The Dimension of Time: Historiography in Information Systems Research

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There is much to be learned from the study of history yet, as a form of research, historical studies have been largely overlooked by the IS community. It is argued that many current information systems can be best understood in terms of decisions taken in a particular temporal context and that by ignoring history, IS research is overlooking a powerful source of insights into the nature of such systems. Based on work in IS and from elsewhere, an outline for a historiographical research method in IS is presented and some issued related to this are discussed.

Keywords: Information Systems, History, Historiography, Interpretive Research.

1. Introduction

"Those who do not learn from history are condemned to re-live it" (George Santayana).

The economist, Joseph Schrumpeter once asserted that any discipline must have four components namely:

- empirical data (observations and facts),
- theories/paradigms,
- an ethics and
- a history.

As a research field, IS has been strong on the first two of these, but less strong on both of the others. Of the latter pair, IS ethics has been steadily gaining momentum as a research field since the 1980s (for example, Mason 1986, Oz 1988). There is an Australian Institute of Computer Ethics (http://www.aice.swin.edu.au/), a Journal of Ethics and Information Technology (http://www.kluweronline.com/issn/1388-1957) and a number of other bodies and researchers actively involved in this field. By contrast, examples of rigorous historical research in IS have been few and far between. Both this literature, and the wider IT history literature are discussed below. It is the contention of this paper that there remains a distinct shortage of good IS historical studies of the development of information systems in organisations and of how IS influences and even shapes organisations over the long term. This is a big subject. What follows must, of necessity, pass lightly over a number of deep issues. What is attempted is to provide both an overview of the field and make the case for more research into what is a fascinating and rich vein of knowledge and insight.

2. What constitutes historical research in IS?

2.1 The beginning of IS history

In making a case for more study of history in IS, the first step is to recognise that, as an historical field, IS is still in its infancy. There are various points from whence one might choose to locate the start of IS history, ranging from the time of Charles Babbage (1791-1871) to the launch of the IBM 360 in 1964. For information *systems*, an appropriate start is the LEO computer system, considered by many to be the first real commercial computer system (Bird 1994, Camier *et al* 1997, Camier 2001). The first ever commercial application of electronic computing (not surprisingly a payroll) was implemented by John Pinkerton on LEO in 1951. Starting in 1951 gives researchers approximately half a century of IS history to explore; not a huge expanse of time but, given the explosive growth of ICT over this period and the relatively short life of many businesses, this is ample material with which to work. Fifty years is a long time in the history of any organisation.

2.2 History and the longitudinal study

Secondly it is necessary to differentiate historiography from other forms of research over time such as longitudinal studies and time series related research. Longitudinal studies are discussed by a number of researchers including Pettigrew (1989) and Lauden (1989). The difference between a longitudinal study and an historical study is a subtle one, but one worth making. Distinctions between these two types of research can include some or all of the following:

Timescale: Most longitudinal research takes place over a relatively short period, say three to five years. Where it occurs, long term longitudinal research is often

intermittent, i.e. it looks at the state of a system or organisation or whatever at intervals, for example every five or ten years.

Presence: A longitudinal study implies that the researcher is present, if not all of the time, then at least at intervals during the period in which events are being studied. Historical researchers, on the other hand, are rarely present at the time of the events being studied.

Real time: Implicit in the preceding points is that a longitudinal study looks at events as they happen, not in retrospect (although it may subsequently reflect on these events in retrospect). Historical research generally considers events in retrospect which both gives a different perspective and necessitates different research methods.

Sources: Longitudinal studies are generally based on observation and contemporaneous measurement. Historical studies generally use a variety of other sources such as documents, commentaries, artifacts and interviews with external observers or commentators.

Focus: A longitudinal study follows a thread of events over time and its aims are description and explanation. Historical studies may do this of course, but historical studies usually interpret and sometimes judge.

Notwithstanding the above, the line between the longitudinal study and the historical study is a blurred one. Historiography is generally (though not necessarily) concerned with events that happened over quite a long period, but it can also be concerned with a short episode or with current events. The terms 'living' or 'contemporary' history are sometimes used to describe the latter. But cases such as this are the exception rather than the rule. Most of the time, the historical researcher will not have been present when the events occurred and will have to reconstruct and interpret events from a variety of sources.

