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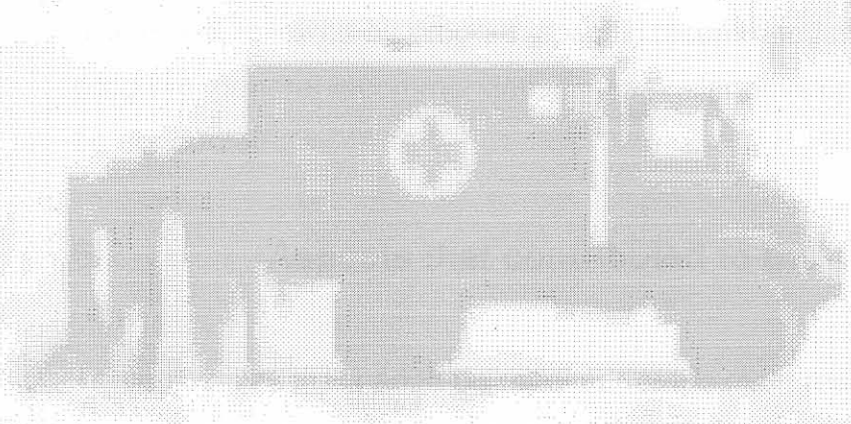
Chapter 6

Conclusions and recommendations



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CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The findings in Chapter 5 indicate that the program that was developed succeeded in creating an attention-getting, realistic environment wherein the field hospital could be simulated and whereby information was provided to prepare military nurses for functioning during military operations.

This chapter focuses on those aspects that contributed to the success of the program and outlines the aspects where differences of opinion occurred.

The overall functionality of the program and the limitations of the research are discussed, followed by program specific recommendations for improvement of the program, general recommendations for similar development and further research to be conducted.

6.2 Aspects that contributed to the success of the program

The objectives that had to be reached for the main research question to be answered, and that were evaluated by means of how successful the dimensions of user interface were applied, are discussed. The objectives are:

- Use multimedia to design and develop the program with the application of sound design specifications.
- Simulate the deployment of the field hospital.

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- Provide information to prepare military nurses for functioning during military operations.
- Create/keep attention.

The dimensions of user interface that were evaluated in order to conclude whether the objectives had been reached, are discussed and are presented in Table 4.1.

6.2.1 Use multimedia to design and develop the program with the application of sound design specifications

According to the findings of this research, sound design principles were applied in the design and development of the program. The design specifications that were implemented in the program are presented in Table 3.7.

The opinions of the users and experts are discussed below.

6.2.1.1 Dimension of user interface: Aesthetics

Reeves & Harmon (1994) state that aesthetics are highly unique and one person's sense of beauty may seem grotesque to another. This statement was confirmed, since most of the users and experts found the layout of the screen and the overall appearance of the program pleasing, except for two expert evaluators. It was indicated that the application of maroon and green text worked well together and enhanced the "military feel" that was created with the "military background". However, one of the expert evaluators complained about the incorrect use of language rules ("field hospital" as a heading was spelt in lowercase) and the disturbing background that he wanted to "wipe clean". The fact that this evaluator is a linguist, may explain his concern. Another expert evaluator did not like the "small faint" font used simultaneously with the large headings on the index page. According to Reeves & Harmon (1994) creative designers may sometimes intentionally violate screen design principles for effect, or to focus the users' attention.

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Most of the users and experts rated the aesthetics dimension (which refers to the artistic aspects of interactive programs in the sense of possessing beauty or elegance) very highly. The researcher therefore did not change anything on the index page and did not change the headings to initial capital letters.

