Intranet – Ongoing Research and Future Directions

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Abstract. In this paper we briefly present ongoing research related to Intranets in order to define shortcomings and needs for further research. The ongoing research mainly focuses on different aspects of: implementation, initiative, development process, knowledge management, roles, and other questions. There are lacks due to empirical studies focusing on the use of intranet and we suggest some aspects influencing the understanding and thereby the use of intranet. These aspects are: further development processes, empowerment, roles, philosophy of management and philosophy of technology.

1 Introduction

Intranet is an example of an Information System where development differs from other kind of Information Systems due to the way the Intranet is initiated, implemented and used. Accordingly, we think there is a need to further investigate development processes in existing and planned intranets regarding to goals, expectations, ideas of and different kind of use [21]. We have delimited the research area, or problem domain, to no-technical aspects. This means that we are not dealing with issues such as best architectures, communication standards etc. This article is part of an umbrella project – the VICQ project [3]. The expected result from the VICQ project is to identify deficiencies in the development process of Intranets and to support future improvement. The project will be carried out through several part projects. The purpose with this article is to identify and analyse the state-of-the-art of ongoing research concerning development and use of intranets. We will also identify areas where there is a need for completed research due to possible lacks or shortcomings in existing research.

2 Background

Desirable attributes such as participation, flexibility and a holistic view of systems development are not new phenomena. However, we believe there is still much work to be done regarding these features, as many development projects still fail. These failures are often associated with excessive costs, dissatisfied users or the fact that systems are not used as stated in original intention. Development of methods has a
long tradition in Scandinavia. The Scandinavian focus represented by Börje Langefors and others (information systems theory and methods) were associated with political projects focusing on participatory design, has been important for development in this area [42], [30] Since needs and possibilities are continually changing, there is also a need for a continuous development of methods. A starting point for this approach is that existing methods do not respond to actual needs. New demands and new technical challenges require new approaches to information system development (ISD).

Previous information systems often took place of manual tasks and were characterised by the following attributes:

- They solved a separate task
- The users were homogeneous and known
- The tasks were quite static. No dynamics were built in
- They were created from zero
- They interacted with a limited number of other systems

Both old and new methods focused on finding solutions to problems within existing structures and thus reinforced outdated, undesirable modes of working. The methods were also often complicated and did not support involvement of users (participatory design). Present and future information systems are of quite another character and therefore have other attributes:

- They demand dynamic and ongoing change
- They act in conjunction with goals and strategies of the business
- Participatory design is essential when developing information systems
- They act together with several other information systems
- They have heterogeneous and sometimes unknown users
- They offer new technical capabilities (graphic arts and communication facilities)
- There is a demand and need for individualisation, for example in the user interface

The attributes above coincide with ideas that Sundgren suggests [28]. Sundgren point out a need for a paradigmatic shift in systems development. Traditional methods are adapted to what he calls “operational systems”. These systems are characterised by having well-acquainted users and modes of use current at the time of their development. Their use is repetitive and there is a close connection between collection and use of data. Information systems developed today have quite another character.

Large organizations, business corporations as well as public institutions, build their own small-scaled Internet – called Intranet – to improve their internal communication and coordination processes [5]. Intranet is a multi-purpose, richly networked technology and offers opportunity to integrate text, graphics, sound and video. Thus Intranet can be regarded as an interactive and reflective medium [11], [29]. The technology allows presence of other IT-systems unlike most IT and is the great unifier that integrates existing IT systems and provides ‘legacy systems’ with a new graphical interface [11]. Several researchers claims that introduction and development
of Intranet in organisations will lead to a lot of changes in the way information systems are designed and managed.

Bansler et al (2000) predict that these changes will have dramatic implications for the way organisations will manage their IS resources in the future. System development will be more like film production and less like traditional engineering and the traditional distinction between users and developers (designers) will become fuzzy. Teams developing IS services must combine high level of technical and artistic skills.

Is there a difference between development and implementation of intranets compared to “ordinary” Information Systems? We argue that there is a difference but in many ways, results and experiences from intranet research might be appropriate for other development projects. The implementation process for intranets is faster than other kind of implementations, especially when the designer can be found among the users. Patterns of use fluctuates more and are also more critical concerning content and demand on stored data. Intranet mirrors often the organisation and the managers view of employees. Intranet is more a tool to support the organisation in common than to solve separate tasks.

