Skills for a Sustainable Intranet

by

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ABSTRACT

Intranets are seen by many organisations as an enabling technology for knowledge management. Experience with similar technology such as the Internet and World-Wide-Web highlights some chronic skills problems. Firstly, as the technology advances at such speed, the currency of some skills expires rather quickly. Organisations are constantly under pressure to recruit and re-train IT staff. Due to the pervasiveness of Intranet technology within an organisation, various new IT skills are required beyond the IS department. In order to ensure the sustainability of an Intranet system, provision of 'just-in-time' skills at the right place must be part of any successful change programme. Based on current literature and some empirical work, this paper proposes a skills framework specifically for Intranet implementation. It also calls for more research data to populate the framework.

1. INTRODUCTION

"An Intranet is a network of networks that is contained within an enterprise. It may consist of many interlinked local area networks and also use leased lines in the wide area network. Typically, an Intranet includes connections through one or more gateway computers to the outside Internet. The main purpose of an Intranet is to share company information and computing resources among employees. An Intranet can also be used to facilitate working in groups and for teleconferences.” (http://www.whatis.com/)

In the new era of knowledge management, there is considerable interest in organisations in setting up their own Intranets which form the infrastructure for employees to share and ‘manage’ knowledge within the organisation while safeguarding these ‘assets’ from the outside world. While acknowledging that knowledge management is more about managing knowledge resources which involves cultural, political and people issues, advanced information and communications technologies (ICTs), such as Intranets, play an important enabling role. To fulfil the potential of an ICT system, a wide range of skills are required to make it happen and make it sustainable. This paper begins by examining this range of skills and discusses the uniqueness, or otherwise, of the demand from Intranets when compared with other ICT systems.

It would be impractical and perhaps unnecessary to expect the availability of all the skills at all times during the introduction and the life time of an Intranet system. The key is to provide the right skills at the right time - i.e. just-in-time skills. If the right skills are not available when needed, the project would either stall or have its quality compromised. A framework is proposed for putting together these skills in the context of time so as to provide guidelines for the organisation which plans to introduce, develop, use and run an Intranet system. The framework was formulated based on the existing literature and initial feedback from an on-going Intranet project. The paper also calls for more research evidence from case studies to refine and populate the proposed skills framework (Yin, 1989).

2. SKILLS CHALLENGE IN AN INTRANET-ENABLED CHANGE PROGRAMME

In initiating an ICT-enabled change programme (for example, using Groupware, Intranets, or other technologies), it is crucial to address the people issues effectively. A superb system without skilled operators would be a terrible waste. When an Intranet system is considered to be the appropriate enabler, the organisation
has to examine its own capability in terms of the opportunity offered. The author believes that a wide range of skills are required to make an Intranet system successful and sustainable; and these skills need to come not just from the IS department, but also from the business units. However, in the planning process, effort is usually focused on the skills required for demonstrating the feasibility of the proposed system. Skills required for sustainability are easily overlooked. Hence the development journey usually turns out to be an exploration in the wild-west requiring the survival skills of the explorers!

From the experience gained in a groupware environment, Orlikowski & Hofman (1997) put forward an Improvisational Model for Managing Change. The model classified changes into anticipated, emergent and opportunity-based. It highlighted the fact that not all requirements of change could be identified (or anticipated) at the outset of the introduction of an open-ended technology such as groupware. Further requirements might emerge after some learning through the use of the technology. New opportunities might be identified when the potential of the technology is better understood. A corollary from this is: it is not always possible to predict all the skills that might be required at the beginning of a groupware project. However, the author believes that there would be a core set of skills which could be anticipated, if past experiences are accumulated and documented.

A number of researchers have come to the conclusion that the impact of groupware/ ICTs would be limited without careful planning for its introduction and the changes that it would entail (Vandenbosch & Ginzberg 1996, Orlikowski 1992, Bjorn-Andersen et al 1986, Ginzberg 1981). ICTs will not spearhead for change in organisations on their own. The author would go further and add that, without incorporating the skills issues in the plan, the intended benefits of the change may not materialise.

However, there has been no comprehensive study of the range of skills issues relating to Intranets. Most publications tend to focus on a narrow band of skills - for example, specific technical skills such as HTML or networking (e.g. Bernard 1998), legal skills (e.g. Rees 1997). The skewed coverage is not surprising perhaps, due to the commercial value of this kind of knowledge. You are more likely to get an offer of consultancy work when you search the WWW on ‘Intranets’ and ‘skills’ then on reference to published work!