6.2.1.2 Dimension of user interface: Design stability

The findings of this study indicated that the program appeared professional and high editorial standards were present. A professional appearance and high editorial standards inspire confidence in the user that the presented information is accurate and reliable. A web site that appears to be sloppily built, with poor visual design and low editorial standards, will not inspire confidence in the users of such a site (Lynch & Norton 1997). One of the expert evaluators complained about the heading of the index page which differed in size and font from the rest of the pages. This evaluator commented that the use of a different font and font size resulted in the eye "to jump" between the pages. The researcher adapted the headings of the remainder of the pages to be the same as those of the index page.

6.2.1.3 Dimension of user interface: Closure

Reeves (1994) states that program information must be organised into manageable segments in order to allow users the ability to access information in a controllable way. Most of the users (nurses and others) indicated that the information contained in the program was presented in manageable segments and that the organisation of the program did not need improvement. The expert evaluators confirmed the standard of closure by rating this dimension as manageable.

One of the users (other than nurses) mentioned that the organisation of the field hospital section could be improved by labelling the tents in the same way as the containers had been labelled. This was done.

One of the experts recommended that the layout of the "about" page be changed.

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Originally the page was constructed like a newspaper with two columns, which resulted in the fact that a user had to scroll down the left-hand column and then up again to read the right-hand column. This matter was corrected by the researcher.

6.2.1.4 Dimension of user interface: Navigation

The findings indicated that navigation within the program was easy. One of the expert evaluators complained about the use of non-standard link colours. The researcher deliberately used "earthy" colours (terra cotta and web safe green) for the links and visited links respectively, to enhance the "military feel" and to complement the background.

According to the literature, standard links to pages that had not been opened are blue and links to previously opened pages are purple or red (Kussler & Van der Merwe, 1998:327). These colours are standard in most web browsers and should therefore be used consistently (Nielsen 1999). However, Reeves & Harmon (1994) state that screen design principles have not kept up with the rapidly changing nature of interactive technology and furthermore, creative designers may intentionally violate screen design principles for effect or to focus the users' attention.

Since none of the other evaluators negatively reported on the colours of the links and because of the fact that navigation within the program was reported as being very easy, the colours of the links were not changed.

One of the users suggested that the "site map" should link from every page. Willis (1995) states that links to internal information should be maximised. This suggestion, therefore, was implemented.

Three of the users and one of the experts indicated that they had experienced problems with certain navigational aspects. One of the comments was: "Way finding between the different pages and back to the site map is easy. At the site map, however, I was not sure which of the sections I already visited". The users and

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experts who experienced these problems, evaluated the program on the researcher's computer. It was found that the program had not been "refreshed" and therefore the links did not change colour after they had been visited.

During the needs assessment, most of the nurses indicated that they were computer literate. Not knowing at that stage which delivery system would be best suited, the researcher wrongly assumed that the target group would be familiar with the Internet if they were computer literate. As a result of this, the researcher had to give initial instruction to users who evaluated the program who were not familiar with the Internet. The evaluators found navigation within the program very easy and the site map provided a familiar place to return to from where the users could further explore the content presented in the program. The way in which they navigated through the program indicated that even a novice could use the program with ease.

6.2.1.5 Dimension of user interface: Mapping

According to Vaughan (1998:468) a familiar landscape must be built to which users may return at any time. For this purpose a site map was constructed which linked to all other pages. The mapping system presented users with an aid in understanding which parts and how much of the information space they had interacted with and which parts and how much of them they had not.

Although one of the evaluators described way finding between the different pages easy, the following comment was made: "At the site map, however, I was not sure which of the sections I already visited". The reason for experiencing this problem is discussed in paragraph 6.2.1.3 (Navigation).

6.2.1.6 Dimension of user interface: Screen design

Treuhaft (1995:2) states that text lines longer than 60 characters are difficult to read and that the number of lines of text should be limited. Vaughan (1998:198) suggests that, unless the purpose of the multimedia program is to display large blocks of text,

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the user should be presented only with a few paragraphs of text per page. Since the program was developed to be informational, it was of the utmost importance that the program had to be developed to fit into the confined space so that it would facilitate the printing of the information, without cutting off half of the information on the page.

