A Data Dictionary Approach to Teaching Information Systems Analysis

KATHLEEN SPURR

Department of Mathematics, Statistics and Computing, Polytechnic of North London, Holloway Road, London N7 8DB

The problems of teaching information systems analysis in an academic environment are well known. Students need to grapple with real-life situations in order to understand fully the theories, and acquire the skills. But often real-life situations are too large and complex to be handled within the confines of a single course unit on systems analysis. Restricting the real-life application, concentrating on a single methodology, and using a data dictionary approach may provide a solution. The aims of such an approach are three-fold: (i) to provide an understanding of the data dictionary concept; (ii) to emphasise the importance of a well-ordered approach to systems analysis; (iii) to show how data dictionary tools may be used to aid and clarify the systems analysis process.

Received November 1986, revised August 1987

1. INTRODUCTION

For many years, finding an effective method of teaching information systems analysis has been regarded as a problem. Gradually, various methodologies for systems analysis were developed,[12,13] implying that systems analysis could be performed in a structured, 'method-driven' way. But studying these methodologies without relating them to a real-life application proved to be unsatisfactory, in the same way as studying the theory of a programming language without writing any programs in that language would be.

For some years now, the author has been experimenting with various methods of teaching the subject through the use of case studies. At first, well-documented, theoretical case studies were considered. These were unsatisfactory because they did not provide the student with experience regarded as crucial to the process of systems analysis – that of attaching a 'structure' to a system where apparently no structure exists. By its very nature, a well-documented case study has to be structured in some way, and the student who is exposed to such an approach is missing out on this important aspect of systems analysis. In addition, experiences with interviewing and fact-finding were regarded as essential to a budding systems analyst. For these reasons, real-life case studies were chosen instead of theoretical ones, an approach also adopted by Wood-Harper and Flynn.[18]

For several years, data dictionaries have been advocated as a tool for developing information systems. A data dictionary can be viewed simply as a repository of data about data, as it was originally conceived,[8] or as a useful tool for the systems analyst:[9] 'The work of a data dictionary aids analysis by documenting and clarifying work as it proceeds'. The Data Dictionary Systems Working Party of the British Computer Society endorsed this idea in their 1977 report.[3]

In 1978 Gradwell, speaking as chairman of the British Computer Society Data Dictionary Systems Working Party, at a conference on Data Dictionary Systems again proposed the use of data dictionary techniques in Systems Analysis and Design.[7]

The DDSWP sees a data dictionary as a tool with several major objectives. These are:

(a) To provide facilities for documenting the information collected and created during all stages of a computer project; analysis, design and implementation.

(b) To provide facilities that will continue to be used in the re-analysis, redesign and re-implementation that will recur after the first phase of the first project. Thus facilities to update the information are as important as facilities to create it (an unchangeable system specification is worse than none).

(c) To ensure that the documentation is structured, [that] selectable subsets are easily available, and that all is properly indexed and cross-referenced.

(d) The system should help analysts and designers to follow well-structured methodologies.

The suggestion was made, in this context, that the term 'data dictionary' was no longer appropriate.[3]

The DDSWP has studied many commercially available and in-house data dictionary systems... from simple data directories describing existing files to full-blown systems analysis, design, implementation and operational tools which could only be termed 'systems encyclopedias'.

Other terms have also been suggested (e.g. 'analyst's workbench', 'analyst's toolkit'). However, there does not exist universal agreement as to the appropriate terminology. The term 'data dictionary' will be used in this paper, since it is probably more widely used than any other term.

This paper details the approach taken to a fourth semester B.Sc. unit on Systems Analysis. The students concerned were mainly studying a half-degree in Computing, the other half being in Mathematics or Statistics. One methodology was studied and applied to a real-life, but restricted situation during the unit. No comparison of methodologies was attempted, as it was felt that this would demand a level of skill and maturity that was beyond the capabilities of these students. The students were given lectures on the theoretical aspects of the methodology in large lecture groups, then divided into smaller seminar groups for its practical application. About half the class contact time was devoted to lectures, the total effective class contact time being 60 hours. Many types of case study have been used, relating to applications as diverse as the sports council, the administration of a lawn tennis and squash club, collection of data on leprosy, a fashion warehouse, a small accounting system and a school records system. This paper will consider examples from a case study concerned with the allocation of berths at a small sailing club.

2. THE METHODOLOGY CHOSEN

It was decided that students would study **one** methodology that was being used in the commercial world. A general-purpose methodology was required that did the following.

(i) Dealt with aspects of both data analysis and process analysis.[5,12] LBMS-SDM/SSADM also satisfies this requirement, but, at the time the course was being developed, there was insufficient published material of a suitable nature to develop a comprehensive course.

(ii) Made extensive use of diagrams, formal techniques, graphical tools and standard forms, for ease of communication. This was seen as being particularly appropriate to students whose background was mathematical. The chosen methodology is not unique in this respect, as most methodologies employ some or all of these techniques.

