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Editorial Notes

For two reasons, this edition of SACJ is far later than it ought to have been. The first reason is that there have been some personnel changes in the editorial team. Lucas Introna, having continued for some time as IS editor after transferring to London, asked to be relieved of his duties. Niek du Plooy has kindly agreed to fulfill this role in a temporary capacity until a suitable replacement for Lucas can be found. Due to work pressure, Riel Smit has also withdrawn as production editor, and has been replaced by John Botha. SACJ owes the two retired members a huge debt of gratitude. During his period of tenure, Lucas did sterling work in setting and maintaining a solid standard for IS contributions. Riel put SACJ on a TeX path, and has laboured diligently to produce an aesthetically pleasing product. Thanks are also due to Niek and John for their willingness to take over in their respective roles. Until further notice, IS contributors may forward their submissions directly to Niek at his address given on the front inside cover. I shall put successful authors in touch with John for further instructions regarding final preparation of their manuscripts.

The second reason for a delay in this edition has to do with authors who have not scrupulously followed guidelines for producing their final submissions. There have been a variety of problems ranging from missing citations and inappropriate production of figures to incompatible electronic file submissions. All of this, coupled with our new production editor (who—despite an extremely busy schedule—has valiantly climbed a steep learning curve) has resulted in an edition that should have been out to press several weeks earlier.

The editorial team will be giving attention to the general matter of format and submission procedures in future. SACJ’s citation and reference methods are somewhat archaic and will probably be revised. All the necessary information will be provided on the new SACJ web site at www.cs.up.ac.za/sacj/. The site will also contain abstracts of articles in this and future editions.

These are times of conflicting stresses on both the academic and industrial IT communities. They are being felt somewhat more acutely in Southern Africa (and presumably in other developing countries) than in the developed world. Internationally there is tendency to cut back on state financing of universities and a seemingly insatiable demand for IT graduates. Many companies snap up new graduates at attractive salaries, positively discouraging full-time postgraduate studies. International recruitment agencies scour the South African scene for qualified candidates, luring some of our most promising young professionals out of the country. Job-hopping, a drift from academia to industry and from local industry to USA or European industry seems to be the order of the day. Despite the availability of private colleges and institutes, virtual or otherwise, there is a rush of students to university and technikon IT departments, all hoping to get at the IT honey-pot. University administrations are struggling to correct the structural deficiencies of the past and to provide IT departments with sufficient resources to cope with demand. As editor of SACJ, I have no particular competence authoritatively to sum up or analyze these tendencies, but it does seem to me desirable that someone ought to do so. Bodies such as SAICSIT, the CSSA, university authorities, IT industry and state representatives ought actively to pursue joint strategies to ensure that our IT departments are properly resourced and that (non-Zuma) measures are taken to retain graduates in the country. It seems almost redundant to attempt to spell out the consequences of inactivity.

Derrick Kourie
EDITOR

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A Computerised-consultation Service for the Computerisation of the Very Small Small-business Enterprise

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Abstract

Small-business performance can benefit from computerisation. Unfortunately, however, most of the very small small­business enterprises do not have the financial means to acquire the services of a computerisation consultant. This paper looks at the design of a computerised consultation service that will help the owners/managers of small businesses to computerise. This service will use the input from the users of the system, and by using expert-system technology, will make a recommendation.

Keywords: Small-business enterprise, computerisation, consultant, end-users, hardware, software, expert system.


1 Introduction

Research has indicated that small-business organisational performance can benefit from a computerised information system [1, 8]. Thanks to computers, the small-business enterprise can attain a competitive edge by outperforming its rivals [16, 12, 22].

The cost of microcomputers, which can be applied in the small-business environment, has reduced to the point where almost all businesses, even the smallest of the small businesses, can afford to use computer power for information processing [4, 19, 3].

A small business (in the South African context) can be defined as a business that has total assets of less than 10 million rands (rand being the South African currency) [28]. The contribution of the small business to economies worldwide is, however, becoming ever-more important [14, 21]. More than 85% of business enterprises in South Africa can be considered to fall into the latter category [29].

The computing and business environment of the small­business enterprise is different to that of a large business [23, 30]. It typically does not have the financial and human resources of the large business and the owner/manager will be responsible for the acquisition of information technology [21, 5, 18, 26].

The small business can range from a very small to a medium to a large small business. The large to very large small business will, naturally, verge on becoming a large business. In this paper, we are interested in the very small to small end of small-business scale. A very small small-business enterprise, in our context, will be one that has just been established and/or does not have the financial means to acquire the services of a consultant for its computerisation.