The general opinion of the evaluators was that the screen was not cluttered with too much text and that the colour of the text provided for good visibility. One of the experts did not like the green coloured headings and recommended that these be changed. According to Alessi & Trollip (1991:42), some colours, especially those near the centre of the visual spectrum such as yellow and green, are easier to perceive than others. Colours at the extremes of the visible colour spectrum (reds and blues) are the most difficult perceptual colours and should be avoided for text and detailed pictures.

Sneiderman (1987), as cited by Reeves & Harmon (1994), maintains that although certain design principles have been established, "screen design will always have elements of art and require invention". The researcher, therefore, did not change the green coloured headings as suggested.

6.2.1.7 Dimension of user interface: Simplicity and consistency

The goal is to be consistent and predictable with web sites. A site should be built on a consistent pattern of modular units, all sharing the same basic layout grids, graphic themes and hierarchies of organisation for maximum functionality and legibility (Lynch & Norton, 1997).

All the evaluators, except one of the experts, rated the program as being very consistent and predictable. This specific evaluator perceived the use of photos as inconsistent, because all of the photographs, with the exception of four, could be "enlarged" when "clicked" on. These four photographs were "roll over" images which confused and frustrated the user, because these images could not be enlarged like the other photographs. The "roll over" images were deleted as a result of this

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feedback.

6.2.1.8 Dimension of user interface: Metaphor or theme for the program

Jones & Okey (1995) suggest the use of a metaphor or theme for a program which should reflect the content of the program. These authors suggest that the metaphor be made obvious to the users. The metaphor must be made applicable to the content of the program, but they also state clearly that not all programs support a metaphor. No metaphor was used for this program, but a military theme was created by means of a photograph that was made transparent and displayed as a background.

The expert evaluators rated the theme as appropriate for the program and very applicable to the content of the program. One of the evaluators recommended that the SAMHS-logo be repeated on all pages. Since he was the only person who made this recommendation, it was not implemented.

6.2.1.9 Dimension of user interface: Media integration

Reeves & Harmon (1994) state that the various media used must work together to form a cohesive program and they pose the question as to whether the various media components are necessary functions of the program, or whether the program would function equally well without them. Alessi & Trollip (1991:40) state that pictures should be presented simultaneously with the related text so as to afford the user the opportunity to inspect the photographs/pictures and the explanations thereof, simultaneously.

Integration of the media was found to be coordinated and the evaluators indicated that the photographs were absolutely necessary to make the information relevant to the target group. One evaluator suggested that, when the program is extended in a next phase, other types of media, like sound and video, should be included to enhance the program.

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6.2.2 Simulate the deployment of the field hospital

6.2.2.1 Dimension of user interface: Information presentation (simulation)

The advantages of simulations are discussed in the literature review and listed in Table 2.3. An important reason for including a field hospital simulation in the program, was that the deployment of the field hospital is extremely expensive and time consuming. When equipment is transported to the deployment area, wear and tear occur. The non-availability of realistic scenarios and inadequate training opportunities result in unprepared nurses being sent to military operations/exercises. Only a limited number of nurses get any actual experience at such military operations/exercises.

Alessi & Trollip (1991:119) refer to physical simulations (simulations that teach *about* something) and procedural simulations (simulations that teach a sequence of actions), both of which were used in the program. When physical simulations are used, a physical object is represented on the screen, while a primary characteristic of procedural simulations is, that there is one or more correct or preferred sequences which should be learned to perform. Schwier & Misanchuk (1993:250) regard the dragging of screen objects as reasonable to use since it provides variety to keyboard response, while Alessi & Trollip (1991:119) see the dragging of screen objects as a useful type of interaction.

Almost all the users indicated that the simulation of the deployment of the field hospital had been a very valuable contribution to familiarise especially the nurses with the aspects that should be taken into consideration during the planning and deployment phases of military operations. More detail and different scenarios were recommended. It was also suggested that the simulation section be developed further and be extended to incorporate more of the other military health services' functions.

