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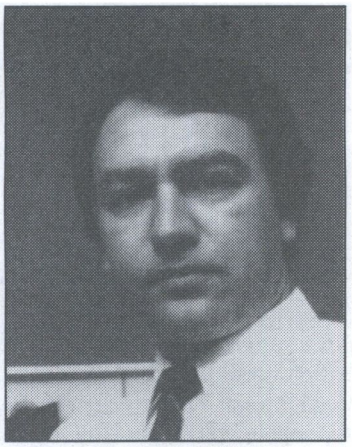

Evolution of information resource management

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Information resource management (IRM) has been with us for almost three decades. Numerous articles and monographs have been written about this interesting unconventional field of management. This article sheds some light on the evolutionary path of IRM. Information explosion, proliferation of paper and extensive use of information handling technologies are examined as causes for the inception of IRM. An attempt was also made to define relations and differences with other concepts such as records management, data management and information management. As any other concept IRM had to be put to the test through its use in government and military sectors, as well as in private business. In dealing with the historical perspective of IRM this article examines some general and theoretical classifications, searching for the place of IRM in the history of information management. Finally, IRM regarded as a live concept, is studied through different stages of its own development.

INTRODUCTION

There are a number of avenues one can take in attempting to trace the birth and evolution of a phenomenon. Particularly in the case of the social sciences where the concepts are dependent on cultural and economic factors and where they easily spread and influence people. Once planted on fertile ground a new concept easily moves from one sector to another, adapts to new environments, changes its forms, and often, in no time, becomes part of our everyday reality. There is a tendency to take many concepts for granted without ever wondering how it all started, where it came from, and many times without even asking where it is leading to.

The evolution of information resource management (IRM) is no exception. The concept has been with us for almost three decades. Numerous articles and monographs have been written about this interesting unconventional field of management. Various aspects of IRM have been thoroughly studied. Many bits of gathered information were put together to form a corpus of knowledge which can be used today for any organized human activity in need of it. Still, in determining the very beginning of IRM and its evolutionary path, researchers are dealing with uncertainty and they are facing the dilemma of which research approach to adopt, which way to go.

Different possibilities for studying the evolution of information resource management are available, and the choice is left entirely with researchers. Whether they want it or not, the repertoire can include a spectrum of different approaches, based on various points of interest which could be regarded as more important or of greater interest at a given moment. Each approach can bring a different perspective and shed new light on the evaluation of IRM. However, only a comprehensive use of most of the available and applicable approaches can secure a valid and long lasting result.

Definition of IRM

Information resource management is one of the concepts which attracts the attention of various researchers. As is the case with many other contemporary concepts, there are as many definitions of IRM as there are authors dealing with the subject. Therefore, it is of importance, for proper orientation and further understanding, to consider some of the definitions available.

Forest W. Horton, Jr. (1979, pp.99-100) one of the leading experts in the area of IRM, begins his process of defining information resource management by viewing an IRM system as "a framework within which to accomplish the management of data resources in an orderly and systematic fashion". According to him, "resource management system includes all methods and procedures for collecting and processing information on a particular resource (i.e. men, money, machines, or what is germane to our subject here, information itself) and formatting that data in a manner which is useful for management."

Pointing out that the IRM system does not cover one-time, non-recurring collections of data and information,

Horton (1979, p.100) concludes that the term 'information resources' covers all "information sources, services, products, and individual information systems which are functionally oriented to some aspects of the organization's operations and activities". In one of his previous works Horton (1974, p.1) describes what is covered by the term 'information resources'.

> By 'information resources' I embrace the full range of producers, suppliers, handlers and distributors, and include information in all of its forms, documented and undocumented, raw data and evaluated information. And I embrace library holdings, information center holdings, data in information systems and computer data banks, office files and records, newspaper clippings, sound recordings and films, correspondence and messages, and other information storage and handling media and forms.

Probably the most comprehensive definition offered by Horton was the one published in his book *Information resources management: harnessing information assets for productivity gains in the office, factory and laboratory* (1985). There he states that IRM is "a managerial discipline which views information as a resource equal to financial, physical, human, and natural resources. IRM addresses the efficient and effective handling of information resources (raw data) and the resulting information assets (knowledge)".

