A stage model of intranet technology implementation and management

Jan Damsgaard[a] & Rens Scheepers[b]
jdamsgaard@econ.au.dk[a] & rens@cs.auc.dk[b]
http://www.econ.au.dk/AFV/staff/jdwww.htm[a]
http://www.cs.auc.dk/~rens[b]
Department of Management, Aarhus University[a]
Department of Computer Science, Aalborg University[b]

Abstract

In the seventies, Nolan was the first to address the need for a descriptive stage-theory concerning the planning, organizing, and controlling activities associated with managing the organizational computer resource. The arrival of newer technologies such as those based on the Internet calls for fresh approaches in terms of their implementation and management. Intranet technology – which is based on Internet technology – differs from other types of IT in terms of its use and implementation. We propose a four-stage model for intranet implementation and management. Each stage is portrayed by seven general characteristics. We propose that in order to ensure intranet institutionalization, three existential crises must be overcome. Firstly, if the intranet is not nurtured by a sponsor it cannot evolve beyond its experimental beginnings. Secondly, if a critical mass of both users and content cannot be reached simultaneously, the intranet will not progress. Finally, if the intranet remains uncontrolled, it will be perceived to be useless and therefore users will abandon it.

Keywords: Intranet implementation, Stage model.

BRT Keywords: EL, FD.

Introduction

Nolan was the first to present a descriptive stage-theory concerning the planning, organizing, and controlling activities associated with managing the organizational computer resource (Nolan 1973; Gibson & Nolan 1974; Nolan 1979). His research was motivated by the pressing need for a normative theory for the management and use of computers in organizations. To a large extent this need remains today.

Today's organizations are no less confused than in the past when it comes to managing the IT resource. Furthermore, the present technology landscape is quite different from that in the 1970's. Instead of being preoccupied with implementing payroll systems, database systems, or office automation systems, modern organizations are in the midst of assessing the competitive effects of the Internet, negotiating extranet solutions with business partners, and they are implementing intranets for internal use. The latter technology is the focus of this paper.

An intranet is the application of Internet technology, more specifically World Wide Web technology within an organization. Internet technology (web servers, browsers, etc.) is applied, but access is restricted exclusively to organizational members for example by firewalls (Oppliger 1997) or physically separating the intranet from external networks (a “firebreak” strategy). The technical set-up of the intranet technology is relatively straightforward (provided the supporting technologies and infrastructure are in place) and the first information content is also quite easily created. However once the initial enthusiasm has subsided two key questions remain: How to proceed, and what to expect in the future?

In this speculative paper we take a similar approach as Galliers & Sutherland (1991) and examine how intranets can be managed at different stages of implementation. We do so by proposing a descriptive stage model that allows organizational actors to reflect on their intranet implementation process and to explore likely scenarios for the future.

This paper is outlined as follows. First, we highlight some specifics of intranet technology. Thereafter we propose an integrated stage model of intranet implementation and management that consists of four stages and seven characteristics pertaining to each stage. We illustrate our model with examples from pertinent literature and our own empirical findings. We discuss the application possibilities of the model, draw some conclusions and indicate areas for further research.

Intranet technology

We strongly concur with research that stresses the criticality of taking a technology’s underlying specifics into account when studying its implementation and diffusion (Prescott & Conger 1995; Damsgaard 1996; Lyytinen & Damsgaard 1998; Monteiro & Hanseth 1995).

According to Prescott & Conger (1995) the locus of impact of intra-organizational information technologies occurs within one or more units of the organization. Intranets, as an example of this class of technologies, can be created centrally in the organization (as a corporate intranet), but organizational units (such as divisions, departments or functional groups) can also create local “child intranets” (Bhattacherjee 1998).

Intranet technology use

Intranets tend to evolve and increase in sophistication over time (Coleman 1997; Scheepers & Damsgaard 1997; Romm & Wong 1998; Damsgaard & Scheepers 1999). Initially the technology tends to be used mainly for publication of static information. This is not a restriction imposed by the technology itself, but rather exhibit the learning involved in applying the technology (Attewell 1992). Later when the organization has become familiar with the technology, it may be applied for more advanced purposes. Intranet technology is highly malleable and can be applied in a number of different use modes simultaneously (Damsgaard & Scheepers 1999). These modes range from simple uses such as the publishing of home pages, newsletters, technical documents, product catalogues, employee directories, etc., to more advanced uses such as organizational-wide searching for information; transacting with functionality on intranet pages and other organizational computer-based information systems (e.g. legacy systems); interacting between individuals and groups in the organization (via discussion groups, collaborative

applications); and possibly even recording the computer-based "organizational memory" (e.g. best practices, business processes).