The simulation and layout of the field hospital were listed by a number of the evaluators as the most valuable aspect of the program.

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6.2.3 Provide information to prepare the military nurse for functioning during military operations

6.2.3.1 Dimension of user interface: Information presentation

The most elegantly designed user interface for an interactive program is useless if the information it is intended to present is incomprehensible to the user. This dimension is concerned with whether the information contained in the knowledge space is presented in an understandable format (Reeves, 1994).

Prior to developing the program, the researcher performed a content/information analysis to clarify and confirm the content that should be included in the program. The reason for this was to make the most essential information available to prepare military nurses to function in the field hospital during military operations.

Most of the users, and especially the nurses, indicated that they would be able to use what they learned in the program. All the evaluators stated that they wanted more content to be included in the program. Two of the four nurses who had been deployed, indicated that the content was not sufficient to prepare them for functioning during military operations. The reason for this was that they knew how important the excluded information was for the pre-deployment planning and functioning during military operations. It is meaningful that the nurses and other users who had been deployed, could indicate what information was lacking. Almost all the users who had not been deployed, indicated that they wanted more visual material and more information to be included. They could, however, not indicate what the information was that they needed. From this it is clear that they wanted as much information as possible, but that they did not know what they wanted to know.

All of the four experts who evaluated the program rated the information provision dimension as very high. They commented that the information presentation was comprehensible and clear and that users would be able to learn from this program. Recommendations regarding the content to be included in the program are presented

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in Table 5.20.

6.2.4 Create/keep attention

The attention of the student must not only be initially attracted, but also maintained throughout the lesson. Various factors for gaining and holding attention play a role, e.g. challenge, curiosity, control, relevance and consistency (Alessi & Trollip 1991:11). The application of the design specifications in the program on how to create and keep attention, are presented in Table 3.6.

Attention was initially attracted by the home page background image and the use of the familiar SAMHS-logo which created a formal, professional appearance. All the users had personal interest in this program because the content of the program is relevant to the knowledge required to be able to function during military operations. Photographs and graphics (drag-able tents and main medical units) were used to capture and focus the attention of the users. Photographs were presented simultaneously with the related text, which created the opportunity to inspect the photos at the same time. Most of the users and all of the nurses who had never been deployed requested more visual material. When asked to list the most valuable aspect of the program one of the nurses who had not been deployed yet, wrote: "Few people get the opportunity to see the field hospital deployed before being called up for a military operation. The program provides information that can be used to prepare the nurse for military operations. At the least, the nurse will be able to recognise the vehicles and familiarise herself with the layout and units of the field hospital".

The user-involvement created through the dragging around of the "tents" and the "deployment of the field hospital", held the attention of the users. Almost all of the users listed the simulation of the field hospital and the corresponding information as one of the most valuable aspects of the program.

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6.2.4.1 Dimension of user interface: Ease of use

The ease of using of a program may be highly correlated with how much users enjoy using a specific program. Not liking an interactive program that is intended to be highly motivating, is a major problem (Reeves & Harmon, 1994).

This program succeeded in creating and keeping the users' attention, because almost all evaluators rated this aspect very highly and indicated that they had enjoyed using the program very much. The experts confirmed this when they rated the "ease of use" dimension as very effective.

6.3 Overall functionality of this program

The target population for the development of this program was registered nurses who are Permanent Force members. The researcher decided, however, to broaden the target group that was to evaluate the program in order to determine whether the program would also be suited for other groups within the military health environment.

