

From Hardcopy to Online Information Dissemination Case Study of NSW Parliament

Gillian Miller
CNG (Kit) Dampney

Department of Computing, ICS
Macquarie University, Sydney
Email: {gillian, cdampney}@ics.mq.edu.au

Abstract

This paper examines a large successful project to build a comprehensive information repository for the Parliament of NSW. This system has brought online information previously distributed as hard copy with many benefits for Parliament. We examine the project from multiple perspectives – organisational, technological and project management. This gives us an opportunity to see IS in practice in the context of a significant textual information domain working with new technologies and ideas. We analyse the factors for success and find that there is a synergy of organisation and social factors that come together with technology. This synergy reflects deep alignment of the technology to match the nature of information in the enterprises and processes of Parliament.

Keywords

Information Dissemination, Intranet, World Wide Web, Web Information System, case study, success factors, government, Information Systems, Project Management

INTRODUCTION

Technological change in Information Systems (IS) has given us the phenomenal rise of the Web and new emerging forms of IS – Internets, Intranets and large information repositories that manage, gather and disseminate information and organisation's explicit knowledge. Much of this is document-centric information that is rich in text and multimedia and of a fundamentally different nature from the structured data in our traditional DBMS.

In this case study we examine a significant and successful project to build a comprehensive information system for the dissemination of information within the Parliament of New South Wales. A vast information resource has been brought online that was previously mainly accessed as hard copy. The result is business change within the NSW Parliament. However this is much more than a paper saving reform. The improved ease of use, availability and integration adds significant value to this information resource for Parliament. This is an opportunity to investigate IS in practice in the context of a significant textual information domain. The evidence from due process in Parliament is vital to Parliamentary activity and is represented in text rather than date-stamped well-structured transactions. While we know much about transaction-oriented systems, we know little about semi-structured information domains and the requirements for information gathering and dissemination. This case study provides an opportunity to analyse both the organisation issues as well as the underlying technology issues relating to this domain. This leads to an understanding of the deep requirements for large web-based applications that support information intensive (in contrast to

data (fact) intensive activity, the nature of the semi-structured information domain, and the new range of capabilities that is required from IS within this context.

Parliament's Requirements For Information

Parliament is an information intensive organisation with highly skilled knowledge workers. Information is absolutely vital. Parliamentary process produces and accumulates a large amount of information in the form of legislation, transcripts and published reports. Members can only participate effectively if they are knowledgeable and have recourse to its vast information resources. The nature of this information is predominantly text and documents as conveyed by Parliaments own definition of information:

Information is a communication of intention, fact or knowledge, data and/or images which are provided in or converted to documents for transmission, manipulation, storage and output by any means. The means may be electronic, paper based or in any material or format imaginable (NSWP 94-99).

Thus information is the major "product" of Parliament, and the ability to access and use that information is a core business requirement of IS which support the Parliament's work.

Definitions

It is the province of knowledge to write and it is the privilege of wisdom to query¹

We thus recall the general definition of *information processing* as the "acquisition, recording, organisation, retrieval, display, and dissemination of information" in its broadest context beyond just computer-based data operations (www.britannica.com). Parliament's repository satisfies the definition of a *Web Information System* (WIS), a system which is more than a set of Web pages because it supports the work of an organisation (Isakowitz *et.al.* 1998). *Information searching and retrieval* is defined to be a "state-of-the-art-approach to retrieving information" that includes two generic techniques, firstly key-word indexing and secondly traversing with the aid of hypertext (www.britannica.com). *Semi-structured information* is represented by data which has irregular structure, missing components, and multiple occurrences of the same component. Different data types may be used to represent the same kind of information (Abiteboul *et.al.* 2000).

Terminology

In general we refer to NSW Parliament as *Parliament*. We shall follow Parliament's official publication conventions in the use of formal case – e.g. *Members* (MPs), *Committees*, *Bills*, *Legislation* and *Hansard*. The *Clerks* are the organisational heads of Parliament. The *Legislative Assembly* and *Legislative Council* are the lower and upper Houses of the Parliament. Information Technology Services (ITS) is the functional unit within Parliament responsible for information technology and management. We will refer to Lotus Notes® as Notes.