2.1 Two skills models

There have been studies in core IS capabilities and the skills required. Three skill sets were identified when examining the role of IS function - namely, ‘technical’, ‘business’ and ‘inter-personal’ (Lee et al 1995, Todd et al 1995). These skills are required in delivering the nine core IS capabilities proposed by Feeny & Willcocks (1997) - IS/IT leadership, business systems thinking, relationship building, architecture planning, making technology work, informed buying, contract facilitation, contract monitoring, and vendor development (see Figure 1).

Taking a more holistic view in the context of a ‘virtual information management organisation’, Heckman (1998) suggested that there are four classes of skills which every organisational unit must obtain in order to thrive: (1) technology skills; (2) conceptual skills; (3) social skills; and (4) marketplace skills (see Figure 2).

The above sources offer two complementary views on the skills issue. Feeny and Willcocks used the capabilities of the IS unit as a starting point to examine the skills required in order to fulfil each capability; whereas Heckman offered a more general skills framework which extends beyond the IS unit. The literature also concurred that it would be difficult, if not impossible, to obtain individuals with a combination of all categories of skills. In particular, the shortage of IT skills had been regularly reported in the media (e.g. see Heckman 1998, and the recent email discussion on ISWORLD). An organisation with strategic vision should adopt a proactive approach in its planning for skills requirements.
2.2 The need for a time dimension

A proactive approach requires anticipation. Recruitment and/or training of the right people takes time - the sooner you can highlight the issue in the plan, the better chance that suitable people would be found when needed. A framework of skills against time would help the decision makers to anticipate, as far as possible, when to draw in or prepare the right people to deliver and use the ICTs in an ICT-enabled change programme.

However, the skills models examined did not lend themselves to such anticipation. Further interpretation is required to identify what skills must be present at the outset and what skills would be required toward the later
stage of implementation. It would be of interest, especially, to investigate if the skill sets show any difference in characteristics under two broad stages of the ‘lifecycle’ - ‘making IT happen’ and ‘making IT sustainable’. In this paper, these two stages are to be labelled as ‘pilot’ and ‘post-pilot’.

3. SKILLS AND THE ISSUE OF TIMING

Attempts have been made to chart the development of systems over time, for example, Nolan (1979) proposed a ‘Stages of Growth’ model. Developing from that idea was a revised ‘Stages of Growth’ model for assessing the quality of an organisation’s Information Systems Management (Galliers & Sutherland, 1991). This used the ‘7S’ framework against the six growth stages progressing towards ‘maturity’ of IS management. Table 1 extracted the two particular ‘S’s from the model for this discussion, one of them is Skills (Galliers, 1998).

One can see that an organisation would be in the ‘mature’ category in its Information Systems Management (e.g. stages IV, V or VI) when Intranet applications are being considered. The model suggested that the initial skills required are - ‘IS/business awareness’, ‘entrepreneurial marketing’, and ‘lateral thinking regarding IT/IS potential’. However, this opens up two further questions. One is the applicability of this IS-based model to today’s Intranet implementation. Secondly, the skills examined are only the initial skills, i.e. skills for making IT happen. Skills required for sustainability are not addressed at all.

Table 1. An extract from Galliers & Sutherland’s Stages of Growth Model (1991)

<table>
<thead>
<tr>
<th>Stages</th>
<th>Strategy</th>
<th>Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Acquisition of IT (Services)</td>
<td>individual; technical; low level</td>
</tr>
<tr>
<td>II</td>
<td>Audit of IT Provision</td>
<td>systems development methodology; cost-benefit analysis</td>
</tr>
<tr>
<td>III</td>
<td>Top-Down Analysis</td>
<td>IS awareness; project management</td>
</tr>
<tr>
<td>IV</td>
<td>Integration, Co-ordination</td>
<td>IS/business awareness</td>
</tr>
<tr>
<td>V</td>
<td>Strategy Linkage</td>
<td>entrepreneurial marketing</td>
</tr>
<tr>
<td>VI</td>
<td>Interactive Planning, Collaboration</td>
<td>lateral thinking re. IT/IS potential</td>
</tr>
</tbody>
</table>

4. IS INTRANET ANY DIFFERENT FROM CONVENTIONAL ICT?

Although an Intranet system can be seen as a subset of general IS implementation, there is a marked difference in the ownership of the information that flows through the system. Conventional ICT systems usually treat the IS unit as the custodian, if not the owner, of the information in the system. Examples include database management systems, ERP systems and data warehousing. By contrast, an Intranet system adopts a model closer to the World-Wide-Web (WWW) - the information providers (usually the business units) are encouraged to take on the ownership role. To fulfil the associated responsibility of an ‘owner’, a certain amount of IT skills would be
required to assure the quality of information to be provided. Hence, the spread of skills required in an Intranet environment would be more distributed, in nature and in location, when compared with those required in a conventional ICT system. The differences in skill requirements are more apparent when it comes to the issue of sustainability.