All of the fourteen users indicated that the program might be applicable to target groups other than nurses and all of the four experts rated the program as highly functional for the target group. They also recommended the use of the program for target groups other than nurses. Some of the most significant comments were: "Nurses function as part of a multi-professional team. This program might be applicable to the other team members as well". "The concept of the complete Medical Battalion Group and Medical Health Task Group concept must be included to incorporate other groups and not only the certain areas where nurses might be utilised". "This program can be used by members of all mustering within the SAMHS who are not familiar with the field hospital. It is a very good effort to bridge the gap that presently exists with regards to training in the SAMHS".

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6.4 Limitations of the research

The limitations experienced by the researcher are highlighted.

6.4.1 Target group

The web pages for this program were developed with *Dreamweaver*© which was not readily available on the users' computers. Most of the users do not make use of the Internet. Therefore, the users had to use the researcher's computer for the evaluation of the program. Only a limited number of users/experts could evaluate the program per day. The findings of this study could thus be derived from only a small sample of the target group.

A large number of experienced members had left the SANDF as a result of transformation. It was, therefore, found that the majority of people questioned or interviewed during the analyses, as well as the people who evaluated the program, had mostly gained experience during military operational **exercises** and had not gained their knowledge during actual exposure to real life military **operations**.

6.4.2 Content/information of the program

The training manuals that existed were not updated and very few local protocols and little doctrine regarding peace operations, existed. The proposed policy on South African participation in Peace Missions (April 1998) was still in a draft form and could not be quoted until approved by the relevant authorities. The researcher, therefore, had to rely on these limited protocols. A new doctrine, which emanated from lessons learnt during Exercise Blue Crane conducted during May 1999, was still in the process of being developed and could thus not be utilised as a basis for the development of this product.

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6.5 Recommendations

The recommendations are discussed as follows:

- Program-specific recommendations that recommend improvements and/or extensions of the developed program.

- General recommendations for the development of similar programs as well as research that can be done.

6.5.1 Program specific recommendations

The need for more information was expressed by almost all users, nurses as well as other military personnel.

The following were not intended to be included in the developed program, but are essential aspects that must be included during the next phases of program development. These are also some of the aspects that were listed by the users in the questionnaires as imperative aspects to be included, viz;

- the equipment and supplies needed for every section, e.g. theatre and casualties;

- checklists for the equipment and supplies in preparation for different types of operations;

- exact (fine) details on how to physically deploy each containerised unit, as well as the checklists for each;

- the functions of nurses in the different sections; and

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- guidelines on how to do an appreciation for the expected number of casualties/patients and the respective planning of equipment and supplies.

Almost all users, nurses as well as other military personnel, requested further development of the program, with specific reference to the simulation section of the field hospital in order to incorporate different scenarios and a larger number of the military health service's functions than only nursing.

Appendix E(2) indicates in italics how little of the possible content that may be incorporated in the future, had been used in the developed program.

6.5.2 General recommendations for similar development

Exercise Blue Crane took place during the period 6 to 30 April 1999. The debriefings of the SA Army, SA Air Force and SA Military Health Service that took place after the exercise, confirmed the lack of experience with regards to training and education of military personnel for military operations.

Multimedia is presently enjoying widespread use in education and training programs and will provoke radical changes in the teaching process of the future, since teachers will become more like guides and mentors, instead of the primary providers of information and understanding.

Further research into computer delivery technologies that can be used to enrich the learning experience for the student in the SANDF, is imperative. The following are some of the technologies that can be further explored for their applicability and possible application in the SANDF:

- Virtual reality and virtual environment. How can they support, for example, training in the deployment of the field hospital and the evacuation of patients?

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- How can multimedia be used for training nurses, medical officers and operational medical care orderlies in the triage, resuscitation and evacuation of wounded under pressure of time and under operational circumstances?