Another author, M. S. White (1982) defines IRM as "the process of efficiently and effectively identifying, acquiring, integrating and applying information resources to meet current and future information requirements". According to Burk and Horton (1988 ,p.243) information resource management is "a management process in which traditional management processes and resource management principles are applied to the stewardship of an organization's information resources and assets". Roberts and Wilson (1987) regard information resource management as "the currently favoured concept linking managerial effectiveness and information acquisition and use". Another aspect in the definition of IRM is emphasized by Elizabeth Adams (1985). Her view is that "IRM is a top management function to develop a set of policies, programs and procedures to efficiently and effectively plan, manage and control information requirements and supporting information handling resources". James M. Kerr (1991) in his recently published book on information resource management defines IRM as "the practice of managing information as a corporate asset".

Initial use of term IRM

In studying the evolution of information resource management, research about the actual appearance and the initial use of the term itself has special significance. This could also be regarded as one of the approaches to the evolution of information resource management. Surely enough, one of the first requirements of this approach is to find out who was the first one to implicitly use the term information resource management, i.e. IRM. That would also give us the exact time when the term was officially introduced to the corpus of information management knowledge. However minor this might seem to be, the exact timing and location of the first use of the term IRM is of particular interest to a curious researcher. Especially to the one who would like to know whom to blame for all the 'trouble' that IRM brought with its appearance and introduction as a new way of managing information.

There is no firm evidence as to who might have been the pioneer in using the term 'information resource management'. Some authors, such as G.H. Hoxie and Donald M. Shea (1976) claim that they have coined the term information resource management (IRM) as a phrase "for an organizational approach that encompasses all corporate information resources". They regarded IRM as the first 'hot button' facing management at that time and it appeared to them that IRM had far-reaching longer-term implications. The starting point for them was that

> the technology and systems disciplines supporting corporate information needs are crossing traditional lines of authority. And they (top managers) are looking for the service and economic benefits of an organizational melding of hitherto fragmented corporation information units - data processing, voice and data communications, stenographic services and other information retention and dissemination systems.

A year later Hoxie and Shea (1977) wrote another article where they made an attempt to detect any significant shifts and trends among the 'top ten' issues for managers. Although the time span was relatively short, some changes were noticed. Among them IRM lost its leading role and became part of a broader concept, namely a part of information policy. Still, they repeated that they were the first ones to coin the term IRM "that would hopefully grease the skids for a synergistic blending of information communications and processing units and avoid the collision course that many companies are currently embarked upon".

The arguments offered by Hoxie and Shea about being the creators of the IRM term unfortunately cannot sustain serious criticism. The only exception might be that they proved the fact that a number of years had to pass before the term IRM became better known and widely accepted. It seems that one of the first published documents which mentioned IRM was F.W. Horton's book *How to harness information resources: a systems approach.* It was published in 1974 by the Association for Systems Management. Not only does this book mention IRM, it is entirely devoted to the subject. Even if there is another published work which used IRM as a term before

Horton's book, we can, with full certainty, argue that *How to harness information resources* was the first book to elaborate and bring a complete system of IRM. It covered a number of topics such as information explosion, information resources management system, information needs and uses, its origins and sources, information handling and processing, information presentation and communication. It also gave a useful guide for the practical implementation of IRM through various steps, starting from inventorying and cataloguing, analysis, model development, testing, and ending with installation and system implementation.

CAUSES FOR INCEPTION OF IRM

The inception of information resource management, as has been the case with many other concepts, was not just a pure coincidence. It was rather an outcome of a set of events which preceded it and influenced its beginning. An analysis suggests that there are at least three events which, when combined together, triggered the inception of IRM. These main events are:

- information explosion;
- proliferation of paper;
- extensive use of information handling technologies.

Information explosion

Information explosion or 'information pollution' as Forest W. Horton (1979, p.1) likes to call it, is an important development of the twentieth century which brought many changes to the way we perceive the world around us. (At the beginning, computer specialists preferred to call it 'data explosion'). Books, journals, newspapers, research reports, proceedings and correspondence, as well as radio, telephone, television, computers, computer networks, online services, CD-ROMs, satellites, all contribute to the flood of information. This is just a short list but illustrative enough to show the diversity of available media. When this, or an extended list of media is multiplied by the number of potential subjects, the amount of information that we are exposed to reaches unbelievable dimensions. This tremendous quantity of information unfortunately does not satisfy, on its own, our need for information, and does not solve our problems; in fact it brings some new challenges (let's not call them problems). The most implicit are economic storage, efficient retrieval, and effective use of such a mountain of information. It is a paradox that we are experiencing difficulties in finding the right information when we are living and working in a flood of information. It appears that the critical piece of information is always somewhere else, it is missing when we need it the most. There is an obvious need for a well organized retrieval system which will allow us to quickly find exactly what we want. Such a system has, therefore, to meet at least two objectives:

- to bring us the information that we are looking for, not something else instead;

and

- to bring the required information fast, it has to be a time saving device which will be appealing and easy to use.

