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## *Invited Paper*

# Reflections on Teaching Information Systems Analysis and Design: From Then to Now!

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**ABSTRACT**

David Avison and Guy Fitzgerald have had over 30 years' experience teaching information systems development methodologies, techniques and tools at the old UK polytechnics, universities and business schools in the UK, France, Australia and the United States in faculties of commerce, management, engineering, science and mathematics in many departments, including (even) that of Information Systems. During this time they have both also had several years' experience in practice, acting as consultant and researcher (and this followed some years as full time systems analysts in a number of companies). In this opinion piece, they discuss their experience with Melissa Cole, who has completed her first year teaching the subject, to see if there is any common ground (or indeed differences) which they could share. The following agreed 'reflections' were formed following several discussions between the three of us. We follow conventional wisdom and use the magic number 7 for our reflections!

## 1. INFORMATION SYSTEMS DEVELOPMENT IS CORE TO THE DISCIPLINE OF INFORMATION SYSTEMS

The process of developing and maintaining information systems is the main role of IS people in practice. This is what IS professionals do. No academic programme in information systems should omit this topic: it is fundamental to information systems. In fact our very earliest teaching at Thames Polytechnic in 1974 was the original National Computing Centre (NCC) course on developing business applications. This material was presented to practitioners (frequently those wishing to make the change from being computer programmers to systems analysts or those studying for British Computer Society (BCS) professional qualification) as well as our undergraduate and graduate students. Thirty years later the general topic is still the fundamental course that we teach to our graduate and undergraduate students and in company in-house programs. Practitioners also still need to understand the fundamentals of information systems development: how to analyse and design computer applications for organizations. It is therefore also at the core of professional courses. Fads and fashions are a feature of our domain, but during our 30 years of teaching, information systems development remains at the core to the discipline of information systems. (Even so, it is usually possible to incorporate the latest fashion into the material, as it was, for example to discuss supply chain management (with ERP development), web application development (with WISDM and other rapid approaches), business process re-engineering (with Davenport's process innovation approach) and so on.)

This topic enables us to show that the information systems discipline does have some form, a methodological framework, it is not merely a hodge-podge of 'facts' about hardware, software and business. The IS development life-cycle provides that framework. Within this framework there are commonly-used techniques (many based on modeling, such as E-R and dataflow diagrams, but others include 'thinking' techniques like brainstorming, lateral thinking and scenario planning) and processes. Computer tools and toolsets, such as Oracle, support the work of developing applications. Information systems development provides the 'disciplinary form' thus enabling the discipline to exist. This can be seen as an intellectual framework whereby we try to

make sense of real-world activities. Discussing the issues of information systems development provides a 'whole' and makes sense of the discipline.

## 2. INFORMATION SYSTEMS DEVELOPMENT COVERS THE MAIN ISSUES OF THE DOMAIN

In line with our first 'reflection', through teaching information systems development we are able to discuss all aspects of the domain with our students. Information systems development is at the meeting place of the three bases of our discipline: information systems and communications technology (ICT), organizations and the human dimension. Thus all modules that are likely to be included in information systems courses can relate to the information systems development core module.

Students can sometimes finish a particular module of their studies conversant in that material but with little understanding about how, or where, it 'fits' with their other subjects. As a result, students inadvertently develop compartmentalized knowledge. The breadth of subject matter in information systems development enables students to see where the other topics fit in. Conversely, the other courses can provide greater depth to the topics discussed in this core course. Being able to develop good information systems requires students to appreciate and combine the overlap between different courses.

## 3. TEACHING INFORMATION SYSTEMS DEVELOPMENT IS NOT TRAINING

For some time, it was frequently fashionable in some universities to teach a particular methodology (SSADM in the UK, Merise in France, Yourdon Systems Development in the United States, Information Engineering in Australia) and use this as the basis for the fundamental course in information systems. For one thing, commercial training companies or in-house trainers can probably do this much better when new recruits are trained to do a specific job in situ. However, as a university course, this approach has limited value and is of short term use. It does not provide the real value of the educational opportunity.

Education in information systems requires understanding of what lays behind the techniques and methodologies. Education should provide analysis and conceptual skills that last a lifetime. For us, this means understanding the underlying issues and concepts of methodologies. We termed this the 'philosophy' of methodologies in our book. For example, Enid Mumford's ETHICS methodology makes an assumption that it is essential for people to be involved in the design of their own work systems. Without understanding this 'philosophy', it is impossible to truly understand the method even if students know all the techniques involved. The kind of teaching that helps unearth these deeper issues and assumptions encourages debate about them, for there are rarely clear-cut answers.

