A Survey of Public Sector Information Resource Management in Australia

Richard Potger
Graham Pervan

School of Information Systems
Curtin University of Technology
Perth, Australia
Email: {potgerr, pervang} @ cbs.curtin.edu.au

Abstract

The concept of Information Resource Management (IRM) was introduced in the mid-1970's by the United States federal government as part of its attempt to reduce the paperwork burden on the general public. Since then, the concept of IRM has evolved and taken on many meanings and diverse interpretations ranging from technical perspectives to "Information Management" perspectives. These diverse interpretations, at least in the Australian context, have held back the successful implementation of IRM in practice. As part of a larger program of research on IRM, a survey of IS/IT executives in some national and state public sector organisations was conducted. Despite the existence of a number of state and federal government policy documents relating to IRM, the survey revealed a lack of penetration of IRM in Australian public sector organisations, a pattern of mixed success and even a lack of awareness of IRM. Factors involved in the success or failure of IRM included awareness of IRM, existence of a CIO role, top-level (CEO) endorsement and strategic planning.

Keywords

Information Resource Management; Information Management; Government Information Policy; IS Research Issues

EVOLUTION OF INFORMATION RESOURCE MANAGEMENT

Information Resource Management (IRM) was first introduced as a concept in the mid-1970's by the United States federal government in an attempt to reduce the paperwork burden on the general public (Lytle, 1986; Owen, 1989). Although IRM was presented as a planning and control mechanism in the context of records management, the term itself was used to refer to information in a broader context than paper-based documents. The Paperwork Reduction Act (PRA) of 1980 established the framework for developing IRM programs in the United States federal government (Trauth, 1989). Subsequently, the Federal Information Resources Management Review Program was established in 1985 to provide policies and procedures for implementing IRM in federal agencies (Miller, 1988). The PRA of 1995 revised the PRA of 1980 as amended by the Paperwork Reduction Reauthorisation Act of 1986.

The concept of IRM has been significantly expanded since the late 1970s to include:

- the convergence of information technologies and high-level information executives to manage them (Holmes, 1977).

- the notion of IRM as a mechanism to convert business goals into strategic objectives (Poppel, 1978).

- the notion of information as a valuable corporate resource comparable to capital and labour (Diebold, 1979; Horton, 1979).

- the coupling of the management of the information resource to the overall goals of the organization (Synnott and Gruber, 1981).

- the management of both information and information technologies (Horton, 1982).

- the function of coordination between the IS department and the user community (Sato and Horiuchi, 1988)

- the effective management of an externally targeted, digitally networked exchange of information and services with citizens (Ryan et al., 1994)

- the integration of the information planning process with the business strategy and the management of the information resource as a shared corporate asset (WAIPC, 1995)

Marchand and Horton (1986) presented IRM as a stage in the evolution of Information Management that commenced in the 1950s. The first stage concentrated on clerical tasks and paperwork.. The second stage introduced the management of technologies, such as computers, telecommunications and office automation, but took an independent view of each area. The third stage introduced IRM as a management strategy to integrate the use of the information resource and information technologies to accomplish strategic organisational goals.

Lytle (1986) noted that

"the maturity of IRM can be measured by the degree to which it moves Information Management toward integration of information assets/resources in the support of an organization's mission."

Diebold (1979) summed up the prevailing attitude toward IRM when he stated that

"it is clear that the organizations which excel will be those that recognize information as a major resource and structure it as efficiently as they do other assets."

Lewis (1993) notes that the literature reveals a number of differing perspectives about IRM such as:

- the *information perspective* that views IRM as the exploitation of the value of information and considers information as a corporate asset equivalent in importance to capital and labor.

- the *data administration perspective* relating to the technical aspects of managing data including the areas of data analysis, logical database design, requirements analysis, software for database schema design, data dictionary systems and information resource dictionaries.

- the *technology perspective* that includes in IRM computing and communications technologies for handling data, voice, image, and text, and considers that combining the various information technologies was a primary objective of technology managers.

- the *management perspective*, implicit in all of the perspectives, that IRM is an integrated management approach requiring the tailoring of the concept to the organization in which it is established, determining the governance mechanism for the IRM program, identifying the organization's information architecture, and establishing standards.