Methodology

A case study is appropriate when exploring contemporary issues that are not yet well defined (Payne and Lawrence, 1999). Single case study research allows the investigation of phenomenon in its natural setting, and is "unique and revelatory and allows us to provide rich description and deep understanding" (Moody and Shanks, 1999). This case study is interpretive, aiming to produce an understanding of the technological and organizational

¹ Based on saying by Oliver Wendell Holmes "It is the province of knowledge to speak and it is the privilege of wisdom to listen" as used in Frakes and Baeza-Yates (1992).

context of these newer forms of IS. Research should be both "(a) relevant to the need of practice and (b) disseminated and used by practitioners" (Moody and Buist, 1999). This case study is based on direct practitioner involvement. The first author worked within Parliament for over five years and was a key-player in many of the systems described here, a direct participant personally involved with the people and the phenomenon. Parliament as an organisation is small enough to allow interaction with many individuals at all levels from the Clerks to the many specialised knowledge workers. This case study is supported by a rich set of written working material accumulated over a period of years including internal memos, reports, project documents and strategic plans (NSWP 94-99; NSWP 1996; Miller 2000).

Literature Background

Comparable case studies are Balasubramanian and Bashian (1998) which describes a large scale document-centric WIS using document management functionality and Tung and Efraim (1997) which describes the use of Lotus Notes by the Singapore government. Recent case studies in Australia are a groupware and Lotus Notes study (Atkinson and Lam 1999); a knowledge management case study (Moody and Shanks 1999) and Extranets for the publishing industry (Payne and Lawrence 1999). Two related academic initiatives and research projects are the Australasian Legal Information Institute (AustLII) and Federal Parliament Sound and Text and Image Environment project (PASTIME) each with overlap in terms of the type and scope of the information content. These projects were joint initiatives of the tertiary sectors and government departments in the mid 1990s, an interaction that "hastened the publishing of the information onto the Internet" (Magarey 1999). The recent *Parliamentary Affairs* issue (1999) gives a parliamentary scholarly perspective on the relationship of IT with parliaments and the parliamentary process (see for example Coleman 1999; Magarey 1999; Campbell *et.al.* 1999).

There is also increasing evidence in the literature of the overlap and merging of IS with the library sciences. Choo (1995) describes this in the context of knowledge management. Rosenfield and Morville (1998) describe the information architecture for large Web sites using library metaphor principles. To understand the Notes technology as applied within this context as a tool for managing documents and organisation knowledge see for example (LD1995; Newbold and Lipton 1997; Miller 2000). The human, social and organisational factors are paramount in the context of Notes as a groupware application (see for example Grudin 1994; Monteiro and Hepso 1998, Atkinson and Lam 1999 and work by Orlikowski, Davenport, Prusak and others).

CASE STUDY – NSW PARLIAMENT

NSW Parliament is the oldest state Parliament in Australia with a mission to make laws for the "peace, welfare and good government" of the state. Parliament has three major roles:

- Legislative including the development, issues of and reviews of laws and regulations.
- Investigative involving the scrutiny of operations of public agencies through the use of Parliamentary Committees.
- Informing and advancing democracy and educating the public.

The core business of Parliament includes the support for Members in the performance of their role as elected representatives of NSW and the support of Parliamentary Proceedings of the two Chambers. Parliament sits for about sixty days per year. Parliament (the Legislature) is an independent authority, but operates under similar conditions to government departments within the NSW Public Service.

System Description

The NSW Parliament information System (hereinafter referred as NSWPS) provides enhanced electronic access to business and corporate information including Hansard, NSW Legislation, Bills, Committee information, business papers, registers, procedural information, corporate information as well as numerous databases for personal libraries and correspondence tracking. This is a vast resource with over 100,000 documents and several gigabytes, and a range and scope that cuts across the organisation's information and business requirements. NSWPS is an information storage and retrieval system that allows a single point of reference to accessing the business information of the Parliament. Users browse catalogues and indexes, and hyperlink between related documents in the same way they browse the Internet. Whole documents or selected portions may be browsed on-line in rich text format, and can be printed and copied into other desktop applications. This is augmented by a simple yet comprehensive search facility that allows powerful text retrieval.

