Using Historical Methods in Information Systems: A Primer for Researchers

Janet Toland
Victoria University of Wellington
janet.toland@vuw.ac.nz

Pak Yoong
Victoria University of Wellington
pak.yoong@vuw.ac.nz

ABSTRACT

This article describes the use of historical methods in information systems research and provides a practical example of how this technique was used in a recent research project. Though the information systems researcher already has a rich cornucopia of research methods to choose from, historical research has the power to offer insights over and above those provided by other techniques. The researcher is forced to step away from a narrow focus on the research question in order to examine the "big picture". This big picture approach means that recurring patterns are identified providing a broad set of findings that are applicable in many different settings. However the flip side is that historical research can have a lack of focus and does not always offer immediate answers to specific research questions. This paper provides guidelines for the use of historical methods by information systems researchers by demonstrating how the seven step approach developed by Mason, McKenney and Copeland was applied to an historical research study which explored the relationship between ICTs and regional development in New Zealand between 1985 and 2005. This research reveals the value of historical research for information systems researchers by showing the effects of long term social trends on ICT use. It also highlights some of the pitfalls that potential users of historical research need to be aware of such as gaps in the data trail and the questionable credibility of some historic records.

Keywords: Historical Research, Historical Methods, Information & Communication Technologies, New Zealand

INTRODUCTION

Information systems have been defined as "a set of interrelated components that collect, manipulate, store and disseminate data and information and provide a feedback mechanism to meet an objective. The feedback mechanism helps organisations achieve their goals, such as increasing profits or improving customer service" (Stair et al. 2011 pg 5). The discipline is relatively young, and the technologies being researched are ever changing. Information systems researchers may see little value in going back to look at technologies that are now obsolete. Why carry out research into COBOL programming, when everyone is now using C#? However information systems is more than the study of technology alone; the interplay between technology, systems and organizations is multi-faceted and complex; the availability of a new technology on its own does not guarantee it's successful adoption

The article sets the scene by first discussing the origins of the use of historical methods in information systems and the founding work done in business history and the history of technology. It then goes on to describe a research project which used historical methods to investigate the contribution of ICTs to

regional development in New Zealand. In particular the seven step approach developed by Mason, McKenney & Copeland (1997b) is discussed in detail. This is followed by a reflection on the lessons learned while using this approach. The article concludes by considering what new insights the use of the historical approach can bring to the study of information systems.

THE ORIGINS OF HISTORICAL METHODS IN INFORMATION SYSTEMS

Historical methods consist of a collection of techniques and approaches which draw on both traditional history, and social research. The methodology was first developed in the nineteenth century by social thinkers such as Marx, Durkheim, and Weber (Neuman, 2003). There has been a resurgence of interest in historical methods in social science since the 1970s, when researchers began to recognise the limitations of methodologies such as structural functionalism and economic determinism, which take a static view of society. Increasing political conflict between Western nations meant that researchers became interested in exploring social change, and looked for a methodology that took into account historical and cultural contexts. Historical methods provide a powerful set of tools for addressing broad, big picture questions (Neuman, 2003).

The most well-known example of the use of historical research in information systems is the work carried out by Mason, McKenney & Copeland (1997a, Mason et al., 1997b). However historical comparative research has long been used by other disciplines. The two areas most closely related to information systems are business history and the history of technology. Business history is concerned with understanding the interplay between economics and individuals, organisations and wider society, while the history of technology is more concerned with the technological artefact itself.

Business History

Business history is generally agreed to have begun as a discipline in the 1920s at Harvard Business School (Hunter et al. 2006) where it grew in tandem with the use of the Harvard Case Method as a teaching tool. Each case would present issues faced by a particular organisation and ask readers to put themselves in the shoes of key decision makers. However business history has grown beyond focussing on a single organisation and the key individuals within it to encompass the broader perspectives of the industry sector alongside national and global perspectives. Many researchers regard Alfred Chandler's "Strategy and Structure" an account of emergence of the multi-divisional firm in American corporate history as the founding stone of the discipline (Chandler, 1962).

The early days of business history focussed on individual entrepreneurs and the organisations they founded (Yates 1997). Since the 1990s' the emphasis has shifted from significant individuals to institutions and organisations. Though this approach opened up new areas of research there was a concern that it could lead to institutional determinism if taken to extremes, meaning that individuals are portrayed as mere pawns at the mercy of the organisations they belong to (Yates, 1997). Researchers (Orlikowski, 2000, Yates, 2005) have used methodologies such as structuration theory to address this unease.

History of Technology

Much of business history is driven by economics, an approach which has worked well for some but has been criticised by others for having a narrow focus on the market (Yates, 1997), an alternative but related field is that of the history of technology which focuses on the technological artefact. As far as information technology goes the majority of material published in this area tends to concentrate on hardware and software development. Misa (2007) identifies three thematic traditions that have emerged in the history of computing in the last twenty-five years. The first phase was machine

centred and concentrated on hardware and software, in the second phase looked at the "information age" characterised by Manuel Castells Information Age trilogy (Castells, 1997). The third theme was taken up by historians who began to ask the question "How did certain institutions shape computing?" organisations which received particular attention were the US military services, the National Science Foundation and IBM.

Both business history and the history of technology have been criticised for having a technologically deterministic approach, where technology is seen as an independent variable that changes structures such as society, firms and the organisation of work (Yates, 1997). In reaction to this many researchers in the history of technology field adopted the social construction of technology approach (Bijker et al., 1989, Hughes, 1994). The use of the social construction approach reflected three different trends, the first was a move away from a concentration on the individual entrepreneur, the second represented a move away from technological determinism, and the third trend was to study technological development as a whole, rather than making distinctions between technical, social, economic and political aspects. Thomas Parke Hughes used a systems approach to integrate technical, social, economic and political aspects in his studies of the different ways in which electric power networks spread across Western countries (Hughes, 1983).

Historical Methods in Information Systems

The use of historical methods in information systems was pioneered by Mason, McKenney and Copeland in their studies of Bank of America, Lyons Electronic Office (LEO) and American Airlines (Mason, 2004, Mason et al., 1997a, Mason et al., 1997b, McKenney et al., 1995, McKenney et al., 1997). Their approach was also used in a study of the use of IT in Texaco within a forty year period (Hirschheim et al. 2003; Porra et al. 2005; Porra et al. 2006).

Mason, McKenney & Copeland, based their argument for the use of historical methods on the work of Joseph Schumpeter who saw capitalism as being characterised by *"gales of creative destruction"* where the economy is radically altered by innovations in products and/or processes, resulting in a fifty-five year cycle of creation, growth, and destruction, known as a Kondratieff wave. Schumpeter's theories were based in turn on the work of Nikolai Kondratieff, who argued that the possibilities of any given generation of technologies become exhausted approximately every fifty-five years (Hall, 1998). As the developments in ICTs form the most powerful force of creative destruction in the last fifty-five years, and can be regarded as the fifth Kondratieff Wave, this is of direct relevance to researchers in the field of information systems.