Intranet champions, sponsors and agents

Due to the organic nature of intranet technology, it often evolves without any “grand plan”. Jarvenpaa & Ives (1996) found that neither top management nor the IS function typically initiates the use of Web technology in an organization. The role of “bringing in” the technology is played by *technology champions* (Jarvenpaa & Ives 1996; Hills 1997; Bhattacherjee 1998). Technology champions are members of an organization and they present a “foreign” innovation to fellow members who are potentially interested in the technology’s use or development (Lawless & Price 1992). Technology champions are also called “originators of ideas” (Schön 1963) or “technical innovators” (Howell & Higgins 1990). These individuals are strongly acquainted with the outside technology (in the case of intranets, the outside technology is Internet technology, and know how about its application within an organizational setting). However in many cases the technology champion lacks the necessary authority and/or formal resources to ensure development and use of the technology (Beath 1991). Thus technology champions seek to “get the attention” of the innovation from other - more powerful - actors in the organization (Lawless & Price 1992) using a variety of measures (Beath 1991; Damsgaard & Scheepers 1999; Markus & Benjamin 1996). Schön (1963) notes that unless someone with the required power and prestige in the organization emerges to take control of the innovation, it will die. Such a person is referred to as a *sponsor* (Humphrey 1989; Beath 1991). In the case of intranets, sponsors have the sufficient funds and the authority to facilitate organization-wide adoption of the technology (Bhattacherjee 1998). Some authors also use the term “champion” when they refer to a sponsor (Rogers 1995; Schön 1963). However we will use the terms *technology champion* and *sponsor* to distinguish between these different roles. *Technology agents* are organizational members who will lead the planning and implementation of the intranet. They collect the resources, assign the work and call on the sponsor for help when needed. Such agents should be technically and politically capable of understanding problems associated with intranet implementation (Markus & Benjamin 1996; Humphrey 1989).

Intranet technology characteristics

Damsgaard & Scheepers (1999) list a number of intranet technology characteristics which are briefly summarized here. Intranet technology is multi-purpose, and integrates text, graphics, sound, and video. Unlike “traditional” intra-organizational information systems (such as inventory, payroll systems, etc.), intranets do not address any specific, well-defined need. Intranets are emergent in nature and intranet development has no well-defined boundaries, functionality or time span, and is often initiated by technology champions outside of the formal IT function (Jarvenpaa & Ives 1996).

The usefulness of the intranet increases as more use modes are activated (see section 2.1). Intranet technology depends on supporting technologies such as communication protocols (specifically TCP/IP) and a physical network infrastructure. If these are in place, the initial technical installation is relatively straightforward, but more advanced use modes such as transacting with “legacy systems”, are technically more complex and demanding.

An intranet can be regarded as an interactive and reflective medium (Markus

1987), with high network externalities (Bailey, *et al.* 1992; Oliva 1994). An intranet thus becomes more beneficial as more people adopt and more content becomes available. A critical mass of early users is therefore needed. This is often referred to as the "chicken and egg" problem. However, unlike many interactive media, where a critical mass of users is sufficient, intranets also require a critical mass of content simultaneously. Intranet implementers are thus faced with a double "chicken and egg" problem. This critical mass may be of global (organization-wide) character or it may exist in a local pocket, e.g. in a "child-intranet".

Intranet technology blurs the clear distinction between developers and users (Lyytinen *et al*. 1998). "Users" in the intranet context are both "consumers" and "developers". As consumers, they "surf" the intranet for information, but they also develop content (e.g. home pages) and even functionality (e.g. pages with embedded applications).

An intranet can be regarded as "fragile" since it depends on existing infrastructure, critical mass, and network externalities. In this sense it is an "all or nothing" type of technology (Markus 1987).

An integrated model of IT penetration

A model that can inform our understanding of intranet technology use and management needs to accommodate the technology's evolutionary nature, use aspects and its characteristics such as critical mass, network externalities, and the loose development boundary. At the same time it is also necessary to consider the broad array of organizational characteristics that are affected by the technology (Damsgaard *et al.* 1994). We turn to a broad diffusion model and combine that with a view of IT penetration in organizations.

The adoption of innovations among a population can in general be described using a bell-shaped curve that depicts the density function of the time taken by different segments of the population to adopt the innovation (Gurbaxani & Mendelson 1990; Rogers 1995) (see Figure 1). When taking the integral of this curve, we get a typical S-shaped temporal pattern of the diffusion process (Grübler 1997) (see Figure 2). The S-shaped curve can be divided into a number of distinct stages (Rogers 1995). These stages can be used to model IT penetration as is done in the well-known and controversial Nolan stage-hypothesis.

