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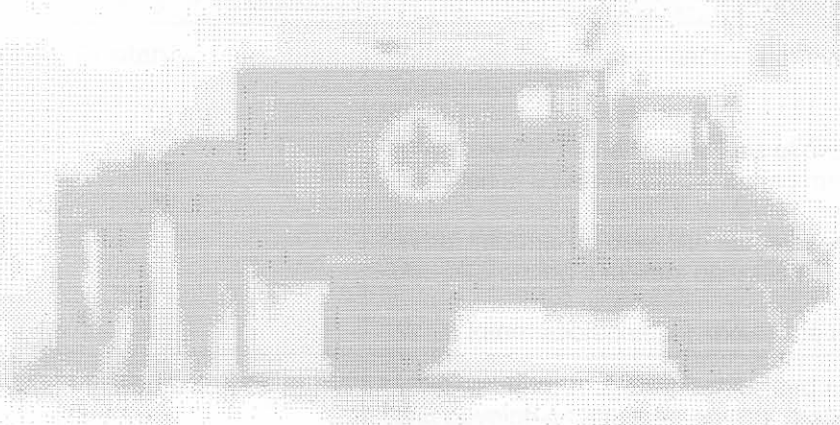
Chapter 3

Design, development and production



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CHAPTER 3

DESIGN, DEVELOPMENT AND PRODUCTION

3.1 Executive overview

This chapter describes the design, development and the production of the multimedia program. An overview of the stages in the development process is presented in Table 3.2. Each of the stages in the process is described in detail.

The following research questions were addressed:

Table 3.1 Research questions

Topic Addressed	Questions
Content	* What are the role and functions of the military nurse during **military operations**? * What are the role and functions of the military nurse to be able to function in a **field hospital** during military operations? * What information does the nurse need to be able to function in the field hospital during a military operation? * What information/content should be made available to the nurse?
Presentation of media	* How can text, images, graphics and animation be combined to create and develop an attention-getting, realistic environment to simulate the deployment of the field hospital and provide information to prepare the military nurse for functioning during military operations?
Delivery of media	* Which delivery system will be best suited taking into consideration the constraints and restrictions of the SANDF?
Project plan	* How should this program be designed and developed?
Evaluation	* How well is this program working?

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Table 3.2 Stages in the development process of the program

Stages	Activities	Output	Discussion
Analysis	**Conduct analysis:**		
	* Goal	* Roles and functions of military nurse	Chapter 3
	* Target group	* Target group profile * Learning needs	
	* Content/information	* Outline of content to be included List of major topics and sub-topics	
	* Presentation and delivery of media	* Literature survey report	Chapter 2
	* Project	* Variables which might effect program design * Project plan	Chapter 3
Designing	**Design of program:** * Write objectives * Decide on delivery system	* Design for the specific system	Chapter 3
	* Analyse content	* Exact content to be included	
	* Sequencing of content	* Navigation map (site map)	
	* Design specifications	* Blueprint	
	* Design evaluation instrument	* Evaluation instrument	
Development	* Decide on program editor	* Program editor installed	Chapter 3
	* Story boarding	* Illustrations of screens	
	* Develop prototype on computer	* Prototype	
	* Conduct **formative** evaluation	* User comments/expert advice * Revise prototype	
Implementation (Programming)	* Design on computer	* Working product ready for evaluation	Chapter 3
Evaluation	* Conduct **summative** evaluation	* Recommendations * Evaluation reports - expert and users	Chapter 4
	* Revise program	* Refinement of program	
Report	* Report **findings** and compile **recommendations** for further study/program development	* Research report * Delivering of product	Chapter 5 Chapter 6

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3.2 Introduction

The researcher adapted the CAI (Computer Assisted Instruction) development model of Alessi and Trollip (1991:245), the process model of making multimedia of Vaughan (1998:430) and the model of Reeves (1994) to use as guides for the development of this program (Table 3.2). Alessi and Trollip (1991:245) recommend a cycle of drafting, evaluation and revision until the product works.