(iii) Was adequately documented in computing texts.[10,15] A paucity of suitable student texts is common to most methodologies. SASD is the only methodology that has had a reasonable variety of student texts available,[4,14,19] but it does not cover the whole of the systems life cycle and it does not employ data analysis to any great extent.

(iv) Related to the whole of the systems life cycle, but placed a major emphasis on analysis. Fitzgerald *et al.*[5] recognised that D2S2 was the only methodology that covered almost all of the system life cycle from the initial strategy phase to the final review and maintenance phase.

(v) Could suitably be supported by a data dictionary. Most methodologies fall into this category. Some of those people involved with the development of D2S2 in the late 1970s were also active participants in the British Computer Society Data Dictionary Systems Working Party, and there is a close association between the notion that a data dictionary should be used in systems analysis and the development of D2S2.

(vi) Was in use in the U.K. commercial computing market. A deliberate policy decision was taken to use an existing commercial methodology, rather than devise another one.

D2S2 was chosen, as it met all of these criteria. However, there is no intention that the data dictionary approach discussed in this paper is dependent on the use of D2S2. Indeed, the data dictionary approach to teaching systems analysis could be applied with any one of several methodologies.

If D2S2 is to be criticised, it is in the area of publications on the methodology – there are few texts suitable for student use. The most suitable student text is Ref. 15, and this is out of print. (Ref. 16 by the same author has now just been published.) This deficiency was offset by having extensive course notes, produced by the author. At the time that the methodology was selected it was felt that D2S2 adequately met the other requirements, so in the absence of a strong competitor it was chosen.

It is recognised that methodologies are particularly susceptible to change with time, and it is not always possible to define precisely what a methodology is composed of at any one time. The methodology chosen in this case is the author's interpretation of that presented in Ref. 10.

The D2S2 life cycle consists of the following six stages.

(1) The Strategy Stage, where an overview of the system is taken and a strategy for system development drawn up.

(2) The Analysis Stage, where selected areas are analysed in more detail.

(3) The Design Stage, where files, databases, transactions and operational procedures are designed.

(4) The Construction Stage, where programs are loaded and tested, files and databases are loaded, and operational documentation is prepared.

(5) The Transition Stage, where the new system begins to go live.

(6) The Production Stage, where the system is run operationally, being maintained and tuned as necessary. This stage terminates when the system becomes obsolete and needs to be replaced.

Only the Strategy and Analysis stages are covered in this paper.

3. THE SAILING CLUB CASE STUDY

Students were given the following brief details of Dell Quay Sailing Club, a small club situated on the south coast of England.

Dell Quay Sailing Club is a small club of about 500 members situated on the south coast of England in Chichester Harbour and run entirely by its members. Members pay a yearly subscription, in return for which they are able to participate in dinghy racing, cruiser rallies and social activities. Members also have access to the club premises which include a bar, changing rooms, toilet facilities, workshop and berthing facilities.

Berthing facilities are available for dinghies, cruisers, tenders and sailboards. The club has a separate berthing committee to administer the allocation of berths. Only club members are allowed to have a berth, and a separate berthing fee must be paid for each berth.

Berths are allocated at the beginning of each calendar year, following the receipt of the member's berth application form. The major problem occurs each year with the allocation of dinghy berths. Generally, there are more applicants for dinghy berths than there are berths available. Frequently, members wish to change their existing berth for reasons relating to size of berth or location of berth.

The berthing committee would like to have a computerised system to help with the dinghy berth allocation process. It is envisaged that this system would be implemented using a microcomputer.

The methodology does not give any guidance on techniques for fact-finding and interviewing. It is therefore left to the analyst to employ any techniques considered suitable. Since the sailing club operates in an informal manner, it was felt that informal interviews and discussions would be most suitable. Interviews were therefore held with the Dinghy Berthing Officer, who is responsible for allocating dinghy berths, and with other officials in the club.

Although a computerised system for the allocation of dinghy berths was the most immediate requirement, the holistic approach to the development of information systems was borne in mind. It is possible that any dinghy berth allocation system may need to interact with the computerised system for handling members' subscriptions, or an accounting system.

4. THE STRATEGY STAGE

During the strategy stage, the analyst attempts to obtain an overview of the system and plan for future development. It has been found that the construction of the following diagrams assists the analyst's understanding of the system, during this stage:

(i) the global entity model, where the main entities in the system and their corresponding relationships are shown;

(ii) a function hierarchy, detailing the main functions in the system and their composition;

(iii) an entity–function matrix, showing how the entities and functions interact.

4.1 Application of the methodology

When students are attempting systems analysis for the first time, a question that is frequently asked is 'What are we supposed to do and where do we start?' It is by constructing diagrams such as entity models and function hierarchies that the students are able to answer this question for themselves. The construction of such diagrams is not seen as an end in itself, but it does greatly assist the analyst's understanding of the system under consideration. Also the diagrams do enable the analyst to attach a 'structure' to the system. The use of entity models and function hierarchies enables both data and process aspects to be considered at an early stage.

