

# TUTDoR

## A managerial strategy for video conferencing implementation

Item Type	Thesis
Authors	Sadie, Alida Jeanetta
Publisher	Tshwane University of Technology
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**A MANAGERIAL STRATEGY FOR  
VIDEO CONFERENCING IMPLEMENTATION**

by

**ALIDA JEANETTA SADIE**

Submitted in fulfilment of the requirements for the degree

**MAGISTER TECHNOLOGIAE:  
OFFICE MANAGEMENT AND TECHNOLOGY**

in the

Department of Office Management and Technology

Faculty of Management

**TSHWANE UNIVERSITY OF TECHNOLOGY**

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January 2004

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I hereby declare that the dissertation submitted for the degree Master Technologiae: Office Management and Technology at Tshwane University of Technology, is my own original work and has not previously been submitted to any other institution/s or quoted as indicated and acknowledged by means of a comprehensive list of references.

A J SADIE (Ms)

**OUR TRUE LOVER OF KNOWLEDGE  
NATURALLY STRIVES FOR REALITY,  
AND WILL NOT REST CONTENT  
WITH EACH SET OF PARTICULARS  
WHICH OPINION TAKES FROM REALITY,  
BUT SOARS WITH UNDIMMED  
AND UNWEARIED PASSION  
TILL BE GRASPS THE NATURE  
OF EACH THING AS IT IS ...**

*Plato*

This study is dedicated to  
my parents, friends and colleagues  
who stood by my side  
when I was long on work  
and short on time

*Thank you for your support*

## ACKNOWLEDGEMENTS

I would like to express my sincere gratitude and appreciation to:

- Prof DP Conradie (Tshwane University of Technology) - Study supervisor
- Mr CJ Badenhorst (Tshwane University of Technology) - Co-study supervisor
- Telematic Education (Tshwane University of Technology) - Prof HJ van der Merwe and colleagues for their support and video conferencing infrastructure used research
- Dr B Eisenberg (Department Research and Development at Tshwane University of Technology) for statistical support and analysis of data
- NRF (National Research Foundation) - Research funds
- DAAD (Deutscher Akademischer Austausch Dienst e.V. - German Academic Exchange Service) - Research funds
- Bureau Connect (video conferencing booking agency) - Use of their client database
- MCT Telecommunications (video conferencing supplier) - Use of their client database
- Sony (video conferencing supplier) - For assistance during data collection
- ETA Audiovisual (video conferencing supplier) - For assistance during data collection
- Tandberg (video conferencing supplier) - For assistance during data collection
- University of Melbourne (Australia) - Assistance with project management on planning of venue design and technology implementation
- Ms JJM Pietersen (South African Bureau of Standards) - language editing

## **ABSTRACT**

Video conferencing networks are complex. Implementation and cross-departmental functioning requires a managerial strategy to ensure a systematic and logical implementation process. The implementation of video conferencing equipment is based on existing managerial strategies e.g. Process, System, Operation and Project Management in a Total Quality Management (TQM) framework. Managerial functions (planning, organising, activation/motivation and control) are applied in the concluding of an effective managerial strategy for video conferencing implementation.

The proposed managerial strategy for video conferencing implementation was tested with video conferencing equipment suppliers (in-depth structured interviews) and video conferencing network managers (questionnaires) in Gauteng. The proposed strategy (chapter 5) as constituted from comprehensive literature studies (chapters 3 and 4) needed to be adapted.

The final video conferencing implementation strategy (chapter 8) indicated that the inclusion of processes and procedures is not sufficient to ensure successful implementation. The final strategy for video conferencing implementation is a flexible strategy that is aligned with existing managerial (operational and implementation) strategies to ensure successful implementation. This is based on the involvement of senior, middle and lower management that also includes the appointment of project teams to ensure successful cross-departmental implementation. The formulation of quality structures and evaluation criteria ensures that strategic objectives set in the strategic plan, vision and mission statement, are achieved.

The conclusion of the implemented project is by testing the project through pilot projects and finalising project documentation by means of an acceptance letter to the management team. Dissemination of data (whether the project was successful or not) has to be made to the senior management team.

Video conferencing implementation is not just an action that takes place on an ad hoc basis. It requires a logical and systematic plan, supported by a scientific managerial strategy to ensure that the set objectives and quality standards are achieved.

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# CHAPTER 1

## INTRODUCTION

*“As the New Era unfolds, young citizens of the world and new technology will alter the economic landscape and destroy business model after business model”*

(Wesbury, c2000:140).

### 1.1 INTRODUCTION

This research explores different managerial strategies and functions with the aim to design and develop a managerial strategy that could contribute to more effective video conferencing implementation in South Africa. The focus is on how to optimise managerial functions, processes and procedures (within a framework of existing managerial strategies) such as:

- **Total Quality Management** (Flanagan & Finger, 2001:308; Crosby, 1979:10; Reynolds, 1994:15; Jablonski, 1991:4),
- **Operations Management** (Naughton, 2002:8; Crosby, 1979:164; Schonberg & Knod, 1999:54),
- **Process Management** (Hindle, 2000:179; Littlefield *et al*, 1978:85; Slack *et al*, 2001:95; Kroon, 1986:56-61),
- **System Management** (Kroon, 1986:61; Cleland & King, 1975:15), and
- **Project Management** (Flanagan & Finger, 2001:292-298; Cleland & King, 1975:18; Slack *et al*, 2001:515; Naughton, 2002:58; Hunter *et al*, 1998:84; Morris, 1988:84; Hindle, 2000:48

so that they are applicable and relevant when implementing video conferencing technology.

Video conferencing is “ a two-way electronic communication system that permits two or more persons in different locations to engage in the equivalent of face-to-face (FTF) audio and video communications ... video teleconferences may be conducted as if all of the participants were in the same room” (Telecom Glossary, 2002:online).

Wire Technologies (2002:online) added the following to the already defined video conferencing concept, namely that video conferencing is “communication across long distances with video and audio contact that may also include graphics and data exchange. Digital video transmission systems typically consist of camera, codec, network access equipment, network and an audio system.” The aim of video conferencing is therefore to support affordable interactive (two-way audio and video), realtime and live communication, disregarding time differences and geographical locations. Video conferencing, allowing people to see and hear people simultaneously, is also integrated with existing infrastructures, e.g. telephony and data networks.

Communication technology applications, including video conferencing, are becoming increasingly relevant in managerial and educational environments. Several Internet articles and journals have reported on these applications, especially “their impact on communication” (Van Oostendorp & Arnold, [S.a.]:75-76).

“As organisations move into the next century, visual communication is poised to be adopted as a business standard” (Portway & Lane, 1997:40). Business in the global arena requires realtime decision-making and problem solving techniques, infrastructures and processes. Infrastructure, e.g. Information and Communication Technology (ICT), is often applied in business and educational environments to support strategic and operational strategies and objectives. ICT can impact on the free flow of information in an organisation, whether this is through paper or electronic technology (Naughton, 2002:72). Changes in the technology environments are occurring because of the technological renewal, replacement and innovation of technology.

Video conferencing is an ICT application that has developed in conjunction with global changes in office and educational environments, especially with the integration of multimedia technology such as computers, document cameras, electronic whiteboards, video machines and audio conferencing. Implementing a video conferencing network requires an understanding and knowledge of a wide variety of processes, systems and conventions related to electronic communication and data networks, e.g. Integrated

Digital Services Network (ISDN), Internet Protocol (IP), venue design, multimedia development, presentation skills, acoustics, lighting, marketing, training, technical maintenance, design, development and maintaining of operational strategies, etc. This is supported by Cleland & King's (1975:23) statement that: "Our ability to manage technology - to make technological innovations, to integrate technology into societal systems, and to organise these systems - is probably more critical to the advance of society than is technology itself".

Kast and Rosenzweig (cited in Kroon, 1986:77) state that "technology compels change." The implementation of any new technology that did not exist in the organisation before, can be seen as new technology. For many organisations the concept of video conferencing is not new, but when it was to be implemented for the first time, the characteristics of the different hardware, network infrastructures, processes and procedures required for video conferencing implementation, are new for those involved.

The responsibility for the installation and implementation of a video conferencing network is becoming more and more a reality for employees (with hardly any video conferencing managerial experience) in South Africa. Prospective video conferencing managers are specialists in alternative fields of expertise, e.g. trainers, computer network managers and communication specialists. Due to changing needs and structures in organisations, these managers are now faced with the implementation and management of a video conferencing network. Before implementing a video conferencing network, planning and documenting the implementation process is essential as "implementation cannot be left to chance" (Valdez, [S.a.]:online).

Specific and detailed managerial strategies are applied to manage these technologies (Kroon, 1986:80-81). Cleland & King (1975:7) support this as they state that solutions are dependent on technology and its effective use, i.e., on technology and the management of technological innovation. A managerial strategy is required to ensure the successful management of the implemented technology. Strategy means a "rational process of deliberate calculation and analysis, designed to maximise long-term advantage" (Whittington, 1993:3).

Predictions from the Wainhouse Research in Massachusetts (Tandberg, [S.a.]:online) are that the video conferencing market in the USA will increase from \$787 million American dollars in the year 2000 to \$1.7 billion American dollars by the year 2005.

Increasing demand for new technology brings about an increased demand for other resources and skills, e.g. the management of these new technologies.

New managerial skills are essential for the “production, acquisition and application of new knowledge:- national growth and competitiveness are dependent on continuous technological improvement and innovation, and are driven by a well-organised, vibrant research and development system which integrates the research and training capacity of higher education with the needs of industry and of social reconstruction” (Republic of South Africa: National Plan for Higher Education in South Africa, [S.a.]:9).

Support for the new technology should ideally be contained in flexible processes, methods and detailed managerial strategies to manage, e.g. new video conferencing networks. Kroon (1986:77-79) supports the above statement namely that research and development help with the creation of new products, processes, methods and managerial strategies to manage the new changes. Well structured and defined managerial strategies are required to ensure an efficient, flexible and integrated service management system in a video conferencing network. Different managerial strategies can be applied, e.g. “change management techniques and skills” (Hussey, 1998:21).

Cleland & King (1975:4-5) applied System and Project Management to ensure technology management. They summarise the problems around technology implementation by stating that “problem solutions will have an equal degree of interdependency and complexity, i.e., that complex systems have to be designed to solve these complex system problems. Many of the solutions will have significant technological components, but these alone will not suffice ... we have not developed the ability to organise the technology and integrate it into systems which effectively resolve problems. In essence, we have not developed the ability to manage technology effectively ... or develop an ability to plan for technological change.”

To design and develop this ideal work environment, a holistic network planning approach and a managerial strategy are essential to ensure effective video conferencing implementation. As stated by Cleland & King (1975:333) managerial strategies, e.g. Project Management, not only need to function as information systems structures but also need to:

- be flexible to adapt to unique needs of different project managers;

- adapt to different projects; and
- adapt to different information requirements.

The implementation of new office and/or teaching and learning technology, e.g. video conferencing, needs to be conducted within existing structured and defined managerial strategies (Kroon, 1986:80-81), e.g. Process, System and Project Management. Processes and procedures also have to be designed to function within a Total Quality Managerial (TQM) environment. This is done by applying managerial functions namely planning, organising, activation or motivation and control (Cleland & King, 1975:9-10; Kroon, 1986:13 & 56; Stallard & Terry, 1984:5-6; Wilson, 1998:159).

Implementation and evaluation are then possible according to, set objectives and standards using allocated resources (equipment and resources), time frames and budgets. The successful implementation of a video conferencing network is therefore challenging. One challenge is the maintaining of international communication standards. International standards are set to ensure that different video conferencing equipment can connect with each other to prevent transmission interruptions.

Kroon (1986:80-81) and McKenna (1999:66) state that new technologies can influence organisations on various levels of operation. Research and development of defined structures and managerial strategies are essential to evaluate and understand these influences. Any implemented video conferencing network will therefore have to operate within business and educational environments that can accommodate various influences.

## **1.2 PROBLEM STATEMENT**

During 1999 the researcher was responsible for the installation of a seven-site video conferencing network at Technikon Pretoria - now Tshwane University of Technology (TUT). Comprehensive research studies (that included research visits to various international training institutions in Australia, France, Spain and Germany) were conducted before commencing with the installation.

The researcher drew from previous experiences with the installation of multimedia and communication infrastructures, e.g. switchboard technology, to implement the video

conferencing network. Limited documentation was available on managerial strategies for video conferencing implementation to ensure that the video conferencing implementation was done according to set international standards. The information available was mainly advice from people who implemented networks and the experience from video conferencing equipment suppliers.

After the completion of the implementation phase various problems arose that could have been prevented if this had been taken into account during the planning phase. The information obtained from the evaluation of the implemented network supported the need for further research of a structured and scientific managerial process for video conferencing implementation.

Craig *et al* (1994:172) defines research as “a systematic process of investigating ideas, events or phenomena to make possible the development of knowledge”. It is therefore essential to state the main and research sub-questions to ensure that this research can be conducted to achieve the objectives of this study.

### **1.2.1 MAIN RESEARCH QUESTION**

The central research question of this study is of an exploratory nature, namely: What would constitute an effective managerial strategy for video conferencing implementation?

### **1.2.2 RESEARCH SUB-QUESTIONS**

Three research sub-questions were answered before an answer to the main research question was derived:

**TABLE 1.1: RESEARCH SUB-QUESTIONS**

<b>RESEARCH SUB-QUESTIONS</b>	<b>FACTORS IN ANSWERING THE RESEARCH SUB-QUESTION</b>
What is video conferencing and what constitutes a video conferencing network? (Chapter 3)	Hardware, communication networks and venue infrastructures were identified in order to understand the cross-departmental functioning that needs to be managed.
What is video conferencing management? (Chapter 4)	Five existing managerial strategies and their implementation processes were compared, Critical Success Factors (CSF) and role players identified to conclude a concept managerial strategy for video conferencing implementation.
What constitutes an effective process for video conferencing implementation? (Chapter 5)	Processes and strategies were identified to ensure that optimal implementation and management of video conferencing were possible.