Building on Schumpeter's ideas of radical innovation, Mason, McKenney & Copeland advanced the concept of successful entrepreneurs who develop a "dominant design" which will change the market place. Central to this approach is the concept of three characters who must be present in an organisation for successful technological change to occur, the "Maestro", the "Executive" and the "Supertech". The Executive is an inspirational leader with a vision for their business, the Supertech has the technical skills to use IT to put their vision in place, and the Maestro is the bridge between the two, making the Executive aware of the possibilities offered by IT, and translating their vision into a form the Supertech can understand. The approach includes the use of a seven step framework to carry out, analyse and present the research. It is this aspect of their research, the seven step framework, that forms the focus of this article.

When introducing their approach they explain how it differs from histories of technologies, and though they acknowledge the contribution of business historians such as Alfred Chandler and JoAnne Yates (Chandler, 1962, Yates, 1989) they do not situate themselves clearly within the field of business history or acknowledge that there might be alternative approaches to the one they have developed. Their interpretation of historical methods is very dependent on the idea that IT can

produce a radical change, and though they have produced a large number of case studies to support their theory (McKenney et al., 1995) other researchers, notably JoAnne Yates and James Cortada has shown that many successful organisations have taken an incremental approach to the adoption of IT (Chandler and Cortada, 2000, Cortada, 2007, Yates, 1989, Yates, 2005).

In any organization, the understanding of the present is facilitated by studying the past, and gaining an awareness of the long-term economic, social and political forces that shape events. The benefit of using historical methods is that deep and wide insights are obtained into the area being researched. For information systems researchers' new perceptions can be gained by considering the long term cultural context in which their research is situated. An application of Mason, McKenney & Copeland's historical methods approach was used to research the contribution that ICT made to regional development in New Zealand. Two contrasting regions were studied over a twenty year period in order to understand the relationship between new developments in information and communications technology and the changes in social and economic development.

For the study of regional development the long-time perspective, which considers the development of social capital, cultural values, and the build-up of social networks made historical methods the most suitable approach. Historical methods highlighted how the two regions had changed over time and the positive and negative consequences of those changes. As a reflective methodology, historical methods enables the researcher to obtain a deeper understanding of these issues than would be obtained by using a case study approach.

LEARNING REGIONS IN NEW ZEALAND

The historical methods approach developed by Mason, McKenney & Copeland was used for research which investigated the contribution that ICTs made to development of "Learning Regions" in New Zealand. The term "Learning Region" is widely used in the field of economic geography to identify regions that have been economically successful over a period of time, and that have successfully adapted to changed circumstances (Cooke, 1996, Florida, 1995, MacLeod, 2000, Storper, 1995). Such regions are characterised by the following factors: a competitive strategy based on learning; intense intra-regional linkages; capacity for innovation; creativity in both arts and sciences; efficient information flows; and regional norms and values that provide stability. These are all long term processes which can interact in a way that results in certain regions becoming consistently successful over time. ICTs have the potential to make an important contribution to the development of each of these factors.

The term learning region was first coined by academic authors (Florida 1995; Morgan 1997; Storper 1995) working in the fields of innovation studies and economic geography. The concept of the "Learning Region" is ambiguous and found in a variety of different contexts. There is no single definition of a learning region, however a common strand in the literature is that such regions have an explicit commitment to placing innovation and learning at the core of development (Larsen 1999). A learning region would generally consist of a network of inter-firm relationships, supported by social capital and trust, and kept dynamic by a continuous process of interactive learning.

The concept of the learning region is particularly relevant for New Zealand, as a small country located at the bottom of the South Pacific it faces particular problems in attempting to integrate the national economy into the global economy. Primary industries dominate, and exports of meat and dairy products make a large contribution to New Zealand's economy. However industries such as forestry, horticulture, fishing, manufacturing and tourism have become increasingly significant, and over the past decades, many new industries have emerged and grown strongly, including software, biotechnology, electronics, marine, education exports, media/film and wine. New Zealand's isolation

and physical distance from major trading partners' means that New Zealand's predominantly small firms wanting to move into export markets face big costs. Regions are affected as technological innovation and increased competition lead to business centralisation. Also industry rationalisation and market deregulation have encouraged skilled people to leave rural regions for broader educational and employment opportunities in major cities (Schollman et al. 2002).

Additionally enhancements and upgrades of physical infrastructure in rural centres have not kept pace with technological progress (due to small market sizes, lack of critical mass, and no population growth) and have led to further population out migration. This has caused problems for some of New Zealand's rural regions, and in some cases led to a vicious cycle of decline. In urban regions all New Zealand cities have low-income areas and pockets of deprivation. In both urban and rural areas, Mãori and Pacific Islanders are disproportionately represented in the disadvantaged population.

The New Zealand government has implemented several initiatives to help to develop a knowledge society, encourage innovation, build up regional economic development, and improve usage and access to ICT. Though the concept of the learning region is not explicitly stated, these initiatives are in line with the thinking that lies behind the idea of learning regions. The overarching aim is to return New Zealand's per capita income to the top half of the OECD rankings and maintain that standing. The use of ICT is seen as central to all of these developments. Many of these initiatives are focused at the regional level, for example Project Probe was a 2002 joint initiative between the Ministry of Education and the Ministry of Economic Development (iStart 2004). The aim was to roll-out broadband communications to schools and rural communities, with a particular emphasis on closing the disparity between rural and urban schools. In order to attempt to assess the long term success of these initiatives this research focussed on regional New Zealand. Two contrasting regions were investigated, one urban region, Wellington and one rural region, Southland. Data was collected over a twenty year period, from 1985 to 2005.

In the regional setting tacit or soft knowledge is more easily transferred than in a national context. This is because social interaction and exchange of information is easier and cheaper (Oughton et al. 2002). These soft people- based social networks take time to develop, and are likely to have a significant influence on the use of the ICT networks that are based within a particular region. The focus of the research was on the interplay between these soft social networks and the hard technology-based ICT based networks operating within the regional setting. The central research question was:
What role do information and communication technologies play in the development of learning regions?

HOW HISTORICAL METHODS WERE USED IN THIS RESEARCH

Mason et al (1997b) have laid out clear guidelines for the researcher using historical methods, seven steps are identified which take the researcher through the stages of deciding on the research question, gathering and analysing the data, and writing up the results, these are outlined in Table 1. This paper will show how this seven step model was adapted to research the topic of learning regions in New Zealand. Though these steps are presented in a linear fashion, when carrying out real-world research, there will always be an overlap and iteration between the steps.

Step One: Begin with focusing questions

Focusing questions were arrived at by an inductive process of searching the literature, relating to the New Zealand context, and using the questions asked in the study of Texaco (Porra et al. 2006) as a guideline. A number of questions were posed, some examples of these questions are:

- What were the significant changes in the New Zealand economy between 1985 and 2005?
- How have new developments in ICT been adopted in regional New Zealand?
- What significant changes have occurred in human and social capital in regional New Zealand between 1985 and 2005?

