Information Systems Design Methodologies – Book Reviews

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***In 1990 work on Information Systems Design Methodologies has been moving forward at a pace. This has led to a spate of results in areas such as Information Strategy, the convergence of different kinds of methodology, the appearance of more comprehensive CASE tools (now beginning to include tools for program generation) and the study of methodologies for office systems, group working and Strategic Information Systems. This spread of work is reflected in the papers appearing in this issue of the* Journal.**

The developments in the research and application areas have been matched by the publication of a number of significant books in the area of methodologies. The purpose of this article is to review in depth five of the more significant contributions, which have either appeared late in 1990 or are to be issued early in 1991; to assess two new Journals, and to note other books which have recently appeared covering associated topics. Details of all the publications are given in the bibliography.

1. UNDERSTANDING METHODOLOGIES

In 1988, a task group of seven prominent researchers, brought together within Working Group 8.1 of IFIP, published through Addison-Wesley a *Framework for Understanding Information Systems Methodologies*. This volume attempted to create a framework within which all the then existing methodologies could be fitted and compared. It identified twelve stages in the system life cycle and three perspectives from which systems analysis and design could be viewed. It described components of the business information systems planning, analysis and system design stages and it provided illustrations of design processes and design products. It was relevant to practitioners, researchers, teachers and students alike. The second edition of the book[1] will have been published by the time that this review appears.

The major changes in the second edition are improvements to the treatment rather than any fundamental change in direction. In particular chapter 2, on the subject of scenarios, has been substantially rewritten and considerably amplified. In chapter 3 the explanation of the behaviour perspective has been extended and improved and the concept of 'methodology-dependent components' has been explained more fully and more clearly. Chapter 8 (which was chapter 9), which considers how an existing information system evolves, has been extended to show how information systems are renovated, through restructuring, reverse engineering and re-engineering. Some changes of wording and rearrangement of the order of presentation have made the whole book a little easier to understand. The examples of components have been clarified and some examples of scenarios have been added. The exercises at the end of each chapter have been extended. I found this last improvement especially helpful.

There is one-extension which is particularly welcome. This is the introduction, in a new chapter 10, of a section on CASE. The chapter does not, however, examine specific CASE offerings. Instead it considers the nature of CASE systems by looking at some generic features common to the architecture of offerings in the market place, it examines the major concepts from the framework which is the subject of the book, and how these can be supported using CASE, and it then considers some of the consequences for the stages of the information systems life cycle of providing computer assistance in handling them. It is, to me, disappointing that a book which includes an appendix which provides information on some existing methodologies does not include a similar appendix covering existing CASE systems. No doubt this could be added to the list of further work to be done. On this point, readers of this *Journal* might like to note that one respect in which the new edition is no different from the earlier one (at least in substance) is in the list of researchable topics. Do we need a change of direction in some of our work?

The first edition was so fundamental to our understanding of Information Systems Design Methodologies that it was an essential reference work on all our shelves. The main question with the second edition is whether the changes are sufficient to buy yet another copy. To me there is no question. The extensions in the cover and the improvements in the presentation, not to mention the comparative economy in the production, mean that I shall be recommending it as soon as it is in the bookshops.

2. CONVERGENCE OF APPROACHES

To my mind a major weakness of the IFIP book[1] is its concentration on structured methodologies with negligible reference to the work on formal methods, soft methods or the socio-technical approach. Two books[2,3] which have appeared towards the end of 1990 indicate how important the human aspects, at least, of systems design methodologies are.

Recent approaches to the design of methodologies for systems development have approached the subject from three angles, the structured systems (SSADM, IEM), the soft systems (Checkland) and the more formal systems. Any real systems development must, however, take into account all three views, and add some hints, not only on what to do but also on how to do it.

Multiview, the methodology introduced in Ref. 2, attempts to combine the human activity systems approach and the socio-technical approach with the more structured techniques developed from the work of

Yourdon and de Marco. Formal methods are not incorporated. The present volume is an update of an earlier work on Multiview, published in 1985.

The book introduces the overall concepts incorporated in Multiview and then explains in detail its five stages. At the end of each section there is a case study, which is presented in a way which relates the tasks identified to be carried out in each stage with a practical example where the methodology has been applied. These case studies are supplemented by a chapter which lists the lessons to be learned from the case studies. Many of the chapters conclude with a small number of exercises which are theoretic in nature.

It is difficult for this reviewer to distinguish a review of Multiview itself from a review of the book. Multiview is interesting because it introduces social aspects of systems development which are so lacking in (say) SSADM, yet it still betrays the same two fundamental weaknesses which plague most of the structured methods. Firstly the two ends of the Systems Development Cycle are missing. These are Strategy (relating the choice of systems to business objectives) and Implementation (making the new system actually work). To be fair, the treatment does introduce some aspects of the problem of implementation, namely testing and training, and maintenance and enhancement. Other important areas such as file conversion, parallel running and cut-over, and modifications to the user environment are all seriously neglected. A second weakness is that whereas structured methodologies provide a checklist of what needs to be done in a systems development project, little is said on the subject of how to go about doing it. Multiview still suffers from this weakness. In order to be successful a systems development project requires an enormous amount of information gathering. The psychology of how to ensure that the information is correct and relevant and comprehensive is not touched on in Multiview.