3 Definitions of Intranet

The concept ‘intranet’ has been in use for some years and differs among authors. Some authors (most) include a web-based interface to the Intranet concept while other talks about web-based Intranets as if there existed Intranet not web-based. Several case studies are also including common GroupWare such as Lotus Notes in Intranets. Furthermore, in some definitions, Intranet includes functions and divisions within a firm or organisation, independent of geographical location, while other also includes clients – people from outside who normally are reached by communication via an Extranet. Some definitions focus on the technology, others on purpose and use. Technically, an Intranet is an application based on Internet technology directed to a predefined group of users. Intranet differs from traditional IT systems: ”Unlike most IT, Intranets do not exclude the presence of other IT-systems … Instead Intranet technology is the unifier that can integrate existing IT systems and provides ”legacy systems” with a new graphical interface.” [12]. Steven Telleen, the creator of the conception “IntraNet”, has moved the focus from a technical definition to a broader one: “An intranet is a set of content, shared by a well-defined group within a single organisation” This definition focuses more on the content than the technology [40]. Some definitions exclude functions such as e-mail and discussion groups if they are not accessible through the web based interface [38], while others include them in the definition. We have adopt the definition of [6] stating: “Intranet is a web-based and TCP-IP based organizational network with possibilities to an unitary user interface, independent of computer platform and server environment, adapted to strengthen and develop the internal information/communication, simplify the access to and exchange of knowledge/data within the organization, as well as function as an interactive working tool in order to support processes and working situations”. The advantage
with this definition is that technical aspects, the purpose and the use of intranet are included.

4 Intranet - ongoing research

In this section we present and analyse some approaches and ongoing research.

4.1 Some approaches and starting points

There are different kinds of approaches depending on the researchers’ choice of problem domain. One approach is intranet development in a broad sense as the problem domain. Others have for example, knowledge management – KM - as the problem domain and looks upon intranet as one way to handle KM. There is also a lot of research focusing on application area or context, where the intranet is implemented. Examples of such application areas or contexts are: medical health care such as improvement of access to stored data, solutions to integration problems, recommended design principles for intranet in hospitals etc [2], [25], [26]. Another application area is banking [27]. Research within local government where Internet and Intranet is used to improve and manage a co-operative environment for local municipalities, is another example where the potentiality in the concept of intranet is discussed [7]. These researchers focus on advantages regarding planning, administration, cooperation, and information sharing in the particular context, using an intranet.

![Diagram](image)

**Fig. 1.** Different focuses of research.

As an example related to figure 1, intranet and the development of intranet can be chosen as the primary problem domain. Theories about design and organisations might be useful as input to the research process in order to develop models, methods and strategies for intranets and increase the knowledge about intranet development.
Researchers who have chosen intranet as the secondary problem domain might have their theoretical starting points in several other disciplines. Example of such disciplines might be organization theory, social science as well as informatics.

In Figure 2, we show how the ongoing research, different aspects and authors are connected with each other. The four areas should be understood as partly overlapping each other. It is recommended that the reader use the map while reading the rest of section 4.

Researchers within knowledge management, organisational theory and design treats intranet as the secondary problem domain. They look upon intranet as a way to handle problem like for example documentation management, agents, empowerment, strategies, diffusions and so on. The researchers that can be found in the informatics area, often sees intranet as the primary problem domain in spite that they collect knowledge from other disciplines as input in their own research.
4.2 Analysis of identified research directions

Designing modern information systems such as Intranets demands a lot of the designer. Some authors have pointed out future skills in a design team such as organisational and artistic skills [Bansler et al (2000)]. There are also questions about the designer vs. the user within development of Intranets. Regarding to Lamb and Davidson [23], there is a Critical Success Factor (CSF) related to development of Intranets such as melting of different roles; the user and the developer are often the same person.

We miss research on suitable methods and techniques to support development of Intranets. The research seems to be more on high-level models than well-defined methods [8], [41]. Some similarities to web-development can be done, for example the recommended model for further development by Scharl where he argues that the development process must be done in an iterative matter because demands and requirements should be handled running instead of accumulated lists indicating the need of new versions [33]. A study among Swedish organisations [4] showed that the further development process was to a high degree not iterative neither were the organisations developed in order to take care of upcoming demands. Furthermore, there were confusions about responsibilities according to handling the upcoming requirements. Wachter and Gupta [41] point out importance of managing the development process. If this process is left unrestricted and unsupported in hand of end-users they think there is a risk that the Intranet concept might end up as what happened to client-server (ibid).