Step	Activities
1) Begin with focusing questions.	The questions asked are going to be about change, as history is primarily the story of change. Inductive thinking is generally associated with the interpretive paradigm, and involves the researcher identifying categories, or patterns in data, that seem suitable candidates for further investigation.
2) Specify the domain for the enquiry.	In the studies carried out by Mason et al (1997a) and (Porra et al. 2006) the primary unit of analysis is an individual organisation. The researcher needs make decisions about what will be included in the domain, and what is the appropriate time span for the study.
3) Gather evidence, using both primary and secondary sources.	Primary sources are those that came into existence during the time to which they refer, and secondary sources are those written by historians about a period in the past. Primary sources can be public documents such as annual reports, statistics and academic articles, which are organised around a timeline. Secondary sources can be slotted into this timeline and include less public information such as letters, budgets, and data collected from individual interviews.
4) Critique the evidence. Is it authentic and credible?	It is common to find that evidence is contradictory, irrelevant or incomplete. Many of the best storytellers favour accuracy less than they favour a gripping narrative. Techniques such as counting the number of times an observation was made, determining the credibility of sources, and establishing whether there are meaningful relationships between the different parts of the evidence can be used to assist with this.
5) Determine patterns using inductive reasoning.	This is one of the central steps, though one of the most difficult. The task is to explain what happened, and how and why it happened. This can be done using a number of different tools; three of the most popular are conceptual frameworks, causal chain analysis, and establishing empathy with the main participants. A conceptual framework can be used to organise facts, and to concentrate attention on the essential areas to be explained. A causal chain is a type of conceptual framework that shows the sequence of events that produced the effects, results or consequences observed. Conceptual frameworks and causal chains can be developed in advance independently of the phenomena to be explained, and used as an explanatory framework, or they can be used as ideal types around which historical data can be organised. A third approach is to try to achieve empathy with the characters in the study. This means imagining how events might have appeared to those who actually experienced them.
6) Tell the story.	This entails bringing together the results of evidence gathering, empathy, and causal chain analysis to form a narrative.
7) Write the transcript.	The historical method is part of the hermeneutic tradition in that it treats the world as a script. Every written account takes its place in the context of a network of other written accounts that attempt to explain the relationships between living generations and their predecessors.

Table 1: Seven Step Approach to Historical Methods (Mason et al, 1997)

In order to address these research questions it was decided to use the concept of the ideal type as a basis for data collection and analysis. A theoretical framework of an "ideal" learning region was built up and the two actual regions were evaluated using this framework. The framework was developed by

reviewing 23 academic articles mainly from the economic and regional geography literature that covered the concept of the learning region in order to identify common terms and themes (Christie et al. 2001; Cornford 2000; Florida 1995; Hudson 1999; Keating et al. 2002; Lagendijk et al. 2000; Larsen 1999; Lever et al. 1999; MacLeod 2000; Malecki 2002; Maskell 1999; Maskell et al. 1999; Morgan 1997; Oinas et al. 1999; Organisation for Economic Co-operation & Development 2001a; Rio 2001; Saxenian 1994a; Schollman et al. 2002; Sokol 2002; Storper 1995; Thompson 2002; Wolfe 2000; Wolfe 2002). Twenty two common terms were identified and these were ranked according to how often they were mentioned, and then grouped into six categories. These categories are presented as the 6-I framework, shown in Table 2. A more detailed explanation of this process can be found in (ref removed). The framework groups characteristics that a learning region should possess into six categories: interconnecting; informing; innovating; interacting; infrastructure and income. The "6-I" framework was used as a basis for data collection and analysis.

Interconnecting	The existence of networks between businesses, customers, suppliers, community groups and local authorities
Informing	Features related to learning such as the presence of embedded tacit knowledge, transfer of best practice, and presence of knowledge workers
Innovating	Evidence of ability to create or adopt innovations, the presence of entrepreneurs, and a competitive culture
Interacting	The presence of strong social capital, high levels of trust, a common regional culture, and professional networks
Infrastructure	Hard infrastructure in terms of transport and telecommunications links, plus soft infrastructure in terms of regional norms and conventions
Income	Economic features such as per capita income and employment levels

Table 2: The 6-I Framework

Step Two: Specify the domain for the enquiry

Neumann (2003) distinguishes between micro-level, meso-level, and macro-level theories. With the selection of the appropriate level being based on time-span, numbers of people involved, and geographical area covered. The larger the level of the theory, the more abstract the concepts it deals with, micro-level theories would be used to explain the interactions between small numbers of individuals, whereas macro-level theories explain society-wide issues.

At the meso level two contrasting regions were selected one urban region, Wellington and one rural region, Southland. Southland is a remote rural area located at the south of the South Island. Farming is the mainstay of the local economy; the region also has the country's only aluminium smelter. Southland Frozen Meat is also a major employer. The Greater Wellington Region (hereafter referred to as Wellington) is located at the south of the North Island and includes the capital city, Wellington. The region includes a wide range of different socio-economic groups; there are some high income areas but also areas of deprivation. As Wellington is a capital city, the public sector is of particular importance, as is the service sector. Wellington is the second most important centre for the IT industry in the country after Auckland. As in Southland, tourism is of growing importance to the region, and is often associated with events such as the Rugby Sevens or the Arts Festival.

New Zealand's major exports are primary products and the rural sector has traditionally been the most important area of the economy. As a rural region Southland provided data about how the rural economy changed over the twenty year period studied. At the same time the country was attempting to diversify its export base, and IT and biotechnology were viewed as offering great potential. As an important centre for the IT industry, Wellington provided data about changes during the period studied.

The second reason for selecting these two regions was that they both had a strong reputation throughout the country for being innovative adopters of ICT networks. In 1995, Wellington was one of the first cities in the world to set up a broadband network in its central business district, and in 2003 Southland made a bold decision to implement a wireless broadband network throughout the region.

The intention was that the scope of this research, which is located in a regional context, should be geographically located at the meso-level, which provides a link between the micro (individual) and macro (national) levels, and therefore connects the particular with the general. However in practice it proved difficult to separate the three levels. Adding to this difficulty is the fact that New Zealand's small population of around four million means that regions are more inter-dependent than in more densely populated countries. The integration of micro and macro level data is traditionally a feature of historical comparative research. Issues are considered at both a society wide and at an individual level (Neuman 2003). For this research the impacts of macro level national policy around issues such as local government restructuring and availability of broadband had to be considered alongside the regional meso level.

Step Three: Gather evidence, using both primary and secondary sources

During the first round of data collection in 2006, twelve in-depth semi-structured interviews were conducted with key figures involved in the adoption of ICT networks. The interview questions addressed a common set of themes including availability of infrastructure, the extent of linkages between local organisations, regional culture, commitment to learning within the region, and the adoption of innovative ideas. The interviewees worked for a range of organisations including local and regional councils, telecommunications providers, schools, and community groups as shown in Table 3. Some of the interviewees were selected for their knowledge of the local situation in Southland or Wellington; others had a national focus.