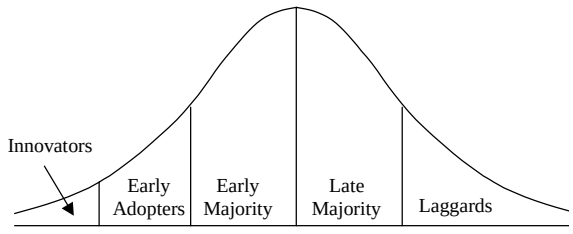

Figure 1. Bell-shaped adoption curve

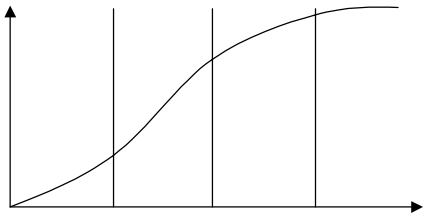

Figure 2. S-shaped integral divided into stages

Nolan's stage hypothesis

Stage models offer insights into how computer Information Technology (IT) and managerial and organizational strategies evolve over time (Lyytinen 1991). According to

stage models, organizations progress through a number of successive, identifiable stages. Each stage reflects a particular level of maturity in terms of the use and management of IT in the organization.

One such stage model is Nolan's stage-hypothesis (Nolan 1973; Gibson & Nolan 1974; Nolan 1979). Nolan's stage-hypothesis has become the best known (for a discussion of similar stage models, see e.g. Galliers & Sutherland 1991), but also one of the most debated and controversial models of IT-penetration into organizations (King & Kraemer 1984; Benbasat *et al*. 1984; Lee 1989; Lyytinen 1991). Nolan's model postulates that the general pattern of IT penetration and use in the organization, can be roughly approximated using the pattern of growth of the organization's computing budget curve. This pattern manifests itself as a crude S-shaped curve and the points of inflection of this curve provide the basis for identifying the different stages (Nolan 1973). Nolan's original model (Nolan 1973; Gibson & Nolan 1974) comprised of four stages, though he later expanded the model by adding intermediate stages (Nolan 1979) due to the emergence of new IT applications (e.g. database systems). His initial four stages (with the budget growth pattern in brackets) are: *Initiation* (slow annual increases after computer acquisition), *Contagion* (highly increasing annual increases), *Control* (decreasing annual increases) and *Integration* (slow annual increases). These budget stages are used as surrogate to represent the growth pattern of IT penetration and use in the organization.

Evolutionary vs. Evolutionist ideas

In their assessment of Nolan's model, King & Kraemer (1984) distinguish between *evolutionist* and *evolutionary* models within the "evolution" concept. In evolutionist models the emphasis is on the direction the change is taking. The logic of the progression is explained in the form of a number of sequential stages where each stage is a precursor for the next one and where there is an ultimate "end state". Evolutionary models on the other hand, describe evolution in terms of the mechanisms of change and do not focus on the direction and end state. Though evolutionary mechanisms (e.g. mutation or adaptation) an entity's features are optimised over time. In this sense each new stage marks a new set of features which are preferable to old features. Each new successive stage can be seen a new state of equilibrium which is adequate for survival.

Our usage of Nolan's model

Apart from describing the four stages, Nolan went further and prescribed certain management tasks at each of the stages (especially Nolan 1974; Nolan 1979). These prescriptions and his unsubstantiated claims about computer budgets stirred the wide debate in the literature as mentioned earlier.

Our use of certain aspects of the Nolan model should be understood in the following context. Firstly, though Nolan's model can be regarded as old and controversial, it remains widely popular and used by both academics and practitioners alike (Galliers & Sutherland 1991). This provides us with a well-established and conceptually stable departure point from which a proposed model can be suggested.

Secondly, we specifically steer away from the controversial elements in Nolan's model, in particular its evolutionist perspectives based on the computer budget as a surrogate. Instead we only use Nolan's stage descriptions and rely on the S-curve as a general evolutionary pattern to portray the organizational pervasiveness of intranet technology in our proposed model. In this sense our approach is supported by research

that has found that Nolan's stages per se are indeed very useful to conceptualize management of a computing resource (e.g. Zuurmond 1991; Lucas & Sutton 1977).

Finally, in the case of intranet implementation and management, the stages identified in the Nolan model presents a powerful basis for the abstraction of this complex, boundary-less process. In our proposed model, we use this basis to describe intranet features in each stage and to examine the management challenges associated with evolving these features further.

