The TEAM Evaluation Approach to Project FAMUS, a Pan-Canadian Risk Register for Primary Care*

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ABSTRACT

The application of the TEAM - Total Evaluation and Acceptance Methodology - to the development of Project FAMUS - Family Medicine, University of Sherbrooke - is described. Project FAMUS is concerned with the establishment of a pan-Canadian risk register, the data being provided from a network of 800 family physicians distributed across Canada. Emphasis is on the first phase of the project and the overall evaluation strategy.

INTRODUCTION

The approach to the evaluation of the implementation of an information system is a subject that provokes as much discussion as progress in its methodology. The TEAM approach -Total Evaluation and Acceptance Methodology - is based on an evaluation methodology developed in the European Community ESPRIT project TAO [1] and has as a major characteristic that the values of the application domain drive the evaluation process. The methodology considers three notions, namely complexity, dynamicity and pragmatism: complex because an information system integrates into the complexity of a working environment, dynamic because there is inevitably an evolutionary development and pragmatic as practical considerations necessarily may influence the evaluation process. These three notions are reflected respectively in a modelling approach, a defined feedback method and a coherent planning approach emphasising user influence.

The TEAM approach is being applied and developed in the context of the FAMUS (Family Medicine, University of Sherbrooke) project. The objective of FAMUS is to establish a pan-Canadian network of circa 800 family medical practitioners whose project patient database is accessed weekly by telecommunication and non-nominative data transferred to the central database at the University of Sherbrooke creating a risk register for primary care. In the first module of the project all new patients (with few exceptions) attending for major complete examination are registered in the project and the data pertinent to diagnosis and management of cardiovascular risk are collected. Each participant has been supplied with a Macintosh Classic, a Stylewriter inkjet printer and a GVC modem. The software for data collection is designed by the FAMUS development team. A Sun SPARC station IPC and the relational database Oracle are used for central analysis of data.

This paper reports the evaluation methodology applied to the development of the project first phase and the implementation of version 1.0 of the FAMUS software.

METHODS

At each evaluation stage an evaluation plan is defined in advance in accord with the stage objectives. The plan should contain a) a sufficient model of the system in the context of the application, b) a definition of the organisation including the return of results to the designers and c) a precision of the techniques used to obtain and analyse the data. The conceptual modelling of the application is within the mainstream of system analysis for information system development and is inspired by the integrated approach of Walliser [2].

The FAMUS design team is multidisciplinary with three major groupings: organisation, informatics and epidemiology including also domain experts in family medicine, cardiology and cardiovascular disease risk factors.The project organisation uses Macproject (Claris, California) as

a management tool with a weekly meeting plan of the different project groups and the evaluation organisation is integrated into this management structure. The first phase of the project completed in December 1991 concerned the software design and implementation for the patient record database to be used by the family medical practitioner (Famus version 1.0).

The doctors who took part in this evaluation were not necessarily those who were to continue with the project, as this was to be determined subsequently by a randomised selection process, but were chosen by the project director to give a useful and convenient group both by the range of practice and experience covered as well as their access by the project personnel. The objectives of the evaluation exercise were firstly the detection of major problems and secondly the identification of important elements necessary for embarking on the next phase. The evaluation exercise took place over three weeks in October 1991 and involved ten doctors, six working in the department of Family Medicine at the central university hospital and 4 working in town family medical practices. The following steps were undertaken in the evaluation procedure, 1) an introduction to the system and explanation of the evaluation procedure always by the same person; provision of user's guide, 2) completion of an a priori questionnaire concerning the participant, the type of medical practice and computer experience as well as attitudes to computing, 3) recording of a simple fictional case, 4) recording of a more complex fictional case designed to cover several visits, to test judgement during the entry of data, and also including additional medical detail to that requested by the project database; the evaluator was asked to print the different possible reports and prescriptions and also to evaluate the graphical displays showing the trends with several visits, 5) completion of a system evaluation questionnaire, 6) personal interview of a sample of participants by a medical and a computer representative of the project team, 7) workshop of participants starting with a presentation of a preliminary analysis of the two questionnaires.The second phase of the project, the progressive recruitment of 200 family medical practitioners from the province of Quebec is scheduled from january to september 1992.

RESULTS OF FIRST PHASE EVALUATION

Questionnaire "a priori"

The profile of each participant as regards special interest within family medicine and also previous computer experience is given in table (1).

A more detailed analysis of attitudes to computing gave three classes of response namely, a) utility in daily practice, b) new possible applications - there are two sub-categories of (b) namely practice related and education/new knowledge related, c) personal interest in furthering (a) and/or (b).

