

THE IMPLICATIONS OF ELECTRONIC RECORDS

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Introduction

Office automation has become a reality. Stand-alone personal computers are universally used for word processing, and spreadsheets have become the workhorses of office life. As a result, electronic records are being created virtually everywhere in the world. Wherever computers are used to carry out a function records are being generated.

Records provide the primary evidence of how the functions of public administration are carried out. They are the building blocks of accountability. Thus they are essential to the provision of good government. But computer generated records are qualitatively different from traditional paper records; thus they are more vulnerable. Electronic records are harder to authenticate than paper records, and their legal status can be difficult to determine. The purpose of this paper is to examine the implications of office automation, and the resulting electronic records, on public sector reform programmes.

Computers and government

Computers can manipulate and process information in an almost infinite variety of ways. Information technology is being used to automate a vast range of government functions. For example, computers are being used to automate individual tasks, such as the word processing of correspondence and reports or the use of spreadsheets to manage financial information. The technology needed to perform these functions can literally be purchased 'off the shelf' at a modest price, from internationally known companies such as Microsoft Corporation or WordPerfect.

Computers also allow individuals to communicate with each other, using electronic mail across networks. Computers can also be applied to whole functions, such as the management of payroll, accounting systems, or national statistics. Some of these kinds of system have been in existence for over thirty years, usually on large mainframe computers centrally operated and maintained. While the applications are tailored to the specific needs of each organisation, the technology is usually well developed. The risk that the application will not work properly is comparatively low.

There are also newer, more experimental uses of information technology, such as for business process engineering. This use of computers presents significant risks, but the rewards are correspondingly great. This system can be complex, lengthy (over five years), and expensive. For example, in order to improve its customs processes, the country of Mauritania committed over \$1 million in the development of a new automated customs system. Now customs declarations are processed in 30 minutes instead of 48 hours; goods clear the ports in one to two days instead of five to twenty.

Governments are also looking to information technology to transform the way their services are provided to the public. For example the G7 industrialised countries have begun a series of initiatives known as the G7 Information Society. These are designed to 'encourage and promote innovation and the spread of new technologies including the development of an open, competitive and integrated world-wide information infrastructure.' One of these initiatives, called Government On-Line will 'address the desire of governments world-wide to lower costs and improve service delivery through effective and innovative use of information technology, thereby transforming government so that, by the turn of the century, most administrative business is conducted electronically.' The world's most powerful economies are aiming to conduct the bulk of their business electronically in five years time. It is inevitable that this change in administration will affect the way governments elsewhere in the world conduct their business.

The reality of automation

Computerised systems offer significant advantages over conventional manual methods. In particular, they can manipulate large amounts of information and generate a wide range of information products. Computers offer speed, precision, diversity, and flexibility. It is no wonder they have been so quickly embraced around the world as a critical information management tool.

But computers also have limitations. For example, they cannot think or organise, they simply process simple routines very quickly. This can have serious implications. The enthusiasm for new technologies often leads to haste in their application. But computers will not clean up a mess that exists already. They will simply process that mess much, much faster. If an organisation's existing procedures are muddled, if they have incomplete data, if their personnel information does not match their payroll information, a computerised system will not untangle the problem.

Therefore, a key step in any automation process is to put the existing system in order first. If the existing paper based information is incomplete and unstructured, then that data has to be reconciled, verified and organised before it is entered into the computer. Implementing a record management programme to improve the existing paper records can be an efficient and cost effective way of preparing for successful computerisation.

Another reality of computers is that they won't work without electricity. In countries where electricity is not available for several hours a day, or where the current fluctuates, one needs to think hard about relying entirely upon automated systems as the main source of information. It is important to have procedures in place that allow for the use of efficient, associated manual systems should the power supply be interrupted.

It is also true that computer systems won't run without paper; at least not for the present. When we talk about computerized systems, we really mean a computer-plus-paper system. Even in the most developed countries, most of an organisation's information is found on paper, not in electronic form. In 1989 95% of all information in the USA was on paper. By 1999 it is projected to be about 92%. This represents a noticeable decrease, but the emphasis is still very much weighted towards paper records. Moreover, in absolute terms the growth in the volume of paper in filing systems is growing, not falling, even in the USA. In other words, statistics confirm what we have all observed in our daily working lives. Computers,

together with photocopiers, have led to a massive increase in paper. We have more paper to organise and manage, not less. The widely held notion that computers will do away with the need for paper records is a fallacy. Again, a well-planned records management programme is one efficient way to manage the huge influx of paper that comes with office automation.