Location	Focus	Role
Wellington	National	Telecommunications consultant
Wellington	National	Rural telecommunications expert
Auckland	National	Rural telecommunications expert
Southland	Southland	Manager - Local Government
Southland	Southland	ICT policy – Local Government
Southland	Southland	Community sector – Local Government
Southland	Southland	Telecommunications provider
Wellington	Wellington	Consultant – Wellington Regional Strategy
Wellington	Wellington	Manager – Local Government
Wellington	Wellington	ICT policy – Local Government
Wellington	Wellington	Community sector – Local Government
Wellington	Wellington	School – ICT Teacher

Table 3: Location and role of interviewees

The second round of data collection focused much more strongly on the regional level and also brought in the historical aspects. The aim was to build up a history of the development of ICT networks in the regions of Wellington and Southland in the twenty years between 1985 and 2005. The strategy adopted was to carry out both macro and micro level analyses of events in both regions over a twenty year period (Rooney, 1996). Primary sources were used to give an overall picture of developments in each region over the whole period, and for three selected years 1985, 1995 and 2005; a more detailed micro analysis was carried out. The idea was to see how those factors that had been identified as being relevant to the development of learning regions were changing in each region during the period covered by this research.

In order to obtain an even amount of material for each of the three selected years, and to cope with the problem of information overload it was decided to restrict the search to three regional newspapers (Dominion/Dominion Post, Evening Post, Southland Times) and one national magazine (National Business Review). The advantage of using newspapers is that they provided a breadth of coverage that was not available from other sources. The material from the newspapers was complemented by national and regional reports produced by a range of organisations such as Statistics New Zealand, independent economic consultants, non-governmental organisations, professional societies and voluntary groups

The initial database held 3,033 items and when coding was completed this was reduced to 2,442 items. The breakdown of the number of articles for each category and region is shown in Table 4 (note that in 2005 the Dominion and Evening Post combined to become the Dominion Post which partly explains the drop in numbers). What is interesting to note is that even though the two newspapers were regional, more than half of the articles selected had a national rather than a regional focus. The fact that Wellington is the capital of New Zealand is also significant. Generally initiatives by the national government were categorised as national rather than regional even though they were located in Wellington. The numbers of articles collected for each category give a broad indication of the category's importance. Though these numbers are of no hard scientific value, counting the number of times a point is mentioned is one of the techniques used in historical research to establish trustworthiness. Counting is also a technique recommended by Miles and Huberman (1994) as a tactic for generating meaning. The same story was often reported in a number of publications, and there were often multiple articles about the same event.

	1985				1995				2005				Overall Total
	N	S	W	Tot	N	S	W	Tot	N	S	W	Tot	
Interconn	97	16	27	140	44	11	43	98	41	13	5	59	297
Informing	95	39	46	180	32	45	74	151	37	24	11	72	403
Innovating	123	21	38	182	104	18	34	156	112	28	32	172	510
Interacting	33	53	69	155	7	35	77	119	4	29	12	45	319
Infrastruct	53	45	58	156	8	43	56	107	58	40	23	121	384
Income	163	42	64	269	41	83	39	163	48	23	26	97	529
Total	64	216	302	1082	236	235	323	794	300	157	109	566	2442

N– National, S – Southland, W- Wellington

Table 4: Newspaper Statistics for 1985 to 2005

After the searches had been carried out the next step was to build up a picture of the situation in each region for each of the three years using the "6-I" model as a framework. This was done by combining the results of the searches ordered by category, sub-category and year for each of the two regions and the national situation. This data was used as a basis to describe developments in that region during 1985 to 2005. As with the first round of data collection further refinement took place during the writing up process, duplications and overlaps were identified and articles were reassigned to different categories as appropriate. The data collection process is summarised in Table 5.

Stage	Method	Analysis
First Round	Interviews with significant figures working in each region.	Data coded using NVivo with 6-I model used as overall conceptual framework.
Second Round	Regional newspapers scanned for relevant articles for years 1985, 1995 and 2005.	Data coded using Access database with 6-I model used as overall conceptual framework.
	National & regional reports produced by Government, economic development bodies, NGO's and Statistics New Zealand collected for period from 1985 to 2005.	Data used to supplement and confirm data from newspaper articles.

Table 5: Data Collection Rounds

Step Four: Critique the evidence. Is it authentic and credible?

Historical source material consists of primary and secondary sources. Historians select the events and people that they consider important. By doing so they don't so much recreate the past as rediscover it, and to some extent colour it with their own set of value judgements. The historical researcher's most important role is to choose reliable sources, in order to create reliable narratives about the past (Howell et al. 2001). There needs to be a systematic approach to gathering data, as collecting only the most compelling evidence can result in material that is unrepresentative (Wenger et al. 2000). Utilising the authoritative source only is not a wise approach. Evidence should be collected from a wide range of sources, each of which will have their own strengths and weaknesses (Tosh 2000). Any source material collected should be subjected to both external and internal criticism. The authenticity of the evidence is determined by external criticism, whereas credibility is established by internal criticism (Shafer 1980). The use of external criticism involves establishing whether a document can be traced back to the purported originator, establishing whether it is consistent with known facts, and studying the form of the document (Tosh 2000). Internal criticism consists of trying to establish the author's meaning and making a judgement as to the intentions and prejudices of the writer (Tosh 2000). An overview of the two techniques is shown as Figure 1.

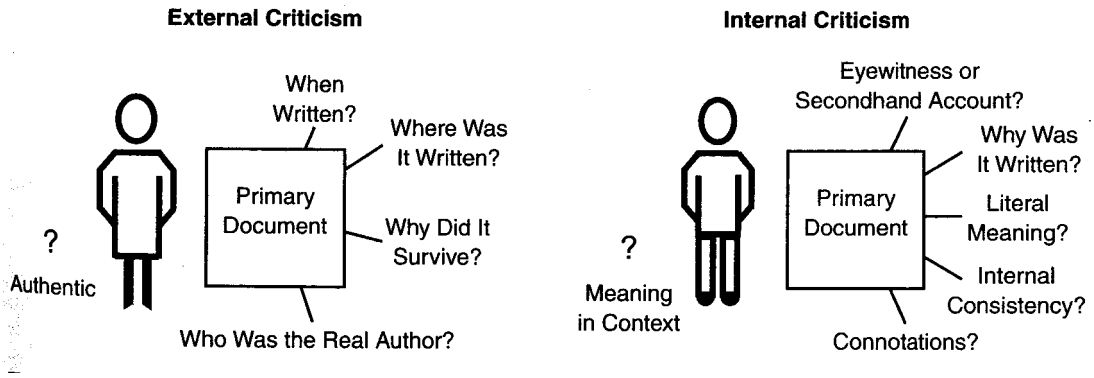

Figure 1: Internal and External Criticism (from Neuman, 2003, p.421)

Regional newspapers are an authentic primary source. The location and time of reporting are recorded, and for many of the later articles the author is also recorded. Statistics from organisations such as Statistics New Zealand and the Organisation for Economic Co-operation and Development (OECD) can also be regarded as authentic as they have official national and international approval. They also tend to have good response rates, for example Statistics New Zealand surveys generally get a greater than 80% response rate. The statistics were used to cross check and confirm assertions made in the newspaper articles. As previously mentioned the large number of articles used increases authenticity, the articles can be counted, if an issue was significant it would be reported on a number of times, both within one newspaper and across different newspapers.

