SWP 15/90 STATE-OF-THE-ART DEVELOPMENTS IN EXPERT SYSTEMS AND STRATEGIC MARKETING PLANNING

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ABSTRACT

The paper describes a case history of the development of an Expert System in Strategic Marketing Planning codenamed EXMAR. It traces the evolution of the system from the formation of the DTI club two years ago to the launch of the prototype model.

The paper outlines the technical and domain-specific obstacles encountered en route and how these were overcome. A number of conclusions are drawn from the project. The principal one is that there is a bright future for expert systems in the field of strategic management.

Professor Malcolm McDonald, one of the authors of this paper, is the principal expert to the club. Hugh Wilson, the other author, is a senior consultant with Artificial Intelligence Ltd. He was also the knowledge engineer and the project manager.

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1. INTRODUCTION

After nearly a quarter of a century of Expert Systems, virtually no progress has been made in the domain of marketing and there are few products and no on-line systems available[1,2]

There are no shortcuts to building good Expert Systems. It takes a considerable amount of skill, patience and several years of effort to develop an Expert System in a new area and get it in the field[3].

During the 1980s, Japanese activity in the field of Expert Systems and related technologies prompted the EEC to give birth to the ESPRIT programme in an attempt to integrate European efforts. This in turn led to the DTI sponsored ALVEY and IED programmes, and other initiatives.

An outcrop of these is a new DTI - sponsored club called EXMAR. EXMAR is a club of ten major British companies. Formed in 1987, its objectives are to investigate the possibility of computerised assistance for strategic marketing planning by the development of a prototype, and to spread awareness of expert systems in club member organisations. It is funded by contributions from the member companies, and by the Department of Trade and Industry.

The club's primary source of marketing expertise is Professor Malcolm McDonald of Cranfield School of Management. Marketing experience within club member companies is also being tapped.

The involvement of Artificial Intelligence Ltd. of Watford, with the club as technical contractor began in the second half of 1988, when AI Ltd. conducted an analysis phase, followed by production of a demonstrator and an appraisal of the way forward. The demonstrator was built in the Interlisp programming environment and the Loops object system on Xerox 1186 workstations.

The Requirements, Functional and Design Specifications for a prototype, to be used for experimentation and evaluation by club members in their own organisations, were completed in August 1989, and work is now in progress on the implementation. The prototype will run on IBM-compatible 386 machines, using Smalltalk-80 and Analyst, and was completed in January 1990.

Purpose and Structure of Paper

The purpose of this paper is to outline the progress of the EXMAR project, and to draw conclusions about appropriate computer support for marketing planning.

In the next section, the approach taken to the analysis phase at the start of the project is outlined, and the system objectives that were derived are described. The nature of the logical model that emerged is discussed, and the demonstrator system based on it is described, emphasising the nature and style of the support to the user provided by the system, how this reflects the logical model, and how this meets the system objectives.

Section 4 describes the feedback from club members on the Demonstrator and how this is influencing current work on the Prototype.

Two review sections 5 and 6, discuss the nature of the marketing planning domain, and the deductions that can be made about appropriate computer support.

Finally, some conclusions are drawn on the appropriate approach to systems development in such "soft" areas as marketing planning.

2. PREVIOUS WORK AND EARLY OBSERVATIONS

The initial requirements analysis produced a number of interesting problems for the project, which were to sow the seeds of expensive and time-consuming delay. These problems can be summarised as follows:-

(i) it became clear that not many of the member companies were particularly au fait with the methodology of marketing planning. This led to the problem of setting clear objectives for the project.

(ii) the diversity of company industry types, ranging from capital goods to service industries, meant that no subsequent system could possibly be suitable for all circumstances.

(iii) problems and subsequent proposed objectives ranged from "To support a formal planning framework to improve discipline during the planning process" and

"To support further understanding of the effects of currency fluctuations"

to

"To promote discipline in pricing control".

For these reasons, it was decided to focus on the process of marketing planning itself rather than on any situation-specific system.

A firm of software consultants was appointed project manager and a knowledge based systems house was appointed principal contractor.

The systems house began a series of twelve half day interviews with Professor McDonald in order to develop a formal paper model as a basis for computerisation. Unfortunately, although taped and transcribed, they were largely unfocussed due to the inexperience of the interviewers and little progress was made towards formal modelling of the marketing planning process, in spite of very specific guidance given by Professor McDonald to the interviewers. The problem centred around lack of proper project control by the project managers, confused expectations by members of the club based on marketing planning naivety, the inexperience of the knowledge engineers, and the passive role of the domain expert, which was necessary in view of the nature of the project. Several attempts on Professor McDonald's part to guide the system were brushed aside as politically inexpedient.

The result was that the paper outlining the tasks to be performed by the computer system targeted the whole marketing planning process rather than any subset, and because of this breadth, the process to be computerised was not documented in any detail, nor backed up by any substantive models and interrelationships. Other specifications required by the development methodology in use, such as financial requirements, system structure and so on, were never produced.

