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Communications of the Association for Information Systems

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Early History of the Information Systems Discipline in the UK: An account based on living through the period

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Abstract:

In 2012, the Association for Information Systems (AIS) decided to establish the history of IS as a major study domain and, in 2013, appointed Professor Ping Zhang from Syracuse University as AIS Historian. One of her first acts was to set up a panel at each of the major AIS-sponsored conferences to examine aspects of IS history. The first conference with a history panel was the June 2013 ECIS in Utrecht. The panelists chosen by Professor Zhang had all contributed to the early developments of IS as practitioners and academics. They included Professor Carol Saunders from the USA, Professor Phillip Ein-Dor from Israel, Professor Niels Bjorn-Andersen from Denmark, and Professor Frank Land from the UK. The panel was chaired by Professor Ping Zhang, who also acted as mediator. This paper is based on my contribution to the panel.

Keywords: International, Industry, Society, Nation, Information Systems Development, Administrative Functional Systems, Enterprise Wide Systems, Decision Support Systems, Executive Support Systems, Inter-Organizational Systems.

Editor's Note: This paper is based on a panel presentation at the European Conference on Information Systems, held in Utrecht Netherlands, June 2013.

Editor's note: The article was handled by Ping Zhang, the Department Editor for History of Information Systems

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I. INTRODUCTION

In 2012, the Association for Information Systems (AIS) decided to establish the history of IS as a major study domain and, in 2013, appointed Professor Ping Zhang from Syracuse University as AIS Historian. One of her first acts was to set up a panel at each of the major conferences sponsored by the AIS to examine aspects of IS history. The first conference with a History Panel was the June 2013 ECIS in Utrecht. The panelists chosen by Professor Zhang had all contributed to the early developments of IS as practitioners and academics. They included Professor Carol Saunders from the USA, Professor Phillip Ein-Dor from Israel, Professor Niels Bjorn-Andersen from Denmark, Professor Frank Land from the UK. The panel was chaired by Professor Ping Zhang, who also acted as mediator.

Professor Ping Zhang asked each panelist to respond to the following questions:

Q 1. What have been the origins and development of global IS communities and infrastructure?

Q 2. What have been the intellectual challenges and advances in different regions?

Q3. What do our recollections on Topics 1 and 2 reveal about the success (or failure) of our academic discipline? What can we learn to benefit our discipline's future?

Below, I present the edited notes I compiled to respond to these questions (including comments included during editing these notes).

Q 1. WHAT HAVE BEEN THE ORIGINS AND DEVELOPMENT OF GLOBAL IS COMMUNITIES AND INFRASTRUCTURE?

My response makes both general comments relevant to the evolution of IS communities anywhere and comments culled from my understanding of IS developments in the United Kingdom.

In a sense, what we see today can be likened to a rich and complex tapestry. A closer analysis shows there are many threads that compose the picture we see today: some threads have been broken in the past, some resurrected at a later date, and new ones introduced. Below, I discuss some of the threads that have been important in building up the tapestry.

IS communities are as old as civilization. They provided the records of government, of treaties, of wars, of laws and court decisions, of religion and its books of revelation, which we still dig up in archeological sites all over the world and find stored as archives in museums and libraries. Libraries and monasteries are good examples of institutions in which IS communities flourished. They often comprised professionals whose designated roles as scribes, as record keepers for the treasuries, as accountants and as lawmakers were concerned with information and information systems. These professionals utilized the materials and technologies available to them—examples include: parchment or slates for holding records, bird feathers (quills) and paint brushes for writing, and, later, printing technology. Throughout history, these communities have also played a major role in developing innovative technologies and devising systems for classifying, storing, and disseminating information.

Wartime IS Community in the UK

If we wish to relate IS history more directly to IT, one IS community stands out in the UK: Bletchley Park (Lerner, 2004; Hinsley & Stripp, 2001). Bletchley Park is the place in which, at the beginning of World War II in 1939, the Government Code and Cypher School gathered together a group of people from many disciplines and with a wide range of skills. Their task was to intercept the encrypted messages flowing between the enemy's command and operational forces, if possible decrypt them, and pass them on to those who could act on them. Today we might describe the overall systems as a management information system (MIS).

Apart from the difficulty of decrypting the messages, the Bletchley organization faced a mammoth data processing task. Each day bought a massive volume of messages that had to be analyzed, categorized, annotated, stored, and passed on. Systems had to be invented to deal with multiple tasks. However, the major task—decryption—thought to be virtually impossible by the enemy, had to be solved. The answer again involved multiple threads. One was to

use the expertise of those whose special skills was devoted to deciphering ancient languages. Another skill was that of the puzzle solvers who were capable of solving complex puzzles such as crosswords. This team with its mixture of skills was able to devise possible processes to decrypt the messages. However, the time taken to decrypt a message would render the decrypts useless.