Following is a discussion on each of the stages used in the development process of the multimedia program.

3.3 Stage 1: Analysis

The analysis report template of Reeves (1994) was used as guideline to present the results of the analysis activities.

This stage describes the **purpose** of the analysis, **limitations**, the analysis **methods, instruments** used, and the **sample,** followed by the **results** of the analysis.

The outcome of the needs analysis was used to design and develop a multimedia **program** to simulate the deployment of the field hospital and provide information to prepare the military nurse for functioning in the field hospital during military operations.

The multimedia program will in future form part of one of the modules of a degree course for military nurses, presently being developed by a tertiary institution.

3.3.1 Purpose

The purpose of the analyses were the following:

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3.3.1.1 Goal analysis (performed in two phases)

The aim of the Phase 1 Goal analysis was to clarify and/or confirm the roles and functions of the military nurse to be able to function during **military operations**.

The aim of the Phase 2 Goal analysis was to clarify and/or confirm the roles and functions of the military nurse to be able to function in a **field hospital** during military operations.

3.3.1.2 Target population analysis

The aim of the target population analysis was to confirm the extent of the nurses' training and education needs regarding functioning in a field hospital during military operations, the knowledge and skills they already possessed and needed to acquire, their expectations, and any constraints.

3.3.1.3 Content/information analysis

The aim of the content/information analysis was to clarify the content/information that should be included in the multimedia program in order to make the most essential information available to simulate the field hospital and to prepare the military nurse for functioning in the field hospital during military operations.

3.3.1.4 Media analysis

- Presentation

The aim of this analysis was to find the best combination of text, images, and animation, to create an attention-getting, realistic environment to simulate the deployment of the field hospital and provide information to prepare the military nurse for functioning during military operations.

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- Delivery

The aim of the research regarding the delivery of a multimedia product was to find a delivery system which would be best suited, taking into consideration the constraints and restrictions of the SANDF.

3.3.1.5 Project analysis

The aim of the analysis was to collect information regarding the design and development **process** of the multimedia program under development and at the same time set target dates for each stage to be finished.

3.3.2 Limitations

3.3.2.1 Content/information of program

The training manuals that existed were not updated and very few local protocols and doctrine regarding peace operations existed. The proposed policy on South African participation in Peace Missions (April 1998) is still in a draft form and could not be quoted until approved by the relevant role players. The researcher therefore had to rely on these limited protocols and people who had been deployed during military operations. New doctrine, emanating 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.

A large number of experienced people had left the SANDF through the process of transformation. It was therefore found that the majority of people questioned or interviewed during the analyses, mostly had experience gained during military operational **exercises** and had not gained their knowledge during exposure to real life military **operations**.

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3.3.2.2 Inspection of deployed field hospital and interviews

The researcher was only able to spend a limited amount of time with the personnel deployed during Exercise Blue Crane and to observe the activities that were taking place at the field hospital.

3.4 Analysis method

Methodological triangulation was used. The research questions and the different quantitative instruments/methods that were applied, are set out in Table 3.3 and are discussed from paragraph 3.4.1.

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Table 3.3 Research questions and analysis methods

Topic addressed and questions	Lit/ Doc	Ques	Inter	Insp	Focus
Information/content:					
Phase 1:					
* What are the role and functions of the military nurse during **military operations**?	✔	✔	✔	✔	✔
Phase 2:					
* What are the role and functions of the military nurse to be able to function in a **field hospital** during a military operation?	✔	✔	✔	✔	✔
* What information does the nurse need to be able to function in the field hospital during a military operation?	✔	✔	✔	✔	✔
* What information/content must be made available to the nurse?	✔		✔		
Presentation: How can text, images, and animation be combined to create an attention-getting, realistic environment to simulate the deployment of the field hospital and provide information for functioning during military operations?	✔				
Delivery: Which delivery system would be best suited?	✔				
Project plan: How should this program be designed and developed?	✔				
Evaluation: How well is this program working?		✔	✔		

Note : The following abbreviations are used in the table :
Lit/Doc = Literature review/Documentation
Ques = Questionnaire
Insp = Inspection
Inter = Interview,
Focus = Focus group.