At this point, the project manager appointed new software consultants to take over the feasibility study and the delivery system.

The new contractor set about finding some common requirements among end users in order to outline the domain model, with a boundary definition showing which parts of the model would be tackled by the computer system. They set about establishing the following areas:

- scope
- constraints
- organisational impact

- maintainability
- extensibility
- technology
- time scales
- risk and cost versus quantifiable benefits

Artificial Intelligence Ltd., the new software consultants, drew various conclusions about the appropriate technical approach:

- **Need for focus**

The previous work had been on a broad front, involving analysis into all aspects of strategic marketing planning. This is a vast topic, tackling many of the most fundamental problems inherent in business activity, and progress was therefore slow. There was a need to focus on a subset of the overall problem.

- **Feasibility and utility to be established**

The very title of the club, "Expert Systems in Marketing", suggested that the use of expert systems techniques in this area was possible and appropriate. This assumption of feasibility was based on the observation that there existed demonstrable expertise, but why this might imply a classic rule-based expert system had not been addressed. This was a doubly large assumption as no previous systems (or work towards systems) were known in this application area. There was a need to address this early, and the related issue of how any system would be of use to the marketing planner.

- **Modelling and representation**

It was decided that the appropriate first step was to carry out analysis in a closely scoped subset of the problem, with the emphasis on modelling the area using whatever formal techniques were appropriate. An example of the choices deliberately not made at the start was whether any modelling of expertise adopted the

"low road" of embedding the expertise in data structures and code, the "high road" of an explicit, "deep" representation, or the "middle road" of an explicit but heuristic representation[4]. In this modelling work, the emphasis would be on representation rather than computation, as the essential first step towards any computer system.

- **The marketing swamp**

Marketing will be referred to later in this paper as a swamp of intuitive, experience-based practice with the occasional rocky peak of formal techniques. In the experience of Artificial Intelligence Ltd. the best place to start when modelling such "soft" domains was often on the boundary between the soft area and neighbouring more readily formalisable areas. In this case, that meant starting with the established formal techniques and working out from there.

3. RESULTS OF ANALYSIS WORK, AND DEMONSTRATOR

Several analysis sessions were held with Professor McDonald, and with marketing practitioners in club member organisations. This resulted in an overall EXMAR system objective, an outline model that was used as the basis for a demonstrator system, and a list of areas where further work was required.

The overall EXMAR system objective was defined to be:

"To provide assistance for the marketing planning process in such a way as to spread knowledge and further understanding of how and why the multifarious factors of the market interact and serve to define the parameters of the business activity."

The remainder of this section describes features of the model, and how these were exploited in the demonstrator. The structure is an interleaved description of the two:

each subsection describes a model feature, and the relevant aspects of the demonstrator.

3.1 Assistance to aid in interpretation and understanding

The model covers the data manipulated by a marketing planner when developing a strategic marketing plan, and structures the marketing planner's task. Many of the individual subtasks or processes of this task involve modelling by the user of the business context, or interpretation by the user of the information entered. There is much that a computer system based on the model cannot do for the user, and it became increasingly clear that its most appropriate aim is to assist.

The objective of the demonstrator was therefore to provide an interactive system that supports a marketing planner by providing tools that help the user to represent the state of the markets and products under consideration; to interpret this information so as to gain an understanding of the markets and one's place within them; and to determine a course of action based on this understanding.

3.2 Model of the process of generating a marketing plan

A hierarchical breakdown of the process the marketing planner should adopt to generate a marketing plan was defined. Encouraging the user to adopt this process is of value in itself, as the process incorporates much experience that helps avoid common pitfalls: for example, the need to arrive at an appropriate understanding of the current situation before setting objectives for the future.

The demonstrator uses this hierarchy as a basis for the user's navigation round the system. The initial screen display is shown to illustrate this (Figure 1). Also shown is a window for more detailed navigation round a particular stage.