### 1.3 CONCEPTUALISATION

Conceptualisation of the different concepts was essential to ensure reflective thinking (Craig *et al*, 1994:38) by means of defining the relevant variables. The term variables refer to whatever characteristic was investigated and analysed (Wisniewski, 1994:76). Project Gold - Research Methods Glossary (2002:online) adds to the definition of a variable that it is “an attribute or characteristic of a person or an object that takes on different values (i.e. that varies) within the population under investigation, e.g. age, weight, pulse rates.

Vermeulen (1998:43) summarises this by concluding that variables are any known or unknown factors that can influence the outcome or deliverables of research. The variables in this research were dependent and independent variables (table 1.2).

**TABLE 1.2: DEPENDENT AND INDEPENDENT VARIABLES**

<b>DEPENDENT VARIABLES</b>	<b>INDEPENDENT VARIABLES</b>
Portland State University ([S.a.]:online) defines dependent variables as those “variables whose values are predicted by the independent variable, whether or not caused by it”.	The variable (or antecedent) that is assumed to cause or influence the dependent variable(s) or outcomes. The independent variable is manipulated in experimental research to observe its effect on the dependent variable(s). It is sometimes referred to as the treatment variable (Project Gold - Research Methods Glossary, 2002:online and McBurney, 2001:118).

During this research, the focus was on video conferencing implementation by manipulating the managerial processes to design, develop, evaluate and verify a managerial process for video conferencing implementation.

In order to answer the research questions, the following dependent and independent variables (table 1.3) were defined and identified:

**TABLE 1.3: VARIABLES FOR THIS RESEARCH**

TYPE OF VARIABLE	IDENTIFIED VARIABLES FOR RESEARCH
DEPENDENT	Video conferencing implementation
INDEPENDENT	Managerial process

The researcher was in control of the design and development of the managerial process. Manipulation and adaption of the managerial process were possible and therefore made this the independent variable.

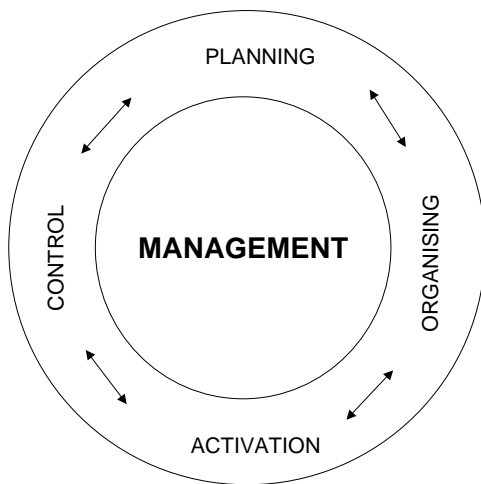
Applying the identified managerial process for video conferencing implementation, the research outcomes were measured. This implementation phase was totally dependent on the identified managerial process, therefore making video conferencing implementation the dependent variable.

Throughout this research, data collected was treated as dependent and independent variables (table 1.2) as conceptualised in table 1.3. Table 1.4, figures 1.1 and 1.2 are an indication of how the variables were applied when a managerial strategy was identified for the video conferencing implementation process.

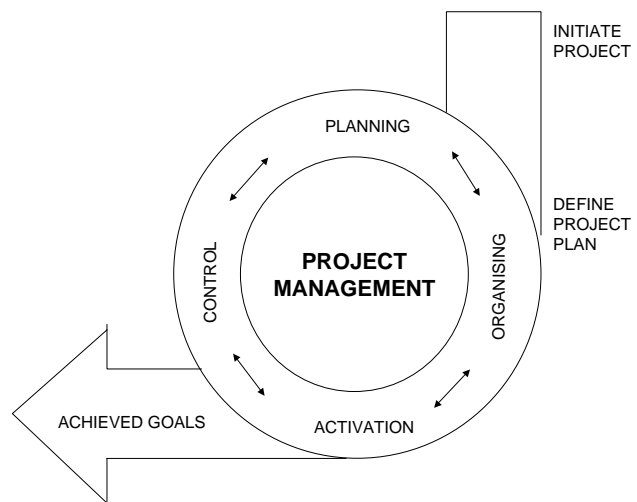
**TABLE 1.4: CONCEPTUALISATION OF RESEARCH VARIABLES**

INDEPENDENT VARIABLE		DEPENDENT VARIABLES	
MANAGERIAL PROCESS (FIGURE 1.1)		VIDEO CONFERENCING IMPLEMENTATION (FIGURE 1.2)	
1.	Applying the different managerial strategies (Operations, Systems, Process and Project Management);	1.	Planning function: strategic planning, development of technology, business and financial plans to achieve set objectives.
2.	in a Total Quality Managerial (TQM) environment;	2.	Activation: appointment of role players (project teams) and the involvement of senior, middle and lower management.
3.	using the different managerial functions namely planning, organising, activation/motivation and control	3.	Motivation: continuous process to keep people involved in operational and training strategies, marketing, replacement/upgrade of networks and the evaluation thereof.
4.	to support the strategic objectives support strategies for implementation.	4.	Control: the evaluation of the implemented network to ensure that deviations from objectives are rectified.

**FIGURE 1.1: MANAGEMENT CYCLE**



**FIGURE 1.2: VIDEO CONFERENCING IMPLEMENTATION CYCLE**



## **1.4 FACTORS CONTRIBUTING TO PROCESS AND DELIBERATIONS OF THE STUDY**

Global (international) standards are defined and documented by various manufacturers of video conferencing equipment to support the minimum standards for implementation. These macro factors to support the South African installations were not present as seen in a few case studies (Annexure C) completed by the researcher during 2002. The lack of these macro factors in South Africa was also experienced in the micro environment of TUT when implementing the video conferencing network in 1999/2000.

### **1.4.1 MACRO FACTORS**

The international sectors (industry or educational institutions) are well equipped to implement and manage video conferencing networks. During a research visit by the researcher to the University of Melbourne in Australia, their video conferencing implementation team was able to provide the researcher with the following documentation:

- standards;
- implementation manuals;
- checklists;
- procedures;
- processes; and
- approved policies.

By documenting minimum standards the University of Melbourne managed their video conferencing network to ensure that a return on their investment (Colebatch, 1996:3) was obtained (financially and added value by quality of services). The same data was obtained during visits to the University of Hamburg (Germany) and the University of Nancy (France), namely that a return on their capital investment was only possible if the managerial structures to ensure minimum standards were documented and implemented.

These documented strategies, processes and procedures were not available from video conferencing network managers or video conferencing equipment suppliers in South Africa. Unable to learn from other specialists in the field, the wheel had to be reinvented

during the implementation of the video conferencing network at the TUT.

#### **1.4.2 MESO FACTORS**

In South Africa the responsibility for the installation and implementation of a video conferencing network is becoming more and more a reality for employees in many educational institutions and organisations - with hardly any video conferencing managerial experience. Prospective video conferencing managers are usually specialists in alternative fields of expertise, e.g. trainers, computer network managers or communication specialists. Due to changing needs and structures in organisations, these managers are now faced with the implementation and management of a video conferencing network.

The practical and managerial problem at hand is: where to start and what to do to ensure successful video conferencing implementation? Specific and detailed managerial strategies are applied to manage technology (Kroon, 1986:80-81). To design and develop this ideal work environment, a holistic implementation strategy is needed that encompasses both planning and managing video conferencing implementation to include all relevant aspects of a video conferencing network.

#### **1.4.3 MICRO FACTORS**

During the year 1999/2000, a seven-site video conferencing network at the Department Telematic Education, TUT in South Africa was implemented. Being employed in this Department, the researcher gained first hand experience in the planning and implementation of a video conferencing network. Difficulties experienced before, during and after implementation were largely due to the lack of published documentation to assist with the implementation of a video conferencing network.

Two years after the completion of the implemented video conferencing network, problems arose due to unplanned circumstances that were not catered for during the original planning. Managerial strategies for longer term management were not included in the planning phase. The following problems could have been avoided if handled as part of the managerial implementation strategy:

- Service Level Agreements (SLA) were not concluded with the telecommunication supplier, Telkom. Support from Telkom on the Integrated Services Digital Network (ISDN) lines were hampered by untrained technical staff.
- Continuous planning for the upgrade of equipment started only after the equipment was in use for three years. Incorrect selection of equipment and applied processes were therefore only rectified three years after the network was in use.

A process of continuous evaluation on the hardware and processes proved to be essential. Implementation and managerial problems, e.g. the incorrect selection of equipment and also insufficient training or marketing strategy could have been rectified long before if the projects and evaluation criteria had been in place.

- Marketing of the video conferencing network was the main focus during the first two years after completion of the implementation phase of the video conferencing network.
- Neither official nor pilot projects were structured to commence directly after the implementation phase. Limited projects for the implemented network meant that the network was not frequently in use, and this made evaluation difficult.

Installation mistakes are usually made due to mismanagement or a lack of knowledge and understanding of the holistic approach required for video conferencing implementation. This is preventable if processes, procedures and managerial strategies required for implementation, are available and documented.

The video conferencing process at TUT therefore showed that even in cases where extensive planning and research have been undertaken, effective video conferencing still requires a holistic managerial strategy. Research on this topic in South Africa is therefore essential. However, no relevant research projects (completed or in progress) were available on the Nexus database (National Research Foundation's (NRF) research database) during 2002 when commencing with the research and confirmed in 2003 during the research.

## 1.5 DEFINING CONCEPTS

Understanding the concepts used in relation to the research are essential. Blue underlined concepts are a cross reference to the attached glossary.

**TABLE 1.5: OPERATIONAL DEFINITIONS**

CONCEPT	DEFINITION/S
Implementation	To carry out or to put into effect (Wevell, 1996:530).
Manage / management	To organise or regulate or to administer; to be in charge of; at the head of (Wevell, 1996:648).  A generic term applied to the group of top-level managers who together are responsible for the <u>work</u> of the enterprise. (Odendaal, 1984:204)
Managerial duties	Managerial duties are support actions for managerial functions. The managerial duties consist of decision-making, communication, motivation, coordination, delegation and discipline (Sadie, 2003).
Managerial functions	Managerial functions consist of planning, organising, motivation and control. These functions form the core of the managerial process (Sadie, 2003).
Managerial strategies	Managerial strategies are plans to ensure that actions are completed by allocated people, resources and within specific time frames and budgets. These managerial strategies work within a Total Quality Framework applying process, system, operations or project management to achieve set objectives (Sadie, 2003).
Strategy	A carefully thought out plan aimed at a particular result or goal (Craig <i>et al</i> , 1994:184).  A systematic plan of action to reach predefined goals (Directorate for Education and Human Resources, 2002:online).  "Strategy may be a decision-making heuristic, a device to simplify reality into something managers can actually cope with; plans may just be managerial security blankets, providing reassurance as much as guidance; strategy may not precede action but may only emerge retrospectively, once action has taken place; strategy is not just about choosing markets and then policing performance, but about carefully cultivating internal competences" Whittington (1993:27).
Video conferencing	See also <u>Teleconferencing</u> and <u>video teleconference</u> . A <u>teleconference</u> that includes video <u>communications</u> .  Pertaining to a two-way electronic <u>communication system</u> that permits two or more persons in different locations to engage in the equivalent of face-to-face audio and video <u>communications</u> . Note: Video teleconferences may be conducted as if all of the participants were in the same room (Telecom Glossary, [S.a.]:online).  <u>Communications</u> across long distances with video and audio contact that may also include graphics and <u>data</u> exchange (Pacific Bell - Videoconferencing Glossary, [S.a.]:online).  Digital video transmission systems typically consist of camera, codec, network access equipment, network and audio system (Wire Technologies, 2002:online).

## 1.6 OBJECTIVES OF THIS STUDY

This research explored the managerial strategy required for an effective video conferencing implementation process in South Africa. The aim was to generate a managerial strategy that included processes and procedures with the application of Operation, Process, System and Project Management strategies to ensure that a scientific approach is applied when implementing and managing video conferencing technology within a Total Quality Management framework.

During this research study, the aim was to find reliable knowledge and valid results through a process of critical reflection and empirical verification. The following objectives provide guidelines on what needed to be accomplished during this research:

- Through literature studies (chapters 3 and 4) a concept managerial strategy was identified from the obtained information.
- This concept managerial strategy (chapter 5) includes existing managerial strategies, managerial functions and duties as well as processes and procedures to constitute a managerial strategy for video conferencing implementation.

In answering the 'how', a managerial process was formulated that can be applied by video conferencing managers and suppliers to manage video conferencing hardware. As stated by Schönsleben (2000:104) processes and procedures are important as "we examine processes and procedures with regard to their success (effectiveness) and their efficiency (and) the analysis of procedures gives us a picture of ancillary constraints and yield initial suggestion of improvement."

- The concept managerial strategy (chapter 5) was tested with video conferencing network managers (questionnaires in chapter 6) and video conferencing equipment suppliers (in-depth structured interviews in chapter 7). The data obtained was used to answer the main research question namely what constitutes a video conferencing managerial strategy (chapter 8).

## **1.7 LIMITATIONS OF THE STUDY**

Literature on the implementation of a holistic video conferencing network is limited.

Much has been published on components of such networks, e.g. Internet Protocol (IP), Integrated Services Digital Networks (ISDN), criteria for venue design and multimedia selection.