Step Five: Determine patterns using inductive reasoning

Mason et al (1997b) identify three different methods for determining patterns: conceptual frameworks; causal chain analysis and establishing empathy. With the conceptual framework and causal chain analysis generally a model or analysis would be developed before collecting the data, and then the material collected would be compared against the original model. The establishing empathy approach attempts to build an understanding of the motivations of the key historical figures in the study, and is generally carried out after data collection. Mason et al.'s research (Mason 2004; Mason et al. 1997a; Mason et al. 1997b; McKenney et al. 1995; McKenney et al. 1997) was conducted at the organisational level and used the approach of establishing empathy with individuals in those organisations. This approach was also used by Hirschheim et al (2003) in explaining the history of Texaco through the eyes of its Chief Information Officers.

This research was conducted at the regional level, and the establishing empathy approach was problematic due to the large number of individuals who contributed to regional development in widely different roles. The approach chosen for this research was the conceptual framework, which uses the concept of an ideal type to organise and interpret the data (Mason et al. 1997a; Mason et al. 1997b). The ideal type is presented as the "6-I" model, and the data collected was categorised using this model, within the context of both time and geographical location. The data collected was then evaluated against the definition of the "ideal" for each of the six categories, and the results for each of the two regions and the national situation were compared. The empathy approach does produce a persuasive story centred on the actions of key individuals however it can be rather subjective as the researcher has to put themselves in the decision-makers shoes. A conceptual framework is more objective, makes the research more transferable and adds rigour to the research.

Step Six: Tell the story

One of the strengths of the historical approach is the compelling story that is produced. This narrative tells the story of the economic and social development of two regions in New Zealand (rural Southland and urban Wellington) with a particular focus on the role of hard ICT-based and soft people-based networks in regional development. In order to assess the role that ICT was playing in the development of learning regions, the two regions were assessed against the "6-I" framework of an "ideal" learning region shown in Table 2. A discussion of the results in each of the six categories together with an overview follows.

Interconnecting

An interconnected region will have active networks operating at international, national and regional levels. Throughout the period studied New Zealand developed more international connections, and ICT made a major contribution to the build-up of international, national and regional networks. ICT had a major effect on organisational form as businesses and public sector organisations throughout the country became more networked. Research based networks linking universities, crown research institutes and large organisations were present at the national level. Active networks were found in both regions, though these tended to be based in a particular sector for example the education sector. Those regional networks that went across a number of sectors tended to focus on unemployment and retraining and had often been initiated by local government. Though there was evidence of clusters for example the effort by a Chamber of Commerce to form a high technology zone in the Wellington region, and the formation of the Southern Wood Council in 2001, no such initiatives had been consistently maintained throughout the period studied.

The results for this category were generally positive, New Zealand did become more connected at global, national and regional levels, and ICTs played a major role in facilitating these connections.

Informing

In an informed region there will be a commitment to learning and evidence of knowledge sharing between different organisations within the region. There was a strong commitment to education that came through at both the national and regional levels, and as with interconnecting, ICT played a major role. At the regional level ICT was used by schools to build networks and to share resources; at the national level the education sector was viewed as the leader for new developments, such as the rollout of broadband into rural areas.

In the education sector, knowledge sharing was enhanced by the use of collaboration software such as videoconferencing and interactive whiteboards. The use of collaboration software demonstrated that tacit as well as explicit knowledge was being exchanged. However, many interviewees made it clear that technologies such as videoconferencing could complement but would never replace face-to-face contact, indicating that there were limitations on the use of ICT networks to exchange tacit knowledge.

Another factor that should be found in a learning region is evidence of a bottom -up approach to knowledge sharing and transfer of best practice. This was definitely evident in the education sector in both regions studied. In the Wellington region, Primary and Intermediate schools under the direction of the Ministry of Education had formed an ICT cluster in order to share ideas and resources. In Southland a survey carried out prior to broadband adoption showed a strong desire on the part of local schools for collaboration.

Commitment to learning at individual, organisational and regional level is another feature of a learning region. The commitment to learning was found most strongly at the regional level

particularly in Southland, where the regional economic development body, Venture Southland demonstrated a strong commitment to improving the educational level of regional residents.

The one weak area was skills shortages, at both regional and national levels. Out-migration of skilled workers in sectors such as health and IT was a major issue. This migration was strongly influenced by economic conditions. When times were good people stayed, but in lean times they looked for better opportunities offshore. Though the problem of staff shortages was felt across the country, it was clear that the problem was much worse for the rural region of Southland. However Southland worked hard to address this issue with a number of initiatives, one of which was the introduction of a zero fees policy at the regional Higher Educational Institute in 2001, these efforts paid off and by 2005 the population of Southland had stabilised.

In summary, the results for this category were generally positive. Throughout the period skill shortages decreased and investment in education grew. There was evidence of ICT enabled regional knowledge sharing in both regions.

Innovating

In an innovative region there will be evidence of new ideas, in terms of both products and processes, and the local culture will encourage competition. There should be evidence of entrepreneurial activity and a strong commitment to research and development. A broad definition of innovation was used, which included adopting innovative ideas from other regions or other countries; this was felt to be most appropriate for the regional context.

Though there was some evidence of innovation, especially in the IT sector, and certainly strong evidence that New Zealanders were world leaders in terms of adopting new ICT technology, neither region demonstrated the density of innovative activity that would be expected in a learning region. The success of individual IT companies was not built on and developed. This was not helped by the low investment in research and development at the national level.

Although the government's financial commitment to research and development could be questioned, there was strong evidence of entrepreneurial activity in New Zealand, though it was noted that there did seem to be a slowdown in the rate of patent applications between 2000 and 2005, despite a growth in the number of researchers. It is difficult to get an accurate measure of innovation levels as many software companies don't bother to apply for patents.

In pure economic terms individuals and businesses in the more populated urban regions of New Zealand were much more likely to be adopters of new ideas and technologies such as broadband than those in the less populated rural regions, even taking account of population size. However, social capital also made an impact. If a strong social network was in place with an active local champion, a new idea was much more likely to take off.

In both regions studied there was some evidence of innovation, and also evidence of the adoption of innovations from outside the region. In the opinions of interviewees the two regions were innovative, and both regions had won strong reputations throughout the country for certain projects e.g. Southland for a wireless broadband scheme. However there was a lack of hard data to back this up. The evidence does seem to indicate that the capacity for innovation is directly related to population size, with the most populated regions being the most innovative.