Parliament's "unstructured" text information turns out to have rich structure and semantics. Considerable value has been added to the documents by breaking them down into smaller semantically coherent components and adding meta-tags to provide enhanced access. For example the Hansard, a large document over half a megabyte in size, has been broken down into a series of articles that represent each day's item of business. Indexes allow location through a number of points – by date, alphabetical title or by name of Member making a speech (See Figure 1) adding considerable information value to the resource.

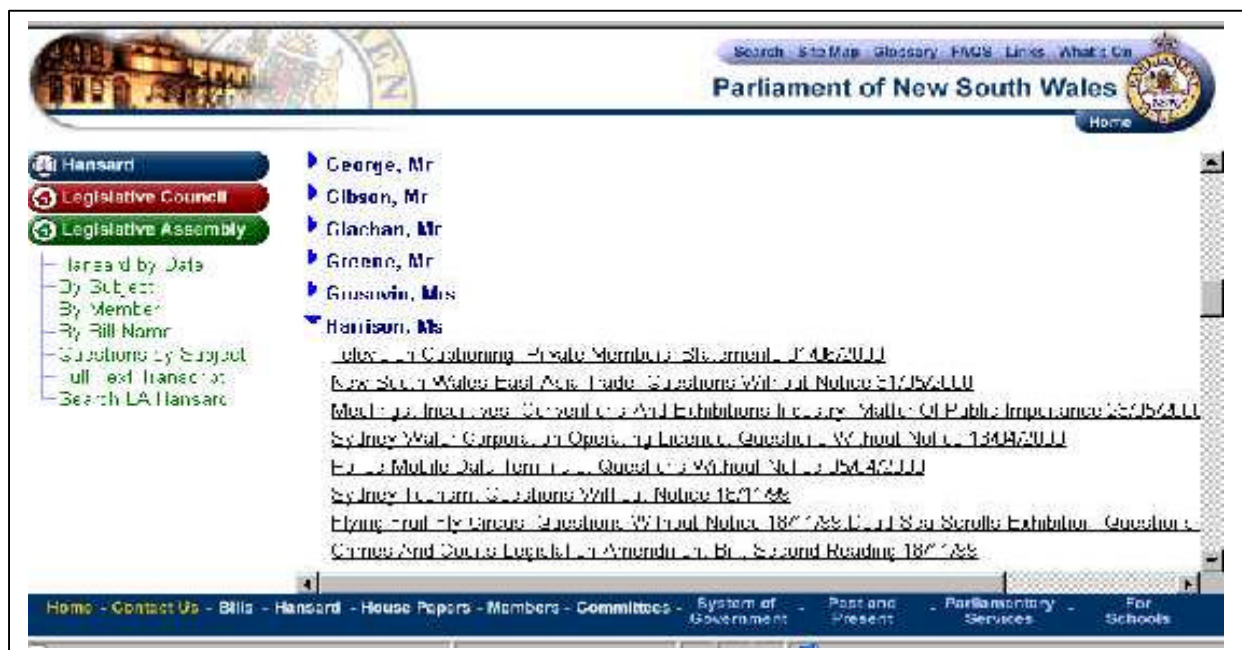


Figure 1: Hansard – Access by member

NSWPS is a database driven repository that uses the Notes technology. Members of Parliament and their staff access it as an Intranet using a choice of both a Notes client and a browser client. In mid 2000 Parliament launched a new Web site driven from this repository.

Benefits

This has changed the way information is gathered and disseminated in Parliament. The shift from hard-copy to centralised electronic dissemination and a move from individual (WP)

documents to shared database managed information has changed parliamentary process. There have been savings in printing costs and associated storage costs (NSWP 94-99). Members and their staff traditionally amassed large piles of papers and volumes of Hansard and could spend hours trying to research and locate ongoing and past business (also compare Campbell *et.al.* 1999). Now this information is on-line and may be accessed and searched within minutes. Another benefit is the increased integration of information. For example the Bills subsystem brings together information in one place that was hitherto difficult to keep track of. For this ITS received a rare formal recognition from both presiding officers:

It is with pleasure that I announce to members ... from today the full text of bills is available to members and staff on the Parliament's Lotus Notes database.. This is another important technological initiative which will save both time and costs in the printing and distribution of bills, and I compliment the staff .. The New South Wales Parliament has been a leader amongst parliaments worldwide in developments in information technology (Hansard 99).

