Selecting computer software packages - a self help guide: discussion paper

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Introduction

To help most doctors and other health care professionals, there is now a variety of commercially available computer software products to run on hardware at a price low enough to permit purchase from the budget or research funds of a given department, without recourse to the health district's main computer organization. But how should a person relatively inexperienced in computing select the best software package for his or her needs?

CASPE Research is helping Brighton Health Authority to develop Quality Assurance (QA) in clinical medicine[1,2]; although the examples used describe the selection of software for computer assistance with certain aspects of surgical self-audit in Brighton, this paper presents a simple method for selection of any computer software.

A 6 step method

Step 1 - form a general appreciation of companies in the field and their product ranges
This can be done by reading the advertisements and articles in the *British Journal of Health Care Computing*; the advertisements usually try harder to communicate to normal working doctors. Much can be learned by talking to colleagues with greater computer experience, but their advice may be partial in both meanings of the word. From time to time, medical journals carry papers reporting application of a particular package, with references which will provide further leads[3-6].

It is very hard to be sure that a supplying company - whether it is primarily a hardware purveyor, a consultancy or a 'software house' - will survive in today's Information Technology jungle. Of course a company with experience will be preferred, but 3 qualifying questions apply: first, how much experience has the company had in general - a company that is well established will not miss the opportunity to make this clear in their publicity and in their early dealings with a potential customer; second, how relevant is the company's experience - it is common for a software company to want to diversify by building on what it hopes is a successful foundation product, but a product that has been a success in general practice, say, will not necessarily translate easily to secondary care aplications - or the company may be experienced in dealing with highly motivated researchers rather than busy and hard pressed professionals whose main concerns are distant from computers; third, what kind of relationship with the company is intended. Some suppliers will be looking primarily for sales volume from off-the-shelf products so that their time of contact with a customer is kept to a minimum and the sales people can concentrate on new business; other companies hope to engage customers in a longer-lasting relationship, and may hope that purchase of a product will open the door to a long-term involvement.

What will count is how the program feels to use for those who will, in practice, use it. Even in similar products this can vary widely, and every product will have been developed with an idea in mind of a specific market and the likely users. Reassuring things may be said about how simple it will be to customize to a user's specific requirements, but unless the company provides satisfactory costed estimates for the modification work required, a buyer may find him or herself committed for a long time to a succession of additional changes before a satisfactory system is attained. This can involve significant investment of time and money to achieve the desired result, especially if the particular package requires significant change in working practices.

Step 2 - define a list of criteria against which to compare the products
From experience and by listening to the concerns expressed by clinicians and other professionals, the following list of criteria was drawn up:

Ease of use initially and for new users.
Ease of use for experienced infrequent users.
Flexibility in the data that can be collected.
Time taken for input in normal use.
Security.
Training and support.
Dependability and experience of supplier.
Cost.
Data storage capacity.
Multi-user capability.
Modifiability of inputs and outputs.
Compatibility with existing district hardware and software.

This was a long list - and some items overlapped - but it served as a checklist to be pruned later. Here are some comments on the various criteria in relation to surgical audit packages:

Ease of use initially and for new users: It is noticeable that users and suppliers of all products now seem to be concluding that the main users for input will be medical secretaries, although of course senior clinicians will normally wish to validate the data (to be) input. It should, however, be possible for clinicians to specify analyses and outputs directly and easily.

Ease of use for experienced infrequent users: Most systems become fairly easy with familiarity, but if the system is not used constantly then even the ablest

user's memory will be tested. Two important design decisions will have been: whether to devote screen space to providing helpful messages at the time of data entry; and whether to provide further help that can be called up on screen or to rely on printed manuals for reference.

Flexibility in the data that can be collected: A product may be deliberately restrictive in terms of the freedom given to the user to collect new data items, or offer freedom within a maximum number of data fields, or be designed with flexibility as a major design parameter; the more flexibility, the more time must either be put in or bought by the user to achieve a cleanly working system.

Time taken for input in normal use: It will be hard to obtain useful estimates of the time taken to collect data because of the variety of ways in which this can be organized, and variation in the complexity of the cases recorded. It is likely that time spent by secretaries on the new tasks will be offset by reduction in time previously spent by the secretaries in other ways, for instance contacting the medical records department, checking patient details, preparing lists etc. The most common bottleneck is assembly of the clinical data by junior medical staff. As to the input of data into the computer, it may be that the initial simplicity of a menu approach to data entry (in which an item is chosen from a list by keying in the reference number of the item) will become a source of frustration over time because it usually takes longer in total than a form-filling method (in which an item or abbreviation is typed directly).