Designing a system which can store such a large amount of information and successfully retrieve desired information is an imminent challenge. Even if we disregard the financial aspect of transferring, organising and storing relevant information and agree that computer technology is an answer, there are other 'challenges' to be resolved. Computers might be a part of the answer to our question of how to store and retrieve information, but it still remains unclear as to what information we need to store. How do we select what is important to be stored and what is not? What is the borderline between the necessary information and the desired information? This is closely related to another challenge that we are faced with. Namely, our ability to absorb all the information that is constantly bombarding us. We need to have some management tool which will help us, not only to organize but also to select information. This selection procedure has to be pre-defined in accordance with our particular needs and, to some extent, with our desires.

> The backlog of unread and unassimilated information materials ebbs and flows with each information user, depending upon his particular circumstances. But a backlog is always there, sometimes quite tangibly and visibly (the mountainous pile of papers in the In Box); sometimes invisibly (delayed decisions or missed opportunities). And inevitably with the results: delays in decisions that are critical, or wrong decisions or erroneous conclusions based on untimely, incomplete, incorrect, and irrelevant information. (Horton, 1974, p.3)

Information resource management imposed itself on us as the way out of this information explosion. Someone once said that "realising that a problem exists is already a half way to its solution". It was realised that the information explosion is not a burden *per se*. The burden is a lack of ability to make use of the increased quantity of information in order to enhance further decision making and improve business and other activities.

Proliferation of paper

The second event which influenced the appearance of IRM is closely related to the above mentioned information explosion. It is the proliferation of paper. Most information is still stored in paper form. Statistics show that the current annual per capita consumption of writing and printing paper today in Northern America reaches 83.2 kilograms. (This figure excludes newsprint) (UNESCO, 1990). Another astonishing finding, which sheds even more light on the proliferation of paper, is offered by the American Paper Institute. According to

their statistics the total production of paperboard, used exclusively for the manufacture of file folders, was the following:

> In 1960 the production of paper for folders was 43 thousand tons. Twenty years later in 1980 the mills were producing about two and a half times that much. Production had increased to 114 thousand tons. Through the 1980s production will have more than doubled again. In 1990 production is estimated to be 240 thousand tons. The figures are startling. (Barber, 1990)

This tremendous amount of paper files and paper documents still available almost everywhere, lead us to at least two related conclusions. "We have an obligation to direct our attention to our own paper records. After all, about 95 percent of records are paper based" (Barber, 1990). The fact that we are still living in a 'paper world' should not limit our thinking to the present 'state of the art'. This situation should be improved and changed through the application of new and presently available technology, such as computers, networks, imaging. Still, we have to concentrate on ways to organize efficiently this 'pile of paper files' while reducing its quantity and increasing its usefulness. Obviously IRM, with its objectives of economic sharing and pooling of information resources towards a common goal, comes as a way out of this paper tunnel.

Extensive use of information handling technologies

The third event which helped to bring about IRM, was the extensive use of information handling technologies, mainly computers and telecommunications. In his book *The Third Wave* Alvin Toffler (1980) suggested that the world will never be the same after the computer revolution. The 'information civilization' which came after the industrial revolution (the second wave) brought us some dramatic changes. Every single aspect of society was affected. It changed the way we organize business and governmental affairs, run the economy, plan agriculture, and changes in our social and cultural lives followed. The computer technology offered an opportunity to reorganize our activities, such as the way we store, retrieve and process information. It was left to people to start exploiting this new opportunity. The attention of human minds switched from tangible resources such as raw materials, equipment, property, finance, energy and labour, to some more elusive resources such as information and knowledge. Hundreds and hundreds of books and articles were written with one goal in common - to explain the way people can benefit from the new concept of information handling based on powerful computer technology. Management of information resources, using the great capabilities of computers to store, retrieve and process information, became the main topic for many researchers and information scientists.

RELATION WITH OTHER CONCEPTS

Evolution of information resource management can be studied from still another perspective. That is, from the perspective of its relation with other concepts. In other words, an attempt can be made to identify the line of thought which preceded the appearance of IRM, helped in shaping it, and drew a line of difference with other related concepts. In its essence, such an approach would be based on the conceptualistic thought "according to which general concepts are neither objective realities nor just language terms. They are rather specific structures of contemplating activities built through the process of comparison and synthesis of observed data." (*Enciklopedija Leksikografskog Zavoda*; 1967 p.566)

Information resource management represents a multi-disciplinary concept. However, it is not a simple combination of different previously known concepts. The result of this combination was a new and synergistic concept which enhanced not only its constituting elements but shed totally new light to this area of human activities. Most authors are of the opinion that there are three main concepts used as sources of IRM's intellectual inspiration. Put in order of historically prevailing influence they are:

- records management
- data management
- information management.