- the *organizational perspective* that described strategies for organizing and implementing an IRM structure, and in particular the idea of a senior executive, the Chief Information Officer, to assume responsibility for the IRM function. The CIO would be positioned at a strategic level in the IRM organization, concerned with planning and policy development while the MIS director would perform at the tactical level, responsible for projects and day-to-day operations.

Several authors have combined the technology and data perspectives, and claim that IRM should be viewed as covering both the management of technology and the management of data. Horton (1979), King and Kraemer (1988), and Owen (1989) have written about IRM from this orientation and suggested that the IRM concept should encompass both a technology and a data dimension, with integration within each dimension.

There are other, less widely held, perspectives that IRM, including that IRM should concentrate on improving the level of an organization's productivity by assuming a comprehensive approach to systems development (Bryce, 1987), and IRM as an educational mechanism (Kull, 1982). Connell (1981) argued that the IRM concept had no foundation and was, in fact, only a gimmick promoted by data processing professionals to ensure a career path. Rathswohl (1990) examined the topic of the differing perceptions of IRM and concluded that there were essentially two perspectives. The first perspective views information as a commodity that should be managed. The second perspective focuses on the use of information by users. He concluded that both perspectives were valid and should be addressed in developing an IRM program, which would then be concerned with both technology and human factors.

Trauth (1989) noted that IRM has taken on a variety of interpretations and the concept has been used in different contexts (Guimaraes, 1988). These different perceptions have contributed to confusion surrounding the concept and highlight the need to examine the domain of IRM. O'Brien and Morgan (1991) note that the effective use of the IRM concept is hampered by a lack of clarity about what the IRM concept means. These varying viewpoints found in the literature offer evidence for the hypothesis that IRM is not well understood, or at least that it is not understood from an accepted common perspective. The term is used in different contexts and takes on different meanings, depending on the author's perception (Lewis, 1993).

These seemingly "fuzzy" definitions of IRM have led to much debate on how best to manage information both within Federal agencies, across government, and between government and citizens. Contemporary Federal IRM policy is a large and complex set of interrelated principles, public laws, guidelines, rules, regulations, procedures, practices and judicial interpretations emanating from government bodies that deal with managing the variously conceived life cycles of government information resources (Ryan et al., 1994).

While no US agency has government-wide IRM authority, several agencies have influence. The Office of Management and Budget's Office of Information Resources Agency (OMB-OIRA) has the widest range of IRM policy authority as sanctioned by the PRA, but it is limited to the Executive Branch. Other agencies influence lie in certain areas of IRM policy, including the General Accounting Office in IT and management evaluation, General Services Administration in procurement and IRM training, the National Archives and Records Administration in records management and preservation, and the National Institute of Standards and Technology in standards development and oversight. Collectively, the policies formed by these agencies have created frameworks for the implementation of IRM by individual states.

When these implementation programs are compared with the Australian experience it is not difficult to understand why the IRM effort in Australia has not progressed much beyond the publication of IRM policy documents and the creation of government Web sites. Clearly, the existence of a state-wide IRM infrastructure dictated by legislation, the involvement of senior agency managers in policy formulation and implementation, and the integration of IRM processes with other planning activities have been critical factors in the success of the IRM effort.

A BRIEF HISTORY OF INFORMATION POLICY DEVELOPMENT IN AUSTRALIAN GOVERNMENT

Early (prior to 1985) examples of government information policy formulation tended to be confined to information infrastructure within particular professions or sectors such as those in the computing, records management, broadcast media, library, and journalism professions and to the relatively narrow area of telecommunications (Middleton, 1997). The following review of information policy and infrastructure initiatives in Australia by Middleton (1997) has been supplemented by the author to include more recent developments at federal and state level:

- 1982 – The State of Victoria was the first Australian state to introduce Freedom of Information Act, in the same year as the federal Government. Several states now have freedom of information legislation.

- 1985 – The Federal Department of Science published a discussion document referring to a public infrastructure consisting of physical resources such as broadcasting, telecommunications and libraries, and an intellectual infrastructure of education for underpinning an information economy. However, a national information policy document did not arise from this document.