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3.4.1 Analysis methods

The following surveys were used as analysis methods:

3.4.1.1 Interviews

During phase one of the needs analysis, the researcher and the head of the nursing department of a South African university visited the Health Studies Division, Royal Defence Medical College in the United Kingdom. The curriculum of their degree in military nursing, the role of the military nurse during military operations, and the needs analysis that had been done before they developed their course, were discussed in detail.

The researcher interviewed each of eight nurses while they were deployed during a military operation. They were purposefully chosen, i.e. all the nurses that were available at the field hospital during the visit of the researcher. The interview was conducted because it allowed the researcher to in more detail explore the information needs and preferences of the nurses while deployed. A questionnaire with ten open-ended questions was used which was tested for content and construct correctness by a nurse who was not part of the interviews or the deployment. The nurses were allowed to collaborate on aspects if so preferred.

The researcher took notes during the interviews and wrote out longer interpretations of the responses soon after the interviews had been conducted.

Military experts were consulted in order to identify the content that should be included in the multi-media project.

3.4.1.2 Focus group (Phase 1)

Two facilitators (industrial psychologists) were appointed to facilitate the focus group during phase one. The facilitators and the researcher established the

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survey goal and the focus group protocol. Sixteen people, military as well as non-military, were purposefully chosen to be part of this focus group. Every person was chosen because of the fact that he/she was a specialist in a certain medical field, e.g. trauma, peace support operations, chemical and biological defensive measures and aviation nursing.

The questions were generated and tested for ease of understanding by a person not part of the focus group.

The facilitators asked the questions and encouraged everybody to give their opinions, and ensured that no single individual dominated the discussion. The researcher took notes and did not take part in the discussion. After each question was asked, the discussion continued until agreement was reached by most of the people on each aspect of the questions.

The data was analysed by the researcher.

An example of the focus group protocol is attached as **Appendix A**.

3.4.1.3 Focus group (Phase 2)

During phase two of the needs analysis, a focus group met at a tertiary training institution to confirm the role and tasks of the military nurse during military operations and specifically in the field hospital.

The head of the nursing faculty established the survey goal and the focus group protocol because the military nursing degree is to be presented at this particular institution.

The following people were purposefully chosen to be part of this focus group:

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- Experts in the field of military operations.

- Nurses who have been deployed in military operations.

- A member of the International Committee of the Red Cross.

- A member of the Royal Defence Medical College in the United Kingdom who had developed a degree in military nursing for their students and who had extensive operational experience.

- The head of the nursing faculty asked the questions and encouraged everybody to give their opinions, ensuring that no one dominated the discussion. The researcher took notes and did not take part in the discussion. The discussion continued until most of the people agreed on a certain aspect and until the role and tasks of the military nurse were agreed upon.

The data was analysed by the researcher and the head of the nursing faculty. An example of the focus group protocol is attached as **Appendix B**.

3.4.1.4 Inspection

The deployment site of the field hospital was visited by the researcher during a military operation to inspect the layout of the field hospital, the flow of patients and the flow of traffic and notes and photographs were taken.

3.4.1.5 Questionnaires

Ten questionnaires with 15 open-ended questions were distributed randomly to ten registered nurses stationed at 1 Military Hospital and to ten lecturers at the SAMHS College for Nursing who were willing to complete the questionnaire. The questionnaire used was tested for content and construct correctness by a nurse

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who was not part of the research.

The researcher collected all the questionnaires the same day they were completed. The data was analysed by the researcher.

3.4.1.6 Documentation review

The existing and currently used training manuals were studied by the researcher to identify the content that the nurses need to know.

The report of a needs analysis that was done by members of the Royal Defence Medical College in the UK to establish the training needs of their nurses in order to develop a course in military nursing for their students, had been studied to learn from their experience.