It rapidly became clear that, unless ways were found to mechanize or automate the decryption process and experiment with different decryption ideas and choose the most robust, the project would fail. Bletchley Park had also recruited some of the most mathematically and technically able scientists in the UK. These included the mathematician Alan Turing who had, in the thirties, published his seminal paper on computable numbers (Turing, 1937) and who, in 1939 at Bletchley, built a device called the Bombe with colleagues, which provided an electro-mechanical means of emulating the rotor settings of the German Enigma encryption device and hence analyzing messages. Although Turing was responsible for designing and constructing the Bombe, the original ideas had come from a device developed in Poland in the 1930s. The Poles did not have the resources to develop their ideas but passed on their design ideas to the British. The Bombe enabled the team for the first time to decipher a range of messages and send the results to the command centers. Their first important success came in 1941. In all, some dozens of bombes were built in the UK between 1939 and the end of the war, and the US (in collaboration with the UK) built many more for its navy and army code breakers (Lee, Burke, & Anderson, 2000).

Yet another thread comprised the actual building of the bombe, which was entrusted to the British Tabulating Machine Company (BTM). Like IBM in the USA, BTM was a direct heir of Herman Hollerith who had invented punched card machinery in the 19th century as a way of compiling census statistics for the U.S. Government.

The Bletchley Park code breaking efforts received fresh stimulus from the work of Tommy Flowers, a communications engineer working at the British Post Office research establishment, and Max Newman, a brilliant Mathematician also part of the Bletchley Park team. Newman was convinced that it needed a more powerful automatic process to decipher the latest increasingly sophisticated German codes. Flowers, overcoming his bosses' skepticism by paying for the work himself, designed and built Colossus, the first programmable digital computer, between the beginning and end of 1943. The Colossus project was a great success: it enabled German messages to be interpreted virtually in real time. In all, ten Colossus machines were built.

Its members sworn to secrecy, Bletchley Park was a closed IS community. The ground-breaking work of the community remained officially secret until 30 years after the end of the war. Most of the bombes were destroyed, as were the Colossus computers. The community dispersed, but the thread continued. Many of the participants joined other government research establishments or industry and played a major role in the British computer industry's emergence in the late 1940s and 50s. However, it was not until 1975 that the Bletchley Park venture was put into the public domain.

Business and Administration

While the IS community built up at Bletchley Park existed to solve one critical wartime problem, a more dispersed and much more open IS community had grown and developed many decades earlier. It comprised managers and their staff, frequently drawn from the accounting side of businesses, who saw the possibility of enhancing business and administrative practices (business process re-engineering?) and reducing office costs by investing in machines to do for office work what machines were doing in factories to enhance productivity. These notions had been given impetus in the US with the invention in 1884 by Herman Hollerith of punched card sorters and tabulators. While Hollerith had provided the machinery, their use was driven in part by the concept and driven in part by the notions of scientific management promulgated and demonstrated by Frederick Taylor (Taylor, 1911). A wide range of office aids became available in the first half of the 20th century: they ranged from calculators and punch card-based unit record systems to accounting machines and cash registers. In the UK, the Office Machinery Users Association was founded as early as 1915. Practical IS communities, specialists in office procedures, became established in much of big business and in government offices, though smaller businesses and local councils often lagged behind. IS specialists also gave advice as consultants working for the big accounting and audit companies.

In practice, we can recognize several distinct but intermingling IS communities. They include the staff working to improve business processes. As noted above, those who drove business process change tended to be connected to the business accounting function and the earliest IS communities were often part of the organization's accounting team.

I describe the conversion from "office machinery" to computers in Appendix I with a case study of a U.K. enterprise, the food manufacturing and catering company J. Lyons & Co. (Ferry, 2003), which designed, built, and used the world's first business computer. The spread was encouraged in the UK by copying the example that Lyons had

provided. The adoption of computers into the business practices of industry, commerce, and administration in the early 1950s coincides with epoch 1 in Hirschheim and Klein's (2012) IS history (Hirschheim & Klein, 2012).