2.3 Time series analysis

Another type of research analyses data gathered over time (frequently by somebody else and for a different purpose). By definition, most time series related research (which encompasses, *inter alia*, much econometric research) is dealing with both the past and an extended period of time. A well-known example of the latter type of research is that of Loveman (1994) and Brynjolfsson and Hitt (1994; 1999) who used data collected over the period 1978-1984 to examine the productivity paradox. Hitt and Brynjolfsson, like other statisticians and econometricians, may seek and sometimes find patterns in data, but they are not carrying out historical research. Nor, one suspects, would they claim to be doing so.

2.4 Defining historiography

There is not space in a short paper to expound at length on the nature of history and historiography, but this debate about this cannot be avoided if a rigorous tradition of IS historical research is to be developed so it is useful to summarise at least some of the issues in historiography which have been fiercely argued over the past 200 years or more.

Perspectives on what constitutes history have changed over time. Carr (1961) states that the 19th century was concerned with 'facts'; in the words of the German historian Ranke, the purpose of history was simply to "…show how it really was (*wie es eigentlich gewissen*)" (Carr 1961, p3.) Historians who followed this doctrine were called Positivists. Methodology comprised establishing the facts, then drawing your conclusions strictly therefrom. As in positivist science, such an approach is predicated on a separation of subject and object. To followers of Ranke, all writing before this point might have been literature or even evidence, but was not history. So much for Herodotus and Anna Comnena!

Towards the end of the 19th century ideas about what constituted history started to change. It began to be argued that history was about interpretation and that any history needed a 'philosophy'. Collingwood (1993) considered that the study of history was the study of thought. History, as viewed by Collingwood, is the re-enactment in the historian's mind of the thought whose history he is studying. To add to the difficulties, the evidence with which historians have to work is often, if not actively partisan, written by the winning side or by members of a certain class or group. Worse, throughout much of history, history itself was not considered that important. According to Galbraith (1951), history was not part of medieval education. Had not Aristotle himself declared that history was less worthy of

attention than history (Connell-Smith and Lloyd 1972)?

From this lengthy debate, two points are worth distilling out for the purpose of the present discussion. First it is simply not possible to know everything about history. Thus for example, Elton (1955) in the preface to his study of Tudor England reflects on the various ways he could approach his subject: from the viewpoint of religion, maritime expansion, Shakespeare and so on. Since it is impossible to view a complex series of events holistically, most professional historians choose to focus on some aspect of history and follow that.

Secondly Stanford (1986) describes the structure of history as follows:

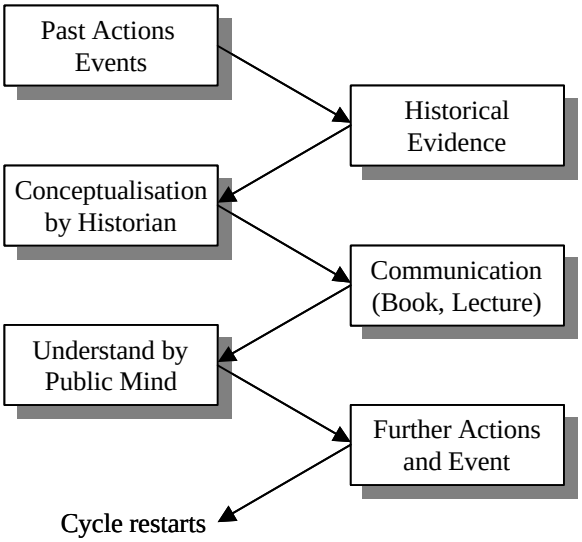

Figure 1: Structure in history (after Stanford (1986))

Both of these have relevance for any study of IS history. There are many viewpoints from which one might approach the subject: the development of hardware, the impact of the military, developments within the airline industry and so on. Secondly, a cursory glance at figure 1 immediately shows why many of the issues that one encounters in reading about historiography are the same as those that one encounters when dealing with interpretive research. The sequence shown in figure 1 could, with a few minor modifications, be used as a model of the interpretive process as described by Walsham (1993). The main difference between historical research and interpretive research into current events may come down to the absence of living witnesses in studies of the past.