A survey has found that user satisfaction and the use of computer-based information systems will increase when a formal approach is followed during the computerisation process [1]. Although most small businesses have a need for expertise during the computerisation process, few have either the in-house expertise or the financial means to acquire it. One way to solve this problem is to use expert-system technology to encapsulate the knowledge of a computerisation consultant.

In this paper, we will discuss the design of a computerised system (using expert-system technology) that will serve as a consultant for the computerisation process of the very small small-business enterprise that does not have the means to acquire the services of an expert.

This paper is organised as follows: we will commence by providing an overview of the typical behaviour of the small business. From there, we will look at the requirements of a computerisation consultation system. This will be followed by a discussion on the CONSULTANT (the computerised-consultation system), followed by a high-level design in which the various phases of the consultation service will come under consideration.

2 Typical Behaviour of the Small Business

Various researchers have uncovered different characteristics of microcomputer usage: Igbaria, for instance, reported that microcomputer usage was related to computer experience [9]. They also showed that user training has a direct influence on microcomputer usage [11]. Lee indicated that microcomputer usage can be correlated with prior computer knowledge [15]. Nolan pointed out that an unsuccessful information system will cause a reduction in the use of that system [20]. Schiffman indicated that end-users in a large-business environment can be divided into five categories [25]:

1. Non-programmers.
2. Command-level users.
3. End-user programmers.
4. Functional support.

5. Professional support.

In a survey done in Taiwan on microcomputer usage, it was concluded that [10]

- over 50 percent of the respondents used two or fewer software packages, compared to the 3.7 different packages used on average in the USA
- more educated people tend to use more packages
- more than 50 percent of respondents use a microcomputer several times a day
- about 50 percent of the respondents used a microcomputer for two or more hours a day
- non-managers use a computer more than managers
- respondents are committed to using a specific software package frequently and for long periods at a time, especially in the finance departments
- there is a correlation between training and microcomputer usage
- user satisfaction leads to greater usage.

It is a normal process for the small business to purchase packaged software such as word processing and spreadsheet packages [1], the most common application area being accounting packages [2, 1]. The advantage of purchasing software is that it provides economy of scale and that it will reduce the risk during the implementation phase [27, 1]. Small businesses are more reliant on packaged software than larger businesses [1, 7].

The manager/owner of a small business will, in general, not employ traditional capital-budgeting techniques, such as internal rate of return, cost-benefit ratio and payback period, during the evaluation of his/her purchase [1]. Other factors that will be more likely to influence them would be the opinions offered by other concerned parties. These parties might include the vendor, friends and/or other employees in the firm.

It is important to bear in mind that the vendor’s opinion might not always be that reliable, seeing that he/she might have biased opinions on certain products and/or brands. End-users will normally recommend the products that they know and are currently using. These products again may not necessarily be the best for that specific application. The owner/manager should bear in mind all these opinions and facts before making a decision.

The system should, for instance, be able to detect a situation where it is not certain about a recommendation and, in such case, it should rather make no recommendation than the wrong one.

The consultation service should be easy enough to operate (with help functions), so that it can be left on a PC and so that users can employ the service without the intervention of a human. The system should, in addition, minimise all possibilities of misunderstanding, in other words, users should at all times know exactly what is required of them when using the system.

The application needs to be highly user-friendly for the sake of those users who do not have computer knowledge, but should, by the same token, not irritate those users who are computer literate; in other words, the application should communicate at a level that is suited to the specific user [24]. This is done by asking the user (in the beginning of the consultation session) to select the communications level at which he/she wants to interact with the system. These levels are as follows:

1. Beginner.
2. Intermediate.
3. Advanced.

The beginner’s level will be greatly detailed and will have a help function explaining all the computer jargon.

The system that is recommended should also be user-friendly, bearing in mind that most users cannot be regarded as sophisticated users [1].

In order for the application to be effective, it should take into consideration the various behaviour factors discussed previously. Obviously, the recommendation should be practicable, for if a user were not satisfied with the recommended application, then the system will not be used at its full capacity.

Technological progress is made so rapidly that provision should especially be made to keep the database of the consultation system up to date. The maintenance will initially be done manually, but it can be upgraded to include a facility whereby a disk (containing information about prices and specifications on products) can be received from the vendors by which the system could update itself. The information on the disk will, naturally, be in a predetermined format.