System Evaluation Questionnaire

The questionnaire covered the following 6 areas:
1. The equipment and learning times
2. Screen presentation of information
3. The medical content
4. Problems experienced in the use of the software
5. Documentation
6. Acceptation

The questionnaire with 37 questions was developed by two physician members of the project team, subject to expert advice from the university department of marketing, and with review by members of the three project groups to ensure that their different perspectives could be taken into account; each question had a space for further remarks. Illustrative examples from areas 2 and 6 follow:

- 2.12 The screen for "active medications"is:

	1	2	3	4	5
a) complete	O	O	O	O	O
b) rapid to fill in	O	O	O	O	O
c) pleasant to fill in	O	O	O	O	O
d) useful	O	O	O	O	O

Tick 1 for complete agreement, 2 for reasonable agreement, 3 for neutral, 4 for with reservation and 5 for complete disagreement.

- 6.2 Do you think that it is realistic to use the computer in the presence of a patient?

- 6.5 Which additional modules to Project FAMUS would be useful in your practice?

Equipment and Training. The learning period varied from 20 minutes to 10 hours (table 1); the reasons for these differences as recorded could well vary with the individual interpretation, in particular as the slow speed of the system performance was commented on in this context. However it was clear that those who were not familiar with the Macintosh environment required more time (table 1). The majority of observations found the hardware easy to use with only one exception namely the use of the mouse by one participant. The learning process was in itself considered easy by the participants although

Table 1. Doctor profile and training times

Doctor Number	Years of Medical Practice	Current Computing Use	Previous Computer Training	Attitude Towards Computing	Previous Macintosh Experience	Initial Learning Time (hrs)
1	15	Occasional	No	Tolerates	Yes	1
2	14	Frequent	Yes	Likes a lot	Yes	0.5
3	14	Occasional	No	Likes a lot	No	2
4	4	Frequent	Yes	Likes a lot	Yes	1
5	11	Occasional	No	Tolerates	Yes	1
6	27	Daily	No	Likes a lot	No	3
7	3	Frequent	Yes	Likes a lot	Yes	0.3
8	15	Rare	Yes	Likes a lot	No	8
9	17	Occasional	No	Likes a bit	No	10
10	4	Daily	Yes	Likes a lot	No	6

some discordance was expressed about the use of fictional patient cases for test purposes. The tendancy was to play with the software rather than systematically enter the provided fictional patient case in that the conceptual basis of a medical record is evident to a medical practitioner.

Presentation of Information. Several questions covered this aspect both as concerns general features such as overcrowding, logical sequence etc. (see table 2), and there was strong agreement that screen design per se was acceptable and attractive. Apart from patient identification the majority of information can be entered as a single mouse click rather than by keyboard; there was a clear request, emphasised at the workshop to reduce by all means the time taken for data entry at the keyboard.

Table 2. Screen features evaluated

Menu terminology

Screen overloading

Logical screen order

Ease of movement between screens

Logical ordering of subjects presented on the screen

Too much information to complete per screen

Appropriateness of dialogue and alert windows

Completeness and utility of each screen

Time to complete each screen

If pleasing or displeasing to complete each screen

Utility and clarity of graphics

The medical content. Substantial commentry by the evaluators concerned the medical content. In part this stemmed from a need to understand the limitations of the project database with respect to a complete medical record database. In the written questionnaire the request to suggest additions produced a variety of responses. A few of these were specific ie the detection of hyperglycemia or the lengthening of space given to the problem list; most were general suggesting a more detailed record possibility of different parts of the medical record.

In discussion at the workshop no clear theme emerged as in fact each practitioner has somewhat different needs.

Apart from the predominant consideration, namely a project-orientated database further aims can be conceived such as, that the record would be complete for the majority of patients whose predominant concern is the identification and reduction of cardiovascular disease risk. A further aim is to advance certain aspects that are common to different types of medical record ie the problem list and the prescription pad. The medicolegal aspect was also raised as to the relationship to the ideal record ie complete and unalterable with the suggestion that this be explicit to the participant.

Significant Technical Problems Identified.

The slowness of the software was again mentioned in this section. Two persons identified major problems. One was due to inexperience with multifinder; the other was as a result of renaming the

hard disk which meant that the FAMUS program could not be located on demand.