3. Published historical research in IS

3.1 Introduction

It was stated in the Introduction that there were relatively few IS historiographies. Specifically, there is only a modest number of journal and peer reviewed publications of the development of IS within organisations over a prolonged period of time. Some of these are discussed below. However there has been a considerable volume of output on the history of the information *technology* and the IT industry in books, the trade press and in academic publications.

3.2 Histories of IT

There is no shortage of good research on the history of computers and information technology, *qua* technology. Publications range from popular books through the *IEEE Annals of History of Computing* to numerous professional articles and conference papers. There has also been, since 1988, a series of conferences on the history of computing held in various locations in France (*http://www.aconit.org/colloque2002/).*

There are many books on computer history. Amongst those looking at the development of computer technology and/or the computer industry are Malik (1975), Kidder (1982) Augarten (1984), Basche (1986), Camier *et al* (1997), and Campbell-Kelly and Aspray (1996). Other authors have studied different facets of the industry such as software (Campbell-Kelly 1995) and computer languages (Wrexblat 1981). Some books, notably *Kidder's Soul of a New Machine*, which won both a Pulitzer Prize an American Book Award for Non Fiction, and Cringely's idiosyncratic account of the development of the PC industry, *Accidental Empires*, (Cringely 1996) have been best sellers.

There have been many articles and papers published on aspect of the evolution of the industry. The *IEEE Annals of Computing History* have been published since 1979 and provide a wide range of scholarly articles on various aspects of IT history. A recent paper from the *Annals* by Ceruzzi (2001) contains an overview of the past 20 years. However few of the articles published in the *Annals* over the past 30 years are about information systems. The focus tends to be either on the history of specific technologies or technology companies or on the impact of technological developments on an industry or society as a whole. In Spring 2001, the journal *Business*

History Review devoted an issue to IT history (Haigh 2001, Berlin 2001, Campbell-Kelly 2001, Abbate 2001) (This may have been to make up what is a notable deficiency. Over the period 1970 to 2000, *Business History Review* published only one article in this general area: Wells (2000)). Of these, the article by Haigh might be broadly classified as being about the impact of information technology on organisations generally or at least about systems issues. The other three are firmly in the tradition of the history of the technology the computer industry.

3.3 (M)IS historiography

In contrast to technology and industry history, when one seeks research on IS or MIS, the amount of published work is remarkably small. As Mason et al (1997b) point out, historical studies of MIS are not the same thing as historical studies of technology or of the development of the IT industry. Historical research of this nature is confined to a relatively small number of publications although the shortage in quality is made up for by the high quality of several of these.

A number of these publications revolve around a project which has drawn a great deal of attention: the development of the Operational Strategy by the UK Department of (Health and Social Services)from 1981 onwards. Studies of this include Dyerson and Roper (1991), Fallon (1993) and Margetts (1999). Margett's study is part of a wide ranging scholarly work which compares the development of the tax and social welfare computer systems in the US and UK over a twenty year period. At the other pole, Fallon's more journalistic approach describes the system from its inception in 1981 to the implementation of the main system in the late 1980s and early 1990s.

A further stream of work emerged from the Harvard MIS History project (Carlson 1993). A number of researchers were involved in this project including Carlson, Mason, Copeland, Fisher and McKenney. Publications which resulted from this include the widely cited study of airline reservations systems (Copeland and McKenney 1988) and a number of publications by McKenney and others on the development of electronic banking in Bank of America (Fisher and McKenney 1993, McKenney *et al* 1997). The work of the Harvard MIS History project culminated in the publication of a book (McKenney *et al* 1995).

Recently, a number of other scholars have looked at organisational issues over time. Winter and Taylor (2001) analyse the impact of IT on the transformation of work as does Orlikowski (1996) though neither of these are really historical studies. Campbell-Kelly (2001b), probably the leading UK historian of IT, examines the impact of IT on organisation in the British census at the turn of the 20th century. Yates (1995) has studied the impact of application software on the insurance industry during in the 1960s and early 1970s.

There are therefore some good exemplars of historical research in IS, but considering the scale and scope of IS in the 50 years since LEO produced its first payslip, this is a very modest literature indeed.