During this stage, the students interviewed a representative from the sailing club and produced the entity model shown in Fig. 1 and the function hierarchy shown in Fig. 2.

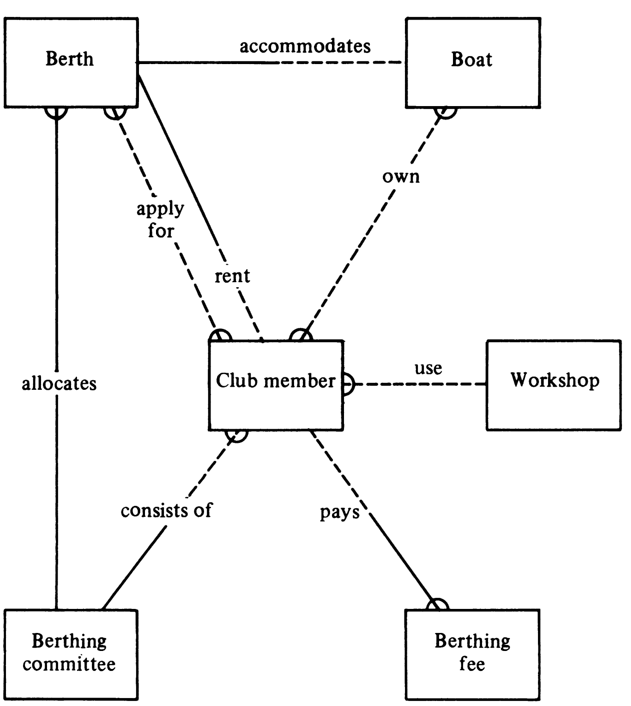

Figure 1. The entity model.

Entities are represented by rectangles, relationships by lines joining entities. Mandatory participation by an entity in a relationship is represented by a solid line, optional participation by a broken line. Thus the D2S2 entity model is particularly rich in expressing the semantics of relationships. However, it is restricted to binary relationship types.

At this stage, the entity 'BOAT' is assumed to include all types of craft – sailboards, cruisers and dinghies.

The function hierarchy in Fig. 2 shows the main system functions, and a broad indication of function decomposition. No sequence is implied.

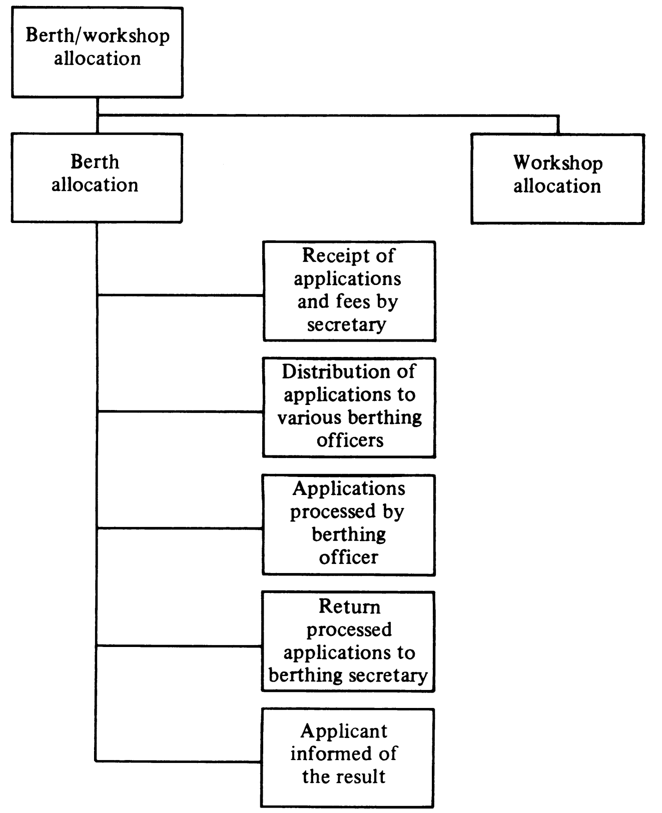

Figure 2. The function hierarchy.

An entity–function matrix is intended to show the interaction between entities and functions, and to pinpoint any omissions or redundancy. If cluster analysis is applied to the matrix, the matrix may be used to break the system into smaller units for further investigation during the analysis stage. Such a technique was found to have dubious value during the small case studies investigated by the students, although it may be of more use in larger systems where several hundred entities and functions have been found. No example of an entity–function matrix has been given in this paper.

Clearly, by comparing the selected entities and functions, an important entity has been omitted – 'application'. This is mentioned in the functions, but not specifically as an entity. An interpretation of 'application' is present in the Global Entity Model as the relationship 'apply for' between BERTH and CLUB MEMBER. Since all the functions of the system under consideration relate to processing applications, it is probably worth considering 'application' to be an entity rather than a relationship.

'Berthing committee' appears to be involved in all functions, but this is not necessarily the case, since a different member of the committee may be involved in each function – this would probably require further expansion during the later detailed analysis stage.