Once combined, they formed a well conceived system in which records management offered general guidelines, principles and practice in regard to the object of management i.e., information and documentation. Data management contributed the knowledge of the tools to be used, such as computers and other information technology devices. It also helped with reshaping the methodological requirements for automated management of information resources. Information management played a critical role in bringing a new dimension to the whole concept, by regarding information as a resource, similar to any other previously known resource, such as financial, human, equipment or other resources.

Records management

> The records management approach to IRM has its origins in library science, records management, administrative management, and other disciplines concerned with the effective storage, retrieval, and utilization of documents in organizations. This was the first area to use the term IRM to describe a coherent and global approach to managing information. (Trauth, 1989)

Well established practice and derived theories offered a good starting point and ground for further development of IRM. The prime goal of records management was always to

facilitate access to documents, improve its use and allow sharing correspondence, documentation and other sources of information. Information storage, organization, retrieval, dissemination, evaluation, as well as information creation control, and its maintenance, were the categories used and developed by the records management adopted by the new concept of IRM.

Data management

Data management and electronic data processing (EDP) was another source from which the theory and practice of IRM was developed. There are some arguments that records management and data management are the same things.[1] (McDonald, 1989, p.5) That might be the reason why some authors use related terminology such as data administration, database management or database administration, just to emphasize the difference between IRM and data management. According to M. Gillenson (1985) data administration is made up of two components: data management (DM) and database administration (DBA). DM is primarily responsible for planning of data, its accountability, training of personnel, policy setting, development of standards, database design and users' technical support. DBA has a more operational responsibility to manage data on a day-to-day basis.

Whichever term is accepted, it remains clear that DM is mainly orientated towards technical questions of electronic data manipulation. The instruments developed here include:

> the systems development life cycle, systems development methodology, tape library management, system and data dictionaries. The data dictionary, for instance, is a tool that serves as a central storage of data (descriptions, attributes, and relationships) about data used by computerized and/or manual systems. If used properly, it captures the corporate data model that can be used to build applications that are consistent in design. (McDonald, 1989, p.7)

Information versus data was a common starting point for the development of a new IRM theory. Bryce brothers pointed out, for instance, that "it is a myth that 'a company runs on data'. The reality is that a company functions with good reliable information. Even though information is only as good as the data used, every action or decision made by an enterprise is based on information, not data" (p.27). They also gave a useful comparison between information and data. According to them, information is regarded as intelligence used by humans, it is produced, and is time dependent. At the same time data is a fact or event, processed by machines and humans, collected, stored, retrieved and it is non-time dependent.

There was an obvious need for the use of a wider data management concept and according to Eileen Trauth (1989) that could explain the emergence of IRM.

> It can be seen as an attempt to disassociate the data administration's role from the data processing image. IRM can be viewed in the context as the term for what data administration would like to be. It would like to address questions such as: What information is most crucial to the success of the company? How can the quality, timeliness, reliability, consistency and accuracy of the information be improved? and how can data redundancy be reduced?

Information management

The third related concept is information management, or more precisely management of information as a resource. The introduction of a concept that information represents an asset, a real resource as any other resource available in a company, was a crucial step towards a change from information management to IRM. Many business organizations were faced with a need to design more efficient offices based on information automation technology. This required an interdisciplinary approach and use of electronic data processing, communications, office administration and paper or records management personnel. The outcome was an increased office efficiency but, at the same time, it raised investments in information assets such as information hardware and software, data storage facilities, as well as data, documents and literature stored in either electronic or paper form. This was the easier part of change. A more complex change was in bringing the 'business mentality' to information storage, retrieval, and its use.

> The strategic objectives for the information-management function have shifted away from an exclusive focus on physical control of paperwork, and the supporting electronic technologies, toward treating information itself as one of a firm's key assets which can be managed like other strategic assets such as personnel, materials or capital investments. This shift has implied applying resource-management techniques (like planning, costing, budgeting, and evaluating) to the information resources of the firm. (Marchand and Horton, 1986, p.122)

Once adopted, this approach brought an important change to the way information was perceived within the context of available organizational resources. IRM puts emphasis on the economic significance of information, particularly, with respect to its collection, maintenance, use, and timeliness.