3.4 Theories of IS history

The aim of the historical positivists, or at least of positivist philosophers of history, was to use the fact to derive theories of history. In terms of IS history, three such theories are worth mentioning, although only one of these emerges from the 'history' literature and that is that proposed by Mason, Copeland, McKenney and Fisher. This theory is discussed in the following section. A number of other researchers have offered models of IS evolution over time which, even if not considered by their authors to be 'historical' research, are based on observation of how IS evolves in organisations. Two well known examples of this are the Nolan-Norton model (Nolan 1979) and Scott-Morton's (1991) model of IT evolution.

Finally, in this brief survey, a number of other scholars have come at history from a more reflective or specific position. Examples of this include Ein-Dor and Segev (1993) who look at the emergence of different types of information system over time and Locker *et al* (1996) who consider some of the historical problems in examining the history of business communication. Within the field of medical informatics, there have been a number of publications which have looked at the historical development of this field including Blum and Duncan (1990), Collen 1995 and Kaplan (1987; 1988; 1995).

This short review does not claim to be comprehensive and is only part of a continuing project to establish the extent of studies of IS history. However, at this stage it seems reasonable to conclude that while the history of technology has been and continues to be well served, there is room for much more research into the historical evolution of IS in organisations.

3.5 Why the vacuum?

Why in comparison to the history of computing *per se*, has historical research in IS been largely ignored? The reasons for this are not obvious. It cannot be because it is uninteresting. Four possible reasons are:

1 It is by nature interpretive and, until relatively recently, interpretive research has been poorly regarded by many researchers. This was shown clearly by Orlikowski and Baroudi (1991) in their study of the assumptions underlying IS research (see also Lee 1991).
2 Historical research is not a research technique with which IS students are familiar. A student who wants to do historical research into IS will not find anything about this in the text books or in the typical research methods course. IS is a dynamic subject with a short half-life of knowledge. Yesterday's technology is quickly forgotten in the pressure to keep knowledge up to date. To misquote Henry Ford, history is junk.
3 It involves research methods which IS researchers find uncongenial. Historical research involves searching through archives, building up indices of documents and possibly even physically searching for material. The actors who participated or shaped the events at the time may not be accessible (or even alive), so researchers have to rely on secondary or even tertiary sources, something with which IS researchers are not always comfortable.
4 .There is little by way of methodological guidance available within the IS literature. The shelf is not entirely bare. There is some good work by Copeland and Mason, which is discussed below, based on the work of the Harvard MIS History project.

Whatever the reasons for the lack of activity, this neglect is unfortunate. Historical research offers many attractions to IS researcher and, as the next section shows, there is at least one methodological model available to follow. Furthermore, there is also considerable scope for developing new models based on the wide historiographic research literature.

4. Methodological issues

4.1 Historiography and other IS research methods

Historical research is not radically different from other types of research which are widely used in IS. As already noted, echoes of the debates within IS are to be found in discussions of historiography amongst professional historians. When one considers the specific case of IS or even more specifically MIS, an immediate question is whether, as Keiser (1994) suggests is possible for organisational history, there are patterns or theoretical models that emerge from history?

4.2 One framework for IS research

One theory of IS evolution in organisations which can be used as a frame for such research has been proposed by Mason *et al* (1997a). This encompasses two concepts. The first is what they describe as three historical roles. The first role is that of the leader who recognises a crisis and the need to respond to it. The second is the maestro, a person who understands both the business and the technology and who has the confidence of both communities. The third is the 'supertech', the person who comes up with the innovative or creative solutions.

The second construct that they propose is the cascade. The cascade is a conceptual framework for describing the development or emergence of an information system and is predicated on there being a 'crisis' in the organisation which IS is used to resolve. It runs as follows:

- There is a crisis;
- This is followed by the search for a technical solution;
- An initial technical solution is found;
- This leads to an adjustment in the organisational structure;
- Assets are formed which resolve the crisis;
- Competitive advantage results;
- A dominant design emerges.

Based on this precept, their method involves a number of steps. First, the researcher should ask 'focusing questions' broadly along the following lines:

- What were the social, technical, political or economic factors that caused the crisis that threatened the organisation?
- Why was IT proposed as a solution?
- How was the technology identified, selected, infused and absorbed?
- What conditions favoured innovation in this organisation and not in others?
- Who played the key executive and technical roles and how were these roles played?
- How did the subsequent events unfold?
- What was the result?
- How was the organisation changed?
- What changed in the industry as a result?

