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# A Glorious and Not-So-Short History of the Information Systems Field

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## Abstract

*In this paper, the more than 40-year history of the information systems discipline is discussed by dividing history into four somewhat overlapping eras. For each era, important events that occurred are highlighted. The events are categorized as "management/governance of the IS function", "technology", "research themes", "research methodology", "education", and "infrastructure" (organizations, conferences, journals, etc.). The paper then speculates on what the value would be if the IS community were to adopt a shared history. The paper contends that such a shared history would be effective in helping to bridge the communication gaps that exist between the different sub-communities that make up the discipline.*

***Keywords:*** *IS History, IS Evolution, Discipline History, Eras, Historical Research*

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# A Glorious and Not-So-Short History of the Information Systems Field

*"Those who cannot remember the past are condemned to repeat it" (*G. Santayana, *The life of reason* (vol.1), 1905)

*"Science and the history of science appeal to very different tempers. An advance in science resolves an obscurity, a tangle, a complexity, an inelegance, that the scientist then gratefully dismisses and forgets. The historian of science tries to recapture the very tangles, confusions, and obscurities from which the scientist is so eager to free himself"* (W. V. Quine, *From a logical point of view, 1953)*

*"Hegel was right when he said that we learn from history that man can never learn anything from history"* (George Bernard Shaw, 1950)

## 1. Prologue[1]

Hegel once wrote that the only thing one can learn from history is that nothing can be learnt from history. In contrast to this rather unflattering view of history, Santayana argued that those who do not know history are condemned to repeat it. These contradictory views about the value of history provide the motivation for this article. We come down on the side of Santayana, believing that much can be learnt from history.

Part of the rationale behind this article comes from our attendance at the International Conference on Information Systems (ICIS) in Charlotte in 1999, the site the first LEO award ceremony. There, the academic association for our field – the Association for Information Systems (AIS) – bestowed awards upon some of the most outstanding contributors to our field. One of the interesting observations of the awards ceremony was the large number of attendees who asked, "Who is Leo?" One attendee was overheard to say: "Oh that must stand for Leo the Lion". The fact that LEO stands for Lyons Electronic Office, arguably the first commercial application of computers to business developed in England in the early 1950s, was apparently not known by many of the attendees. This probably shouldn't come as a surprise, as many of the attendees likely hadn't even been born yet. More worrying however, was the number of attendees who hadn't heard of some of the LEO award recipients, in particular, Börje Langefors and Enid Mumford. How could it be that some of the founding members of the field, whose ideas were the cornerstones of the field, whose writings were the basis of much of work in the field, could be unknown to so many?

This realization gave us pause for concern. It appears to us that as the field has grown so large so quickly, with so many different sub-communities working on their own specialist topics, the field's history has been largely ignored. This is not to suggest that researchers in the field are remiss in their literature surveys where prior relevant research is quoted and built upon, thereby furthering the cumulative tradition in the field. But as the field has evolved, the ideas of the early thinkers have largely been forgotten. Perhaps the reason is that many in the field believe that as technology develops so rapidly, and the half-life of knowledge continues to decrease, there is little reason to know about the early history of the field. It simply is irrelevant given the dramatic changes. People holding this position apparently believe in Hegel's philosophical dictum.

It is with this very position that we take exception. The evolution of the core ideas currently driving the field can be better understood with some knowledge of past history; yet this is not easily apparent to those who did not live the history of IS. Therefore, the purpose of this paper is to provide a concise introduction to the foundational ideas of IS as an object of research and IS as an institutional discipline. One of the values of such a proposition would be showing how certain ideas from the 1960s, '70s, '80s and '90s continue to resurface in the current research agendas, often with different names. Indeed,

[1] We are indebted to Siew Fan Wong for her assistance in gathering a good deal of the background material for the four eras identified in this article. We would also like to thank Richard Welke, Detmar Straub, Kalle Lyytinen, and Bob Galliers for their comments on earlier drafts of the paper. Special thanks goes to Frank Land for his detailed review that pointed out numerous omissions that we have tried to correct, and to Carol Saunders who took the role of developmental editor seriously and who helped make the paper much stronger and more focused. Of course, all errors and omissions are ours, and we would welcome readers' comments and suggestions.

while it would certainly be interesting to show how these research areas grow, die, recycle, resurface, morph into new areas, and so forth, this must be left for other researchers to explore.

Here, the primary purpose of the paper is to offer our historical interpretation as a basis for a shared view of history by the IS community. Why is this important? Because the field lacks a clear identity: a shared concept of who we are and what we do. In the past this lack was "explained" by the newness of IS as an academic discipline. How much longer can we use this excuse? A discussion about our identity cannot seriously proceed without being grounded in a shared history of who we were and what we did in the past. It is in the articulation of a "history" (which hopefully can become "shared") that is the *raison d'etre* of this article.

## 2. Introduction

In 1981, Gary Dickson published the first and (arguably) last widely recognized historical treatment of the field[2] of management information systems (MIS) – now more commonly called information systems (IS)[3]. Given the many shifts in the direction of IS since 1981 and the wide-ranging and sometimes heated debate about the identity and core characteristics of IS, we contend that the field could benefit substantially from another historical analysis. Indeed, our position is a simple one -- that it is important for IS researchers to have at least some form of shared understanding of the short history of our field; that is, the major intellectual waves that shaped our perspectives. Most of these intellectual waves originated in Europe – in particular, the U.K. and Scandinavia – and the U.S. These waves were originally distinct but have gradually come together. For example, the original Conference on Information Systems (CIS) has become ICIS (the International Conference on Information Systems); AIS – our institutional IS academic body – has a membership consisting of a significant and growing number of international affiliates. Yet, only a few old-timers, who directly participated in the beginnings of the globalization of IS research, know the intellectual foundations that drove these institutional changes and that now legitimize them. Therefore, a historical reflection, biased and incomplete as it necessarily must be, can provide an essential foundation for a broader dialogue for those in – or wishing to join – the field. In this article, we attempt to excavate the most significant milestones of the field's evolution and place them in their historical context[4].

We need to state at the outset that our historical interpretation has a distinct academic, US-centric, business school-oriented, private sector focus[5], interpretive research method, systems development bias. It should go without saying that all histories are biased. While we have done our best to articulate key historical events, artifacts, people, research themes and ideas, we are well aware that others will believe we have not done justice to their favorite historical facts; that we have underplayed/undervalued certain events, people, or research topics or missed major milestones. To be sure, what constitutes the key aspects of history is in the eye of the beholder. This paper represents our "view" of history. The field could benefit from other interpretations of its history, and we welcome and encourage others to offer their historical views[6]. Indeed, the *JAIS* special issue devoted to IS history is a key milestone in the field's recognition of the importance of history.

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[2] The terms "field" and "discipline" are used synonymously in this article.

[3] We don't want to imply there have been no publications attempting to describe the evolution of the field; only that they either focus on one research theme or research approach (i.e., one specific angle); or they offer a very general overview of the field, which is essentially too superficial to be of much help (cf. Bacon & Fitzgerald 2001; Christiaanse, 2006; Cooper, 1988; Mathiassen, 1998; Swanson & Ramiller, 1993; Teng, 2003). There are a number of books that purport to address IS history (cf. Avison, Elliott, Krogstie, & Pries-Heje, 2006; Mingers & Stowell, 1997; Willcocks & Lee, 2008) but they are typically collections of chapters written by different authors, each with their own perspective on one piece of IS history. The chapters are disjointed and do not give any real sense of the evolution (and continuity) of the field. The one exception might be Gable, Gregor, Clarke, Ridley, & Smyth, (2008), but their book only covers IS in Australia.

[4] In writing this history, we wish to acknowledge the important role played by the various actors who contributed to making IS history: the academic community from both inside and outside the developing discipline; practitioners working in the public and private sector; consultants; vendors; government and funding agencies who encouraged and sponsored research and education; and the media.

[5] Because of our focus on the private sector, we have no doubt undervalued the role of the public sector. See, for example, Ken Kraemer and his colleagues of the Public Policy Research Organization at UC-Irvine (Dutton & Kraemer, 1978; Kraemer, Dutton, & Northrup, 1981) who initiated a well known program of research into the societal, political, economic, and policy impacts of IT.

[6] See also the six-volume collection entitled *Major Currents in Information Systems,* edited by Willcocks and Lee (2008). Although, at a price of $1,400 for the collection, it isn't likely to be purchased by many individuals.

Before explaining the benefits (and risks) of such an undertaking, a short reflection on the meaning of history is required to forestall misunderstandings from the very start. Often history is misleadingly looked upon as that branch of knowledge of which the main purpose is to catalogue and study the past. This working definition is misleading because it captures the least important meaning of history, which Heidegger calls the antiquarian notion. A catch phrase for this rather limited meaning is that "something is history", indicating that it is dead and no longer of importance except for those who have an interest in knowing what has been for its own sake. While some knowledge of past events and actions is certainly part of history, the following two sample phrases point us to at least two other and more important meanings of history, which are almost the exact opposite of the first (cf. Heidegger, 1931). Consider what is meant when someone claims "Pearl Harbor made history" and "Bin Laden already had a history when he master minded 9/11". The startling difference between the first and second meanings is that these two phrases insist that what happened in the past continues to affect the present in obvious and maybe not so obvious ways. Habermas (1973) coined the phrase "effective Wirkungsgeschichte" (history of continuing effects or history of effective outcomes) for this meaning of history. History in the second sense can be attributed to natural events (the comet hitting the earth about 65 million years ago made natural history by leading to the extinction of the Dinosaurs and other species) as well as to individuals and social groupings (the Norman invasion of England in 1066 made history by creating the British class system). Typically, the phrase "making history" is only associated with human agency, that is, s/he who made history will also have a history (we are less inclined to say that "the comet hitting the earth had a history" even though one might say George Washington's axe or the Gattling's gun had a history (besides making history). Of course, on a smaller scale, all people have their own (personal and social) history.

In this article, we shall concentrate on the first of these two meanings by asking in what sense of the word IS as a discipline has a history and how the outcomes of this history continue to be significant in shaping current academic directions of IS. Of course, the kind of analysis envisaged for the main part of this article will also require us to say something about the key stages or events that comprise the principal building blocks of IS history, but it is the former – the continued influence of past choices – that will determine the latter, in other words, the selection of those stages or events that we as authors consider to be the key to understanding the field's present. This typically leads to multiple histories of the same phenomenon – which of course is true of any complex social entity. Clearly, it would be imprudent for us to claim that our history of IS is the "correct" or only valid history of the field. Indeed, as any historian knows, histories are simply interpretations of the past. And that is what we offer here[7].

Additionally, it is important to distinguish between history and the historian, and more specifically, to distinguish the relationship between the two. History is essentially a description of the past, typically considered the "story" of the past. The story is written by the historian and is an interpretation of what happened in the past. It is usually based on interviews, historical documents (books, articles, records, statements, memos, pictures, etc.), and other historians' accounts of the past[8]. But this can be, and usually is, highly subjective. How can a historian "know" the accuracy of these documents; know the factualness of prior historical accounts? (And what do "accuracy" and "factualness" really mean? – factualness for whom; at what point in time; from what perspective?) What about missing data; inconsistent data[9]? What about the action of historians who accidentally– or instrumentally – distort the story for their own purposes? In writing history, the contemporary historian uses the records

[7] Historians are often asked the question, "Why are you writing a history of …?" This gets at the very core of what history is, and why we undertake writing histories. It isn't because by knowing history a new direction for doing something will necessarily become apparent (although it might); history -- and the events, people, places, actions, objects that are the basis of that history – need to be documented, for posterity. If it isn't written down, if there is no record of past actions/occurrences, then people who come after these events will not know what happened (or why it happened). Without a documented, readily available history, a discipline (or any social group) could be subjected to various forms of "revisionist history" – an interpretation of history which suits the proponent's instrumental action. Politics is a great example of where this often happens.

[8] We have used a variety of sources for unearthing the field's history. These include: word of mouth accounts from those intimately involved in the formation of the field; journal and conference papers; books; trade magazines and newspapers such as Datamation, Computer Weekly, Information Week, Computerworld; consultant publications such as EDP Analyzer, Infotech State of the Art reports, Diebold reports, and Gartner Group reports; and published user/practitioner opinion surveys.

[9] One considerable problem in writing history is access to the relevant documents. Often these documents are unobtainable, or so obscure that few even know of their existence. This is especially true the further back in time one goes.

created by earlier historians and is, therefore, engaged in a hermeneutic exercise, attempting to interpret the interpretation of earlier historians. Not surprisingly, different historians can come up with significantly different representations of what purports to be the story of the past. In our case, our philosophical leanings are clearly positioned in the interpretivist camp, which biases our historical interpretation in that direction. We don't apologize for this. Indeed, we welcome and endorse engaging in a debate from the many different communities about their perspectives on IS History.

In summary, history is important for understanding the evolution of social collectivities (including whole societies – cf. Kieser, 1994). Such understandings empower us to examine how the past continues to influence (and constrain) the present. Understanding history also enables us to identify past mistakes, so that we have a better chance of avoiding similar mistakes in the future – hence the Santayana aphorism. We also believe that a historical understanding makes us more appreciative of the situation in which we find ourselves today. And this insight – if applied to IS – could contribute to improving communication among diverse scholarly communities and to establishing a social identity for IS as a field (cf. Mason, McKenney, & Copeland, 1997).

Our goals in excavating the partly forgotten influences of the past are twofold: first, to propose a structure for "institutional memory" at a time when most of the "founding members" of the discipline can still be consulted for their views on the key milestones[10]. Without such a memory, the coherence that existed in the past – when the field's stock of knowledge was still sufficiently bounded so that it could be comprehended, at least by a few individuals – would be lost. And if whatever coherence existed is lost, it is hard to see how the field could ever arrive at a common identity. With such an institutional memory, diverse communities comprising IS can be connected to a shared past even if they disagree about specific details. The institutional memory can function as a map to the origins of diverse communities. The memory structure and contents can also provide basic concepts, meanings, and exemplars for addressing communication gaps by encouraging sense-making between those communities – it is a vehicle for "connecting the dots". All of this helps to counteract the inevitable biases of individual attempts at integrative perspectives of the field that would increase, rather than decrease, internal divisions.

Once the institutional memory is accepted and continually maintained, it can serve a second major objective, which is to create a conveniently accessible teaching tool for socializing the next generation of IS academics into the community. A "living" institutional memory can also be an important resource for all members to articulate the field's identity to other important constituencies, such as practitioner communities and colleagues in other academic fields.

Collectively, the insights derived from an historical analysis are a prerequisite for IS researchers to make informed judgments (not to mention to engage in a discourse across the many specializations), about the scope of IS research and teaching and where the field could and should go in the future. Given what to us seems such an obvious need, it is somewhat surprising that the discipline of IS has few published reflective pieces tracing the historical roots of the field. We are not sure whether the field considers itself too young to need such a reflection or whether there simply are not enough "old timers" around who could provide such a view. Whatever the case, we believe this to be a serious shortcoming of the IS discipline, and one which this article attempts to address.

The paper is organized as follows. The second section offers a brief overview of the field. Next, comes the main body of the paper, where we divide the history of IS chronologically into four eras or development stages. For each of the eras, we highlight important events that occurred. We also briefly discuss the research themes and research methodology that emerged in each era. The last two sections of the paper briefly consider the implications of a shared IS history. We believe such a shared history would be effective in helping to bridge the communication gaps that exist between the different sub-communities that make up the field of IS.

[10] Unfortunately, this time is running out, as the passing of one of the authors of this article (Heinz Klein) attests. The field has also lost many leading lights - Gerry DeSanctis, Rob Kling, Enid Mumford, Dan Couger, and West Churchman to name just a few.

# 3. Overview of the IS Field

The field of information systems has been around since the 1960s when it was commonly referred to as "management information systems", and has been evolving ever since. It formed from the nexus of computer science, management and organization theory, operations research, and accounting (Davis & Olson, 1985, pp.13-14)[11]. Each of these areas or disciplines brought a unique perspective to the application of computers within organizations, but each was also far broader in orientation. None focused specifically on the application of computers in organizations. IS emerged as the field to do just that.

The growth of the IS field over the past four plus decades has manifest itself in many ways. For example, as the field has grown, new specialties and research communities have emerged, and the level of research has increased dramatically. New journals, new conferences, new departments, and separate IS programs are indicative of the growth of the field[12]. We have witnessed the generation of a wealth of literature in information systems. On the whole, this literature can be characterized as diverse and pluralistic (King, Myers, Rivard, Saunders, & Weber, 2010, have called this "harmonious pluralism"). Whether such diversity is considered a blessing (Robey, 1996) or a curse (Benbasat & Weber, 1996), it is widely accepted as a hallmark of the field (Alavi, Carlson, & Brooke, 1989; Banville & Landry, 1989; Cooper, 1988; Grover, forthcoming; Hirschheim & Klein, 2003; Keen, 1991; King & Lyytinen, 2006; Klein & Hirschheim, 2008; Markus, 1997; Orlikowski & Baroudi, 1991; Swanson & Ramiller, 1993).

With such extensive development and advancement in the IS field, one would expect the field to have established a strong position in both practice and academia. However, that is, arguably, not the case. Instead, the IS field continues to struggle (Benbasat & Zmud, 2003; Checkland & Holwell, 1998; Galliers, 2003; King & Lyytinen, 2006; Mingers & Stowell, 1997). It continues to face questions about its identity and its legitimacy. Today, more than four decades after its conception, researchers in the field raise questions about "whether IS is in crisis" (Hirschheim & Klein, 2003), and "what would happen if the IS field goes away?" (Markus, 1999). In response to the dilemma faced by the field, IS researchers have tried to articulate "what is IS" and "how IS differs from other disciplines such as Computer Science and Management" (cf. Backhouse, Liebenau, & Land, 1991). Some have gone so far as to suggest the need for "positive thinking" (Grover, Straub, & Galluch, 2009) and/or articulating what is to like about the field (King et al., 2010). Early researchers such as Langefors (1974), Blumenthal (1969), Davis (1974), and Land (1975) provided conceptualizations of IS. But no agreement was ever reached, and this helps to explain why we have such difficulty defining even today what IS is or is not. Other researchers such as Gorry and Scott Morton (1971), Mason and Mitroff (1973), Ives, Hamilton, and Davis (1980), and Nolan and Wetherbe (1980) attempted to categorize IS research and its boundaries through the development of frameworks. Again, numerous conflicting frameworks were proposed during different eras, leading to the lack of a tacit agreement on the field's core (Wand & Weber, 1990). It also explains why, at various times different names such as MIS, IT, IS, DSS, information management, information science, informatics, and others have been proposed to label the field (cf. Avgerou, Siemer, & Bjorn-Andersen, 1999; Davis, 2000). Each framework's architects thought to have discovered the true core of IS, but later IS researchers recognized that the new framework shed light on just another aspect of the proverbial elephant: The whole Gestalt of the field remains elusive. Such work shows continuous effort to define and redefine IS to reflect the evolving boundaries of the field, testifying that we still cannot define the field's identity in simple terms, despite our best efforts. The boundary remains fluid.

On the one hand, such fluidity provides the field with the strength and flexibility to allow a wide variety of ideas to enter it (Davis, 2000; Robey, 1996). On the other hand, this characteristic has led to what Banville and Landry (1989) describe as a "fragmented adhocracy" where researchers adopt "piecemeal research tactics" (Hirschheim, Klein, & Lyytinen, 1996) and work on a wide variety of

[11] Other areas that are often thought to be significant in the development of IS are systems theory, cybernetics, and information economics. Additionally, disciplines such as psychology, anthropology, economics, sociology, political science, philosophy, and architecture are considered to have had an impact on the IS field.

[12] Although the field has been experiencing a decline of late in terms of IS majors (cf. George, Valacich, & Valor, 2005; Granger, Dick, Jacobson, & Van Slyke, 2007; Hirschheim, Newman, Loebbecke, & Valor, 2007).

topics that are often quite disjointed (Benbasat & Weber, 1996; Bjørn-Andersen, 1984). The diversity ranges from the problems and topics addressed to the theoretical foundations and reference disciplines used to guide IS research and to the methods used in collecting, analyzing, and interpreting data (Benbasat & Weber, 1996). Such diversity often makes the field look disorganized (Lucas, 1999) and raises the question of whether research in the IS field has contributed to a cumulative research tradition (Keen, 1980). The fluid boundary of the field also introduces the possibility of the field being dispersed into other disciplines, particularly in business schools (Lucas, 1999). Indeed, some deans of business schools contend that there is no need for a separate area of IS study (Lucas, 1999; Watson, Sousa, & Junglas, 2000). They argue that since IS is a service function to other organizational units such as management and marketing, research in IS should naturally occur within the context of problems faced by these business areas. As such, the study of IS should be taught as a service course by other fields. In fact, other disciplines in business schools are already offering what might be perceived as "IS courses". For example, some marketing departments offer courses in e-commerce and data mining, while accounting departments offer courses in accounting information systems

The first step in trying to understand and resolve these issues is to step back and reflect on the history of the IS field. In doing so, it should help facilitate IS researchers in: (1) answering the age-old question "what is IS?", (2) differentiating the IS field from other disciplines, and (3) developing a sense of an "IS identity".

## 4. The History of IS

Since its inception in the mid 1960s (Davis, 2000), the IS field has seen significant progress. From its early days when the focus was on differentiating itself from computer science and other disciplines, to its current state of disciplinary recognition, IS has had an eventful (some might say tumultuous) history. The challenge for us is to take this continuously evolving history and document it in some coherent fashion. This challenge is considerable, because there is no straightforward – or generally accepted – way to write the story of IS. Portraying more than 45 years of history as one continuous linear set of events would be mind-numbingly boring. We have, therefore, chosen to divide this history into eras or epochs[13]. We are well aware that such a division has its own set of challenges: what constitutes an era; when does one era begin and one end; how does one choose the boundaries of the eras; what about events that span multiple eras; and so on. There are no easy answers to such questions. Nevertheless, disciplines, organisms, and social collectives often describe their histories in terms of eras (epochs) or development periods where each successive period builds on the previous period, and where prior periods act as pre-histories to the next. World history, for example, typically distinguishes three major eras: antiquity, medieval, and modern age. Psychologists normally discuss their subject domain (humans) in terms of the development periods of growth: pre-natal, infancy, childhood (pre-pubescence), adolescence, and adulthood (and then death).