4.1 Making it happen – the pilot stage

Davenport (1994) emphasised the importance of establishing an appropriate ‘information culture’ and being in touch with the requirements of rank-and-file users before building any grand ICT schemes. An Intranet application would have similar needs – requiring interpersonal skills to communicate the ideas to others in the business units and analytical skills to identify requirements in information / knowledge sharing.

To introduce a new ICT solution requires skills in a) identifying business opportunities which can be enabled by that particular type of ICT, b) finding a champion/sponsor, c) getting initial user support, d) piloting a system and e) seeing through the implementation process - a fairly typical system lifecycle. In an Intranet project, there would be great similarity in the requirements for these ‘transferable’ organisational skills, although the type of IT skills would differ. An additional understanding of different technical solutions for sharing information/knowledge within an organisation would open up more opportunities. The problem here is that technology for Intranet systems advances at such speed that it is more realistic to look for skills in learning new technical skills.

Further differences from other ICT projects are technology-dependent design skills for translating requirements into solution specifications, specific technical skills in developing the applications (for example Lotus Notes, ActiveX, Java) and in setting-up and running a network infrastructure. An Intranet project also demands other not-too-obvious skills. Some examples are: the identification of drivers (or ‘killer applications’) which is not always obvious in an ‘open-ended technology’ (Orlikowski & Hofman, 1997); skills in publishing documents on Intranet platforms; artistic/graphical skills for aesthetic presentation; and even skills in dealing with legal matters such as copyright and the data protection act (Rees, 1997).

4.2 Making it sustainable – the post-pilot stage

For conventional ICT systems, sustainability is normally called ‘on-going maintenance’ undertaken by IT professionals. In an Intranet environment, sustainability demands a much wider spread of IT skills across the organisation. Orlikowski & Hofman (1997) emphasised the importance of ongoing support in their study on groupware implementation, which can be extrapolated onto Intranet applications. They suggested that a successful groupware-enabled change programme requires the ability of the organisation to notice and recognise opportunities, issues, breakdowns and unexpected outcomes as they arise. It requires ongoing adjustments to the technology itself as users learn and gain experience with the new technology’s capabilities over time. It means that an organisation must have employees who have the authority, credibility, influence, and resources to implement the ongoing changes.

Intranet applications also require a higher level of co-operation from people across the organisation because of their potential pervasiveness and their use as a leverage for sharing/managing knowledge in an organisation. Co-operation is required in terms of:

(1) Different technical people need to work together to provide the on-going support for the applications, systems and network infrastructure. For example, a wide range of technical skills is required in running an Intranet system using technology such as Lotus Notes. In Litton et al (1997), they specified that the following essential
administrative roles are essential - Notes database manager; Notes server manager; Notes network manager; Domain manager; Webmaster; and Network administrator. This requires skills from different technical areas.

(2) People from different business units need to co-operate to ‘energize’ and maintain the flow of information/knowledge within the Intranet system. The model in Figure 3 highlights the spread of IT skills required in non-IT units. Three roles are identified in this ‘supply chain’ of information in an Intranet environment - an ‘information owner’ who provides first hand information/knowledge, an intermediary ‘author’ who captures the information and converts it into a written format and a ‘publisher’ who makes the written format accessible on the Intranet. The customers of this supply chain either directly use the browsers and related plug-ins to access the information for their own use (i.e. as primary users) or use their IT skills to extract relevant information for the intended users (i.e. as secondary users or a ‘broker’).

To illustrate the problem of sustainability, we could look at the current WWW as an example. Most of us would recognize the problems in keeping the information on the WWW up-to-date, relevant, artistically presented and useful. One of the main reasons for these problems is the increasing separation of roles in the process of ‘supplying’ information onto the WWW.

In the early days of the WWW (you can replace the word Intranet by WWW in Figure 3), it was very likely that the same person would act as the information owner, author and publisher. Then, the supply chain was short and information was as up-to-date as the information owners wished. Nowadays, as more people without the appropriate IT skills wish or are required to supply information through the same channel, the supply chain has

**Figure 3. Main players in a sustainable Intranet application**
lengthened. Authoring and publishing roles are taken on by people who are not necessarily the information owners. With the emergence of ‘friendlier’ web-authoring tools, non-technical staff without much knowledge of HTML can be asked to take on the publishing role. This separation of roles introduces weaknesses in the supply chain. Firstly, any inefficiency in the links causes delays in the provision of up-to-date information. Moreover, the quality of the information might not be as stringently checked by the author/publisher as they might not have the appropriate background knowledge that the information owners have. Bottlenecks would also appear if there are more information owners than authors/publishers. We can expect similar dilemmas in an Intranet environment.