At the end of the strategy stage the student will have decided on a draft structure for the system. It is not complete, nor final, but it can be used as a basis for further detailed investigations.

In structuring the system, the students were mainly concerned with ensuring that all the important aspects of the system were included as either entities, relationships or functions, and no important aspect was omitted; also that a consistent level of detail at the 'type' level was maintained.

4.2 The strategy-stage data dictionary

Essentially, at the strategy stage, the system has been viewed as consisting of: a set of entity types and their interactions; a set of function types; a set of entity–function interactions. Eventually, at the lowest level of analysis, the entity types could be mapped to record types when the system is implemented, and the function types be mapped to transaction types. the entity–function interactions would then appear within program modules. But all of these transformations may only be meaningful after a considerable amount of further analysis.

At the meta-level, the data dictionary for the strategy stage would contain information about the strategy-stage decisions on entities, functions and interactions. The diagram in Fig. 3 shows how this meta-data is represented in the data dictionary. An entity is related to a number of other entities; a function consists of several other functions. One entity may participate in several entity–function interactions, and a function may require several entity–function interactions.

It is not appropriate to include too much detail at this stage, as this may conflict with decisions made after further analysis when more information has been obtained. For example, it could be said that the details as to whether a relationship is optional, contingent or mandatory should be left till a later stage. However, from a student's point of view this is probably worth including at the strategy stage, as an aid to clarifying the technique, provided it is recognised that the decisions made could be changed following further analysis.

The strategy-stage data dictionary is essentially intended to be manual, although the diagrams could be stored using a computer medium, if necessary.

5. THE ANALYSIS STAGE

Detailed investigation is carried out during the analysis stage, and data dictionary techniques are particularly useful for ensuring completeness and consistency of definitions.

Ideally, during the analysis stage, the students work as a team, each student concentrating on a minimal, self-contained subsystem. The students have to ensure that their analysis is consistent and complete within their subsystem, and that it enables suitable interfaces to be set up with the other subsystems.

In order to illustrate the technique, the process of allocating dinghy berths will be analysed in detail.

5.1 Application of the methodology

During the analysis stage, we focus on the relationship 'apply for' between dinghy berth and club member, derived from the strategy stage global entity model of Fig. 1. For reasons previously stated, it has been decided that this relationship should be considered as an entity. Hence we have the amended entity model in Fig. 4.

For reasons of simplicity, it has been deliberately decided to omit any considerations relating to the entity

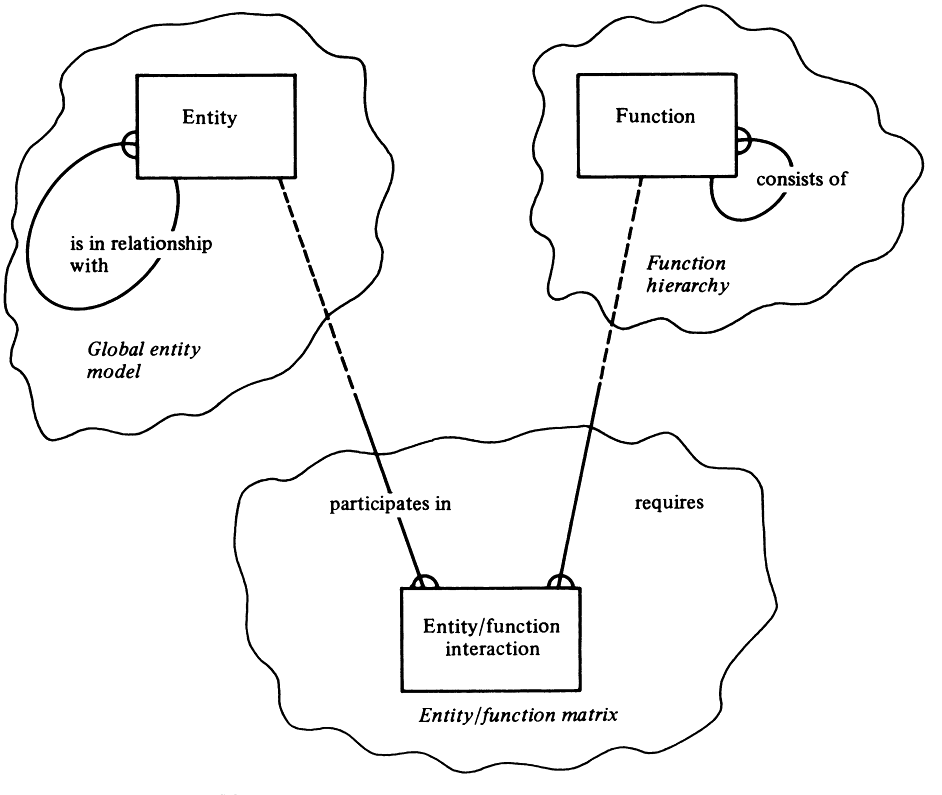

Figure 3. The strategy-stage data dictionary.