With regard to the book itself, the text is well written, it is comprehensive and it benefits from the addition of case studies. On the other hand, I found the exercises provided at the end of the chapters so vague as to be impossible to undertake. They were very limited in scope and no solutions were offered. For example the problem, 'Differentiate between real time, on-line and batch processing' could have as many different answers as the number of people to whom it is asked. This lack of follow-up and reinforcement is a serious omission in a book which is clearly a student text, as confirmed by the foreword. Nevertheless, it introduces an approach to the subject which is unique and to which students in the subject should be exposed, and at £14.95 is quite reasonably priced. I shall be recommending my own students to buy it.

Since the publication, in 1981, of Peter Checkland's book *Systems Thinking, Systems Practice* the information systems community has though long and hard (or should I say long and soft) about the relationship between the hard and soft approaches and the implications for systems development in practice. With the publication late in 1990 of a new text,[3] which brings the work on soft systems methodology up to date, derived from practical experience of using the methodology during the last decade in industry, the Civil Service and the service sector, the information systems community needs to examine the role of the soft approach even more closely.

Of course, soft systems methodology is not, *per se*, directed to information systems development projects. Indeed, none of the many practical examples quoted in the new text is concerned directly with information systems. As our colleagues working in the area of information strategies will tell us, however, information systems are not divorced from the business environments which they serve. Before we can have an information strategy we must be clear about what is the business strategy that we are going to support. At the corporate level the soft approach precedes the introduction of the hard approach. In particular, the CCTA, through its 'Compact' approach, has linked SSM to SSADM as a means of tackling the 'business analysis' stage of a project.

Within the new text the authors have addressed directly the question of the relationship between SSM and information systems development. There is a brief introduction in the first chapter followed by an Appendix, called Information Systems and Systems Thinking, devoted wholly to considering the relation between SSM and information systems. Whilst the book overall is very impressive, in its industrial relevance, its depth of research and its clarity of expression, I thought that this particular section was not very well developed. The author takes a very limited view of information, based on processing data, and an equally limited view of the project life cycle. Before applying the ideas presented, readers should be fully familiar with the work in both Refs 1 and 2 and also should have studied the papers contained in this *Journal* in July 1985. On the other hand, readers should also take to heart Peter Checkland's comments on the changing nature of information systems development. He notes how the driving centre for IS development is moving towards the end user, and how the strategic use of IS and the management of IS development all include a role for SSM.

This book is directed quite clearly at the researcher into methodologies and at the practitioner. It is clearly written, it is comprehensive and it includes (is almost wholly devoted to) detailed case studies. It is not, however, a book for undergraduate students. The case studies assume a knowledge of industry; they are not supported by exercises. The bibliography is extensive although, like the mean treatment, it is less impressive in relation to information systems methodologies than general systems methodologies. For the new hybrid manager who is now emerging from MBA and MSc courses it is a must.

3. DATA-DRIVEN METHODOLOGIES

Although the IFIP book[1] identifies twelve stages in the systems life cycle, most of the methodologies address only some of the stages. SSADM has the advantage of addressing as few stages as most. Nevertheless, its status as the methodology chosen by the United Kingdom government for systems projects in government installations, plus the availability of impressive tools such as LBMS's Systems Engineer (now available as SSADM Engineer for Version 4 of SSADM), means that its approach must be covered thoroughly. There have been a number of books on SSADM since 1988, but one of the

latest[4] has the advantage of being written by two authors who have both been central to the development of SSADM.

The authors begin by considering the three views of a system (logical data structures, data flow diagrams and entity life histories) and explain their meaning and use. They then develop each of these views through the stages which SSADM defines, although they omit the feasibility stage, and they use a case study (a vehicle and driver hire and invoicing system), plus references to other applications, to demonstrate how each stage is applied.

The present volume is one of the most thorough treatments of SSADM that I have seen. It is well written and easy to read. It even mentions that there are problems in systems development that SSADM doesn't address (e.g. recognising the informal system – p. 63), but it still doesn't overcome the two main SSADM weaknesses. It says what to do but not how to do it and, once the physical design stage has been completed, it just fades away. The treatment is supported by exercises, only a few and not of much depth, and there is a bibliography, again not particularly comprehensive.

This volume is directed at students and analysts who are moving into the use of structured methodologies for the first time. It is factual rather than analytic, but the study is logical and well directed and newcomers would find it an easy route into the prescriptive discipline which SSADM demands. I have recommended it to my students. At the same time one must bear in mind that this book covers Version 3 of SSADM. Version 4 has already been announced and there could be a case for waiting until Version 4 is incorporated into the literature.

It would be easy to say that, as SSADM is to the United Kingdom so MERISE is to France. Such an approach would, however, be far too simplistic. Although MERISE has become more and more influential as the best-known and used method in France to develop information systems, both in the public and private sectors, it nevertheless adopts a quite different approach to the problem to be addressed. One of the major French texts on the subject of MERISE has now been translated into English[5] and is due to appear in the bookshops in May 1991. This provides an introduction to information systems in general, a description of the MERISE method, details of some tools which can be used with MERISE and some general observations on how to use MERISE effectively. The original French authors have both worked extensively on projects employing MERISE, and this depth of knowledge about how to apply MERISE is what comes over most clearly.