Computers not only create more paper documents, they actually require more documents in order to operate efficiently. The heads of computer departments or the commercial suppliers of computers do not often mention this, but the reality is that paper records are an essential component of any computer system. But the issue reaches well beyond this. In many cases the records generated by computer systems do not reside in electronic form but as paper printouts. Computers are excellent tools for manipulating information, but they are much less reliable as a means of keeping records.¹

Another limitation of computers is that the records produced by automated systems are not as reliable as those in traditional paper systems. This is in part because of the technology itself and partly because of the way the technology has been used when designing automated systems. This fact has a bearing on the objectives of public sector reform: legitimacy, accountability, competency, respect for civil rights and the rule of law. The ease with which computers can manipulate and process information no doubt improves competency, but these very characteristics create a problem because the evidential value of the resulting record can be questioned.

Part of the solution is to use paper as an integral component of the automated system. Paper records can validate the information on the database. One can arrange for the regular printing out of the contents of the database on to paper or microfilm (technically known as a 'report'). This report can include a printed date and time, indicating when the report was run on the computer system, so that one can fix precisely the state of the data at an exact moment. Thus we have a reliable and authentic record of the database; essential evidence for accountability. Second, one can create and keep data input forms which record what data was entered on the system. These must record what date the information was keyed on the computer. The paper records need to be arranged in a way that is useful if they need to be consulted. Their treatment needs to be tied to the backup cycle on the computer system. Typically, data managers operate what is known as the 'grandfather system' of backups, named after the conceit that each backup represents a generation. Thus the grandfather system means keeping three backups, each older than the subsequent one. The input forms should be arranged in input order until the third generation of the backups has become obsolete. This is to make the organisation of the re-keying of the information easier should that be necessary because the database has 'crashed'. Once the grandfather backup has become obsolete, the forms should be placed on the appropriate paper file, the paper filing system should be the ultimate authority.

It is one of the paradoxes of databases, for example, that for 90% of the time they are in operation (or even more) the data on the database is inaccurate. The constant updating of data leads to errors, and the fact that there are usually many different data contributors means that it is difficult for any individual to have an overview of all the data on the system. Usually, databases used for a particular function such as payroll have an in-built checking

¹ 'David Bearman overhead projection sheets for 'Implementing Functional Recordkeeping Systems: A Report on the University of Pittsburgh Project on Electronic Recordkeeping Functional requirements' presented to The World Bank, 4 August, 1995.

system. Once a month or once very two weeks the database is used to pay staff. The staff are naturally very keen critics of the accuracy of the data. If anyone is underpaid, the system administrator will hear about it very quickly.

On the other hand, databases without built-in checking systems are prone to error; there is no regular review of the accuracy of the information. For example, the student registration system database used by the University of London in the late 1970s was inaccurate for many years. It was only when the government requested accurate reports on a certain date every year that the inaccuracies in the data came to light. The government demanded that the registry data be accurate, and that the university was compelled to rectify the situation. It was a long and painful process taking several years. The lesson is clear, databases will tend to be inaccurate records unless there is a regular and rigorous audit by a higher authority.

Because the validity of computer generated records can be questioned, not every country accepts computer generated data as evidence in a court of law. Those that do, do so only on strict conditions. In most cases, there is a requirement that the organisation demonstrate that the computer system has consistently applied appropriate procedures to ensure the authenticity of the record. This means keeping records both of the procedures themselves, but also records to show that the procedures have been regularly applied. Obviously, whether electronic records are admissible in a country's courts of law will have a major impact on the degree to which the government can rely on electronic records for accountability.

Information versus records

What is the difference between an information system and a record keeping system? Three qualities are important: timeliness, manipulability, and redundancy. Information systems contain timely, manipulable, non-redundant data. Record keeping systems contain time-bound, inviolable, redundant data.

Data on an information system is timely: it is the latest information. Data on record keeping systems may be weeks, months, or even years old. The commercial world recognises this distinction. For example, Reuters, the news and financial information company makes a distinction between 'real time' and 'historical' information. Real time information products are updated immediately a transaction occurs, often within a fraction of a second. 'Historical' information is everything else.

An information system is designed to allow the data to be manipulated and changed. It is essential, for example, that statistical information be updatable as the core data changes. On the other hand, the data in a record keeping system must be inviolable. If it is possible to change the figures of a financial statement or the text of a policy recommendation after the event, then the resulting record is clearly not reliable.