We have chosen – for better or worse – to structure the history of the field into four somewhat overlapping eras that do not have well defined boundaries, nor are they necessarily the same length of time. We prefer to think of these eras as development periods of the field. Further, it must be emphasized that these development periods are largely a complexity-reducing structure or simplifying vehicle that attempt to organize what would otherwise be a stream of consciousness exercise. They allow the reader to see more easily the evolution of the field.

The eras have the unembellished labels: "First Era"[14] (mid 1960s to mid 1970s), "Second Era" (mid 1970s to mid 1980s), "Third Era" (mid 1980s to mid/late1990s), and "Fourth Era" (late 1990s to

[13] Eras are traditionally thought of as "meaningful spans of time which are considered to be of a distinctive character, usually involving a system of chronological notation". Within the IS field, numerous authors have used eras as a way of structuring important historical developments, be they technology developments, types of information systems, specific applications, etc. (cf. Dahlbom & Mathiassen, 1993; Pearlson & Saunders, 2009; Laudon & Laudon, 2010; Petter, DeLone, & McLean, forthcoming)

[14] Note that this article does not discuss the period before the first era, as most of the academic work in IS only began during the mid 1960s. This is not meant to ignore the important work done by practitioners prior to the founding of the academic discipline (cf. Land, 2000; Davis, 2000; Mason, 2004; Hally, 2005).

today). In attempting to segment IS history into four periods, the obvious challenge is distinguishing the key changes or events that define each era. So how are these events chosen?

Here we take our cue from world history, which used a mixture of hard (physical) events, such as the discovery of new continents, and soft events such as mind shifts (e.g., geo- vs. heliocentric world view, politics like the erosion of the Pope's power monopoly where simple papal decrees would dethrone emperors) to identify era boundaries. We will attempt a similar strategy to define eras of IS evolution. For hard events we take our lead from major technology changes (including, but not limited to computer generations, which were used in the history of computer science)[15]. Mind shifts[16] in IS began with the establishment of distinct schools of thought (e.g., Blumenthal's 1969 view of an automated MIS versus Churchman's concept of IS as Inquiring Systems). Later on, mind shifts manifested themselves in other ways, such as new research themes, emergence of new research methods, and acceptance of multiple research philosophies (paradigms), as will be further examined below. In selecting the era-defining references, we looked for seminal first works and then included logical extensions of these seminal works. It must be stressed that such era-defining references should not be taken as concrete boundaries because these eras tend to be fluid, where a particular research theme surfaces in one era but continues to evolve through successive eras, sometimes taking on a completely different title[17]. In addition, it is critical to note that each era acts as a pre-history for the following eras. One can only understand the evolution of the IS discipline if we see each era/development period rooted in its prehistoric ancestry[18]. Technology and mind shifts are used to define eras because they are perceived to be the key changes that were significant for the evolution of IS as a field. We characterize each era by, first, looking at the major development and advancements in (1) technology and (2) mind shifts (including noteworthy research themes, influential schools of thought, and research methodologies). This is then followed by highlights of other significant events that help to understand the flavor and Zeitgeist (spirit) of each era. These are (3) the emergence of IS degree programs and professional societies plus (4) infrastructure advancements, in particular, the establishment of peer-refereed IS journals and of national and international conferences, which are still influential.

Table 1 provides an overview of the four eras discussed in this paper[19].

[15] Technology change refers not only to hardware/software changes but also to "the nature of the technology and how it has been applied and managed" (DeSanctis, Dickson, & Price, 2000; Hevner, Berndt, & Studnicki, 2000). To some extent, this aspect also captures what happened in industry (Davis, 2000), and to a limited extent, the technological changes in industry also reflect significant changes in academic eras. However, the academic evolution of IS has also been driven by internal forces, independently of, and sometimes even in contradiction to, industry trends. An example of the latter might be the concern with participatory system development or with proposing quality of work life as a major requirement for IS user acceptance (cf. Mumford, 1983).

[16] Mitroff (1983) refers to these mind shifts as theoretical shifts in thinking.

[17] Indeed, in associating research themes to particular eras, we are most certainly not implying that a specific research theme started and ended in a particular era. On the contrary, we are only suggesting that most researchers in the community would agree that a particular research theme likely emanated during this particular time period. Once started, the theme continued to grow and evolve during successive eras (although in some cases, it might have ceased to evolve, that is, die, within the space of one or several eras).

[18] A good example of this is Frank Land's (2008) reflections on "Decision Support Systems", where his historical narrative reveals both the continuity of history and its transformations.

[19] When we first started writing this paper, we felt that the field could best be described as evolving through four eras. However, as the paper has evolved through countless drafts over its very long period of writing, reviewed by many individuals, it has – in some sense – taken on a life of its own. A number of the reviewers have suggested that the field may have entered a fifth era. This may indeed be true. But in keeping with the original set of eras that the two of us felt existed, a decision has been made to stick to the original notion of four eras, although a good case could be made for a fifth one.

**Table 1. Overview of the Eras**

| Era | Technology | Research Themes | Research Methodology | Education | Infrastructure |
|---|---|---|---|---|---|
| **First Era** (mid 1960s to mid 1970s) Management / Governance: Centralization; IS reporting relationship under control of Accounting | Third generation mainframe(IBM 360); Languages: Assembler, Fortran, COBOL; Database; Ethernet | Decision Support Systems; Human-Computer Interaction; Early Frameworks; Skeptics; Stages of Growth of IS; What is the real value of IS | *(Note: there was no real discussion of research methodology in this era, but Schools of Thought) Churchman, Teichroew, Langefors, Blumenthal, Emery & Trist (also Mumford, Davis* | ACM graduate curriculum (1972); ACM undergrad curriculum (1973); IFIP TC3 (1974) | *Organizations: TIMS, AoM, ACM, DPMA, ASM, SMIS, AIDS, IFIP TC8. Research Centers: CISR, MISRC, ISRAM* |
| **Second Era** (mid 1970s to mid 1980s) Management / Governance: Steering committees; User-led IS development projects | Minicomputers; Mid-range computers; PCs; Fifth Generation Computer project | New Frameworks; Defining the field; Impact of IS Success; Competitive advantage; IT & organization change; IS in the public sector; Participative design | Colloquium at Manchester Business School 1984 – need for different research approaches | DPMA (1981) (practitioner-oriented) | *Conferences:* ICIS, HICSS, IRIS, IFIP TC8 WG8.2 *Journals* : MISQ, I&M, IS, JMIS |
| **Third Era** (mid 1980s to mid/late1990s) Management / Governance: Departmental computing / Decentralization; Emergence of the CIO | Internetworking leading to the emergence of the Internet | IT productivity/economic performance; IT Value; Technology acceptance; GDSS (Arizona and Minnesota); Process-based view of IT implementation; Outsourcing; Aligning IT Strategy with | Harvard Business School Colloquia on research methodology; Copenhagen Conference 1990 expanding research approaches | IFIP/BCS curriculum (1987) | *Organizations:* AIS, ISWorld (AISNet) Conferences: ECIS, PACIS, AMCIS, ICOIS *Journals:* ISR, CAIS, JAIS, JIT, EJIS, JIS, I&O, JSIS, IT&P, SJIS, AJIS, DSS, JGIM |
| **Fourth Era** (late 1990s to today) Management / Governance: Management of widely distributed technologies and personnel (including offshore vendor staffs) | Internet Age; Ubiquitous computing (laptops, netbooks, tablets, smart-phones, etc); Search Engines; Social Media | Adoption of Internet/e-commerce; Globalization and cross-cultural studies; IT in developing countries; Virtual teams; Knowledge management; IT personnel; Business intelligence; IS research productivity; Design Science; IS journal practices and ratings; New disciplinary frameworks Discipline critiques: - Is there a future for the field? - Relevance vs. Rigor | Philadelphia Conference 1997 encouraging qualitative research; Aalborg Colloquium 2000 promoting new research methods; MISQ special issues and conference panels; Second Manchester Conference 2004 (20 year reflection) expanding research approaches; Books on qualitative research methods in IS | IS'97 Model Curriculum; IS 2010 | *Journals:* JECR, EJISDC, ISF, JITTA, JITCA, MISQ Executive Also new AIS sponsored journals, e.g. Pacific Asia Journal of the AIS; RELCASI as well as non-Anglo-American journals: Wirtschaftinformatik / Business & Information Systems Eng. Journal *Special Interest Groups* : SIGPHIL, SIGOUT *Specialist Conferences* : Design Science |

## 4.1. First Era (Mid 1960s to Mid 1970s)[20]

After the first computer ("electronic calculator"), applications with a business flavor had succeeded (with Lyon's Electronic Office – LEO – in 1951 and various logistics systems)[21], special IS groups or departments began to emerge in organizations, signaling the beginning of this era. It is, therefore, typically taken to mark the beginning of MIS or IS as a discipline in business schools (in the US) and Informatics departments (in Europe). At that time, managers of organizations saw the need for consolidating a variety of disparate processing functions each using incompatible hardware and software. The introduction of third generation computers, in particular the 360 series computers by IBM, created an awareness of the need for standard platforms. The 360 computer series – followed by the development of integrated circuits and eventually, microprocessors – pushed along the advancement in information technologies. This era also marks the development period when the focus of organizations shifted slowly from merely simply automating of basic business processes in the 1950s and the early 1960s to consolidating the control within the data processing function. To achieve that, organizations centralized their IS function to consist of routine data processing operations, with some inventory management and transaction processing systems. This function was, in most cases, led by the manager of computer operations who reported to the controller of accounting. There were few users, with most concentrated in engineering and accounting departments. The engineering users performed CPU-intensive applications for number crunching, while the accounting users had I/O-intensive operations primarily for report generation. Banks and the military were also early adopters of data processing. Nearly all computing systems were developed internally by corporate programming staffs (often with the assistance of vendor personnel) using an Assembler language or a standardized programming language such as COBOL or FORTRAN. These development processes tended to be highly technical, and the systems usually took very long to develop and were very costly.

### *4.1.1. Technology*

Mainframes were the dominant computers used in organizations, as they had more speed and power to run complicated business transactions. However, each new model mainframe required new hardware and software. As a result, the computers were not compatible with each other. In 1964, the nature of the market changed when IBM introduced its 360 family of compatible computer systems. The 360 series introduced the notion of integrated, uniform computer system architecture across organizations and highlighted the importance of software that was compatible across different platforms. It also ushered in the era of the operating system, which revolutionized the distinction between system and application software. The 360 series allowed organizations the alternative of purchasing low-capability models for business data processing. Along with IBM computers, new technologies such as the integrated circuit and microprocessor were also evolving. Gordon Moore, a cofounder of Intel, noted that integrated circuit density was doubling every year and predicted that by the end of this era all circuits of a mainframe could be implemented on a single chip. His observation was later known as Moore's law. In addition, the introduction of database technology, the development of direct-access storage devices (DASD) and the innovations in the realm of data communications (i.e., the Ethernet in 1973) allowed data transmission to extend outside the computer room for the first time, thus making networking a reality. All these innovations led to the decrease in the cost of hardware and software and, therefore, improved the cost/performance ratio of computing. Nonetheless, the rising corporate costs for computing drew the concern of senior management (cf. Canning, 1972).

### *4.1.2. Schools of Thought[22]*

During this era, many schools of thought emerged. They provided the foundation for what IS fundamentally was, and greatly influenced the research direction and perspective of IS. They also span the range of technical and social IS camps. One of the earliest schools of thought can be

[20] The discussion of this era is longer than the other eras because it is less well known by the IS community as a whole than the other eras, and its understanding explains much about how and why the field evolved the way it has.
[21] See, for example, Simmons (1962) and Caminer , Aris, Hermon, and Land (1996).
[22] The notion of "schools of thought" was critical for the birth and development of the field, as they provided the essence of what an information system was (and by implication, what it was not). Without these various conceptions that researchers could adopt and modify, it would have been difficult for the field to coalesce. So important were these schools that we have chosen to separate them out from research themes.

attributed to C. West Churchman. Churchman, a philosopher at the University of California, Berkeley is well known for his conceptualization of "inquiring systems" that was founded on the systems approach[23]. He argues that in order for one to conceptualize a problem, one has to conduct an inquiry. This inquiry will address the nature of the problem and will collect information about the problem. One of Churchman's novel ideas was the notion of "guarantor", and how each inquiry system would, in essence, "guarantee" the truthfulness of its claims. According to Churchman, there are five types of inquiry systems: Leibnizian IS, Lockean IS, Kantian IS, Hegelian IS, and Singerian-Churchman IS. Each of these systems is distinct from the others and, as a result, each has a different representation of a problem and will produce different kinds of information. In addition, each system also has different methods to verify the content of the information produced. Churchman's thoughts on systems concept and inquiry systems were recorded in his (1971) and (1979) seminal works on *The Design of Inquiring Systems: Basic Concepts of Systems and Organization* and *The Systems Approach and Its Enemies,* respectively[24]. Churchman's thoughts had great influence on early work in the area of IS development.

Daniel Teichroew, initially at Case Institute of Technology (now Case Western Reserve University) and then the University of Michigan, adopted a set-theoretic conceptualization of IS. He was concerned with the development of computer-based information processing systems by using the computer itself in the process, and by applying management science and systems theory techniques to the problem. In the mid 1960s, he saw the need to build a system that would facilitate system developers in their work and decided to develop such tools to automate systems development. He envisioned a set of routines that would interact to automatically build computer systems. Teichroew's idea took shape in the form of a research project called the ISDOS project (Teichroew, 1972). This project involved the building of many pieces of software to automate systems development[25]. However, only two of the major pieces were ever fully developed and implemented. These pieces were the Systems Optimization and Design Algorithm (SODA) and the Problem Statement Language/Problem Statement Analyzer (PSL/PSA). Fundamentally, Teichroew was concerned with the automation of IS design including software generation from an exact "problem statement" (expressed in PSL). When this proved impossible, the research moved to supporting the specification process, that is, IS modeling. For Teichroew, an IS was whatever could be specified consistently in a repository[26]. Teichroew's ISDOS software was perhaps the first implementation of a CASE tool and was certainly the first repository-based version of a CASE tool.

In the mid 1960s, researchers in Europe began a stream of research based on hard systems thinking. Börje Langefors, an influential figure in Scandinavian countries, developed a set theoretical representation of IS that embraced set transformations and metrics. He applied this view into his work on "systemeering", where he pioneered the infological approach to ISD. The basic idea of this approach is to differentiate between an "infological problem" (i.e., determining what information the system should provide in order to satisfy users' information needs) and a "datalogical problem" (i.e., determining how the information and system should be structured using IT) (Langefors, 1974). His infological equation was: I = i(D, S,t) where: I is the information produced by the system; D is the data made available by system processes; S is the recipient's prior knowledge and expertise (world view); t is the time period during which the interpretation process occurs; and i is the interpretation process that produces information for a recipient based on both the data and the recipient's prior knowledge and experience. Langefors' equation recognized that information is not simply the result of algorithmic processing. Rather, information included the result of prior knowledge and experience of the individual receiving the results of the processing data. As such, no two individuals would receive exactly the same information from one data processing. However, the equation acknowledged the fact that individuals having similar prior experience and knowledge could possibly share meaningful interpretations of the same data. Even though Langefors' work was criticized as being too rigid and

[23] Systems thinking is a mode of inquiry that focuses on synthesis. At the core of systems thinking lies the concept of an "adaptive whole" – a whole entity that can adapt and survive, within limits, in a changing environment.
[24] Mitroff and Sagasti wrote an article in 1973 that summarized Churchman's idea on inquiry systems.
[25] In the UK, there was something of an analogous project called Systematics (Grindley, 1968).
[26] *De facto*, this was very similar to what Yourdon (1978) tried to teach with manual specifications, even though Teichroew claimed that the ISDOS project was independent of any specific methodology.

mechanical (Kling & Scacchi, 1982; Morgan, 1986), his work paved the way for the dominance of Scandinavian research among the European IS research communities in the 1970s and the early 1980s. Such dominance explains why Langefors and Scandinavian researchers were key players in founding IFIP TC8 (Technical Committee of Information Systems). Langefors' ideology on the infological approach has also become the foundation for other approaches to ISD in the Scandinavian research community (Iivari & Lyytinen, 1999).

In the late 1960s, Sherman Blumenthal undertook the task of documenting a process for the development and use of computer-based information systems for business organizations based on a cybernetic view of organizations. His book *Management Information Systems: A Framework for Planning and Development* (Blumenthal, 1969) was most likely the first detailed North American treatment of the subject and might have rivaled Langefors work had Blumenthal lived long enough to finish his book and promote his ideas. In the end he died before the book was finished, and it was left up to one of his colleagues to complete. The result was bittersweet. While the book was indeed a comprehensive attempt at the development of IS theory, it never quite lived up to Blumenthal's claim that his ideas were "the long awaited intelligent, scientific approach to determining an organization's information needs and developing the kind of system that is responsive to sound decision making." It would be more accurate to characterize Blumenthal's ideas primarily as a modular, incremental design strategy for building reporting and control systems on top of transaction-based systems. His implied IS "theory" was that of a parametric feedback loop hierarchy of the type envisioned by Jay Forrester's *System Dynamics*.

In the early 1960s, Emery and Trist began to work on extending previous thinking on hard systems (Emery & Trist, 1965). While studying the British coal industry, they found that existing thoughts on system development could not fully explain the phenomena they observed in their study. They contended system thinking was technical in nature and could not explain the impacts of systems on the work environment. They argued that in order to better understand the complete picture, one needs to also look at the social dimensions of the system. They used the term "social-technical system" (STS) to capture the need to consider jointly social and technical issues in systems design (DeGreene, 1973). The ideology of Emery and Trist has been influential in Europe. In the early 1970s, Enid Mumford – who had herself studied the coal mining problem by going down to the coal face to meet the workers and deputies -- took the idea of STS and applied it to the design and development of computer systems. This idea emphasizes the relationship between the technical systems and the social system and the necessity for working with both when designing a new production system (Mumford, 1974). Similarly, in the US, Davis and Taylor (1972) used STS as a basis for the design of jobs and work. In the late 70s and early 80s, the focus of attention shifted from STS design and development toward STS implementation. This resulted in the emergence of "participative design", which emphasized the importance of user participation in system development process (cf. Mumford, Land, & Hagwood, 1978; Land, 1982; Land & Hirschheim, 1983).

At Lancaster University, a group of researchers led by Peter Checkland began to provide consulting services at British Aircraft Corporation during the 1970s. During his research in the company, Checkland found that "hard system thinking" as applied in the 1960s by Churchman, Ackoff, and others in the operations research community could not explain many incidents that occurred in the company. Instead, he found that the complexity of the world not only made it difficult for hard systems to define their objectives precisely, it also made the results produced at the end of the project irrelevant. He, therefore, saw the need to find an explanation for the phenomena in British Aircraft Corporation. By combining the sociological and philosophical ideas of Weber and Husserl, respectively, and the cybernetic work of Stafford Beer, Checkland added a phenomenological twist to the traditional hard systems thinking to introduce his famous Soft System Methodology (SSM) (Checkland, 1972, 1981, 1999). SSM is a learning system that provides a way of conceptualizing the social processes that a particular group of people is involved in within a particular organizational context. It stresses the importance of differentiating the various meanings attributed by individuals to the same phenomena. When applying SSM to IS, Checkland refers IS to a "*meaning attribution system* in which people select certain data and get them processed to make them *meaningful in a particular context* in order to *support people who are engaged in purposeful action* [emphasis added]"

(Checkland, 1999, p. 53). To further understand the "meaning attribution system" or the "human activity systems", Checkland proposed a seven-stage methodology (Checkland & Scholes, 1990). His methodology has been adopted and adapted in a number of other approaches (cf. Avison & Wood-Harper's (1990) multiview and Schafer et al.'s (1988) functional analysis of office requirements (FAOR)). (See Stowell (1995) for a review of the contribution of soft systems methodology to IS.)

Another research stream was begun by Gordon Davis and his colleagues at the University of Minnesota. This stream is not as theoretical as previous schools. Rather, it was the first truly empirical research stream in IS history. Davis, often referred to as the "father of the [IS] field" (Sipior, 1997), has been instrumental in the conceptualization, development, and advancement of the field of IS (at least in the US). In the 1960s when the field focused on data processing (DP), Davis envisioned the value and the need to extend DP to include an understanding of managers, organizations, information, systems (in general), and computer systems (in particular). He saw the need to add a business-oriented perspective to the notion of DP. To accomplish this, Davis envisioned a formal program for teaching IS. In 1967, Davis and his colleagues (mainly Gary Dickson) began the widely recognized and highly successful PhD degree program in MIS at the University of Minnesota in the US. Following the establishment of the program, Davis and Dickson saw the need to have a close relationship with practitioners. To promote and facilitate such a relationship, they established the University of Minnesota Management Information Systems Research Center (MISRC) in 1968. Davis and Dickson have had a significant impact on IS research, and what constitutes "valid" IS research. Their interest in IS analysis and the behavioral aspects associated with it led them to conceive a series of laboratory experiments to develop a knowledge base about IS specifically on the topic of the relationship between the decision, the decision maker, and the IS supporting the decision. This proved to be very successful and has had a major impact on the field, resulting in the foundation of the Decision Support Systems (DSS) research stream that continued into the mid 1980s (DSS research will be discussed next in the era of the 1970s). These experiments, best known as the Minnesota Experiments, resulted in a series of publications, the most famous of which was the paper by Dickson, Senn, and Chervany (1977) summarizing a set of 10 experiments that were conducted over a period of eight years to examine the nature of IS on decision-making behaviors. These experiments are all firmly rooted in the empirical camp and are classically functionalist in orientation.

Table 2 summarizes the key "schools of thought" and how each conceived of what an information systems was.