3.4.1.7 Literature search

A literature search was done to collect information regarding how the multimedia product to be developed could be utilised to simulate the deployment of the field hospital and which delivery system would be the most suitable for this purpose.

3.5 Sample

The people that were included in the analyses are indicated under each of the following headings.

3.5.1 Interviews

A **member of the Royal Defence Medical College** in the United Kingdom who had developed a degree in military nursing for their students and who has had extended operational experience had been interviewed to identify and confirm the tasks that a military nurse might perform while functioning in a field hospital during

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military operations.

Registered nurses who had previously deployed during military operations and military operational exercises were interviewed at the place of deployment during a military exercise to clarify the educational and training needs of the military nurse in order to be prepared to function during military operations. Their computer literacy level was identified and their motivation to use a computer as a supplement for their information needs was established.

Registered nurses who had never been deployed were interviewed to identify their educational, training and information needs to prepare themselves for deployment in a military operation. Their computer literacy level was identified and their motivation to use a computer as supplement for their information needs was established.

Experts in the field of military operations were interviewed to identify and confirm the content that should be made available to the military nurse.

A **member of the International Committee of the Red Cross** was interviewed to identify and confirm the content that should be made available to the military nurse from the perspective of the Red Cross.

3.5.2 Focus group (Phase 1)

A total of **sixteen people, military as well as non-military**, took part in the focus group discussions. These people were chosen because they were specialists in a certain field, e.g. trauma, peace support operations, chemical and biological defensive measures and aviation nursing.

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3.5.3 Focus group (Phase 2)

The following people were involved in this focus group: Experts in the field of military operations, nurses who had been deployed before, a member of the International Committee of the Red Cross as well as a member of the Royal Defence Medical College in the United Kingdom who had developed a degree in military nursing for their students and who has had extensive operational experience.

3.6 Instrumentation

The following instruments and methods were used during the analyses.

3.6.1 Questionnaires

3.6.1.1 Questionnaires to registered nurses

Ten questionnaires with 15 open-ended questions were used. See **Appendix C** for an example of the questionnaire.

The aspects that were addressed in the questionnaire are the following:

- The training and applicable courses needed or required to be able to function during military operations.
- The information and educational needs required to be prepared to function during a military operation.
- Their general knowledge regarding the field hospital was tested.
- Their computer literacy level and motivation to receive information or training with computer assistance was established.

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3.6.1.2 Interviews with registered nurses

Eight nurses were interviewed while being deployed during a military exercise during which a questionnaire with ten open-ended questions was used. See **Appendix D** for an example of the questionnaire.

The aspects that were addressed in the questionnaire are the following:

- The training and applicable courses needed or required to be able to function during military operations.
- The information and educational needs required to be prepared to function during a military operation.
- The computer literacy level and motivation needed to receive information or training with the assistance of a computer.

3.7 Results

The results of the needs analysis are described below.

3.7.1 Goal analyses

A graphic representation and a table were used to display the results of the goal analyses during Phase 1 of the analysis. See **Appendices E(1)** and **E(2)** for the results. Only the section indicated in blue in Appendix E(2) was further analysed in Phase 2 for the purpose of developing a multimedia product.

The result of the goal analysis in Phase 2 is displayed in a diagram attached as **Appendix F**. This diagram was used to analyse the content that was made available to the students, taking the educational and information needs indicated by the students into consideration.

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3.7.2 Target population profile

Since the researcher is a nursing educator and is familiar with military nurses, the military environment, and the training that is available, it allowed her to narrow down the analysis because of her familiarity with and awareness of many of the training and educational needs as well as the constraints that may have an influence on developing a multimedia program.

The target population was male and female registered nurses who are Permanent Force members. They are located throughout the country, working in various sickbays and Military hospitals.

Only eight of the nurses who were interviewed or completed the questionnaire, had been deployed before as part of a military exercise.

Aspects like language preference of the target group were not taken into consideration, because the language most understood in the military environment is English. For this reason the multimedia product was developed in English.