- 1988 – The Federal Government developed the Government Open Systems Interconnection Protocol (GOSIP) to provide guidelines for public sector electronic information transfer. GOSIP defined an Open Systems architecture based on the adoption of international standards. This was further developed in consultation with Australian Information Industry Association and Standards Australia and later adopted by federal and state governments in 1993. GOSIP has been promoted by the Information Exchange Steering Committee (IESC) of the Department of Finance.

- 1991 - the Jones Report documented an agenda for a national information policy but this did not lead to policy statements. A Government response to this report 18 months later acknowledged that information in its many forms was taking an increasingly central place in society but avoided the adoption of a national information policy. Nevertheless, many of the 21 elements identified by Jones have been addressed within the policy initiatives of the last few years.

- 1992 - The State of Queensland published the Information Technology Industry Strategic Plan and created an Information Industries Board and an Information Policy Board within its Premier's Department. The State of Victoria published Information Technology Management guidelines and a policy promoting departmental use of the Internet.

- 1993 – In a well-known example of information strategic planning the Ipswich City Council adopted an economic development program that endorsed the principle of development led

by information technology as a key strategy. This led to the establishment of the Global InfoLinks project, housed with the city's library in what the Council called the Global Information Centre located in the Ipswich Central Business District. It was designed to function as an information technology and telecommunications hub, and was linked to the World Wide Web.

- 1993 – The IESC published a document on Electronic Data Management giving guidance for electronic document management within the framework of an information management decision model, and a document management life cycle model. It itemized essential features of electronic documents that should be recorded. It also identified critical success factors such as clearly defined and consistent agency policies and procedures, and easy access to agency standard information management tools.

- 1993 - The West Australian state government established the position of the Office of the Information Commissioner. The Commissioner is an independent officer directly accountable to Parliament for the performance of statutory functions. The Attorney General is the Minister responsible for the legislation. The Office of the Information Commissioner provides a range of services to the public, government agencies and Parliament, but the main function of the Information Commissioner is to deal with complaints made about decisions made by agencies in respect of applications to amend, or seek access to, personal information.

- 1994 - The State Government of South Australia released its IT2000 concept document (IT2000, 1994) that envisioned such developments as its software and IT services sector achieving 40% of its revenues through exports, a 'world-class IT industry in five niche areas', and multinational IT companies investing locally as part of their global strategy.

- 1994 - A Commonwealth State Internet Working Party (CSIWP) was established by the joint Commonwealth/State Government Telecommunications and Technology Committee (GTTC) in September to facilitate the use of the Internet by Commonwealth and State agencies by developing an official hierarchical information framework that, at its highest level, was based on the Australian Governments Entry Point. At the next level of the framework, each government was responsible for establishing government home pages that, in turn, pointed to the information being provided by their respective agencies. Each agency was responsible for its own information.

- 1995 - The Prime Minister established a National Information Services Council (NISC) under the auspices of the Prime Minister's Science and Engineering Council, to discuss issues associated with the widespread adoption of information services and technologies. The working papers prepared for the meeting were an effective discussion of the issues that must be addressed as national information infrastructure is developed (http://www.dist.gov.au/SCIENCE/pmsec/nla/nisc/nisc1.html).

- 1995 - The Department of Social Security launched the Community Information Network (CIN) pilot project to provide, in 300 sites in Tasmania and other pilot areas, free access to a range of government and community information, and interactive communications facilities such as e-mail and bulletin boards.

- 1995 – The Ministerial Council on Employment, Education, Training and Youth Affairs (MCEETYA) agreed to a broad framework for the establishment of a national education

network, EdNA (*Ed*ucation *N*etwork *A*ustralia). It was agreed that such a network must offer Australia-wide coverage, avoiding discrimination on the basis of geographical location, and must be subject to an appropriate governance structure. EdNA was expected to offer national coverage, to provide a directory of educational services and an interactive messaging service, which could be accessed at affordable rates by teachers and students from educational institutions or from home.

- 1995 – The Information Technology Review Group recommended that the Federal Government adopt the concept of a Chief Information Officer located in the portfolio of the Minister for Finance. This was adopted and the position filled. The Group also made recommendations with respect to many aspects of information management, a number of which would be the responsibility of the Chief Information Officer.