Secondly the researcher should specify the research domain and determine the primary and secondary units of analysis. Typically the primary unit is the organisation, the secondary unit being the industry/economy within which it operates.

The third step in their method is gathering evidence. This starts with public sources. The timeline, in particular, is a key methodological tool (this tool is also used and discussed by Pettigrew (1979)). In research of this type there are, as elsewhere, primary and secondary sources. Secondary sources can be used, but are not generally adequate for good research (they use the interesting term "espoused theory" to describe the bias that can be induced by this type of research). Primary sources are key and these are of four types:

- Written (e.g. notes, diaries, internal documents generally).
- Material in the form of objects.
- Traditional in the form of stories.
- Eye witnesses. These are the most important primary source.

This method is close to that described by Yin (1993; 1994) for case study research. In fact, if the case approach as outlined by Yin is combined with Walsham's ideas on interpretive research, the result is, as a methodology, quite close to the above outline and to that in diagram 1. The limitation of Mason *et al's* methodology is its assumption of a crisis. Not all organisations undergo crises of the magnitude described by the McKenney *et al* (1997) in the Bank of America. If we are to believe Greiner (1998), all organisations go through a regular series of crises as they grow, but these are not the types of crisis envisaged discussed by Mason *et al*. It may be a fruitful field of research to examine the relationship between the evolutionary crises that Greiner describes and the evolution of IS.

4.3 Possible future directions into the past

That said, it does not take a major crisis to justify an historical study of IS in an organisation. The idea of dominant design is a powerful one, but one which, by definition can only be created in a minority of organisations. What of organisations which neither have such a crisis or where no dominant design emerged or where such a design emerged without a crisis? There is much to be learned from such studies. Questions that might (and in some cases have been studied) include:

- How has the evolution of information systems affected the evolution of power structures within organisations?
- Why do some organisations use IS much more effectively than others over time?
- How have organisational structures been altered over time by IS evolution?
- Can a dominant design be achieved without a crisis? Is leadership alone sufficient?
- How important is the role of leaders/ individuals in long term effectiveness in use of IT?

There are also many other areas of IS research which might benefit from deeper historical research. These include:

- IS value;
- IS/IT diffusion;
- Knowledge management;
- Decision support;

and so on.

The conjecture at the heart of this paper is that such issues as the use, speed of diffusion, effectiveness and value for money obtained of IS are things which are in large part a product of historical decisions. The methodology to investigate this conjecture is essentially a combination of case study, interpretation and good, old fashioned digging and interviewing, but there remains work to be done on developing further theoretical frameworks beyond the special cases considered to date.

5. The case for historical research in IS

In his writings on business history, Alfred Chandler asks a series of provocative questions. What in the past has given businesses the opportunity or created the need for them to change and what were they doing when they did it? What did business leaders know at the time? Why did the change come when it did? Why did it take the form it did? What was the result? To these questions we may add: what did IS add to this process?

The case for further research into the history of MIS was forcefully made by Mason *et al* in 1997 in *MIS Quarterly*. In so doing they draw on work by Kieser (1994) on organisation theory. Keiser suggests that there are four reasons why historical research would add value to that discipline, all of which apply to IS:

- First both the structure and the behaviour of organisations reflect the culture and circumstances in which they develop.

Technology innovations are, in Mason *et al*'s (1997b, p310) interpretation:
"…heavily conditioned by the historical milieu from which they emerged. Contemporary economists refer to this as path dependence."

- Secondly, the path or trail of an organisation results from influential decisions that key parties make. Keiser argues that historical analysis teaches us that existing organisational structures are not determined by some set of abstract impartial laws, but as a result of decisions made by individuals and groups over many years. These decisions were made in response to problems and/or opportunities at the time and were conditioned by historical context.
- Third, the identification of organisational problems and of their appropriate remedies is often not free of ideology or the researcher's perspective. Sometimes history is fashioned to serve as a mirror of the researcher's own beliefs. This is, of course, the question addressed by hermeneutics, however the absence of eye-witnesses with whom the researcher can engage effectively terminates the hermeneutic circle leaving the researcher to interpret other 'dumb' sources of evidence. Good historical research can counteract this potential bias.
- Fourth, by confronting them with historical developments, theories can be subjected to a more radical test than they have to pass when merely being confronted with short run changes. A further advantage is that this sheds light on a society's, or in this case an organisation's, resistance to change.