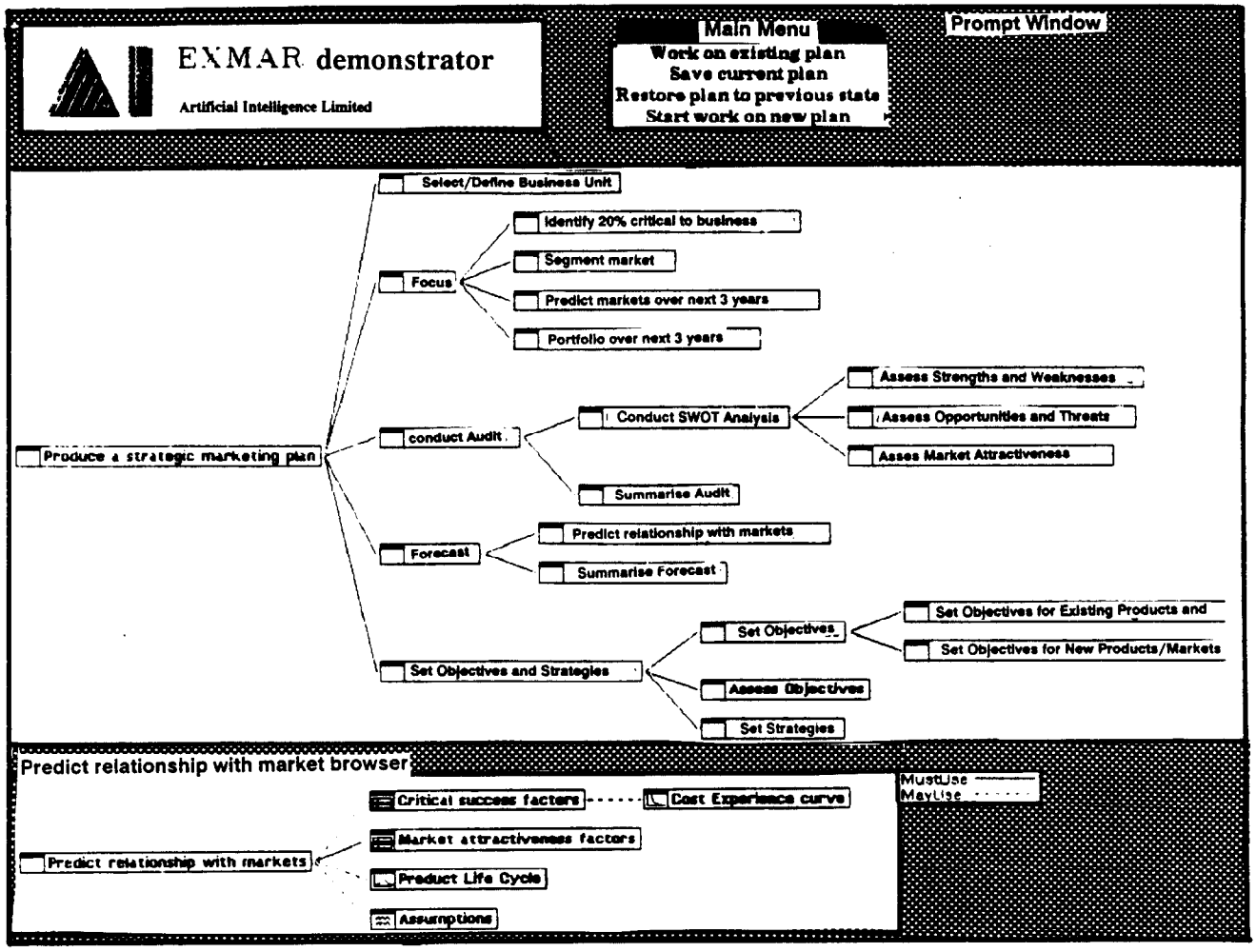


Figure 1 **Initial screen display, with an example of a detailed browser**

Each box in the graphical browsers represents a stage of the process. The user carries out a stage by selecting a box with the mouse: the system then takes the appropriate action, which may for example be to present the user with a form to fill in, or to open a more detailed browser of the process for that stage.

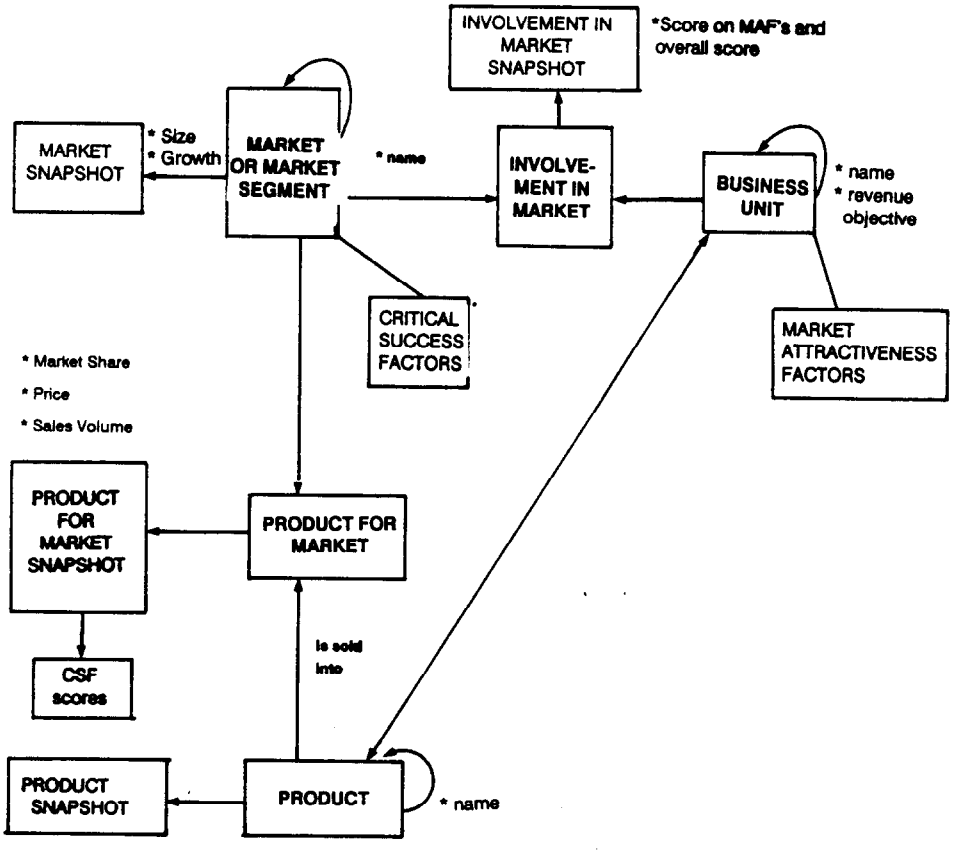
To give an overview of the process: Select/Define Business Unit identifies which area of the business the marketing plan is for, and records the purpose of the business area. Focus identifies which of the unit's markets and products are of interest. Conduct Audit assesses the current position of the products and markets. Forecast predicts the future position of the products and markets, assuming we do not intervene, as a base-line for objective setting. Finally, Set Objectives and Strategies sets objectives for the business unit based on the information collected, analysed and summarised; and defines strategies by which the objectives are to be met.