The following will not be included in the study because it is assumed that knowledge on the following subjects/topics is known if the video conferencing manager wants to manage or implement a video conferencing network:

- Criteria for venue selection and design, technical specifications for acoustics and lighting, ergonomics for furniture selection etc.
- Criteria for hardware (video conferencing equipment) selection and multimedia integration.
- Knowledge of network and communication structures, e.g. ISDN, IP, LAN (Local Area Network), WAN (Wide Area Network) and ATM (Asynchronous Transmission Mode).

## **1.8 EXPOSITION OF STUDY**

The dissertation of this research is divided in eight chapters. The following chapters (table 1.6 and figure 1.3) were documented:

- Chapter 1 focusses on the rationale, research problem and objectives of the study.
- Chapter 2 describes the outline of the research design and research methodology applied.
- Chapters 3 and 4 focus on literature studies in order to identify the concept managerial strategy for video conferencing implementation.
- The concept managerial strategy was tested by means of questionnaires and structured interviews and documented in chapter 5.

- Results of data collected are documented in chapters 6 and 7.
- Research conclusions and recommendations are documented in chapter 8.

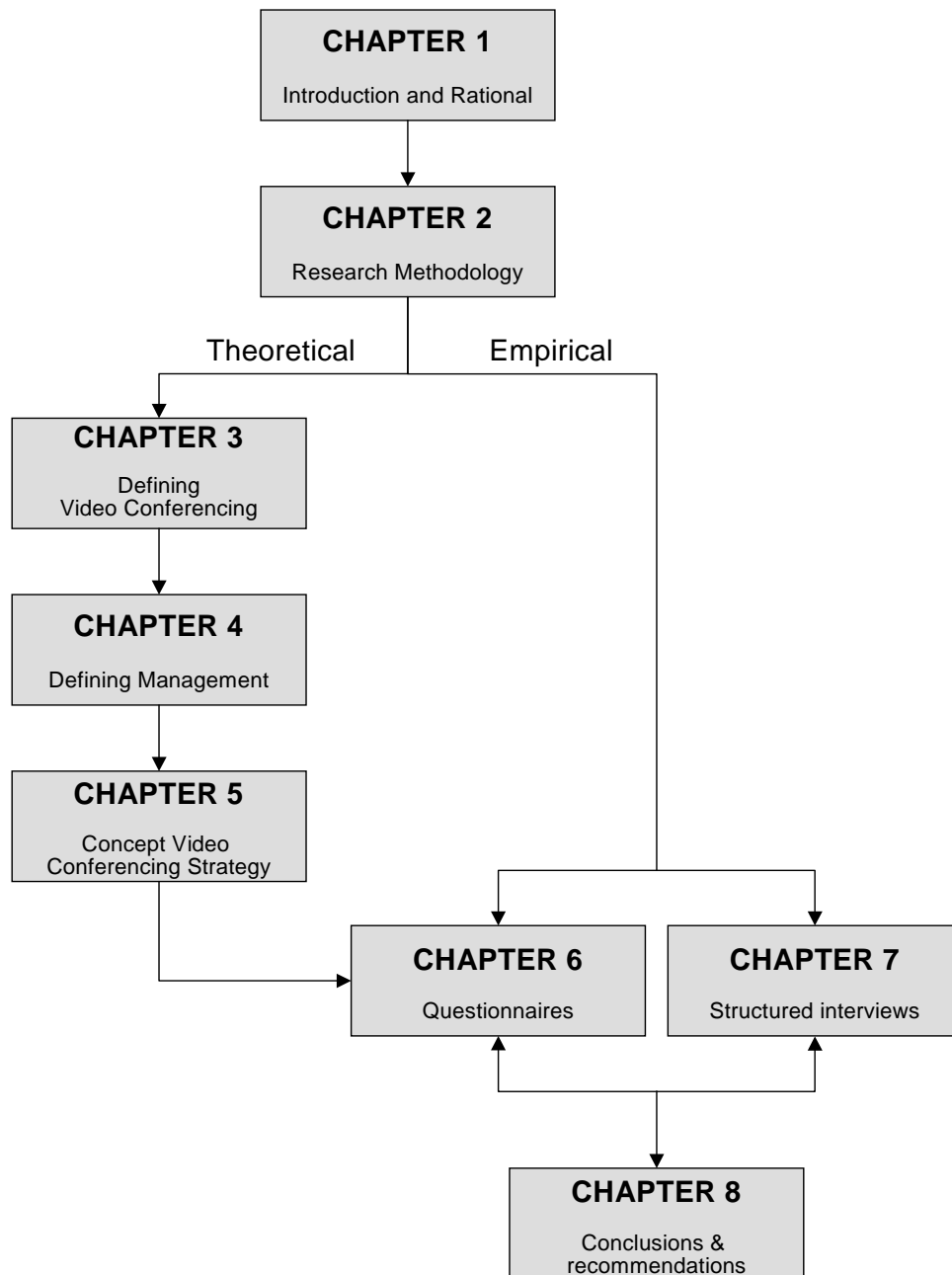
This is summarised in table 1.6 and figure 1.3:

**TABLE 1.6: CHAPTER OUTLAY**

<b>CHAPTER</b>	<b>CONTENT</b>
<b>1</b>	<p><b>Introduction</b></p> <p>Chapter 1 provides background and a rationale for this research as it defines the problem statement. The research main and sub-questions as well as objectives of this study were structured.</p>
<b>2</b>	<p><b>Research Methodology</b></p> <p>This chapter is an introduction into the research methodology that was applied to address the main and research sub-questions.</p>
<b>3</b>	<p><b>Defining video conferencing</b></p> <p>This chapter focusses on the first research sub-question namely what is video conferencing and what constitutes a video conferencing network. Understanding the complexity and cross-departmental functioning within a video conferencing network is essential in order to understand what needs to be managed within that environment.</p>
<b>4</b>	<p><b>Defining management and managerial strategies</b></p> <p>This chapter underlines the different managerial strategies, functions and duties and analysis how this was applied when designing a concept managerial strategy for video conferencing implementation. These managerial issues were formulated to answer the second research sub-question of what video conferencing management is.</p>
<b>5</b>	<p><b>Concept managerial strategy for video conferencing implementation</b></p> <p>This chapter defines what the process for video conferencing implementation is as concluded from the literature studies in chapters 3 and 4. From these data a concept managerial strategy for video conferencing implementation was derived and will be tested in chapters 6 and 7.</p>
<b>6</b>	<p><b>Data collection: questionnaires</b></p> <p>Chapter 6 focusses on data collection using questionnaires with video conferencing managers. Elements in the proposed concept managerial strategy were tested and analysed.</p>

CHAPTER	CONTENT
7	<b>Data collection: structured interviews</b> Chapter 7 focusses on data collection using structured interviews with video conferencing equipment suppliers. Elements in the proposed concept managerial strategy were tested and analysed.
8	<b>Conclusions and recommendations</b> Chapter 8 contains conclusions and recommendations of what constitutes video conferencing implementation strategy.

**FIGURE 1.3: OUTLAY OF CHAPTERS**



## CHAPTER 2

### RESEARCH DESIGN AND METHODOLOGY

*“The supreme challenge of the 21 st century will be the ability to manage projects that transcend all the conventional boundaries, whether to produce global products or prevent global warming. The bureaucracies of the Industrial Age, with their rigid focus on in-house protocols, will appear to the new intercorporate transcontinental networks like old Royal type-writers do to PC users”.*

(Lipnack and Stamps, 1991)

#### 2.1 INTRODUCTION

During this research a structured research design (plan) was followed and research methods applied to ensure that valid data was collected for evaluation and analysis. The research methodology also made provision for the measurement of empirically collected data in order to draw conclusions and to make recommendations.

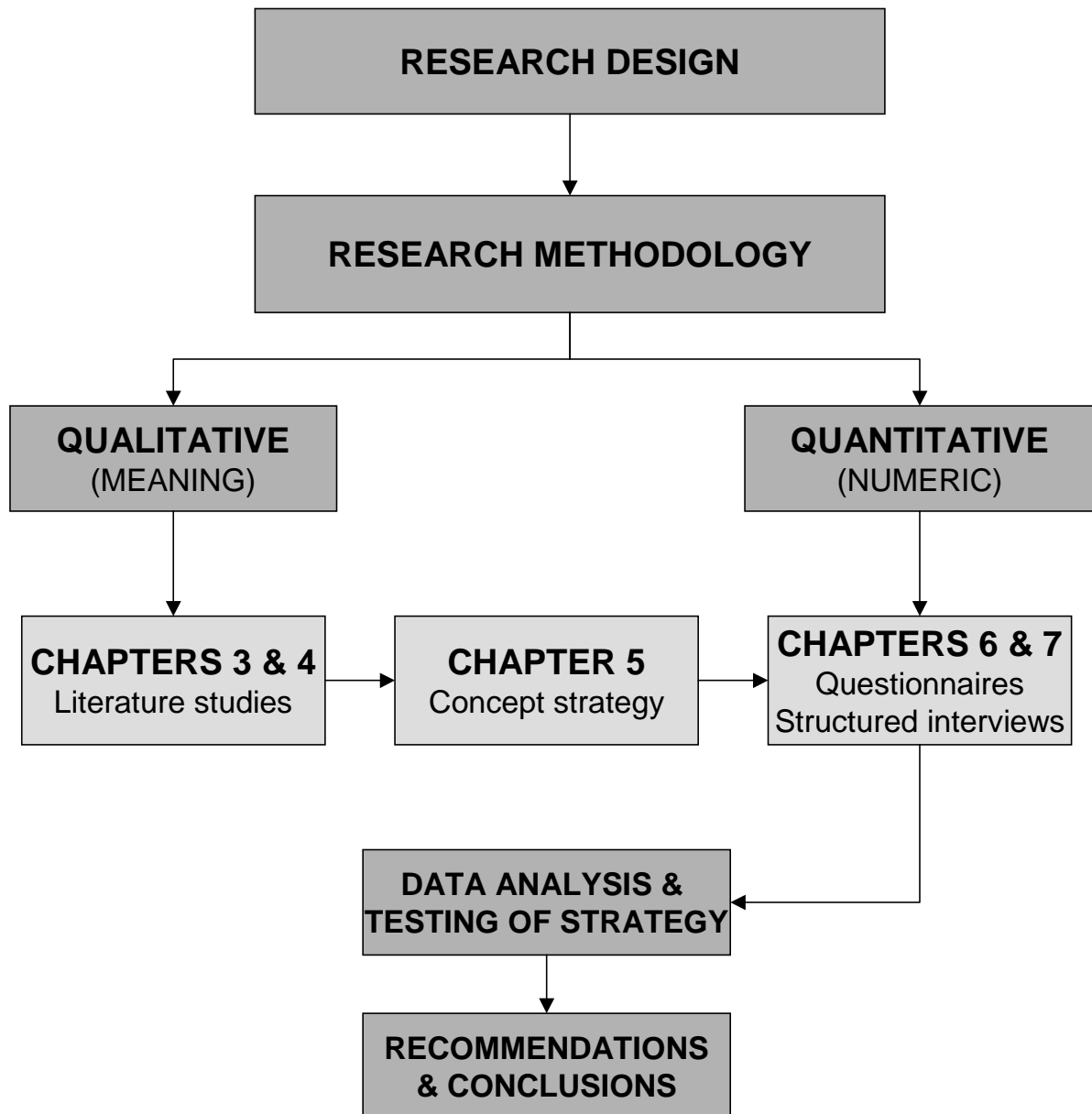
#### 2.2 RESEARCH DESIGN

Research design is the “plan or blueprint of how you intend conducting the research” (Mouton, 2001:55). Portland State University ([S.a.]:online) expands on this short explanation by adding that research design is also “the science and art of planning procedures for conducting studies so as to get the most valid findings - called ‘design’ for short. When designing a research study, one draws up a set of instructions for gathering evidence and for interpreting it.”

The research design in this research focussed on obtaining data and on maintaining objectivity. A systematic research process was followed with the objective to study the relationship between successful video conferencing implementation and managerial processes. The research perspective was qualitative in that it gave meaning to the different phenomena by means of literature studies (chapters 3, 4 and 5). This was supported by quantitative data gathered by means of questionnaires (chapter 6) and in-depth structured interviews (chapter 7).

Final conclusions were drawn and recommendations were made in chapter 8. In order to do the research systematically to ensure validity of data, the research process that was followed is summarised in figure 2.1:

**FIGURE 2.1: RESEARCH DESIGN**



The chronological order of the research process was as follows:

- 2.2.1 A comprehensive **literature study** was completed. Chapter 3 focus on what video conferencing is and what constitutes a video conferencing network. Chapter 4 focusses on the managerial strategies, functions and duties required to design a process for video conferencing implementation and management.
- 2.2.2 A **concept managerial strategy** was developed from the data in chapters 3 and 4. The concept managerial strategy for video conferencing implementation is presented in chapter 5. Managerial processes and procedures defined into various strategies, e.g. operational, technological and strategic, were defined.
- 2.2.3 Quantitative data was obtained to place into perspective the qualitative data obtained from the literature studies. This was done by means of questionnaires (chapter 6) and structured interviews (chapter 7). **Questionnaires** were used to test the proposed managerial strategy among video conferencing network managers. **Structured interviews** were used to test the impact video conferencing suppliers have on the implementation process.
- 2.2.4 Qualitative data gathered by means of structured interviews and literature studies, was organised in specific **categories**, namely the four managerial functions of planning, organising, activation/motivation and control. Patterns, associations and relationships were identified by means of grouping the relevant information together to evaluate the collected data. Dey, (1993:online) defines the grouping of data as the development of a set of criteria in terms of which to distinguish observations as similar or related. Stepwise regression was applied by utilising SAS System software to analyse the data from the questionnaires.
- 2.2.5 **Inductive analysis** (namely the logical process of reasoning) was applied to develop more general rules from specific observations; this type of reasoning moves from the specific to the more generalised (Project Gold - Research Methods Glossary, [S.a.]:online).
- 2.2.6 After the data had been documented (textual and graphic), **evidence was corroborated**. This is a procedure “in which we think critically about the quality of the data” (Dey, 1993:online).