Project Background

The lifecycles of these projects spans four years and a period of great change in the marketplace, especially for textual information systems. This is a timeframe where we see the explosion of the Web, the rise of the Intranet and the super search engines on the Web. The project was conceived in 1996 as the replacement of an old text retrieval system to search the Hansard. This was in an era that pre-dated visually rich multimedia and GUI interfaces for many applications. The early-genre text retrieval product was difficult to use and the boolean command syntax mastered by only a select few. Certainly most Members and their staff did not use this system. A formal Request for Quotation was issued in 1996 for an upgrade to the information retrieval system and a range of products were evaluated. The Notes technology was evaluated and selected on the basis of its information retrieval and access capabilities rather than its groupware capabilities.



Figure 3: Hardcopy - Parliaments Historic Jubilee Room with floor to ceiling shelves of Hansard and other Parliamentary Publications

Initially there were some organisational and political barriers (see below) that nearly prevented the project from proceeding. However the project was eventually released (Murray 1996) and after some initial resistance by some Members was accepted and became widely used. Once the system had become established, there was a momentum that kept the project growing. A succession of sub-projects large and small expanded the information holdings from the Hansard to the full range that it is today. Online Bills were introduced in 1999 (Hansard 1999). A new Parliamentary Web site based on this repository was released to the public in mid 2000 (NSWP 2000).

CASE STUDY ANALYSIS – ORGANISATION AND SOCIAL CONTEXT

Late Adoption of Technology – Desktop to Parliamentary Wide

This has been a period of great technological change within the organisation. NSW Parliament was not computerised until 1990 with the closure of the Government printing office. Coleman (1999) notes the late adoption of technology as characteristic of parliaments worldwide and sees a pattern of the reluctance of parliaments to embrace new forms of information including the two previous "information revolutions" of print and then radio and television. Parliaments "resent intrusion into their affairs" and consider that "every person ... ought to keep secret and not to disclose the .. things done and spoken in Parliament" (Coleman 1999).

The advantage of the late start for NSW Parliament was the government and industry experience that enabled it to leap straight into a modern office automation infrastructure. Now NSW Parliament would be considered amongst technological parliamentary leaders (Hansard 1999; compare Magarey 1999). NSW Parliament organisation has had to climb a steep learning curve in the understanding of and driving of technology to progress on this rapid transition from immaturity. This has not always been an easy path.

The Bicameral Organisation – Dual Control

Parliament is a bicameral organisation that mirrors the underlying bicameral system of government. This means separate administration support for the two houses and a lack of a single line of control (the two Clerks perform the role of Chief Information Officers). ITS is a joint functional unit and must get agreement from both houses for strategic planning and major project funding. In difficult situations there is no single arbitrator and it has been difficult in the past for ITS to fight for projects with corporate wide goals. However one fascinating aspect of the bicameral nature is that this has sometimes allowed ITS innovation which might not otherwise have taken place (Miller 2000).

Initial Barrier to Success

There was an initial barrier to the success of this project. The choice of Notes as the strategic platform for information retrieval was contentious amongst other groups within NSW Parliament. These other groups proposed different technological solutions including Internet technologies. A battle ensued and this project came precariously close to being analysed as another "project that had failed". Eventually the impasse was broken. The proposed system was in alignment with a new strategic initiative that embraced a "transition to a paperless office" and was taken up by a champion in senior management. In addition, the system had been demonstrated as a prototype and influential stakeholders were impressed by the potential (Miller 2000). Finally in October 1996, the project for electronic access to Hansard was endorsed with a "reduction of printing costs .. as integral to this aim" (Murray 1996).

Maturing organisation players

As IT in NSW Parliament matures, we can observe a number of senior people including the Clerks who are becoming increasingly computer literate and who understand how to drive technology. Information dissemination in particular is something these senior people can relate to. Once the NSWPS had been established, the system provided a new way of visualising information and an opportunity for direct involvement. These individuals were increasingly involved in many levels of the system – the information architecture right down to the editorial content. Very importantly these individuals identified information gaps and were instrumental

in organising important initiatives. This personal and direct involvement translated into a high level commitment and understanding by senior management (Miller 2000).