Detailed browsers contain icons showing the nature of the support offered for a particular stage: for example, there are icons for graphical displays of information, for tables of numbers, and for free text. The Predict Relationship with Markets browser is illustrated as an example, also in Figure 1.

Users will largely go through the process depth first and top to bottom; but they are free to do otherwise, as there are many cases where they may legitimately wish to do so.

3.3 Generally applicable, sound data model

A data model was developed that captured and related the information considered during production of a strategic marketing plan. It has proved essentially sound, and of general applicability to the wide range of marketing situations represented by the diverse club member companies. A simplified entity-relationship diagram of the model is given below in Figure 2, and briefly described.



The model has three cornerstone entities: Business Unit, the part of the organisation for which the plan is being developed; Product, the products or services offered by the unit; Market, the markets in which it operates.

Critical Success Factors model the workings of a market by documenting the factors critical to the success of any product in the market, from the consumers' viewpoint. They are an objective assessment of how the market works, independently of the Business Unit's presence in it. The matching of products to markets is represented by the important Product for Market entity: a product's score on the Critical Success Factors relates to this entity.

Market Attractiveness Factors model the priorities of the business unit by documenting the factors determining how attractive a market is to the unit. Being a subjective assessment of the business unit's priorities, the criterion for their correctness is the agreement of key executives. The matching of markets to business units is represented by the important Involvement In Market entity: a market's score on the Market Attractiveness Factors relates to this entity.

Time-dependent information is held in Snapshot entities.

For each plan, the demonstrator system holds data structures closely based on the data model. The user's primary means of manipulating the data is by using forms, which are illustrated in Figure 3.