The Office Machine communities

Working closely with these IS communities were the sales and consultancy staff of the office machinery manufacturers. In the UK, the office machine market was dominated by two big U.S. companies: NCR (National Cash Registers) and Burroughs. However, the growing punch card-based unit record market was served mainly by two British companies: British Tabulating Machine Company (BTM) and Powers-Samas. By the early 1950s, both were developing electronic versions of their equipment with relatively low levels computing power (they had very limited internal storage, rather slow arithmetic units, and limited programming facilities). IBM, the world's principal manufacturer in this discipline and, like the British companies, an heir to the business built up by Herman Hollerith, was excluded from the British market by a 1902 market sharing agreement with BTM that did not expire until 1948. In return, 25 percent of BTM's revenue was paid to IBM as royalties. And when IBM entered the British market, the world of these IS communities changed. IBM, which was much larger than its British competitors, spent far more on research and development, had a wider product range, and used superior marketing strategies, began to dominate the market. Powers-Samas and BTM were forced to amalgamate.

Specialist Services and Consultancy

A third IS community grew up alongside the user community and the hardware and software vendor communities. This third community comprised the consultants who advised and supported users and eventually those who provided specific outsourced services, including the design of information systems, the provision of software products, programming, and even operating computers on behalf of its clients. Major consultancy companies such as Urwick Orr and the major accounting and audit partnerships such as Coopers and Lybrand, Price/Waterhouse, Arthur Anderson, and many others established communities of specialists in IS. Indeed, much of the early research into IS was conducted or sponsored by these groups. A company called INFOTECH published its "State of the art" reports on a regular basis. In some of the companies, the IS community was spun off as a specialist group. Thus Urwick Orr spun off its IS group as Urwick Dynamics, and Arthur Anderson, now dissolved, spun off Accenture.

As the market for computers grew in the 1950s, so did the market for specialist services and consultancy. The need was met by a growing number of newly established computer and IS companies, some of which found significant success and grew into international enterprises. Many companies were founded by individuals who had developed ideas and methods to help the user community adopt computer-based systems. The influence of these gurus was and still is profound. The most influential included John Diebold, Isaac Auerbach, James Martin, Michael Jackson, Tom DeMarco, Peter Keen, Chris Date, and later consultancy-cum-software enterprises such as Logica and Oracle. Many of these organizations now have a global reach, and the best known ones are by far the largest communities of IT and IS specialists, with several companies currently (2014) employing over 250,000 consultants and several others employing in excess of 150,000¹.

Scientific, Engineering and Research

Another stream of innovation in the late 1940s and 1950s helped to provide computers to serve scientific and engineering needs of research institutions, companies working in the engineering and technology sectors, universities, and the military. At the time, the UK had a thriving but fragmented electrical and electronic industry. These included well established industrial enterprises such as Ferranti, English Electric, Elliott Automation, Associated Electrical Industries, General Electric, Standard Telephones and Cables, and government laboratories including the National Physical Laboratories (NPL) and Harwell (for atomic power research). With the end of World War II, the team that had built the bombe and Colossus at Bletchley Park dispersed. Some, such as Turing, went to the NPL and were involved in the design of the pilot ACE computer whose further development was subsequently taken over by English Electric as the successful DEUCE computer. Some of the team went to Manchester University and helped to design the Manchester "baby": the first stored program computer to demonstrate the feasibility of Von Neumann's notions of computer architecture. Subsequently, Manchester collaborated with Ferranti in the building the Mark I, Mercury, Pegasus and Atlas computers, probably the most successful series to serve the early technology market (which included universities). Each of the companies designed and constructed their own brand of computer with varying degrees of success. Some, like the Standard Telephone and Cables STANTEC-ZEBRA, are no more than a footnote in IT history. Nevertheless, these companies built up substantial IT communities.

By the late 1950s, it became clear that the business and administrative sectors were the most rapidly growing markets for computers. The industry responded by adding business computers to their range. Some organizations,

¹ See http://en.wikipedia.org/wiki/List_of_IT_consulting_firms for a breakdown by region of IT consultants including staff members.

such as English Electric, did so by buying American computer designs and rebranding them as the KDP 10 before later designing their own business computer, the KDF 6. Others, such as Ferranti with its ORION computer, were designed as business computers. Others sought to sell modified versions of their main products.

Government

By the late 1950s, government offices were themselves beginning to use computers in their back offices. The U.K. Government also set up its own central body, the Central Computer and Telecommunications Agency (CCTA), to exercise some control over the way the government itself used IS and to establish standards for users in its employ. By the 80s, the CCTA had taken a leading role in developing standards for use in government offices. Perhaps best known is the project management and evaluation methodology *Prince*, which was initially developed in and is still mandatory for Government IS projects in its latest release (*Prince2*). Some of these standards were adopted, typically, by larger commercial users.