A stage model of intranet implementation and management

In this section we combine Nolan's four stages into a tailor-made model of intranet implementation and management. The model is based on extensive research and it is both theoretically and empirically founded. The empirical foundations are presented and discussed in Bansler *et al*. (1999) and Damsgaard & Scheepers (1999). Furthermore the model has been presented and discussed with both practitioners and researchers.

Based on our empirical work and founded on the knowledge of the diffusion of networked technologies we identify that there are essentially three existential crises when implementing an intranet. The first crisis emphasizes the intranet's dependence on resources that must be in place for the intranet to be implemented. Therefore there is the need for the intranet to be "grabbed" by a sponsor. If the intranet is not nurtured by a sponsor it cannot evolve beyond its experimental beginnings.

The second crisis emphasizes the need for a critical mass of both content and users to coexist for the intranet to self-expand and become self-sustaining. If this is not met, the intranet will stagnate and regress to being an experimental technology.

The third crisis deals with the planning and procedures that must be in place for the intranet to stay up to date and useful. If the intranet "grows wild", it eventually becomes chaotic. The wilderness of information becomes impossible to manage and update. Users will perceive the intranet content with mistrust and look for other ways to obtain timely and accurate data. Again the result is that the intranet stagnates.

Therefore we propose that each stage poses a key challenge that must be overcome in order to proceed to the next stage. If the challenge is not met the intranet stagnates. Success and failure at each stage relates to the organizational "pervasiveness" of the technology. Ultimate success means the intranet becomes institutionalized in the organization. Failure during any stage means the intranet stagnates.

Our model is depicted in Figure 3. To structure our discussion of management and implementation aspects at each stage, we follow a similar approach as Galliers and Sutherland (1991) and adapt the so-called Seven S's taxonomy of Pascale & Athos (1981). Other taxonomies could be considered, but we decided upon the Seven S's because it addresses general organizational and management elements and lends itself well to adaptation to specific contexts. In Table 1 we summarize the original Seven S's and our reformulation of each element in the intranet context.