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The system will eliminate the intimidation that so often occurs when a human consultant communicates at too high a level for the user. In such instances, the user does not comprehend the jargon and often just says yes in order to save face. In terms of our system, the user can spend ample methods.

We said previously that there is a clamant need for a computerisation consultation service that is inexpensive and in terms of which good, unbiased recommendations could be made. For the consultation service to be cheap, the consultant (human) can be replaced by a software application that will simulate the expertise of the human consultant. By replacing the consultant (human), the consultation fee (hourly rate) can be eliminated.

3 Requirement Specifications

Selecting the right computer system (hardware and software) is becoming ever-more important. The compatibility (the ability to import and export files) of various software packages has to be borne in mind, especially if the user will be using integrated reporting methods.

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time on each question, until he/she is sure about each and
every aspect, by using the help function, if required.

We will now discuss the design of a computerised-
consultation system. In this paper, we will henceforth refer
to this system as the CONSULTANT.

4 The Consultant

In our consultation system (the CONSULTANT), we
have identified the following distinct elements of a
computerisation project:

1. Hardware.
2. Software.
3. Use.
5. Implementation.

During the consultation session, the CONSULTANT will
ask various questions and will allow the user to make
selections. The way the system operates is as follows:

1. The CONSULTANT will ask certain (carefully
   selected) questions.
2. The user will answer these questions.
3. Based on the answers, the CONSULTANT will
   make calculations.
4. Using these calculations, the CONSULTANT will
   then make recommendations.

The questions can be asked in one of two ways:

The option box
As an answer, the user can exercise one of various options,
for example:

What processing speed do you require?

- Fast
- Very fast
- Does not matter

The user will then have to exercise one of the options. When
the user exercises an option, that option will be
highlighted (see Figure 1).

The rating box
As an answer, the user will have to rate a specific factor
(see Figure 2). The user will now change the setting of the
scroll bar, so that the number reflects the rating that the
user wants to assign to that specific factor. From the
answers to these questions, the CONSULTANT will glean

5 High-level Design

In Figure 3, we can follow the logical flow of the system
from the user's point of view. The system flows from one
phase to the next, and the direction of the flow is indicated
by arrows. In the next section, we will discuss what is
accomplished during each phase, as well as the manner in
which the various phases fit together.

Phase 1: Global criteria

Many of the factors related to the consultation process are
interrelated and are determined by other factors. For
instance, the operating system can be determined by the
processing speed required by the user, as well as by the
price the user is prepared to pay for a system, as well as by
user preferences and the user's level of computer literacy.

Another factor to bear in mind is relative concepts such
as "fast". Most users want a fast machine, even though they
do not state that they require a 200 MIPS processor. In
other words, the concepts of "fast" and "very fast" are
relative, and will, in turn, be determined by other factors.

In the global criteria phase, we determine the factors
that do not pertain to a specific phase of our consultation
system but rather to the system as a whole, which is why we
refer to them as being "global". The global factors will
typically include aspects such as price, the user's computer
literacy, processing speed, etc. These factors will influence
various decisions throughout the consultation process.

Phase 2: The software-selection phase

The software-selection phase is divided into seven
categories, which will cover a different application area
each:

1. Document creation.
2. Calculations.
3. Filing.
5. Drawings.
6. Communications.
7. Other.

Each category will, in turn, have different questions and
criteria which the user has to select and choose from. These
specifications will be used by the CONSULTANT to make

Figure 2. The rating box.

How important is a low price?

Does not matter

Very important

Figure 1. The option box.
Figure 3. A logical flow of the system (a user's view).
a recommendation for that specific category. Following, a description of the document-creation category to illustrate this phase.

The document-creation category
The approach followed for the document-creation category is as follows: the programs (software) that will be recommended will be determined by the specific application for which the user intends to use it. The application will place the user into a category. We have identified the following three categories in this respect:

1. Editors.
2. Word processing.
3. Desk-top publishing (DTP).

Unfortunately, things are not always clear cut and certain grey areas (areas between two categories, where the recommendation can go either way) exist. An individual writing correspondence on a daily basis and, once in a while, a newsletter can, for instance, use a word processor. But if the user writes newsletters on a regular basis, then a DTP package will be recommended.

We pointed out earlier that the application for which the user wants the software will place him/her into a certain category, but that there are relative factors (global criteria) to be considered too. These can include things such as price, speed and computer literacy: if a user is computer illiterate, then he/she will most probably battle to use a DTP package, with the result that such recommendation should be avoided. But if a user is computer literate and the recommendation happens to fall in the grey area (in between “Editor” and “Word processing”), then this recommendation can be moved to the higher category, which is “Word processing”.