Evolution of IRM was very quick. From the point where there were no differences between information resources and other resources, IRM evolved to another extreme where "the historical evolution of information management is dramatically different from the evolution of personnel or financial management" (Marchand and Horton, 1986, p.117). Cornelius F. Burk Jr. and Forest W. Horton Jr. (1988, pp.118-120) compiled probably the most comprehensive list of similarities

and differences between information and other resources. In short, the similarities are the following: information, like other resources, is acquired at a cost, it possesses values, its 'consumption' can be expensed or capitalized, accounting techniques are applicable, it has a life-cycle, and it could be processed. The main differences however are that information is expandable, compressible, substitutable, transportable at the speed of light, diffusive and shareable.

It is worth mentioning that there are authors who regard the concept of 'information economy' with a bit of scepticism. King and Kraemer (1988), for instance, regard a resource as:

> a source of supply or support, and information in a general sense can conform to this definition. But the concept requires specific conformance in order to be sensible, and this poses problems. The tools to assess the economic value of information are not well developed. It is extremely difficult to place a value on information. Every piece of information has potential value in hypothetical situations that might arise, but how does one judge whether collection and retention of information is justifiable, given the hypothetical value of information? The values imposed will be judgmental and case-specific, making a mockery of the effort to establish objective value for information.

It is a fact that such scepticism was regarded once as a threat to the establishment of IRM. However, today it is regarded more as an encouragement to continue with the research in this area and to further develop an already considerable body of knowledge about IRM.

FIRST PRACTICAL USE OF IRM CONCEPT

There are at least three general sectors of human activity in which we can trace the very beginning of a practical use of information resource management. The three sectors which could be regarded as the roots of IRM are government, military, and private business.

Government sector

Contrary to the use of IRM in private business and the military sector, its use in the government sector is very well covered in the literature. A number of various commission reports, articles and books were written and are easily available through different academic, special or public libraries. This explains the general notion that IRM, is in fact, the product of US federal legislature.[2] It is very often directly related to work preparatory to the passage of the Paperwork Reduction Act of 1980 (PL 96-511). "The IRM concept was an outcome of the U.S. Commission on Federal Paperwork, which functioned from 1975 to 1977" (Broadbent and Koenig, 1988). The Commission produced over twenty documents which, together with the Paperwork Reduction Act, represented a framework for the implementation of information resource management. It is worth mentioning that a person most often associated with the work of the Federal Paperwork Commission is Forest W. Horton, Jr.

> As director of the commission's information management study, Horton articulated the need for 'efficient, effective, and economical management of all of the organization's information and information resources'. This approach sought to formalize the treatment of information and deal with data as a 'manageable and budgetable resource, in the same way that organizations must deal with human, physical, financial, and natural resources. (Broadbent and Koenig, 1988)

The Commission believed that "the real culprit of the paperwork burden is mismanagement of information resources. Government has tended to regard information as a relatively free and unlimited commodity, like air and sunshine, simply ours for the asking." (Commission on Federal Paperwork, 1977, p.12)

There are seven main areas of information resource management covered by the Paperwork Reduction Act:

- paperwork reduction;
- data processing and telecommunications;
- statistics;
- records management;
- information sharing and disclosure;
- information policy and oversight;
- organization development and administration.

(US General Accounting Office, 1983 pp.48-56)

> When adopted, the act's purposes and requirements appeared to be clear: federal managers were to have standard information policies and practices with an assurance of confidentiality in any federal information handling; have well managed and efficient information handling, collection, maintenance, use and dissemination; make sure that automated data processing and telecommunications technologies were well planned, obtained, and used; and, perhaps most importantly, minimize the private paperwork burden. (Caudle, 1988)

However crucial for the development of the information resource management within the Federal Government and for its wider application, the Paperwork Reduction Act, for the most part was not carried out. Still, it remains as one of the main cornerstones in the evolution of IRM.

Military sector

There are some indications that it was in the military that the first benefits of information resource manage-

ment were harnessed. However, because of its secretive character there is very little information openly available about the IRM endeavour in the military sector. According to some works published by L.G. Becker (1980, 1981, 1982) and reports published by Arthur Young and Company (1978, 1979, 1980, 1981) first attempts were made by the Defense Intelligence Agency (DIA). A Directorate for Resources and Systems (RS) was established by DIA in 1976. Its objectives were to manage budgetary, financial, and information resources , acquisitions and logistics. The Directorate was also in charge of some support services such as ADP, communications, graphics, printing and library/document related services. The original organizational structure was set up in such a way as to provide the best possible link between available resources and the execution of main services of the Defense Intelligence Agency.