3.7.2.1 Training and applicable courses needed

Although all the nurses (n=28) had done some military courses, they all indicated that the military courses were just enough to give them some background but had not been sufficiently applied to the role and tasks of the military nurse to prepare them for military operations.

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Table 3.4 Military courses completed by target group

Officers Formative Training Course	Battle Handling Course	Junior Command and Staff Course
28	20	5

Note : Officers' Formative Training must first be completed before the other courses may be attempted, which means that only five nurses had completed all three courses.

Most of the nurses (n=20) felt that their training for nursing was adequate but that they needed more exposure to the field hospital and functioning in adverse conditions. Eight nurses indicated that if they would be called up to be ready for a military operation the following day, they would not be able to function properly since they lacked both nursing and military experience.

The nurses interviewed at the deployment area (n=8), all indicated that they had not been sufficiently prepared for, or briefed about the military exercise and that they had learned through trial and error.

The courses that were indicated as necessary for military nurses to be able to function during military operations are: advanced trauma and life support, clinical diagnosis and treatment, aviation nursing, first aid, theatre technique, and practical experience/ exposure to the field environment and the field hospital.

3.7.2.2 Educational and informational needs

The informational needs of the nurses who had been interviewed that had already been deployed during a military exercise, were slightly different from those of nurses that had not been deployed before. All the nurses (n=8) who had been interviewed at the place of deployment, indicated that they would have preferred to have been more informed about general aspects like the kind of weather to be expected, the kind of diseases to be expected, the specific military operation and

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that they would have liked to have been part of the planning process of the deployment of the field hospital and the supplies needed. Two of the nurses indicated that they were not familiar with all the military vehicles and that they would have liked to have been able to distinguish between them. Four of the nurses wanted to learn more about radio-communication procedures and helicopter drills.

The nurses who had never deployed before, indicated that they would like to have been informed about the layout of the field hospital, the components of the field hospital, what would be expected of them, where they would sleep and what kind of facilities would be available to them. Three of the nurses indicated that they would have liked to know what supplies and equipment would be available.

Table 3.5 Nurses' needs for information, training and education

Informational needs	Training/educational needs
Equipment and supplies needed	Helicopter drills
Kind of patients/diseases that can be expected	Radio-communication procedures
Functions of the nurse/what will be expected of the nurse	The different vehicles used during a military operation
The layout and components of the field hospital	The layout and components of the field hospital
Need to be part of planning cycle - pre-deployment planning appreciation	Type of military operation
Ablution facilities and sleeping arrangements	
What they must take along	

3.7.2.3 General knowledge regarding the field hospital

The nurses who had been deployed while interviewed, had not been questioned about the field hospital because they had been part of the deployment of the field hospital and were therefore familiar with the layout.

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The nurses who had never been deployed before, had either never seen the field hospital deployed or could not remember what they had been told during the military courses. The field hospital is only explained in theory but they had not actually seen it deployed.

3.7.2.4 Computer literacy

Most of the nurses indicated that they were computer literate.

The nurses indicated that real life experience could never be replaced by simulation or a computer, but that through the computer they could gain information that could help them to prepare for a military operation or would serve as a precursor for a military exercise.

3.7.2.5 Motivation

Although not all the nurses indicated that they had access to a computer with a CD-ROM, they were highly motivated people who indicated that if they knew that information was available by means of a computer to prepare them for deployment, that they would spare no pains to get hold of that information. Two of the nurses indicated that they were not interested in getting the information by means of a CD-ROM.

3.7.3 Content analysis

The researcher used a diagram (**Appendix F**) to indicate that which was decided upon by the focus group as important aspects to be taken into consideration for teaching the field hospital. Not all the learning needs, as indicated by the students, were included at that stage. The final decision regarding the content that had to be included in the multimedia product, changed after discussion with the military experts and during the development stage.

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3.7.4 Media analysis

A media analysis was done to determine how text, images and animation could be combined to create an attention-getting, realistic environment to simulate the field hospital, as well as which delivery system would be best suited, taking into consideration the constraints and restrictions of the South African National Defence Force (SANDF). (See literature review **Chapter 2** for the results).