Any discipline needs to have some theoretical bases and again the topic of information systems development enables us to raise these issues. To give only one example, s in the domainystems theory and systems thinking are of course a tenet of Checkland's SSM, and systems thinking has been incorporated elsewhere.

## 4. THE MATERIAL CHANGES ALL THE TIME WHILE STAYING THE SAME

The fundamentals of the first edition of Avison and Fitzgerald (1988) are still those of the fourth edition of Avison and Fitzgerald (2006). The structure remains the same. However the topic has expanded greatly. The sheer number of themes, techniques and methodologies has expanded from 9, 8 and 9 respectively in the first edition to 28, 29, and 25 in the third edition (2002). Interestingly these latter numbers have remained fairly stable in the fourth edition. Nevertheless each new edition has necessitated a thorough look at the detail which always requires a thorough sifting and updating throughout every four years or so. The pace of this detailed change has increased over the years.

What has changed is the emphasis from the computing and IT aspects to the human and organizational aspects over the 18 years of the four editions. Human and organizational aspects were represented in the first edition. One of its strengths was the emphasis on human approaches (in particular Mumford's ETHICS) and organizational approaches (in particular Checkland's SSM) along with the more conventional approaches, but the emphasis in the book and the teaching was on the more technical process and data approaches. Present discussions are more balanced between the technical, human and organizational aspects. Within that overall picture, however, the detail does change as techniques improve in practice, tools develop and methodologies are adapted.

Although there has been a succession of 'new' approaches, often emerging from practice, we wonder 'what is really new and what is simply a new badge?'. For example, the present stress on agile methods goes back to rapid application development, prototyping and user involvement, all of which were included in our 1988 edition.

## 5. USING CASE STUDIES CAN GIVE MEANING AND REAL-WORLD CONTEXT TO THE MATERIAL

The NCC course introduced us to case studies. One case involved the students role-playing systems analysts trying to capture the requirements for a system from people in a fictitious company. One of these people did not want to give up his hard-earned knowledge, fearing that he might be made redundant as a result of the system. We used to enjoy playing that role! It was a great lesson to see how teaching could be less lecture-intensive, involve the students more, and also be fun. However, at that time, we did not really concern ourselves with theories about how to teach and our knowledge about pedagogy was inadequate. Although there are many 'downsides', the UK teaching quality assessment exercise has made us think more about how we deliver our courses.

Following the NCC cases, we have used a number of Harvard cases and similar. These case studies have become the bedrock of much business management and information systems teaching. These cases are usually very well packaged but we do have concerns as they tend to suggest 'the' answer to issues. One case leads students to assume that the secret of successful information systems development is the role of a 'champion'. Of course a champion for the system can be important, but it is simplistic for students to think that there can ever be 'one solution' to the complexities of information systems development. We do need cases that raise issues, provide critical feedback on decisions taken and enable deeper debates and insights.

Students seem to have a low boredom threshold and cases can help enormously. Video cases can provide greater understanding of what happens in organizations, and we would like to see more 10-15 minute videos that raise issues for discussion rather than solve them. One such video develops a scenario and then asks 'what should we do now?'. This leads on to a discussion about whether the company should develop its own system, outsource or buy an application package. We would also like to see 'games' that might be incorporated into the classes.

## 6. ENCOURAGING DEBATES PROVIDES GREATER DEPTH OF UNDERSTANDING

One technique that we have introduced more recently into our teaching is to encourage 'assumption/implication debates'. These take the form of us stating some assumption in relation to systems development and then asking the students to think about the possible implications of the assumption. For example, we might begin by asking "What is the purpose of systems analysis and design" and the students might make various attempts to define its purpose. They might end up with something like "help develop effective systems that enhance the objectives of the organization". We then ask them to identify the implications of such an assumption, of which there might be many. For example, one obvious implication might be that systems developers need to know what the objectives of the organization are. This also has implications, perhaps including the need for developers to find out about the objectives and understand the business strategy.

One can use this technique at any level, so for example it might be used in the specific domain of a discussion about the use of 'specifications'. The students might define that as "helping to communicate requirements from business people and users to developers". They then think of implications, which might include that a specification needs to be understood by both users and developers. This then might lead to the implication that a specification needs to provide a level of detail from which developers can develop a system without recourse to asking the users again or guessing. Each implication generates a discussion of what users and developers do and how they communicate. One implication that might be discussed is whether the users know what they want and whether we are able to specify it to the level of detail required.