In 1978, Headquarters, Department of the Army (HQDA) contracted with Arthur Young and Co. to determine the requirements for effective automated information management, to develop an IRM programme and to develop a plan for its implementation. The final report produced by the consultants covered a lot of ground. Among other things it included records, forms and reports management; data standards; co-ordination of information systems, database management, assessment of IRM technology and IRM education.

Private business

It is possible that the very first use of IRM was made by some technologically advanced private enterprise. Driven most likely by the necessity to lower the overhead expenses related to information, and maximize the use of information technology, they started to think in terms of 'economy of information'. This was not yet the real development of 'information as a resource concept'. It was an introduction to a new way of perceiving information as a corporate asset. Information and, in particular, the required processing equipment, were no longer regarded as a free commodity. There was a price to be paid for both information and technology (online time, disc space, printing, etc.) and that had to be acknowledged. Once this critical step was made, it was just a question of time to start thinking and dealing with information in a manner similar to any other asset. Accountability for information was not a simple change in the approach taken, it was a major qualitative change which brought many benefits while requiring much more attention and planning on the part of the management team. However obvious the benefits of this new IRM way of thinking and dealing with information has been for private companies, there is not much supporting evidence available. Almost every researcher, when dealing with the private sector and the beginning of IRM, is faced with the problem of information availability, given a lack of easily accessible and reliable documentation. It is difficult to obtain all the documentation needed for proper analysis, establishment and confirmation of a theory which states that it was really the private sector which made initial use of IRM. According to Karen B. Levitan (1982, pp.246-247) the reasons for the lack of open literature are two-fold:

> First, corporate studies produce internal documents that rarely get disseminated unless they are repackaged for professional meetings or publications. The IRM articles that are published are necessarily very general. Second, many corporations work with private consultants, who develop specific methodologies that are then sold to other clients as a consulting practice or in the form of conferences, seminars, handbooks, and other information management products and services. Some are good and some are not, but all are costly and the publications are generally not available in academic, public, or government libraries.

HISTORICAL PERSPECTIVE OF IRM

Another approach to studying the evolution of information resource management is by analyzing a broader time span in which IRM became a recognized concept. Such an approach enables us to determine the exact place of IRM in a chain of events which created the conditions for its appearance. Understanding characteristics of IRM and defining its relation to other elements of information management is also a result of such analysis. The historical perspective, or the place of IRM in the history of information management, is therefore, one of the building blocks which will be of help in understanding the concept of IRM.

Most researchers agree that information resource management is, in fact, a stage in the development of information management. There are differences in their beliefs about the number and the nature of those developmental stages. A two level model was offered by Burk and Horton (1988, pp.10-12). Information resource management (IRM) was put in a broader framework of information management (IM) which represented the first level of their model. The second level consisted of IRM, information functions management (IFM), information life-cycle management (ILCM) and other objects of information management.

Donald Marchand offered in 1985 his view of the evolution of information management. According to him, information management develops through four stages. Stage one is *Physical control of information*. This fifty year long stage started somewhere at the beginning of this century. It was mainly concerned with paperwork management, records/reports management, correspondence and mail management, vital records and office design. The basic technologies used were paper, typewriter, telephone, file cabinets, tabulating machines and microfilm. A fragmented and loosely co-ordinated management function was carried out by supervisory and

lower middle managers. The main objective set by managers during this stage was to increase procedural efficiency and physical control of information. Stage two was *Management of automated technology* and it covered the period from the 1960s to the mid-1970s. It was based on technology such as second and third generation computers, electronic duplicating machines, word-processors and the first voice communication equipment. Management responsibility during this stage was transferred to middle managers. Their main concern, during this stage, was technical efficiency and control of information. It resulted in the separate development and enhancement of data processing, telecommunications and office systems.

According to this classification, information resource management came as the third stage. It was predominant from the mid-1970s to the 1980s. The shift in management responsibility brought higher echelons of managers to the scene of IRM. They were mainly concerned with integrated management of information technologies, strategic planning, integration of manual and automated information resources. The basic technology during this stage was distributed data processing, personal computing, and multifunction workstations.