2.2.7 Collected data was **interpreted** by comparing results.

2.2.8 **Recommendations** were made to improve on the identified managerial strategy and with regard to possible future research.

## 2.3 RESEARCH METHODS

Research methods are defined as specific procedures used to gather and analyse research data by the application of “different approaches to systematic inquiry developed within a particular paradigm with associated epistemological assumptions, e.g. experimental research, grounded theory, ethno-methodology” (Project Gold - Research Methods Glossary, [S.a.]:online).

A **mixed method research methodology** was applied during this research. Both quantitative and qualitative methods for data collection and data analysis were used. Although this research was mainly qualitative in nature, the obtained data was also supported by quantitative data. The content was continuously analysed by linking the different factors that influence the implementation process to the managerial functions required to implement video conferencing.

The application of the constant comparative method where newly data was gathered was continually compared with previously collected data in order to refine the development of theoretical categories in order to draw valid conclusions and to make recommendations.

### 2.3.1 DESCRIPTIVE AND EXPLANATORY RESEARCH

For this research, descriptive and explanatory research (table 2.1) were used throughout this study. With descriptive research, the aim was to research phenomena in order to describe it more comprehensively and to differentiate between the different and other phenomenon (Vermeulen, 1998:9). Descriptive research enabled the researcher to analyse the most important or central features (Craig *et al*, 1994:63) and also “... say what something is like, give a detailed account of it, to have qualities specified, to call, to label, to draw an outline, to make out, to class, kind and sort” (Wevell, 1996:270).

**TABLE 2.1: DESCRIPTIVE AND EXPLANATORY RESEARCH**

DESCRIPTIVE RESEARCH		EXPLANATORY RESEARCH
DEFINITION	Descriptive research describes the research phenomenon or give a detailed account of it by comparing it to other phenomena by classifying, differentiating between different / other phenomena and objectively identifies the most distinctive features of something (Craig <i>et al</i> , 1994:63; Wevell, 1996:270).	To study the interrelationship between phenomena in order to make something easy to understand (Wevell, 1996:352).  To provide the reasons for something being or happening in a particular way (Craig <i>et al</i> , 1994:83).
APPLICATION	Descriptive research was applied to compare the five identified managerial strategies in order to make comparisons and draw conclusions of what elements constitute the critical success factors and who the role players are.	Explanatory research was used to quantify the critical success factors, role players, processes and phases of implementation of the five managerial strategies in order to analyse the relation thereof to design and develop a proposed concept managerial strategy for video conferencing implementation.

The descriptive research focussed on the holistic explanation and documentation of the phenomenon, namely video conferencing and the managerial strategy required to support video conferencing implementation. The researcher defined a managerial strategy for video conferencing implementation that supported the requirements of validity, practicality and effectiveness. The focus was also to test the phenomenon (managerial strategy for video conferencing implementation) against the literature studies (chapters 3 and 4) with questionnaires (chapter 6) and structured interviews (chapter 7). The explanatory research focussed on the relation of the different dependent and independent variables of this research.

### 2.3.2 QUALITATIVE AND QUANTITATIVE RESEARCH

Data collection was done by means of a comprehensive literature study (qualitative research data was obtained) to conclude a concept managerial strategy for video conferencing implementation. The strategy was tested by means of quantitative methods namely structured interviews with video conferencing suppliers and questionnaires with video conferencing network managers.

Measurement of the collected data from the questionnaires was done by analysing the different dependent and independent variables by means of Stepwise regression. During this research special attention was given to the validity, mode of analysis and the triangulation of data.

Mixed research evaluation techniques were important for this research. The practical implication was an evaluation of which the design included the use of both quantitative and qualitative methods for data collection and data analysis. Although this research was mainly qualitative in nature, the data obtained was supported by quantitative data. Portland State University ([S.a.]:online) as well as the Directorate for Education and Human Resources (2002:online), differentiate between qualitative and quantitative research (table 2.2) as follows:

**TABLE 2.2: QUANTITATIVE AND QUALITATIVE RESEARCH**

QUANTITATIVE RESEARCH	QUALITATIVE RESEARCH
Said of variables or research that can be handled numerically. Usually contrasted with qualitative variables and research (Portland State University, [S.a.]:online).	Refers to study of subjects that are hard to quantify, such as art history. Qualitative research tends to be a residual category for almost any kind of non-quantitative research (Portland State University, [S.a.]:online).
The approach to evaluation involving the use of <i>numerical measurement</i> and data analysis based on statistical methods (Directorate for Education and Human Resources, 2002:online).	The approach to evaluation that is primarily <i>descriptive and interpretative</i> (meaning) (Directorate for Education and Human Resources, 2002:online).
Surplus meaning: in other words the concept can be interpreted in a number of ways (Mouton & Marais, 1996:160-161).	Unambiguous meaning: in other words new words with a unique meaning could even be created (Mouton & Marais, 1996:160-161).

“A qualitative research strategy is inductive in that the researcher attempts to understand a situation without imposing pre-existing expectations on the setting” (Mouton & Marais, 1996:204). They expand further on the purpose of qualitative research design by stating that it “begins with specific observations and build towards general patterns.”

Meyers (1997:online), summarises this by stating that “qualitative research methods are designed to help researchers understand people and the social and cultural contexts within which they live.” According to Meyers (1997:online) the combination of both quantitative (numerical measurement) and qualitative (meaning to concepts) research methods will assist the researcher to ensure that data, strategies and theories are understood through a comprehensive literature study. This will also help with the triangulation of collected data.

Table 2.3 summarises the applied methods of data collection and the different qualitative and/or quantitative data the researcher obtained:

**TABLE 2.3: QUALITATIVE AND QUANTITATIVE RESEARCH METHODS**

DATA COLLECTION METHOD	QUALITATIVE RESEARCH DATA	QUANTITATIVE RESEARCH DATA
Literature study	✓	
Structured interviews		✓
Questionnaires		✓

### **2.3.3 STEPWISE REGRESSION**

Stepwise regression was done utilising software based on the SAS System. The SAS System “is an integrated suite of software for enterprise-wide information delivery. The functionality of the system is built around the four data-driven tasks common to virtually any application - data access, data management, data analysis and data presentation” (SAS Technologies, 2004:online).

Stepwise regression is a linear regression process that identifies which of a selected number of independent or predictor variables play the most important role in the variation of a dependent variable. In this study, it was used to determine which managerial factors contribute most to the success of video conferencing implementation.

According to Shtatland *et al*, S.a., “Stepwise ... builds models in a sequential manner and it allows for the examination of a collection of models which might not otherwise have been examined.” The computer software identifies one variable at a time and test it in order to ascertain which variable has the most variation with regard to the dependent variables. The answer obtained from the data is which explanatory variables are ‘mathematically’ related to the dependent variable. All variables left in the managerial strategy are significant at the 0.1 ( $p < 0.1$ ) level.

The process followed, is as follows:

- Variables were identified in the literature study. These variables were tested with video conferencing network managers and suppliers.
- A concept managerial strategy was compiled from the identified variables in the literature studies.

- Stepwise regression was used which is a combination of both backward and forward regression. Harrell *et al*:S.a. differentiates between backward and forward regression of data as follows: backward regression is the process to eliminate the least significant variables from the proposed managerial strategy, while forward regression is the inclusion of the most significant co-variable in a regression model. Only the variables that will influence the managerial strategy for video conferencing implementation the most, were used.
- The data obtained from the SAS System was based on an SLENTY (significance level for data entering) of  $p < 0.1$ . Shtatland *et al*:S.a. indicated that  $p < 0.1$  is sufficient as SLENTY levels for explanatory research. The interpretation and prediction of data and results were evaluated.
- Data obtained from the video conferencing suppliers were cross-referenced with the Stepwise regression data obtained from the SAS System.
- Presentation of the managerial strategy for video conferencing implementation by documenting the conclusions and recommendations.

## 2.4 MEASUREMENT

Measurement is defined by McBurney (2001:121) as the assignment of numbers to events and objects according to rules that permit important properties of the objects or events to be represented by properties of the number system. Measurement as described by Odendaal (1984:204) is the element of the control function of management that provides information regarding the quantity and quality of output and the economical use of resources in the performance of the task.

Measurement aims to achieve the following:

- dimensional effectiveness of video conferencing implementation;
- reliability;
- validity (internal and external); and
- triangulation of data.

The focus of the research methods (questionnaires and structured interviews) was to collect quantitative data to support the qualitative data collected during the literature study. Measurement of the collected data was done by assigning a number or category to represent it.

The measurement scales that were applied for both questionnaires and structured interviews, were nominal, ordinal and interval scales. Ordinal scales were used to rank data into categories such as:

- not applicable at all;
- applicable to a very small extent;
- applicable to an average extent;
- applicable to a high extent; and
- applicable to a very high extent.

**TABLE 2.4: MEASUREMENT METHODS AND SCALES**

MEASUREMENT SCALE	
Questionnaires	Stepwise regression was applied using an SLENTY level of $p < 0.1$ . The cross-validation of dependent and independent variables (table 1.3) was measured in order to know the extent to which two or more things are related ("co-related") to one another (Portland State University, [S.a.]:online). Questionnaires were concluded applying a five-point measuring scale, namely not applicable at all, applicable to a very small extent, applicable to an average extent, applicable to a high extent and applicable to a very high extent.
Structured interviews	Interviews with video conferencing suppliers were conducted using the same structured questions to all suppliers. Open-ended questions were asked in order to understand the meaning of the specific questions.  Answers to the questions were compared to obtain a general and overall impression of the involvement of video conferencing suppliers in the management of video conferencing networks. Structured interviews were concluded to formulate percentages were possible in order to make comparisons.

#### **2.4.1 VALIDITY OF RESULTS**

Validity in its general sense describes that which is legitimate or acceptable (Craig *et al* (1994:201) and the soundness of the inferences made from the results of a data-gathering process (Directorate for Education and Human Resources, 2002:online). Thus validity refers to:

- the accuracy and truth of the findings and research (Project Gold - Research Methods Glossary, [S.a.]:online) by means of a measurement instrument or test that measures what it is supposed to measure;
- the extent to which a measure is free of systematic error (Portland State University, [S.a.]:online) in order to manipulate and measure the identified research variables (dependent and independent).

It is essential to ensure that validity and reliability of results can be proved at all times.

Research design needs to be well structured to ensure that internal and external validity of the research can be validated. Evidence with regard to the internal validity namely that it is the cause of the result and also that results can be generalised (external validity) (Lawler, [S.a.]:online), requires a clear and definite focus.

**Internal validity** will be drawn by means of valid conclusions from the data collected by means of questionnaires and structured interviews. During the research different managerial strategies (identified from a comprehensive literature study in chapter 4) were applied to ensure that the concept managerial strategy (chapter 5) compiled, were supportive to video conferencing implementation. Random sampling of the identified population was applied in order to give everyone the opportunity to be selected.

**External validity** or generalisability was obtained by testing the research questions with a population of video conferencing network managers in Gauteng. External validity was obtained by using the nationwide population of video conferencing equipment suppliers. The selection of the different methods for data collection, namely literature studies, questionnaires with video conferencing users and structured interviews with video conferencing equipment suppliers, will enhance the validity of the data collected, as the measuring instruments will ensure that data can be cross-referenced.

Table 2.5 gives a clear indication of the process of ensuring how internal and external validity was approached in this research:

**TABLE 2.5: INTERNAL AND EXTERNAL VALIDITY**

VALIDITY	DEFINITION/DESCRIPTION	RESEARCH FOCUS ON VALIDITY
Internal	The extent to which the results of a study (usually an experiment) can be attributed to the treatments rather than a flaw in the research design; in other words, the degree to which one can draw valid conclusions about the casual effects of one variable on another (Portland State University, [S.a.]:online).	<p>A comprehensive literature study ensured that valid conclusions were made during the design and development of the managerial strategies.</p> <p>Questionnaires tested dependent (video conferencing implementation) and independent (managerial process) variables by manipulating the process to ensure that valid conclusions are made.</p> <p>Standard and recognised processes, e.g. Stepwise regression was used. Statistical experts were used to ensure that data analysed was interpreted accurately.</p>
External	The extent to which the findings or a study is relevant to subjects and settings beyond those in the study. Another term for generalisability (Portland State University, 2002:online & Vermeulen, 1998:50)	Structured interviews were scheduled with the five national video conferencing equipment suppliers in South Africa. All five equipment suppliers were included to ensure generalisability.

During this research attention was given as prompted by Cronje (2003:email), namely that the following are essential to ensure validity of data:

- Personal bias of the researcher to be excluded
- The use of multiple instruments to ensure reliability
- The use of real-life case studies to ensure validity
- Triangulations of results.

Reference to an unpublished document on video conferencing case studies (Appendix C) was made. Five case studies were done by the researcher to analyse existing managerial strategies in relation to the success rate of the video conferencing network. The data in relation to conclusions will ensure that validity of data is tested.

#### 2.4.2 POSSIBILITY OF ERROR

Mouton (2001:177) documented the sources of errors when applying model-building research methods. According to this author the “main sources of error relate to the assumptions that are made in specifying the model, the quality of the empirical data against which the model will be fitted, and the correct use of statistical and mathematical

procedures”.

To ensure that all data collected was correctly administrated and interpreted, the Research Department’s Statistic section from TUT was approached to assist in statistical processing and interpretation.

### **2.4.3 TRIANGULATION OF DATA**

Triangulation as a “term is used as a research context to describe the use of a variety of data sources or methods to examine a specific phenomenon either simultaneously or sequentially in order to produce a more accurate account of the phenomenon under investigation (Project Gold - Research Methods Glossary, [S.a.]:online).