Finally, information systems do not contain redundant data. As soon as the data in a database is superseded by more recent information, it is automatically deleted and replaced by the latest data. In contrast, record keeping systems keep large quantities of redundant data. Correspondence and reports about completed actions and projects provide valuable information and evidence.

Clearly, record keeping systems contain an origination's institutional memory, information systems do not. But what is a record?

Quite simply, a record is a document containing information about a transaction. But a sheet of paper is not enough to provide a full understanding of events; to allow the record to serve as evidence. Records require content, structure and context in order to provide reliable evidence.

Electronic information is not a record. Without the combination of content, structure and context, an electronic record is no more than a discrete piece of data; it cannot serve as evidence. Let us look at an example from recent American history. The Iran-Contra arms scandal in the United States turned on whether Oliver North was acting alone or with the knowledge of his political superiors. An important piece of evidence was a two word sentence found in the White House electronic mail system. It simple read 'well done'. Those two words were the content or data, but in themselves they were meaningless. For their significance to be dearer two other pieces of information are needed: context and structure.

The context of 'well done' was that it was processed by the White House PROFS e-mail system, a system which is encrypted and password controlled to prevent tampering, and that the message was received at some time on 20 August 1986. The structure of the record was that the message had been forwarded by the White House electronic mail system form John Poindexter to Oliver North, following a previous message which read 'Session was a success. Ollie covered following points: XXXX... gave no military advice.' The structure shows that Poindexter had much greater knowledge of North's activities than he had publicly admitted. The data alone — well done'— had no value as evidence without the structure and the context.

This is what record keeping systems do. They provide the content, the structure and the context. This cuts to the central concern of civil service reform: accountability. Without good records civil servants cannot be accountable to their political masters, and subordinates cannot be accountable to their managers.

Deciding when to use computers

Computers are a tool like any other. Before we undertake the expense and disruption of automating an activity we must be certain that it is worth the investment. Every situation is unique. It is important that we do not become seduced by the aura of modernity and the claims of manufacturers and suppliers into presuming that computerisation will automatically be the most efficient solution to our organisational problems. My job here is not to recommend an 'anti-computer' approach to information systems but to urge a cool appraisal of the options and a rational assessment of each individual case.

it is important to look at all the options before automating a function. Perhaps an individual within a department is not working effectively. The solution may be to allocate another supervisor or to improved the training of the existing supervisor rather than buy a computer. The procedures themselves may be inefficient. They could be reorganised, improving efficiency without automating. Ultimately, introducing a computer system might be the most efficient approach. But before that decision is made, it is important to cost the different options realistically and with an open mind. It is necessary to cost the space, equipment,

wages, data conversion, training and maintenance for each option. Moreover, computerising is an irreversible change, once you have committed to automating a function, it has significant long term implications for your dependence upon foreign suppliers and balance of payments.

The cost of computerising may be much higher than originally anticipated. The initial cost of buying the equipment and the software may seem enormous, but in fact they are only a small proportion of the costs of running an automated system. Getting the data on the system can actually cost more than purchasing the equipment. This is partly because computers are intolerant of even minor inaccuracies which the human mind would correct automatically. A great deal of effort has to be put into checking and rechecking the data to ensure it is absolutely accurate.

What about the costs of staff training, or equipment maintenance? Computer systems need constant maintenance. In the USA alone, about \$30 billion is spent annually on software maintenance, and in 1995 the process of fixing and upgrading ageing software will employ about 90% of all resources made available for software development and use.

The consequences of not allocating resources to computer maintenance can be severe. For example, an automated personnel management and stock control system, custom made for a palm kernel processing company in Port Harcourt, Nigeria, was abandoned after considerable expense on its development. When the number and ratio of the company's daily and monthly paid workers changes, the system needed to be revised to reclassify some workers and install a new formula for calculating wages. The cost of abandoning the system and starting afresh was much greater than the maintenance would have cost.²

The opportunities for information technology

From the executive standpoint the significance of the Information Technology explosion is threefold:

- computers present an increasing range of choices for applying technology to a widening range of a ministry's business activities
- while unit acquisition and running costs are declining steadily, ministries are also confronted with new risks and cost pressures. These rise from inappropriate technical choices, poorly designed applications, lack of co-ordination, and inadequate end-user training. As well, maintenance, processing and communications costs rise as dependence upon information systems accelerates
- the control of computer applications and data management is no longer the preserve of systems professionals. Increasingly, it is dependent on end-users initiative and skills.