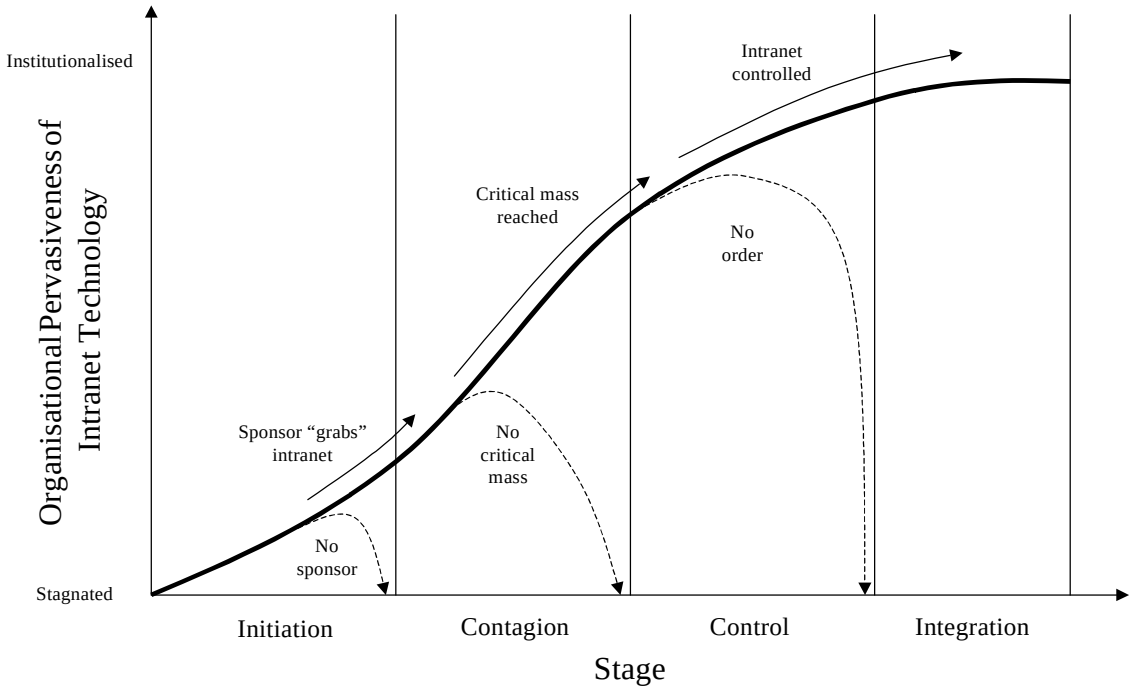

Figure 3: Success and failure in the management of intranet technology

Table 1: The seven S's

Element	**Description (Pascale & Athos 1981, p.82)**	**Meaning in an intranet context**
Strategy	Plan or course of action leading to the allocation of a firm's scarce resources, over time, to reach identified goals.	The intranet strategy that deals with how the superordinate goals in terms of the intranet are to be achieved.
Structure	Characterization of the organization chart (i.e. functional, decentralized, etc.)	Describes where the responsibility for the intranet resides in the organization.
Systems	Proceduralized reports and routinized processes such as meeting formats.	The intranet itself as it is used in the organization. This includes its content and functionality, its use modes and its relationship to other organizational processes and systems.
Staff	"Demographics" description of important personnel categories within the firm (i.e., engineers, entrepreneurs, MBAs, etc.). "Staff" is *not* meant in line-staff terms.	Important role players with regard to the intranet, such as senior managers, technical and organizational intranet champions, content providers, developers and users.
Style	Characterization of how key managers behave in achieving the organization's goals; also the cultural style of the organization.	Describes how key managers behave with regards to the intranet.
Skills	Distinctive capabilities of key personnel or the firm as a whole.	The capabilities of staff who are involved with the intranet.
Super-ordinate Goals	The significant meanings or guiding concepts that an organization imbues in its members.	The guiding concepts regarding the use of intranet technology in the organization.

Initiation

The initiation stage concerns the introduction of intranet technology into the organization by one or more technology champions. Due to the "bottom-up", informal nature of their

efforts and a lack of resources, little content and few users exist. Through experimentation the technology is "re-invented" in the organization (Attewell 1992; Damsgaard & Scheepers 1999; Rogers 1995).

The reasons for the introduction of the technology seem to vary from curiosity to self-interest. In some cases the technology champions started "playing" with intranet technology based on their experiences with the Internet. In another case a technology champion outside the formal IT function told us how he saw his work with the intranet as part of his career planning:

> "People are joking with me, but I put my name on all the intranet pages I create. I want to go further and get a post as a programmer so I can have a budget for software, etc." [Technology champion, January 1998]

The strategy at this stage revolves around the attempts of technology champions to "sell" the intranet concept to others in the organization. Successful progression to further stages is dependent on the emergence of a technology sponsor who can marshal the necessary resources for further intranet progress. In most of our cases, the experiments of technology champions caught the imagination of some senior manager who realized the technology's organizational-wide potential. If no sponsor emerges, the intranet stagnates (Schön 1963).

At this stage there is no formal organizational structure associated with the intranet and there is little or no coordination between the individual efforts of technology champion(s). In one case, we found that the independent efforts of technology champions lead to numerous, "island" intranets.

Publishing (see section 2.1) is the main technology use mode at this stage. Technology champions use their technical skills to create applications such as departmental home pages with lots of eye-catching graphics designed to impress potential users. Reflecting on their intranet at this stage, one manager remarked that it consisted mainly of "this is me and this is my team sites".

Even though a technology sponsor may emerge during this stage, this does not necessarily mean a "wholesale" of the technology to all managers. Some managers may still be unaware of the intranet or even view the technology with some suspicion. An information specialist remarked:

> "At the moment top management is a little bit weary of this new thing. They've got this idea that surfing the intranet means playing around all day. 'You're going to surf pornographic sites, you are going to play games'. We have to get it across to them that it is of business value to them. We are not at the point where management is giving it their full support." [Information Specialist, December 1997]

Using the Seven S's taxonomy, this stage is summarized in Table 2.

Table 2: Summary of Initiation stage

Strategy	"Selling" the technology to others in the organization
Structure	One of more independent individuals (technology champions)
Systems	Technology is mainly used for publication; "This is me and this is my team" sites; intranet "islands"
Staff	Technology champions "push" the technology
Style	Management is unaware or views the technology with suspicion
Skills	Technology champions use their technical skills to impress others with the technology
Super-ordinate Goals	Engaging a technology sponsor who can marshal the necessary resources for further intranet progress in the organization

Contagion

Realizing its (political) potential, an intranet sponsor takes control of the intranet, effectively "grabbing" the technology from the champion(s) (Schön 1963). The technology champions now move to the background (Humphrey 1989).