3.7.5 Project analysis

The result of the project analysis was a project plan which was developed using a combination of the steps of the models recommended by Alessi & Trollip (1991:245) Vaughan (1998:430) and Reeves (1994). The development process is set out in table format as well as the target dates for each stage to be finished. (See **Appendix G** for the project plan).

3.8 Triangulation

3.8.1 Data triangulation

The debriefing reports of the SA Army, SA Air Force and SA Military Health Services after Exercise Blue Crane during the period 6-30 April 1999, confirmed the lack of experience/training/education of military personnel.

Only the aspects that are applicable to the nurses and which they identified as lacking or as needs are listed:

- Lack of operational experience and doctrinal knowledge of peace operations.

- Lack of standard radio-communication procedures.

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- Lack of knowledge regarding essential aspects of deployment.
- How to pitch tents.
- How to deploy the field hospital.
- Layout of the field hospital.
- Thorough appreciation (aspects to consider before deployment).
- Lack of knowledge about the Law of Armed Conflict and Humanitarian Law.

3.9 Stage 2: The design of the program

According to Hannafin & Peck (1988:58) the purpose of designing is to identify and document the best means of achieving the desired results. Allesi & Trollip (1991:293) state that the design step is critical to the effectiveness of the program. The content is outlined and sequenced and then the plan is reviewed by colleagues and clients. It is much easier to revise things on paper than revise a computer program.

3.9.1 Objectives

Objectives that should be met in the program for the main research question to be answered were written and included a description of how the objective will be met. The objectives also guided the researcher to stay on track. The objectives are presented in Table 3.6.

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Table 3.6 Design objectives

Objectives	How objectives will be met
* Create **attention**	* Graphically attractive Home Page by using an eye-catching photograph scanned in as background. No information given, except a heading that might create curiosity. * Photos - small and enlargements. * Simulation of field hospital - interactivity by user.
* **Simulate** the deployment of the field hospital	* Click and drag the "tents and containers" to "deploy" the field hospital - user try him-/herself. * Proposal of a deployment that might work well.
* Provide **information** to prepare the military nurse for functioning during **military operations**.	* Content outlined in site map (**Appendix H**)

3.9.2 Delivery system

As a result of the restrictions of the SANDF with regards to the publishing of training material, the use of the WWW for this purpose could not be considered. The use of HTML and a web design format, however, posed a possibility for the delivery of this multimedia program, since use could be made of the Intranet of the SAMHS. A large proportion of the military nurses are located throughout the country, which made the use of a CD-ROM/WWW hybrid as a delivery system, the most feasible option. The information which is likely to change in the short term, could be placed on the SAMHS Intranet.

3.9.3 Analysing the content

Subject matter experts were asked to analyse the content that should be included in the program to make sure that the most essential information was made available. It was decided not to include all the learning and educational needs as indicated by the nurses during the analysis phase. The aspects that were

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excluded are those aspects that are of a more practical nature as well as those that are subject to change, depending on the type of military operation.

3.9.4 Sequencing

The structure of the program must be mapped out, because navigation maps outline the connections or links among various areas of the content and help organise the content. The navigation map (or site map) provides a chart of the logical flow of the interactive interface (Vaughan, 1998:464).

According to Vaughan (1998:468) a familiar landscape must be built to which users may return at any time. A site map for the web site was therefore constructed to which all other documents were linked. The site map would be directly accessed upon exiting any such document. A nonlinear approach was used, i.e. users were given navigational control so that they could wander through the content at will. The site map was, however, arranged in such a way that the user might be enticed to start at the top left and work through the program in a sequential manner. (See **Appendix H** for site map layout).

3.9.5 Design specifications

The factors that should be taken into consideration when designing are discussed in detail in **Chapter 2.** The way in which they were implemented in the program are set out in Table 3.7.