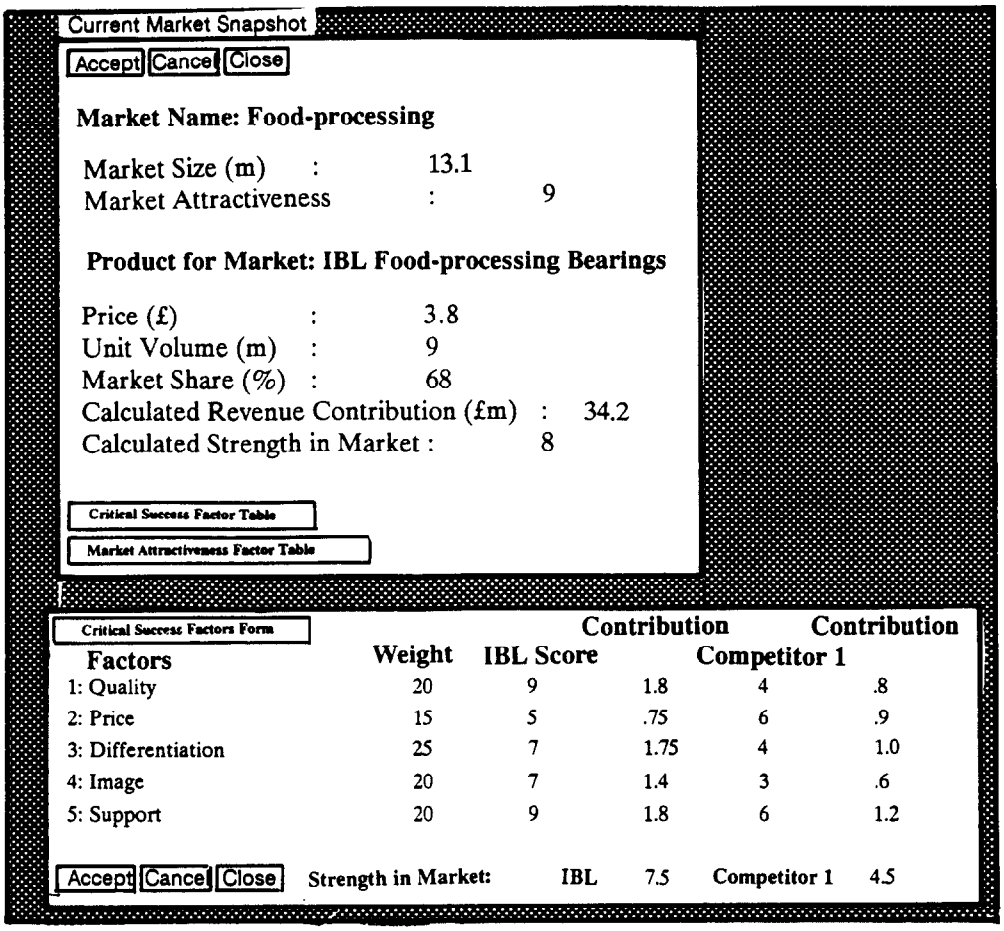


Figure 3 **Typical forms for data manipulation**

The top form shows current information about the Food Processing market for the fictional International Bearings Limited (IBL) company, which sells bearings into a variety of markets. The bottom form shows the Critical Success Factors defined for this market, with weights to illustrate their relative importance. For example, while price is important in this market, it is less so than several other factors, such as product differentiation and quality, the product's image, and the engineering support provided. It also shows a score for IBL and its main competitor against these factors, and a weighted average computed by the system, to represent IBL's overall strength in the market. This is copied to the top form by the system. The Market Attractiveness score on the top form results from a similar weighted average form for the attractiveness of the market against such criteria as the market's size, growth and profitability.

3.4 The use of techniques in the data model

The "rocky peaks" with which the analysis work started are "textbook" techniques for analysing an organisation's markets and products, such as the Directional Policy Matrix, which is illustrated below (Figure 4), the Boston and Porter matrices, and so on. These view different aspects of the data model using differing graphical representations, to aid in interpretation of the data. To extend our analogy, the data model thus forms the bridges between the rocky peaks to enable us to navigate the intervening swamp.