**Table 2. Information Systems – Key Schools of Thought**

| Original Schools of Thought | Concept of information systems |
|---|---|
| Langefors (1966, 1973) | Datalogical and infological systems |
| Blumenthal (1969) | Reporting and control systems |
| Teichroew (1972, 1974), Yourdon (1978) | Formal specified technical systems |
| Churchman (1971) | Inquiry systems |
| Dickson (1968, 1981), Davis (1974) | Behavioral systems |
| Mumford (1974), Mumford and Henshall (1978), Bostrom and Heinen (1977), Emery and Trist (1965) | Socio-technical systems |
| Checkland (1972, 1981) | Human activity systems |

### *4.1.3. Research Themes*

In this era, researchers put a great deal of effort into describing why IS was different from other disciplines. Dickson (1968), for example, saw IS as a way to "integrate…these techniques [e.g., operations research, systems analysis, integrated data processing and management] and to provide the analytical frames of reference and the methodologies necessary to meet the new management requisites" (p.17). Gordon Davis also saw the need to extend the notion of DP to include an understanding of managers, organizations, information, and computer systems. He intended to

provide and define the idea of MIS in his classic book, *Management Information Systems: Conceptual Foundations, Structure and Development*. He defined IS as "[an] integrated, man/machine system for providing information to support the operations, management, and decision-making functions in an organization. The system utilizes computer hardware and software, manual procedure, management and decision models, and a data base" (Davis, 1974, p. 5). Davis's book was arguably the first widely adopted textbook in the IS field, although Dearden and McFarlan (1966) and Dearden, McFarlan, and Zani (1971) pre-dated Davis' book. Other significant books that provided topical coverage of IS included Gregory and Van Horn (1960), Sharpe (1969), Sanders (1970), Li (1972), Coleman and Riley (1973), and Davis and Everest (1976). In the UK, Stamper's (1973) book on information systems (where IS was conceived from a semiotic perspective) was arguably considered the seminal book in the field.

Besides books, many framework articles appeared during this time period that attempted to define IS by providing templates to guide the direction of research in the 1970s and into the 1980s. Mason and Mitroff (1973), for example, characterized IS from an individual perspective where they saw IS as composed of five main components: (1) the psychological type of the individual, (2) the classes of problems to be solved, (3) the method of evidence generation, (4) the organizational context, and (5) the mode of presentation of the output. Gorry and Scott-Morton (1971) argued that IS should exist only to support decisions and suggested that IS should be looked at from a decision-making perspective. Lucas (1973) took an organizational approach and developed a model of the impact of situational, personal, and attitudinal variables on the systems usage and systems users. Chervany, Dickson, and Kozar (1972) proposed the relationship between decision outcomes and several input variables. Young (1968) developed a detailed model of organization as an adaptive total system and proposed that problems within organizations be treated with a "total systems" approach. He, therefore, proposed a structure for total management information systems[27]. Note that these early conceptual definitions of IS focused on "elements making up the system of information storage and processing and the applications supported by the system…[These definitions] were based on the interaction of information technology, information systems, organizational systems, and individuals and groups employing or affected by the systems" (Davis, 2000, pp.72-73).

While some were very enthusiastic about IS, others were not. Ackoff (1967), for example, outlined his concerns about the nature of IS. In his article *Management Misinformation Systems*, Ackoff warned against widespread but false assumptions about IS. He argued that these false assumptions had led to major deficiencies in the resulting systems. Similarly, Tolliver (1971) presented his version of pitfalls resulting from management's being oversold on the advantages and capabilities of computers. Dearden (1972), in his article *MIS is a Mirage*, took a highly skeptical view of the MIS idea. Specifically, he questioned the existence of the systems approach as an independent field of specialization and doubted the practical feasibility of an integrated IS in supplying the needs of organizations. Brooker (1965) refuted the "total systems approach" proposed by Young (1968) by arguing that systems theory functions was not the only analytical tool needed to explain and predict an organization's total performance. Instead, he proposed a "human-oriented" theory of business. The disagreement between the supporting and the dissenting views of the IS field resulted in a series of debates on the efficacy of IS (Emery & Sprague, 1972; Rappaport, 1968). Nevertheless, overall, both IS academics and practitioners were generally enthusiastic about the emergence of IS.

The way IS researchers conceptualized IS (i.e., as a supporting tool in decision-making as shown in the various definitions presented above) along with the series of laboratory experiments conducted in Minnesota formed the foundation of the DSS research stream[28] in the mid 1970s. The conceptual thinking of DSS was mostly influenced by the early work of Michael Scott Morton (1971), Peter Keen

[27] Researchers such as Blumenthal have argued that the concept of "total management information systems" commenced with a sometimes naïve, sometimes sophisticated theory of the firm. He said that attempts toward total MIS fell short of translating what is merely perspective and overview into something concrete, in the form of a comprehensive and integrated corporate-wide plan.

[28] Research on IT support for decision making originated in the 1960s with the work by Herbert Simon, Allan Newell, and their colleagues. In fact, their work established a behavioral perspective on the relationship between IT and decision-making. The development of management science and operations research around the same time frame provided the mathematical framework for DSS research.

(Keen & Scott Morton, 1978), Steve Alter (1975), and John Bennett (1983). This line of thinking integrated behavioral decision-making and cognitive science with ideas from mathematical modeling and operations research. Early DSS research sought to explain how to build an effective decision support system and whether a DSS actually improved decision quality and decision performance (Sprague, 1980; Sprague & Carlson, 1982). They argued that an unstructured decision process could be structured with the appropriate system. As the research developed, studies attempted to link the user's cognitive style to the design of a DSS, as the decision-maker who helped to design the system would ultimately be using the system (Zmud, 1979). This issue was debated during the late 1970s and into the 1980s, with Huber and Robey debating the issue in Management Science in 1983 (Huber, 1983; Robey, 1983). Individual and design characteristics were also debated throughout the development of DSS research in the attempt to determine how these features affected decision-making effectiveness. Mixed results were found in the area of DSS, but researchers continued to investigate the linkage between design and individual characteristics and decision making effectiveness. Researchers also continued to study how to reduce effort using DSS capabilities and guide efforts toward a favorable decision (Todd & Benbasat, 1992, 1999; see also Hosack, Courtney, Hall, & Paradice, forthcoming).

Closely related to DSS research and Minnesota research has been the study of human-computer interactions (HCI). This stream of research seeks to understand how to build systems that are easy to use and ranges from "hard" HCI (e.g., plotting eye movements) to "soft" HCI (e.g., involving cognitive psychology). Various HCI aspects such as hypertext, ergonomics, screen displays, and graphical output emerged from this research (Shackel, 1997). This research stream continues to undertake studies on how to develop systems that present information in a manner that is most relevant to the audience.

In addition, researchers also continued to show interest in studying the IS development (ISD) process. Research in this area was greatly influenced by Churchmanian "hard" systems thinking. Many studies were conducted to examine each step of the Systems Development Life Cycle (SDLC) or the "waterfall model" of the systems development processes (Avison & Fitzgerald, 1999; Daniels & Yeates, 1971). These studies focused on the technical dimensions of SDLC. However, this technical SDLC method has been criticized for failing to meet the needs of management, for its instability across the whole process, and for its inflexibility (Avison & Fitzgerald, 1995). ISD continues to be a key research area even today.

Because of the need to better understand how IS could be used in organizations and how to track its maturity, Nolan (1973, 1975, 1979) presented a stage model of growth that became quite a centerpiece for discussion by both academics and practitioners[29]. The model originally consisted of four stages but was later expanded to six stages: initiation, contagion, control, integration, database administration, and maturity.

Finally, there was growing concern about the real value add of these newly developed and implemented information systems, which led to a number of conferences and associated proceedings on the subject. For example, IFIP in 1961 sponsored one such event (although it was labeled "auditing") (Frielink, 1961) and then a follow-up conference (labeled "informatics") in 1975 (Frielink, 1975). In the UK, the National Computer Center set up a working group (of practitioners and academics) in 1971 to study the return on data processing investments, which led to a report by Morris (1971). In the US, the Society for Management Information Systems (SMIS) commissioned a similar study – Emery (1971). This topic continues to receive considerable attention through the history of IS, with each era adding its own new ideas for IS investment evaluation (cf. Farbey, Land, Targett, 1993; Ward & Daniel, 2006).

[29] Even though a number of researchers found that Nolan's stage model was inconsistent with empirical studies (Lucas & Sutton, 1977; King & Kraemer, 1984; Benbasat, Dexter, Drury, Goldstein, 1984), his model has nevertheless been widely adopted by practitioners because it made sense and gave managers a tool for proactive control over the IS function.

### 4.1.4. Education/Curriculum

During this era, IS grew outside of the shell of the 1950s and early 1960s where its main function was the automation of clerical tasks. IS now became more than simply a data processing tool; organizations began looking at IS as a potential tool to support decision making in organizations. As a result, the tasks performed by computers became more complex. Organizations began to realize that many individuals hired for IS jobs did not have the formal educational background adequate for their positions. The few who knew how to do IS jobs accumulated much of their knowledge through experience, most of which was technical in nature. These individuals did not have an understanding of the integration between technology and organizations. As a consequence, organizations feared that as they grew more and more complex in the future, a point would be reached where these few individuals with experience would not have the knowledge and the skills required to perform their jobs efficiently and effectively. Even though other academic disciplines at that time offered courses related to computers, these courses were too specific in nature. For example, while computer sciences departments offered courses that emphasized algorithmic problem solving and management departments offered courses on decision making based on the available data, neither of these programs was designed to equip students with both the technical and the organizational knowledge required to perform an IS job.

ACM determined that the only way to solve the problem was to formulate formal guidelines for IS courses in higher education. However, there were no governmental college accreditation procedures in the USA that would govern such a process. So, the ACM formed a committee to draft and make recommendations for an IS program appropriate for an entry-level position. The members of the committee included Dan Teichroew, Robert Ashenhurst, Dan Couger, Gordon Davis, James McKenney, Russell Armstrong, Robert Benjamin, John Lubin, Howard Morgan, and Frederic Tonge. After extensive discussions with representatives from industry and educational institutions, the first ACM graduate curriculum for IS was published in 1972 (Ashenhurst, 1972). This curriculum attempted to add a new perspective to the IS field by integrating the IS knowledge (technically oriented) with organizational knowledge (managerially oriented) (Davis, 1974). The curriculum report provided detailed course outlines for major new courses necessary for a professional program in systems design and recommended new fields of specialization for IS in existing educational programs. In the following year, the ACM published the curriculum for an undergraduate IS degree program under the leadership of Daniel Couger (Couger, 1973). An updated version of the ACM curriculum was later published in 1982 (Nunamaker, Couger, & Davis, 1982). It should be noted that the ACM curriculum was only intended to provide guidance for the design of an IS program, with the expectation that individual schools would modify the specific courses to reflect their own identity. Even when schools stated that they were following the ACM curriculum, the ACM did not accredit the programs nor attempt to enforce compliance of its guidelines. It did, however, represent the first formal guideline marking the beginning of a shared educational format[30].

Besides the higher educational institutions in the US, academic institutions in Europe also faced the same issue of the lack of formal educational guidelines for an IS degree. In 1968, the IFIP Technical Committee for Education (TC3) and the IFIP Administrative Data Processing Group (IAG) initiated a working group to prepare a suitable curriculum for an IS degree. The members of the group included: R. Buckingham, F. Land, D. Seibt, W. Bauer, P. Heydendhoff, P. Hughes, K. Klockner, C. Port, and M. Domke. Similar to the ACM, the objective was to provide educational guidelines that would prepare individuals for a professional career as information analysts and system designers. This curriculum was designed to accommodate individuals with different educational backgrounds and experiences. The curriculum was also designed in such a way that institutions in different countries could adapt it as necessary. However, unlike the curriculum proposed by the ACM, the IFIP/BCS curriculum required students to have practical experience as part of the program. After six years of effort, the completed report was finally published in 1974 under the title, *An international curriculum for information system designers* (Land & Brittan, 1974). In 1987, a revised version of the curriculum

[30] Although the ACM undergraduate curriculum was produced in 1973, a number of schools in the US were already offering nascent IS undergraduate degree programs. For example, in 1966, Mississippi State University was offering a program entitled "Business statistics and data processing". The University of Minnesota was also offering an IS program around the same time.

was published (Buckingham, Hirschheim, Land, & Tully, 1987). Schools such as the London School of Economics, the Royal Military College of Science (Shrivenham), Hatfield Polytechnic, and North Staffordshire Polytechnic were the early adopters of the this IFIP/BSC curriculum[31].

### 4.1.5. Infrastructure Advancements: Professional Societies

Although there existed a number of societies interested in computers and organizations prior to the mid 1960s, they were only tangentially related to IS. These included the Institute of Management Science (TIMS), the Academy of Management, and the Association for Computing Machinery (ACM). During this era, other societies such as the Data Processing Management Association (DPMA), the Association for Systems Management (ASM), and the Society for Management Information Systems (SMIS) emerged to serve practitioners. At the same time, the American Institute for Decision Sciences (AIDS)[32] and the IFIP technical committee 8 (TC8)[33] were formed to serve academics. While IS was only a small subset of the overall activities in AIDS, it was the main focus in IFIP TC8. Specifically, IFIP TC8 was dedicated to promote cooperation among world-wide IS researchers in studying IS-related issues and to increase understanding among practitioners about IS. Key individuals involved in TC8 and then in the formation of its first two working groups – WG8.1 (focusing on the more technical aspects of IS) and WG8.2 (focusing more on the social and organizational aspects of IS) – were Hank Lucas (NYU), Niels Bjorn-Andersen (Copenhagen Business School), Leif Methlie (Norwegian School of Economics and Business Administration), Deiter Seibt, Klaus Horing and N. Szyperski (BIFOA – University of Cologne), Richard Welke (McMaster University), Frank Land (London School of Economics), Bill Olle (Olle and Associates), Mats Lundeberg (University of Stockholm), Markku Saaksjarvi (Helsinki School of Economics), Pentti Kerola (Oulu University), Henk Sol (Gronigen University), Alex Verrijn-Stuart (Leiden University), and Jean-Claude Courbon (University of Grenoble). In the US, a number of members of TIMS (the Institute for Management Science) who were interested in information systems met regularly at the "IS Forum" at Cornell University and produced the TIMS "IS Interfaces Newsletter" first edited by Richard Welke in the mid 1970s. In other parts of the world, other IS-oriented associations had also formed: Germany had GMD (Gesellschaft fur Mathematik and Datenverarbeitung) and Britain had its British Computer Society as well as the joint government-industry-academia initiative implemented as the National Computing Center.

In addition to these professional societies, IS academics also began to recognize the importance of conducting research that could be tied to practitioners (or at least partially funded by industry). This led to the birth of University-based IS research centers. Besides the Minnesota school discussed above, the Massachusetts Institute of Technology (MIT) formed its own Center for Information Systems Research (CISR) in 1974. Similar to the mission of Minnesota's MISRC, CISR's mission was "to develop concepts and frameworks…[that would] help executives address the IT-related challenges of leading increasingly dynamic, global, and information-intensive organizations". Compared to the research at Minnesota, which was highly laboratory-oriented at that time, most of the work at MIT was field-based research[34] aimed at studying the management and use of IS in organizations (Canning, 1979). In Canada, McMaster University started its own Information Systems Research Center (ISRAM) also in 1974. Around the same time, other programs also began at University of Michigan, University of Pennsylvania, New York University, the University of California at Los Angeles, and the University of Colorado at Colorado Springs.

[31] Along with these national and international curriculum initiatives by ACM and IFIP, were more local efforts such as the CNAA of the UK, which approved curricula for the UK polytechnics.
[32] AIDS was later changed to DSI.
[33] TC8 was formed by IFIP. Among those who founded this society included Langefors and other Scandinavian communities who dominated the European IS community at that time. Although we contend that TC8 largely serves the academic community, it was initially envisaged to include and be relevant for both academics and practitioners (Olle, 2006).
[34] An interesting aspect of this era was the lack of any significant discussion about research methods. Positivist methods ruled supreme.

## 4.2. Second Era (Mid 1970s to Mid 1980s)

In this second era, technological advancement continued to soar. The major advancement was the introduction of the personal computer (PC). With the introduction of PCs, organizations began to distribute their computing/processing powers across organizations as the hardware cost of PCs was much cheaper compared to mainframes. This era also saw business units other than the accounting and the engineering departments compete for computer resources. As the range of users broadened, organizations took a stronger management orientation to their traditionally technical-oriented approach to IS operations. They tried to address and satisfy user requirements by forming steering committees. Many organizations also began to involve users in their systems development projects, where the users would help to determine application requirements as well as monitor the deliverability of information systems as developments took place (DeMarco, 1978; Gane & Sarson, 1979). Later, some users even took charge of IS projects. However, corporate level strategies for IS were not very well developed. Nor for that matter was there much discussion about alignment of IS with business strategy. Rather, individual functions or departments were developing IS applications of critical importance to their particular areas.

### *4.2.1. Technology*

Computing technology had evolved to the point where new processing options became available. Midrange and mini computers (especially DEC's PDP and VAX machines) had arrived to enable organizations to process a number of applications locally. Still, most organizations relied on corporate mainframes for most core business applications. However, in 1981, the reliance on mainframe computers shifted with IBM's introduction of the personal computer[35]. PCs made desktop computing a real possibility. These computers had open architectures and were available at lower individual unit cost compared to mainframes. As a result, organizations began to replace mainframes with PCs and used PCs to distribute processing power throughout their organizations. Organizations also began to redesign their business processes based on the new distributed computing architectures. While organizations continued to develop their own systems in-house, some commercial, externally developed software packages now became available.

An interesting technology development during this era, initiated by the Japanese Ministry of International Trade and Industry (MITI), had the intent of revolutionizing computer technology. It was the so-called "Fifth Generation Computer project". The core of the Japanese proposal was massively parallel CPUs and artificial intelligence. So concerned was the rest of the world that the Japanese would take over the entire computer industry that countries rushed to implement their own equivalent. In the US, it was the Microelectronics and Computer Technology Corporation (MCC), in the UK it was the Alvey initiative, and in Europe it was the European Strategic Program of Research in Information Technology (ESPRIT). In the end, the project was widely considered a failure, although it did create somewhat of an "arms race" among the various nations and led to more research funds (both from industry and government) being directed at technology R&D.

### *4.2.2. Research Themes*

During this era, the effort to define the IS field continued. Ives, Hamilton, and Davis (1980) defined IS in terms of five IS environments (external, organization, user, IS development, and IS operations), three processes (user, IS development, and IS operations) and an information subsystem. Nolan and Wetherbe (1980) defined IS as an "open system (technology) which transforms data, requests for information, and organizational resources (inputs) into information (outputs) in the context of an organization (environment of MIS) and provides feedback system" (p. 6), while Keen (1987) categorized the IS field in terms of problem areas that each historical era (from the 1970s to the 1980s) chose to focus on. While these researchers tried to define IS from the perspective of different research areas, other researchers chose to search for the IS identity through the identification of reference disciplines. Culnan (1986, 1987) and Culnan and Swanson (1986), for instance, conducted co-citation analyses and identified three categories of "referents" that IS research drew on. These referents were fundamental theory (e.g., systems science), related applied disciplines (e.g.,

[35] Although IBM was not the first to produce a microcomputer, the TRS-80, Commodore 64, Altair, and others that had been developed prior to 1981 were not considered "real" computers and, hence, had no impact in the corporate world.

management, finance), and underlying disciplines (e.g., sociology, psychology). However, one important point worth noting here was that the scope of the research in identifying the IS field expanded beyond those of the 1960s and 1970s. Whereas earlier frameworks (such as those of Mason and Mitroff, and Gorry and Scott-Morton) stopped with the identification of research areas, frameworks that surfaced in the 1980s evaluated the contribution of IS research. For example, Ives, Hamilton, and Davis (1980) categorized 331 doctoral dissertations into their framework, while Nolan and Wetherbe (1980) tested their framework with samples from the IS literature.

In addition to working on defining the field, IS researchers also conducted research on a variety of diverse topics. One of these topics focused on examining the organizational impact of IS. As DeLone and McLean (1992) discussed the relationships between different surrogates for IS success, researchers attempted to use a variety of dependent variables of "success" at this level[36]. The most famous was the group of researchers who attempted to determine the impact of IS on an organization's competitive advantage (Clemons, 1986; Ives & Learmonth, 1984; McFarlan, 1984; Porter & Millar, 1985; Rackoff, Wiseman, & Ullrich, 1985). Michael Porter orginated the concept of "competitive advantage" at the Harvard Business School. He proposed that in order for organizations to achieve competitive advantage, they could adopt two different strategies: (1) be a cost leader, or (2) be a differentiator (Porter, 1980). Research in this area found that IS can function as a competitive weapon. However, IS in itself does not implicitly lead to the desired outcome. Rather, it is management's ability to conceive of, develop, and exploit IS applications that leads to the possibility of a sustainable competitive advantage (Ives & Learmonth, 1984; McFarlan, 1984; Porter & Millar, 1985). Further research also concluded that the use of IS allows organizations to change their competitive boundaries in the marketplace (Parsons, 1983; Cash & Konsynski, 1985) and create organizational structures that are more nimble and able to adapt to the external environment more quickly (Huber, 1990). This last result initiated a widely debated issue on the causal link between the presence of IS and organizational change (Markus & Robey, 1988). Some researchers argued for a direct link, while others argued for a contingency view.

Participative design was another area of interest during the 1980s (Cavaye, 1995; Hirschheim, 1985; Ives & Olson, 1984; Mumford, 1981). This stream of research grew out of the work on social-technical systems of the 1960s. Here, researchers such as Enid Mumford, Frank Land, and Bob Bostrom applied the original STS ideas through user participation. Specifically, they studied how user participation during the systems development process led to a successful system implementation. While this research had mixed empirical results, it was clear that user involvement and participation are important in the systems development process. This research also tried to identify factors that increase involvement and participation and argued that by increasing involvement and participation, users will be more likely to accept and be satisfied with the system. To measure end-user satisfaction, a variety of researchers developed scales (Bailey & Pearson, 1983; Doll & Torkzadeh, 1988; Ives, Olson, & Baroudi, 1983) that assess the satisfaction of users. While user participation research around this era focused on the traditional system development process, later research expanded it to include the areas of the Internet and e-commerce.

In the area of ISD research, various sociological perspectives emerged to explain issues in ISD research. This is in contrast to the primarily technically-focused perspective of the 1970s. These sociological perspectives find their bases in Checkland's SSM (Checkland, 1981), the social-technical approach (Mumford, 1983), and Kling's interactionist approach (Kling, 1980). Researchers such as Hirschheim, Iivari, Klein, and Lyytinen have done considerable work in this area (cf. Lyytinen, 1987; Hirschheim, Klein, & Lyytinen, 1995).

As an alternative to the study of IS in the private sector, Kraemer and his colleagues produced a number of studies on IS use in the government sector (Kraemer et al., 1981; Danziger, Dutton, Kling, & Kraemer, 1982; Danziger & Kraemer, 1986; Dutton & Kraemer, 1978). Similar public sector research occurred in Europe and elsewhere (cf. Eade & Hodgson, 1981).

[36] Along with the studying of IS success, there was considerable interest in its converse: failure (cf. Lucas, 1975).