- 1995 - The State Government of Western Australia in March, through the Strategic Information and Information Technology Unit of the Public Sector management Office, released its draft document "Information Resource Management Strategies: A Best Practice Guide for Agencies". The draft was circulated within state government agencies for comment and the final version was published as A Guide to Information Resource Planning in December 1995 (WAIPC, 1995). The WAIPC took an all-encompassing view of the information resource that should be managed.

  The Information Resource Plan was to be developed through a series of planning activities that included identifying the information needs of the agency from its Strategic Plan, modeling how information was acquired, managed and stored within the agency (information audit), analyzing how information was used (information use), displaying the relationship between sources, suppliers, and users of the information (information mapping), looking at communications, inter-relationships and movement of information throughout the agency (information flows), bringing these together with the needs of the users and the organization to analyze shortfalls (information needs and gap analysis), and identifying information that can be shared (information verandahs).

- 1997 - The Minister for Communications, the Information Economy and the Arts, Senator Richard Alston, announced the appointment of the Chairman of the Advisory Board of the new National Office for the Information Economy (NOIE).

- 1999 - Senator Alston released the strategy document, A Strategic Framework for the Information Economy - Identifying Priorities for Action. At its inaugural meeting in December 1998, the Australian Information Economy Advisory Council (AIEAC) endorsed the strategic framework and agreed that it is vitally important for Australia to have a comprehensive national approach to these issues.

- April 1999 - The Western Australian Technology and Industry Advisory Council (TIAC) released a report, entitled "Towards an Information Infrastructure Policy for Western Australia: The Business Aspect" (TIAC, 1999). The formal objective of the study, as defined by TIAC, was:

  "To identify Information Infrastructure policy options that will capture maximum economic benefit for all industries across the State."

So, while there have been numerous examples of government policy with regard to IT and related issues they have focussed largely on issues such as technical infrastructure

(telecommunications), public rights to information (Freedom of Information Acts) and business opportunities. IRM principles may be found embedded in some of these government initiatives but none, except for the West Australian initiatives, have specifically addressed IRM as a discipline to be embraced by the organization. The WAIPC guidelines are also the only government publication to specifically use the nomenclature 'Information Resource Management'. Even so, survey and anecdotal evidence suggests that the efforts of the Australian Federal and State governments with respect to IRM have not been entirely successful.

DESCRIPTION OF STUDY DESIGN

As part of a wider study of the practice of IRM in government and private sector organizations, a postal survey of 80 Australian government organizations (40 West Australian and 40 national) was conducted.

The aim of the government survey was to investigate:

1. The penetration of IRM in public sector organizations in Australia

2. The underlying reasons for success or failure in implementing IRM in government agencies

3. The opinion of senior IS/IT executives in the public sector about the importance of IRM.

While it is acknowledged that an extensive series of case studies would provide greater depth of knowledge concerning IRM in particular organizations, it was felt that a focused survey of a larger number of organizations would provide a broader picture and was likely to achieve the aim of the study in a shorter time. Follow-up case studies were planned.

For the purpose of this research the following definition of IRM (Lewis, 1993) was used:

"IRM is a comprehensive approach to planning, organizing, budgeting, directing, monitoring and controlling the people, funding, technologies and activities associated with acquiring, storing, processing and distributing information for the benefit of the entire organization."

This definition was included in the cover letter that accompanied the survey questionnaire. To achieve the aims of the study the questionnaire was constructed to collect data in the areas of the respondent's personal profile (including the organisational role and number of reporting levels between the respondent and the CEO), the organisational profile (including IS& IT expenditure), the IS/IT departmental profile (examining factors such as the nature of the IS & IT role and problematic issues for the IS/IT department), technological factors (including the types and level of integration between the various data repositories), organisational factors (such as the awareness of senior management of the value of the information resource) and IRM factors (including Critical Success Factors for the implementation of IRM). The focus of this paper is on those parts of the survey relating to the implementation of IRM and the factors that either enable or inhibit successful implementation.

The initial version of the questionnaire was piloted tested on six IS/IT managers and suggestions for improvements were incorporated in the final version. A copy of the questionnaire is available on request.

ANALYSIS OF RESULTS

A total of 31 questionnaires were received from the target group of 80 IS/IT managers of government departments or agencies. This represented an adequate response rate of 38.75%, but a re-sampling mailout conducted a month later increased the total responses to 39 (48.75% response rate).