MERISE is presented as having two approaches. The first approach is based on the system life-cycle concept and identifies six stages of a project, corresponding approximately to the twelve stages identified in Ref. 1. The second approach defines six stages for the application of MERISE, consisting of three levels (conceptual, logical and physical) each related first to the data and then to the processes. Having established the need for considering the system life cycle, nothing is said about the planning and implementation stages of a project – the whole treatment is devoted to the analysis and design of a database and corresponding transactions. One paragraph states that the conceptual data model is developed during the first three stages of the life cycle, but it does not say how. One paragraph is devoted to project management and one Appendix describes some of the documents used to assist with project management, but I was still left wondering where project management fitted into the overall framework. In this treatment MERISE is not shown as having a highly prescriptive flavour, as does SSADM.

One aspect of the book is that it is difficult to realise that it is a direct translation from the French. Apart from a very occasional lapse ('project leading' for 'project management') the English flows well. Also the examples chosen are ones which relate directly to how business systems are organised in the English-speaking world. One isn't saying 'we don't do it like that' at any point. The translators must be congratulated on having done an excellent job.

Although the treatment employs throughout a worked case study based on a French software house (I hope an imaginary one but that isn't clear) there are no exercises provided and the final bibliography is weak. Nevertheless the treatment is thorough, the text is easily readable and the subject matter is important. A European methodology is under discussion. A comprehensive book on MERISE is a must for students, practitioners and researchers alike. At £18 it is within the price bracket of any of these groups.

4. JOURNALS

There are a number of journals, not least this one, already in the market for practitioners and researchers in information systems. It is not the remit of this review to analyse any of these. Two new ones,[6,13] however, will have appeared by the time that this review has been published. The first is published by Blackwell. Again David Avison is making a major contribution this time in collaboration with Guy Fitzgerald.

The new journal seeks to provide a natural home for articles on research, practice, experience, current issues and debates concerning information systems. It takes as its definition of information systems the effective analysis, design, delivery and use of information and information technology in organisations and society, with the implication that psychology, philosophy, semiology and sociology will figure in the coverage in addition to the usual technical and managerial considerations.

The membership of the Editorial Board is representative of the soft, the structured and the formal methodologists. It is likely, therefore, that the editors will be able to achieve the aims that they have set for the journal and that some progress towards a methodology which addresses all the present aspects of systems development, not to mention the new areas of development, will result.

The second[13] is intended to have a European flavour. Submissions may propose new theories or extend existing theories, they may be of a tutorial nature or they may review existing literature. Papers which are based on empirical research and provide an insight into current practice are particularly welcomed.

5. ASSOCIATED TEXTS

Arising from the investigations needed to compile the present review the author has been made aware of a number of other recent texts,[7–12] which have relevance to

the development of information systems. They are not, however, addressed directly to systems methodologies.

The first group[7,8] are concerned with specific aspects of using information technology rather than the methods by which we decide what to do and how to do it. Ref. 7 concerns systems in general and, with its considerable emphasis on data modelling, is of immediate relevance to practitioners working with (say) SSADM. Ref. 8 is concerned solely with open systems. It addresses issues such as standards and their role in portability, interconnection, etc. and it analyses specific aspects of open systems such as data handling, user interfaces, security and administration. I should regard both as tutorial texts rather than research texts. They are both thorough and well written, but neither includes exercises and worked solutions.

The second group[9,10,11,12] are concerned with software development rather than systems development. Ref. 9 looks at software engineering from a viewpoint very close to that of the system developers, while Ref. 10 describes a particular methodology (and tools) for software development. Ref. 9 is clearly a tutorial text, but Ref. 10 could be of wider interest since it presents a specific approach to software engineering in the context of the wider issues which SE is attempting to address.

Refs 11 and 12 are conference proceedings. In each there is one paper which is relevant to the various systems methodologies. In Ref. 11 one contribution extends SSADM into the program production stage. Having criticised SSADM because it stops short at this point I should not disparage a development of this kind. Nevertheless, I believe that the degree of formalism contained in the method presented will be off-putting to many practitioners. In Ref. 12 there is a description of a methodology for the development of knowledge-based systems. It is interesting but it does not yet display the rigour of the approaches summarised in Ref. 1.

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Announcement

AUGUST 1991

DEXA '91, International Conference on Database and Expert Systems Applications, Berlin, Germany

Aims of the conference

The use and development of database and expert systems can be found in all fields of computer science. The aim of DEXA '91 is to present a large spectrum of database and expert systems, already implemented or just being developed. The conference will offer the opportunity to discuss extensively requirements, problems and solutions in the field.

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All accepted papers will be published in the *Conference Proceedings* (Springer Verlag). Selected papers will be published in the journal *Expert Systems with Applications* (Editor in Chief: Jay Liebowitz).