### 4.2.3. Research Methodology

In 1984, researchers began expressing their concerns over research methods in IS. They questioned the adequacy of traditional research methods for investigating social needs and problems in IS research. To address this issue, IFIP TC8 Working Group 8.2[37] organized a colloquium that was held at the Manchester Business School in 1984. The conference, chaired by Enid Mumford, allowed researchers to "look critically at the kinds of research associated up to now with information sciences, and…[to discuss] the need for new approaches" (Fitzgerald, Hirschheim, Mumford, & Wood-Harper, 1985, p. 2). It also allowed researchers to "call into question the notion of research in information systems being a science, in the same sense as research in the physical or natural sciences, and to ask whether the scientific research methodology is the only relevant methodology for information systems research or indeed whether it is an appropriate one at all" (p. 2). This colloquium not only marked a milestone in the effort to inaugurate additional research approaches that are needed to explain and understand IS (Nissen, Klein, & Hirschheim, 1991; Lee, Liebenau, & DeGross, 1997; Kaplan, Truex, Wastell, Wood-Harper, & DeGross, 2004), it also demonstrated the willingness of IS researchers to appreciate the different approaches to research (Mumford, Hirschheim, Fitzgerald, & Wood-Harper, 1985)[38].

### 4.2.4. Education/Curriculum

In 1981, a curriculum called the Data Processing Management Association (DPMA) Computer IS curriculum was published by DPMA Education Foundation (Adams & Athey, 1981). This curriculum had the same objective as the ACM and IFIP/BSC curriculums, that is, to provide a structure for an IS degree. The DPMA curriculum, however, differed from previous curricula in that it was initiated by practitioners who, in turn, defined the skills and education required for an entry-level position of data processing personnel. As such, it tended to be narrow and focused only on skill sets related to data processing. It also differed from the ACM curriculum, as it required schools that elected to adopt the curriculum to follow the structure without any modification. This requirement explained why the curriculum had a significant impact on data processing education at the undergraduate level but not at the graduate level (Davis, 2000). Also, since this curriculum employed strict rules, it provided certification to schools that met the requirements of the curriculum.

### 4.2.5. Infrastructure Advancements: Conferences and Professional Societies

In 1980, the first conference for the IS discipline – the International Conference on Information Systems (ICIS) – was held in Philadelphia, Pennsylvania. The conference was supported by SMIS, TIMS, and ACM to serve primarily IS academicians along with invited IS practitioners. The objective of the conference was to provide a direction to IS research as it moved into the 1980s. Many significant issues were addressed during this conference. Peter Keen (1980), for example, stressed the importance of building a cumulative research tradition. To that extent, he urged researchers to identify the dependent variable of IS research and clarify the reference disciplines of the IS field. Davis (1980) discussed the roles of publication for tenure and promotion for IS academics, while Dickson, Benbasat, and King (1980) identified problems, challenges, and opportunities for IS research. Their advice and concerns later became the subject of discussions and research for some time. While most conferences have been held in North America (mainly in the US, with the exception of the 1994 conference, which was in Canada), ICIS is internationally oriented and, thus, has been held in Europe (Denmark in 1990, the Netherlands in 1995, Finland in 1998, Spain in 2002, and Paris in 2008), Australia (in 2000), and China (2011). Today, ICIS annually attracts more than 1,000 leading academicians worldwide. Researchers welcome the conference, as the presentations and panel discussions provide a single place for researchers to get together to share and exchange their research ideas and knowledge. Through these interactions, researchers stimulate each other's thinking and nurture their research relationships. In addition to the presentations and panel discussions, ICIS has also organized various activities to guide newcomers in the field. For example, ICIS has doctoral consortia where Ph.D. students in their dissertation stage can get together to discuss

[37] Note that the area of interest and focus of IFIP's TC8 Working Group 8.2 is the relationships and interactions between IS, IT, organizations, and society.

[38] Even Davis said this colloquium altered his once only positivist view of IS research. He stated that he now believes a "world-class scholar must be competent in both hypothesis testing using quantitative data and qualitative, interpretive methods using observations, interviews, and participation" (2000, p. 80).

their research areas and interests. ICIS also has junior faculty workshops where newly graduated Ph.D. students and assistant professors can discuss the problems they face in the process of building their careers. Recent ICIS sessions have brought together senior faculty to discuss and plan the direction of the IS field. All these activities are useful in building and shaping the future of the IS field.

Before ICIS, a popular conference that supported IS research was the Hawaiian International Conference on System Sciences (HICSS). While somewhat broader than just IS, it started in the mid 1970s, and continues to bring together members of the IS community on an annual basis.

In Scandinavia, a group of IS researchers launched an annual meeting called IRIS (Information Systems Research in Scandinavia) in 1978. This meeting was intended to provide researchers with a yearly look into Scandinavian IS research. It began as a Finnish event but soon developed into an event for all Scandinavian IS researchers as well as others.

In the late 1970s, IFIP TC8 created a new working group (TC8 WG8.2) whose focus was the organization and social aspects of information systems. It was arguably the first formal group to broadened the conception of IS and IS research to embrace the social as well as technical aspects of IS. A number of "working conferences" followed, the first of which took place in Bonn in July 1979 whose theme was "the information systems environment" (Lucas, Land, Lincold, & Supper, 1980).

### 4.2.6. Infrastructure Advancements: Journals

As more and more research was being conducted in the IS field, IS researchers began producing more IS articles and, thus, needed more journal space to publish their scholarly work. Until 1977, there was no publication outlet that was IS specific. Instead, IS researchers had to depend on journals that belonged to other disciplines such as *Management Science*, *Communications of the ACM* (CACM), and *Academy of Management Journal* to get their IS articles published. As a result, some researchers were pressured to "force-fit" their work to suit the style and themes of the particular journal[39] (Keen, 1980, p. 10). Even then, many manuscripts were rejected because they did not fit closely enough with the focus of a particular journal. Facing these problems, IS academicians saw the need to have a journal of their own. SMIS, which was short on products and services to offer its members at that time, welcomed the idea of a journal. So, with SMIS needing a service and product for its members, and MISRC wanting to be the home for a journal in the IS area, the first journal that belonged to the IS field – *MIS Quarterly* (MISQ) – was born. Gary Dickson, the founding editor of *MISQ*, stated in his first editorial note that MISQ "attempts to break new ground in the information systems field" by providing a vehicle of communication for IS communities (Dickson, 1977, p.iii). During the early days of *MISQ*, there were two target audiences, the IS academics and the practitioners. However, the focus tended to be on practitioners[40], as the primary source of funding at that time came from SMIS, a society comprised primarily of IS practitioners. Yet, *MISQ* strived to satisfy the need of both audiences by creating a two-section journal, one on Application and the other on Theory and Research. Dickson stated that the goal of *MISQ* was "to be managerially oriented [to]…offer something of benefit to the practitioner…[and] at the same time…to provide a vehicle for the researchers working in the information systems field to communicate with each other and with practitioners" (1977, p. iii). Over the years, *MISQ* has shifted its target audience from practitioners to academics. It has maintained its quality and reputation as the top IS journal of the field; highly regarded both within and outside of the IS field (Gillenson & Stutz, 1991; Jackson & Nath, 1989; Walstrom, Hardgrave, & Wilson, 1995) as well as both in North America and abroad (Chen & Hirschheim, 2004).

Besides *MISQ*, another IS-oriented journal published by Elsevier Science, *Information and Management (I&M)*, emerged in 1977. *I&M* evolved from *Management Datamatics*, which, in turn,

[39] *Management Science*, for example, was mainly quantitative in orientation; *CACM* published computer science (technical material) *Academy of Management Journal/Academy of Management Review* published decision-making research or organizational studies. Periodicals such as *Datamation* and *Journal of Systems Management* were practitioner oriented.

[40] Even though the primary referees of the articles published under the "Theory and Research" section of *MISQ* were academicians, a practitioner referee was involved to assess whether or not the articles had any practical value.

came from *Management Informatics*[41]. However, this journal had a new editorial focus and tended to have a more European flavor. Around the same time the journal *Information Systems* was formed. It had a distinctly European and Computer Science focus, however, and was not a viable outlet for behavioral and managerial IS research. In 1984, the *Journal of Management Information Systems* also began publication. In the German speaking world, the journal *WIRTSCHAFTSINFORMATIK* was the primary outlet for IS-oriented research (Buhl et al., forthcoming).

## 4.3. Third Era (Mid 1980s to Mid/Late 1990s)

During this era, many business units resorted to purchasing their own hardware and software to suit their departmental needs. This was the era of personal computing giving rise to departmental computing (e.g., decentralization). This trend led to new problems of data incompatibility, connectivity, and integrity across functional departments. It also gave rise to the concern about legacy systems and what to do about them. The dire need to provide improved access to corporate DP resources for users throughout the organization and organization-wide connectivity led to the dramatic growth of separate IS departments. This IS department was responsible for maintaining organization-wide data, applications, and computer architecture as well as developing new systems for future needs. The head of the department was given the title of CIO. As competition became stiffer and profit margins shrank, organizations looked to outside vendors for IS solutions. At the same time, they began to align their IS strategies with corporate strategies.

### *4.3.1. Technology*

This is the era where PC hardware, software, and telecommunications evolved rapidly. New products were continually being introduced, each more appealing than its predecessors. This phenomenon further improved the price/performance ratio of computer devices. But perhaps the main technological advance of this era was the emergence of large scale computer networking, over both private and public networks. The key development, in particular, was the widespread adoption of the TCP/IP protocol for computer networks. While the development of packet-switched networks can be traced back to the 1960s (e.g., ARPANET) it wasn't until the mid 1980s that such technology took hold. ARPANET was originally conceived to be an open, packet-switched network (with hardware and software from a myriad of vendors) made up of many independent networks. The network eventually grew to include packet satellite networks, ground-based packet radio networks as well as other types of networks. The Internet emerged as an outgrowth of ARPANET with its original goal intact (viz., open architecture networking). But while the Internet may have begun in this era, it wasn't until the next era that it really changed the information systems field.

### *4.3.2. Research Themes*

In terms of research, the era saw the emergence of new research topics in addition to the continuance of research areas from the previous era. New topics included implementation, IS productivity paradox, strategy alignment, and outsourcing. The research stream on IS productivity continued the tradition of economics-based research of the 1980s. This research stream studies the organizational impact of IS on the economic performance of organizations (Hitt & Brynjolfsson, 1996; Mahmood & Mann, 1993). Researchers attempted to assess IS value through performance metrics such as return on investment (ROI) and market share. Results in this area found little correlation between IS investment and improved performance (Barua & Mukhopadhyay, 2000). This led Roach (1988, 1989) to coin the term "IT productivity paradox" to capture the conflicting results. Researchers argued that the reason behind the contradicting results is due to the fact that economics-based approaches cannot pinpoint where and how IS impacts are created and where management action may be needed to increase the payoff from IS investments (Barua, Kriebel, & Mukhopadhyay, 1995; Barua & Mukhopadhyay, 2000). Another perspective on measuring the value of IS progressed concurrently and independently. This perspective took the "process-model" orientation and proposed a multiple dimensional approach to study IS value creation (Kauffman & Kriebel, 1988; Banker & Kauffman, 1991). This perspective can be seen as a complement to the earlier economics-based approach. Specifically, this perspective analyzes the impact of IS and other factors through a network

[41] Management Datamatics and Management Informatics are no longer in publication.

of relationships between various variables of interest. The research stream on IS value continues today and is possibly as contentious now as ever (cf., Strassmann, 1985).

Following as an outgrowth of the user participation area (i.e., focusing on individual users), a stream of research that studied user acceptance emerged in the late 1980s. This research, based mainly on Fred Davis' (1989) Technology Acceptance Model (TAM), posits that users will intend to use a system based upon its perceived usefulness and perceived ease of use of the system. This model has been investigated over the years in a variety of contexts using a number of technologies and has been found to predict up to 40 percent of intentions to use (Davis & Venkatesh, 2000). Other researchers in this area have attempted to refine what it means to "use" a system (Chin, Gopal, & Salisbury, 1997; DeSanctis & Poole, 1994), arguing that the faithfulness of use is important as well. Besides user acceptance, Rogers' (1983) diffusion of innovation has also formed a considerable body of IS research in the study of IS diffusion. Specifically, researchers studied the rate, pattern, and factors that determine an organization's decision to adopt a particular innovation (Fichman, 2000; Moore & Benbasat, 1991).

The research stream that began in DSS started to shift into the area of GDSS at the beginning of this era. The focus of GDSS is individual users and groups within organizations (Kraemer & King, 1988). Two universities, the University of Arizona and the University of Minnesota, have contributed significantly to the development of GDSS. However, each university adopted different research philosophies and methods when studying GDSS. The University of Arizona adopted the EMS model proposed by Jay Nunamaker, Alan Dennis, Benn Konsynski, Doug Vogel, Joe Valacich, and others (Dennis et al., 1988). This model was grounded in an engineering worldview and its proponents believed that group performance and behavior could be improved by imposing an efficient structure on the group through specific processes and technologies. The University of Minnesota, on the other hand, adopted the Adaptive Structuration Theory (AST) framework proposed by Geraldine DeSanctis and Marshall Scott Poole (1994). Proponents of this framework, grounded in a traditional social science worldview, believe that since each group appropriates technology in a unique way, it is important to understand how groups interact with and adopt technology. Even though early research in GDSS produced inconsistent results (Gray, Vogel, & Beauclair, 1990; Rao & Jarvenpaa, 1991), GDSS had been found to have impacts on some aspects of group processes and outcomes (Dennis, George, Jessup, Nunamaker, & Vogel, 1988; Nunamaker, Chen, & Purdin, 1991). While the traditional focus of GDSS was to support management decision making, its current incarnation has expanded into other types of technologies and users.

With the concern for various technical and sociological issues that arose as technologies were being introduced in organizations, researchers began studying the issue of IS implementation. This research stream stems mostly from a process-based view (Kwon & Zmud, 1987), and researchers argue that there are stages through which the process of implementing technology progresses. Cooper and Zmud (Cooper & Zmud, 1990) present a famous model of implementation that includes the stages of initiation, adoption, adaptation, acceptance, routinization, and infusion. The implementation process has also been viewed from a variety of perspectives including politics (Markus, 1983), a change perspective (Zmud & Cox, 1979), a factor-based view (Aggarwal, 1995; Zmud, 1979), and a social system view (Bostrom & Heinen, 1977; Robey, 1987).

As organizations got frustrated with the uncertainty of their IS investment and were faced with problems in their IS implementation, they began looking for a less expensive way to get the job done. They looked outside of their organizations to vendors for solutions. With Kodak pioneering the first outsourcing contract, many organizations adopted the belief that outside vendors whose core competence was in IS would be able to provide more cost efficient and effective services (Loh & Venkatraman, 1992). Such a belief was largely predicated on transaction cost economics (Williamson, 1975). This trend initiated an outsourcing research stream that sought to understand various outsourcing issues such as motivation (Fitzgerald & Willcocks, 1994; Lacity & Hirschheim, 1993,1995), scope (Benko, 1992; Gupta & Gupta, 1992), performance (Arnett & Jones, 1994; Loh & Venkatraman, 1995), insourcing-or-outsourcing (Meyer, 1994; Lacity & Hirschheim, 1995; Reponen, 1993), contract (Fitzgerald & Willcocks, 1994), and partnership (Grover, Cheon, & Teng, 1996;

Klepper, 1995). Recent research in this area has expanded to include offshore outsourcing (Rajkumar & Dawley, 1998; Rajkumar & Mani, 2001), insourcing/backsourcing (Hirschheim & Lacity, 2000; Veltri, Saunders, & Kevan, 2008), online sourcing marketplace (Gefen & Carmel, 2008), and the vendors' perspective (Clark, Zmud, & McCray, 1995; Levina & Ross, 2003). (See Dibbern et al. 2004 for a detailed survey of outsourcing.)

The decision to outsource shows a shift in IS strategy in organizations. As a continuation of previous research on IS value and IS competitiveness, researchers focused on how to align business strategy and IS strategy (Brown & Magill, 1994; Chan, Huff, Barclay, Copeland, 1997; Henderson & Venkatraman, 1992; Sabherwal, Hirschheim, & Goles, 2001), how IS and business units relate and formulate strategy (Sambamurthy & Zmud, 1992), how business and IS plan (Teo & King, 1999), and how IS accomplishes its tasks (Sambamurthy & Zmud, 1999; Venkatraman, 1991). Researchers also focused on business process redesign (BPR) and enterprise resource planning (ERP) as major developments in the IS arena. These topics were of particular interest to the practitioner community and influenced greatly the applied research that was done during this era.

### 4.3.3. Research Methodology

In this era IS researchers continued to pay attention to the importance of the state of IS research. In response, Harvard Business School organized a research colloquium to discuss the state of IS as a field of study. A steering committee comprised of James Cash, James McKenney, Warren McFarlan, Jack Rockart, Jay Nunamaker, Gordon Davis, and Richard Mason identified five subject areas that needed further attention. One of these subject areas was "research methodology": qualitative research, experimental research, survey research, mathematical models, and software systems demonstrations. The methodology colloquia resulted in the publication of three volumes of research on: qualitative research methods (Cash & Lawrence, 1989), experimental research methods (Benbasat, 1990), and survey research methods (Kraemer, 1991).

In addition to the Harvard Business School colloquium, IFIP also continued its previous efforts to address issues on qualitative research. Another colloquium was held in Copenhagen in 1990, and the result was documented in the book *IS research: Contemporary approaches and emergent tradition* (Nissen et al., 1991).

### 4.3.4. Education/Curriculum

As technology developed and requirements for skill level changed in organizations, academics also tried to ensure that they equipped future IS professionals with current and necessary skill sets. In 1987, a revised version of the IFIP/BCS curriculum was published. This revised curriculum updated the previous curriculum published in 1974 (Buckingham et al., 1987). Additionally, the emergence of enterprise resource planning systems, and in particular SAP, created a demand for students who had ERP skills. This led a number of universities to join the SAP consortium and teach SAP in both their undergraduate and graduate IS programs (Watson, Rosemann, & Stewart, 1999).

### 4.3.5. Infrastructure Advancements: Professional Societies

As the IS field grew more diverse, IS research communities saw the need for a professional society to represent the field[42]. Such a need was first spelled out in an editorial authored by the original five Editors-in-Chief of the *MISQ* in March of 1993. IS communities envisioned the professional society to provide a shared vision that would unify the diverse communities (Dickson, Emery, Ives, King, & McFarlan, 1993). They also envisioned a society to provide the leadership needed for the IS field (Dickson et al., 1993). Based on the hard work of many individuals, in 1994, the premier international association for IS academics, AIS, was formed. AIS has a governance structure that represents three international regions (1) Americas, (2) Europe and Africa, and (3) Asia and the Pacific. Its leadership (really management) comes from various regions and rotates annually. See Appendix A for a list of past presidents.

[42] During this time, there was no professional society that was IS-oriented. Instead, IS communities joined other societies such as DSI, TIMS, and so forth.

Since its inception, AIS has worked hard to improve the IS field. For example, it publishes two electronic journals – *Communications of the Association for Information Systems* (*CAIS*) and the *Journal of the Association for Information Systems* (*JAIS*). *CAIS* publishes tutorials, comments, and pedagogical articles that fall outside of traditional research. *JAIS*, on the other hand, publishes traditional research articles. These electronic journals have moved the field into a different mode of publication. They lifted the concern about limited journal space and reduced the turnaround time for the review process[43]. The emergence of these two electronic journals is considered by many as a key milestone in the evolution of the field, as it marked the time when the field's association (AIS) took control of its key publication outlets rather than leaving it in the hands of outside publishers.

AIS offers various other services to its members. The AIS-ICIS placement service, for example, provides a very useful service to both the institutions and Ph.D. candidates searching for jobs. The AIS e-library initially provided access to AIS journals (*CAIS* and *JAIS*), AIS conference proceedings (both ICIS and AMCIS), and *MISQ*. The e-library has now expanded to include access to a variety of AIS sponsored and affiliated conferences and journals. AIS also sponsors the establishment of Special Interest Groups (SIGs). These groups bring together researchers who are interested in specific research areas and allow them the opportunity to exchange knowledge and ideas and to form a close relationship with each other. The focus of these groups includes, but is not limited to, human-computer interaction; e-business; knowledge management; cognitive research; Internet and network security; process automation and management; and agent-based IS, outsourcing, philosophy, and so forth In addition, AIS forms loose affiliations with other international organizations such as SIGMIS, TC8 (IFIP) and INFORMS (formerly called TIMS and then ORSA/TIMS). It also runs ICIS and AMCIS and supports PACIS (Pacific-Asia Conference on Information Systems) and ECIS.

As envisioned by the committees who formed AIS, today AIS is recognized as the association for the IS field. Through its various services, AIS has established an administrative and legal structure for managing the IS community. It has also established a formalized political voice to lead the direction of IS research and education.

In addition to AIS, the launch of the ISWorld Net in 1994 marks another significant milestone for the IS field. ISWorld was formed under the vision of Blake Ives. Today, it is the premier communication and cooperation vehicle for the field. It provides various resources such as information related to research, teaching, and professional activities; an online directory of IS faculty members[44], and links (i.e., portals) to country-specific pages and discussion lists. In 1998, ISWorld formed an alliance with AIS[45]. The alliance also included ICIS, which was a separate group distinct from AIS, even though ICIS council members were also AIS members, some of whom were also on the AIS council. The alliance was a significant achievement, as it brought together several disparate factions under one roof. It also unified and coordinated the services provided to the IS community.

### *4.3.6. Infrastructure Advancements: Conferences*

This era saw the emergence of a number of regional conferences. The European Conference on Information Systems (ECIS), for example, was first organized in 1993 by the London School of Economics. It attracted researchers and practitioners worldwide and has since become a significant event for European IS scholars. The first Americas Conference on Information Systems (AMCIS) was held in 1995 in Pittsburgh, Pennsylvania. This conference was formed by AIS and was designed to complement ICIS in its program and placement activities. The first Australasian Conference on Information Systems (ACIS) was held in 1990, and the first Pacific-Asia Conference on Information Systems (PACIS) was held in 1993. The conferences have the objective to serve the interests of IS scholars from Australia/New Zealand and from the Asia Pacific Region, respectively. These conferences also have affiliated with them doctoral consortia, which help aspiring doctoral students to

[43] For a journal, a turnaround time of two to three years is not unusual.

[44] The Americas database online access was developed by Janice DeGross, David Naumann, and Jesper Johansson. Europe/Africa and Pacific/Asia directories were developed by Niels Bjørn-Andersen and Guy Gable.