- The feasibility of providing access for all military personnel to the Internet, or at least the Intranet, for training and educational purposes. Through the Intranet, current training and support materials can be delivered to a large dispersed audience, more cost and time-effectively than traditional training material. The field hospital program was developed as a CD-ROM/WWW hybrid, which is essentially a web site on a CD-ROM disc that could be played off a CD-ROM drive. Hyperlinks on the CD-ROM would take a student effortlessly from a CD-ROM to the Internet and back. Information that is likely to change in the short time, cannot be included on a CD-ROM, but updates to a web site can be done easily and immediately. The information on the CD-ROM includes aspects of a permanent nature. The emphasis of future development of this program should therefore be on the aspects that were excluded from the program because of their temporary nature, or aspects that might change according to circumstances. Equipment and supplies for the field hospital are examples of aspects that might change according to the type of military operation for which is to be prepared. This type of information would be best suited for availability on the Internet/Intranet. The researcher could, however, not develop for the Intranet of the SAMHS, because it is currently not utilised effectively and is still a novice idea to use as training/education method within the SANDF.

- Displaying photographs to explain related text, has proved to be very useful and popular in the developed multimedia program. When developing similar programs for the future, or improving on the current one, use can be made of digital videos and/or photographs with specific techniques for obtaining special effects. “Panaview” photos, for example the inside of the theatre, are taken very close to each other. The photos are then “stitched” together to create the impression that the viewer is situated inside the theatre and can see the inside

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of the room through a 360º view. The user will then be able to see the complete interior of the theatre by "clicking" and moving the mouse over the photograph. Such a program can be developed even further by showing an enlarged photograph of a specific section of the interior of the theatre, on which the users can "click" with the mouse. In this way, equipment can be explained and supplies can be listed whenever a user exercises that choice.

An overview of the recommendations and the limitations is presented in Table 6.1.

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Table 6.1 Overview of recommendations

Objectives	Recommendations	Limitations
Use **multimedia** to design the program, with the application of sound **design specifications.**	* Research into technologies like - virtual reality and virtual environment. How can they support for example, training in the deployment of the field hospital and the evacuation of patients? - multimedia to train nurses, medical officers and operational medical care orderlies in the triage, resuscitation and evacuation of wounded under pressure of time. * Access for all military personnel to the Internet or at least the Intranet. Through the Intranet current training and support materials (programs like this one) can be delivered to a large dispersed audience more cost and time effective than traditional training methods.	* Access to a computer at home or work is not equally possible for all users. * To develop a multimedia program with sound and video, the users must have access to computers that have sound and video capabilities. This is also not possible for all users.
Simulate the deployment of the field hospital.	* Develop the simulation section further to incorporate different scenarios and more of the military health team than just nurses.	

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Objectives	Recommendations	Limitations
Provide **information** to prepare the military nurse for functioning during **military operations**	The following were not planned to be included in this program but it is essential aspects that must be included during the next phases of program development. They were also some of the aspects that were requested by the users in the questionnaires to be included: * The equipment and supplies needed for every section, e.g. theatre, casualties. * Checklists for the equipment and supplies. * Exact (fine) details on how to deploy each containerised unit plus checklists of each. * Functions of nurses in the different sections. * Guidelines on how to do an appreciation for the expected number of casualties/patients and the planning of equipment and supplies accordingly.	* Equipment and supplies are examples of the aspects that might change according to the type of military operation for which is to be prepared. This type of information would be best suited to be on the Internet/Intranet and not on CD-ROM, as the currently developed program. Internet is not available to every user and the Intranet is currently not used effectively.

6.6 The way forward

Being part of the information age means, amongst others, adapting to the ever changing technological environment and coping with the rate at which information becomes outdated.

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The SANDF is going to have to research into new technologies that will reduce the overall cost of training in the long term, without negatively affecting the high standard of training, but improving on it instead. The advantages of using multimedia in training and education, are virtually inexhaustible. If funds are not available for immediate application, the development of such multimedia products can be implemented in stages for more advanced utilisation at a later stage.

This developed multimedia program on CD-ROM, is but a small beginning and creates a most exciting challenge for exploring and developing various and alternative training strategies and media of instruction in the SANDF and specifically the SAMHS.