Towards a Whole Of Parliament Approach

The bicameral system has resulted in duplication of information and information flows across the house. Each House has been concerned with its own view of information to the extent that documents reflecting that House view were published separately. With the NSWPS project, ITS had the concern to take a whole of parliament approach so that information resources are shared and integrated, and there is a consistent look and feel across the site. Much effort was expended to work towards a shared work-flow and a joint approach.

Political Discourse without Technology

The NSWPS is a representation of the official Parliamentary processes. However there is much discourse, dialogue, lobbying and activity occurring against a background of close personal and social interaction, taking place in corridors and back rooms as it has for hundreds of years without the need for technology. Members would previously rely on their staff for technology matters and just four years ago were initially resistant to the forced imposition of electronic Hansard. The change over this period has been quite noticeable as Members become increasingly computer literate and thus dependent on their laptops, electronic dissemination, as well as their desktop tools, calendars and e-mail. Members are also becoming another strong internal political force driving the agenda of ITS (Miller 2000).

PROJECT MANAGEMENT CONTEXT

A system for disseminating information is different from a business transaction system. This is not a domain of repetitive, tractable clerical processing that can be imposed on users. There is nothing to compel users to come to the repository so bringing information on-line does not mean it will be used or read. How then do we bring users to the repository? How do we ensure the timeliness, quality and accuracy of the information? There are different costs in the production of information so there is not the scale of cost savings that can result by automating predictable, repetitive tasks across a broad base of clerical users. These are small incremental gains to be made. Authors and users are specialised knowledge workers, self-managed working on individual tasks. Efficiency is no longer the key requirement. Instead we need flexibility, responsiveness and ease of use.

We believe some of the following general and project management principles were key to the success of the NSWPS:

Senior Management Support

In the early stages there were senior managers who became champions of the project. The strong commitment of “enthusiastic” individuals and champions has been also noted elsewhere in information dissemination systems (Moody and Shanks, 1999; Coleman *et.al* 1999).

Building up a Critical Mass

Having information available online does not necessarily guarantee it will be read. An earlier "Bulletin Board" system (based on the same technology) had fallen into disuse because its holdings represented only a fraction of overall information requirements. The Hansard transcripts are highly regarded and critical to Members and staff and thus provided the “critical mass” of information that brought users to the NSWPS repository. (also compare Grudin 1994 for the need for a critical mass of users in relation to groupware).

Useable Information – Add Value

Having large amounts of information online does not guarantee that it will be used. The previous text retrieval system containing the Hansard was used by a handful of dedicated specialists. NSWPS succeeded because it could draw users by adding value – rich-access paths, classification indexes, full text search, information gathering and integration. A wide user base in turn ensures committed management and committed authoring.

Devolved Authoring

A fundamental principle adhered to throughout this project was the principle of devolved authoring. This means the distribution of the editorial responsibility back to the primary owners of that information. It is the owners that understand that information, and are in the better position to keep this information up to date. An essential part of distributed authoring is commitment from both the authors and from management.

Responsiveness to Authors

A corollary to this is being able to continually meet authors needs to make changes to the underlying information representation. Authors are used to "cut and paste" freedoms and the Parliament information structures contain many exceptions and special cases. This means that the system must support for improvisation and exceptions to standard procedures (also see Grudin 1994).

Knowledge Workers Sharing their Domains

Authors in Parliament were not the stereotype that is often portrayed as resistant to new forms of work. These users gladly cooperated and shared their knowledge, motivated by the wide reader base including the public on the Web and in some instances new workflow processes made their jobs more efficient (NSWP 94-99).

Transparent Project Management

With all small, medium and larger project, ITS adhered to a controlled project management strategy at the outset of projects. This included the completion of proper terms of reference and user specification documents which needed to be signed off from both Clerks. This provided a measure of control and helped ensure commitment from management and stakeholders. Once the project was initiated there was a flexible adaptive approach to project management using a prototyping methodology. Many of the subsystems went through several iterations, and we believe this contributed to ensuring that users needs were satisfied

Small ITS teams and Rapid Development Cycles

ITS is a relatively small section and the NSWPS development project teams consisted of one or two dedicated application developers using a methodology of prototyping and rapid development cycles. The advantages of such small teams and lifecycles is that less formal processes are required to control the design and development process which in turn cuts down project management costs.