Since intranet technology can be regarded as an interactive media, progress to further stages depends on attaining a critical mass of users and content. Markus (1987) argues that interactive media will either attain critical mass and progress further or fail at this stage. There is no in-between success scenario. Initially the technology sponsor pursues a *strategy* that aims to attract a critical mass of users (a "reach" focus (Keen 1991)), but she soon realizes that this alone is not sufficient. As a consequence more attention and resources will be allocated to provide a critical mass of intranet content (a "range" focus (Keen 1991)), and a focus on finding "killer-applications". A senior manager reflecting on their intranet at this stage echoes this:

> "…we are talking about the 'hen and the egg' problem. We had to get critical mass here, otherwise people would say 'this is nice, but there's nothing on it" [Senior manager, October 1998]

Romm & Wong (1998) report on the stagnation of an Australian university intranet, because departments did not convert their hard copy documents and therefore not enough content was available on the intranet.

Depending on the level of the intranet, the scope of the strategy can be either local (intra-functional processes) or global (cross-functional processes). If only a local critical mass is reached, a situation arises where the intranet may be successful where the local critical mass exists, but not throughout the rest of the organization.

Under the wings of the intranet sponsor, resources are allocated and the intranet "takes off" in the organization. Typically, an informal intranet project team is created to coordinate efforts. The team will most likely consist of staff from different functions such as IT, possibly some technology champions from the previous stage and internal marketing/communications staff. The intranet sponsor actively supports the project team.

With funding negotiated by the sponsor, more advanced use of the technology is made. Apart from pure publication, the interaction and searching use modes of the technology are applied (see section 2.1). Some discussion groups are created and an organizational search engine may be built. To extend the range of the intranet, intranet "killer applications" are sought. A frequent favorite is an employee/telephone directory on the intranet. An intranet user stated:

> "The most useful site is the telephone directory. You can search on both first name and

second name. Our telephone book is only printed by surname. And the intranet version is updated all the time. People move around a lot ... The moment the book is printed, it's out of date." [Intranet user, October, 1998]

Internal marketing and communication skills within the intranet team are used to attract users to the intranet (Hills 1997). This is achieved via presentations, intranet demonstrations and articles in the staff paper. In two cases organization-wide intranet campaigns were launched. Intranet posters were put up and coffee cup "coasters" (with the intranet information) were handed out. In one case a company-wide intranet "treasure hunt" was organized and users had to find clues on the intranet in order to win prizes.

Due to increased marketing and communication efforts from the sponsor and the intranet project team, there is greater awareness about the intranet among managers. However, a laissez-faire management style pervades, focussing on quantity ("as long as we gain users and content, it's good"). Little planning and quality control mark this stage. Since many users are encouraged to create content, a multitude of sites result. Many of the sites are however just experiments and are not maintained further, resulting in outdated information and "broken" hyperlinks. This stage is summarized in Table 3.

Table 3: Summary of Contagion stage

Strategy	Initially a "reach"-strategy supplemented afterwards by a "range"-strategy. The scope is either local (intra-functional processes) or global (cross-functional processes).
Structure	An informal intranet project team consisting of staff e.g. from IT, internal communications, technology champions
Systems	Technology used for publishing, interacting, and possibly searching. Intranet "killer applications" are sought; A lot of intranet content is developed by many users, but with questionable quality (e.g. outdated information, broken hyperlinks)
Staff	Intranet project team "runs" the intranet with strong support from the technology sponsor
Style	Laissez-faire style; little planning, quantity rather than quality
Skills	Marketing and communication skills feature most prominently
Superordinate Goals	Reaching a critical mass of intranet users and intranet content in order for the intranet implementation process to sustain itself further.

Control

The uncontrolled explosive growth of the intranet due to the critical mass of users and content generated in the previous stage calls for the organization to insert some "safety rods" into the chain reaction to prevent the intranet from overheating and subsequent meltdown. Thus there is a need to rethink and reflect. Intranet control becomes vital to prevent the intranet from becoming a gigantic "mess" of information, links and applications that need to be updated and maintained (Phillips 1998).

Instead of pursuing quantity, the strategy now shifts to higher quality, value of content, and rightsizing of content. This calls for attention to streamline and embed content and functionality on the intranet. There is more standardization and formalization to ensure quality. Usage starts to stabilize, because most organizational actors now have access to and use the technology and the controls stem the proliferation of useless content. The organization may fail to realize the danger at this stage of chaos due to a lack of control and coordination (Hills 1997). Finding broken links or outdated information in one place creates a general mistrust which spread throughout the organization. Soon the "trustworthy" intranet content falls below the critical mass and users turn to other channels. This indicates that unless formal procedures and routines are established, the intranet cardhouse falls.