The findings for this category were mixed, there was evidence of innovation nationally and in both regions, but it was not present at the high levels that would be expected in a classical learning region.

Interacting

In an interactive region individuals within the region will share a common culture, social capital will be high and crime rates will be low. There will also be evidence of active social networks through work, sport, voluntary groups and similar. There was strong and consistent evidence of high social capital in New Zealand at both the national and the regional levels. There was a strong cultural identity in Southland; in Wellington cultural loyalties tended to be to the local authority area rather than to the region.

By the end of the period community groups had become well aware of the contribution ICT could make to regional development. In 1985 and 1995 ICT networks were mainly used by the government and private business, but by 2005, ICT was widely used in the voluntary and community sectors. This trend was observed in both regions and was reinforced at a national level by the publication of the government's Digital Strategy (Ministry of Economic Development 2005). Community groups were using hard ICT networks to complement and reinforce existing soft networks.

By 2005 information technology was being increasingly used by the not-for-profit sector and Mãori groups. However, though ICT networks were identified as playing a role in building interaction within a region they were seen as a complementary to rather than as a replacement for face-to-face contact.

The results for this category were very strongly positive, at both the national and regional levels there was plenty of evidence of good social capital, and active citizen involvement in civic life.

Infrastructure

The ideal learning region will have a well-developed telecommunications and transport infrastructure, together with institutional thickness, as demonstrated by lively interactions between different organisations in the region. In New Zealand the issue of infrastructure seems to be of more importance than in other countries with more developed infrastructure, such as Europe and the USA. A well -developed infrastructure tends to be taken for granted; it is when there are gaps that it becomes a more pressing issue.

At both national and regional levels there was significant investment in telecommunications infrastructure. Despite complaints that New Zealand was not keeping up in global terms, it was clear that successive governments were committed to developing telecommunications and believed it would strengthen the economy.

In both regions there were frictions between local and regional government, which worked against the development of institutional thickness. There was evidence of interaction between the different organisations within a region. However, frequent changes caused by local politics meant it was difficult for these networks to develop and grow.

The results for this category were also mixed. Though telecommunications were recognised as crucial to the economy, New Zealand's low population means that it is always going to be more expensive to build up infrastructure than in more densely populated countries. The country is always going to struggle to improve its position in the OECD rankings when it comes to features such as broadband adoption. There was also a tension between the different levels of government that at times seemed to inhibit progress.

Income

The ideal learning region is consistently economically successful, with low unemployment rates. Though the economy of both regions improved over the period studied, alongside reduced levels of

unemployment, neither region exhibited the exceptional economic performance that would be expected of a learning region.

Though the findings for this section are a little disappointing, it should be noted that as a small country, located at some distance from major world markets New Zealand faces a more difficult task than many other countries in developing its economy. The fact that the country has managed to make progress despite these challenges needs to be recognised.

Overview of findings

The positive areas were interconnecting, informing and interacting and ICT was found to be making a contribution in all three areas. Between 1985 and 2005, organisations became much more interlinked in terms of their ICT networks, and information technology opened up access to the rest of the world. ICT was used to increase interconnection at the regional level, particularly in the dairy farming, education and community sectors. These interconnections opened up new opportunities for regional learning and innovation. Both regions were successful in setting up high quality ICT networks, most notably in the education sector in Southland and the community sector in Wellington.

However, though ICT contributed to positive developments in these areas, it could not operate in a vacuum. The existence of good social networks and strong local champions were critical to regional development. ICT could complement these social networks but was no replacement for them. Therefore there was no direct cause and effect relationship between ICT and regional economic development.

Though many examples were found of positive initiatives in both regions it was difficult for initiatives to gain momentum and achieve lasting change. At various points throughout the twenty year period, initiatives were set up around establishing clusters, developing a regional strategy, setting up high technology zones or developing partnerships between education and business, but there was no evidence that such initiatives built steadily over the years. Proposed changes at a regional level seemed to be met with infighting and local resistance, which inhibited any steady long-term development. So though the soft networks formed by clusters, joint ventures and networks were present, no clear pattern of development could be observed.

In terms of infrastructure the general picture that emerged is of a clear linear progression in terms of the development of hard networks, but a more attenuated pattern in terms of soft networks where the same issues were revisited a number of times over the years. Though there was evidence of a relationship between the soft networks that existed at the regional level and the utilisation of hard ICT networks within a region, it was difficult to quantify.

A learning region is typically characterised by high levels of innovation, which in turn lead to economic success. Though New Zealanders have a reputation for being innovative, and examples were found of successful individual companies, neither region managed to develop anything close to a regional innovation system. The issues previously discussed are part of the reason. The findings of the research show that hard and soft networks evolve differently over time and that the relationship between the two is nuanced. Though good social capital existed in both regions, especially in rural Southland, it was located in different interest groups and was not easy to bring together. This lack of co-ordination meant that the possibilities opened up by ICT infrastructure in terms of increasing innovation were not fully realised. Both regions did demonstrate a strong commitment to learning, but this learning had yet to be translated into economic success.

Step Seven: Write the transcript

The transcript produced needs to be placed within the context of previous work. This research builds on the work on historical methods in information systems carried out by Mason et al (Mason et al. 1997a; Mason et al. 1997b) by applying it at a regional rather than at an organisational level. It also provides an example of the use of a conceptual framework, the "6-I" model for data analysis, as well as using regional newspapers as a source of data.

Historical research is often incomplete and provisional, it provides a rich thick description of events, that is particular and descriptive rather than being analytical and general (Neuman 2003). A major goal of historical research is organising and giving new meaning to evidence rather than providing an authoritative account. This research fits in with this tradition, by providing a detailed examination of the use of ICT in two regions of New Zealand over a fairly limited period of time. The findings demonstrate the important role that soft social networks play in the successful utilisation of ICT networks within a regional setting. This was found to hold true whether the technology being considered was videotex, the internet or ultra-fast broadband.

LESSONS LEARNED

The following section reflects on the lessons learned at each stage of the research.

Step One: Begin with focusing questions

This research asked a broad big picture question and historical methods was chosen as the best approach to address it because of the ability to provide deep and wide insights. Learning regions take time to grow and the development of social capital; cultural values and the build-up of networks are most meaningfully examined using a long time perspective. However, big picture type questions need to be made manageable, according to the resources available to the researcher. In this case the research question was broken down by using a framework developed from the literature review. This imposed some order on the research process, by facilitating the selection and ordering of relevant data.

Step Two: Specify the domain for the enquiry

The issue of deciding on the appropriate scope for the research is critical. Most historians would consider looking back only twenty years as barely touching the tip of the iceberg. To some extent this can be justified by the fact that ICT is a fairly recent phenomenon. However in terms of social networks it would have been useful to dig further back into the history of each region.