Diffusion and infusion of Intranets are critical. How the Intranet is spread to use (diffusion) and the degree of integration with existing business processes (infusion) is described by Eder & Igbaria [15]. Their theoretical starting points are, innovation diffusion literature and implementation literature. Some factors like Earliness of adoption and top management support affect both infusion and diffusion and others affect only diffusion or infusion. Damsgaard and Scheepers [11] identify three crises related to Intranets: First, the sponsor of Intranet must nurture the Intranet with necessary resources when it is implemented. Otherwise the Intranet won’t evolve beyond the experimental beginnings. Second, a critical mass of both users and content must be fulfilled simultaneously. Third, planning and procedures must be in place so the Intranet can stay up to date and be useful. If the Intranet grows wild, it will even be chaotic and therefore mistrusted - it will stagnate. Damsgaard and Scheepers [9] draw attention to the initiation phase of Intranet where the Intranet will to a high degree be formed by existing social structures than in latter phases. The sophistication of Intranets increases over time and will be institutionalised.

Initiation of Intranets often starts from “the bottom” and this might even be in conflict with managers who see a risk of misuse. The bottom-up perspective can also lead to “Intranet islands” and in the lengthening poor use of common resources, reinvention of the wheel and so on [11]. Several case studies [9],[22],[24] concern top-down approaches where initiative has come from the managers. These studies are examples on Intranets used as tools for standardisation and making the culture within firms more common. The Swedish study [4] showed that 4 of 5 organisations had developed the intranets from a top-down perspective. The initiatives were with one exception, coming from the managers. Wachter and Gupta [41] are also focusing on
the initiative to the Intranet and development process. They call the extremes - bottom-up and top-down - decentralized model and centralized model. Both models have advantages and disadvantages depending on who the observer is. Wachter and Gupta suggest a model that manages Intranet development by recognising and treating it as an extension of end-user computing [ibid].

There is also a lot of research on knowledge management – KM. KM as a research area, put requirements of functionality, user interface and involvement of users in development process. This is a challenge for designers – who might be the users! One of the main motive powers for KM is reduction of problems of reinventing the wheel by using existing knowledge more efficiently [39], [12]. However, regarding to Damsgaard and Scheepers [12] there are few documented examples of successful Intranet implementations supporting KM. The failures are more common, where examples of most used information are “the bus timetable”.

The Intranet in many organisations has been developed in an ad hoc manner. After this first period organisations have begun to look more closely at the issue of knowledge creation and management via the Intranet [35]. Standing et al [35] claims that current Intranet interfaces are ineffective for knowledge acquisition and management. The typical Intranet model is hierarchical and it is a limiting structure for knowledge representation. Standing et al present some alternatives to the hierarchical interface. Some examples are site maps, usage maps and new metaphors such as towns.

Several authors are dealing with the distinction of knowledge as: tacit and explicit knowledge. Tacit knowledge is embedded in human brains and difficult to formalize, explain and codify [31], [13]. There must be an incitement to share tacit knowledge with others. Personally, tacit knowledge might be a competition advantage and therefore not desirable to share with others – they might be your competitors. [37], [38].

The possibility to share documents could be supported by Document Management Systems (DMS). Intranets are often connected to such DMSs and provide this possibility through a common platform. Some problems within DMSs are inefficient access to documents that implicates misuse of the authors’ expertise, poor document management and as a result - poor knowledge management [16], [18]. Problems might in some ways be solved with the use of agents [16], [17], [18], [1].

The view of the Intranet as a common place to share knowledge, co-operate and communicate must be shared within the firm or organisation. The content must be up-to-date and continuously questioned to match the need and demand from all kind of users. According to Stenmark [38], the mangers must allow, not only a narrow group of information professionals, but also the entire employee-base to publish information because it have a positive effect on the knowledge creation of the organisations. There might be a discrepancy between need of information and information owners. In organisations with problems concerning poor communication and mistrust among the levels of departments, it is typical that there is an absence of information. The information owner (often managers at several levels) is in a powerful position to neglect the employees’ important information. The use of an Intranet does not solve this problem but it might highlight it, because of the possibility to communicate independent of existing hierarchy in organisations. The use of Intranets can make the organisation look flatter for employees and therefore even threat managers that might
feel that they are loosing control. We found in our study [4] some aspects influencing the use such as competence, the need for a general picture and context, organisational belonging/affiliation of the Intranet and organisational culture. These aspects were to some degree depending on the fact that the intranets were mainly used to be informed, not to inform others. Accordingly, we argue that the common view of intranets is essential.

Several authors point out importance of empowerment of employees [38]. There is a potential in the fact that the employees are highly involved in knowledge creation, cooperation, problem solving and information sharing. This will be made possible with the allowance for users to have access to the Intranet. There might be a conflict in interests between managers and employees regarding access to information. In the results from the study of Bank & Nyström [4] there was a concordance between policy, experiences and use among the organisations. Most of the users felt that they were empowered. All interviewed, except one, found it meaningful to use the Intranet and they used it daily. However, the use was passive rather than active. We think that the expanded role of the traditional user to a developer, content owner and user also should be seen as a possibility for him or her to increase the quality of his/her work and thereby the satisfaction.