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Table 3.7 Design specifications

Design specifications	Implementation in program
Multimedia organising structure	Non-linear.
Multimedia building blocks:	
Text attributes:	
* Fonts/type faces	Arial.
* Print size	Large enough to read comfortably on screen, small enough to print out in few pages per topic.
* Type styles	Headings: bold. Italics instead of underlining.
* Cases	Combination of upper case and lower case - easier to read.
* Serif vs Sans serif	* Sans serif - more legible and attractive when presenting a substantial amount of text on screen as in this program. * Large serif font for headings - deliver message of elegance.
* Justification of text	Left justification.
* Menus for navigation	Navigation site map (text list of topics) at beginning of site - familiar place for user to go back to.
* Buttons for interaction	* Default buttons of Internet used. * Instructions to click on photos to view an enlargement.
* Fields for reading	* Text per subject organised to be able to print in no more than two pages. * Lots of white space around text. * Line length limited to maximum of 60 characters.
* Symbols and icons	Logo of the SAMHS used on index page. Arrows and helicopter pad - known symbols.
* Animating text	Not used.
* Layout of text	* Down scrolling limited to 2 screens maximum. Scrolling left and right avoided. * When a combination of text and graphics appear on display, the text is isolated. * Indentations used and blank lines to indicate new paragraphs. * Information organised into manageable segments - users do not get overwhelmed by the amount of information.

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Design specifications	Implementation in program
Screen design principles:	
* Simplicity	* Simple and straightforward - no "bells and whistles". The best designs are the ones no one ever notices.
* Consistency	* Consistent use of colour and screen layout - consistent density and white spaces, background image and familiar site map. Background image used as theme for program - theme reflects program's content.
* Clarity	* Bullets used whenever possible. Language level compatible with target group.
* Aesthetic consideration: - balance - harmony	* Harmony through consistency of font, colour and background image. Images and text are balanced within the page with lots of white space to create harmony.
* Design stability	* Interactive elements work reliably. High design and editorial standards.
Colour combinations	Only two colours were used for the text, that is black and web safe green for the headings. Green (near the centre of visual spectrum) is easier to perceive than others. The background colour used is white. A photo of a Mfezi ambulance and a helicopter busy with the evacuation of patients was scanned in and used as background image to create a military operations atmosphere.
Images	Photos scanned in and JPEG saved - permits a greater degree of compression than GIF and faster downloading. Photos do not take more than 15 seconds maximum to download. Four photos at the most on one screen not to clutter the screen. Photos are presented simultaneously with the related text - opportunity to inspect the photos and explanation together. The user controls the length of time for looking at the photos (do not disappear after predetermined time period). Click on a photo to see an enlargement - choice of user.
Graphics	Vector drawn graphics ("tents and containers") of the field hospital were created by the researcher and GIF saved - background of graphics made transparent.
"Drag-able" screen objects	"Tents" and "containers" are moved on the screen by clicking and dragging them to construct the layout of the field hospital.
Feedback and dialogue	Link provided to site's editor through direct link to e-mail address.

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Design specifications	Implementation in program
Create/keep attention	Attention attracted initially by the home page background image and the use of the familiar SAMHS logo which create a **formal, professional look - importance of content**. **Curiosity** - what is behind the home page? **User involvement** - dragging around of "tents". **Personal interest** because the content of the program is relevant to the knowledge required to be able to function properly during military operations. **Photos** - capture attention more than text and explain text. Text is balanced with photos and graphics to focus attention. **Consistency** - is more important than varying layout to maintain attention.
Simulation	Physical simulation combined with procedural simulation. "Deployment" of the field hospital - help user to build a useful mental model.
Delivery systems	CD-ROM/WWW hybrid which is particularly useful for distance learners. The Intranet for information that might change frequently.

3.10 Stage 3: Development of the program

3.10.1 Choice of editor for creating and managing web pages

Dreamweaver® was chosen as the editor for creating and managing web pages for the following reasons:

- With *Dreamweaver®*, it is easy to create cross-platform, cross-browser pages.
- HTML documents can be imported without reformatting the code.
- *Dreamweaver®* makes it possible to use HTML features such as animated layers and behaviours without writing a code which was a mandatory feature to allow moving around of the "field hospital" components.