[45] Two main reasons that led to the formation of the alliance between ISWorld Net and AIS: (1) Lack of support to develop and maintain Web repositories and the list server and (2) Lack of resources to support the operations of ISWorld Net. ISWorld also renamed itself AISWorld.

become more familiar with the academy. Other conferences focusing on specific research areas are also being held. Examples of these types of conferences are the International Conference on Outsourcing of Information Services (ICOIS), the European Conference on e-Government, and the International Conference on Electronic Commerce.

### 4.3.7. Infrastructure Advancements: Journals

During this era, the number of professionals with an IS degree and the number of programs offering IS degrees increased dramatically. Concomittantly, the production of IS research by academics brought with it the need for more publication outlets. With *MISQ* being the only high quality IS-oriented journal, researchers began to seek additional high quality publication outlets. During ICIS in 1985, Chris Bullen, the Chair of the TIMS College on IS, organized an informal discussion that led to the establishment of an ad hoc committee to investigate the need for a new journal. This committee was chaired by Bill King. Other members of the committee included Gordon Davis, E. Burton Swanson, Omar El Sawy, George Huber, Charles Kriebel, Robert Rouse, and Michael Treacy. The committee sent a survey to 400 randomly selected IS faculty and received 196 responses that showed substantial support for a new journal. During the following ICIS, King and Bullen led a discussion to refine the idea of publishing a new IS journal. King and Bullen formally proposed the idea to a TIMS Council meeting in 1986. The proposal was approved, and *Information Systems Research* (*ISR*) was established. It was published by The Institute for Operations Research and the Management Sciences (INFORMS, formerly TIMS)[46] and began publishing papers in 1990. *ISR* took a different focus from the early *MISQ*. It targeted research communities and focused on publishing "theoretical and empirical works". *ISR* publishes a variety of articles including "those of organizational application of IS, conceptual work in IS, how different literatures may be jointly drawn upon to explain significant IS phenomena, theoretical analysis where the connection to IS practice is a strong one, good qualitative as well as quantitative, empirical research" (Swanson, 1990). *ISR* has historically been considered among the IS field's top journals.

In Europe, several journals emerged to serve the interests of European communities whose research was often broader than their North American counterparts and frequently outside of the orthodox positivist camp that tended to dominate IS research in North America (Orlikowski & Baroudi, 1991). These journals included the *Journal of Information Technology* (*JIT*) (published in 1986), the *European Journal of Information Systems* (*EJIS*), the *Journal of Information Systems* (*JIS*)[47], *Information & Organization* (formerly *Accounting, Management and Information Technologies*), *Journal of Strategic Information Systems,* and *Information Technology & People,* which all started publishing around 1990. In Scandinavia, the *Scandinavian Journal of Information Systems* (*SJIS*) began publishing in 1988 as a place for Scandinavian researchers to publish their work. In Australia, the *Australian Journal of Information Systems* (*AJIS*) was formed in 1993. *AJIS* has changed its name to *Australasian Journal of Information Systems* to better reflect the wider arena of its author base.

Many topic-specific journals have emerged to serve the interests of particular research areas. For example, *Decision Support Systems* began in 1985 to support the DSS community, and the *Journal of Global Information Management* (*JGIM*) began in 1993 to serve the community whose interests lie in the area of global IS management and cross-cultural research.

## 4.4. Fourth Era (Late 1990s to Today)

This era marks a significant shift of IS technology and the business environment. The commercialization of the Internet enabled new methods of communication and ways of conducting business that were not possible in the previous eras. The Internet allows the dissemination of knowledge to different parts of the world regardless of time and space. Due to this changing environment, organizations started to modify their business strategies to take advantage of the new technological opportunities afforded by the Internet. Organizations also shifted their focus to provide

[46] Note that at that time, the Institute for Operations Research and the Management Sciences (INFORMS) had already published many scholarly journals for specific areas. For example, *Management Science* was publishing OR related articles; *Organization Science* was publishing organizational related articles; and *Marketing Science* was publishing marketing related articles.

[47] The Journal of Information Systems changed its name to Information Systems Journal.

better services to their customers. To that end, they customized services and products to meet individual needs. The pervasiveness of technology means more problems for IS managers who must manage the widely distributed technologies, IS personnel, and users. In particular, the widespread adoption of outsourcing has led to challenges associated with managing multiple onshore and offshore vendors that provide services to the organization (Lacity & Rottman, 2008; Willcocks & Lacity, 2006). Complicating these matters has been the rise of the open source community, which challenges the traditional development paradigm (Fitzgerald, 2004). Causing further problems, the collapse of the "dot-coms", led to a shakeup of the IS job market and raised some serious questions as to the viability of IS.

### 4.4.1. Technology

As organizations entered the mid to late 1990s, the focus turned from the invention and development of new technologies to reaching a "critical mass" in this "Internet age" (Hevner et al., 2000). The commercialization of the Internet dramatically changed the environment organizations compete in, as the Internet provides a state of connectivity such that organizations are networked and constantly connected to their customers and suppliers. This eliminates previous concerns about differences in time and space. All these changes dissolve traditional organizational boundaries and make the traditional "bricks-and-mortar" business model obsolete. In order to compete with new forms of organizations (e.g., virtual organizations), many existing organizations have now reengineered and consolidated their operations to move toward networked organizations. Intranets and extranets were developed to further support the reengineering process. As the price/performance ratio for technology continues to improve, myriad forms of IT have become pervasive within organizations. It is widely believed that technological advances will continue to push the world toward ubiquitous computing (Lyytinen & Yoo, 2002). Indeed, organizations now equip their employees with various mobile technologies such as laptop computers, netbooks, mobile phones, tablets, etc., that allow their employees to extend their work beyond the formal workplace. Much of this growth is fueled by the continued developments in wireless technology. The emergence of search engines such as Google have dramatically altered how individuals find information and engage in research. Additionally, we are witnessing the enormous growth of social media and social networking, which promise to revolutionize the way individuals and groups work and interact with each other[48].

### 4.4.2. Research Themes[49]

Many themes studied by researchers in this era are extensions of the previous eras. However, the commercialization of the Internet led to a number of new research streams. Research in this area ranged from the investigation of general uses of the Internet to the more specific business adoption of the Internet (i.e., e-commerce). These include the study of the adoption of e-commerce (Tan & Teo, 2000) and the value and performance of the Internet (Bakos & Nault, 1997). Additionally, the widespread use of search engines has opened up significant research avenues surrounding search engine optimization (SEO) and web analytics.

Globalization that began to expand during this era encouraged researchers to pay attention to environments other than one's home country. As a result, cross-cultural research in IS (Hunter & Beck, 2000; Myers & Tan, 1997; Straub, Loch, Evaristo, Karahanna, Strite, 2002) began to emerge. Generally, researchers investigated research topics similar to thos previously explored, except now researchers had to take into consideration the differences in culture. In addition, cross cultural researchers began to pay more attention to IS in developing countries (Avgerou, 2002; Heeks, 2002; Walsham & Sahay, 2006). Both the commercialization of the Internet and the emergence of the

[48] Some believe that social media (involving applications such as Facebook, Twitter, MySpace, Second Life, YouTube, Wikipedia, Flickr, and others) is, in fact, the next generation of IT (Shih, 2009) and will be revolutionary (Kaplan & Haenlein, 2010).

[49] As one might expect in such a burgeoning and diverse discipline, the number of research themes that the IS community worked on exploded during this era. Here we only mention a small number (e.g., e-commerce, globalization, knowledge management, and broader disciplinary discussions). However, there are many other significant research areas important for the field, but simply too numerous to list here. These include Enterprise Resource Planning (ERP), Business Process Management and Reengineering, Services (including Service Oriented Architecture), medical informatics, IS institutional economics, open source, social/digital media, computer-mediated learning, mobile computing, e-government and NGO applications, gender differences, agile systems development, data analytics, virtual social/gaming worlds, and so on. The references we list for the various research themes are meant to be illustrative of the types of research done, but are in no way exhaustive.

phenomena of globalization led to the development of another research stream: the study of virtual organizations and virtual teams (Saunders, 2000). Researchers studied issues such as the factors affecting the effectiveness of virtual teams (Jarvenpaa & Leidner, 1999; Majchrzak, Rice, Malhotra, King, & Ba, 2000) and the performance of virtual teams (Furst, Blackburn, & Rosen, 1999; Piccoli, Powell, & Ives, 2004). Further, with the changes in the business environment and strategy, organizations began to understand the significant implications of managing organizational knowledge. Researchers have, thus, begun to pay more attention to the area of knowledge management (Alavi & Leidner, 1999; Alavi, 2000; Davenport & Prusak, 2000; Land, 2009) and IS personnel (Abraham et al., 2006; Ang & Slaughter, 2000; Bullen, Abraham, Gallagher, Kaiser, & Simon, 2007). Similarly, the interest in business intelligence led to a significant stream of research (Watson, 2009). The same can be said of business analytics (Davenport & Harris, 2007).

Another theme that took hold during this era was the focus on rich frameworks to classify and categorize the field of information systems (Hirschheim, Klein, & Lyytinen 1995, 1996; Mingers & Stowell, 1997; Currie & Galliers, 1999). Baskerville and Myers (2002) went so far as to suggest IS could become a reference discipline for other fields.

Other themes that surfaced in this era include: IS research productivity (Cuellar, Takeda, & Truex, 2009; Frolick, Chen, & Jans, 2005; Gallivan & Benbunan-Fich, 2007); design science (Gregor & Jones, 2007; Hevner, March, Park, & Ram, 2004; Nievhaves, 2007; and the design science special issue of *MISQ* – December 2008); and IS journal publication practices and ratings (Chen & Hirschheim, 2004; Galliers & Meadows, 2003: Kateratanakul & Han, 2003; Lowry, Romansm, & Curtis, 2004; Rainer & Miller, 2005).

### 4.4.3. Research Methodology

This era further developed the state of IS research methodology. Prior to this era, IS research was primarily grounded on functionalist philosophical assumptions. Research that adopted this assumption was conducted using positivist research methods such as laboratory experiments and survey research methods, and was analyzed using quantitative analysis. Interpretive research was virtually non-existent (Alavi & Carlson, 1992; Orlikowski & Baroudi, 1991). However, this era marks tremendous progress in terms of the field's acceptance of interpretive research methods (Chen & Hirschheim, 2004). In 1997, IFIP 8.2 held another colloquium in Philadelphia. The purpose of the colloquium was to take a self-reflective and evaluative stance to examine qualitative research and its history within the IS field (Lee et al., 1997). Again, in 2000, IFIP 8.2 held another colloquium in Aalborg for qualitative researchers to discuss the issues they faced in their research (Baskerville, Stage, & DeGross, 2000). Then to celebrate the 20-year anniversary of the first Manchester conference, IFIP 8.2 held another conference whose theme was to see how research methods could be used to provide relevant theory to inform practice (Kaplan et al., 2004). It was concluded from these three colloquia that the IS community has become more understanding and appreciative of other philosophical assumptions such as the interpretive and critical research paradigms (Cecez-Kecmanovic, Klein, & Brooke, 2008), and more journals are publishing qualitative research (Myers & Walsham, 1998). *MISQ*, for example, has devoted a special issue to address qualitative research (Markus & Lee, 1999, 2000). Further, there have been a number of books on qualitative research in IS: Trauth (2001) and Myers and Avison (2002), and even one on Critical Research (Howcroft & Trauth, 2005). In addition, numerous workshops (as noted above) and panel discussions at various conferences (e.g., ICIS, AMCIS, ECIS, ACIS, HICSS, PACIS) have been organized on qualitative research. ICIS 2001 even had a specific panel discussion on confessional research (i.e., ethnography research). The field also attempted to broaden its theoretical base by finding social theories that might help explicate IS phenomena. Such theories included structuration theory (Giddens), actor network theory (Latour), and critical social theory (Habermas) (cf. Jones, 2000). Each of these theories illuminates certain IS phenomena and their characteristics while downplaying other phenomena. This is rather like different telescopes focusing on different objects, with each telescope associated with its own set of research methods.

### 4.4.4. Education/Curriculum

In terms of curriculum, AIS as the professional association of the IS community took an active role in revising the existing curriculum. To that extent, AIS worked with ACM and AITP (formerly DPMA) to revise the curriculum. The result was the IS 1997 Model Curriculum report that was published in the Winter 1997 issue of Database (Couger, Davis, Feinstein, Gorgone, & Longnecker, 1997). Recently, IS 2010 was published, which is the latest in a series of model curricula for undergraduate degrees in information systems. It was the third collaborative effort between ACM and AIS to produce new curricula guidelines (Topi et al., 2010).

### 4.4.5. Infrastructure Advancements: Professional Societies

AIS continued to grow and become the key professional society for international IS academics. As the society grew, it branched into new areas and offered a variety of new and/or improved services to its members. For example, there are now many special interest groups (SIGs); a number of student chapters; sponsorship of the field's major international and regional conferences; sponsorship of a number of key new academic journals such as *Pacific Asia Journal of the Association for Information Systems* and *Revista Latinoamericana Y Del Caribe De La Association De Sistemas De Informacion* (*RELCASI*); career placement support for its members; an e-library for on-line access to IS publications; AIS InSider, an electronic monthly newsletter that goes to all members; a faculty directory listing all IS academics from around the world; and three awards for recognizing outstanding achievements in IS. The first is the LEO Award for Lifetime Exceptional Achievement in IS (established in 1999). It is the highest honor in the IS field, presented to a very small number of truly outstanding individuals who have devoted themselves to the ongoing development of the IS field. The second is the AIS Fellows Award, also established in 1999. It recognizes major contributions made by individuals in national, regional, and international settings. And the third is the Distinguished Member Award (established in 2006) and is given posthumously. Appendix A lists the recipients of these awards.

### 4.4.6. Infrastructure Advancements: Journals

As in the end of the previous era, many topic-specific journals have emerged to serve the interest of newly emerging research areas. For example, in 2000, the *Journal of Electronic Commerce Research* was published to serve researchers who study issues surrounding electronic commerce while the *E-Journal on Information Systems in Developing Countries* (EJISDC) was established to publish research originating in developing countries. *Strategic Outsourcing: An International Journal* emerged to serve the outsourcing research community in 2008. *Wirtschaftsinformatik / Business & Information Systems Engineering* (started in 2009) was an outgrowth of the German language IS journal *Wirtschaftsinformatik,* which publishes English language IS papers. The *Journal of Information Technology Case and Applications Research* (formerly referred to as JITCA and started in 1999) was created to publish IS application case studies. Additionally, *Information Systems Frontiers* – a more general IS journal – came on stream in 1999. Also in 1999, the AIS founded another on-line outlet – *Journal of Information Technology Theory and Application* (JITTA), which was considered a companion to CAIS and JAIS. *MIS Quarterly*, in an attempt to address the need to be more practical, started publishing a new journal in 2002 – *MISQ Executive* – which specifically focuses on more applied articles. It in many ways competes with journals such as *Sloan Management Review* and *California Management Review*. This era also saw a change in *Communications of the ACM* – previously a key publication outlet for scholarly IS research – because it morphed into an outlet for short articles appealing to the wider practitioner and academic computing communities.

By 2007, it was clear to many in the IS community that there were now a large number of journals publishing IS articles, but what was less clear was how individuals – especially from outside the field – would judge the quality of IS publications. In the US, university tenure and promotion committees tended to use only *MISQ* and *ISR* articles in their deliberations. This unfairly penalized scholars who did not publish in these journals. In an attempt to combat this erroneous assumption that only articles published in these two journals were of high quality, a group of senior scholars (comprising senior information systems academics who had served as editors-in-chief of *MISQ* and *ISR*, plus former ICIS program chairs, and presidents of AIS) met and produced what was termed The Senior Scholars Basket of Journals. This "basket" recognized the diversity inherent in IS research, and the journals

chosen were based on: (1) the rigorousness of the review process, (2) the composition of the editorial board (members must be widely respected and recognized), and (3) the existence of an international readership and contribution. The basket originally included six journals: *European Journal of Information Systems, Information Systems Journal, Information Systems Research, Journal of AIS, Journal of MIS, and MIS Quarterly*. But the senior scholars also noted that two additional journals could be included in the basket without any loss of quality: *Journal of Strategic Information Systems* and *Journal of Information Technology*. Since the production of the basket, considerable debate has ensued. Some felt the basket did more harm than good; some argued for expanding the basket, while others for reducing the number; one group went so far as to suggest the development of the basket was yet another attempt by the ruling cabal to keep control of the field. It appears the basket of journals acted as a lightning rod for the field.

### 4.4.7. Discipline Critiques

Recently, the field has started to question its very existence, and a rich debate has ensured. Markus (1999) openly wonders: What happens if the IS field as we know it goes away? For her, the field is at a crossroads. On the one hand, it could become one of the most important areas for business, since no organization can ignore the inexorable development and application of new information technology and expect to survive. On the other hand, there is a move to emasculate and devolve the field, moving IS tasks and skills into the business functions and/or overseas. Lucas (1999) supports Markus' concern and notes that the migration of IS skills to other business disciplines is occurring. He also complains that many deans of business schools no longer support a vibrant IS academic unit, a view consistent with Watson et al. (2000). Hirschheim and Klein (2003) suggest another reason that skills are disappearing: the dramatic increase in the offshoring of IS jobs to places like India, China, and Russia (see also Hirschheim, 2009).

Whether these concerns are real or not, they have led to lively debate on what the core of IS is or should be (cf. Benbasat & Zmud, 2003). A special issue of the *Communications of the AIS* (Gray, 2003)[50], and several papers appearing in *Journal of the AIS* focused on the Benbasat and Zmud position (DeSanctis, 2003; Galliers, 2003; Ives, Parks, Porra, & Silver, 2004; Lyytinen & King, 2004; Robey, 2003). This debate on the essence of the field and its academic legitimacy does not show any sign of abating (Agarwal & Lucas, 2005; Grover, forthcoming; Hassan, 2006; King & Lyytinen, 2006; Klein & Hirschheim, 2006, 2008; Lyytinen & King, 2006; Weber, 2006;). Fueling this debate was the provocative article by Nicholas Carr (2003) who claimed that “IT Doesn’t Matter” so essentially there is no point in having an IS discipline. John King (2011) provocatively argued the IS field can no longer assume it will exist, and must make a choice of “how best to live dangerously” (p. 134).

Another aspect of disciplinary critique that has been widely debated involves the issue of relevancy. Markus (1997), in her IFIP8.2 keynote address, argued that one of the directions the field should take is the appreciation of practicality in IS research. She felt that researchers in the IS field need to complement theoretical research with rigorous research that describes and evaluates what is going on in practice. This was underscored by the conference theme of ICIS 1997, with its emphasis on "the issue of relevance and relationship of IS research to practice" (Kumar, 1997, p. xvii). In 1999, the Editor-in-Chief of *MISQ*, Allen Lee, announced a renewed thrust aimed "at better imbuing rigorous research with the element of relevance to managers, consultants, and other practitioners" (Lee, 1999a, p. viii). The discussions presented in Benbasat and Zmud (1999), Applegate and King (1999), Lyytinen (1999), and Lee (1999b) supported this thrust. In March 2001, *Communications of the AIS* (Volume 6) had a special issue on relevancy, and Kock and his colleagues took part in an interesting panel discussion on the topic at ICIS 2001 (Kock et al., 2002). The interest in relevance versus rigor continues even today (King & Lyytinen, 2006; Klein & Rowe, 2007). An interesting anomaly of this call for relevancy is that much European IS research is curiously considered by North Americans to be too practically focused and lacking in rigor. Many European and Australasian IS researchers have been quick to point out the irony in this relevancy plea by the North Americans.

[50] The article by Alter (2003) is particularly noteworthy since his proposal (work systems) is in stark contrast to the notion of the IT artifact as the core of IS.

# 5. Summary and Discussion

The IS field has made significant progress over the past 45 years and has, in the view of some, "fully emerged as a discipline in its own right" (Baskerville & Myers, 2002, p. 1). Many universities now offer an IS degree at both the undergraduate and graduate levels. In fact, the number of degree programs has increased significantly over the years as a result of the growing need for IS skills in industry (although the types of IS skills needed have changed) (Abraham et al., 2006). The field has also tried to educate the business community as a whole on what it needs to know about IS (Ives et al., 2002).

The IS field has begun to accumulate its own distinctive subject matter and now studies a wide range of issues surrounding technology within an organizational context. Examples of research themes that have emerged are decision support systems; organizational impact of IS, ISD, IS adoption and diffusion; IS productivity; outsourcing; IS evaluation (including success and failure); knowledge management; IS alignment; and others. A cumulative research tradition is also evident as current and previous IS research has served as a foundation for further research. The field has begun to embrace different research perspectives in addition to the traditional positivist stance. Compared to the earliest days of the field, it is now more receptive to interpretive, action, and critical research. An indication of this is *MISQ*'s "Special Issue on Intensive Research in Information Systems" over three volumes (Markus, 2000; Markus & Lee, 1999). Further, the IS field has produced well-known scholars. These scholars have published a variety of exemplar articles that are highly influential and widely cited. Markus' (1983) article *Power, Politics and MIS Implementation* and Davis' (1989) Technology Acceptance Model are but two examples.

Moreover, the field has journals such as *MISQ, ISR, JAIS,* and *JMIS* that publish IS-oriented articles. These journals have grown in quality over the years and have established themselves as top IS scholarly journals both within and outside of the field. The same can be said of the more European journals such as *EJIS, ISJ, JSIS, JIT,* and *Information and Organization*. Indeed, the field of IS has become truly global with high quality conferences and journals being produced across the globe. Each of these regions has its own history of IS, and some of those histories have been well documented (cf. Avergou et al., 1999; Galliers & Whitley, 2007; Iivari & Lyytinen, 1999; Gable et al., 2008)[51].

The field has its own international society (AIS) that functions as a political voice for the IS community. AIS has provided leadership and various services that are contributing to the unification and the development of the field. Further, the field has other services such as special interest groups and AISWorld that equip IS researchers with better resources. Collectively, these form an excellent communication network for IS scholars to interact with each other, to share knowledge, and to build research relationships.

The IS community has set its own standards and procedures to measure the performance of IS academics. For example, journal rankings are used to measure the quality of publications. This measurement – while not perfect – is, in turn, used for tenure and promotion purposes. The IS community recognizes and supports the establishment of such standards as a way to make the tenure and promotion process more transparent[52] and the senior scholars' basket of journals was an effort to help university academics recognize the top quality journals in the field.