There are a growing number of Intranets but there are also a lot of failures concerning implementation, development and acceptance. According to Swan et al [39], the reason might be that focus is too much related to the technology than to people. The social context is important and a more integrated socio-technical view is critical to avoid separation of social behaviour from technologies [19],[20].

5 Conclusions

We found ongoing research concerning Intranets rather broad and not yet matured in any sense. We can also see that use of references not yet have found any kernel of established Intranet researchers or conception creators except references to authors within knowledge management such as Th. Davenport and M. Polanyi. Many researchers have their background in other disciplines than informatics. We argue that there is a need to investigate intranet as the primary problem domain. There are a lot of questions concerning intranet itself, as strategies for implementation, education, development processes and other aspects influencing the use of the intranet.

5.1 Empirical Studies

Several researchers point out the need for empirical studies. These studies could for example concern investigation of social consequences [20], intranet adoption [34], in what way hierarchal cultures influence existing and planned intranets [32], long term studies about intranet implementation [10], in what way intranet implementation differs from traditional information systems where intranet spans an entire organization [9] methodology for analyzing benefits through real case studies [14], iterative development process [4], empowerment [38], [4], philosophy of managers and philosophy of technology [4], aspects influencing the use such as competence, the
need for a general picture and context, organizational belonging/affiliation of the Intranet and organizational culture.

The following headings are topics identified and in a need for further research.

5.2 Use

The use concept is rather complex and could be viewed as an aggregate of different characteristics. The potential of intranets are to our opinion, not yet fully exploited. This was also found in the study made by Bank & Nyström [4] where we found a lot of concrete suggestions about extended functions as different kind of working tools supporting daily work. There was also a demand for increased interactivity. In some organisations there were discrepancies between actual content and actual use and in some cases functions belonging to higher use modes but not used. This might be explained by a lack of general picture, lack of information and education, when the Intranets were introduced.

5.3 The designer – Melting roles

Lamb & Davidson [23] argues that the intranet is used most intensive when the roles of IS department and other categories of users merges. Is the designer of Intranets the user and in case, how can he be educated, trained and supported by appropriate methods? What skills do a designer of future Intranets need [Bansler et al (2000)]? The result from the study by Bank & Nyström [4] showed that the users did not look upon themselves as developers as Bansler et al (2000) had experienced.

5.4 The development process - Continuously and dynamic development

Traditional system development methods are not suitable for development of intranets. Demands on changes in intranet should not be handled as accumulated lists indicating that new versions or releases are needed. The process to further improve web based information systems – continuous development – is as mentioned before, critical and should be treated in an iterative manner [33]. The further development process was formalised in one of the organisations in the study made by Bank & Nyström [4] but not totally anchored. In the other four organisations were neither formalised nor iterative. There were also confusions about the responsibility for the further development processes.

5.5 Initiation and implementation

There is, as several authors claim [41], [11], [22],[24], a discrepancy between the top-down vs. the bottom-up approach when initiating intranets. Both this perspectives, or combinations thereof, should be further investigated. With one exception, the intranets in our study were top-down approaches initiated by the mangers [4]. The
implementation of intranet and the social context may have vital importance for the acceptance and the use of the technology [19],[20].

5.6 Philosophy of management and technology – Strategies

We agree with Stenmark when he claims that empowerment of employees should be supported in order to increase quality of work and user satisfaction [38]. This should also increase the use of the intranet. The Intranet should also mirror the actual philosophy of the managers regarding to responsibilities, cooperation and influence. There is a need of balance between centralisation or decentralization of power and control. Furthermore, there is also a need to encourage improvisations and creativity and at the same time avoid chaos [Bansler et al (2000)]. Purpose and goals with the intranets in our study, were to a high degree unknown [4]

6 Further research

According to the state-of-the-art and the analysis made in the conclusions, we have identified the following areas for further research. These areas are Management and strategy – especially philosophy of managers and philosophy of technology, empowerment, further development, use and roles. The areas are positioned in the “intranet map” – figure 3 – below, where we can see how the research areas are connected to other areas.

![Fig. 3. The “intranet map” completed with our research areas.](image-url)
References

3. Bank, B & C.A Nyström (2002) Application for a project contribution - Intranet - a tool for power and control or a possibility to increase the quality of work. Working paper. Informatics and Statistics, Dept of Information Technology and Media, MidSweden University, Östersund, Sweden


