the PharmaCo and US West cases, it was demonstrated that corporate acceptance of emergent

change and the resulting diffusion of innovation, broke down "barriers of resistance" and engendered greater acceptance and ownership (Bansler, 2000 & Bhattacherjee, 2000). However, the fact that in both instances the organisations either had to repeatedly re-design or experience disjointed intranet interfaces, has forced the author to recognise the need for far greater controls - see section "ownership and roles".

7.3. Implementation Strategy

Both Top-down and grassroots approaches have vulnerabilities and yet it was perhaps surprising to note the absence of formal pilot projects in the cases reviewed. Organisations appear to have made a "leap-of-faith" that they needed an intranet, which interestingly, is at odds with intranet development in UK government departments (Cumming, 2001).

7.3.1. Top-down

Hierarchical or top-down strategy requires careful audience management. But, in the PlayCo implementation there was no mention of communication strategies employed to sell the benefits of the project. This approach risks end-users perceiving it as a vehicle for receiving the views of the organisation rather than for sharing their own views.

A top-down strategy clearly allows an organisation to control systems deployment, resource allocation and corporate style and it will inevitably ensure conformance through central control or guidelines. However, where an intranet provides corporate-wide functionality e.g. telephone directories or core business applications; this becomes virtually a non-negotiable issue.

It was illustrated in the PlayCo case that group-wide intranet implementation was inconsistent with management philosophy of the business. The author considers this is a high-risk issue that could undermine successful deployment.

7.3.2. Grassroots

The quality of existing grassroots initiatives must have a bearing on implementation strategy, particularly if there is no strategic/business plan for intranet development. Grassroots can offer a vehicle for diffusion of awareness and provide a tool to dismantle resistance. However, the author would be concerned if significant numbers of local web sites were allowed to propagate, unchecked, on a network.

It has been implied that cultivation of grassroots initiatives results in greater end-user ownership and higher usage (Lamb Davidson, 2000 & Bansler, 2000 & Bhattacherjee, 1998). This may be true but at what cost? The consolidation in numbers of local sites by IBM clearly demonstrates that proliferation had been unmanaged. Whilst empowered grassroots innovations have produced "feature-richness" they threaten proliferation at the expense of a co-ordinated overall design. The author agrees that unchecked proliferation could make subsequent integration more difficult (Rooney, 1997 & Lamb Davidson, 2000).

7.3.3. Socio-Technical Systems

The author considers that, regardless of implementation strategy, an ETHICS approach (Mumford, 1995) should be considered i.e. a process of "negotiation & reconciliation" of interests. Mumford says, "it is vital that the new technical system is surrounded by a compatible, well-functioning organisational system". To achieve an effective implementation end-users should have both the opportunity to influence the design of their own work environments and to set work satisfaction objectives consistent with technical/operational objectives.

7.4. Development Approaches

In-house or outsourced developments are not considered a contentious issue; they must be determined by the extent of internal expertise and the growth of available development tools (Nielsen, 2002 & Karlsbjerg, 2000). The author would support the view that, wherever possible, an in-house approach should be adopted; given that development by competent teams would provide greater flexibility, control and maintenance options. All 3 cases adopted in-house strategies and both PharmaCo and US West encouraged grassroots innovation; PharmaCo even providing "starter-kits". However, outsourcing could offer fresh perspectives on design and approach.

7.5. Ownership & Roles

Regardless of implementation strategy the consensus view amongst the papers researched is that ownership, roles and best-practise enforcement are critical to implementation success and cost

control (Bloomfield, 1994 & Bansler, 2000 & Bhattacherjee, 1998).

7.5.1 Ownership

The re-alignment of organisational structures has clearly been evidenced by the creation of new roles and the traditional role of IT departments owning both the network and information has been challenged. The author agrees with the view (Bhattacherjee, 1998), that a successful intranet requires a partnership culture where "operations and publishing" are separated; interestingly an approach also reflected in a number of government department Websites (Cumming 2001).