In Africa other executive considerations further complicate the situation. Procurement is a case in point. It is quite common for information technology to be introduced as a component of donor funded technical assistance. Recent field studies have indicated that

² Evans E Woherem, 'Towards a Culture of Management of Software Systems in Africa', *Information for Technology and Development*, March 1995, Volume 6, pp.6, 10.

uncoordinated technical assistance from aid agencies may actually be compounding existing problems of poor information management by introducing a multiplicity of systems, which are incompatible both with each other and with the existing paper systems of recipient agencies.

Senior managers have an opportunity to ensure that any additions to computer equipment form part of a strategic procurement plan, designed to address the needs of the civil service as a whole. For example, there are discounts from buying equipment in bulk, and similar savings to be had from simplified training, user support and maintenance. A civil service wide strategy for information technology systems will ensure the advantages of sharing information or transferring data from, one system to another over networks are maximized.

The government is a major consumer of information products. Government work is by its very nature highly information intensive. According to the World Bank, in most developing countries, government procurement accounts for 40% to 60% of the consumption of information technology.³ Government procurement will, for better or worse, affect standards and offerings on the information technology market. Senior managers can have a significant effect on their administrations by planning strategically, efficiently, and co-operatively.

The role of records managers and archivists

Records managers are in the information business. Their job is the management of records, and the protection of information not just for possible research use but also, critically, for the protection of the integrity of the record. Records managers and archivists ensure the accountability of government through the protection of government records.

More than any other profession, records managers and archivists are grappling with the consequences of the information technology revolution. They need senior management support in their efforts. For example, what about the actual preservation of records in electronic form? Archivists are skilled at preserving paper records; that is their job. But rapid developments in hardware, demands for more and more powerful software, the deterioration of electronic media, the lack of adequate standards and documentation, and the failure of institutions to evolve procedures for handling electronic records, all conspire to make the preservation of electronic information increasingly difficult. Archivists are seeking solutions that ensure the authenticity and integrity of the records; which are essential to its use as evidence of government activities.

Archivists must also address the reality that governments are installing diverse computer systems, for different uses, throughout their departments. What kinds of records will result from such varied applications? Can archivists and records managers reconcile the information, in order to make it accessible now and in the future? Ideally, they should be involved in the planning stages of automation, in order to advise on the records implications of new technologies and assist with the development of planned and mutually useful strategies.

³ Eduard Tallero and Philip Gaudette, *Harnessing Information for Development: World Bank Group Vision and Strategy*, draft, July 1995.

- Records professionals need to understand the business objectives of their organisation. They need to know whether it needs highly developed record systems or whether a cost analysis would point to cheaper but less efficient systems. They need to be involved in the administrative process.
- Secondly, archivists must become ‘technologically aware’: they need to keep up to date with developments in the information technology field in so far as they have an impact on records. Training is essential to allow the records professionals to bridge the gap between the computer systems developers and the end users. While they do not have to become computer experts, they do need to be able to communicate records concerns in a way that both technologists and government officials can understand. Training and awareness such as offered through this seminar are essential.
- Finally, records managers need to forge alliances with information managers and with senior managers. Increasingly archives management will mean working as part of a team. At present few organisations manage their resources effectively. This situation is likely to change as organisations recognise the high cost of failing to manage information sensibly. The archivist is a key player in the government’s information strategy; this role needs to be recognised.

Actions for policy makers

What, then, are the actions policy makers can take to ensure the efficient management of electronic information, and the protection of vital electronic records?

- First, and most important, the legal status of electronic records needs to be resolved. Without statutory clarification of the admissibility of electronic records in a court of law, the potential of automation technologies cannot be exploited to their fullest extent.
- Secondly, the technical problems of computers need to be recognised. Where there are problems of power supply, access to spare parts, regular maintenance, and so on, a decision has to be taken over how far essential government functions may be computerised. Guidelines are required for deciding which functions are essential and what minimum level of alternative manual operation is acceptable.
- Thirdly, office automation offers enormous opportunities for the improvement of efficiency, but it also poses problems for accountability unless steps are taken to ensure that authentic, reliable records are created. This will require leadership at a senior level. Policy makers need to ensure that the institutional requirement for accountability is met by determining which databases will be maintained as records and by setting target dates for the review and audit of data, to ensure its accuracy.

Conclusion

Electronic records have implications both for records professionals and policy makers. This seminar serves as an indispensable forum for raising awareness of some of the issues. We need to be talking to each other about ways of solving the problems. This paper is offered as a contribution to that dialogue.