We believe that since the IS field has achieved a level of maturity as discussed above, it needs to now focus on two critical yet fundamental tasks: (1) to build a common body of knowledge, and (2) to better identify its customers and its missions. The former involves soul-searching within the field to identify a distinctive body of knowledge that differentiates IS from other disciplines, while the latter involves an understanding of customers (i.e., IS practitioners) and their needs in order to make IS research of greater relevance.

[51] In fact, Gable et al. (2008) might serve as a model of how the rest of the world could document its specific IS history.

[52] Of course, such standards can act as a straightjacket, keeping out paradigm-challenging pieces and exerting pressure on those in the community to conform to the standards.

## 5.1. Toward Building a Common Body of Knowledge

Despite some progress, the IS field remains highly diversified and pluralistic (Alavi & Carlson, 1992; Banville & Landry, 1989; Benbasat & Weber, 1996; Hirschheim et al., 1996; Robey, 1996). This diversity has led to a fragmented research community where a group of researchers can work on a research topic that is totally different from that of another group of researchers as long as each has its own inner-circle members to support its research (Banville & Landry, 1989). To solve this problem, the IS field should begin by identifying its core body of knowledge (Hirschheim & Klein, 2003; Wand & Weber, 1990; Weber, 1997). This body of knowledge, when identified, would function as an umbrella for the IS field. It would set standards to govern the knowledge creation process in the field. It would also stimulate the intellectual rigor and flexibility of IS researchers to not only build but also refine a "theoretically appealing, and practically relevant, action oriented body of knowledge" (Hirschheim & Klein, 2003). Through governing the knowledge creation process, the body of knowledge would provide a shared worldview to the fragmented IS community. Most importantly, this body of knowledge would provide a unique identity for the IS field that would distinguish it from other disciplines (Davis, 2000).

We are aware that such a common body of knowledge does not come without some risk. Once a certain body of knowledge becomes officially "approved" or institutionalized by the professional elite, the usual bureaucratic dysfunctions could surface. Powerful interests gain a stake in the status quo and, hence, criticism and revision of the accepted body of knowledge could suffer from myopic politicization. This would endanger the pluralistic debate about the nature of knowledge, preferred research methods, and so forth, which has stimulated many interesting contributions to the IS literature. The true mark of intellectual penetration and vigorous research is the ability to function even with contradictory conceptualizations and fragmentary understandings. Professional bodies, on the other hand, often view fundamental criticism and dialectical debate as confusing the public and, hence, as threatening their status and recognition. They are, therefore, often inclined to decide epistemic issues by political fiat, which forces premature closure to what is better left to free and open debate. Clearly, one must be careful in recommending such a body of knowledge and the institutionalizing of a professional council in charge of overseeing such knowledge.

## 5.2. Identifying Customers and Missions

The business community, as well as the public sector, are primary supporters of the IS academic field, as they are the ones who put IS theory into practice and who hire IS graduates. As such, the relevance of IS research to their practices is of great importance. This issue of relevance is also of concern to the IS research community, as noted above. On one hand, there is a need for IS researchers to produce rigorous scholarly work, but on the other hand, there is the need to produce research of relevance to the business community[53]. To complicate matters, IS academics have not caught up with the dynamic environment of the IS practitioners' world (Benbasat & Zmud, 1999). Instead of leading practice, or at least co-existing with it, IS research chases after practice and publishes articles only after the technology has been used by practitioners[54]. One way to solve the

[53] Note, one of the main reasons that led to the lack of relevancy of IS research is the reward structure currently in practice in academia. Often, research with industry that does not produce rigorous scholarly publication is ignored; and articles published in practitioner-oriented journals do not count as equivalent to articles published in refereed, "scholarly" journals.

[54] The long review process (i.e., the cycle time to get the articles reviewed, revised, and readied for publication) is no doubt to be blamed for much of this. Also, while most everyone would agree that some form of academia-practitioner relationship is necessary, at least three very different positions are possible. The first is that industry should lead; academia should basically serve industry's recruiting needs by teaching the leading edge of industry applications and cooperate with industry on addressing the problems as seen by leading practitioners. The second (and opposite extreme) is that IS research should look beyond the commercial interests of industry and teach for the future, primarily based on insights derived from theoretically guided research. A third view is that both academia and industry should have their own special spheres of core competencies. Industry's expertise is in knowing what the "real" problems are and understanding the practical constraints on proposed solutions to meet current needs. Academia's core competency is in analyzing the limitations of currently proposed solutions from multiple, socially responsible perspectives, not just from the perspective of instrumental economic-technical rationality. That is, academia should serve society's need for independent, fundamental criticism (cf. Etzioni, 1968). Academia would also be the only institution that could provide broad, vendor-independent introductions into the foundations of current IS solutions to prepare the next generation of practitioners for a future fraught with many uncertainties. Each of these three positions leads to rather different views on what should be the proper ethics and fruitful

problems identified here is to try to tailor IS research to meet the needs of practitioners. (Of course the notion of practitioner is not monolithic, but just as highly differentiated as academia. There is executive level management (CEO, board), senior functional management of which the CIO function deserves special attention for the IS field, consultants, vendors, contractors, and IS workers.) To that end, IS researchers need to identify their target customers (Markus, 1999). This includes asking the questions, "Who are they?" and "What do they want?". The problem here is that answers to these questions change with the evolution of IS practice in organizations. In the early days of IS, the target customers were mainly organizations who built their own IS and used their own products. The mission was to deliver usable systems on time and within the budget. Therefore, IS research focused on studying the best way to develop and implement systems that would be used by the business units. Today, the target customers have expanded to include vendor organizations, consulting organizations, citizens, and even IS students who will be the future practitioners. The mission of each of these parties differs from the earlier mission of in-house IS organizations. Through the identification of its target customers, the field should be better able to allocate resources to areas that are of relevance to the business and public sector communities. And it is here where the AIS should be leading the way, because it is hard to imagine how IS as a discipline can survive if all it can do is comment on the work of others.

# 6. Conclusion

There is little doubt that the IS field has reached a level of maturity that has elevated it to an accepted discipline. But while the field has achieved a certain level of maturity, there is considerable diversity among its members in terms of research interests, research communities, and beliefs about what belongs and does not belongs in the field. Such diversity can be seen as valuable if we see it as evidence of past progress. Only by knowing and understanding the many streams that have shaped the current landscape can we collectively prepare for the field's future even if we cannot agree what the best future or futures might be. Perhaps a shared sense of history is more effective in helping with bridging the communication gaps than with obtaining consensus on preferred forms of knowledge creation. Isn't it easier for all of us to agree on what has been accomplished by the field in the past than on what we should do in the future to advance knowledge creation?

By seeing alternative visions of the discipline's future against a shared historical backdrop, each of us can achieve a sense of the larger meaning of our individual contributions and a better understanding of the potential contribution of the work of others. We believe that a better grasp of IS history is a more feasible strategy for improving mutual understanding among differing communities. The field would benefit by addressing its current and future issues if we could align our perspectives at least about past accomplishments even if we continue to disagree about current and future research priorities and strategy. This would not only nurture identity-forming discussions about historical controversies but also facilitate boundary spanning among the field's diverse communities for the following reasons. (1) Historical analyses lead to shared concepts, (2) a shared history makes communications easier across boundaries, (3) a shared history forms emotional bonds and commitments, and (4) historical awareness supports reflection and critical distance from the present, helping to divorce discussions from personality conflicts and various forms of dogmatism. We hope our attempt to offer an IS history will help the field develop such a shared understanding. It is long overdue.

Last, we hope that this article will act as a catalyst to spur debate on the direction the field should go. If and when we get such a debate off the ground – hopefully with broad participation – it would offer the chance for rapid, dialectical growth of knowledge. However, along with this chance for a debate looms the danger of sectarianism – a further split into sub-communities, which might prefer to ignore each other rather than to engage in critical dialogue. Nevertheless, we believe this is a risk worth taking.

contacts with industry, and each has its own peculiar strengths and weaknesses. There is no simple way to define which relationship between industry and academia is best, even though everyone seems to have an opinion.

## References


Abraham, T., Beath, C., Bullen, C., Gallagher, K., Goles, T., Kaiser, K. & Simon, J. (2006), IT Workforce Trends: Implications for IS programs. *Communications of the AIS*, *17*, 1147–1170.

Ackoff, R. (1967). Management misinformation systems. *Management Science*, B147-156.

Adams, D. R., & Athey, J. H. (Eds.). (1981). DPMA model curriculum for undergraduate computer information systems education (Document ED239584). Park Ridge: DPMA.

Agarwal, R., & Lucas, H. (2005). The information systems identity crisis: Focusing on high-visibility and high-impact research. *MIS Quarterly*, *29*(3), 381-398.

Aggarwal, S. (1995). Flexibility management: The ultimate strategy. *Industrial Management*, *37*(6), 20-26.

Alavi, M. (2000). Managing organizational knowledge. In R. W. Zmud, (Ed.), *Framing the domains of IT management: Projecting the future from the past*. Cincinnati: Pinnaflex Educational Resources.

Alavi, M., & Carlson, P. (1992), A review of MIS research and disciplinary development. *Journal of Management Information Systems*, *8*(4), 45-62.

Alavi, M., & Leidner, D.E. (1999). Knowledge management systems: Issues, challenges, and benefits. *Communications of the AIS*, *1*(7), 1-37.

Alavi, M., Carlson, P., & Brooke, G., (1989). The ecology of MIS research: A twenty year review. In J. I. DeGross, J. C. Henderson, & B. R. Konsynski (Eds.), *Proceedings of the Tenth International Conference on Information Systems* (pp. 363-375).

Alter, S. (1975). *A study of computer-aided decision making in organizations* (Unpublished PhD dissertation). Massachusetts Institute of Technology, MA.

Alter, S. (2003). 18 reasons why IT-Reliant work systems should replace 'the IT artifact' as the core subject matter of the IS field. *Communications of the AIS*, *12*(23), 366-395.

Ang, S., & Slaughter, S. (2000). the missing context of information technology personnel: A review and future directions for research. In R. W. Zmud (Ed.), *Framing the domains of IT management: Projecting the future from the past*. Cincinnati: Pinnaflex Educational Resources.

Applegate, L., & King, J. (1999). Rigor and relevance: Careers on the line. *MIS Quarterly*, *23*(1), 17-18.

Applegate, L., McFarlan, W., & McKenney, J. (1996). *Corporate information management: Text and cases*. Boston: Irwin/McGraw-Hill.

Arnett, K. P., & Jones, M. C. (1994). Firms that choose outsourcing: A profile. *Information & Management*, *26*, 179–188.

Ashenhurst, R. L. (1972). Curriculum recommendations for graduate professional programs in information systems. *Communications of the ACM, 15*(5), 364-398.

Avgerou, C. (2002), Information Systems and Global Diversity, Oxford University Press, Oxford.

Avgerou, C., Siemer, J., & Bjorn-Andersen, N. (1999). The academic field of information systems in Europe. *European Journal of Information Systems*, *8*(2), 136-153.

Avison D. E., & Wood-Harper, A. T. (1990). *Multiview – An exploration in information systems development.* London: Blackwell Scientific Publications.

Avison, D. E., & Fitzgerald, G. (1999). Information systems development. In W. L. Currie & B. Galliers (Eds.), *Rethinking management information systems: An interdisciplinary perspective* (pp. 250-278). New York: Oxford University Press.

Avison, D. E., & Fitzgerald, G. (1995). *Information systems development: Methodologies, techniques and tools* (2nd ed.). New York: McGraw-Hill.

Avison, D., Elliott, S., Krogstie, J., & Pries-Heje, J. (Eds.). (2006). *The past and future of information systems: 1976-2006*. Berlin: Springer.

Backhouse, J., Liebenau, J., & Land, F. (1991). On the Discipline of Information Systems. *Journal of Information Systems*, *1*(1), 19-27.

Bacon, J., & Fitzgerald, B. (2001). A systemic framework for the field of information systems. *The Database for Advances in Information Systems*, *32*(2), 46-67.

Bailey, J., & Pearson, S. (1983). Development of a tool for measuring and analyzing computer user satisfaction. *Management Science*, *29*(5), 530-545.

Bakos, J. Y., & Nault, B. R. (1997). Ownership and investment in electronic networks. *Information Systems Research*, *8*(4), 321-341.

Banker, R., & Kauffman, R. (1991). *Quantifying the business value of information technology: An illustration of the 'business value linkage' framework* (NYU working paper no. IS-91-21). New York: New York University.

Banville, C., & Landry, M. (1989). Can the field of MIS be disciplined? *Communications of the ACM*, *32*(1), 48-60.

Barua A., Kriebel, C., & Mulhopadhyay, T. (1995). Information technology and business value: An analytic and empirical investigation. *Information Systems Research*, *6*(1), 3-23.

Barua, A., & Mukhopadhyay, T. (2000). Information technology and business performance: Past, present, and future. In R. W. Zmud (Ed.), *Framing the domains of IT research: projecting the future through the past* (pp. 65-84). Cincinnati: Pinnaflex Educational Resources.

Baskerville, R. L., & Myers, M. D. (2002). Information systems as a reference discipline. *MIS Quarterly*, *26*(1), 1–14.

Baskerville, R., Stage, J., & DeGross, J. (Eds.) (2000). *Organizational and social perspectives on information technology*. Boston: Kluwer Academic Publishers.

Benbasat, I. (Ed.). (1990). *The information systems research challenge: Experimental research methods* (Vol.2). Boston: Harvard University Press.

Benbasat, I., Dexter, A., Drury, D., & Goldstein, R. (1984). *A critique of the stage hypothesis: Theory and empirical evidence*. *Communications of the ACM*, *27*(5), 476-485.

Benbasat, I., & Weber, R. (1996). Rethinking diversity in information systems research. *Information Systems Research*, *7*(4), 389-399.

Benbasat, I., & Zmud, R. (1999). Empirical research in information systems: The practice of relevance. *MIS Quarterly*, *23*(1), 3-16.

Benbasat, I., & Zmud, R. W. (2003). The identity crisis within the IS discipline: Defining and communicating the discipline's core properties. *MIS Quarterly*, *27*(2), 183-194.

Benko, C. (1992) If information system outsourcing is the solution, what is the problem? *Journal of Systems Management*, *43*(11), 32-35.

Bennett, J (1983). *Building decision support systems*. Reading: Addison-Wesley.

Bjorn-Andersen, N. (1984) Challenge to certainty. In T. Bemelmans (Ed.), *Beyond productivity: Information systems development for organizational effectiveness* (pp.1-8). Amsterdam: North-Holland.

Blumenthal, S. C. (1969), Management information systems: A framework for planning and development. Englewood Cliffs: Prentice-Hall.

Bostrom, R., & Heinen, S. (1977). MIS problems and failures: A sociotechnical perspective - Part I: The causes. *MIS Quarterly*, *1*(3), 17-32.

Brooker, W. (1965). The total systems myth. *Systems and Procedures Journal*, *16*(4), 28-32.

Brown, C. V., & Magill, S. U. (1994). Alignment of the IS function with the enterprise: Toward a model of antecedents. *MIS Quarterly*, *18*(4), 371-403.

Brynjolfsson, E. & Hitt, L. (1996). Paradox lost?: Firm-level evidence of the returns on information systems spending. *Management Science*, *42*, 541-558.

Buckingham, R. A., Hirschheim, R. A., Land, F. F., & Tully, C. J. (1987). Information systems curriculum: a basis for course design. In R. Buckingham, R. Hirschheim, F. Land, & C. Tully (Eds.), *Information Systems Education: Recommendations and Implementation* (pp. 14-133). Cambridge: Cambridge University Press.

Buhl, H., Roeglinger, M., Fridgen, G., & Mueller, G. (forthcoming). Business and information systems engineering: A complementary approach to information systems – what we can learn from the past and may conclude from present reflection on the future. *Journal of the Association for Information Systems*.

Bullen, C., Abraham, T., Gallagher, K., Kaiser, K., & Simon, J. (2007). Changing IT skills: The impact of sourcing strategies on in-house capability requirements. *Journal of Electronic Commerce in Organizations*, *5*(2), 24–46.

Caminer, D. T., Aris, J. B. B., Hermon, P., & Land, F. (Eds.). (1996). *User driven innovation: The world's first business computer.* Maidenhead: McGraw-Hill.

Canning, R. (1972). That maintenance iceberg. *EDP Analyzer*, *10*(10), 1-14.

Canning, R. (1979). The analysis of user needs. *EDP analyzer*, 17(1).

Carr, N. (2003). IT Doesn't Matter. *Harvard Business Review*, *81*(5), 41-48.
Cash J. I., & Konsynski, B. R. (1985). IS redraws competitive boundaries. *Harvard Business Review*, *63*(2), 134-142.
Cash, J., & Lawrence, P. (Eds.) (1989). *The information systems research challenge: Qualitative research methods* (Vol.1). Boston: Harvard University Press.
Cavaye, A. L. M. (1995). User participation in system development revisited. *Information & Management*, *28*, 311-323.
Cecez-Kecmanovic, D., Klein, H., & Brooke, C. (2008). Exploring the critical agenda in information systems research. *Information Systems Journal*, *18*(2), 123-135.
Chan, Y. E., Huff, S. L., Barclay, D. W., & Copeland, D.G. (1997). Business strategy orientation, information systems orientation and strategic alignment. *Information Systems Research*, *8*(2), 125-150.
Checkland, P. (1972). Towards a systems-based methodology for real-world problem-solving. *Journal of Applied Systems Engineering*, *3*(2), 87-116.
Checkland, P. (1981). *Systems thinking, systems practice.* Chichester: John Wiley & Sons.
Checkland, P. (1999). Soft systems methodology: A thirty year retrospective. Chichester: John Wiley & Sons.
Checkland, P., & Holwell, S. (1998). *Information, systems and information systems—Making sense of the field.* Chichester: John Wiley & Sons.
Checkland, P., & Scholes, J. (1990). Soft systems methodology in action. Chichester: John Wiley & Sons.
Cheon, M., Lee, C., & Grover, V. (1992). Research in MIS - Points of work and reference: A replication and extension of the culnan and swanson study. *Database*, *23*(2), 21-29.
Chen W., & Hirschheim, R. (2004). *A paradigmatic and methodological examination of information systems research from 1991 to 2001. Information Systems Journal*, *14*(3), 197-235.
Chervany, N., Dickson, G., & Kozar, K. (1972). *An experimental gaming framework for investigating the influence of management information systems on decision effectiveness* (MISRC Working Paper No. 71-12). Minneapolis, MN: Management Information Systems Research Center, University of Minnesota.
Chin, W. W., Gopal, A., & Salisbury, W. D. (1997). *Advancing the theory of adaptive structuration: The development of a scale to measure faithfulness of appropriation*. *Information Systems Research*, *8*(4), 342-367.
Christiaanse, E. (2006). 1.5 million years of information systems: From hunter gatherers to the domestication of the networked computer. In D. Avison, S. Elliott, J. Krogstie, & J. Pries-Heje (Eds.), *The past and future of information systems: 1976-2006*(pp. 165-176). Berlin: Springer.
Churchman, C. W. (1971). *The design of inquiring systems*. New York: Basis Books.
Churchman, C. W. (1979), *The systems approach and its enemies*. New York: Basic Books.
Clark, T., Zmud, R., & McCray, G. (1995). The outsourcing of information services: Transforming the nature of business in the information industry. *Journal of Information Technology*, *10*(4), 221-237.
Clemons, E. K. (1986). Information systems for sustaining competitive advantage. *Information & Management*, *11*(3*)*, 131-136.
Coleman, R. J., & Riley, M. J. (Eds.). (1973). *MIS: Management dimensions*. San Francisco: Holden Day.
Cooper, R. (1988). Review of management information systems research: A management support perspective. *Information Processing & Management*, *24*(1), 73-102.
Cooper, R.B., & Zmud, R.W. (1990). Information technology implementation research: A technology diffusion approach. *Management Science*, *36*(2), 123-139.
Couger, J. D. (1973). Curriculum recommendations for undergraduate programs in information systems. *Communications of the ACM*, *16*(12), 727-749.
Couger, J. D., Davis, G., Feinstein, D. L., Gorgone, J. T., & Longenecker, H.E. (1997). IS'97, Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems. *Database*, *26*(1), 1-94.
Cuellar, M. J., Takeda, H., & Truex, D. P. (2009). Assessing scholarly influence: Using the Hirsch indices to reframe the discourse. *Journal of the AIS*, *10*(7), 560-594.