In an evaluation, triangulations are an attempt to get a fix on a phenomenon or measurement by approaching it via several (three or more) independent routes. This effort provides redundant measurement (Directorate for Education and Human Resources, 2002:online). Chenail’s (1997:online) definition of triangulation “means that researchers use different sets of data, different types of analyses, different researchers, and/or different theoretical perspectives to study one particular phenomenon”.

Triangulation of data is essential to ensure that conclusions and recommendations made during this research are based on different methods of data collection. Denzin (cited in Mouton & Marais, 1996:206) indicates the importance and necessity of triangulation as the “combination of different methods of observation which direct a researcher to utilise several different tools in the observational process. The rationale for this is that no method alone can adequately treat all problems of discovery and testing. Since each method has restrictions, by combining several methods in the same study the restrictions of one tool are often the strengths of another.”

Different researchers focus their research on different points of views, findings and facts on the same topic. Denzin (cited in Mouton & Marais, 1996:206) proposes that “the greater the triangulation in a research design, the greater the confidence a researcher may have in his findings.”

He further suggests that the triangulation strategy should embrace the following:

- Multiple data sources - whereby the researcher goes to as many concrete situations in a setting as possible to form an observational base;
- Multiple methods - whereby any and all techniques that can better unravel the processes under study are used. Methodological triangulations - which involve using more than one method and may consist of within-method or between-method strategies.
- Multiple perspectives - whereby participants' accounts of their behaviour are compared with alternative schemes.
- Multiple theories - which consist of using more than one theoretical scheme in the interpretation of the phenomenon.

The multiple methods applied in this research for triangulation purposes were literature studies, structured interviews with video conferencing equipment suppliers and questionnaires with video conferencing users.

## **2.5 DATA COLLECTION**

Data collection commenced with the purpose of understanding existing managerial concepts and strategies in order to draw conclusions and develop a concept managerial strategy that would include optimal procedures for video conferencing implementation. Although the focus was on qualitative research, data collected during structured interviews and questionnaires was mainly quantitative in nature. Data collection was done by means of:

- Literature studies;
- In-depth structured interviews with video conferencing equipment suppliers ; and
- Questionnaires among video conferencing network managers (Stepwise regression).

### **2.5.1 LITERATURE STUDIES**

Literature studies described in chapters 3, 4 and 5, aimed to document various views, strategies and insights with regard to video conferencing and managerial strategies. These were found in sources (table 2.6) such as the Internet, articles, books and journals.

This process was essential to define key concepts, and it helped the researcher to structure a framework for the research design to extend the findings of the interviews and questionnaires. Descriptive research, through a comprehensive literature study and obtained qualitative data, focussed on an intensive description of the main and research sub-questions of this research (table 2.6).

**TABLE 2.6: RESEARCH RESOURCES FOR ANSWERING RESEARCH SUB-QUESTIONS**

RESEARCH SUB-QUESTIONS		BOOKS	JOURNALS	ARTICLES	INTERNET	MULTIMEDIA
1.	What is video conferencing and what constitutes a video conferencing network? (Chapter 3)	✓	✓	✓	✓	✓
2.	What is video conferencing management? (Chapter 4)	✓	✓	✓	✓	✓
3.	What constitutes a process for video conferencing implementation? (Chapter 5)	✓	✓	✓	✓	✓

## 2.5.2 STRUCTURED INTERVIEWS

In order to answer the main and sub-research questions of what constitutes an effective managerial strategy for video conferencing implementation, structured interviews were conducted among video conferencing equipment suppliers. A concept managerial strategy for video conferencing implementation (chapter 5) was concluded and tested with video conferencing equipment suppliers (chapter 7).

Structured interviews were used by the researcher to ask the respondents the same questions probing specific areas using an interview schedule - a formal instrument that specifies the precise wording and ordering of all the questions to be asked of each respondent. The purpose was to learn more of their impressions and experiences (Project Gold - Research Methods Glossary, 2002:online; Directorate for Education and Human Resources, 2002:online and McNamara, [S.a.]:online).

Structured interviews were conducted:

- to obtain data directly from all the role players within the video conferencing enterprise (see chapter 3, point 3.4) namely the video conferencing supplier;
- to obtain information that could shed light on a complex implementation process (see chapter 3, table 3.2 and figure 3.2);
- to compare data collected both quantitatively (increased understanding) and qualitatively (numeric); and
- to enhance the collected data obtained from questionnaires (chapter 6).

### **2.5.3 QUESTIONNAIRES**

A concept strategy for video conferencing implementation (chapter 5) was designed and developed from the collected data of the literature study (chapters 3 and 4). This was tested among video conferencing suppliers (chapter 7) by means of structured interviews. Questionnaires (chapter 6) were used, targeting at existing video conferencing network managers in Gauteng.

Questionnaires as defined by Wevell (1996:882) are “a request for information”. Questionnaires are formal questions asked to a specific and targeted population to gain information in order to conclude and make certain recommendations with regard to the research question at hand. The evaluation of the managerial strategies was not done to test the success or failure of the program, but rather to obtain feedback to improve on the identified managerial strategies.

Questionnaires were used because they enabled the researcher to gain information from people in a non-threatening way (McNamara, [S.a.]:online). The questionnaires were handled to ensure the anonymity of every participant. Responses were analysed statistically by means of Stepwise regression.

## **2.6 POPULATION AND SAMPLING**

Implementing a video conferencing network is complex as two groups of role players are involved namely the video conferencing equipment suppliers and the video conferencing network managers. These two groups constituted the two populations to be studied in this research:

### 2.6.1 VIDEO CONFERENCING EQUIPMENT SUPPLIERS

Defining the population of video conferencing equipment suppliers in South Africa was done on the basis of brand names of video conferencing codecs available in South Africa. The following criteria were used to qualify suppliers as part of the population of South African suppliers to be studied:

- the supplier had to be the main importer of that codec, and also be
- the national service provider, supplier and distributor,
- with clientele over South Africa.

The following population of national suppliers of codecs (table 2.7) in South Africa was obtained and all suppliers were approached for structured interviews:

**TABLE 2.7: STRUCTURED INTERVIEWS - VIDEO CONFERENCING SUPPLIERS**

CODEC	SUPPLIER
Aethra	MCT Telecommunications
Tandberg	Questek
Sony	Sony South Africa
Polycom	ETA Audiovisual <sup>1</sup>
VTEL and VCON	Comperex Africa <sup>2</sup>

The response rate obtained within the population was 100% as all the suppliers took part in this research.

### 2.6.2 VIDEO CONFERENCING NETWORK MANAGERS

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1  
ETA Audiovisual supplied Polycom during this study. Kathea is the new Polycom supplier and ETA supply SONY.

2  
VTEL and VCON equipment are sold by the same company namely Comperex Africa. During the research, VTEL and VCON's data was disregarded. Their annual sale figures were too low and it is therefore questionable if they can add any value to this research - only four units were sold in 2002.

The population of video conferencing network managers was defined by utilising:

- available Internet video conferencing directories namely SAVIE, HUT CET - Helsinki University of Technology's Centre for Educational Technology, FTP Public Videoconferencing Site Directories, Pacific Bell Knowledge Network Explorer and St. Joseph's University International Videoconferencing List, and
- the client database from Bureau Connect (South African video conferencing reservation agency).

From the compiled list of 189 national video conferencing site managers, 44 were not situated in Gauteng. 145 site managers were situated in Gauteng. The focus was on video conferencing managers in Gauteng because of their geographical location to the researcher. According to Stoker's formula, the researcher aimed to obtain a response rate of at least 40% in order to conclude and make recommendations from the data received. It was therefore essential that at least 55 responses were received.

Users were drawn from this list (names were not alphabetical) with random sampling: a process of selecting a sample from a larger group or population whereby each member of the population has an equal chance of being included (Project Gold - Research Methods Glossary, 2002:online; Directorate for Education and Human Resources, 2002:online; Easton & McColl, [S.a.]:online). This ensured that everybody on the Gauteng list had a reasonable chance of being selected.

Questionnaires were distributed by means of fax and email. After the first round only 9% of the sample responded to the request to partake in this research. The researcher phoned every video conferencing network manager to ascertain why no response was received. The general conclusion was that about 70 % of the video conferencing sites registered had closed down over the past two years. The main reason was that the video conferencing sites were not financially feasible and that the option to outsource, was more viable. This meant that the scope of the study was reduced from 195 to 34. All of these were approached and included in this research. Of these 34 approached, a response rate of 79 % was obtained.

Cited in Vermeulen (1998:59-60) Seaberg, Grinnell & Williams stated that given an acceptable sampling procedure is used, a 10% sample size of the total population is

usually sufficient. Grinnell & Williams state that for statistical evaluations a minimum of 30 respondents in a sample are representative of any population. Stoker (cited in Vermeulen 1998:60) gives the following framework (table 2.8) to calculate sample selection and population sizes:

**TABLE 2.8: SAMPLE AND POPULATION**

POPULATION	ENVISAGED PERCENTAGE	RESPONDENTS IN REPRESENTATIVE SAMPLE	RESPONSE RATE DURING RESEARCH
50	64%	32	-
100	45%	45	-
145 <sup>3</sup>	40%	55	79%
200	32%	64	-

## 2.7 INTERPRETATION OF DATA

Dey (1993:online) defines the core of qualitative analysis in three related processes:

- describing phenomena (comprehensive description);
- classifying it; and
- seeing how the concepts interconnect.

Hermeneutic principles were used for analysing data. The basic question of hermeneutics is: what is the meaning of this text? Tayler (cited in Meyers, 1997:online) defines hermeneutics as the “interpretation ... to make sense of an object of study. This object must, therefore, be a text, or a text-analogue, which in some way is confused, incomplete, cloudy, seemingly contradictory - in one way or another, unclear. The interpretation aims to bring to light an underlying coherence or sense.”

Hermeneutic analysis refers to the total understanding of the research question “constantly from the whole to the part and back to the whole - it is a circular relationship.”

Meyers (1997:online), further declare that the aim and purpose of this total understanding of the whole or holistic approach is one of “trying to make sense of the

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Calculation for population size by the researcher for this research was done according to Stoker's formula.

whole, and the relationship between people, the organisation and information technology.” Throughout the research the three research sub-questions will be answered using a holistic approach.

The process of defining the managerial strategy through a literature study as well as data obtained, involved inductive and deductive strategies as modes of reasoning. Table 2.9 differentiates between inductive and deductive reasoning.

**TABLE 2.9: INDUCTIVE AND DEDUCTIVE REASONING**

INDUCTIVE MODE OF REASONING	DEDUCTIVE MODE OF REASONING
<p><b>Inductive modes of reasoning</b> are manifested in statistical model-building where a model is constructed to fit certain empirical data.</p>	<p><b>Deductive forms of theory construction</b> are much more formal in nature. A set of postulates or axioms is formulated and taken to be true. From these postulates, further theoretical propositions are deductively derived.</p>
<p>A variation on inductive reasoning is analogical reasoning, i.e. constructing a model of a phenomenon on the basis of its similarities to another phenomenon.</p>	<p>This process is followed until a comprehensive set of theoretical propositions has been developed that will ultimately be tested against empirical data.</p>

During the quantitative part of the research, deductive reasoning was applied to analyse existing data, documented managerial strategies and theories. In the qualitative research inductive reasoning was applied to formulise concepts and insights. Descriptive statistics in the form of tables and graphics were used for interpreting the data, and descriptive measures such as percentages were used to quantify the findings.

## 2.8 CONCLUSION

The main research question of what would constitute an effective managerial strategy for video conferencing implementation can only be answered if the research sub-questions are answered. A comprehensive literature study was used as the basis for compiling a concept strategy for video conferencing implementation.

This will be tested empirically by interviewing video conferencing equipment suppliers and distributing questionnaires to video conferencing network managers. The qualitative data obtained from the literature study was thus supported by the quantitative data obtained from the questionnaires and structured interviews. Conclusions and recommendations were facilitated by a process of analysing the data by means of

Stepwise regression and data analysis.

## CHAPTER 3

### DEFINING VIDEO CONFERENCING

*“Psychologically we like to interact on a more personal level and video conferencing allows personal contact in meetings and lessons, in a location of our choice. We no longer have to travel distances to attend meetings or miss study opportunities because we live too far from a major centre. Virtual face-to-face classes and meetings are possible whether the participants are in the same locality or another country”.*

(Montage Plus, 2001:online)

#### 3.1 INTRODUCTION

Various research projects and video conferencing systems were evaluated over the past years, especially “their impact on communication” (Van Oostendorp and Arnold, [S.a.]:75 - 76). A survey completed during 2000 in the United States of America (USA) by Portway & Lane (1997:42) states that “the majority of network produced programs (66.2 %) are related to product and/or skills training.” Survey results (52.5 %) indicated the main reason for purchasing video conferencing technology is corporate communications. Other uses for video conferencing are skills training (36.6 %) and a further 8.8 % for education. In order to sustain the positive impact on the various applications, correct and successful implementation of video conferencing technology is essential.

Before the main research question of what constitutes an effective process for video conferencing, the first research sub-question of what video conferencing is and what constitutes a video conferencing network, need to be defined.

A video conferencing network consists of different equipment components (computer, video conferencing and multimedia) as well as communication network infrastructures (ISDN or IP). Video conferencing is not just the implementation of specific hardware but also the management of specific skills and actions across different departments in order to install the hardware and also to manage people, budgets and objectives.

It is therefore essential to understand what is required for the implementation of video conferencing technology. The dependent variables (tables 1.2 and 1.3) are defined in

this chapter to ensure that the complexity of the video conferencing network is understood.

Defining the different components, a holistic managerial approach can be derived to ensure that the different role players, hardware and infrastructure are selected, implemented, maintained and managed according to a specific managerial strategy for video conferencing implementation. The complexity of the different components in this enterprise requires that a managerial process for video conferencing is defined before starting with the implementation of the hardware.