Decisions made in the distant past affect numerous aspects of how organisations use IS today including IS organisations, suppliers, architectures, applications and attitudes. Moreover, the historical perspective can give quite a different picture of events. In the introduction to their article on the SABRE system, Copeland and McKenney (1995) refer to how these systems have become popular (they might have said almost sacred writ) in the competitive advantage literature. However looking at them from an historical perspective gives a rather different view from the sometimes semi-mythical perception held by those who have never studied the genesis of these systems in any detail. This does not invalidate their role in achieving competitive advantage for American and United Airlines, but it does give a much deeper insight into how these systems emerged and in particular how far back in time these developments originated. SABRE was no overnight phenomenon.

6. Conclusion

It is almost a cliché to say that IS is an instrument of economic and social change and a specific case of what Schrumpeter calls industrial mutation. IS is one aspect of the phenomenon of creative destruction. It changes the way businesses do business and the ways that they are organised. Arguably information technology is currently the most influential force leading to the restructuring of business, politics and economics. In the process of this change, a new bureaucratic form is being created called the "information based organisation" (Drucker 1988). If we are to understand this organisation, we need to understand both how it has emerged as well as what it is.

The study of history offers a valuable perspective with which to view our present circumstances. History provides the context within which IS phenomena occur. History allows the researcher to follow a trail and illuminates the role of decision making in shaping events. At least four different products can emerge from IS historical research:

- An account of important past events,
- Use of the data collected in a process of inductive reasoning to see historical patterns,
- Validation or falsification of existing theory and
- New hypotheses.

Each of these is valuable in its own right. A good piece of historical research may yield all four.

Buckland (1998, p3) describes history and information systems as having 'an unusual relationship'. History is concerned with the analysis, weighing and interpretation of evidence. Information systems are concerned with the selection, representation and preservation of that very evidence. If there are no documents, there is no history. This paper started with a quotation from the philosopher George Santayana. It is apposite to finish with another quotation from Carr (1967, p68):

> *"Learning from history is never simply a one way process. To learn about the present in the light of the past means also to learn about the past in the light of the present. The function of history is to promote a profounder understanding of*

both past and present through the interrelation between them."

References

Abbate, J. (2001) "Government, Business and the Making of the Internet", *Business History Review*, 75, pp 147-176.

Augarten, S. (1984) *Bit by Bit: An Illustrated History of Computers*, Ticker and Fields, New York.

Basche, C. (1986) *IBM's Early Computers*, MIT Press, Cambridge, Mass.

Berlin, L. (2001) "Robert Noyce and Fairchild Semiconductor, 1957-1968", *Business History Review*, 75, pp 63-102.

Bird, P (1994) LEO: *The First Business Computer*, Hasler, London.

Blum, B. and K. Duncan (eds.) (1990) *A History of Medical Informatics*, ACM Press History Series, Addison-Wesley.

Brynjolfsson E. and L. Hitt (1999) "Paradox Lost? Firm Level Evidence on the Returns to Information Systems Spending.", in Willcocks, L. and S. Lester (Eds.), *Beyond the IT Productivity Paradox*, Wiley, pp 381-409.

Brynjolfsson, E. and L. Hitt (1994) "Paradox Lost? Firm-level Evidence on the Returns to Information System Spending", *Management Science*, 42, 4, pp 541-588.

Buckland, M. (1998) "Overview of the History of Science Information Systems (Draft)", *American Heritage Foundation Conference on History and Heritage of Science Information Systems, Pittsburgh*, October 1998. www.sims.berkeley.edu/~buckland/chfintr.htm.

Camier, D. (2001) "LEO and the Computer Revolution", *Proceedings of "Business Computing, the Second 50 Years*", The LEO Foundation, London.

Camier, D., J Aris, P. Hermon and F. Land (1997) *LEO: The Incredible Story of the World's First Business Computer*, McGraw Hill, London.