Culnan, M. (1986). The intellectual development of management information systems, 1972-1982: A co-citation analysis. *Management Science*, *32*(2), 156-172.
Culnan, M. (1987). Mapping the intellectual structure of MIS, 1980-1985: A co-citation analysis. *MIS Quarterly*, *11*(3), 341-353.
Culnan, M., & Swanson, E. B. (1986). Research in management information systems, 1980-1984: Points of work and relevance. *MIS Quarterly*, *10*(3), 289-302.
Currie, W., & Galliers, R. (Eds.). (1999). *Rethinking MIS*. Oxford: Oxford University Press.
Dahlbom, B., & Mathiassen, L. (1993). *Computers in context: The philosophy and practice of systems design.* Oxford: Blackwell.
Daniels, A., & Yeates, D. A. (1971). Basic training in systems analysis (2nd ed.). London: Pitman.
Danziger, J., Dutton, W., Kling, R., & Kraemer. K. (1982). *Computers and politics: High technology in American local governments*. New York: Columbia University Press.
Danziger, J., & Kraemer, K. (1986). *Computers and people: The impacts of computing on end users in organizations*. New York: Columbia University Press.
Davenport, T., & Harris, J. (2007). *Competing on analytics: The new science of winning*. Boston: Harvard Business School Press.
Davenport, T., & Prusak, L. (2000). *Working knowledge: How organizations manage what they know*. Boston: Harvard Business School Press.
Davis, F. D., & Venkatesh, V. (2000). A Theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, *46*(2), 186-204.
Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, *13*(3), 319-339.
Davis, G. (1974). *Management Information Systems*. New York: McGraw-Hill.
Davis, G. (1980). *A systematic evaluation of publications for promotion of MIS academics*. Paper presented at the Proceedings of the First Conference on Information Systems, Philadelphia.
Davis, G. (2000). Information systems conceptual foundations: Looking backward and forward. In R. Baskerville, J. Stage, & J. DeGross (Eds.),*Organizational and social perspectives on information technology* (pp. 61-82). Boston: Kluwer Publishers.
Davis, G., & Everest, G. (Eds.). (1976). *Readings in the management of information systems*. New York: McGraw-Hill.
Davis, G., & Olson, M. (1985). *Management information systems: Conceptual foundations, structure, and development.* New York: McGraw-Hill.
Davis, L., & Taylor, J. C. (1972). *Design of Jobs*. Harmondsworth: Penguin Books.
Dearden, J. (1972). MIS is a mirage. *Harvard Business Review*, *50*(1), 90-99.
Dearden, J., & McFarlan, F. W. (1966). *Management information systems: Text and cases*. Homewood, Ill: R. D. Irwin,
Dearden, J. McFarlan, F. W., & Zani, W. (1971). *Managing computer-based information systems*. Homewood, Ill: R. D. Irwin,
DeGreene, K. (1973). Sociotechnical systems: Factors in analysis, design and management. Englewood Cliffs: Prentice-Hall.
DeLone, W. H., & McLean, E. R. (1992). Information systems success: The quest for the dependent variable. *Information Systems Research*, *3*(1), 60-95.
DeMarco, T. (1978). *Structured analysis and systems specification*. New York: Yourdon Press.
Dennis, A., George, J., Jessup, L., Nunamaker, J., & Vogel, D. (1988). information technology to support electronic meetings. *MIS Quarterly*, *12*(4), 591-624
DeSanctis, G., & Poole, M. S. (1994). Capturing the complexity in advanced technology use: Adaptive structuration theory. *Organization Science*, *5*(2), 121-147.
DeSanctis, G., Dickson, G., & Price, R. (2000). Information technology management. In G. Dickson & G. DeSanctis (Eds.), *Information technology and the future enterprise: New models for managers*. Upper Saddle River, New Jersey: Prentice Hall.
DeSanctis, G. (2003). The social life of information systems research. *Journal of the Association for Information Systems*, *4*(7), 360-376.
Dibbern, J., Goles, T., Hirschheim, R., & Jayatilaka, B. (2004). Information systems outsourcing: A survey and analysis of the literature. *Database*, *35*(4), 6-102.
Dickson, G. (1968). Management information-decision systems. *Business Horizons*, *11*, 17-26.
Dickson, G. (1977). Editorial. *MIS Quarterly*, *1(*1), i-iv.

Dickson, G. (1981). Management information systems: Evolution and status. In M. Yovits (Ed.), *Advances in computers* (Vol. 20, pp. 1-39.). New York: Academic Press.
Dickson, G. W., Benbasat, I., & King, W. R. (1982). The MIS area: problems, challenges, and opportunities. *Database*, *14*(1), 7–12.
Dickson, G. W., Emery, J. C., Ives, B., King, W. R., & McFarlan, F. W. (1993). Professional societies: A service to members and professional leadership. *MIS Quarterly*, *17*(1), iii-vi.
Dickson, G. W., Senn, J. A., & Chervany, N. L. (1977). Research in management information systems: The Minnesota experiments. *Management Science*, *23*, 913-923.
Doll, W. J., & Torkzadeh, G. (1988). The measurement of end-user computing satisfaction. *MIS Quarterly*, *12*(2), 259-274.
Dutton, W., & Kraemer, K. (1978). Management utilization of computers in American local governments. *Communications of the ACM*, *21*(3), 206-218.
Eade, D., & Hodgson, J. (Eds.). (1981). Information systems in public administration. Amsterdam: North Holland.
Emery, F., & Trist, E. (1965). The causal texture of organizational environments. *Human Relations*, *18*, 21-32.
Emery, J.C. (1971). *Cost benefit analysis of information systems* (SMIS workshop Report No 1). Chicago, IL: The Society for Management Information Systems.
Emery, J., & Sprague, C. (1972). MIS: A mirage or misconception? *Harvard Business Review*, *50*(3), 22-23.
Etzioni, A. (1968). The active society. New York: The Free Press.
Farbey, B., Land, F., & Targett, D., (1993). How to assess your IT investment: A study of methods and practice. Oxford: Butterworth Heinemann.
Fichman, R. G. (2000). The diffusion and assimilation of information technology innovations. In R. W. Zmud (Ed.), *Framing the domains of IT management: Projecting the future through the past* (pp. 105-128). Cincinnati: Pinnaflex Publishing.
Fitzgerald, B. (2004). A critical look at open source. *IEEE Computer*, *37*(7), 92-94.
Fitzgerald, G., Hirschheim, R., Mumford, E., & Wood-Harper, T. (1985). Information systems research methodology: An introduction. In E. Mumford, R. Hirschheim, G. Fitzgerald, & T. Wood-Harper (Eds.),*Research methods in information systems* (pp. 3-9). Amsterdam: North Holland.
Fitzgerald, G., & Willcocks, L. P. (1994). Outsourcing information technology: Contracts and client/vendor relationships (Working Paper RDP94/10). UK: Oxford Institute of Information Management.
Frielink, A. B. (Ed.). (1961). Auditing automatic data processing. Amsterdam: Elsevier.
Frielink, A. B. (Ed.). (1975). Economics of informatics. Amsterdam: North Holland.
Frolick, M., Chen, L., & Jans, B. (2005). Supply and demand of IS faculty: A longitudinal study. *Communications of the AIS*, *15*(7), 674-695.
Furst, S., Blackburn, R., & Rosen, B. (1999). Virtual team effectiveness: A proposed research agenda. *Information Systems Journal*, *9*(4), 249–269.
Gable, G., Gregor, S., Clarke, R., Ridley, G., & Smyth, R. (Eds.). (2008). The information systems academic discipline in Australia. Canberra: ANU Press.
Galliers, R. (2003). Change as crisis of growth? Towards a trans-disciplinary view of information systems as a field of study. *Journal of the Association of for Information Systems*, *4*(6), 337-351.
Galliers R., & Meadows J. (2003). A discipline divided: Globalization and parochialism in information systems research. *Communications of the Association for Information Systems*, *11*(5), 108-117.
Gallliers, R., & Whitley, E. (2007). Vive les differences? Developing a profile of european information systems research as a basis for international comparison. *European Journal of Information Systems*, *16*, 20-35.
Gallivan, M. J., & Benbunan-Fich, R. (2007). Analyzing IS research productivity: An inclusive approach to global IS scholarship. *European Journal of Information System*, *16*(1), 36-53.
Gane, C., & Sarson, T. (1979). *Structured systems analysis: Tools and techniques*. Englewood: Cliffs.Prentice Hall.

Gefen, D., & Carmel, E. (2008). Is the world really flat: A look as an offshoring online programming marketplace. *MIS Quarterly*, *32*(2), 367-384.
George, J., Valacich, J., & Valor, J. (2005). Does information systems still matter: lessons for a maturing discipline. *Communications of the AIS*, *16*, 219-232.
Gillenson, M. A., & Stutz, J. D. (1991). Academic issues in MIS: Journals and books. *MIS Quarterly*, *15*(4), 447-452.
Gorry, G., & Scott-Morton, M. (1971). A framework for management information systems. *Sloan Management Review*, *12*(1), 55-70.
Granger, M. J., Dick, G., Jacobson, C. M., & Van Slyke, C. (2007). Information systems enrollments: Challenges and strategies. *Journal of Information Systems Education*, *18*(3), 303–311.
Gray, P. (2003). Introduction to the debate on the core of the information systems field (editorial). *Communications of the AIS*, *12*(42), 1-7.
Gray, P., Vogel, D., & Beauclair, R. (1990). Assessing GDSS empirical research. *European Journal of Operational Research*, *46*(2), 162-176,
Gregor, S., & Jones, D. (2007). The anatomy of a design theory. *Journal of the Association for Information Systems*, *8*(2), 312-335.
Gregory, R., & Van Horn, R. (1960) *Automatic data-processing systems*. California: Wadsworth.
Grindley, C. B. (1968). The use of decision tables within systematic. *The Computer Journal*, *11*(2), 128-133.
Grover, V. (Forthcoming). The information systems field: Making a case for maturity and contribution. *Journal of the Association for Information Systems*.
Grover, V., Cheon, M. J., & Teng, J. T. C. (1996). The effect of service quality and partnership on the outsourcing of information systems functions. *Journal of Management Information Systems*, *12*(4), 89–116.
Grover, V., Straub, D., & Galluch, P. (2009). Turning the corner: The influence of positive thinking on the information systems field (editorial). *MIS Quarterly*, *33*(1), iii–viii.
Gupta, U. G., & Gupta, A. (1992). Outsourcing the IS function: Is it necessary for your organization? *Information Systems Management*, *9*(3), 44–50.
Habermas, J. (1973). Wahrheitstheorien. In H. Farhrenbach (Ed.), *Wirklichkeit und Reflexion*, *Walter Schulz aum 60* (pp. 211-265). Geburtstag, Pfullingen: Neske.
Hally, M. (2005). Electronic brains: stories from the dawn of the computer age. London: Granta Books.
Hassan, N. (2006). *Is information systems a discipline? A Foucauldian and Toulminian Analysis*. Proceedings of the Twenty-Seventh International conference on Information Systems, Milwaukee, 425–439.
Heeks, R. (2002). Information systems and developing countries: Failure, successes, and local improvisations. *The Information Society*, *18*(2), 101-112.
Heidegger, M. (1931). *Sein und Zeit* (3rd ed.). Halle: Max Niemeyer..
Henderson, J., & Venkatraman, N. (1992). Strategic alignment: A model for organizational tranformation through information technology. In T. A. Kochan & M. Useem (Eds.), *Transforming organizations* (pp. 97-117). Oxford: Oxford University Press.
Hevner, A. R., Berndt, D. J., & Studnicki, J. (2000, January). Strategic information systems planning with box structures. Paper presented at the IEEE Proceedings of the 33rd Hawaii International Conference on Systems Science, Hawaii.
Hevner, A., March, S. T., Park, J., & Ram, S. (2004). Design science research in information systems. *MIS Quarterly*, *28*(1), 75–105.
Hirschheim, R. (1985). User experiences with and assessment of participative systems design. *MIS Quarterly*, *9*(4), 295 303.
Hirschheim, R. (2009). Offshoring and the new world order. *Communications of the ACM*, *52*(11), 132-135.
Hirschheim, R., & Klein, H. (2003). Crisis in the IS field? A critical reflection on the state of the discipline. *Journal of the Association for Information Systems*, *4*(5), 237-293.
Hirschheim, R., & Lacity, M. (2000). Information technology insourcing: Myths and realities. *Communications of the ACM*, *43*(2), 99-107.

Hirschheim, R., Klein, H., K., & Lyytinen, K. (1995). *Information systems development and data modeling: Conceptual and philosophical foundations*. Cambridge, UK: Cambridge University Press.

Hirschheim, R., Klein, H. K., & Lyytinen, K. (1996). Exploring the intellectual structures of information systems development: A social action theoretic analysis. *Accounting, Management and Information Technologies*, *6*(1/2), 1-64.

Hirschheim, R., Newman, M., Loebbecke, C., & Valor, J. (2007). Offshoring and the Implications for the IS Discipline: Where perception meets reality. *Communications of the AIS*, *20*, 824-835.

Hitt, L., & Brynjolfsson, E. (1996). Productivity, profit and consumer welfare - three different measures of information technology's value. *MIS Quarterly*, *20*(2), 1-23.

Hosack, B., Courtney, J., Hall, D., & Paradice, D. (Forthcoming). A look toward the future: Decision support systems research alive and well. *Journal of the Association for Information Systems*.

Howcroft, D., & Trauth, E. M. (Eds.). (2005). *Handbook of critical information systems research: Theory and application*. Cheltenham, UK: Edward Elgar Publishing.

Huber, G.P. (1983). Cognitive style as a basis for MIS and DSS designs: Much ado about nothing? *Management Science*, *29*(5), 567-577.

Huber, G. P. (1990). A theory of the effects of advanced information technologies on organizational design, intelligence, and decision making. *Academy of Management Review*, *15*(1), 47-71.

Hunter, M. G., & Beck, J. E. (2000). Using repertory grids to conduct cross-cultural information systems research. *Information Systems Research*, *11*, 93-101.

Iivari, J., & Lyytinen, K. (1999). Research on information systems development in Scandinavia. *Scandinavian Journal of Information Systems*, *10*(1&2), 135-185.

Ives, B., & Learmonth, G. (1984). The information system as a competitive weapon. *Communications of the ACM*, *27*(12), 1193-1201.

Ives, B., & Olson, M. H. (1984). User involvement and MIS research: A review of research. *Management Science*, *30*(5), 586-603.

Ives, B., Hamilton, S., & Davis, G. (1980). A framework for research in computer-based management information systems. *Management Science*, *26*(9), 910-934.

Ives, B., Olson, M., & Baroudi, J. (1983). The measurement of user information satisfaction. *Communications of the ACM*, *26*(10), 785-793

Ives, B., Parks, M. S., Porra, J., & Silva, L. (2004). Phylogeny and power in the IS domain: A response to Benbasat and Zmud's call for returning to the IT artifact. *Journal of the Association for Information Systems*, *5*(3), 108-124.

Ives, B., Valacich, J., Watson, R. T., Zmud. R., Alavi, M., Baskerville, R., Baroudi, J. J., Beath, C., Clark, T., Clemons, E. K., David, G.B., David, F., Dennis, A. R., El Sawy, O.A., Fedorowicz, J., Galliers, R. D., George, J., Ginzberg, M., Gray, P., Hirschheim, R., Jarvenpaa, S. L., Jessup, L., Kemerer, C. F., King, J. L., Konsynski, B., Kraemer, K. L., Luftman, J.N., March, S. T., Markus, M. L., Mason, R. O., McFarlan, F. W., McLean, E. R., Olfman, L., Olson, M. H., Rockart, J., Sambamurthy, V., Todd, P., Vitale, M., Weber, R., & Whinston, A.B. (2002). What every business student needs to know about information systems. *Communications of the AIS*, *9,* 467-477.

Jackson, W. M., & Nath, R. (1989). Publication patterns of MIS researchers. *Interface*, *11*(2), 15-20.

Jarvenpaa, S. , & Leidner, D. (1999). Communication and trust in global virtual teams. *Organization Science*, *10*(6), 791-815.

Jones, M. (2000). The moving finger: the use of social theory in WG8.2 conference papers. In R. Baskerville, J. Stage, & J. DeGross (Eds.), *Organizational and social perspectives on information technology* (pp. 15-32). Boston: Kluwer Academic Publishers.

Kaplan, A., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of social media. *Business Horizons*, *53*(1), 59-68.

Kaplan, B., Truex, D., Wastell, D., Wood-Harper, T., & DeGross, J. (Eds.). (2004). Information systems research: Relevant theory and informed practice. Boston: Kluwer Academic Publishers.

Kateratanakul, P., & B. Han (2003). Are European IS Journals under-rated? An answer based on citation analysis. *European Journal of Information Systems*, *12*(1), 60-72.

Kauffman, R. J., & Kriebel, C. H. (1988). Modeling and measuring the business value of information technology. In ICIT Research Study Team (Eds.), *Measuring the Business Value of Information Technologies*. Washington, DC: ICIT Press.

Keen, P. (1980). MIS Research: Reference disciplines and cumulative tradition. In E McLean (Ed.), *Proceedings of the First International Conference on Information Systems, Philadelphia, 17-31.*

Keen, P. (1987). MIS research: Current status, trends and needs. In R. Buckingham, R. Hirschheim, F. Land, & C. Tully (Eds.), *Information Systems Education: Recommendations and Implementation* (pp. 1-13). Cambridge: Cambridge University Press.

Keen, P., & Scott-Morton, M. (1978). Decision support systems: An organizational perspective. Reading: Addison-Wesley.

Keen, P. (1991). Relevance and rigor in information systems research: Improving quality, confidence, cohesion, and impact. In H. E. Nissen, H. K. Klein, & R. Hirschheim (Eds.), *Information Systems Research: Contemporary Approaches and Emergent Traditions* (pp. 27-49). Amsterdam: North-Holland.

Kieser, A. (1994). Why organization theory needs historical analysis – and how this should be performed. *Organization Science*, *5*(4), 608-620.

King, J. L (2011). CIO: Concept is over. *Journal of Information Technology*, *26*(2), 129-138.

King, J. L., & Kraemer, K. (1984). Evolution and organizational information systems: An assessment of Nolan's stage model. *Communications of the ACM*, *27*(5), 466-475.

King, J. L., & Lyytinen, K. (Eds.). (2006). *Information systems: The state of the field*. Chichester: John Wiley & Sons.

King, J. L., Myers, M., Rivard, S., Saunders, C., & Weber, R. (2010). What I like about the IS discipline. *Communications of the AIS*, *26*, 441-450.

Klein, H. K., & Hirschheim, R. (2006). Further reflections on the IS discipline: Climbing the Tower of Babel. In J. King & K. Lyytinen (Eds.), *Information Systems: The State of the Field* (pp. 307-323). Chichester: John Wiley & Sons.

Klein, H. K., & Hirschheim, R. (2008). The structure of the IS discipline reconsidered: Implications and reflections from a community of practice perspective. *Information & Organization*, *18*(4), 280-302.

Klein, H. K., & Rowe, F. (2007, December). *Marshalling the professional experience of doctoral students: Towards bridging the gaps between theory and practice*. Paper presented at the Proceedings of the Twenty Eighth International Conference on Information Systems, Montreal.

Klepper, R. (1995). The management of partnering development in I/S outsourcing. *Journal of Information Technology*, *10*(4), 248-257

Kling, R. (1980). Social analyses of computing: Theoretical orientations in recent empirical research. *ACM Computing Surveys, 12*(1), 61-110.

Kling, R., & Scacchi, W. (1982). The web of computing: computer technology as social organization. *Advances in Computers*, *21*, 1-90.

Kock, N., Gray, P., Hoving, R., Klein, H., Myers, M., & Rockart, J. (2002). IS research relevance revisited: Subtle accomplishment, unfulfilled promise, or serial hypocrisy? *Communications of the AIS*, *8*, 330–346.

Kraemer K. L. (Ed.). (1991). *The information systems research challenge: Survey research methods* (Vol. 3). Boston, MA: Harvard Business School.

Kraemer, K. L., Dutton, W., & Northrup, A. (1981). *The management of information systems*. New York: Columbia University Press.

Kraemer, K. L., & J. L. King, (1988). Computer-based systems for cooperative work and group decision making. *ACM Computer Surveys*, *20*, 329-380.

Kumar, K. (1997). Program chair's statement. In K. Kumar & J. DeGross (Eds.), *Proceedings of the Eighteenth International Conference on Information Systems* (pp. xvii-xix).

Kwon, T.H., & Zmud, R. W. (1987). Unifying the fragmented models of information systems implementation. In R. J. Boland & R. A. Hirschheim (Eds.),*Critical Issues in Information Systems Research* (pp. 227-251). Chichester: John Wiley & Sons.

Lacity, M., & Hirschheim, R. (1993). *Information systems outsourcing: Myths, metaphors and realities.* Chichester: John Wiley & Sons.

Lacity, M., & Hirschheim, R. (1995). *Beyond the information systems outsourcing bandwagon: The insourcing approach.* Chichester: John Wiley & Sons.
Lacity, M., & Rottman, J. (2008). Offshore outsourcing of IT work. Basingstoke: Palgrave.
Land, F. (1975). Evaluation of systems goals in determining a design strategy for a computer-based information system. *The Computer Journal*, *19*(4), 290-294.
Land, F. (1982). Notes on participation. *The Computer Journal*, *25*(2), 283-285.
Land, F. (2000). the first business computer: A case study in user-driven innovation. *IEEE Annals of the History of Computing*, *22*(4), 16-26.
Land, F. (2008). *Reflections of decision support pioneer*. Available from DSSResources.com
Land, F. (2009). Knowledge management and the management of knowledge. In W. King (Ed.), *Knowledge management and organizational learning. Annals of Information Systems* (Vol. 4, pp. 15-25). Berlin: Springer.
Land, F., & Brittan, J. (1974). *An international curriculum for information system designers*. Rome: IBI-ICC Publications.
Land, F., & Hirschheim, R. (1983). Participative systems design: Rationale, tools, and techniques. *Journal of Applied Systems Analysis*, *10*, 91-107.
Langefors B. (1966). *Theoretical analysis of information systems*. Lund: Studentlitteratur.
Langefors, B. (1973). Theoretical analysis of information systems. Philadelphia: Auerbach.
Langefors B. (1974). *Information systems. Information Processing 74* (pp. 937-945). Amsterdam: North-Holland.
Laudon, K., & Laudon, J. (2010). *Management information systems: Managing the digital firm.* Upper Saddle River, NJ: Pearson Prentice Hall.
Levina, N., & Ross, J. (2003). From the vendor's perspective: Exploring the value proposition in information technology outsourcing. *MIS Quarterly*, *27*(3), 331-364.
Lee, A. (1999a). The MIS Field, the publication process, and the future course of MIS quarterly. *MIS Quarterly*, *23*(1), v-xi.
Lee, A. (1999b). Rigor and relevance in MIS research: Beyond the approach of positivism alone. *MIS Quarterly*, *23*(1), 29-33.
Lee, A., Liebenau, J., & DeGross, J. (Eds.). (1997). *Information systems and qualitative research*. London: Chapman & Hall.
Li, D. (Ed.). (1972). *Design and management of information systems*. Chicago: SRA Publishers.
Loh, L., & Venkatraman, N. (1992). Diffusion of information technology outsourcing: Influence sources and the Kodak effect. *Information Systems Research*, *3*(4), 334-378.
Loh, L., & Venkatraman, N. (1995). *An empirical study of IT outsourcing: Benefits, risks and performance implications.* Paper presented at the International Conference of Information Systems (ICIS), Amsterdam.
Lowry, P., Romans, D., & Curtis, A. (2004). Global journal prestige and supporting disciplines: A scientometric study of information systems journals. *Journal of the Association of Information Systems*, *5*(2), 29-77
Lucas, H. C. (1973). A descriptive model of information systems in the context of the organization. *Database*, *5*(2), 27-36.
Lucas, H. C. (1975). *Why information systems fail*. New York: Columbia University Press.
Lucas, H. C. (1999). The state of the information systems field. *Communications of the AIS*, *5*(1), 1-6.
Lucas, H., Land, F., Lincoln, T., & Supper, K. (Eds.). (1980). The information systems environment. Amsterdam: North-Holland.
Lucas, H. C., & Sutton, J. (1977). The stage hypothesis and the s-curve: Some contradictory evidence. *Communications of the ACM*, *20*(4), 254-259.
Lyytinen, K. (1987). A taxonomic perspective of information systems development: Theoretical constructs and recommendations. In R. Boland & R. Hirschheim (Eds.), *Critical Issues in Information Systems Research* (pp. 3-41). Chichester: Wiley.
Lyytinen, K. (1999). Empirical research in information systems: On the relevance of practice in thinking of IS research. *MIS Quarterly*, *23*(1), 25-27.
Lyytinen, K., & King, J. (2004). Nothing at the center? Academic legitimacy in the field of information systems. *Journal of the Association for Information Systems*, *5*(6), 220-246.
Lyytinen, K., & King, J. L. (2006). The theoretical core and academic legitimacy: A response to Professor Weber. *Journal of the Association for Information Systems*, *7*(11), 714-721.