Encouraging students to think critically and out of their comfort zone of unambiguous technology and into that murky area of uncertainty can prove difficult. Students of systems methodologies need questions that are sufficiently open-ended to create ambiguity, but equally have enough clues to support their hesitant and faltering steps into this highly complex 'grey area'. Through the use of carefully constructed problems for debate, students can begin to understand the degree of methodological complexity they face and the impact that inappropriate techniques and partial implementations have on organizational transformation.

## 7. THE MATERIAL IS 'USEFUL' FOR NON SPECIALISTS

There is much debate now about the reduced student demand for courses in information technology and information systems. This reduced demand has been part of the fall-out from the dot.com crash. We think this is a temporary phenomenon anyway. However, it is not difficult to make a case for information systems development to be on the core curriculum. All students in whatever discipline (and none more so than MBA students) will use information systems in their work. They are important stakeholders and need to be involved in the development of 'their' systems to ensure that they fulfil their needs and are designed to fit in with their abilities, education, workplace, and so on. Many organizations incorporate joint application development (JAD) workshops and the like: stakeholders have to be involved (and rightly so!).

The material is also important in other domains. In a business program, for example, discussions about customer relationship management, web development and data mining systems can support marketing courses - and the same can be said for enterprise resource planning systems and logistics, auditing packages and accounting, methodologies, especially PRINCE2, and project management, risk and success/failure and management science, outsourcing development and globalization, systems planning and strategy - to provide only a few examples. Non-specialists still need to know how these applications are developed, along with their potential (the realization of which will be partly determined by how much the non-specialist is involved). But it is also essential for computer science students. They need to know how hardware and software is used in organizations and, more importantly, how issues of information systems development (in particular, people issues) should impact on their designs.

In this opinion piece we have made a case for information systems development being core to the discipline and practice of information systems. It provides the intellectual framework whereby we try to make sense of real-world activities and discussion of the issues of information systems development provides a 'whole' and makes sense of the discipline. It is at the centre point of ICT, organizations and people. We argue that the subject matter taught should be broad-based and of value educationally and not be merely 'training' as would be a course teaching one methodology, for example. Although the material does change consistently, the basic themes remain fairly consistent and some 'new'

topics are merely 'old wine in new bottles'. We make a case for using case studies and other teaching approaches that stimulate debate: the old-fashioned lecture with PowerPoint slides is not enough and maybe much less important. However we make a plea for better case studies and video material and even games that support teaching of the various topics. Finally, we suggest that the reduced student demand for the subject is short-term and that the subject is vital for non-specialists as well as specialists.

## AUTHOR BIOGRAPHIES

**David Avison** is Professor of Information Systems at ESSEC Business School, Paris, France. He has published over twenty books as well as a large number of papers in learned journals, edited texts and conference papers. He is Chair of the International Federation of Information Processing (IFIP) 8.2 group on the impact of IS/IT on organizations and society, and was past President of the UK Academy for Information Systems (UKAIS) and also UK Professors and Heads of IS. He has served as chair of several international conferences, including the International Conference in Information Systems (ICIS) in 2005. His research looks at information systems in their natural setting, in particular using action research. He is co-author with Guy Fitzgerald of a popular textbook, first published in 1988 and now in its fourth edition, *Information Systems Development: Methodologies, Techniques and Tools*.

**Guy Fitzgerald** is Professor of Information Systems at the School of Information Systems and Computing at Brunel University, UK. He has also worked in the computer industry for many years with companies such as British Telecom, Mitsubishi and CACI, Inc. International, in a variety of roles, including those of programmer, systems analyst and consultant. His research interests are concerned with information systems and information management and he has published widely in these areas in books, scholarly journal articles, and international conference papers. In particular his research has been concerned with the effective development of information systems and methodologies. More recently he has addressed the area of information systems strategy and has developed a framework for ensuring the effective linking of business and IT strategy and has undertaken an in-depth study of IT outsourcing in the UK.

**Melissa Cole** has recently taken up a post as a lecturer in information systems and computing at Brunel University. Her principal research interests are electronic commerce, human-computer interaction, applied hermeneutics and other novel methodologies investigating human use of new technologies. She has published in a number of international journals and conferences, including Communications of the ACM, International Journal of Human-Computer Studies, and Information Systems Frontiers.


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