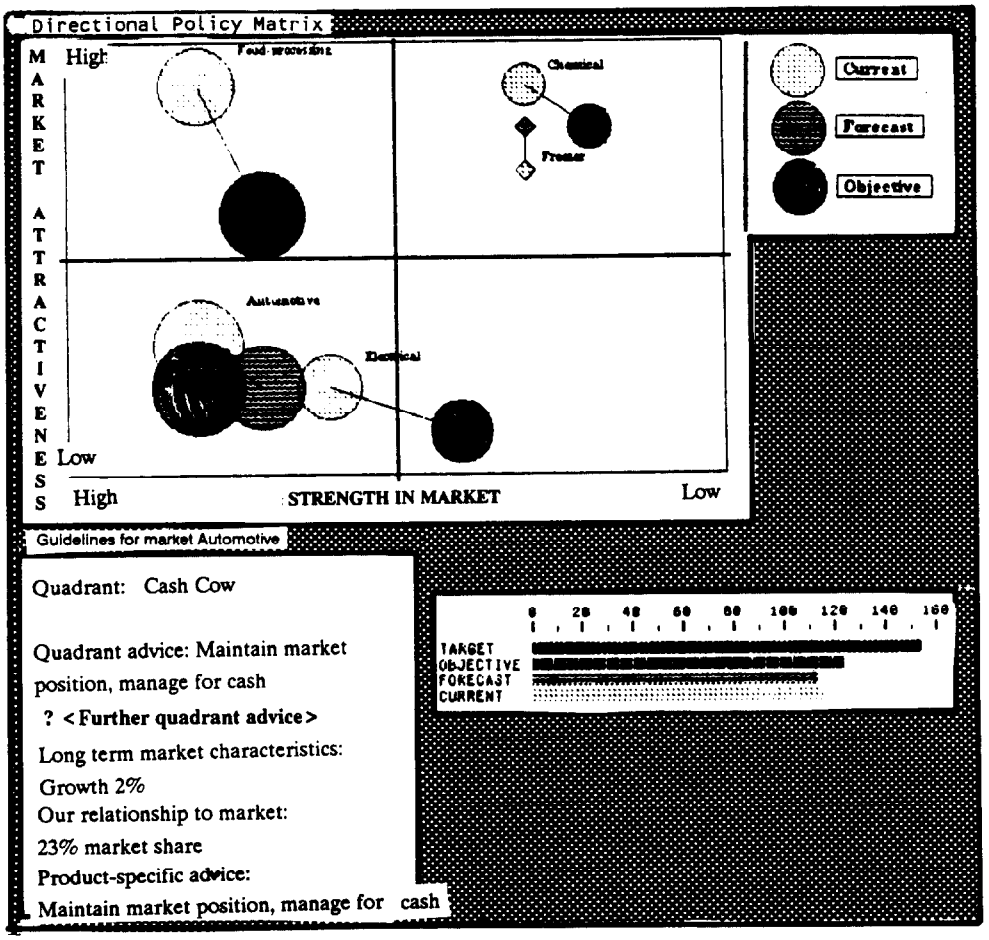


Figure 4 **Data presentation to aid understanding**

The screen snapshot in Figure 4 gives an example of how the demonstrator exploits these features by showing the underlying data presented in the standard formats. The Directional Policy Matrix plots, for each of IBL's markets, the market attractiveness against IBL's strength in the market. The size of the circles is proportional to the market's contribution to IBL's revenue (though it could have been set to any useful metric). Different circle shadings illustrate the current, forecast and objective situations for the product/market. (In terms of the data model discussed earlier, each circle strictly represents a Product For Market.)

The matrix aids in understanding both the situation of an individual product/market, and the balance of the portfolio of products. An example of the matrix's interpretation is that in all its markets, IBL is moving downwards and rightwards from the current to the forecast situation. This indicates a general weakening of IBL's position: the matrix illustrates what IBL intends to do about this for the automotive market by maintaining its competitive position while cutting costs where possible.

The demonstrator also provides on request standard, "textbook" advice for a product-for-market in a given position on the matrix, as a guide to the planner in setting objectives. For example, for the automotive market, the system advises that the market position (strength in market, and market share) be maintained, but that subject to this the market be managed for cash to fund development of more attractive markets. This is the only case in the demonstrator where it was felt appropriate that the system should take an active role of giving advice, rather than the passive role of presenting information in differing forms to aid the user in interpretation.

The diagram also shows a "gap gauge", a bar chart showing the financial gap between the business unit's target revenue and the sum of the individual objectives so far set for the various markets.

3.5 Less structured information: checklists, free text

Some parts of the marketing plan were best expressed in text: for example, the business unit's mission statement, and lists of opportunities and threats. Also, in several areas, marketing expertise was identified that was not formalised beyond free text in the model. Examples are checklists of common critical success factors; assistance with definition of a business unit's mission statement; and checklists of possible opportunities and threats to consider. This unstructured information was related, however, to specific points in the planning process, or to specific items in the data model. The demonstrator exploited this by making available text windows at appropriate points with icons on the browsers and elsewhere. This was implemented using the NoteCards hypertext system.

4. DEMONSTRATOR FEEDBACK AND PROTOTYPE

Initiative is with the user

The demonstrator leaves the user to decide what to do next. This was liked by the club members, who felt it to be appropriate for this application.

Evidence of utility

Club members felt an operational system based on the demonstrator's ideas could be of significant use in the vital process of strategic marketing planning. This is an example of utility being addressed by the clients rather than by the developers.

Communication of the nature of the proposed prototype

The demonstrator served to communicate the nature of the support that would be offered to a marketing planner by a fuller computer system, to club members and to the primary expert, Professor McDonald. With this innovative system, this was difficult to achieve on paper.

Use in specification of prototype

The demonstrator has been used effectively in discussions with club members to aid with specification of the prototype now being developed.

5. REVIEW OF THE VALUE OF APPLYING EXPERT SYSTEMS TO THE MARKETING PLANNING PROCESS

During the 1960s, attention was focussed on specific problem-solving applications in scientific fields. Many successful Expert Systems have been built, including MYCIN for diagnosing infectious diseases[5], and PROSPECTOR, a system for evaluating geographical locations for possible mineral deposits[6].

Management problems, however, do not lend themselves to quite the same precise logic as scientific problems. People do not solve most of life's problems by mathematical means, but rather by experience, knowledge and intuition. Marketing problems are dealt with in the same way, as most of them are logical rather than mathematical, and problem-solving knowledge, whilst available, is incomplete.

Decision-Support Systems and the like have traditionally used hard facts and static formulae which, given the correct data, provide correct answers. They belong more naturally to the logical, black-or-white, right-or-wrong world of computers. But managers in the world of marketing deal with uncertainties and often with vague concepts. One approach to pinning down the basis for such decisions is to attempt to

model the decision-making process as a set of "rules", or heuristics, that reflect the expert's own knowledge and experience about the problem in question. These "rules" are hard to nail down and quantify - partly, perhaps, because the expert's experience enables him to think in terms of shades of grey, "more or less", and "approximately" - and partly because rules are not always an appropriate or sufficient representation. When human beings find a path through situations that are too complex and amorphous for the human mind to handle in a totally conscious, rational, scientific way, it can be difficult or impossible to elicit the means by which they do so.