The U.K. civil service set up its own staff college for training IS and IT staff with many hundreds trained each year. Some of the expected leaders sent to study for graduate degrees in computing and systems analysis at a number of British Universities including Imperial College and the London School of Economics.

IS Education and Training

The newly formed computer communities in industry—both for technical computing applications and for what was then called “business data processing”—required sets of skills then not taught in the education establishment. Training was generally provided by the vendors for their customers. The UK at the time had a binary higher education system: polytechnics and universities. It was the polytechnics who first accepted the challenge and began to offer diploma and later degree courses in IT/IS. It was they, under the auspices of their supervisory body the CNAA (Council for National Academic Awards), who established the first (in the mid-1960s) recognized curricula. To offer accredited degree and diploma courses, the polytechnics had to demonstrate that the courses followed the CNAA guidelines, which included a requirement that students had carried out a practical project hosted and supervised by an industry host. Communities of IS teachers evolved in most polytechnics.

Universities first offered courses to enable staff and students to use the university computers. By the early 60s, these had developed into more academic courses as part of engineering, science, and mathematics degrees, which lead to the establishment of computer science degrees. In 1967, the U.K. National Computing Council (NCC), a joint government/business body sponsored by the U.K. Government, noted the IS gap in computer teaching and research and provided grants to two universities to fill the gap and establish IS as a university discipline. As a result, Imperial College London sponsored by its operational research (OR) group and the London School of Economics sponsored by its statistics department were awarded the grant. In 1968, the NCC published the first curriculum in systems analysis. In the USA, the Association for Computing Machinery (ACM) published a curriculum embracing IS for graduate and undergraduate studies in the early 1970s (Ashenurst, 1972; Couger, 1973), which had significant influence on IS education worldwide. A revised curriculum was published in 1982, (Nunamaker, Couger, & Davis, 1982), and a European initiative sponsored by the International Federation for Information Processing (IFIP) and the British Computer Society (BCS) followed in 1987. It included an analysis by leading scholars and provided a comparison of the ACM's and the IFIP/BCS's initiatives (Buckingham, Hirschheim, Land, & Tully, 1987).

In 1968, IS (or systems analysis as it was known) became a graduate degree at the LSE, first at the diploma level and, by 1970, at the masters and PhD levels. The first IS PhD in the UK was completed at the LSE in 1967 by Patrick Losty with the title: “The computer and management structures”. For the first few years, teaching and research focused on requirements engineering, development methodologies, and finding ways of measuring the value of IS systems: indeed, determining on the one hand the expected cost of building an IS system and on the other establishing what, if any, value was added by the new systems was regarded by users as one of the principal problem areas, with conferences addressing the problem in 1962 and 1965 (Frielink, 1962; Frielink, 1965). For example, in 1970, the NCC funded a joint industry academia project on evaluation (Morris, 1971).

By the mid 70s. U.K. researchers became engaged in joint projects with Scandanavian and German associates. These included the publication of a number of teaching curricula aimed at different levels of students (Land, 1968; Land et al., 1975).

In the early years, there were no trained IS staff who knew anything about computers. Many users attempted to recruit from inside their own organizations, often from their unit record (punched card) outfits. This had only limited success because pesonnel recruited from that source tended to limit their ambitions to replicating what had been done on the old equipment. Others were persuaded to seek graduates with mathematics backgrounds. Organization and Methods (O&M) and OR departments were also used as a source for recruits. Training of recruits was often



outsourced to the equipment vendors. As higher education began to offer computer and IS courses, a larger proportion of those entering the industry—users and suppliers—were expected to have acquired qualifications. Academia had its own problems in finding the personnel to give the new courses. Nearly all the pioneers in establishing the IS discipline in academia came from a practitioner background or from closely related academic disciplines. Thus, in the UK, the well-known soft systems methodology was developed by Peter Checkland and his colleagues at Lancaster University (Checkland, 1981; Checkland & Holwell, 1998) as a technique for overcoming the restrictions of the hard deterministic school of OR from which he originated. Enid Mumford had been schooled in the socio-technical approach to organizational change developed at the Tavistock Institute in the 1940s. Stafford Beer, best known for his work in cybernetics and his work in Chile with President Allende to design a computer-based system to organize Chile's national economy, invented the viable systems model, which was later embedded in Mumford's ETHICS methodology (Mumford, 1995). The model is still relevant today (Beer, 1972; Hoverstadt, 2008).

At the high-school level, it took a long time for elements of IS to be established and, in the UK, it has still not taken root as a proper school subject in its own right.