TECHNOLOGY IN CONTEXT

In this section we examine the context of technology in relation to the nature of information within Parliament. As De Michelis *et.al* (1998) argue, the analysis of IS requires a multi-faceted view which does not ignore the interdependence of the facet of technology and the way information systems are developed and deployed.

Nature of Information

The underlying due processes of government in a Westminster system are formal and stable. They are not defined by product and role, but rather rules and procedures which govern, in contrast to support the processes. In government the evidence from due process is represented in text rather than date-stamped transactions as in commerce and hence there are new requirements of technology to support this. There is a need to be able to gather information on demand from various sources – this is information that is gathered across a broad spread of recorded facts and text – meeting agendas, new bills, schedules of speakers. The Members of Parliament depend on information to track Bills and Legislation, participate in committees, remain informed, reference the Hansard and to communicate effectively.

Lotus Notes as Enabling Technology

Notes was chosen as the foundation and enabling technology for the system for a number of reasons. It allowed the integration of information retrieval using full text search; had the ability to combine structured data with rich text; provided rich access metaphors to browse and locate information. Finally it has a rapid IDE and building blocks that turn out to be natural for this type of information-centric domain (also see Miller 2000). Parliaments use of the Notes technology is a non-standard application of this groupware tool. The interest was not in its "communication, collaboration and co-operation" features but rather as a database platform that allows applications to be developed around documents and forms, inherent rich text and that precipitates rich access metaphors (also see LD 1995).

Key Features of Technology that Aligns with the Domain

The evidence is that Notes is a good technological fit for this application. It is believed that this system could not have been accomplished with alternative technologies and especially traditional database technology. Table 1 highlights some of the underlying technological features that our analysis shows to be key to meeting the requirements of this domain.

- | |
|---|
| <ul style="list-style-type: none">• The extraction of information must be supported by rich text as well as semantic tags to give context to the information which is the basis of form-centric design in Notes. Essentially the <i>form</i> is a metaphor for classifying and describing information – a library metaphor that is entirely appropriate for the nature of information in Parliament• Notes forms tend to favour a gathering of information (essentially because Notes does not inherently support a join). This turns out to be an advantage because it allows information to be integrated from a number of disparate sources.• Notes provides <i>rich access metaphors</i> with its hierarchical, views and categorised lists (where information is grouped under expandable categories). These allow users to browse the database like a "book" using table of contents and indexes in addition to the traditional search metaphor. Relational databases simply do not support these access paradigms.• Notes provides the ability to have several different overlapping information structuring in place. This allows different perspectives for different users and the ability to inter-relate in a variety of ways. This is assisted by the rich access metaphors reflecting the different needs for information and cross referencing.• Information is realised within the structure of the Notes forms (essentially an inverted file) and not just the underlying relationship and entities. Information that is disseminated has minimal structure unlike information in transaction oriented systems. While there may be deep structure, we can represent this information as shallow structures as the deep structure is relatively unchanging over time• Notes development is much faster than relational development, which in itself changes the nature of the system. Relational development does not allow efficient responsiveness to be effective in the time spans available.• Notes has no schema. The fundamental difference between Notes and traditional databases is the lack of |
|---|

schema. The great flexibility in the structuring enables rapid prototyping and allows for incremental development. The system could be refined and easily adjusted to meet continually changing requirements.

- HTML does not scale. A typical approach to sites for information dissemination is to build Web HTTP sites using file managed HTML pages, manually coded links and PDF files. Indeed this was the system used for NSW Parliaments first version of its Web site for the public. The evidence is that this approach does not scale and that the HTML based Web site had become unmanageable. In contrast NSWPS when viewed through a browser manages over 100,000 pages and dynamically creates millions of hyperlinks and access points. This is a by-product of the Notes Domino Web enabling technology. There are obvious advantages within Parliament in terms of the additional accessibility and the management and authoring of such a large resource.