The formalization in terms of strategy is reflected in the structure for the control of the intranet. Responsibility resides with an intranet steering group with formal responsibilities and reporting relationships. In terms of staff, various intranet positions are established. These typically include an intranet coordinator and intranet developers who operate as technology agents leading the implementation (Bhattacherjee 1998). Other positions include information quality controllers and content providers, all with formally assigned responsibilities. Project management skills are essential.

More advanced use of the technology is made, such as transacting. As a stable, accepted and well-known technology, more and more applications, computer-based systems (also legacy systems) and work processes are unified with the intranet, making it the "universal platform". Restrictions are introduced (e.g. via internal firewalls and password protection) to limit access to certain content for specific users only.

The organizational rethink, control and standardization require a formal management style. The guiding concepts in this stage is rationalization and management control (Cash *et al*. 1992). A Corporate IT Manager reflected:

> "…everybody tends to park all their frustrations on the new technology. But you need to carefully manage it. Keep control of the infrastructure. Don't just let it run free. I think these disciplines are very important." [Corporate IT Manager, October, 1998]

This stage is summarized in Table 4.

Table 4: Summary of Control stage

Strategy	Control of intranet content and use via standardization and formalization
Structure	Intranet steering group with a formal responsibilities and reporting relationships
Systems	The technology is used for publishing, interacting, searching and transacting; other computer-based systems (also legacy systems) and work processes are unified with the intranet, making it the "universal platform"; limited access restrictions
Staff	Formal intranet responsibilities and positions such as coordinators, developers, content providers, quality controllers.
Style	Formal
Skills	Project management skills
Superordinate Goals	Rationalization & management control

Integration

The final stage of intranet implementation and management concerns a state where the technology is increasingly integrated in the organization. The intranet in this stage corresponds to Heidegger's term *ready-at-hand* where the technology disappears and becomes a natural "extension" of the users (Winograd & Flores 1986; Dahlbom & Mathiassen 1993). Users do not think about the technology itself anymore. A senior manager had this vision of the technology in this stage:

> "…what will it look like in two years? Everything will be browser-based. Then you could ask what is an 'intranet'. Would people be able to distinguish when they access information from their normal MIS systems or the SAP system or the newspapers? Will the user see a difference? Will they know they are working on the intranet or some other information? – probably not. It becomes transparent." [Senior manager, October 1998]

This transparency does not extend to those involved in the technical aspects of the intranet. They now pursue a *strategy* of continuously fine-tuning, steering and optimizing existing content (Humphrey 1989). However, their role is very much "behind the scene" or "in the engine room" and much less visible to the users than at the earlier stages.

The superordinate goal in this stage is the institutionalization of the intranet as a standing entity in the organization. Technologies are institutionalized and become "myths" binding on the organization when they become a taken-for-granted means to accomplish organizational ends (Swanson 1987; Meyer & Rowan 1977). A "litmus test" for an institutionalized intranet is the following: if the intranet is theoretically "switched off", most organizational routines will come to a halt (i.e. no dual systems and processes exist) (Damsgaard *et al.* 1994). Realizing its value, management exhibits a high degree of commitment towards the intranet.

In this final stage we see the most advanced use of the technology. This now includes use of the recording mode where the intranet becomes the "definitive record" of what is happening in terms of processes and learning. Organizational processes are intertwined with the intranet and the intranet becomes the "organizational memory" (Huber 1991).

The intranet is no longer the responsibility of a centralized team. Centralized and decentralized solutions coexist and ownership shifts to decentralized content and process owners. Knowledge management becomes an important skill (Nonaka 1994). This stage is summarized in Table 5.

Table 5: Summary of Integration stage

Strategy	Continuous optimizing in both technology and use
Structure	Dispersed multi-disciplinary entity (embedded)
Systems	All the technology use modes are exploited. Centralized and decentralized solutions coexist; The intranet becomes the "organizational memory" in terms of processes and learning.
Staff	Dispersed content and process owners
Style	Commitment
Skills	Knowledge management
Superordinate Goals	Institutionalization of the intranet

Discussion

Here we outline some aspects of the model we proposed. A summary of the stages and the management and organizational aspects thereof appears in Table 6.

Progression through the stages

The model offers guidelines as to what can be expected when implementing an intranet and how to manage the three inherent challenges. However we do not have a dogmatic, evolutionist view of the model in the sense that all organizations must necessarily go through these stages in sequence. The validity of the model should be tested against its practical applicability, its broad ability to explain intranet implementation, and its suggestions of feasible ways to cope with this new information technology in a complex organizational setting. However we do believe that most organizations will most likely progress through these four stages and that our advice about how to address managerial challenges is sufficiently theoretically founded to meet a rigorous trial.