### **3.2 DEFINING VIDEO CONFERENCING**

“Videoconferencing is simple: callers see each other on a screen and talk! Groups of people can share conversations, hold a meeting or attend a class where everyone can see and talk to everyone else. Participants can also share access to material and work collaboratively on documents (document sharing), spreadsheets, project briefs and diagrams. Video conferencing is popular because it’s interactive, it’s live and it’s natural” (Montage Plus, [S.a.]:online).

Video conferencing is “a two-way electronic communication system that permits two or more persons in different locations to engage in the equivalent of face-to-face audio and video communications ... video teleconferences may be conducted as if all of the participants were in the same room” (Telecom Glossary, 2002:online). Wire Technologies (2002:online) added the following to the already defined video conferencing concept namely that video conferencing is “communication across long distances with video and audio contact that may also include graphics and data exchange. Digital video transmission systems typically consist of camera, codec, network access equipment, network and a audio system.”

For the purpose of this study, the researcher defined video conferencing as follows:

Video conferencing supports interactive (two-way audio, video and graphics), realtime and live communication, disregard of time differences and geographical locations. With its ability to see and hear people simultaneously, it is also integrated with existing communication infrastructures, e.g. telephony and data networks and enables users to enhance the interactive process by the application of graphics with the integration of multimedia equipment.

The British Council (international organisation for educational, cultural and scientific relations) work together with the Tasmanian Educational Department (Montage Plus: [S.a.]:online) on the implementation of video conferencing technology. Their research question of “does the ability to see the other party really add to the interaction?” According to these statements the answer was: “Yes, that’s why the telephone isn’t enough.”

### **3.3 VIDEO CONFERENCING NETWORK**

An existing video conferencing network at TUT compiled by the researcher. Video conferencing networks are complex and consist of various elements. A clear understanding of what a video conferencing network is, is therefor essential. For the purpose of this study, the researcher defined a video conferencing network as follows:

A video conferencing network functions/operates within a special designed venue (specific acoustic, lighting and ergonomic standards) that is equipped with communication infrastructures (Internet Protocol for data and telephony technology, e.g. ISDN or switchboard) to transmit and receive signals by means of a codec. The integration of multimedia technology, e.g. screens, TV monitors, sound equipment, computers and document cameras enable users to transmit graphic images while interacting in a realtime or live environment.

The following components (figure 3.2 and table 3.2) as implemented by the researcher, constitutes the video conferencing network at TUT and are essential to constitute a video conferencing network namely equipment, communication networks and venue infrastructure:

### 3.3.1 EQUIPMENT

**Equipment** consists of video conferencing, multimedia and computer equipment. The following equipment is essential in a video conferencing network:

3.3.1.1 **Video conferencing equipment** consisting of the codec (decoding and encoding of incoming and outgoing signals) and cameras. Montage Plus ([S.a.]:online) explains ISDN video conferencing as follows: “a computer compresses the video signal allowing it to be transmitted ... “ Information is transmitted using a **codec** (**co** = coding and **dec** = decoding) to send and receive a clear and understandable signal. The codec is a specialised piece of equipment and not a computer.

3.3.1.2 **Computer equipment** for data presentations that connect to the TV monitor or data projector. The data signal is transferred to a Video Graphics Array (VGA) signal - the VGA signal is required in order to view this via a TV monitor or data projector.

3.3.1.3 **Multimedia equipment** is an important component especially the integration with existing video conferencing equipment. TV monitors, data projectors or big motorised screens, additional cameras to facilitate different camera angles, document cameras to support writing and 3D presentations, video machines for playback of material or recording of presentations and other specialised equipment, e.g. microscopes in a medical environment, are essential to substantiate the network.

### 3.3.2 COMMUNICATION NETWORK

A **communication network** is required to convey the different signals in between video conferencing networks at different locations. This network can be on either Integrated Services Digital Network (ISDN), Internet Protocol (IP) or a telephony switchboard. Table 3.1 is a summary of the different communication networks available.

**TABLE 3.1: COMMUNICATION NETWORKS FOR VIDEO CONFERENCING**

TYPE	DESCRIPTION
<b>ISDN</b>	<p>The <b>ISDN network</b> can be a private network provided directly from a local service provider, e.g. Telkom in South Africa.</p> <p>Compressed digital video over ISDN lines uses minimum of 128 Kbps. The lowest speed is 128 Kbps but multiple lines of 128 Kbps namely 256 Kbps, 384 Kbps or 512 Kbps provide two-way video of almost broadcast quality.</p>
<b>PABX</b>	<p>The local <b>PABX</b> of the company can also be used. The switchboard technology can be upgraded with the required digital switching technology to assist with the management of bandwidth required to make a video conferencing connection.</p> <p>Special digital cards and switches to transfer video and audio signals simultaneously over analogue telephone lines, are used.</p>
<b>IP</b>	<p>The <b>IP network</b> is a data network that can be Asynchronous Transmission Mode (ATM), Local Area Network (LAN) or Wide Area Network (WAN).</p> <p>Using LAN, WAN and ATM with desktop and codec networks, it is possible to use existing IP networks to transmit video and audio over the Internet or data network while sharing applications.</p>

### 3.3.3 VENUES AND INFRASTRUCTURE

The video conferencing network requires a venue where the different equipment and communication infrastructure can be located. A venue with specific design requirements, are essential. The requirements for **venue design and infrastructure installation** must be known to the video conferencing manager. The technical design and requirements are not essential and part of this research. The following is a summary of what is required in a video conferencing venue:

3.3.3.1 **Before construction** and during the design phase, venue design must include the following for video conferencing and multimedia equipment:

- Lighting (specific lighting for cameras are required).
- Channelling for cables (ISDN, data and cables for equipment must feed separate from the power cables in their own channels to prevent interference on the cables).
- Power feeds to the different equipment must be on separate sources,

e.g. power feeding for motorised screens must be on separate power feeds as those feeding the cameras).

- Air conditioning (fresh air flow is required without air conditioning equipment making background noises).
- Multimedia equipment selection must be made during the initial design phase (power plugs, channelling, etc. must be provided to ensure that equipment is installed without technical difficulty and will support maintenance, future upgrades and replacement of equipment).
- Acoustics (walls, ceilings and floors).

3.3.3.2 **After construction**, attention to the following is essential:

- Selection of furniture (soft furniture is essential because hard surfaces will influence the acoustics and sound quality).
- Wall decorations (pictures in frames will glare in the lights and will have an effect on the cameras).
- Wall colouring (white and pale colours influence the focus functioning of the cameras).
- Carpets (colouring and also quality will help with the acoustics as well as ergonomics in the room).
- Clocks (managing time during a video conferencing is important - different clocks, e.g. six different clocks can help to assist with the six main time differences in the world and it is not just decorative but also practical).

**FIGURE 3.1: VIDEO CONFERENCING NETWORK**

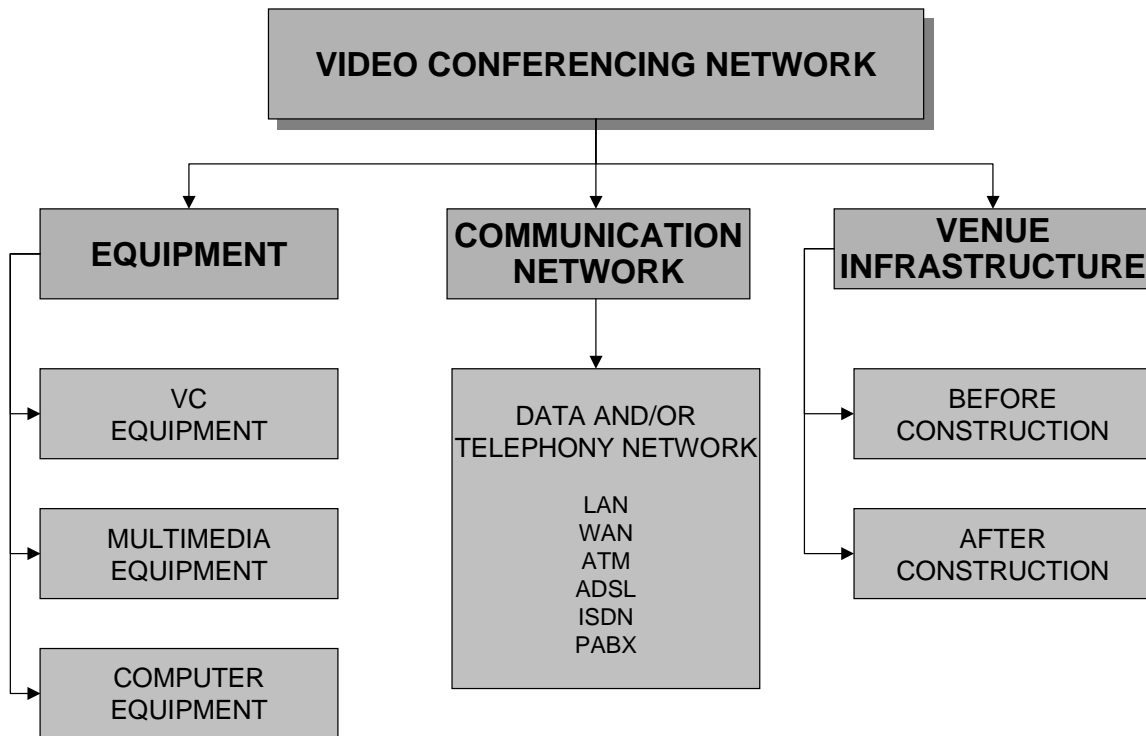


Table 3.2 explains the different components required in a complex video conferencing network. Because of the different components, cross-department functional will be required for video conferencing implementation.

Different and knowledgeable people on venue design (ergonomics, electricity, lighting, acoustics, furniture, etc.), multimedia, data and telephone infrastructure and equipment as well as managerial strategies are required.

**TABLE 3.2: COMPONENTS OF A VIDEO CONFERENCING NETWORK**

1. EQUIPMENT	
Video conferencing equipment	<b>Codecs</b> - for the <b>encoding</b> and <b>decoding</b> of outgoing and incoming signals. Codecs are manufactured according to international standards to ensure that different codecs can interpret each others signals.
	<b>Codec cameras</b> - codecs are fitted with standard cameras to record what is seen in the venue. Additional cameras can be added.
	<b>Audio conferencing</b> - codecs can link a video and audio session simultaneously. This is done by adding a site (without visual connection) via a telephone line.
Multimedia equipment	<b>Control panels</b> - multimedia in the same network is managed by control panels. This can be programmed remote controls or Liquid Crystal Display (LCD) panels.

	<p><b>Document cameras</b> - enable projection of 3D items, presentations from books, transparencies or paper with digital zoom facilities to enlarge graphics. Document cameras are also alternatives for electronic whiteboards.</p>
	<p><b>Video machines</b> - it is essential to record meeting proceedings and also play prerecorded video material during presentations.</p>
	<p><b>Audio tape decks</b> - audio recordings are standard applications during meetings and audio conferencing. Computer software will enable you to record audio conversations directly onto the computer in the network.</p>
	<p><b>Digital Versatile Disc player (DVD-player)</b> - this equipment can be installed in the system or the DVD-ROM from the computer can be used for DVD playback purposes.</p>
	<p><b>Electronic whiteboards</b> - MIMIO and SMART boards are available to record what is written on the whiteboard and the signal is transmitted via a scan convertor to the computer. This can then be transmitted via the codec. This is used in venues where the presenters need to move around and where a document camera is not available.</p>
	<p><b>Additional cameras</b> are required to ensure that everybody are visible.</p>
	<p><b>Projector screens</b> - screens can be motorised or fixed. The sizes and quantity of screens are dependent on the room design and size.</p>
	<p><b>TV Monitors or data projectors</b> - images are projected by adding data projectors or TV monitors. Two monitors are required for dual projection (faces on the one and multimedia images on the other monitor). Data projectors on one big screen enable the viewer to have Picture-in-Picture (PIP) images. This means that both the faces and images are seen on the same screen.</p>
	<p>Live <b>title production equipment</b> to make titles, e.g. presentations names, main headings etc.</p>
	<p><b>Amplifiers</b> - manage, e.g. treble levels and audio level outputs</p>
	<p><b>Microphones</b> - depending on the design of the venue, ceiling or table microphones are used. Wrong selection and incorrect installation of microphones can result in audio interference.</p>
	<p><b>Speakers</b> - speakers are installed in specific places in the venue or in the ceiling. Feedback from the microphones because of incorrect placement of speakers, is one of the main problems in a video conferencing network.</p>
	<p><b>Microphone mixers</b> - if more than two microphones are used, a microphone mixer is required to manage audio levels of microphones.</p>
	<p><b>Echo cancellation</b> - microphones, speakers and acoustic problems are managed by applying echo cancellation equipment.</p>
	<p><b>Switchers</b> - multimedia equipment in a network needs to be selected, e.g. a document camera for one application and a video machine for the next application. Switchers enable users to select between the different equipment by means of pressing one button.</p>
<b>Computer equipment</b>	<p><b>Hardware</b> - computer boxes or Central Processing Units (CPU's) are required for normal Microsoft PowerPoint or Corel Presentations. Computers can also be used to record audio conversations, e.g. meetings or audio conferencing sessions.</p>