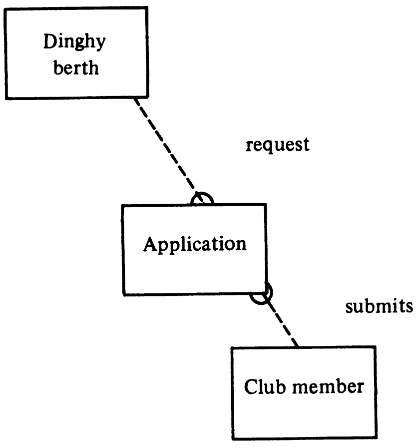

Figure 4. Amended entity model.

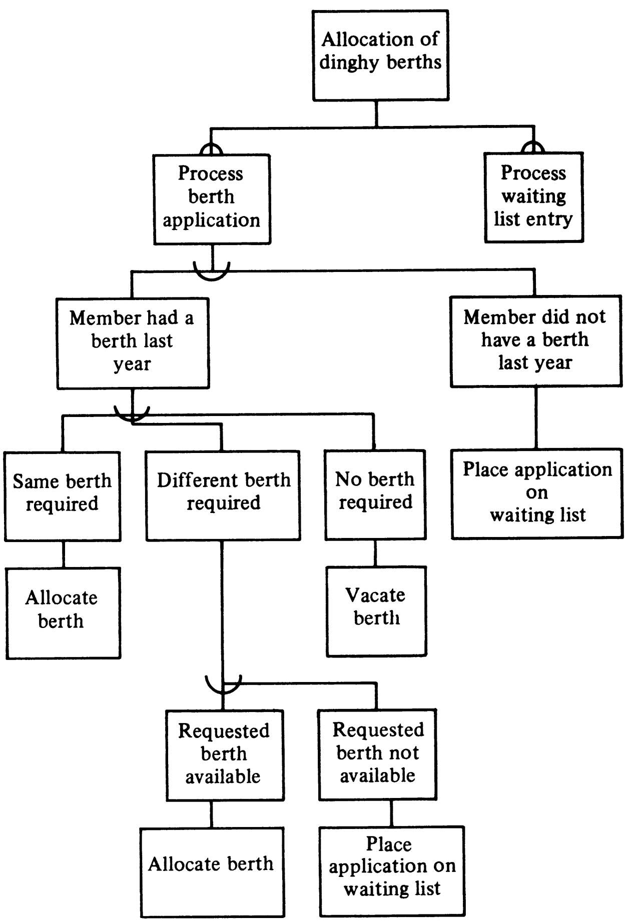

Figure 5. Detailed function model.

'BOAT', and hence assume that all boats will fit into all berths. During the analysis stage we concentrate on the two entities DINGHY BERTH and APPLICATION. CLUB MEMBER will be referred to only in so far as it is an attribute of APPLICATION.

A detailed function model for the allocation of dinghy berths is shown in Fig. 5.

Notice that at the lowest level of this model the functions are 'elementary functions' and may be represented by simple computer transactions.

The function model does not give any details of the sequence in which functions are performed. A function dependency diagram is used for this purpose. This is very similar to the data flow diagram used in structured analysis and structured design,[4,14,19] although traditionally the data flow diagram includes files and data stores (which the function dependency diagram does not) and no control details.

Entity life cycle diagrams show the states in which an entity may exist during its life cycle and the functions that cause the entity to change its state. These functions and states correspond inversely to those on the function dependency diagrams. In addition, a form is completed to define each entity, function, attribute and relationship in the system.

By focusing on a severely restricted subset of the system under consideration and by adopting a data dictionary approach, it has proved possible to perform in-depth analysis within the confines of a single-semester B.Sc. unit to a point where it is possible to represent the subsystem completely using a manual data dictionary.

In this particular example, the clients wished to have a computer system that modelled their own procedures where possible. It would have been a simple matter to proceed to the design and construction stages and implement a solution, but it was not the intention to design and construct a new system within the course unit, as the major emphasis was on analysis.

5.2 The analysis-stage data dictionary

Fig. 6 shows the contents of the data dictionary used for the analysis stage. The conceptual view of the data is shown in italics.

The construction of a data dictionary for the analysis stage involved producing:

(1) descriptions of each entity in the system using the entity-type specification form;

(2) descriptions of each function in the system using the attribute-type specification form;

(3) descriptions of each attribute in the system using the attribute-type specification form;

(4) descriptions of each relationship in the system using the relationship-type specification form;

(5) the association between each attribute and the entity it described, given by the appropriate entries in the entity and attribute forms;

(6) the association between each relationship and the two participating entities, given by the appropriate entries in the relationship form;

(7) the time dependencies between functions given by the function dependency diagram and appropriate entries in the function-type specification form;

(8) the decomposition of functions given by the function hierarchy model and appropriate entries in the function-type specification form;

(9) for each appropriate entity, an entity life-cycle diagram showing how it is affected by the functions it participates in;

(10) for each appropriate function, a function logic model showing the path it must trace through the data model.