According to Marchand, the fourth and current stage of information management is knowledge management. It is based on expert or knowledge based systems, decision support systems and office intelligence systems. The main characteristic of this stage is "increased dependence on and penetration of information technology into operational and managerial decision making at every level of the firm." (Marchand, 1985)

Another similar model of stage development of information management was offered jointly by Donald Marchand and Forest Horton, Jr. in their book *INFOTRENDS* (1986, pp.126-127). According to them, information management develops through five different stages:

- paperwork management;
- management of automated technology;
- management of corporate information resources;
- business competitor analysis and intelligence;
- strategic information management.

The models and concepts of historical development of IRM mentioned here, show that information resource management is a stage in a longer and broader development of information management. However, historical analysis does not stop here. There are a number of elements which need to be reviewed and placed in an appropriate historical perspective when discussing the evolution of IRM. Besides this broad perspective in which the place of IRM and its relation to other IM concepts is determined, there is a narrower but, at the same time, more concentrated perspective. From that perspective, it appears that there is a specific line of development characteristic for IRM itself. In other words, there is a development trend within the IRM worth exploring.

DEVELOPMENT OF INFORMATION RESOURCE MANAGEMENT

It is always of intellectual interest to study a phenomenon from a perspective of its development over a period of time and to try to trace the path. IRM has been with us for almost three decades, a period relatively long enough to offer some ground for studying the changes which occurred in the process of its growth. IRM appeared at a particular point in time when all the conditions and demands for such a concept were met. Its body of knowledge gradually increased and now provides the necessary requirements for the appearance of a new concept. The new concept will further enhance IRM to an extent that it will become something totally new in the area of information management. However, before considering the future of IRM let us for the moment examine its developmental path.

Few books give a comprehensive coverage of IRM. The best known are those written by Horton (1985), Marchand and Horton (1986), Marchand and Kresslein (1985), Wood (1982), Taylor (1986), and Burk (1984). Although somewhat different in scope and in aspects covered, generally speaking they provide a thorough coverage of the broader subject of IRM. There are also some works published under titles which imply a comprehensive coverage of IRM but, in their essence, they mainly concentrate on either a single topic or a single aspect. An example is Ricks and Gow's book on IRM (1984) which brings a records management perspective. Another often emphasised view of IRM is from a perspective of management-information systems (MIS). Books written by Sinnott & Gruber (1981), Hussain & Hussain (1984), Duffy & Assad (1980) are good examples of such an approach.

Beside this group of books and other works concerned with a more general coverage, it seems that a period of almost thirty years of IRM studies passed through stages during which the interest of researchers was focused on the following aspects:

- information as a manageable resource;
- measuring the cost and value of information;
- IRM techniques;
- strategic planning;
- information policies.

This list, at the same time, identifies a path of development which IRM followed. It started with the simpler task of showing that information should, in its own right, be regarded as a manageable resource. Comparison to other resources, such as accounting and budgeting were among the favourite topics. From there it went through the next stage, where a set of various suitable techniques of IRM was developed. A vast number of books and articles were written on techniques

such as inventories, information flow analysis, information environment analysis, data dictionaries and information architecture. Finally, the development of IRM reached a stage where emphasis was placed on much wider and far reaching concepts. IRM started to be regarded as a part of strategic planning and an element of information policies.

> The importance of information to successful business enterprises has become a popular topic. Books that promise a 'competitive advantage' from the use of information as a 'strategic weapon' are best sellers. Information can and must be used to achieve the overall strategic objectives of the organization. (Lytle, 1986 p.317)

FUTURE ISSUES

While writing his review of information resource management in 1982 Levitan (pp.252-253) made a remark that the body of IRM literature:

> does not yet add up to a substantive management area. It still represents basically a promise. There is no IRM methodology - only suggested approaches... Given the number of obstacles to IRM, its promise to manage 'all' of the information resources in an organization must be cast in more realistic terms and expectations. IRM does address concrete management needs, but it is still moot as to whether a new IRM function will be established to resolve these needs.

Four years later Lytle (1986, p.327) wrote that:

> IRM is an integrative management technique. Deriving mostly from data processing, it has increasingly encompassed management and information areas as well. Further growth of IRM should draw on professional expertise in the information studies disciplines by bringing information professionals into the IRM arena. Conversely, IRM may provide the most promising frontier for expansion of information studies.

Lytle draws attention to some issues which need to be further developed in the future. Information policies, according to him, are primary means of managing large and complex organizations and distributing responsibility for information and information technologies. "However, the usefulness of policies for information management is not self-evident. Development of information policies as a recognized management tool should be high on the IRM priority list." (Lytle, 1986) He also regards information architecture and the value of information as other issues that are critical for further development of IRM.