Institutions and Associations

With the rapid spread of computing including IS and the growth of distinct IS communities came the need for institutions analogous to trade associations (or medieval guilds) responsible inter alia for establishing standards, educating and regulating, promoting the development of computing, and providing a meeting place for the various IT and IS communities that were emerging. The British Computer Society (BCS) was formed in 1957. Its founders came primarily from the computer science sector, and it was largely sponsored by research establishments, the computer industry, and universities. Although it began to accept that its role must include IS, it has tended to lean towards the technical side. Nevertheless, by the early 1960s, it had included IS as part of its membership qualifying examinations. By the late 60s it set out to become the professional organization covering all aspects of computing, including IS, with examinations (or some other proofs of skill) required to acquire membership. The BCS established specialist groups for the range of interests of its members, often permitting practitioners and academics to work on common areas of interest. Some of these became important in the development of IT and IS disciplines. Members were given the right to call themselves chartered engineers. It hoped that, like medicine or the law, practice as a professional would require membership of the legally recognized professional association. While many IT and IS practitioners have acquired membership of the BCS, such membership is not a requirement by employers and a large proportion of IS staff (and IS academics) are not members of the BCS. Its principal journal, the *Computer Journal*, publishes mainly papers reporting on computer science and numerical method research, with an occasional IS-focused paper. IS academia did not acquire its own professional institution until much later with the formation of the UK Academy of Information Systems (UKAIS) in 1994, which is now a body affiliated with the AIS.

The move to establish institutions similar to the BCS in many countries led to the formation in 1960 of the International Federation for Information Processing (IFIP) with Isaac Auerbach from the USA as its first president. The BCS is the U.K. body affiliated to the IFIP. The IFIP established a number of technical committees, each with its own working groups. These provided further means for the different communities, including IS, to work together on common problems. Sponsoring research and annual conferences, technical committee 8 with its working groups became the focus for the international IS communities.

Q 2. WHAT HAVE BEEN THE INTELLECTUAL CHALLENGES AND ADVANCES IN DIFFERENT REGIONS?

In all regions, the challenges facing the practitioner overlap the challenges facing the academic. However, we can identify some distinctions:

IS and IT have transformed the way economic, administrative, and social activities take place. Nevertheless, the challenges discussed below continue to be the chief information officer's (CIO) principal concerns.

For the IS practitioner in the user organization, the existential challenges have included and still include:

- (a) Building systems that work and satisfy their users for a sustainable period. But who is the user? There is a potential conflict between user as client, the managers who define the requirements of the system, the employees who "operate" the system, and the end user outside the organization. It is a conflict that Mumford and others sought to resolve by involving all stakeholders in the process of designing systems (Mumford, 1995; Mumford, Hawgood, & Land, 1978). However, these ideas were not widely adopted by IS practitioners. Give the possibility of systems failure and the high rate of failure, this is a constant challenge to the practitioner.

- (b) Providing systems that can respond to changing circumstances. Changing circumstances arise all the time. They range from the trivial to the profound. They may be induced by outside pressures such as changing economic circumstances or new opportunities stemming from technological or organizational innovations (Brynjolfsson & McAfee, 2014). They may be the result of changes inside the organization including changes in management personnel (Baskerville & Land, 2002; Porra, Hirschheim, & Parks, 2005) or mergers and acquisitions. Frequently they include elements of all of these.
- (c) Aligning IS to fit in with business strategies (Luftman, 1993). Business strategies are often seen to be top-down, but can also be bottom-up or middle-out and may involve conflicts between, for example, top management and the management of powerful business units. Business strategy may be explicit and detailed or based on nudges and hints. The CIO often has to attempt to navigate in these difficult waters. This is one reason why “alignment” has remained high on the list of the CIO's principal concerns (Luftman, 2008).
- (d) Provide systems that deliver: added value; competitive advantage; improved services to users, customers and clients; improved quality of employees' working life (QWL); and, at the same time, systems that are robust in the face of ever-changing modes of attack that range from industrial espionage to terrorism and hobby hacking. Keeping up with technological changes and challenges provides new opportunities and new threats. Hence, systems' security has risen to be one of the CIO's principal concerns and a major challenge.
- (e) Being regarded as a member of their organization instead of being the perpetual “outsider”, also associated with the “blame game” still rife in many organizations where IS practitioners blame users for not being able to state requirements in a clear and unambiguous manner and of constantly changing requirements, and where users blame their IS counterparts for not understanding the way a business works (Gannon, 2013; Porra et al., 2005).