Large regional organizations (>500 employees) were well represented in the sample (56%). With a median of $380M turnover, they spent an average of $5M on IS/IT. Hierarchical control along divisional/functional lines with formal procedures and rules dominated most organizational structures. The role of CIO existed in 15.4% of respondent organizations. Outsourcing of IS development was greater than in-house development.

A significant portion (31.6%) of respondent organizations reported that IRM had never been attempted. A few (5.3%) reported that IRM had been attempted without success, 60.5% reported that IRM had been attempted with some degree of success, while only one organization reported a great deal of success.

Federal government organizations were more likely (76.9%) to have attempted IRM than their local counterparts (60.4%) with success rates being 69.2% and 64% respectively. This is a significant result considering the fact that the West Australian Government is the only government body in Australia to have published guidelines for the implementation of IRM.

A number of explanations, based on anecdotal evidence, for this situation may be offered. Firstly, individual government agencies are not compelled to comply with these guidelines. The desirability and feasibility of such legislation is debatable. Further, as a result of the lack of legislation, many public sector IS/IT managers have simply ignored these initiatives because of pressure of work from other areas. Secondly, the lack of a high-level Chief Information Officer at the state level to champion the implementation of IRM has meant that the management support so essential for its success has not been forthcoming.

Respondents were asked to comment on the reasons why IRM had never been considered or attempted with no, some, or a great degree of success in their organizations. A total of 19 comments (23.8% of all respondents) were received.

Inhibiting Factors

Seven respondents claimed that lack of management support or follow-through was a factor in either the situation where IRM had never been attempted or where its successful implementation in the organization was limited.

One respondent, with limited success of IRM, noted that the "focus of skill set was heavily technical (*sic*) oriented with low profile sponsor". Four respondents noted that a lack of awareness of the importance of the information resource was an inhibiting factor in the implementation of IRM, with comments such as "the information value is unrecognized", "starting to recognize that data does not necessarily equal information", and "information is a tool that they [management] do not yet know how to use or exploit" and "not enough people have seen sufficient significance".

Four respondents indicated they had never heard of the term IRM or were unaware of it as a discipline. Other priorities or constraints were cited by three respondents quoting reasons such as "other business issues are a higher priority", "lower business priorities than applications",

"difficulty in estimating costs, priorities" and "constrained by lack of resources and constant change". Another respondent with limited success noted that "many of the required disciplines are in place, however extension beyond computer-based data is limited".

Enabling Factors

The one respondent indicating that IRM had been implemented with great success, cited the reason for this was the fact that IRM was "a corporate approach, driven from the top, with strong endorsement and support from the CEO". This response was from one of the six (out of 39) organizations indicating the existence of the CIO role. Those organizations with CIOs were nine times more likely to have attempted IRM with either some, or a great deal of success than those organizations without CIOs. In a study of 110 American firms it was noted that lack of management support was the number one reason for the failure of the IRM effort (English and Green, 1991).

One respondent noted that the requirement for IRM has been recognized and that "a branch has been created to address it, but has been operational for a short time". Moody (1996) recommends the establishment of an IRM Group to coordinate IRM activities within the organization. Another respondent noted that some success with IRM had been achieved in that "the last Corporate Data Model was part of the Information Architecture developed for the last 5 Year Strategic IT Plan".

In summary, the survey revealed only limited penetration of IRM in the Australian public sector at the state (WA) level and was only slightly higher at the national level . There were a variety of reasons quoted as underlying the failure of IRM, including lack of compliance with guidelines, lack of CIO appointment, lack of awareness. Successful IRM, on the other hand, seemed to relate to top level (CEO) endorsement of the concept, appointment of a CIO, and formal strategic planning.

CHARACTERISTICS OF AN ORGANISATION SUCCESSFUL WITH IRM

The survey covers many interacting factors that require more discussion than is possible for this paper. However, the following information obtained from the questionnaire of one particular respondent presents a profile of an organization that was successful in implementing IRM.