System Acceptation.
a) Time taken

The length of time taken in interacting with the FAMUS prototype software was uniformly judged as far to long. The time taken to enter a first patient visit as recorded by the evaluator on the questionnaire was approximately 15 minutes with estimates varying from 5 to 30 minutes; for a follow-up visit the average was about 10 minutes with a range of 5 to 15 minutes. Significant improvements in software speed have been made before the release of version 1.0.

b) Suitability for use in the presence of a patient

The lengthy process was considered an adverse factor against the use of the computer during the patient interview. However half of these doctors would be prepared to use the computer at consultation, whereas the other half believed that it would be inconsiderate - one practitioner would use the computer between consultations.It was remarked that a suitable printout could be helpful and interesting for the patient.

c) Potential Project Advantages and Disadvantages

A range of responses were elicited thus suggesting that family medical practitioners cannot be simply considered as a homogenous group and that some investigation is needed to characterise and understand their different needs. Two doctors saw an advantage in a standardisation of approach and the benefit such a tool could have to practice research. The availability of graphics was appreciated by another who saw this as a way of explaining progress to the patient. A further remark was the benefit of the information base in having a better grasp of practice activity; this notion could perhaps be linked to the idea that a step is being made towards a computerised medical record. Another saw that the availability of tools such as a printed prescription would facilitate his tasks.

The recorded disadvantages were less in number and centered firstly on the time taken plus the risk of a duplication of effort, and secondly that the medical record was incomplete. (See discussion above concerning medical content).

Possible Additional Modules. A range of suggestions were made, modules for other diseases, periodic medical examination, problem coding, diary, appointment scheduling, access to information concerning risks of drug interaction, automatic recall for preventative procedures.

It is to be perhaps noted that such suggestions do not necessarily mean the simultaneous provision of a complete medical record and do not invalidate the present philosophy of a modular approach.

Feedback of the results of the evaluation exercise to project design. A number of specific changes were made in the detail of screen design. The understanding of these changes was undoubtedly helped by the opportunity of discussion given by interviews and the workshop after the initial questionnaire had been collected. Other larger issues such as the nature of medical content were noted and are to be discussed in the context of development planning.

DISCUSSION

A number of criticisms concerning the evaluation of information systems, not only in medicine have been made in recent years [3,4]. A particular observation based on conference presentations is the lack of an evaluation component to the experimental design which devalues the presentation of results [4]. The implication is that evaluation is often regarded as secondary to the undertaken technological development, an attitude which is contrary to the objective of succesful application in medical practice.

One major characteristic of the TEAM methodology is to enable the perceived needs of the different categories of user to be efficiently taken into account during the design process. Acceptance by the physician of the information system and compliance with the project objectives are issues of obvious crucial importance. The emphasis on user acceptance also means that the values of the domain, ie what is important or not, are taken into account. Recent publications have also re-emphasised usability [5] and testing reality [6]. The evaluation exercise recorded here used an interview process and a workshop to supplement the questionnaires. All the design team were also present at the workshop which enabled the concerns of the ten family physicians who participated in the exercise to be effectively communicated. It was considered that questionnaires alone however comprehensive or well designed could not be the ideal vehicle to capture the nuances of interpretation to permit a comprehensive assessment of high quality. Indeed the workshop provided the richer opportunity; presentation of the questionnaire results to the workshop enabled a structured basis for discussion, a discussion which permitted issues to be clarified between practitioners as well as between the design team and the user representatives.

Another characteristic of the TEAM approach is the attention paid to explicit mechanisms to enable feed-back of evaluation results to project design decision making. The importance of feed-back in the evolution of information system projects is repeatedly emphasised [7]. During the evaluation process two levels of feed-back were discerned, the first consisting of specific changes to the software compatible with the current design direction, and the second level produced notions with implications for medium and long term development. An example of this second level is the approach required to coding of the patient problem list.

The Macintosh computer has been chosen because of its small size so that it can acheive a place on the doctor's desk, and because of the user-friendly characteristics of its interface design. The doctor is encouraged to enter the patient information during the interview, a proposition accepted by only half of the evaluators on the grounds of a diminution in the quality of the patient - doctor relationship. However the results of a recent literature review suggest that this is not perceived as such by the patient [8]. This aspect will be closely followed in the subsequent evaluation exercises.

Three factors affecting future project compliance were elicited. Firstly system speed was clearly seen to be of primary importance. Secondly opinions about the degree of system utility were also sought by questionnaire and at the workshop. Here a consensus was less evident although there were several different ideas expressed of potential advantages of such a system. This supports the notion that an approach needs to be taken that can characterise and facilitate the exploitation of these different ideas, an approach that should be incorporated into the evaluation program for the next phase. Finally the importance of project interest was also examined. Although less debated at the workshop, individual remarks suggest that it is advisable to ensure an approach so that the value of the project to the individual practitioner is maximised for example in feedback of data analysis concerning his medical practice or how his practice fares in relation to others. It is important that the way that the project is integrated into the practice routine is clearly understood both from the project and the family medical practitioner point of view. The continuing application and development of the TEAM methodology and the analysis of the evaluation procedure of the second phase of the FAMUS project will be the subject of a further report.

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