One of the most difficult aspects of using historical methods for an IT researcher is setting an end date, the rapid rate of new developments in the IT field means that it requires immense self-discipline to put them to one side while concentrating on the past. In the case of this research there seemed to be an almost constant stream of new initiatives around the issue of broadband, which were very difficult to ignore. Alongside this is the concern that the findings of the research will be dismissed as out-of-date and irrelevant.

Step Three: Gather evidence, using both primary and secondary source

When using historical methods the availability of data is a key issue, if there is no data, there is no story. At an early stage the researcher needs to establish if there is enough information available to answer the research question. One frustration with this research was the difficulty of finding accurate

data at the regional level; though Statistics New Zealand now collect regional statistics they weren't available for the earlier parts of the period studied.

Another issue when using historical methods is the large quantity of data that is collected, this is not only time consuming it also creates the challenge of ordering and categorising the data in order to make it meaningful. Details and individual incidents may be significant but overall findings have to be reported in a concise fashion. The technique used in this research to organise the data was the use of a conceptual framework, in this case a model of an "ideal" learning region, the "6-I" framework, was used to organise the data into categories. Another strategy was to only collect detailed data for three key years, 1985, 1995 and 2005, during the twenty year period studied. This meant there were ten year gaps between each collection point during which a lot of information was missed, meaning that the data collected can only be regarded as a snapshot in time. Strictly this means the research could be categorised as a longitudinal study rather than true historical research (Bannister 2002). This was ameliorated to some extent by the use of other materials such as statistical reports, but it is still a limitation of the research.

Step Four: Critique the evidence. Is it authentic and credible?

The use of newspapers for historical research raises questions about whether such materials are a good source for historical truth, as reporting can be biased and inaccurate. Some steps were taken to address this, such as cross checking events across a range of publications, and using reports produced by independent bodies, but it does need to be acknowledged that newspapers can be fallible. Contradictions were found. Different articles on the same topic often contained conflicting facts and figures; claims made by politicians weren't supported by the statistical evidence. Every effort was made to try and resolve these contradictions by cross-checking data from a number of sources, but in many cases this was not possible and data was presented as found.

The trustworthiness of qualitative research is always open to question; newspapers have an advantage over data collected by techniques such as interviews or focus groups, in that they are in the public eye. Newspapers can face libel if they publish inaccurate information therefore journalists take some steps to check their facts, and readers have a feedback mechanism in the form of the letters page.

One of the techniques of historical research is to listen for "silences", in other words to work out what is missing from the data. The regional newspapers did not provide good coverage of the industries in their regions, and initiatives such as the formation of business clusters tended to be under reported.

This issue relates back to Step 3, in this case newspapers were used extensively as little other data was found at the regional level, so a researcher not only needs to consider if there is data available to answer the research question, but also to assess the quality of that data before proceeding.

Step Five: Determine patterns using inductive reasoning

Mason, McKenney & Copeland have outlined three approaches that can be used for this: conceptual frameworks, causal chain analysis and establishing empathy with the main participants. It is important for the researcher to decide at an early stage which approach they are going the use, as this will affect both the research question and the approach taken to data gathering. Establishing empathy is the most common approach used to date, and is suitable for a study of one organisation, it also has the advantage of producing a compelling story. This research has demonstrated the use of a conceptual framework, causal chain analysis is potentially the most rigorous approach, but also the most challenging.

Step Six: Tell the story

The main goal of historical research is to produce a narrative. However due to the extensive data collection, that use of historical methods usually involves, that story is often rather long and very detailed. This creates issues for researchers who are under pressure to get their work published. Currently in information systems, publishing in journals is given more weight than writing a book, but it is often difficult to compress the findings of historical research into the word limits set by journals.

Step Seven: Write the transcript

The researcher needs an understanding of where there work fits in with previous studies, they should be aware of previous research in this area, and what contribution will be made by their study.

CONCLUSION

This article gives an overview of the use of historical research in information systems and provides an example of how historical methods was used in a research project. In particular, the seven stage method of Mason et al. (1997b) was applied to explore the role of ICT in facilitating the development of two learning regions in New Zealand.

ICT is a maturing discipline, even though New Zealand was a relatively late adopter of ICT, with the first mainframe computer, an IBM 650 for the Treasury, not arriving in the country until 1960 (Newman, 2008), computers have still been around for over fifty years. Even before this the precursors to computers in the form of tabulating machines (Yates, 2005) and totalisers (Doran, 2006-2007) were in widespread use. This gives researchers a long enough period to study the use of ICTs within the broader social, cultural and economic context. The reasons for the success of ICT in one setting and its failure within another become clearer. For example the rapid adoption of the Internet in New Zealand in 1995 can be seen in the context of a strong desire by citizens of a remote country to improve their connections with the rest of the world, this longing for fast and affordable international communications can even be traced back to Henniker Heaton's campaign for a penny post between Australia and the rest of the Commonwealth (De Garis, 1972).

Overtime historical research reveals underlying patterns which enable cause and effect to be established, this provides researchers with greater insights into the reasons behind the differing fortunes of ICT systems in different contexts. While the scope of this research was too limited to definitively establish cause and effect, underlying patterns were revealed, in particular the impact of power struggles between different groups within the two regions which often worked against the long term success of new initiatives.

The strength of historical research is that it takes the big picture approach which considers developments in information systems within the context of wider changes at the organisational, regional or national level. However the big picture approach can also prove a weakness as well as a strength; tackling a large scale problem often means that the contribution of any one piece of research is rather limited. Historical research should be regarded as a transcript which needs to be placed within the context of previous work (Mason et al., 1997b). It is often incomplete and provisional, providing a rich, thick description of events that is particular and descriptive rather than analytical and general (Neuman, 2003). A major goal of historical research is organising and giving new meaning to evidence rather than providing an authoritative account. New historical research in information systems should be regarded as providing only part of the big picture and should not be judged in isolation but evaluated on the contribution it makes towards building up that authoritative account.

Information systems is a discipline that prides itself on being forward looking, there is a tendency for researchers to focus on the latest trends and out-of –date technology is often dismissed as irrelevant. However people change more slowly than technology and patterns of behaviour tend to repeat themselves. There are many lessons to be learned from the past, and as the information systems discipline matures historical methods will form a useful addition to the information systems researchers' toolkit.

REFERENCES

Bannister, F. "The Dimension of Time: Historiography in Information Systems Research," Electronic Journal of Business Research Methods (1:1) 2002, pp 1-10.

Christie, I., and Hepworth, M. "Towards the Sustainable E-region," in: Digital Futures: Living in a dot com World, J. Wilsdon (ed.), Earthscan Publications Ltd., London, 2001.

Cornford, J. "The Evolution of the Information Society & Regional Development in Europe," Norwegian Regional Development Ministry, Oslo, Norway.

Florida, R. "Toward the Learning Region," Futures (25:5) 1995, pp 527-536.

Hirschheim, R., Porra, J., and Parks, M. S. "The Evolution of the Corporate IT Function and the Role of the CIO at Texaco - How do Perceptions of IT's Performance Get Formed," The DATA BASE for Advances in Information Systems (34:4) 2003, pp 8-27.