In a sense the contagion and control stages in the model are "unstable", intermediate stages. The intranet cannot remain indefinitely in these stages. It will either progress to the Integration stage or regress and stagnate. This corresponds to the "all or nothing" characteristic of the technology (Markus 1987). However we do believe that the

intranet can survive for a while in these “unstable” stages through “first aid” measures such as to continuously provide resources to increase content and draw users.

We believe progression can be made even though not all elements of Table 6 are strictly “in the same phase”. For example, the intranet may be institutionalized in terms of publication and interaction, even though transacting and recording is not used at all. Also it may be possible to “leap” a stage in some cases.

We also believe that in heterogeneous environments where local critical mass is possible, different heterogeneous unit level intranets can be at different stages. However 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 which is just as strong as its weakest link (from an organizational perspective).

Existing competencies and leadership are key in ensuring steady progress through the stages. Overcoming the technical difficulties such as integrating the intranet with legacy systems demands competencies in these areas. Overcoming the difficulties of integrating the intranet organizationally demands visionary leadership, and new role players (See also Scheepers, 1999).

Intranet institutionalization

Unlike other types of IT, one cannot be sure how intranet technology will manifest itself, because it is so malleable and generic.

The intranet does not carry any specific belief or ideology, and intranet success cannot be measured by reach only. This is different from most traditional IT systems (Jarvenpaa & Ives 1996). A new Lotus Notes system for sales reports denotes a new management strategy. A 100% reach of such a system means that the management has successfully implemented the strategy. With the intranet it is different. The intranet is so malleable that it can support most strategies. This is one of its strong features, but it is also why intranet success cannot be measured through reach only. We therefore caution intranet practitioners against relying purely on “hit counts” as a measure of success.

We see a lock-in effect of the technology use. We therefore caution organizations that are using the intranet as a change agent, which is so commonly advocated by intranet vendors and consultancy firms. Instead, we find, that the use of the intranet replicates existing structures and enforces them if it is left unattended or not planned well. Once institutionalized, the intranet therefore becomes a thick barrier to change. It is in the inscription of the intranet technology that the organization gets a friend or enemy. Therefore an intranet alone is not sufficient to create change, instead the intranet can be used as a powerful and crucial tool to support new management strategy.

Table 6: Stages of intranet use and management

Elements/ stage	Initiation	Contagion	Control	Integration
Strategy	"Selling" the intranet concept	"Reach" followed by "range" strategy; Intra-functional or Inter-functional growth	Control via standardization and formalization	Continuous optimizing
Structure	Independent Individuals	Informal project team	Intranet steering group	Dispersed multi-disciplinary entity
Systems	Use mode: Publishing;	Use modes: Publishing, Interacting, Searching;	Use modes: Publishing, Interacting, Searching, Transacting;	Use modes: Publishing, Interacting, Searching, Transacting, Recording;
	"This is me and this is my team" sites; Intranet islands	Intranet "killer applications"; Multitude of sites; Some outdated information and broken hyperlinks	Integration with other systems, work processes; Intranet becomes "universal platform"; Access limitations	Centralized and decentralized solutions coexist; "Organizational memory"
Staff	Technology champions	Technology sponsor; Informal project technology agents	Formal intranet positions e.g. coordinator; developers, content providers	Decentralized content and process owners
Style	Suspicion	Laissez-faire	Formal	Committed
Skills	Technical	Marketing; communicating	Project management	Knowledge management
Super-ordinate Goals	Engaging an intranet sponsor	Reaching a critical mass of users and content	Rationalization and management control	Intranet Institutionalization

Conclusion

Intranet technology differs from other types of IT in terms of its use and implementation and this requires a fresh new approach in terms of its management. We proposed an integrated four-stage model of intranet implementation and management that describes seven characteristics pertaining to each stage. We also indicated how to view progression through the stages. We illustrated the model with examples from pertinent literature and our own empirical findings.

We conclude that in order to ensure intranet institutionalization, three existential crises must be overcome. Firstly, if the intranet is not nurtured by a sponsor it cannot evolve beyond its experimental beginnings. Secondly, if a critical mass of both users and content cannot be reached simultaneously, the intranet will stagnate. And finally, if the intranet remains uncontrolled, it will be perceived to be useless and stagnate.

Our approach here was to speculate, propose, and *illustrate* a model. We did not attempt to validate it here and therefore future research should test and refine this model empirically, e.g. in terms of practical applicability and degree of institutionalization. One obvious venue is further empirical validation of the framework also in medium and small

organizations. We are currently involved in study work were we follow intranet implementation processes over the next three years in small and medium enterprises.

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