Campbell-Kelly, M and W. Aspray (1996) *Computer: A History of the Information Machine*, Basic Books, New York, 1996.

Campbell-Kelly, M. (1995) "Development and Structure of the International Software Industry, 1950-1990", *Business and Economic History*, 24, 2, pp 73-111.

Campbell-Kelly, M. (2001a) "Not Only Microsoft: The Mature of the Personal Computer Industry, 1982-1995", *Business History Review*, 75, pp 103-146.

Campbell-Kelly, M. (2001b) "Information Technology and Organizational Change in the British Census, 1801-1911", in Yates, J. and J. Van Maanen (Eds.) *Information Technology and Organizational Transformation: History, Rhetoric and Practice*, Sage Publications, London, pp 35-58.

Carlson, W. (1993) "Transforming an Industry Through Information Technology", *Annals of the History of Computing*, 15, 1, pp 39-43.

Carr, E. (1961) *What is History?,* Macmillan Press, London

Carr, E. (1967) *What is history?* Penguin Books, London.

Ceruzzi, P. (2001) "A View from 20 Years as a Historian of Computing", *IEEE Annals of the History of Computing*, October-December, pp 49-55.

Collen, M. (1995) *A History of Medical Informatics in the United States: 1950-1990.* American Medical Informatics Association.

Collingwood, R. (1993) *The Idea of History : With Lectures 1926-1928,* Oxford University Press, Oxford.

Connell-Smith, G. and H. Lloyd (1972) *The Relevance of History*, Heinemann Educational Books, London.

Copeland, D. and J. McKenney (1988) "Airline Reservations Systems: Lessons from History", *MIS Quarterly*, 12, 3, pp 353-370.

Copeland, D., R. Mason and J. McKenney (1995) "SABRE: the Development of Information-Based Competence and Execution of Information-based Competition", *IEEE Annals of the History of Computing*, 17, 3, pp 30 –57.

Cringley, R. (1992) *Accidental Empires: How the Boys of Silicon Valley Make Their Millions, Battle Foreign Competition, and Still Can't Get a Date*, Viking, London.

Drucker P. (1988) "The Coming of the New Business Organisation", *Harvard Business Review*, 66:1, January-February, pp 48-53.

Dyerson, R. and M. Roper (1991) "Implementing the Operational Strategy at the DSS: From Technical Push to User Pull." in Adler, M and R. Williams (Editors), *The Social Implications of the Operational Strategy*, New Waverly Papers, Social Policy Series No. 4, University of Edinburgh, U.K., pp 1-10.

Ein-Dor, P. and E. Segev (1993) "A Classification of Information Systems: Analysis and Introspection", *Information Systems Research*, 4, 2 pp 166-204.

Elton, G. (1955) *England under the Tudors*, Methuen, London.

Fallon, I. (1993) *The Paper Chase*, Harper Collins, London.

Fisher, A. and J. McKenney (1993) "The Development of the ERMA Banking System: Lessons from History", *IEEE Annals of the History of Computing*, 15, 1, pp 44-57.

Galbraith, V. (1951) *Historical Research in Medieval England*, University of London (Constable, London).

Greiner, L. (1998) "Evolution and Revolution as Organisations Grow", *Harvard Business Review*, May-June, pp 55-67.

Haigh, T. (2001) "Inventing Information Systems: The Systems Men and the Computer, 1950-1968", *Business History Review*, 75, pp 15-61.

Kaplan, B. (1987) "The Influence of Medical Values and Practices on Medical Computer Applications." in Anderson J.G. and S.J. Jay (eds.), *Use and Impact of Computers in Clinical Medicine*, Springer, New York.

Kaplan, B. (1988) "Development and Acceptance of Medical Information Systems: An Historical Overview", *Journal of Health and Human Resources Administration, Special issue on Medical Information Systems* 11(1): 9-29, Summer.

Kaplan, B. (1995) "The Computer Prescription: Medical Computing, Public Policy, and Views of History," *Science, Technology, and Human Values* 20(1): 5-38, Winter.

Kidder, T. (1982) *The Soul of a New Machine,* Allan Lane, London.