The application for which the user wants the software will be determined as follows: the user will receive a list of possible documents that can be created by software. These will include letters, memorandums, reports, newsletters and complex documents (see Figure 4). The user then has to select the appropriate documents that he/she will be using/creating in his/her business environment. After the user has selected a particular document, the scroll bar for that document will be activated and the user can then set the predicted document creation for that specific document.

The scroll bar has five positions, ranging from 0 to 4. These positions (for the document-creation phase) each signifies the following:

0 = Not being used.
1 = Once a month.
2 = Once a week.
3 = Once a day.
4 = More than once a day.

For each of the documents, a value will be allocated at a certain position on the scale. These values are used to classify the user into one of the three categories that will allow the system to make a recommendation.

Most of the documents will return an absolute value, whilst some will return a relative value. The relative values are used to move between categories if the current position were to fall into a grey area. (See Figure 5 for a break-up of the categories.)

Another fact to bear in mind is the minimum value assignments. These would come into play where a document setting will put a recommendation in a specific category. The minimum value and the relative value movements are linked together. If, for instance, the accessory tables (see Figure 4) are used extensively, the minimum value will put the recommendation into the word-processing category, whilst the relative value (seeing that it is used extensively) might move the recommendation into the next category, which is DTP.

Once all the documents applicable to the user's business environment have been selected, the system will put the user in a specific category. In Figure 5, we see that there are three categories. Category one is the simplest one, namely that of text editors, whilst category two is word processing and category three is the highest level, namely that of DTP.

There are also two grey areas visible, of which the first overlaps categories one and two and the second overlaps categories two and three. When a recommendation falls in a grey area, it allows the CONSULTANT, when necessary, either to move the recommendation one category up or down.

From Figure 5, it also becomes clear that each category has different alternatives: category two has three alternatives, namely MS Word, Word Perfect and Works. The final choice from these and other alternatives will be made during PHASE 4, entitled “The compatibility check phase”, once all the categories for the other components (calculations, filing, bookkeeping) have been assigned. This is done to optimise on compatibility between the software components. Before the system selects an alternative, however, it will take all the other elements of the computerisation into consideration as well. The latter will include the hardware-selection phase.

At the end of the document-creation category, the system will have a value (for the user) that will place the recommendation into one of the said three categories. The system will then move on to the next software section, which is “Calculations”. This section, as well as the other five (filing, bookkeeping, drawings, communications and other), will require a very similar modus operandi (see Figure 3, “The software-selection phase” (Phase 2)). The user will first answer the questions pertaining to the software category and then the CONSULTANT will assign a value, which will place the user into a category. Once all six software categories have been completed, the system will return to each of the categories and then make a final software recommendation from the available alternatives in each of these categories.

In the following section, we will have a look at the operating system that forms an integral part of the system software.
The operating system

For this section, the CONSULTANT will again ask the user to rate certain criteria that are applicable to the section. The criteria that will determine which operating system to recommend will include the following:

1. User-friendliness.
2. Compatibility/Popularity.
4. Speed.
5. Price.

Most of these criteria are global factors. There are, however, a number of factors that will directly influence the operating system, for example, graphical or character-based and technologies such as multitasking. These criteria will be specified by the user. At the end of this section, the CONSULTANT will, with the help of a decision table, match all the answers for the criteria and produce a suitable recommendation. Once this has been done, the CONSULTANT will move to the hardware-selection phase.

Phase 3: The hardware-selection phase

This phase of the CONSULTATION process can be divided into the following five sub-phases:

1. Direct questions.
2. Ad hoc questions.
3. The “Always” section.
5. Security and backup.

We will now discuss each of these phases in detail. To determine what hardware systems are required, the CONSULTANT follows two different approaches. The first comprises a routine-type approach in terms of which the CONSULTANT questions the user and the answers will determine what is required. This procedure will be repeated for each consultation session. The second approach entails obtaining answers to ad hoc questions in terms of which the CONSULTANT will, based on answers in the other component phases (software, compatibility, etc.), determine that a piece of hardware is required and then ask the user whether or not he/she would like to acquire it. These questions will, naturally, not be the same for each consultation session.

Sub-phase 3.1: Direct questions

These questions are asked for each consultation session and will always be the same.

CPU and RAM

Users are divided into categories according to their requirements. There are various factors that are taken into consideration for the recommendation on the CPU and RAM. These factors include: type of user, money spent, time spent and processor speed.