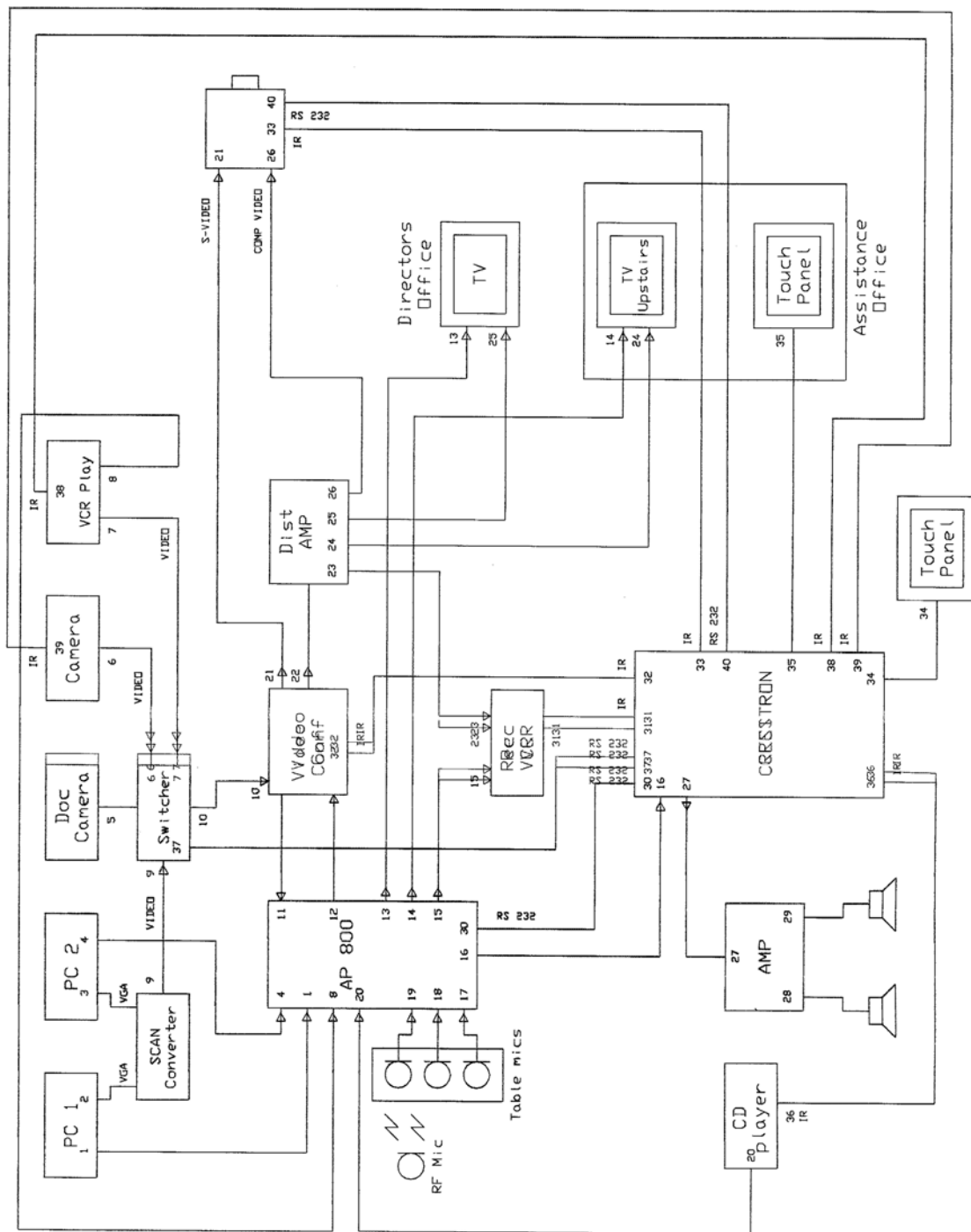
	<p><b>Internet</b> - connection to the Internet is obtained by a fixed computer connection via the LAN or WAN of the enterprise. A fixed IP address is required for the codec to do video transmissions over an IP network.</p> <p><b>Software</b> - software on computers to do presentations or to record audio files on. Software, e.g. Excel, Microsoft PowerPoint, Corel Suite etc. "The quality of the audio and the video image greatly depends upon the software used and the rate of information transmission" (Van Oostendorp and Arnold, [S.a.]:76).</p> <p><b>Scan convertors</b> - digital computer signals are converted into VGA (video) signals that make it possible for the codec to transmit this signal to other codecs.</p>
<b>2. NETWORK COMPONENTS</b>	
<b>Data</b>	Leased lines (data lines) or <b>BRI ISDN</b> (Basic Rate Integrated Services Digital Services Network) is used to transmit video, audio and graphic images between video conferencing sites on different locations. If more bandwidth is required, a <b>PRI ISDN</b> (Primary Rate Integrated Services Digital Network) can be used.
<b>IP</b>	<b>Internet Protocol (IP)</b> - video over a data network is done using data protocols via fixed IP addresses on an LAN, WAN or ATM data network.
<b>LAN</b>	<b>Local Area Network (LAN)</b> - restricted data network on one premise.
<b>WAN</b>	<b>Wide Area Network (WAN)</b> - restricted data network from the same organisation but in a wider geographical area.
<b>ATM</b>	<b>Asynchronous Transmission Mode (ATM)</b> - providing more bandwidth, e.g. 720 Kbps for video conferencing on a restricted data network of the organisation using different data technology.
<b>ISDN</b>	<b>Integrated Systems Digital Network (ISDN)</b> - A minimum of 128 Kbps is required for video and audio transmissions. More bandwidth can be obtained by adding more ISDN lines in frequencies of 64 Kbps per line. 384 Kbps are a good average bandwidth but 512 Kbps can be seen as close to broadcasting quality. The more lines used, the higher the dial-up cost will be.
<b>ADSL</b>	ADSL access is based on Asymmetric Digital Subscriber Line, a new modem technology that converts your telephone line into a multi tasking access medium. The same line can be used for telephone conversations, video conferencing, Internet access while sending a fax at the same time (Telkom, 2003(a):online).
<b>Switchboard (PABX)</b>	Local switchboard technology can also be used for the switching and connection of codecs. Bandwidth is managed and allocated by the preprogramming of software and special telecommunication cards installed in the telephony switch.
<b>3. VENUE INFRASTRUCTURE</b>	
<b>Before construction</b>	<b>Venue design</b> - a holistic approach is essential towards all factors that might influence video or audio in a venue before the installation process. Documentation and graphic representation of the channelling, equipment, power feeds, furniture placements, etc. must be made before installations can commence. This will also help to draw up budget into more detail.
	<b>Channelling</b> - cables (ISDN, data and cables for equipment) must feed separate from power cables as this may interfere with the functioning of the cables.
	<b>Lighting</b> - specific lighting for cameras are required to limit shadows on faces. Yellow light makes it difficult for cameras to focus as codec camera specifications are not studio quality and requires more white light.

	<b>Power feeds</b> to the different equipment must be on separate sources, e.g. the motorised screens and cameras.
	<b>Acoustics</b> - hard surfaces (walls, floors and ceilings) influence the quality of the acoustics in the room. Softer surfaces enhance and limit audio problems.
	<b>Multimedia equipment</b> - selection is made during the initial design process.
	<b>Air conditioning</b> - fresh air flow without equipment making background noises.
<b>After construction</b>	<b>Venue design</b> - The documentation prior to the installation and budget phases, must be updated with the routes followed for specific equipment installations, etc. to ensure that records are maintained for upgrades and future maintenance.
	<b>Wall surfaces, colouring and decorations</b> - wall decorations, e.g. pictures in glass frames will glare and will have an effect on the cameras. Wall colouring, e.g. white and pale colours influence the focussing of the cameras.
	<b>Carpets</b> - essential for colouring, ergonomics and acoustics.
	<b>Furniture</b> - soft surfaces will enhance the acoustics and sound quality.
	<b>Clocks</b> - time management during live sessions as well as for decorative purposes.
	<b>Multimedia equipment</b> - update the installation diagrams. Training on equipment is essential and needs to be supported with manuals.

It is essential to document equipment and their placement in the network, before starting with the installation - flow diagrams with software programs, e.g. Computer Aided Design (CAD) are used. This will ensure that cable routes are planned for and that video machines, e.g. are defined to playback and record - two separate cables are required to do this. Visualising this on paper or by means of technology, e.g. CAD will help to limit mistakes and more detail is also available for budgeting purposes.

The following flow diagram (figure 3.2) is a graphical representation of the video conferencing site at Telematic Education, TUT in South Africa. The graphical representation of the network is an indication of the complexity of the network. The various components are demonstrated by using CAD to indicate the integration of the different technologies as well as the complexity of the installation. This flow diagram is but one part that needs to be well managed to ensure successful video conferencing implementation.

**FIGURE 3.2: IMPLEMENTED VIDEO CONFERENCING NETWORK AT TELEMATIC EDUCATION, TSHWANE UNIVERSITY OF TECHNOLOGY** (Approval for use gained from ETA Audiovisual)



### 3.4 VIDEO CONFERENCING ENTERPRISE OR ENVIRONMENT

The video conferencing network is complex and the cross-departmental functioning needs to be managed to ensure an effective implemented video conferencing network. Cross department function is essential to include various skills and knowledge to build and sustain such a complex network. This is done by managing the people, resources, budgets and time issues.

Understanding and defining the enterprise is essential to adopt a managerial strategy that will support the goals and objectives of the specific enterprise. Wevell (1996:336) defines an enterprise as “a project or undertaking, especially a bold or difficult one, e.g. a business activity.”

For the purpose of this study, the enterprise for video conferencing implementation is defined as follows, supported by the definition of Wilson (1998:159):

The enterprise of video conferencing network implementation consists of the identifying of a strategic plan that includes the setting goals and objectives that are transformed into the rendering of services that need to be planned, monitored and controlled by means of applying specific activities to ensure that the set goals and objectives are met.

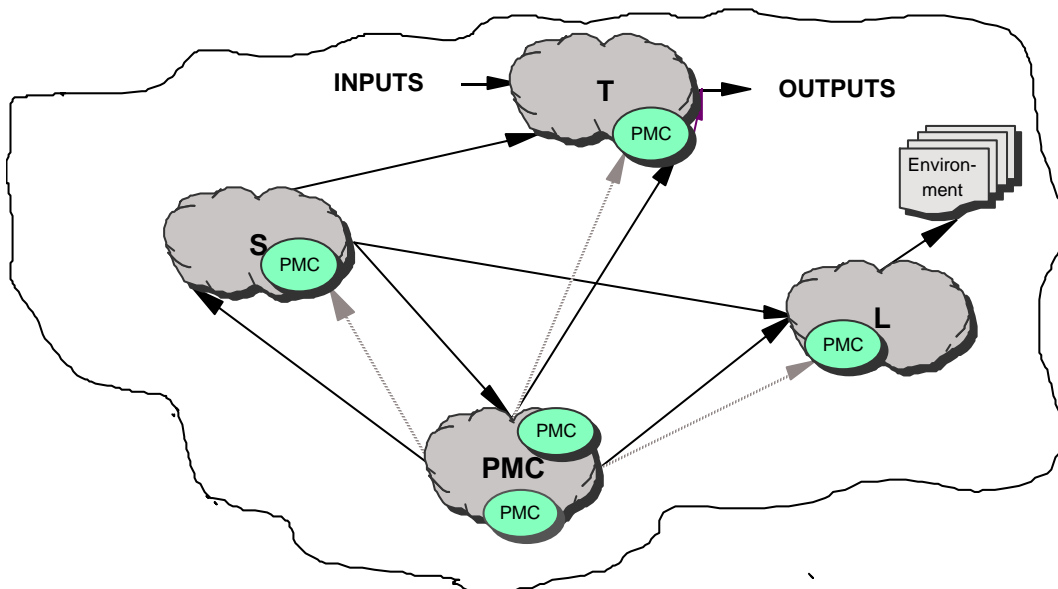
According to Naughton (2002:50-51) project environments or enterprises require an understanding of the location, the customers and their individual expectations, end user requirements as well as the resources available. Whittington (1993:3) adds that “... good planning is what it takes to master internal and external environments.”

Wilson (1998:159), gave the following graphic representation of an enterprise (figure 3.3) and how the different managerial functions and duties are applied within an enterprise. According to Wilson, each activity consists of its own Planning, Monitoring and Control (PMC) subsystems.

According to this strategy, organising as a managerial function is excluded. No reasons were found in the literature. Organising is essential to ensure that the required resources are in place and available to start and continue with the actions and activities

to ensure that the production or implementation phases of the project can begin and continue. Organising is an essential managerial function to ensure that the desired outcomes or deliverables can be maintained. As stated by Kroon (1986:267-284) organising is part of the four managerial functions and will therefore be included in chapter 4.

**FIGURE 3.3: A MODEL OF AN ENTERPRISE** (Adapted from Wilson, 1998:159)



**L E  
ND:**

**G E**

- **T** = Transformation (reduced goals: “converting a perceived market needs into the satisfaction of that need”).
- **S** = Service (service functions to support the transformation process).
- **L** = Activities and link to the environment.
- **PMC** = Planning, Monitoring, Control (steer the enterprise in the direction of its goals).