7.5.2. Roles

In any collaborative environment there must be individual accountability or else group abdication will pervade. Research has identified several key roles:

> **Intranet "champion":** A critical role if the intranet is to represent the internal face and voice of the business. Has overall responsibility and is the person who can be the ultimate decision maker.
>
> **Network Infrastructure Owner:** IT should take responsibility for corporate-wide issues e.g. the network, workstation specifications, security and integrity of the systems/data. Additionally, should own corporate-wide applications e.g. centralised processing, portals and telephone directories.
>
> **Web co-ordinator:** In the PlayCo deployment, the web co-ordinator was in reality "controller". This position, within the corporate information department, was pivotal in influencing design and content. The author considers that this is inconsistent with the need to secure end-user buy-in and would prefer to see a service role interfacing with information owners and co-ordinating user support.
>
> **Information Owner:** The key distinction must be between information owner (PharmaCo & US West) and information provider (PlayCo). The author considers the latter approach to be less likely to stimulate and encourage involvement in information generation. Whilst PharmaCo's concept of "super-user", as a key role, is wholly consistent with the objective and need to secure ownership and buy-in through active user-support.

7.6. Maintenance

Organisations, particularly those embracing grassroots initiatives, must develop a "content management strategy" if the objective is to develop a corporate-wide entity (Nielsen, 2000). The author agrees that information owners should be empowered to add value to content and message; not site design. However, the author considers it important that all roles should function within a centralised operating and best-practise framework.

Research has identified virtually universal agreement that management standards must be agreed at the outset; the author agrees that this is a key requirement. Information should be valid, accurate and updated on a daily basis. Whilst local initiatives should be encouraged, an agreed design template should be followed to avoid ad-hoc styling and ensure navigation consistency. Periodic reviews should be conducted to ensure that standards are being maintained.

7.7. The Captive Audience?

It has been seen that end-user intranet adoption has been achieved through identification of user needs and provision of "killer applications" e.g. telephone directories, search facilities and "e-meetings" (Coyne Nielsen, 2001). The author recognises that end-users need functionality that helps them to work smarter and this must be a key strategy in achieving process acceptance.

Much of the end-user input, to secure buy-in, was generated by interviews, focus groups and usability acceptance testing e.g. Lulea & CISCO systems (Lamb Davidson, 2000 & Coyne Nielsen, 2001). However, the author considers that there is also a requirement for an on-going, post-implementation process, measuring not only end-user satisfaction but also dissatisfaction with systems performance and functionality. This should safeguard against organisational complacency and form the next stage in the co-evolutionary process.

8. Conclusion

Clearly, large organisations have compelling justifications for developing intranets. However,

successful implementation requires that organisations achieve a balance between the needs of the organisation and its employees by managing change in a way that recognises the benefits of emergent innovation. Whilst intranets promote collaboration, planned change that harnesses grassroots initiatives, also demonstrates a collaborative culture.

An organisation's key resource is its workforce and self-development of people must co-exist with the co-evolutionary cycle of innovation. Mumford's ETHICS approach seeks to reconcile the interests of the individual, the group and the task. A top-down implementation strategy need not exclude grassroots innovation; instead it should positively exploit such emergent change by allowing it to challenge centralised concepts by viewing such innovations as functional prototypes – or pilot projects.

The traditional role of IT has had to adapt and re-align itself by recognising that end-users can be "experts" in their own functional requirements. It is entirely right that end-users are given the opportunity to determine their future ability to deliver and contribute to the development process.

Effective intranet implementation can provide end-users with efficient tools to achieve work goals, if it supports open and timely communication, freely shares understanding of business issues, standards and best-practise and translates this into an empowering process to achieve corporate goals.

Successful implementation is merely the first step of the evolutionary cycle. Intranets will only provide added value if they make working easier and more productive for the business and, as previously highlighted, IBM's commentary (Smeaton, 2002) provided an insight into the challenge:

"there were far too many sources of information to search through .. Key to our success .. was the goal of rendering the complexity of the organization irrelevant"

This statement surely embodies the core aim for businesses pursuing intranet development.

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