Howell, M., and Prevenier, W. From Reliable Sources: An Introduction to Historical Methods Cornell University Press, Ithaca, London, 2001.

Hudson, R. "The Learning Economy, the Learning Firm, and the Learning Region: A Sympathetic Critique of the Limits to Learning," European Urban & Regional Development Studies (6:1) 1999, pp 59-72.

Hunter, I., and Morrow, D. (eds.) City of Enterprise: Perspectives on Auckland Business History. Auckland University Press, Auckland, 2006.

iStart "Broadband for All - Project Probe explained," in: iStart, 2004.

Keating, J., Badenhorst, A., and Szlachetko, T. "Victoria as a Learning Region: Background Report," OECD, Melbourne Victoria, pp. 1-154.

Lagendijk, A., and Cornford, J. "Regional institutions and knowledge - tracking new forms of regional development policy," Geoforum (31:2) 2000, pp 209-218.

Larsen, K. "Learning cities: The new recipe in regional development," Organisation for Economic Coooperation and Development:, The OECD Observer (Summer 1999) 1999, pp 73-76.

Lever, W. F., and Turok, I. "Competitive Cities: Introduction to the Review," Urban Studies (36:5-6), May 1999 1999, pp 791-793.

MacLeod, G. "The learning region in an age of austerity: capitalizing on knowledge, entrepreneurialism, and reflexive capitalism," Geoforum (31) 2000, pp 219-236.

Malecki, E. J. "Hard and Soft Networks for Urban Competitiveness," Urban Studies (39:5-6) 2002, pp 929-945.

Maskell, P. "Globalisation and Industrial Competitiveness: The Process and Consequences of Ubiquitification," in: Making Connections: Technological Learning and Regional Economic Change, E.J. Malecki and P. Oinas (eds.), Ashgate Publishing Ltd, 1999, pp. 35-59.

Maskell, P., and Tornqvist, T. Building a Cross-Border Learning Region: Emergence of the North European Oresund Region Copenhagen Business School Press, 1999.

Mason, R. O. "The Legacy of LEO: Lessons Learned from an English Tea and Cake Company's Pioneering Efforts in Information Systems," Journal of the Association for Information Systems (5:5) 2004, pp 183-219.

Mason, R. O., McKenney, J. L., and Copeland, D. G. "Developing an Historical Tradition in MIS research," MIS Quarterly (21:3), SEpt 1997 1997a, pp 257-278.

Mason, R. O., McKenney, J. L., and Copeland, D. G. "An Historical Method for MIS research: Steps and Assumption," MIS Quarterly (21:3), Sept 1997 1997b, pp 307-320.

McKenney, J. L., Copeland, D. C., and Mason, R. O. Waves of Change: Business Evolution Through Information Technology Harvard Business School Press, Cambridge, Massachusetts, 1995.

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

Miles, M., and Huberman, A. Qualitative Data Analysis: An Expanded Sourcebook, (2nd ed.) Sage, Thousand Oaks, 1994.

Ministry of Economic Development "The Digital Strategy: Creating our Digital Future," Wellington.

Morgan, K. "The Learning Region: Institutions, Innovation and Regional Renewal," Regional Studies (31:5) 1997, pp 491-503.

Neuman, W. L. Social Research Methods: Qualitative and quantitative approaches, (5th ed.) Allyn & Bacon, Boston, 2003.

Oinas, P., and Malecki, E. J. "Spatial Innovation Systems," in: Making Connections: Technological Learning and Regional Economic Change, E.J. Malecki and P. Oinas (eds.), Ashgate Publishing Ltd, 1999.

Organisation for Economic Co-operation & Development Cities and Regions in the New Learning Economy Organisation for Economic Co-operation & Development, Paris, 2001a.

Oughton, C., Landabaso, M., and Morgan, K. "The Regional Innovation Paradox: Innovation Policy & Industrial Policy," The Journal of Technology Transfer (27:2) 2002, pp 97-110.

Porra, J., Hirschheim, R., and Park, M. S. "The History of Texaco's Corporate Information Technology Function: A General Systems Theoretical Interpretation," MIS Quarterly (29:4) 2005, pp 721-746.

Porra, J., Hirschheim, R., and Parks, M. S. "Forty Years of the Corporate Information Technology Function at Texaco Inc. - A history," Information and Organization (16:1) 2006, pp 82-107.

Rio, C. R. d. "Learning to Innovate: Learning Regions," Organisation for Economic Co-operation and Development /Institute for Regional Development, Andalucia.

Saxenian, A. Regional Advantage: Culture and Competition in Silicon Valley and Route 128 Harvard University Press, Cambridge, M A., 1994a.

Schollman, A., O'Neill, D., Doczi, M., and Kelly, F. "Regional Innovation, Learning & Governance - Rediscovering New Zealand's Regions: A Central Government Perspective," Learning Cities and Regions Conference, OECD, Melbourne, 2002, pp. 1-24.

Shafer, R. J. A Guide to Historical Method, (3rd ed.) The Dorsey Press, 1980.

Sokol, M. "Regional Dimensions of the Knowledge Economy: Implications for the "New Europe"," in: Centre for Urban And Regional Development Studies, University of Newcastle upon Tyne, Newcastle upon Tyne, 2002.

Stair, R., Moisiadis, F., Genrich, R., and Reynolds, G. Principles of Information Systems, (2nd ed.) Cengage Learning, Melbourne Australia, 2011.

Storper, M. "The resurgence of regional economics, ten years later: the region as a nexus of untraded interdependencies," European Urban & Regional Development Studies (2:3) 1995, pp 191-221.

Thompson, H. "Creating and Sustaining Online Communities - Replicable Web-Based Services Meeting the Diverse Needs of Regional and Rural Australia," Learning Cities and Regions, Melbourne, Australia, 2002.

Tosh, J. The Pursuit of History: Aims, Methods and New Directions in the Study of Modern History, (3rd ed.) Pearson Education Limited, Harlow, 2000.

Wenger, E. C., and Snyder, W. M. "Communities of Practice: The Organisational Frontier," Harvard Business Review), January-February 2000 2000, pp 139-145.

Wolfe, D. A. "Globalization, Information and Communication Technologies and Local and Regional Systems of Innovation," in: Transition to the Knowledge Society, K. Robenson and H. Schuetze (eds.), Vancouver Institute for European Studies, University of British Columbia, Vancouver, 2000, pp. 147-162.

Wolfe, D. A. "Social Capital and Cluster Development in Learning Regions," in: Knowledge, Clusters and Learning Regions: Economic Development in Canada, J.A. Holbrook and D.A. Wolfe (eds.), School of Policy Studies, Queen's University, Kingston, 2002, pp. 11-38.

Yates, J. "Using Giddens' Structuration Theory to Inform Business History," Business and Economic History (26:1) 1997, pp 159-183.