Most people would acknowledge that in virtually any walk of life, the true expert has built up his expertise largely from experience and an intuitive grasp of problem-solving in the real world, something which is often referred to as the "University of Life". Indeed, many of the world's leading business people acknowledge that they owe their success not to formal business education and text books, but to their own experience, flair and intuitive good judgement.

Donald Schon[7] describes this phenomenon as follows: "Competent practitioners usually know more than they can say. They exhibit a kind of knowing-in-practice, most of which is tacit". He cites an investment banker, who makes his decisions based on 70 to 80 per cent instinct, and only 20 to 30 per cent calculable rules. This "gut feel" was a major asset to the bank in question. His point is that artistry is not reducible to discernible routines.

He describes scientific rigour as "describable, testable, replicable techniques derived from scientific research, based on knowledge that is testable, consensual, cumulative and convergent", but then goes on to argue that much of what passes for scientific management is irrelevant because business problems do not come well formed. Certainly, most marketing problems are messy and indeterminate and successful practitioners make judgements using criteria which are difficult to define. Many

academics would decry this as a lack of rigour, and in so doing exclude as non-rigorous much of what successful practitioners actually do.

The following quotation from Schon neatly sums up the problems facing not only teachers and researchers of marketing, but, more importantly, the initiators of expert marketing systems :

"In the varied topography of professional practice, there is a high, hard ground which overlooks a swamp. On the high ground, manageable problems lend themselves to solution through the use of research-based theory and technique. In the swampy lowlands, problems are messy and confused and incapable of technical solution. The irony of the situation is that the problems of the high ground tend to be relatively unimportant to society at large, however great their technical interest may be, while in the swamp lie the problems of greatest human concern."

Marketing Planning remains one of the last bastions of ignorance in the field of marketing. The benefits of marketing planning are well documented and agreed,[8] yet so complicated is the process of marketing planning, and so confusing are the interrelationships between the tools and techniques of marketing planning[9], that very few British companies enjoy these benefits, as has been shown by a seminal paper by Greenley[10] that reviewed all the major UK empirical research in this area. Indeed, there were as many dysfunctional results from the attempts of companies to initiate marketing planning procedures as there were benefits.

The problem to be addressed by Expert Systems in the marketing domain centres around how to take account of the intuitive artistry displayed by experts in situations of complexity and uncertainty in a way that is describable and susceptible to a kind of rigour that falls outside the boundaries of technical rationality. An important

aspect of this is to identify where a computer system cannot hope to solve a problem on its own, and in such cases, how it can best assist the marketing manager.

The question, then, is how an epistemology of practice can be captured and represented in an Expert System.

6. APPROPRIATE TECHNOLOGY IN THIS DOMAIN

6.1 Previous systems

To date, no one to our knowledge has seriously tackled the world of marketing with Expert Systems other than the MSI ADCAD[11] system developed to advise on advertising design. After considering a variety of consumer and environmental factors, advertisers use a combination of empirical research, communication theory, and rules of thumb, to select communication objectives and select appropriate creative approaches.

The authors themselves list a number of weaknesses in ADCAD, but conclude: "As one advertising executive put it: *"it helps us to think a little deeper about the issues we have to consider in developing ads that are both strategically and executionally sound"*. Another interesting and relevant conclusion was that most managers, when asked, said they would like to make use of existing theoretical and empirical knowledge of marketing when making decisions. However, few actually did use such knowledge. Expert Systems can bridge this gap by structuring, validating and disseminating marketing knowledge, whilst at a theoretical level, they challenge their creators to understand and critically evaluate the elements of marketing knowledge and their interrelationships.

6.2 Problems suitable for expert systems

In deciding whether marketing planning was a sensible domain for the application of Expert Systems technology, the MSI checklist[11] fits our experience. Four criteria are provided:

- Are the key relationships in the domain logical rather than arithmetical ?
  - Concepts such as the strength of a product in a market, the attractiveness of a market or product differentiation are clearly not arithmetical - though numbers may be used to good effect in clarifying thought. So the answer is "yes" (though not in the sense of mathematical logic).

- Is the problem domain semi structured rather than structured or unstructured?
  - The marketing planning process has both structured elements - for example, the segmentation of a market, the relevant financial information - and related unstructured elements - for example, a mission statement or a list of forecasting assumptions. So the answer is "yes".

- Is knowledge in the domain incomplete ?
  - Since marketing planning and all its contextual problems remains one of the most under-researched areas of marketing, and since little has been published about the interrelationships of all the techniques of marketing in systems design, the answer is "yes". This is in fact the key to the whole project and why it was chosen in the first place by the club members.

- Will problem solving in the domain require a direct interface between the manager and the computer system ?

- The intention is to have operational marketing managers using the system for the production of marketing plans, and the system can solve few of the problems by itself, so the answer is "yes".

6.3 Role of the computer

The potential benefits shown by the EXMAR demonstrator are due mainly to its assistance with the understanding and interpretation of the information entered. The end result may include a marketing plan, but it also includes an enhanced and readily communicable understanding of the business gained by the marketing planner. These benefits are largely due to appropriate and varied display of the information.