Table 1: Key Technological Features that align with Domain

ANALYSIS OF SUCCESS

To build projects such as this is an accomplishment – there is more involved than setting up the implementation of technology. There is a need for a vision to create these systems, bring the organisation on-side and set up the ITS infrastructure so as to be able to harness and create a viable information resource. Behind the success of this project is much hard work, intense interactions amongst the key individuals and many challenges and obstacles that had to be overcome along the way. This was a long term process that did not simply unfold.

There are multi-dimensional facets that must come together to bring about the success of an IS- strategic, software development and engineering, project management, technological and social. The non-alignment of these facets may mean failure (see for example Southon *et.al.* 1999; Dampney 1994; De Michelis *et.al.* 1998). However it is non-trivial to align and synergise the forces over the threshold that means success rather than failure. We believe the following were key ingredients to the success:

- Committed management – information dissemination is something senior executives can understand,
- Systems that were strategically beneficial to the work of parliament,
- Technology that was aligned with the requirements and the nature of information involved,
- Building up a critical mass of information and ensuring information is comprehensive, accurate and up to date,
- Value adding and accessibility,
- A solid base of readers,
- Devolved authoring which in turn ensures author commitment,
- Partitioning of information domains within an overall information framework,
- Iterative, responsiveness and flexibility

In addition we can identify other factors :

- Good project management. Small specialised teams meant flexibility and small development lifecycles, which minimised the risk of project overruns and exploding costs.
- The technical infrastructure already in place and a series of low development costs resulting in tangible benefits
- Rapid development and prototyping to help ensure users needs were being met

The nature of information required in Parliament becomes clear. It has deep roots in the traditions and processes of Westminster which are deeply entrenched within the users. Such structure therefore does not need to be explicit, it is implicitly part of the decision-making process constantly. Information well tagged by fonts and style to their evidentiary origins is

needed. A fixed explicit schema that specifies structure is not practical – instead a flexible inverted file is appropriate. Such qualities – immediacy, strong semantic cues and metaphors, changing structure – characterise the nature of Parliament and its information. We thus see a deep alignment between the particular technology as it was deployed and the nature of information in context.

CONCLUSIONS

This case study examined a significant and successful project for the dissemination of information within the NSW Parliament. An information dissemination system such as this must be seen within the widest context. There is a complex mix of organisation, technology, cultural and social factors that must all come together to create a synergy that allows a system such as this to succeed and to continue to grow. We believe key factors are the alignment with strategic direction, commitment from senior managers, strong project management, a critical mass of information, devolved and adaptable authoring, rich accessibility and the adding value to information to make it more effective. Rapid development cycles and less formal methodologies allowed a succession of projects, iterations and refinements and facilitated inroads into this application domain. Technology principles must match the nature of information and organisation in context. The nature of information dissemination and unstructured/semistructured information requires IS systems with a high degree of flexibility and malleability, adaptable authoring processes and rich access for readers.

REFERENCES

- Abiteboul, S., Buneman, P. and Suciu, D. (2000) *Data on the Web; From Relations to Semistructured Data and XML*, Morgan Kaufmann: San Francisco.
- Atkinson, D., Lam, A. (1999) A case study exploration of groupware supported workflow, *Proceedings of Tenth Australasian Conference on Information Systems* 1999 30-41.
- AUSTLII Australasian Legal Information Institute (AustLII) <http://www.austlii.edu.au>.
- Balasubramanian, B., Bashian, A. (July 1998) Document Management and Web Technologies: Alice Marries the Mad Hatter. *Communications of the ACM*, July 1998/Vol 41, No 7 107-115.
- Campbell, A., Harrop, A. and Thompson, B. (1999) Towards the Virtual Parliament - What Computers can do for MPs, *Parliamentary Affairs* July 1999 Vol 52 Number 3 pp 388
- Choo, Chun Wei (1995) Information Management for the Intelligent Organization: Roles and Implications for the Information Professions URL <http://choo.fis.utoronto.ca/FIS/ResPub/DLC95.html>.
- Coleman, S. (1999) Westminster in the Information Age, *Parliamentary Affairs* July 1999 Vol 52 Number 3 pp 371, Oxford University Press.
- Dampney, CNG (1994) Operational Integration of Information Systems and Business Processes: Case Studies of the Artefacts and Artifices of people at Work, *Proceedings of Fifth Australasian Conference on Information Systems* 1994
- De Michelis, G., Dubois, E., Jarke, M., Matthes, F., Mylopoulos, J., Schmidt, J., Woo, C., Yu, E. (1998) A Three-Faceted View of Information Systems, *Communications of the ACM* Dec 1998 v41 i12 p64.
- Frakes, W and Baeza-Yates (1992) editors *Information Retrieval* Prentice Hall: New Jersey