An organisation running an Intranet system also needs to ensure that the employees (primary and secondary users) have the skills to extract information/knowledge from the system when appropriate. From experience, these skills are not as easily acquired as most ICT people think, and improved search engines do not solve all the problems.

Sustainability of an Intranet implies a continuous supply of, and demand for, information within the organisation. The current WWW provides such a wealth of diverse information that there is always some demand from somewhere on the Internet at any point in time. However, this is not necessarily the case for an Intranet as the use of the information is usually constrained by its ‘relevance’ to the work or organisation and context. Maintaining the motivation for sharing (supplying) and using (demanding) the information requires careful thought.

5. TAKING A PEOPLE VIEW

The Intranet Supply Chain depicted in Figure 3 offers a theoretical framework for anticipating the skills required for sustainability. By identifying the participants and noting the changes in their role from pilot to post-pilot stage would enable us to plan for the provision of the right skills at the right time. It also provides a means of examining the forces driving the continuing use of the Intranet. Table 2 uses an example of an Electronic Campus Noticeboard for Staff, a possible Intranet for any university, to illustrate the application of the framework.

In this example, the Press Office and the Secretariat are playing the leading role in the pilot because they are the current custodians of some ‘repositories’ of information which are to be distributed to other staff members in the university. Table 2 highlights the change of role for the Press Office and the Secretariat after the transition from the Pilot to the Post-pilot stage. For a sustainable Intranet, the supply of information must be expanded. In this example, the Departmental Information Officers and some staff members are identified as the providers of the new information, and they must be prepared for the new role when the project is moving into the post-pilot stage.

The following two subsections expand on the specific skills required in developing an Intranet system during the pilot and post-pilot stages. An extension to Feeny and Willcock’s model (1997) is made to cover the users/business communities. In Feeny and Willcocks’s model (see Figure 1), there is an underlying temporal relationship amongst the three broad areas of IS capabilities: that is, ‘business and IT vision’; then ‘design of IT architecture’; and then ‘delivery of IS services’- a logical systems development lifecycle. In our application, we found the content differs between the pilot and the post-pilot stage.

5.1 Pilot (making it happen)

At this stage, skills are required from a smaller set of people. To lead the pilot, skills are needed in maintaining the momentum of the business driver(s) for the Intranet system and in project management. Analytical and business skills are then applied in identifying information/knowledge processes with can be
supported by Intranet technology. Co-operation must be gained from both the business communities and the technical staff (some of whom might see the Intranet application as an extra burden to their existing roles). An architecture needs to be laid down for the network infrastructure, client-server systems, access and security. A prototype system is then built which requires technical skills in developing the Web-enabled /Intranet applications and skills in working with end-users to ensure its acceptability. Procurement of the hardware, software and expertise commences and skills in contract facilitation are used. End-users participating in the pilot need to acquire the skills in electronic information handling that are particular to the technology. Training the trainers must also take place. General knowledge in good information management will be drawn on when dealing with sensitive information and with matters such as copyright and data protection.

5.2 Post-pilot (making it sustainable)

At this stage, more users would be bought into the system. This requires skills in identifying further opportunities to spread the use of the Intranet and in relationship building such as broadcasting results to other units and propagating best practices. Technical skills will be drawn on to deal with the expansion of the infrastructure, and to offer on-going support and maintenance of the technology. Business skills are required for contract monitoring and vendor development. Provision needs to be made to populate end-user community effectiveness in electronic information handling, and to offer on-going end-user support in terms of training new end-users and trouble-shooting.