Eileen M. Trauth (1989) compiled a list of the five most significant issues for the success of IRM in the future. They are:

- new and better ways for measuring information productivity;
- determining the appropriate mix of control, co-ordination, and decentralization;
- increased user accountability;
- provision of appropriate access to the expanded set of information resources;
- new management roles and increasing emphasis on user education and support.

Joseph Ferreira and Philip R. Harris (1985) see the changing roles of IRM professionals as the main issue in its further development. To assume leadership roles, IRM professionals should redefine their functions in order to cover the following responsibilities:

- information resource architects (which information processing and exchange activities need to be automated);
- information resource consultants (listen to clients, analyze their problems, and assess their computer literacy);
- information resource synergists (get various entities within a corporation to share information);
- and information resource educators.

Osamu Sato and Masahiro Horiuchi in their study of IRM in large Japanese firms (1988) came to a conclusion that co-ordination between the information system (IS) department and information users is one of the important IRM functions which deserves greater attention. Proper balance of responsibilities between the IS department and users must be found if the organization is to benefit from modern information technology and the IRM approach to its management.

As shown by many of its proponents, IRM has good prospects for development and a bright future ahead. Although there are problems and challenges to overcome, and issues to improve, its future is certain. Most of the authors agree with this. Still, there are some who are not so optimistic about IRM and its future. Their criticism sometimes goes as far as complete negation of IRM, questioning of its justification and feasibility. Usually they attack one or more cornerstones or IRM. Whatever the case, their scepticism could be used for sharpening the arguments for further development and strengthening of IRM.

John Leslie King and Kenneth I. Kraemer (1988) , professors at the University of California, in their article 'IRM: Is it sensible and can it work?' argue that there are two issues of IRM workability worth considering. The first issue questions whether "the cure is better than the sickness", while in the second one they try to identify unanticipated effects from implementation of IRM. They question whether the traditional ways of dealing with information in organizations are so bad that IRM becomes necessary. The argument is that a small fraction of organizations'

operating budgets are spent on computerized data processing which, even if improved, brings "more that a marginal solution to a marginal problem". Regarding information necessary for top level decision-making, they are of the opinion that information needed for most decisions is rarely available in the databases of lower sub-units. Another problem that IRM underestimates is, what King and Kraemer call, a need for a super-human to accomplish the broad array of IRM objectives. A list of responsibilities of the IRM executive is so wide that it would require extraordinary power to be given to him and specified in his or her job description. "A person with exceptional skills in administration, budgeting, information theory, technical systems, planning, policy-making, human relations, and operational knowledge of the organization's functions; such people are likely to be hard to find." (King and Kraemer,1988)

Possible unanticipated, and obviously negative effects which IRM can have in an organization, according to King and Kraemer, are: production of subtle tendencies toward centralization, and cost-benefit presumption in collection of information. In other words, is the 'money value of information' the only criterion to determine what needs to be collected. In addition to this, how to prove that the needs will be cost effective, and finally, who determines what is needed.

Sharing the destiny of information management IRM has become a concept whose development path is hard to predict. New information technologies are constantly bringing new solutions to existing problems.

> In many instances, managers are tempted to seek answers to information management problems by investing in new tools and techniques before they consider how their businesses should be organized to manage information resources and what contributions information management can make to corporate growth and profitability. As a result, the evolution of information management in business lags behind the tools and techniques available. The outcome is often inappropriate use of new technologies, wasted expenditures and lost opportunities. (Marchand, 1985)

What needs to be done in every single organization is a thorough and honest assessment of its position in the evolutionary path of information management. Based on the findings, new IRM policy has to be drawn with a view to the strategic integration of information resources and development goals. Therefore, proper understanding of information resource management and its evolution increases the opportunities for future growth.

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NOTES

1 Acording to McDonald (1989, p.5) records management and data management quite literally mean the same thing.

> There is no 'gap' as indicated in the title. The only gaps that exist are in the perceptions that we have of what each concept means and the functions and status of the information jurisdiction that have claimed each for their own. Records management, for instance, immediately seems to bring to mind the image of underpaid file clerks looking after paper records in file folders, while data management seems to bring to mind highly paid computer systems specialists or data administrators planning and designing complex computerized databases. The distance that exists between the two in terms of their skills, their tools and techniques and their place in the organization, have reinforced our perception that records management and data management are two distinctly separate things.

2 During the 1970s and early 1980s there were some parallel developments in Canada and Australia (Marianne Broadbent and L.B. McIntyre). The UK perspective on IRM followed a few years later (Blaise Cronin, Peter Gillman and Peter Vickers).

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