Time taken to produce outputs and analyses: The normal approach to this is to make it easy - though time consuming - to build up a library of predefined database searches which can be called up and applied to different sets of data. Computer sales people are practised at preparing a slick and speedy demonstration using test data and analyses which the system can handle quickly; in preparation for a demonstration of the product, a wary potential customer will be prepared with an analysis he or she actually wants to do, and will make sure that a realistically large set of data is present in the machine.

Security and confidentiality: Password procedures to restrict access are present in all systems; some are more sophisticated than others in their discrimination between different classes of permitted users.

Training and support: The supplier should be asked if some existing users may be contacted in order to check their satisfaction; the supplier will normally agree.

Dependability and experience of the supplier: This key question was dwelt upon earlier in the paper.

Modifiability of inputs and outputs: It should be easy to change any data.

Data storage capacity: The company should be asked in writing to estimate how many records of the size you anticipate handling can be stored on the mass storage hardware recommended by the company, and to show how long it takes to make back-up copies in the manner suggested.

Multi-user capability, and compatibility with district information technology: If there could be any prospect of linking the new software to other systems, then the advice of the local district computer department should be sought even if the intention is to remain independent in other respects.

Step 3 - give each criterion a weight
For this step, a rough decision is made on how important each criterion now seems in making a choice, by attaching a numerical weight to each (expecting to revise these weights later). Any consistent basis will do, but more important criteria are given higher numbers; a scale of 1 to 10 is reasonable.

Step 4 - arrange a demonstration of the products that look interesting, and reduce the choice to a shortlist of 4 or 5 at the most
It may be found difficult or inappropriate to prepare a formal invitation to tender, but the companies could be sent in advance: a statement of needs, perhaps a list of the criteria it is proposed to apply in making a choice, maybe some sketches of the kind of outputs to be produced, and some questions that will be asked at the demonstration. One or two of the questions should be saved up; no-one wants to trip up the demonstrator unnecessarily, but he or she should expect to be tested.

Step 5 - score the products on the shortlist against the criteria for choice
Using their own judgement, the potential users give a score between 0 (useless) and 5 (excellent) for each product against each criterion, informed wherever possible by the opinions of existing users of the product. The keynote is a consistent and thoughtful basis for appraisal of the systems - not a rejection of subjective judgement. The value of the exercise lies in enhancing appreciation of which criteria seem most significant, and reducing duplications and overlaps in the criteria; there will be at least a few.

The scores may now be summarized in 'Which' magazine form (0 to 5 blobs for each criterion/product pair), and a visual impression of the relative mass of blobs may suffice. But it will usually be worthwhile to take a further step; this is now explained.

Step 6 - produce a weighted total score for each product
First a framework of the form shown in Figure 1 is drawn up. If someone can be found with a microcomputer and a 'spreadsheet' program, such a program will make this and the ensuing arithmetic very easy.

The names of the shortlisted products and selection criteria are written in the appropriate places on the Figure 1 framework. In the column on the right-hand side should be written the weights chosen in *Step 3*, and the scores from *Step 5* entered into the various cells of the matrix. Starting with product A, the score against the first criterion is multiplied by the weight for the first criterion, and the result recorded; the same is done for the rest of the criteria, adding the results together. The result is a total weighted score for product A which can be compared with the total
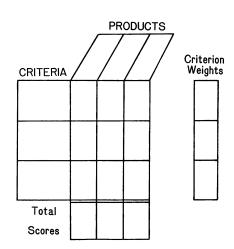
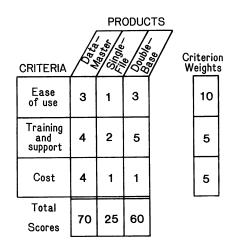*Figure 1. A weighted total score matrix*

Figure 2. A completed weighted total score matrix

weighted scores for the other products, achieved in the same way. In the imaginary example given in Figure 2, DataMaster appears to be the best choice (a high score for cost means that the product is better on cost grounds, i.e. it is cheaper).

The results achieved in practice are often surprising to participants, and so the natural response is to revise the weights and see what effect this has on the total weighted scores (the scores can also be changed, but the weights tend to attract more disagreement). Such an informal process of 'what if' questions very often leads to revision of earlier impressions, and almost always to increased certainty about the final choice.

Conclusion
In the context of choice of suitable computer facilities for quality assurance work in Brighton Health District, a straightforward method has been described for applying users' own judgement to the computer software selection problem - using a well known technique of weighting and scoring. The author has used the technique in several settings within and outside the health service, and many uses can be found for the method other than that to which the paper directly relates.

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