1. Type of user

We have divided the users into the following three groups [25]:

1. Power users.
2. Command-level users.

We also made the assumption that a power user wants a faster system than what would be acceptable to a non-performance user.

2. Money spent

During the global criteria phase (Phase 1) of the consultation (see Figure 3), the user was asked to indicate what amount he/she was prepared to spend on the computerised system. The answer to this factor can vary from “minimum” or “average” to “not a factor (does not matter)”. In the latter case, a faster and more expensive system can, naturally, be recommended.

3. Time spent

The “time spent” factor is made up of two sub-factors, namely “usage frequency” and “duration” [10].

Usage frequency

The “usage frequency” refers to the different times the user will be using the recommended system. There are three “usage frequency” levels, which vary from

1. once a week or less
2. once a day
3. more than once a day.

Duration

This factor refers to the duration for which the user will be using the recommended system at a given time. This varies from

1. less than a hour
2. one to three hours
3. more than three hours.

The “time spent” factor has three alternatives: minimum, average and maximum. Based on the different values of the sub-factors, the “time spent” factor will be determined (see Figure 6). In the figure, it becomes clear that a usage frequency of three and a duration of three will give a “time spent” factor of “maximum”. The more time a user spends in front of the computer, the more important it becomes for that time to be used effectively, and for a faster machine to be considered.

Processor speed

For this factor, we have assigned three possible values:

1. Average.
2. Fast.
3. Very fast.

Inquiries are made as to the user’s preference of how fast the system should be. The user is also reminded of the fact that a faster processing speed will necessarily mean a more expensive system.

Based on the values assigned to these and the global factors, a recommendation will now be made. We have
Figure 4. A layout of the document-selection screen.

Figure 5. The document-creation categories.
divided the recommendations into the following five categories:

1. Slow.
2. Entry level.
3. Medium.
5. Very fast.

These five categories are fixed over time, but the contents (products) that are recommended (for each category) will be determined by time. We can, for instance, say that, in 1990, the contents of these categories were as follows:

1. 286
2. 386sx
3. 386dx
4. 486sx
5. 486dx

These still range from slow to fast. The present (at the time the article was written) recommendation might be as follows:

1. dx2-66
2. dx4-100
3. PENTIUM 75
4. PENTIUM 100
5. PENTIUM 133

Again, we see that they range from slow to fast. Over time, we see that the products will move gradually down over the categories as the latest technologies are introduced into the market.

Sub-phases 3.2 to 3.5

In the next section, we will discuss the other sub-phases that make up the rest of phase 3.

In sub-phase 3.2 (ad hoc questions), the questions that are initiated by other components of the computerisation process are asked. These will depend on the situation and will not always be the same. For example, if a software application that is recommended by the system (during the software-selection phase) has the capability for sound and the CONSULTANT has not yet recommended a sound card, it will then prompt the user with a question pertaining to a sound card.

In sub-phase 3.3 (the “always” section), all the hardware devices that are almost always present in a computerised system are dealt with. They are essential to a computerised system, and will include the following: a keyboard, a mouse, a 1.44 stiffy-disk drive, etc.

For each of these devices, variations are available. The CONSULTANT will recommend a default, whilst the user will be afforded an opportunity to change to another variation alternative.

In sub-phase 3.4 (the “connectivity” section), the CONSULTANT will determine whether or not the user has the need for any communication devices such as modems and network cards. Based on the questions answered, the CONSULTANT will determine if a recommendation be justifiable or not. Fax/Modems and connecting with other networks are the most common connectivity recommendations.

In sub-phase 3.5 (“security and backup devices”), the CONSULTANT will identify any need for backup and security devices with the appropriate software. This will only be recommended if it is a high priority to the user. The global factor (price) has to be borne in mind as well.

This will conclude the hardware-selection phase. We will now discuss the compatibility check phase, which constitutes the last part of the software-selection process.

Phase 4: Compatibility check

During this phase, the CONSULTANT will look at all the alternatives in the applicable software categories. Remember that the user was categorised into categories for the different application areas (ranging from document creation, calculations to other). In these categories, there are various alternative solutions. The CONSULTANT will now take all the categories, as well as the global criteria and any user preferences, and will make the most compatible (optimum) recommendation for each of the software-selection categories.

Phase 5: Hard-disk drive capacity calculations

The hard-disk drive (HDD) size to be recommended will be determined in this part of the consultation process. Factors that will be taken into consideration will include the following:

1. Operating system's HDD installation space requirement.
2. All the recommended software HDD installation space requirements.
3. The recommended software's generated documents space required.