Kieser, A. (1994) "Why Organization Theory Needs Historical Analyses - and How This Should be Performed", *Organizational Science* 5:4, November, pp 608-620.

Lauden, K. (1989) "Design Guidelines for Choices Involving Time in Qualitative Research" in Cash, J. and P. Lawrence (Editors), *The Information Systems Research Challenge: Qualitative Research Methods*, Harvard Business School, Cambridge, Mass.

Lee, A. (1991) "Integrating Positivist and Interpretive Approaches to Organizational Research", *Organization Science*, 2, 4, pp 342-365.

Locker, K., S. Miller, M. Richardson, E. Tebeaux, and J. Yates (1996) "Studying the History of Business Communication", *Business Communications Quarterly*, 59, 2, pp 109-138.

Loveman, G. (1994) "An Assessment of the Productivity Impact of Information Technologies" in Scott Morton, M. (Ed.) *Information Technology and the Corporation of the 90s*, Oxford University Press, pp 84-110.

Malik, R. (1975) *And Tomorrow the World? Inside IBM*, Millington Books, London.

Margetts, H. (1999) *Information Technology in Government: Britain and America*, Routledge, London.

Mason, R. (1986) "Four Ethical Issues of the Information Age", *MIS Quarterly*, 10, 1, pp 5-12.

Mason, R., J. McKenney and D.G. Copeland (1997a) "An Historical Method for MIS Research: Steps and Assumptions", *MIS Quarterly*, 21, 3, pp 307-320.

Mason, R., J. McKenney and D.G. Copeland (1997b) "Developing an Historical Tradition in MIS Research", *MIS Quarterly*, 21, 3, pp 257-276.

McKenney, J., D. Copeland and R. Mason (1995) *Waves of Change: Business Evolution Through Information Technology*, Harvard Business School Press, Boston.

McKenney, J., R. Mason and D. Copeland (1997) "Bank of America: The Crest and Trough of Technological Leadership", *MIS Quarterly*, 21, 3, pp 321-353.

Nolan, R.L (1979) "Managing the Crisis in Data Processing", *Harvard Business Review*, May-June., pp 115-126.

Orlikowski, W. (1996) "Improvising Organizational Transformation Over Time: A Situated Change Perspective", *Information Systems Research*, 7,1 March, pp 63-92.

Orlikowski, W. and J. Baroudi (1991) "Studying Information Technology in Organizations: Research Approaches and Assumptions," *Information Systems Research* (2), pp 1-28.

Oz, E. (1992) "Ethical Standards for Information Systems Professionals,: A Case for a Unified Code", *MIS Quarterly*, 16, 4, pp 423-433.

Pettigrew, A. (1979) "On Studying Organizational Cultures", *Administrative Science Quarterly*, 24, December, pp 570-581.

Pettigrew, A. (1989) "Issues of Time and Site Selection in Longitudinal Research on Change" in Cash, J., P. Lawrence (Editors), *The Information Systems Research Challenge: Qualitative Research Methods*, Harvard Business School, Cambridge, Mass.

Scott Morton, M. (1991) *The Corporation of the 1990s: Information Technology and Organizational Transformation*, Oxford University Press, UK.

Stanford, M. (1986) *The Nature of Historical Knowledge*, Blackwell, Oxford.

Walsham, G. (1993) *Interpreting Information Systems in Organisations*, John Wiley, Chichester, England.

Wells, W. (2000) "Certificates and Computers: The Remaking of Wall Street 1967-1971", *Business History Review*, 72, pp 193-235.

Winter, S and L. Taylor (2001) "The Role of Information Technology in the Transformation of Work: A Comparison of Post-industrial, Industrial and Proto-Industrial Organization", in Yates, J. and J. Van Maanen (Eds.) *Information Technology and Organizational Transformation: History, Rhetoric and Practice*, Sage Publications, London, pp 7-34.

Wrexblat, R. (Ed.) (1981) History of Programming Languages, Academic Press, New York.

Yates, J. (1995) "Application Software for Insurance in the 1960s and Early 1970s", *Business and Economic History*, 24, 1, pp 123-135.

Yin, R. (1993) *Applications of Case Study Research*, Sage Publications, London.

Yin, R. (1994) *Case Study Research - Design and Methods*, 2nd Edition, Sage Publications, London.