- Grudin, J. (1994) Groupware and social dynamics: eight challenges for developers, *Communications of the ACM* 1994 37(1) pp 93 - 105
- Hansard (1999) Parliament Information Technology, *NSW Parliament Hansard – Legislative Council and Legislative Assembly*. (13/5/99)
- Isakowitz, T., Bieber, M. and Vitali, F. (1998) Special Section of Web Information Systems, *Communications of the ACM* July 1998 Vol 41 No 7.
- LD (1995) Lotus Notes - A System for Managing Organisational Knowledge DocId:114595 URL <http://www.lotus.com>.
- Lynch, P. (1997) Hermes unravels Parliament, *The Australian* (16/9/97).
- Lotus (2000) Lotus - Work The Web URL <http://www.lotus.com>.
- Magarey, K. (1999) The Internet and Australian Parliamentary Democracy, *Parliamentary Affairs* July 1999 Vol 52 Number 3 p 405, Oxford University Press.
- Miller, G. (2000) *Part 1 - survey of concepts and technology for text and unstructured information and Part 2 - From Hardcopy to Database to the Web – Case Study of the NSW Parliament*. Master Computing Dissertation, ICS, Macquarie University, Sydney
- Monteiro, E., Hepso, V. (1998) Diffusion of Infrastructure: Mobilization and Improvisation, *Current Issues and Future Trends : Proceedings of IFIP Working Groups 8.2 and 8.6 Joint Conference on Information Systems 1998 Helsinki Finland* pp 255 - 274 URL <http://www.bi.no/dep2/infomgt/wg82-86/proceedings/monteiro.pdf>.
- Moody, D. and Buist, A. (1999) Improving Links Between Information Systems Research and Practice – Lessons from the Medical Profession, *Proceedings of Tenth Australasian Conference on Information Systems* 1999 645 - 659.
- Moody, D. and Shanks, G. (1999) Using Knowledge Management and the Internet to Support Evidence Based Practice: A Medical Case Study, *Proceedings of Tenth Australasian Conference on Information Systems* 1999 660 - 677.
- Murray, J. (1996) "Electronic Access to Hansard" - Memorandum to all Members.
- NSWOIT (1997) IM&T Blueprint Memorandum - Information Management URL <http://www.oit.nsw.gov.au/memo/infomanm.asp>.
- NSWP (1996) NSW Information Technology Parliament of New South Wales - Hansard Redesign and Text Retrieval and Management System - Systems Documentation.
- NSWP (2000) NSW Parliament Web Site URL <http://www.parliament.nsw.gov.au>.
- NSWP (94-99) NSW Parliament Memorandum, reports, project terms of reference, specification documents, IT strategic planning documents.
- PASTIME (1998) Pastime Project - ANU URL <http://pastime.anu.edu.au/>.
- Payne, C and Lawrence, E. (1999) Extranet, Extranet: Changing Publishing Paradigms A Case Study of Extranets in Advertising, *Proceedings of Tenth Australasian Conference on Information Systems* 1999 725-735.
- Rosenfield, L and Morville, P. (1998) *Information Architecture for the World Wide Web*, O'Reilly & Associates.

Southon, G., Sauer, C. and Dampney CNG. (1999) Lessons from a failed information systems initiative: issues for complex organisations. *International Journal of Medical Informatics* 55 33-46

Tung, Lai Lai and Efraim, Turban (1997) One Organisation's Use of Lotus Notes, *Communications of the ACM* Oct 97 Vol 40 No 10.

COPYRIGHT

Gillian Miller, Kit Dampney (c) 2000. The authors assign to ACIS and educational and non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The authors also grant a non-exclusive licence to ACIS to publish this document in full in the Conference Papers and Proceedings. Those documents may be published on the World Wide Web, CD-ROM, in printed form, and on mirror sites on the World Wide Web. Any other usage is prohibited without the express permission of the authors.