Apart from data presentation, a computer system in this domain can perform the tasks for which computers have traditionally been used: managing data, maintaining constraints between data items like a speadsheet, and performing routine calculations. These free up the user's thoughts for higher-level problems.

Finally, in some cases the computer can be more pro-active, offering advice, pointing out decisions that go against conventional wisdom, and so on.

The most appropriate technology for this mix of roles will itself be a mix. In the case of EXMAR, the software techniques included object-oriented programming, hypertext and use of windows-based programming environments, to enable swift development and a carefully tailored user interface. We have not found rule-based representations so far to be relevant, though they may be in future developments.

To some Expert Systems workers this emphasis on data presentation and low-level data management, as opposed to sophisticated calculation or reasoning, would constitute some sort of failure. We consider, however, that the objective of computer systems is to make the combination of user and system more effective than the user alone, not to build 'clever' computer systems. Even in the classic scientific expert systems such as those quoted earlier, the user interface frequently constituted more of the work, and more importantly delivered more of the benefits, than emphasis in the literature would suggest. We suggest that this applies even more in such 'soft' and ill-understood areas as marketing planning: the rapid recent progress in the power, and price, of the underlying software tools that enable graphical user interfaces to be provided will enable more such areas to be tackled effectively in the future.

6.4 Analysis approach

The analysis approach used for EXMAR was undogmatic and modest: to model the available expertise with whatever modelling techniques proved most appropriate, starting with the most well-established and documented, and verified, expertise. "Don't run before you can walk" should not need emphasising: but the early experience of the club shows that perhaps it still does. The very term "Expert Systems" has led some to unjustified assumptions not just of the feasibility of building computer systems based on expertise, but also of their utility, and of the most appropriate modelling and system-building tools[5]. The alternative is classic software engineering, with an expanded tool kit of analysis and implementation techniques to draw upon as appropriate.

This may lead to the question about how and to what extent the model and demonstrator may be said to incorporate expertise. All aspects of the model and demonstrator can reasonably be said to be based on expertise: the process, the data model, the means of presentation of information, the checklists provided, and the one case where data-dependent advice is given. The system thus takes the "low road" according to Brown's categorisation discussed earlier. There is certainly much available (but not necessarily formalisable) expertise that has not been captured: the critical design task has been the effective definition of the boundary between the system and the user such that the user is encouraged to think about the issues that the system cannot of itself address. This conforms to the stated EXMAR system objective quoted earlier, of providing assistance for the marketing planning process in such a way as to spread knowledge and further understanding of the business and its markets.

7. CONCLUSIONS

A number of conclusions can be drawn from the EXMAR experience:

(i) The development of EXMAR shows that it is possible to use Expert Systems methodologies to build support systems in complex areas of marketing management, especially if the domain is well defined, has a large number of factors to be considered and relevant expert knowledge is available.

(ii) The more complex and amorphous the expertise to be captured, the longer it takes both the expert and the knowledge engineer to reach an acceptable

approximation. It is clear that to develop an Expert System that is of some practical use requires both time and resources of massive proportions. This is supported by the MSI research paper[11], which concludes: "There are no shortcuts to building a good Expert System. It takes a considerable amount of skill, patience, and years of effort to develop an Expert System in a new area and get it into the field".

(iii) Expert Systems provide a consistency to human decision making which is valuable, since people tend to forget or ignore knowledge.

(iv) EXMAR has generated considerable interest and support among the major multinational companies that form the club, because it forces them to think deeply and in a structured way about the issues that need to be considered in developing a strategic marketing plan.

(v) Expert Systems are useful in helping both academics and practitioners to structure, validate, and use marketing knowledge and to better understand the interrelationships between the elements of marketing.

(vi) Tight project control is vital. This view is supported by Mumford[13]. Many issues need to be considered, such as clear definition of subject matter, availability of inputs, and clear agreement with users on objectives, timescales and resourcing. The close involvement of the EXMAR club members has been essential in this respect. It has been achieved through an active working party, through agreed quality assurance criteria for each stage of the work, and through the use of a demonstrator.

(vii) The potential advantages of Expert Systems in marketing are:

- consistent advice

- secure knowledge bases
- making better use of experts
- enhanced decision making
- improved analysis.

(viii) Since we live in an imperfect world, with imperfect problems and imperfect tools, it is unreasonable to expect a perfect Expert System until there are perfect experts and perfect technology. On the other hand, if an Expert System gives better advice than you would have had without it, it is probably worthwhile.

In conclusion, it is unlikely that Expert Systems will ever be able to give the same value as real human experts, although clearly they can offer reasonable advice. Nor will they guarantee that you make the right decisions. But they can help you gain a proper perspective of the alternatives.

In a sense, Expert Systems will always be a bit like Distance Learning programmes, which can replace a bad teacher, but never a good one.

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