6. A DISCUSSION OF THE DATA DICTIONARY APPROACH

The use of the data dictionary approach is not restricted to the D2S2 methodology. In this paper the D2S2

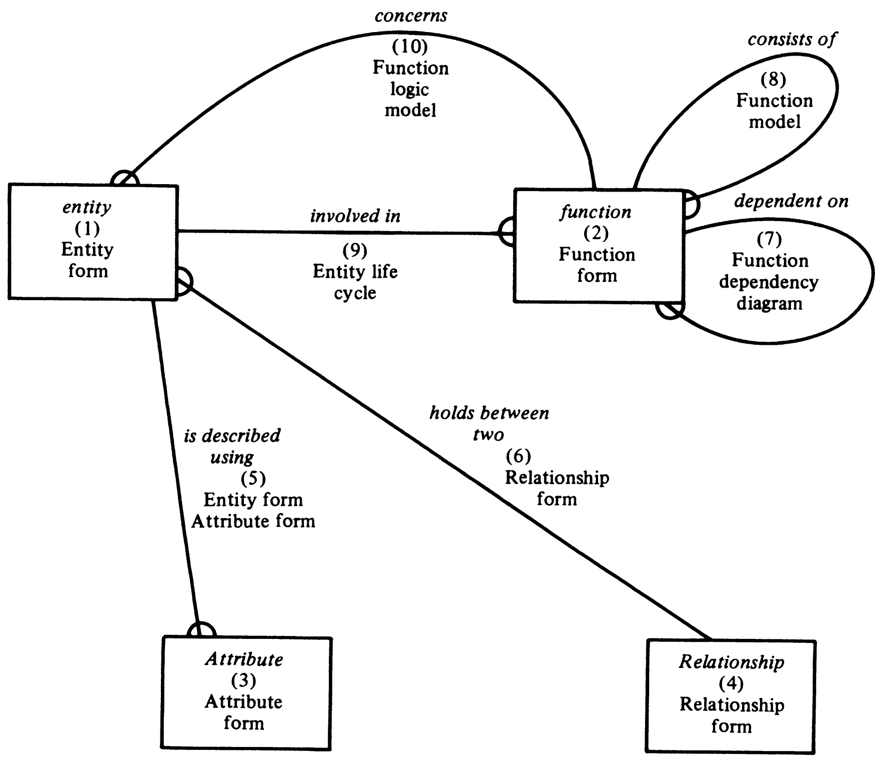

Figure 6. The analysis-stage data dictionary.

methodology has merely been used as a vehicle to illustrate the approach.

Essentially, the teaching approach discussed in this paper is top-down and has three main elements, as follows.

(i) Obtaining an overview of the system and expressing this in some formal way. In D2S2 this activity takes place during the strategy stage. The formal methods used relate to data models and process models. With SASD, for example, the formal high-level model is a context diagram.[4]

(ii) Focusing on a small aspect of the system which will be analysed in detail. Generally, several students would be working on the case study and it would be usual for each student to take one aspect of the system and develop it further.

(iii) The use of a disciplined approach to documentation and communication. If an automated data dictionary were available to support the analysis, this discipline would be enforced automatically.

This approach may be applied to any methodology that is essentially top-down. It would be difficult to apply element (i) to a methodology like JSD for example,[20] which is inherently 'bottom-up'. However, elements (ii) and (iii) should apply, no matter which methodology is used.

When using D2S2, the end part of the analysis stage is a blueprint from which technical design can proceed. Thus the 'analysis' techniques discussed in this paper presuppose that some design decisions have been taken relating to the proposed business system and only the technical details (e.g. design of databases, files, programs, menus, screens, etc.) remain to be sorted out.

The aims of this approach were threefold: (i) to provide an understanding of the data dictionary concept; (ii) to emphasise the importance of a well-ordered approach to systems analysis; (iii) to show how data dictionary tools may be used to aid and clarify the systems analysis process.

The data dictionary approach adopted fulfilled each of the stated aims in that the students came out of the course with a good understanding of the concept of a data dictionary and its use in systems analysis. They appreciated the importance of a well-ordered approach to systems analysis, although some students experienced difficulties in expressing their ideas using the techniques of the chosen methodology. The benefits of a data dictionary tool to aid and clarify the systems analysis process were apparent.

It should be emphasised that a data dictionary, like any other information system, has both data and functional aspects. With regard to the production of 'deliverables', it could be said that the teaching approach discussed in this paper concentrated more on the data aspects of the data dictionary (as seen in Figs 3 and 6) rather than functional aspects. However, in order to produce the required deliverables, the students must have an understanding of the functionality (e.g. to ensure that when an attribute description is updated in the data dictionary, inconsistencies do not arise). The data aspect of the data dictionary was essentially paper-based, and the functional aspect was performed by the students themselves.

7. THE USE OF AUTOMATED TOOLS IN INFORMATION SYSTEMS DEVELOPMENT

Several automated tools which have been designed to aid the development of information systems are now appearing on the market. Such tools tend to fall into one of two categories.