This was a relatively large national public sector organization, with 800 employees overall and an annual IS/IT expenditure of M$14. The organization was characterized by having a hierarchical structure with formal procedures and rules. It was reported that the organization culture made it relatively easy to introduce change and innovation. This was achieved by targeted staff development programs and encouragement and support of innovation by individuals. Senior management was somewhat aware of the value of information resources, had a reasonably high level of IS/IT knowledge, and a reasonably high perception of the strategic importance of IRM.

The IS/IT department, which had 62 staff, experienced growth over the previous three years and was headed by a CIO who reported directly to the CEO. The department had a federal structure with corporate organization and control and with some input from other business units. Some system development was outsourced, while in-house development was conducted using multiple methodologies. The IS/IT department concentrated mainly on new applications of IT, standardizing IT within the organization, and assimilating new technologies into its base

architecture. IS/IT was used mainly for cost reduction, competitive thrust, product differentiation and customer focus but less for management support or strategic planning.

The issues of coping with an increasing variety of information, reliance on information, client demand for more information, problems comparing consolidating or combining data across systems, and information shortfalls were reported as being somewhat problematic. In contrast, inaccurate or out-of-date information was not a problem at all, and the response was neutral for the issues of data administration difficulties, data access, duplication of data and inconsistency of data.

Both an Information Management Plan and a corporate-wide Strategic IS Plan, conducted after the Corporate Strategic Plan, were produced and these focused mainly on integrating these plans with the business strategy and using IS/IT for competitive advantage. IS/IT planning was perceived as being interdependent, where development or modification of IS/IT was done in constant alignment within the strategic context. Information Resource Planning and Information Needs Analysis was conducted entirely in-house, but an Information Management Statement did not form part of project proposals. The organization did report the existence of an Information Management Committee, but no performance indicators had been established. The role of Information Steward had been established within the organization's business units.

Like many IT-mature organizations, the information resource was held in separate relational databases on different machines, with in-house standards for database design and implementation. A formalized Data Administration role existed within the organization. Data integration was an objective for the organization, but only to the extent that was feasible. Total data integration was not intended. A Corporate Data Model was not used. No data dictionary was available and users did not have access to ad-hoc query tools. Users found it reasonably difficult to combine information contained in different systems. Characteristics of organizational information such as timeliness, and completeness rated as very good, while accuracy, precision, conciseness and relevance were rated as quite good.

The most important driver for the implementation of IRM was the awareness of the strategic importance of information. This was followed by an increasing reliance on information, existing information shortfalls and problems comparing, consolidating or combining data across systems. Technical issues such as data administration difficulties, duplication and inconsistency of data were not seen as problematic. Critical Success Factors for the IRM implementation were, in order of importance, business buy-in and involvement, delivery of short-term results, early involvement in systems development and the measurement of results. The organization was neutral on the issue of focusing on the most critical data. Although no formalized IRM group had been established, a performance measurement program for the IRM effort was planned.

The key message about IRM is perhaps best summarized by this respondent who noted that "Given the strategic importance of IS/IT to any sizeable organization, IRM is a MUST (respondent's emphasis). Efficiencies and competitive advantage will not be realized without a strong commitment to IRM, but the key to success of IRM is strong support and ownership by senior management. This requires significant effort by the IT group, but is absolutely essential."

CONCLUSIONS AND FURTHER WORK

This paper has presented a history of government IRM initiatives in the Australian public sector and some of the results from a study of the practice of IRM in Australian government agencies. It is clear that implementation of IRM practices is not widespread and that even in the state of Western Australia, where government has been most active in publicizing the benefits of IRM, the take-up of IRM practice is at best patchy and success rates are inconsistent. Many senior managers have commented that they were unaware of the concept of IRM. A number of reasons for the success and failure of IRM were revealed by the survey, including compliance with guidelines, CIO appointment, awareness of IRM, top level endorsement of the concept, and formal strategic planning.

A number of state agencies consider the methodology presented in the Guide to Information Resource Planning to be too time-consuming and, while they can see the eventual benefits of IRM, the commitment by top management to provide the resources necessary for such an effort is not always available.

The results of this study are limited to the public sector, but a comparative survey has also been conducted in the private sector (state and national) and a series of case studies have been carried out. This paper has focused on IRM implementation, but other information relating to the management of IS/IT obtained from the survey is being studied. Through this work it is hoped that a better understanding of the practice of IRM in organisations, particularly in Australia, can be achieved.

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