Technological advances including the capability of digitizing documents, music, and pictures, the availability of cheap mass storage, and communication capacity via broadband and smartphones have been game changers. Living in today's information age, information and knowledge, which yesterday was available to only a handful of specialists, can be downloaded and studied by the interested layman. For example, the Dead Sea scrolls, which were, until recently, locked away for study by a few specialist scholars, have been digitized and are widely available².

For the citizen and authorities, the challenges include:

- (a) Coping with the increased demand coming both from commerce and from government to enact transactions “online”. A digital divide (van Deursen & van Dijk, 2011; White, 2013)³ has been created between the majority who have the resources and skills to operate online and mobile systems, and the minority, often the aged, the socially deprived, and the physically handicapped, who have neither the resources nor the skills, but are being penalized, for example, by extra charges, for not using online systems for necessary transactions. The digital divide similarly has implications for employment opportunities with those on the wrong side of the divide being severely handicapped (Bynner, Reder, Parsons, & Strawn, 2008). This can be regarded as a challenge for the citizen, for the policy makers, and for those responsible for system designers.
- (b) The Internet, social networks such as Facebook and Twitter, search engines such as Google, and mobile facilities such as tablets and smartphones and their apps have changed the everyday activities and behavior of large sections of the worldwide population. Huge amounts of often personal information transverse the networks daily and is stored in digital repositories, which is available to inquisitive searchers. At the same time, the source and destination of all traffic on the network is recorded and again is available to inquisitive searchers. The leaked revelations in 2012 by Edward Snowden⁴ have shown that US and UK—similar to other governments who have the capability—have empowered security agencies to monitor all network and mobile phone traffic, including that of other countries, and use the power of their own computers to decrypt encrypted material. The rationale for this activity is protecting the state and its citizens against criminal and terrorist behavior. The extent of this activity raises major issues and challenges for politicians, the executive branch of government, the judiciary and the citizen.

² The Dead Sea Scrolls, which include the oldest known biblical manuscripts in existence, have been digitized and are now accessible online: <http://dss.collections.imj.org.il/isaiah>

³ Two studies on the Digital Divide: One from the Netherlands, the other from Glasgow in Scotland.

⁴ http://en.wikipedia.org/wiki/Edward_Snowden

- (c) One particular trend that raises concern is the way children use social networks. Behaviors such as online sexting (Phippen, 2012), online bullying, trolling, and downloading pornography have become widespread, and have resulted in cases of suicide and self-harming. These activities raise issues of parenting and the wider political issue of the extent to which regulators should attempt to interfere with the freedom of the networks.

For the IS academic, the challenges include:

- (a) Providing solutions to the practitioner's challenges. Academic research in IS was established to provide tools and methods to help practitioners build and evaluate systems. IS was seen as a pragmatic, engineering-type discipline. However, a gap has opened between the two communities as academia increasingly has sought a theory-based understanding of IS often couched in a language that the practitioner cannot understand. A practitioner walking into an IS seminar on, say, social materiality, would wonder what was going on. It is as if the discipline has moved from engineering to cosmology. Some members of the academic community are well aware of the problem and, in 2013, launched an initiative to discover the community's attitude to collaboration between industry and academia⁵.
- (b) Understanding social and mobile IS and its impacts. Much of the research in this arena is trans-disciplinary involving researchers from a variety of social studies disciplines. Indeed, many of the findings are published in journals or websites outside the IS discipline.
- (c) Finding explanations and theories that make sense of IS phenomena such as success and failure. No single theory can encompass the complexity of the domain, and searching for such a general theory of IS may be a delusion. Different theoretical frameworks help to throw light on particular aspects of the IS experience (Mingers, 2001).
- (d) Understanding something of the trans- and inter-disciplinary context in which IS works and how this contributes to explanations.
- (e) Providing the education and training that will make IS students both useful to their employers and good citizens.
- (f) Effectively communicating both with their academic peers and the world of the practitioner.
- (g) Coming to grips with, and anticipating the consequences of, rapid technological, and equally cultural and social, changes.
- (h) Understanding and developing research methods that provide convincing (verifiable) evidence and explanations of the IS experience such as why some systems succeed and others fail.
- (i) Advancing personal academic careers. Unfortunately, advancing academic careers may conflict with some of the other desirable characteristics of working in an IS community.

Have we missed some sections or topics that should be part of the IS domain?

The paradigm that dominates IS has been what might be called the “business school” paradigm. That notion puts the business value of IS in capitalist enterprises at the center of academic concern. Recent issues of the top journals show a welcome broadening of the IS domain into areas such as the social networks and a greater interest in security and privacy concerns.