After having taken all the factors into consideration, the CONSULTANT will calculate and make a recommendation.

Phase 6: Recommendation display phase

The CONSULTANT will now display the final recommendation on the screen. This will include all the aspects covered above, including hardware and software. The layout will resemble a quote (see Figure 7). In the centre column will be the optimum recommendation. The column to the left will include an alternative, which is regarded by the CONSULTANT as being a smaller (cheaper, not as powerful), but still adequate recommendation.

The column to the right will include an alternative, which the CONSULTANT regards as being an equivalent, albeit not the optimum alternative. The user will now be afforded an opportunity to change any of these recommendations, either to the left or to the right. The user can even go back to the previous phases (software or hardware selection) to make changes, if necessary. Another feature that the user can use is the explanation option, which will show why the
<table>
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<tr>
<th>COMPONENT DESCRIPTION</th>
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<th>OPTIMAL RECOMMENDATION</th>
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</thead>
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<tr>
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<td>DOS 6.2 + WIN 3.1</td>
<td>DOS 6.2 + WIN 3.1</td>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>CPU/DRAM</td>
<td>PENTIUM 75 8 MEG</td>
<td>PENTIUM 100 16 MEG</td>
<td>PENTIUM 133 16 MEG</td>
</tr>
<tr>
<td>HARD DISK CAPACITY</td>
<td>500 MB</td>
<td>640 MB</td>
<td>850 MB</td>
</tr>
<tr>
<td>SCREEN TYPE</td>
<td>VGA MONO</td>
<td>VGA COLOUR</td>
<td>VGA COLOUR</td>
</tr>
</tbody>
</table>

Figure 6. The time spent factor.

Figure 7. An example of the recommendation screen.
As was emphasised earlier on, the consultation service will, therefore, be determined by its programmer's relevance of their facts. The success of each expert system definition of the problem space [4].

The maintenance of the computer system may include aspects such as backup calls (via the telephone) when users need help. It will also include callouts to the business premises where the system needs reconfiguration and to sort out any problems that may occur.

At the end of the consultation session, the user will have a complete recommendation, which will cover hardware, software, training and a maintenance contract.

6 The Limitations of Rule-based Expertise

In a rule-based environment, all the elements/facts are represented as rules. The significance of one element will, therefore, depend on that of other elements. In order for these elements to be recognised as forming patterns and meaning, they must be related to other elements by means of rules [4]. The computer will use these facts and rules for reasoning.

We know, however, that real expertise is not to be captured in rules as such, but rather in knowing when to break with those selfsame rules. To build human flexibility into the system, the programmer will have explicitly to state all that he/she normally takes for granted in being a human being, since computers can only deal with facts, whilst man is the source of facts and the creator of this world of facts.

In short, these rules have been designed to deal with certain situations, and trying to solve a situation that was not catered for, will result in problems. Expert systems can, therefore, only be as good as the completeness and relevance of their facts. The success of each expert system will, therefore, be determined by its programmer's definition of the problem space [4].

7 Conclusion

As was emphasised earlier on, the consultation service should be user-friendly and easy to use. To facilitate this, the user interface will be done in Visual Basic, which allows for all the features of Microsoft Windows. The consultation side will be simulated by means of expert-system technology. The program that we will be using is M4. The reason for this is that M4 and Visual Basic are highly compatible. M4 (an expert-system shell) was chosen over If-then-else statements because of the fact that the process of consultation for computerisation is so complex.

The CONSULTANT is aimed at providing a service for the very small small-business enterprise in South Africa, in which standardised packages can be applied. In terms of this system, the service can be applied to any small-business computerisation in the context of a developing country.

In conclusion, the CONSULTANT will make optimum recommendations based on the criteria/information gathered by the system. The system will help small-business owners/managers with their computerisation process. Even if they were to elect not to implement the CONSULTANT's recommendation, the whole experience with the consultation service will help to shed light on and will make a positive contribution to their computerisation process. By working with the CONSULTANT, the user will be exposed to the various aspects of the computerisation process.

References

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- The first page should include:
  - title (as brief as possible);
  - author’s initials and surname;
  - author’s affiliation and address;
  - an abstract of less than 200 words;
  - an appropriate keyword list;
  - a list of relevant Computing Review Categories.
- Tables and figures should be numbered and titled.
- References should be listed at the end of the text in alphabetic order of the (first) author’s surname, and should be cited in the text in square brackets [1-3]. References should take the form shown at the end of these notes.

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