<table>
<thead>
<tr>
<th>Roles</th>
<th>Require skills for</th>
<th>Pilot Stage of project</th>
<th>Post-Pilot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Owner</td>
<td>Generating information/ knowledge</td>
<td>Press Office, Secretariat</td>
<td>Committees and groups, staff members</td>
</tr>
<tr>
<td>Author</td>
<td>Capturing information, Converting information into written format</td>
<td>Press Office, Secretariat</td>
<td>Some staff members, Press Office, Secretariat, Departmental Information Officers</td>
</tr>
<tr>
<td>Publisher</td>
<td>Presenting information on the Intranet</td>
<td>Webmaster</td>
<td>As in ‘Author’, special publisher units, Webmaster</td>
</tr>
<tr>
<td>Technical Support</td>
<td>Application development, Systems and Network administration</td>
<td>IS with added responsibility</td>
<td>Dedicated administrative roles in maintaining the electronic resources, IS</td>
</tr>
<tr>
<td>Secondary User</td>
<td>Extracting information for other identified users</td>
<td>none</td>
<td>Departmental Information Officers</td>
</tr>
<tr>
<td>Primary User</td>
<td>Extracting information for their own use</td>
<td>On-campus staff only</td>
<td>All members of staff in all departments</td>
</tr>
</tbody>
</table>

Table 2. An example of a skill framework for sustainability - an Electronic Campus Noticeboard project
6. PROVISION OF JUST-IN-TIME SKILLS

“Not having all the necessary people at a particular stage often leads to expensive and time-consuming efforts to fix problems that the right people would have detected earlier” (Meyer, 1994). There are three ways to provide skills for projects - buy-in the expertise at the appropriate time (be it outsourcing or in-sourcing), enable learning within the organisation, or both.

In projects using groupware Lotus Notes, Roberts (1996) recommended the hiring of experts to mentor the IS staff who are going to keep the system running. Sending someone in-house to a training class at the start would take a long time to get the system going; but if the project was handed over to an outside expert, there would be no in-house expertise for on-going support. The approach suggested by Roberts certainly has sustainability in mind, but it needs to be extended beyond the IS staff in an Intranet implementation as the example in Table 2 has illustrated.

With the development of end-user computing since the eighties, the roles of both end-users and developers have undergone changes as some end-users now take on the role of development. While this may take away some of the burdens from the IS staff, it could lead to role overload as well as to conflict and ambiguity (Galletta and Heckman, 1990). This might also be the case in the evolutionary path to an Intranet environment when end-users are encouraged to take on the roles of Owners, Authors and even Publishers (refer to Table 2). Sustainability requires quality control of information in the system. Current paradigms in Web-publishing evolves around the mechanics of converting documents into HTML format or the assembly of a collection of multimedia gadgets. Effective information presentation such as those advocated by Tufte (1997) requires human intervention /interpretation. However, this important role seems to have fallen between the two camps: ‘end-users’ and ‘IS professionals’. Neither of the two skills models discussed in section 2.1 covers this very important skill set required in an Intranet application. The skills framework proposed in this paper overcomes this deficiency.

At the demand end of the Intranet supply chain, it would be the end-users’ own responsibility and initiatives in selecting and searching for the relevant electronic information – a change from the days when end-users were fed with predefined printouts at specified time. The electronic ‘Push’ paradigm experimented with in recent years has not been well-received either, as it could cause information overload. Lessons learned from the past tell us that groupware or ICT implementation is a social and technical intervention (Bullen & Bennett, 1990; Kling and Iacono, 1989). The way that intervention is conducted has a bearing on how the skills are learned and exploited. For example, when groupware was introduced as a way of streamlining procedures by merely training new users in the mechanics of the tools, people used a minimum of the functionality present on the systems; but when instruction went beyond mechanical steps to stimulate people, they tend to be more creative in the use of the functionality to improve their work. This should be heeded by the ‘trainers’ in an Intranet implementation.

Intranet implementation is an area where more research is needed in terms of building up a knowledge base of best practice. Case studies using a longitudinal, field-based methodology in order to understand the evolving process of implementing new technologies would enrich our understanding and expand out insight into the dynamics of the domain (Kling 1980; Pettigrew 1990; Zuboff 1988). The framework discussed in this paper provides a starting point for conducting structured observations on the skills issues in Intranet applications.

7. CONCLUSION

This paper examined the skills required in the implementation of an Intranet environment. Similar to the use of advanced ICT in the past, setting up a system is only part way through the jungle. Sustaining its effective use is perhaps the more challenging part of the journey.
Intranets differ from other advanced ICTs in their expectation that user/business communities will take more control over the ownership of the information/knowledge that is flowing through the Intranets. Hence, an appropriate ‘information culture’ needs to be nourished by providing just-in-time skills to people outside the IS unit. The ‘just-in-time’ requirement is brought about by the rapid pace of advancement in the associated technology and the dynamic nature of the business environment we face today. An organisation wanting to get more out of its Intranets should examine its own policies to ensure that it provides a positive learning environment for its own employees. The skills framework presented in this paper has taken a step towards making the skill requirements more explicit. More research evidence, however, is needed to populate and refine the framework.

REFERENCES


ROBERTS, BILL (1996)