(i) Diagram Tools, for the purpose of constructing models such as data flow diagrams, entity–relationship diagrams and entity life-cycle diagrams. Such tools have obvious and immediate uses, but they do not enforce consistency between the various models used. They can be used by analysts who are not harnessed to a particular methodology but do not ensure that a well-ordered, coherent approach to systems analysis is applied.

(ii) Data Dictionary- (or Encyclopedia-) based tools which have a central information resource for the systems analyst. These tools will generally support the use of a specific methodology and will produce diagrams, pseudocode, etc., which is consistent with the techniques in the methodology, and with the life-cycle stages of the methodology. If such tools are to be effective, they must have a central information resource which is based on the data dictionary concept. In terms of the methodology chosen in this paper, the 'Information Engineering Facility' appears to be a suitable automated product, although it has not yet been officially released,[11] and hence its capabilities are not yet known. Other similar automated products are appearing on the market.

Ideally, in a teaching situation, automated tools, preferably in category (ii) should be available. This would make the application of the data dictionary approach discussed in this paper much easier and much more fruitful. The development of such category (ii) tools is still in its early stages, but it is expected that in a year or two these tools will start to make a substantial impact on information systems development and hence on the education of systems analysts. When this happens the data dictionary approach presented in this paper may become the norm.

8. STUDENT REACTION

The approach was successful in achieving its previously stated three-fold aims, and in enabling a detailed complete analysis of a small system to be done in the limited time available. During the initial years that the course ran, student reaction to the approach was enthusiastic. The students generally enjoyed the case-study work, and found the discipline satisfying. A small staff–student ratio was necessary during seminars in order that the students could fully get to grips with the chosen methodology.

Consequently, the course became a popular choice for second-year students, and during the latter years that the course was run, student numbers had increased by a factor of three or four, to some 70 students in total. It must be said that the technique did not work as well with larger groups of students. The students achieved less in the time available and had less understanding of the principles involved, although the essential aims of the approach were still fulfilled.

One would hope that in the near future data dictionary-based software tools (category (ii) previously mentioned) for supporting the development of information systems would be available for educational use. Thereby, the data dictionary approach to teaching systems analysis would become the norm, and the educator could concentrate less on the mechanics of the development process and more on the eventual aims and aesthetics[17] of the final product.

This may imply that a single coherent methodology should be adopted for systems analysis, an approach criticised in Ref. 1. The alternative is to use category (i) diagram tools, which may result in lack of coherence and force the 'training of the analyst to focus on the variety and selection of tools, so that appropriate methods may be used in different problem situations'.[1] One could argue that the alternative suggested in Ref. 1 reduces the role of the information systems developer to that of a technician who chooses appropriate tools for different tasks, rather than that of a designer who is less concerned with the mechanics of the analysis and design process and more with the quality of the final product.

9. CONCLUSION

Although this paper has described an approach to teaching systems analysis, the arguments presented extend further than the teaching situation.

It has been recognised for some time that the data dictionary should be used as a fundamental resource in the development of information systems. This author firmly believes in that principle.

If a data dictionary is to be used effectively for this purpose, the presupposition is that the techniques to be used are known in advance and that these techniques are part of a coherent whole. Hence a methodology-based approach to information systems development is required, rather than a toolkit approach. The toolkit approach would imply that the analyst selects the most suitable techniques for the job, that the selection is not known in advance and that the techniques are not part of a coherent whole. Hence the toolkit approach implies that a data dictionary cannot be used to its full effect to support systems analysis.

This author recognises that there exist deficiencies in the methodologies currently available, as do other writers.[1,2,6] However, a methodology-based approach is the only way in which coherent automation of information systems development may proceed. Thus, continuing effort ought to be directed towards the development of such methodologies.

Acknowledgement

I would like to express my thanks to Professor Peter King for his kind, helpful and constructive comments on this paper.

REFERENCES

1. D. Benyon and S. Skidmore, Towards a tool-kit for the systems analyst. *The Computer Journal* **30** (1) (1987).
2. J. A. Bubenko, Information systems methodologies – a research view. In *Information Systems Design Methodologies: Improving the Practice,* edited T. W. Olle, H. G. Sol and A. A. Verrijn-Stuart. North-Holland, Amsterdam (1986).
3. *Data Dictionary Systems Working Report*, Wiley Heyden, Chichester (1977) – also published in the USA as a joint special issue of *Database* (journal of the ACM SIGBDP). **9** (2) (1977) and *SIGMOD Record* (journal of ACM SIGMOD), **6** (4) (1977).
4. T. De Marco, *Structured Analysis and System Specification.* Yourdon, New York (1978).