However, there are several important IS issues that are rarely addressed by IS scholars and teachers and, in some senses, are regarded as taboo by the IS scholarly community. These include:

- **Embedded systems**, often using AI techniques. The design and construction of embedded systems employs huge resources and have transformed many consumer products and industrial processes. They are truly information systems. Take as an example the motor car. Sitting in the driving seat of the modern car, the driver is confronted with an array of information-providing and automatic control devices. These

⁵ <http://www.e-competence.org>



information systems are taking over more and more activities previously thought to require human intervention. It was good to see at least one paper at the 2013 ICIS conference providing a case study and analysis of development of such a system (Hylving & Schultze, 2013). The designers of such systems are faced with similar design issues as designers of a business IS, in particular in defining what part of the system should be completely automatic and what part should permit human intervention. The next step embedding technology in humans is well on its way and is surely a topic relevant to IS.

- **Criminal and dubious use of IT/IS.** Most IS research and teaching focuses on the beneficial use of IS. Yet there is a huge underground use of IS that is designed to aid subversive, criminal, or semi-criminal behavior (Mumford, 1999). A typical example is pornography, which is still one of the largest and most used sector of Internet activity. A recent study in the UK reported more than 50 percent of teenage boys downloaded pornography on a regular basis (Phippen, 2012). To a limited extent, it is studied by IS scholars, but mainly in the sense of how the law can, aided by filtering technology, limit access to its worst manifestations. But pornography has not been studied by IS scholars as one of the major applications that has itself made advances in the way we use technology. We have to go elsewhere to discover the impact of IS on pornography and pornography on IS (Dines, Jensen, & Russo, 1998; Coopersmith, 1999). The same critique applies to the study of hacking, phishing, but also to more controversial arenas such as Wikileaks. The policy issues raised are only rarely discussed formally by IS scholars.
- The study of **knowledge management** has become one of the more important areas of IS interests with its own journals and conferences. It has developed its own orthodoxy concentrating on the benefits, such as competitive advantage, that sharing knowledge can bring. But the other side of KM (knowledge manipulation by the use of advertising, PR, censorship, *omertà*, need-to-know rules practiced in scientific management) rarely form part of the KM discourse (Land, 2009). To what extent was the 2008 credit crunch fostered by the break in the traditional knowledge bond between borrower and lender by practices such as securitization? A case perhaps of IS knowledge mismanagement having disastrous outcomes. The study of data mining and the analysis of big data tends to focus on the techniques and the value such analysis can give an organizations, rather than as an aspect of KM that creates new hazards.
- **Cyber warfare and citizen surveillance** is becoming increasingly important and yet another instance of the deployment of IS. Where are IS scholars in the debate about these new practices? Is it a part of the role of IS communities, including the academic community, to engage in the debate on many of the major political debates and, as scholars, carry out research that can inform the debate? My answer is yes.

Q3. WHAT DO OUR RECOLLECTIONS ABOUT QUESTIONS 1 AND 2 REVEAL ABOUT THE SUCCESS (OR FAILURE) OF OUR ACADEMIC DISCIPLINE? WHAT CAN WE LEARN TO BENEFIT OUR DISCIPLINE'S FUTURE?

- **Partial failure of discipline to connect and influence practice.** Papers that are accounted as a success in academia are regarded as obscure or irrelevant by practitioners. As an example, does all the effort that goes into the technology acceptance model yield any practical outcomes that the astute CIO does not achieve anyway? To an extent, this is offset by the consultancy advice provided by IS scholars to industry, commerce, and administration. All the evidence suggests that practitioners highly value such advice.
- **Playing catch-up.** The IS discipline is not noted for providing innovative techniques or methods for practitioners. Most innovations that have transformed the way IS is done or used have come from outside the IS academy (Land, 1996). In the forefront have been the major consultancies, software producers and vendors, and individual experts. The role of IS academics has primarily been to evaluate and promote innovations, though, at times, they appear to be jumping onto a band wagon.
- **Academic career progression** does little to encourage stepping outside the mainstream with speculation or innovation. We must be prepared to give credit to those who are prepared to step outside the box even if they don't fulfill their ration of publications. Most academic departments have members who come up with ideas that spark valuable research and result in publications but not by the originator who has turned their attention to other areas. Such people are invaluable, but cannot be retained by current models of how academic careers should be assessed
- **In view of the trans-disciplinary nature of IS** (Bryant & Land, 2012) **there is a need to work more closely with others outside the borders of what is regarded as IS.** Good example are working with criminologists on the dark practices of IS or with sociologists and psychologists on, for example, the impact on children of social networks.