Lyytinen, K., & Yoo, Y. (2002). Introduction to the Special Issue on issues and challenges in ubiquitous computing. *Communications of the ACM*, *45*(12), 62-65.
Mahmood, M., & Mann, G. (1993). Measuring the organizational impact of information technology investment: an exploratory study. *Journal of Management Information Systems*, *10*(1), 97-122.
Majchrzak, A., Rice, R., Malhotra, A., King, N., & Ba, S. (2000). Technology adaptation: The case of a computer-supported inter-organizational virtual team. *MIS Quarterly*, *24*(4), 569-600.
Markus, M. L., & Robey, D. (1988). Information technology and organizational change: Causal structure in theory and research. *Management Science*, *34*(5), 583-598.
Markus, M. L., & Lee, A. S. (1999). Special issue on intensive research in information systems: Using qualitative, interpretive, and case methods to study information technology (foreword). *MIS Quarterly*, *23*(1), 1-2.
Markus, M. L., & Lee, A. S. (2000). Special Issue on intensive research in information systems: Using qualitative, interpretive, and case methods to study information technology—second installment (foreword). *MIS Quarterly*, *24*(3), 472-474.
Markus, M. L. (1983). Power, politics, and MIS implementation. *Communications of the ACM*, *26*(6), 430–444.
Markus, M. L. (1999). Thinking the unthinkable: What happens if the IS field as we know it goes away? In W. Currie & R. Galliers (Eds.), *Rethinking MIS* (pp. 175-203). Oxford: Oxford University Press.
Markus, M. L. (1997). The Qualitative Difference in Information Systems Research and Practice. In A. Lee, J. Liebenau, & J. DeGross (Eds.), *Information systems and qualitative research* (pp. 11-27). London: Chapman & Hall.
Mason, R. (2004). 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), 183-219.
Mason, R., & Mitroff, I. (1973). A program for research on management information systems. *Management Science*, *19*(5), 475-487.
Mason, R., McKenney, J., Copeland, D. (1997). Developing an historical tradition in MIS research. *MIS Quarterly*, *21*(3), 257-278.
Mathiassen L. (1998). Reflective systems development. *Scandinavian Journal of Information Systems*, *10*(1&2), 67-118.
McFarlan, F. W. (1981). Portfolio approach to information systems. *Harvard Business Review*, *59*(5), 142-150.
McFarlan, F. W. (1984). Information technology changes the way you compete. *Harvard Business Review*, *62*(3), 98-103.
Meyer, N. D. (1994). A sensible approach to outsourcing. *Information Systems Management, 11*(4), 23-27.
Mingers, J., & Stowell, F. (Eds.). (1997). Information systems: An emerging discipline? Berkshire, UK: McGraw-Hill.
Mitroff, I. (1983). Stakeholders of the organizational mind: Toward a new view of organizational policy making. London: Jossey-Bass.
Mitroff, I. I., & Sagasti, F. (1973). Epistemology as general systems theory: An approach to the design of complex decision-making experiments. *Philosophy of Social Sciences*, *3*, 117-134.
Moore, G., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research*, *2*(3), 192-222.
Morgan, G. (1986). *Images of Organizations*. London: Sage.
Morris, W. E. M. (1971). *Economic evaluation of computer based systems: Working party report, books 1 and 2.* Manchester: National Computing Center.
Mumford, E. (1974). Computer systems and work design: Problems of philosophy and vision. *Personnel Review*, *3*(2), 40-49.
Mumford, E. (1981). Participative systems design: Structure and method. *Systems, Objectives, Solutions*, *1*(1), 5-19.
Mumford, E. (1983). *Designing human systems: The ETHICS method*. Manchester: Manchester Business School Press.

Mumford, E., & Henshall, D. (1978). *A participative approach to the design of computer systems*. London: Associated Business Press.
Mumford, E., Hirschheim, R., Fitzgerald, G., & Wood-Harper, T. (Eds.). (1985). *Research methods in information systems.* Amsterdam: North-Holland.
Mumford, E., Land, F., & Hawgood, J. (1978). A participative approach to the design of computer systems. *Impact of Science and Society*, *28*(3), 235-253.
Myers, M. D., & Avison, D. (Eds.). (2002). Qualitative research in information systems: A reader. London: Sage.
Myers, M. D., & Tan, F. B. (1997). Beyond models of national culture in information systems research. *Journal of Global Information Management*, *10*(1), 24-32.
Myers, M. D., & Walsham, G. (1998). Exemplifying interpretive research in information systems: An overview. *Journal of Information Technology*, *13*, 33-34.
Niehaves, B. (2007, December). *On epistemological diversity in design science: New vistas for a design-oriented IS research*? Paper presented at the Proceedings of the 28th Annual International Conference on Information Systems, Montreal.
Nissen, H.-K., Klein, H., & Hirschheim, R. (Eds.). (1991). *Information systems research: Contemporary approaches and emergent themes*. Amsterdam: North-Holland.
Nolan, R. L. (1973). Managing the computer resource: a stage hypothesis. *Communications of the ACM*, *16*(7), 399-405
Nolan, R. L. (1975). Thoughts about the fifth stage. *Database*, *7*(2), 4-10.
Nolan, R. L. (1979). Managing the crises in data processing. *Harvard Business Review*, *57*(2), 115-126.
Nolan, R. L., & Wetherbe, J. C. (1980). Toward a comprehensive framework for MIS research. *MIS Quarterly*, *4*(2), 1-19.
Nunamaker, J., Chen, M., Purdin, T. (1991). Systems development in information systems research. *Journal of Management Information Systems*, *7*(3), 89-106.
Nunamaker, J., Couger, J. D., & Davis, G. B. (1982). Information systems curriculum recommendations for the 80's: Undergraduate and graduate programs – a report of the ACM curriculum committee on information systems. *Communications of the ACM*, *25*(11), 781-805.
Olle, T. W. (2006). IFIP TC8 information systems: Conception, birth and early years. In D. Avison, S. Elliott, J. Krogstie, & J. Pries-Heje (Eds.), *The past and future of information systems: 1976-2006* (pp. 1-10). Berlin: Springer.
Orlikowski, W., & Baroudi, J. (1991). Studying information technology in organizations: Research approaches and assumptions. *Information Systems Research*, *2*(1), 1-28.
Parsons, G. L., (1983). Information technology: A new competitive weapon. *Sloan Management Review*, *25*(1), 3-14.
Pearlson, K., & Saunders, C. (2009). *Managing and using information systems: A strategic approach* (4th ed.). New York: John Wiley & Sons.
Petter, S., DeLone, W., & McLean, E. (forthcoming). the past, present and future of IS success. *Journal of the Association for Information Systems*.
Piccoli, G., Powell, A., & Ives, B. (2004). Virtual teams: team control structure, work processes, and team effectiveness. *Information Technology & People*, *17*(4), 359-379.
Porter, M. (1980). *Competitive Strategy*. New York: Free Press.
Porter, M., & Millar, V. (1985). How information gives you competitive advantage. *Harvard Business Review*, *63*(4), 149-160.
Rackoff, N., Wiseman, C., & Ullrich, W. (1985). Information systems for competitive advantage: Implementation of a planning process. *MIS Quarterly*, *9*(4), 285-294.
Rainer, K., & Miller, M. (2005). Examining differences across journal rankings. *Communications of the ACM*, *48*(2), 91-94.
Rajkumar, T. M., & Dawley, D. (1998). Problems and issues in offshore development of software. In M. C. Lacity & L. P. Willcocks (Eds.), *Strategic sourcing of information systems: Perspectives and practices* (pp. 369-386). Chichester, UK: John Wiley & Sons.
Rajkumar, T. M., & Mani, R. V. S. (2001). Offshore software development: The view from Indian suppliers. *Information Systems Management*, *1*(1), 63-73.
Rao, V. S., & Jarvenpaa, S. L. (1991). Computer support of groups: Theory-based models for GDSS research. *Management Science*, *37*(10), 1347-1362.

Rappaport, A. (1968). Management information systems - another perspective. *Management Science*, *15*(4), B133-136.
Reponen, T. (1993). Strategic information systems - a conceptual analysis. *Journal of Strategic Information Systems*, *2*(2), 100-104.
Roach, S.S. (1988). Technology and the service sector: America's hidden competitive advantage. In B. Guile and J. B. Quinn (Eds.), *Technology in services* (pp.125-145). Washington, DC: National Academy Press.
Roach, S. S. (1989, December). The case of the missing technology payback. Paper presented at the Tenth International Conference on Information Systems, Boston, MA.
Robey, D. (1983). Cognitive style and DSS design: A comment on Huber's paper. *Management Science*, *29*(5), 580-582.
Robey, D. (1987). Implementation and the organizational impacts of information systems. *Interfaces*, *17*, 72-84.
Robey, D. (1996). Diversity in information systems research: Threat, promise, and responsibility. *Information Systems Research*, *7*(4), 400-408.
Robey, D. (2003). Identity, legitimacy and the dominant research paradigm: An alternative prescription for the is discipline. *Journal of the Association for Information Systems*, *4*(7), 352-359.
Rogers, E. M. (1983). *Diffusion of Innovations*. New York: Free Press.
Sabherwal, R., Hirschheim, R., & Goles, T. (2001). The dynamics of alignment: Insights from a punctuated equilibrium model. *Organization Science*, *12*(2), 179-197.
Sambamurthy, V., & Zmud, R. (1992). *Managing IT for Success: The Empowering Business Partnership*, Morristown, NJ: Financial Executives Research Foundation.
Sambamurthy, V., & Zmud, R. (1999). Arrangements for Information Technology Governance: A Theory of Multiple Contingencies, *MIS Quarterly 23*(2), 261-290.
Sanders, D. (1970). *Computers and Management in a changing society*. New York: McGraw-Hill.
Saunders, C. (2000). Virtual teams: Piecing together the puzzle. In R. Zmud (Ed.), *Framing the domain of IT management: Projecting the future through the past*. Cincinnati: Pinnaflex.
Schäfer, G., Hirschheim, R., Bjorn-Andersen, N., Domke, M., Harper, M., & Hansjee, R. (1988). *Functional analysis of office requirements: A multiperspective approach*. Chichester: John Wiley & Sons.
Scott Morton, M. (1971). Management decision systems; Computer-based support for decision making. Boston: Graduate School of Business Administration, Harvard University.
Shackel, B. (1997). Human-computer interaction - whence and whither. *Journal of the American Society for Information Science*, *48*(11), 970–986.
Sharpe, W. (1969). *The economics of computers*. New York: Columbia University Press.
Shih, C. (2009). *The Facebook era*. Englewood Cliff, NJ: Prentice-Hall.
Simmons, J. R. M. (1962). LEO and the Manager. London: Macdonald.
Sipior, J. C. (1997). Congratulations to our ACM Fellows. *Database*, *28*(1), 14-16.
Sprague, R. (1980). A Framework for the Development of Decision Support Systems. *MIS Quarterly, 4*(4), 1-24.
Sprague, R. H., & Carlson, E. D. (1982). *Building effective decision support systems*. Englewood Cliffs, NJ: Prentice-Hall.
Stamper, R. (1973). *Information in business and administrative systems*. Chichester: Halstead Press.
Stowell, F. (Ed.). (1995). *Information systems provision: The contribution of soft systems methodology.* Maidenhead: McGraw-Hill.
Strassmann, P. (1985). The information payoff: The transformation of work in the electronic age. New York: The Free Press.
Straub, D., Loch, K., Evaristo, R., Karahanna, E., & Strite, M. (2002). Toward a theory-based measurement of culture. *Journal of Global Information Management*, *10*(1), 13-23.
Swanson, E.B., & Ramiller, N. (1993). Information systems research thematics: Submissions to a new journal, 1987-1992. *Information Systems Research*, *4*(4), 299-330.
Swanson, E. B. (1990). Distributed decision support systems: A perspective. *Proceedings of 23rd Annual Hawaii International Conference on System Sciences: Vol. 111, Hawaii, 129-136.*
Tan, M., & Teo, T. S. H. (2000). Factors influencing the adoption of Internet banking. *Journal of the Association for Information Systems*, *1*(5), 1-42.

Teichroew, D. (1972). A survey of languages for stating requirements for computer based information systems. Paper presented at the Proceedings of the Fall Joint Computer Conference.
Teichroew, D. (1974). *Improvements in the system life cycle. Information Processing 74*. Amsterdam: North-Holland:
Teng, J. T. C. (2003). The evolution of the IS discipline: A naturalistic view. *Journal of Information Technology Cases and Applications*, *5*(1).
Teo, T., & King, W. (1999). An empirical study of the integration business planning and information systems planning. *European Journal of Information Systems*, *8*(3), 200-201.
Todd, P., & Benbasat, I. (1992). The use of information in decision making: An experimental investigation of the impact of computer-based decision aids. *MIS Quarterly*, *16*(3), 373-393.
Todd, P., & Benbasat, I. (1999). Evaluating the impact of DSS, cognitive effort, and incentives on strategy selection. *Information Systems Research*, *10*(4), 356-374.
Tolliver, E. M. (1971). Myths of automated management systems. *Journal of Systems Management*, *22*(3), 29–32.
Topi, H., Valacich, J., Wright, R., Kaiser, K., Nunamaker, J., Sipior, J., & de Vreede, G.-J. (2010). IS 2010: curriculum guidelines for undergraduate degree programs in information systems. *Communications of the AIS*, *26*(18), 359-428.
Trauth, E. M. (Ed.) (2001). *Qualitative research in IS: Issues and trends*. Hershey, PA: Idea Group Publishing.
Veltri, N., Saunders, C., & Kevan, C. B. (2008). Information systems backsourcing: Correcting problems and responding to opportunities. *California Management Review*, *51*(1), 50-76.
Venkatraman, N. (1991). IT-induced business reconfiguration. In M.S. Scott Morton (Ed.), *The corporation of the 1990s: Information technology and organizational transformation* (pp. 122-158). New York: Oxford University Press.
Walsham, G., & Sahay, S. (2006). Research on information systems for developing countries: Current landscape and future prospects. *Information Technology and Development*, *12*(1), 7-24.
Walstrom, K. A., Hardgrave, B. C., & Wilson, R. L. (1995). Forums for management information systems scholars. *Communications of the ACM* , *38*(3), 93-102.
Wand, Y., & Weber, R. (1990). Toward a theory of the deep structure of information systems. In J. DeGross, M. Alavi, & H. Oppelland (Eds.), *Proceedings of the Eleventh International Conference on Information Systems, Copenhagen, 61-71.*
Ward, J., & Daniel, E. (2006). Benefits management: Delivering value from IS & IT investments. Chichester: John Wiley & Sons.
Watson, E., Rosemann, M., & Stewart, G. (1999). An overview of teaching and research using SAP R/3. In W. D. Haseman & D. L. Nazareth (Eds.), *Proceedings of the 5th Americas Conference on Information Systems, Milwaukee.*
Watson, H. (2009). Business intelligence: Past, present and future. Paper presenented at the Proceedings of AMCIS 2009.
Watson, H., Sousa, R., & Junglas, I. (2000). Business school deans assess the current state of the IS academic field. *Communications of AIS*, *4*.
Weber, R. (1997). *Ontological Foundations of Information Systems*. Melbourne: Coopers and Lybrand
Weber, R. (2006). Reach and grasp in the debate over the IS core: An empty hand? *Journal of the Association for Information Systems*, *7*(10), 703-713.
Willcocks, L., & Lacity, M. (2006). *Global sourcing of business and IT services.* London: Palgrave.
Willcocks, L., & Lee, A. (Eds.) (2008). Major currents in information systems. Thousand Oaks, CA: Sage Publishers,
Williamson, O. (1975). *Markets and hierarchies: Analysis and antitrust implications.* New York: Free Press.
Young, S. (1968). Organization as a total system. *California Management Review*, *10*(3), 21-32.
Yourdon, E. (1978). *Modern Structured Analysis*. Englewood Cliffs: Prentice-Hall.
Zmud, R. W., & Cox, J. F. (1979). The implementation process: A change approach. *MIS Quarterly*, 3(2), 35-43.
Zmud, R. (1979). Individual difference and MIS success: A review of the empirical literature. *Management Science*, *25*(10), 966-979.

# Appendix

## Appendix A: AIS Award Winners and Past Presidents

**LEO Award Winners:**
Björe Langefors, Enid Mumford, Dan Couger, West Churchman, Gordon Davis, Dick Mason, Paul Gray, Jay Nunamaker, Frank Land, Jack Rockart, Bill King, Rob Kling, Andy Whinston, Philip Ein-Dor, Niels Bjorn-Andersen, Izak Benbasat, Eph McLean, Ken Kraemer, Bob Zmud, Lynne Markus, Dewald Roode, Burt Swanson, Dan Robey, Blake Ives, Carol Saunders, Rick Watson and Ron Weber. [See LEO Award winners at http://home.aisnet.org/displaycommon.cfm?an=1&subarticlenbr=149]

**Fellows Award Winners:**
Chrisanthi Avgerou, Niels Bjørn-Andersen, Paul Gray, Blake Ives, William R. King, Iris Vessey, Ephraim R. McLean, Maryam Alavi, Gordon B. Davis, Phillip Ein-Dor, Frank Land, Henry C. Lucas, Jr., Jay F. Nunamaker, Jr., Ronald Weber, Sirkka Jarvenpaa, Jim McKenney, Izak Benbasat, Dennis Galletta, Seev Neumann, Mike Vitale, Robert Galliers, Rob Kling, Ken Kraemer, T. P. Liang, Carol Saunders, Robert Zmud, Kalle Lyytinen, M. Lynne Markus, Dan Robey, Doug Vogel, Hugh Watson, Michael J. Ginzberg, John Leslie King, Allen Lee, Detmar Straub, Kwok Kee Wei, Cynthia Beath, Jane Federowicz. Ralph H. Sprague. Rick Watson, Rudy Hirschheim, Malcolm Munro, E. Burton Swanson, Ilze Zigurs, Dov Te'eni, Omar A. El Sawy, Rajiv Sabherwal, Joey F. George, Michael D. Myers, Joseph Valacich, Vallabh Sambamurthy, Sid Huff, David Avison, Shirley Gregor, Arun Rai, Marco de Marco, Juhani Iivari, Ritu Agarwal, Jae Lee, Dorothy Leidner and Bernard Tan. [See Fellow Award Winners at http://home.aisnet.org/displaycommon.cfm?an=1&subarticlenbr=59]

**Distinguished Member Award Winners:**
Gerardine DeSanctis, Heinz Klein, Claudio Ciborra, Charles Kreibel and Alessandro D'Atri. [See Distinguished Member Award winners at http://home.aisnet.org/displaycommon.cfm?an=1&subarticlenbr =150]

**AIS Past Presidents:**
Bill King (from Americas in 1995), Niels Bjorn-Anderson (from Europe/Africa in 1996), Ron Weber (from Asia/Pacific in 1997), Gordon Davis (Americas in 1998), Robert Galliers (Europe/Africa in 1999), Michael Vitale (Asia/Pacific in 2000), Blake Ives (Americas in 2001), Philip Ein-Dor (Europe/Africa in 2002), K.K. Wei (Asia/Pacific in 2003) Rick Watson (Americas in 2004), Claudia Loebbecke (Europe/Africa in 2005), Michael Myers (Asia/Pacific 2006), Dennis Galletta (Americas in 2007), David Avison (Europe/Africa 2008), Bernard Tan (Asia/Pacific 2009), Joey George (Americas 2010), Dov Te'eni (Europe/Africa 2011), and Doug Vogel (Asia/Pacific 2012). [See past council members at http://home.aisnet.org/displaycommon.cfm?an=1&subarticlenbr=10#Past]

## About the Authors

**Rudy HIRSCHHEIM** is the Ourso Family Distinguished Professor of Information Systems at Louisiana State University. He previously has previously been on the faculties of the University of Houston, the London School of Economics (University of London), and Templeton College (University of Oxford). His PhD is in Information Systems from the University of London. He was the founding Editor of the John Wiley Series in Information Systems in 1985, and continued as its co-editor until 2008. He is Senior Editor for the journal *Information & Organization*, past Senior Editor for the *Journal of the Association for Information Systems* and on the editorial boards of the journals: *Information Systems Journal; Journal of Strategic Information Systems; Journal of Management Information Systems; Journal of Information Technology; Wirtschaftsinformatik/Business & Information Systems Engineering;* and *Strategic Outsourcing*. He has previously been on the boards of: *European Journal of Information Systems* and *MIS Quarterly*. He was VP for Publications for the Association for Information Systems. He was awarded an honorary doctorate in the Faculty of Science, University of Oulu (Oulu, Finland) in May 2006. He was made Fellow of the Association for Information Systems in 2007.

**Heinz K. KLEIN** was Adjunct Professor at the School of Management of the State University of New York at Binghamton and Invited Chair at Salford University in Manchester, United Kingdom. He held teaching and research positions at Temple University in Philadelphia as well as at universities in Germany, Canada, Finland, Denmark, New Zealand, and South Africa. His research on the philosophy of IS research, foundations of IS theory, and methodologies of information systems development have appeared in *MIS Quarterly, Information Systems Research, Information and Organization, Information Systems Journal, Communications of the ACM, Journal of Management Information Systems, Decision Sciences*, and other journals, as well as in research monographs and international conference proceedings. He served on the editorial boards of several scholarly journals including *Systèms d' Information et Management* and the *Wiley Series in Information Systems*. He has a Ph.D. from the Faculty of Business Administration of the University of Munich, and received honorary doctorates from the University of Oulu, Finland, and University of Pretoria, South Africa. Professor Klein passed away in June 2008 and received the Distinguished Member Award from AIS in December 2008.