5. G. Fitzgerald, N. Stokes and J. R. G. Wood, Feature analysis of contemporary information system methodologies. *The Computer Journal* **28** (3) (1985).
6. C. Floyd, A comparative evaluation of system development methods. In *Information Systems Design Methodologies: Improving the Practice,* edited by T. W. Olle, H. G. Sol and A. A. Verrijn-Stuart. North-Holland, Amsterdam (1986).
7. D. Gradwell, Objectives and scope of a data dictionary system. *The Computer Bulletin* (1978).
8. P. J. H. King, Some comments on systematics. *The Computer Journal* **10**, 116–118 (1967).
9. P. J. H. King, Systems analysis documentation: computer-aided dictionary definition. *The Computer Journal* **12** (1) (1969).
10. I. G. Macdonald and I. R. Palmer, System development in a shared data environment – the D2S2 methodology. In *Information Systems Design Methodologies: A comparative Review,* edited T. W. Olle, H. G. Sol and A. A. Verrijn-Stuart. North-Holland, Amsterdam (1982).
11. I. G. Macdonald, Information engineering – an improved automable methodology for the design of data sharing systems. In *Information Systems Design Methodologies: Improving the Practice,* edited T. W. Olle, H. G. Sol and A. A. Verrijn-Stuart. North-Holland, Amsterdam (1986).
12. R. N. Maddison (ed.) *Information System Methodologies.* Wiley Heyden, Chichester (1983).
13. T. W. Olle, H. G. Sol and A. A. Verrijn-Stuart, *Information Systems Design Methodologies: Improving the Practice.* North-Holland, Amsterdam (1986).
14. M. Page-Jones, *The Practical guide to Structured System Design.* Yourdon, (1980).
15. R. Rock-Evans, *Data Analysis.* Computer Weekly Publications, London (1981).
16. R. Rock-Evans, *Analysis Within the Systems Development Life Cycle.* Pergamon Infotech (1987).
17. K. S. Spurr, Building beauty at the hard face of information. *Times Higher Education Supplement* (January 1987).
18. T. Wood-Harper and D. Flynn, Action learning for teaching information systems. *The Computer Journal* **26** (1) (1983).
19. E. Yourdon and L. Constantine, *Structured Design.* Yourdon, New York (1978).
20. M. Jackson, *System Development.* Prentice-Hall, Englewood Cliffs, N.J. (1983).

Announcements

19–22 September 1988

Royal Holloway and Bedford New College, Egham, Surrey

IFIP WG 8.1 Conference in the CRIS Series

CRIS 88, Computerised assistance during the information systems life cycle.

Location

The conference will be held on the pleasantly wooded campus of the Royal Holloway and Bedford New College, Egham, Surrey. This is conveniently located 15 kilometres south-west of London Heathrow Airport and well served by public transport.

Themes

The conference will have three separate, but closely related themes. All three of these make use of two case studies; a fairly simple inventory control and purchasing system and a conference organisation system.

The latter is more complex, and is based on the conference organisation example of the IFIP WG 8.1 CRIS 82 conference. (The proceedings of this conference were published under the title *Information Systems Design Methodologies: A Comparative Review* by North-Holland in 1982 edited by T. W. Olle, H. G. Sol and A. A. Verrijn Stuart.)

Theme 1. Automatic aids for analysis and design

The first theme concerns the phase in the Information Systems Life Cycle concerned with Business Analysis and System Design. Contributions are invited on ways in which these phases may be partially or wholly computer-assisted.

The spectrum of capability may range from a basic documentation aid to an expert system which can be used by a relatively inexperienced analyst or designer to lead him through the steps involved. Illustrations should preferably be based on one of the two case studies.

Theme 2. Approaches to automated system generation

The second theme is intended to stimulate both research and industrial effort on the problem of the cost-effective construction of an information system, starting from a complete design.

Using one of these two available designs as a starting point, contributors from both academia and industry are invited to prepare written submissions, indicating how they approach the construction of an operational system based on the detailed design specifications available.

The system built may be identified by the submitter as a prototype, but it is expected to be a usable system and not a mock-up. Submitters may modify the organisers' design if they wish, and are invited to indicate in their written paper the rationale for so doing.

Theme 3. Integrated and automated analysis, design and construction

The third theme is the most challenging, because it covers submissions in which the analysis and design of the first theme are integrated with the automated construction of the second theme.

Contributions are invited which carry the output from the system design to the construction and operational functioning of a computerised system.

Demonstration room

It is planned to have facilities available for the demonstration of systems which are relevant to the themes of the conference. Those interested in giving such a demonstration are requested to return a Letter of Intent form.

Conference organisation

This conference is sponsored by IFIP Working Group 8.1, the title of which is 'Design and evaluation of information systems'. The conference is the fourth in the series of CRIS conferences. (CRIS is an acronum for Comparative Review of Information Systems methodologies).

The proceedings of CRIS 88 will be published by North-Holland. A softcover participants' edition will be available to all persons attending the conference.

All enquiries should be addressed to the Conference Secretariat mentioning CRIS 88. BISL Conference Department (CRIS 88), The British Computer Society, 13 Mansfield Street, London W1M 0BP. Tel: 44 1 637 0471.