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The researcher was unfamiliar with the program and spent considerable time into mastering the program. An informal teaching session was arranged to teach the capabilities and technical aspects of the program.

3.10.2 Story boarding

"Story boards are illustrations depicting each change to the computer screen and conveying other important information to the reviewers and programmers" (Hannafin & Peck, 1988:61).

Since the researcher was doing the designing and developing of the program, less-detailed story boards were used. The program was developed for the web which meant that, except for a few pages with photos on and the simulation of the field hospital, all the pages were the same. The story boards were therefore only used as a rough schematic guide for development of the program.

3.10.3 Development of the prototype

A small portion of the planned project was selected and developed to get it to work as it would in the final project. At least one of each of the different kind of web pages were developed e.g. a page with photos that link to enlargements, a page with only information and links and a page which creates interactivity through "clicking and dragging" of objects.

3.10.4 Conduct formative evaluation and revise the program

Formative evaluation refers to evaluation that takes place while the program is being developed (Hannafin & Peck, 1988:63).

"Test it, then test it again; that's the unavoidable rule" (Vaughan, 1998:544).

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3.10.4.1 Testing the program on the web

Testing the program on the web was essential to ensure that the end result appears on screen exactly as planned. The background of the program was not visible on the web, even though it was visible on the researchers' computer on "view on browser" mode. After a long fault finding process it was found that the setting on the *Dreamweaver®* program was incorrect since it was set relevant to site root instead of relevant to document.

3.10.4.2 Potential users

The people who were involved in the formative stage were registered nurses who were previously deployed as part of a military operation and registered nurses who had not been part of military operations before.

The potential users were observed while they were going through the program. Their reactions were analysed and all questions noted. One of the nurses was unfamiliar with the way the program was designed for the web and asked for instructions. Aspects that needed revision were identified and rectified.

3.10.4.3 Graphic design experts

The first design of the program was in the colours of the South African Military Health Service (SAMHS), namely maroon text on a background of cream and web safe green for links and visited links. The SAMHS logo was used on top of each page to create a professional and formal look. The idea was to create an atmosphere that was military and dusty because the deployment of the field hospital is just what the name indicates, in the field. The multimedia design experts recommended, however, that white be used as a background colour and black used for the text. It was also suggested that the SAMHS logo be omitted.

The researcher then scanned in a photo of an Mfezi ambulance and helicopter,

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made it transparent and used it as a background image on a white background. The result was a professional look with a "military feel" and without the all white clinical background, which satisfied the graphic design experts.

The researcher worked according to the time schedule as set out in **Appendix G.**

3.11 Stage 4: Production

Most users at home and the office have 14 - 15 inches monitor screens which are set to display a 640 x 480 pixel screen. Since the program was developed to be informational, it was of the utmost importance that the program be developed to fit into the confined available space so that it would be easy to print the information without cutting off half of the information on the page. Lynch & Horton (1997) describe the "safe area" dimensions for layouts designed to print well as 535 pixels maximum width and 295 pixels maximum height.

To design and develop for a CD-ROM/WWW hybrid delivery system, certain principles had to be kept in mind. On a 640 x 480 pixel VGA monitor, the working space on the monitor is about 600 pixels wide by 300 tall because browsers include controls and slider bars (Vaughan, 1998:497). He also recommends that eye-catchers that will be first loaded and viewed by visitors without scrolling, be placed in this space (Vaughan, 1998:497).

The design principles which were used for this program are set out in Table 3.6.

3.12 Stage 5: Summative evaluation of the program

The aim of the summative evaluation was to evaluate if the program met the prescribed objectives. The evaluation process is discussed in **Chapter 4.**

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3.13 Stage 6: Report

The findings of the summative evaluation and the recommendations for revision of the program and future development are discussed in **Chapters 5 and 6.**