- **Ensure that our writing is clear, jargon free** so that it can be understood by the non-specialist. In assessing academic performance include clarity of expression as an important performance parameter.
- **And—most important—keep aware of values as a driver of behavior and ethics as a guideline and constraint on improper activity.** The issues were also debated in the *Journal of Information Technology* in 2012 after being triggered by an paper suggesting that IS needs to ask itself: what is IS doing to make the world a better place (Walsham, 2012)?

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Editor's Note: The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the paper on the Web, can gain direct access to these linked references. Readers are warned, however, that:

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APPENDIX A

In November 1951 at the London premises of J. Lyons & Co., a large British Company, well known for its teashops, restaurants, hotels, bakeries, tea, ice cream, and confectionary, the first time-critical application of business data processing was rolled out on the company's LEO I computer (Bird, 1994; Caminer et al., 1996; Ferry, 2003).

John Simmons at Lyons became the influential President of Institute of Administrative Management (founded in 1915 as Office Machinery Users Association) and, in 1962, published one of the earliest books on computers and MIS *LEO and the managers* (Simmons, 1962), which strongly advocated the idea of integrated systems enshrined in a master plan. Simmons, a first-class mathematician from Cambridge University, had joined Lyons in the early 1920s and established a department he named systems research. This department sought to find ways of restructuring business procedures with innovative tools and processes, and Simmons sent two senior executives to the USA in 1947 to check out what progress had been made in improving business methods, but also to take a look at the talked-about electronic computers. They saw early digital computers, spoke to some of the pioneers, and came back with the idea that computers could transform the way the company, and indeed the UK, could solve many of its business problems⁶.

Simmons endorsed the report prepared by the two executives and persuaded the Lyons Board to set up a project to build a computer designed to cope with the needs of a business like Lyons: the handling of very large numbers of small value business transactions generated each day by their operations, large volumes of printed output in the form of production schedules, payslips, invoices, management statistics, very large files including accounting records, inventories, and customer information. At the same time, the amount of calculation to be performed was small compared to that required by science and engineering.

Lyons collaborated with Cambridge University, who was in the process of designing and constructing the EDSAC computer—the first production electronic digital computer to run on Von-Neumann principle of treating the computer program as if it were data in the computer store rather than fixed by hard wiring or an external pluboard. The outcome of the collaboration was the LEO (Lyons Electronic Office) computer. By November 1951, the small Lyons team had built and tested the LEO and were ready to roll out the first application to be followed by a stream of new applications, both for the parent company and many external clients wanting to use the capabilities of the computer. A new IS community was forged.

ABOUT THE AUTHORS

Frank Land started his career in computing with J. Lyons, in 1953, working on the pioneering LEO Computer first as a programmer and then as a systems analyst. In 1967, he left industry to join the London School of Economics on National Computing Centre grant to establish teaching and research in systems analysis. This led to the formation of the Department of Information Systems of which he became convener. The department developed teaching programs at graduate level (Masters and PhD) and a lively research activity, the first university in the UK to establish such programs.

In 1982, he was promoted to Professor of Systems Analysis. In 1996, he joined the London Business School as Professor of Information Management. He retired in 1991 and was appointed Emeritus Professor at the LSE in the Department of Information Systems in 2000. Frank Land has been Visiting Professor at the Wharton School, the University of Sydney, the University of Cairo, Bond University, Curtin University, and is currently Visiting Professor at Leeds Metropolitan University. He is past chairman of IFIP WG 8.2 and on the editorial board of a number of academic journals. He is a Fellow of the British Computer Society, was awarded a Fellowship of the AIS in 2001, and received the AIS LEO Award in 2003..

As a researcher, Frank has worked with End Mumford and others on sociotechnical ideas since the early 1970 and is currently active with the British Computer Society's Sociotechnical Specialist Group. Working with Barbara Farbey and David Targett he has carried out research and written papers and books on the problems and tools of IS evaluation. More recently, he has become involved with work in knowledge management, focusing on the manipulative aspects of KM and in the history of business computing with books and papers in the IEEE Annals of

⁶ The Modern Record Centre at Warwick University house the Simmons archive, which provides a fascinating insight into the thinking and ideas propagated by John Simmons. Digitized archives relation to LEO can be found at <http://www2.warwick.ac.uk/services/library/mrc/explorefurther/digital/leo/digitised/>

computing History. Currently, Frank is co-editing a book with colleagues Claudio Ciborra and Chrisanthi Avgerou at the LSE on the social study of information and communications technology published by Oxford University Press. He is currently involved in the history of information systems and information systems studies.

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