### 3.5 VIDEO CONFERENCING APPLICATIONS

The implementation of a video conferencing network is done to fulfill a specific purpose and objective. Table 3.3 is a summary of some of the applications by video conferencing users:

**TABLE 3.3: VIDEO CONFERENCING APPLICATIONS**

CATEGORY	DESCRIPTION	EXAMPLE
Events	Involvements of specialists that are milestones or highlights	Community events, e.g. different parents from deaf children sharing the same agenda
Presentations	Formal presentations	Conferences, seminars and workshops
	Remote guest speakers and experts	Experts in a specific field of expertise
Business management	Meetings and discussions	General or board meetings
	Facilitate collaboration, information sharing, problem solving and decision-making	Brain storming
	Deliver information on rapidly changing topics	An announcement that income tax laws have been passed in parliament. Chattered accountants can talk to an expert to ensure that work is done according to up to date information
	Planning, implementing and management of new projects	Project management
	Online industry training	Training sessions
	Informal work meetings	Discussion sessions
	Formal appointments	Job interviews
	Collaborations and enterprise solutions	Brain storming and problem solving
	Contract negotiations	Defining contract specifications
	Professional development	Training with specialists in the field
Training or education	Provide equitable access to resources for at-risk or special-needs students	A visit to the Barrier Reef and experience the marine life first hand and in realtime
	Courses, lessons and tutoring	Training sessions
	Facilitate collaboration, information sharing, problem solving and decision-making	Peer learning with other students in different locations, e.g. students in Australia and Canada

CATEGORY	DESCRIPTION	EXAMPLE
	Deliver information on rapidly changing topics	An announcement that income tax law have been passed in a parliament. Talking to an expert can change old information in text books and update it with relevant information
	Remote guest speakers and experts	Sharing of expertise to enhance the teaching and learning environment
	Professional development	Just in time training of what is required to improve required skills to complete a specific task
Specialised applications	Specialist diagnostic services, e.g. law and health	Courts to prevent child rape victims to come into contact with the raper
General	Provide a virtual experience when the real experience is not feasible	A visit to NASA in the USA from Africa to talk to astronauts

### 3.6 BENEFITS OF VIDEO CONFERENCING

As seen there are many applications and reasons why a video conferencing network is required. Implementing a video conferencing network has in general the objective to add value and to increase the organisations competitive edge. The Tasmanian Department of Education documented in Montage Plus ([S.a.]:online) their reasons for implementing a national video conferencing network in Tasmania, Australia as follows:

- to deliver information on rapidly changing topics;
- to facilitate collaboration, information searching, problem solving and decision-making based on dialogue and distributed expertise;
- to access national and international networks;
- to offer increased access to global markets and to
- achieve access and equity goals by allowing institutions to offer additional courses and enabling students at remote locations to join to form viable classes.

### **3.7 CHALLENGES OF VIDEO CONFERENCING**

Van Oostendorp and Arnold ([S.a.]:75) summarised the following as challenges or problems with the application of video conferencing. He also added that these problems “all arise from the loss of processes”. These problems can be overcome by applying managerial procedures and training for users. Managerial strategies aim to provide structure and to put processes in place to manage and overcome these problems.

- “These media reduce the amount of verbal and nonverbal information normally available in face-to-face communication, mainly because regulating characteristics of communication, such as eye contact, giving feedback and turn-taking, are disrupted in teleconferencing systems.”
- Topic shifts can occur - a strong facilitator or chairperson is needed to help manage time, people and topics (agendas).
- Impersonal tone of conversation - people are not natural presenters. They need to be trained on how to communicate vividly in front of cameras.
- Privacy intrusions - incorrect camera settings that focus too close on a specific person, can cause discomfort. Codecs are also set on ‘auto answer’ in order to permit incoming signals. Technicians sometimes test lines and connections to other users without consulting with the users. This causes interruptions of meetings and intrudes in confidential meetings.

### **3.8 CONCLUSION**

Video conferencing networks consist of various components including equipment, network infrastructures (ISDN or data) and a well-designed venue to support its function of live interactive transmission of audio, video and graphics. The different design and development features, e.g. acoustics, lighting etc. makes this a complex network that requires a special managerial strategy to ensure that the complex video conferencing network is managed according to the main project plan to ensure an effective video conferencing network.

Understanding the complexity of this network, the design and development of a specific managerial strategy for video conferencing implementation is essential to support the implementation process of video conferencing implementation and management before, during and after implementation.

## CHAPTER 4

### VIDEO CONFERENCING MANAGEMENT

*“With the advent of fast personal computers, digital television and high bandwidth cable and radio-frequency networks, so-called post-industrial societies stand ready for a yet deeper voyage into the ‘permanently ephemeral’”*

(Michael Benedikt, 1993: Cyberspace - First Steps)

#### 4.1 INTRODUCTION

In answering the main and second research sub-question of what video conferencing management is, five existing managerial strategies and processes as well as four managerial functions and six managerial duties were analysed. Five managerial strategies were identified for investigation in order to design processes and procedures to conclude a managerial strategy for video conferencing implementation.

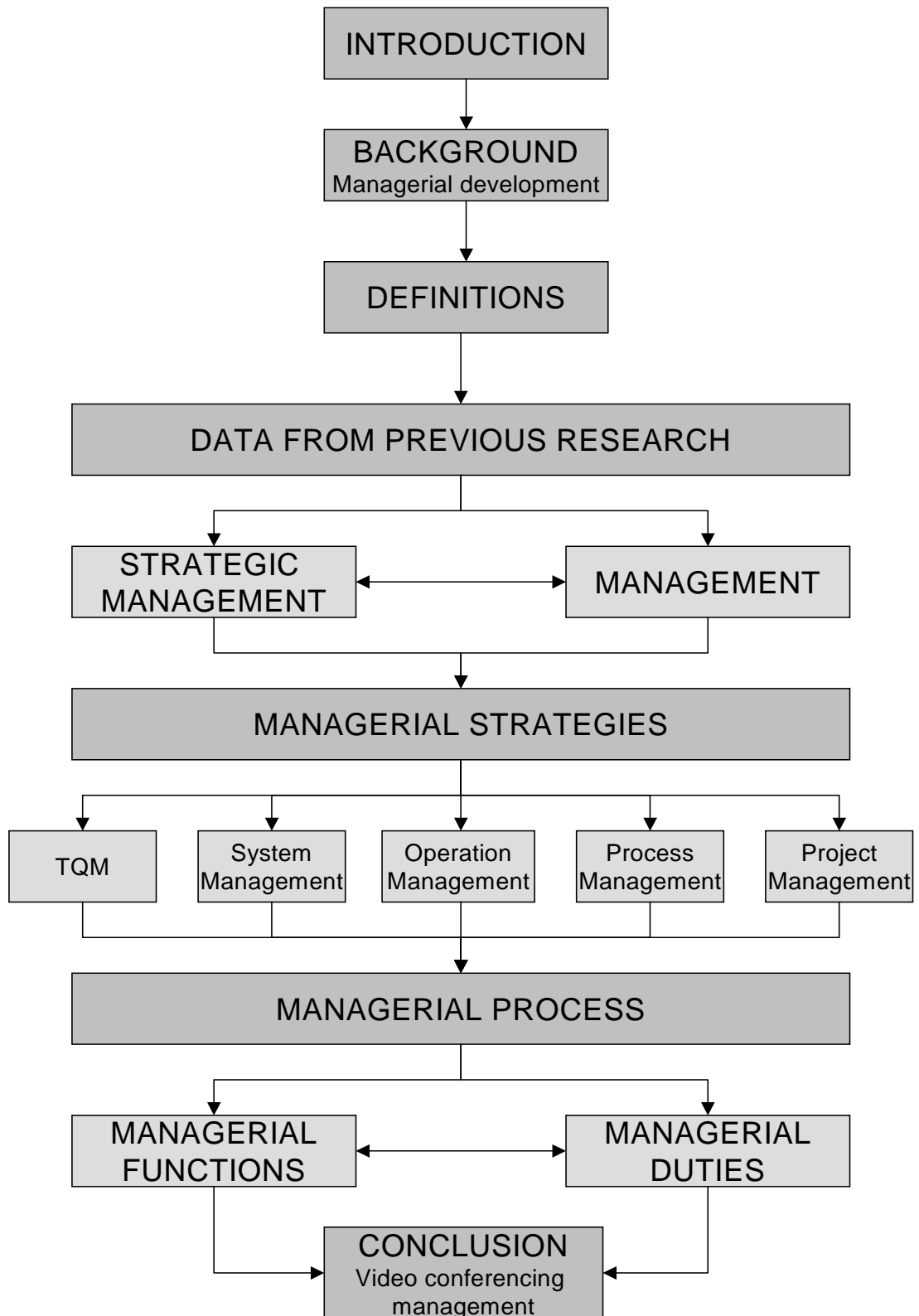
A managerial strategy (chapter 5) will be concluded from these managerial strategies to support video conferencing implementation and will be tested in chapters 6 and 7. Four managerial functions (planning, organising, activation/motivation and control) were applied to conclude the managerial and implementation process for video conferencing.

The managerial duties namely decision-making, communication, motivation, coordination, delegation and discipline support the managerial functions. The managerial duties are essential as it helps with task allocation to the different role players involved in video conferencing implementation. The layout of chapter 4 is seen in figure 4.1. This logical approach is necessary to ensure that the question of what video conferencing management is, is answered.

Managerial strategies have been developed and improved over the decades of managing men/woman, resources, money and time. As stated by Kroon (1986:15) managerial literature provides the manager with information on how to act in certain circumstances.

## 4.2 BACKGROUND

FIGURE 4.1: LAYOUT OF CHAPTER 4



Limited literature is available on the video conferencing implementation and managerial process. General managerial strategies are available but no literature were found on applications in South Africa that illustrated how available strategies are applicable within the implementation process of video conferencing.

Over the years many managerial processes and procedures were developed and documented within environments, like the church, politics and the military. Even the description in Exodus 18 (Bybel,1985:26) of Moses appointing various line managers to assist with the ruling of the land, as well as Genesis 41 (Bybel,1985:54) that describes Joseph's successful administration of the grain sheds, to ensure that the seven difficult years were survived by all in the country, are examples of documented managerial processes.

One of the biggest project management projects recorded in history, was completed 4500 years before Christ - the building of the **Egyptian pyramids**. Analysing the building project, it is clear that the different managerial functions of:

- Planning (the architecture evidence as a strategy for precise planning)
- Organising (mobilisation of slaves, human and natural resources)
- Activation (involving communities on national level) as well as
- Control (ensuring that the Pharos's food hangars provide sufficient food for all building the pyramids), were in place to complete these projects. The development of a hierarchy in organisation, namely top, middle and lower management, are still in use in modern organisations (Kroon, 1986:13).

After the **Industrial Revolution** (1760) the focus changed to the development and improvement of existing managerial techniques and methods of production (McKenna, 1999:10-11 & 52-54 and Kroon, 1986:22 & 28). Increased production was achieved by managing the following:

- Man (human resources - reduced working hours from 14 to 12 hours per day)
- Material (housing - textile factories under one roof)
- Machines (using machinery - steam to increase production)
- Money (paying employees for services rendered)

**James Watt and Matthew Boulton** documented their implementation process for the building of a steam engine in 1800 (Kroon, 1986:29). This documentation included the first work flow process. The focus was to reduce losses and increase profits. **Robert Owen** documented in 1771 (Kroon, 1986:29) the evaluation and control process for his cotton mills - processes that are still in used in modern applications. **Charles Babbage** developed and designed in 1792 the first mechanical computer (McKenna, 1999:10 and Kroon, 1986:29). This computer was used to calculate the actions of employees and analyse their productivity to ensure that a skill's development programme was created. The outcome was an increase in employee skills, higher profits and raised productivity.

**Fredick Winslow Taylor** published his *Scientific Management* in 1947 (Anderson, 1984:46, Koontz & O'Donnell cited in Kroon, 1986:33-36, Schonberger & Knod, 1999:700-701 and McKenna, 1999:54-55) and focussed on eliminating unnecessary actions and increased production by standardising of procedures (Stallard & Terry, 1984:5). "Taylor believed in 'science of management' based on observation, measurement, analysis and improvement of work methods, and economic incentives" (Stevenson, 1999:20).

Taylor stated (cited in Kroon, 1986:33) the following: "Now, in its essence, scientific management involves a complete mental revolution on the part of the working man engaged in any particular establishment or industry - a complete mental revolution on the part of these men as to their duties toward their work, toward their fellow men, and toward their employees. And it involves the equally complete mental revolution on the part of those on the management's side - the foreman, the superintendent, the owner of the business, the board of directors - a complete mental revolution on their part as to their duties toward their fellow workers in the management, toward their workmen, and toward all of their daily problems. And without this complete mental revolution on both sides scientific management does not exist." Farrell (1993:142) summarised Taylor's strategy as the "one best way to do the job". The "one best way" got translated into the "only way" (Farrell, 1993:144-145) but "they're not much help in inventing products, beating deadlines, hitting new levels of quality, or fostering employee commitment."

Taylor used four scientific methods that are essential in modern applications today:

- Studying the processes and procedures of activities on the lowest levels - it is

possible to develop the best method to complete a specific task.

- Selecting of the best employee for the correct duties - he also adapted payment scales for different responsibilities.
- After selection, employees went through detailed training before commencing with their duties - training was part of the managerial function and not like in other industries where employees were used to train new staff members.
- Creating an environment of teamwork where the different roles of management and worker were defined and where teamwork forms the platform in goal achievement.

**Henry L Gantt** worked with Taylor and added additional focusses. He added value with his scheduling system by means of providing a bonus system to supervisors when goals were achieved (Stevenson, 1999:20) by documenting the production process and problems, delays were foreseen and were therefore able to manage it accordingly. Adding managerial tools like process flow documentation, Gantt provided a tool for managers to assist them with medium and long term planning like the ordering and delivering of production materials and also the measurement of production (Kroon, 1986:36-37). "The purpose of the charts, as with any visual aid, is to clarify and thus improve understanding and to serve as a focus for discussion" (Schonberger & Knod, 1999:700-701).

**Frank and Lilian Gilbert** worked together and founded the Society for the Promotion of Science and Management in 1911. They used work flow processes and defined the processes into time and activity studies (Schonberger & Knod, 1999:700-701 and Kroon, 1986:38-39). They studied the detail when completing a task and were able to study small portions of a task at a time (Stevenson, 1999:20). Using technology like photos (still images) and film cameras (movement), they were able to document activities in the creation of the shortest route and time to complete an activity.

**Harrington Emerson** published a book, *The Twelve Principles of Efficiency* in 1924 (Kroon, 1986:39). In this book he stated that higher efficiency in an organisation is the result not just of the employee but also the use of better managerial methods.

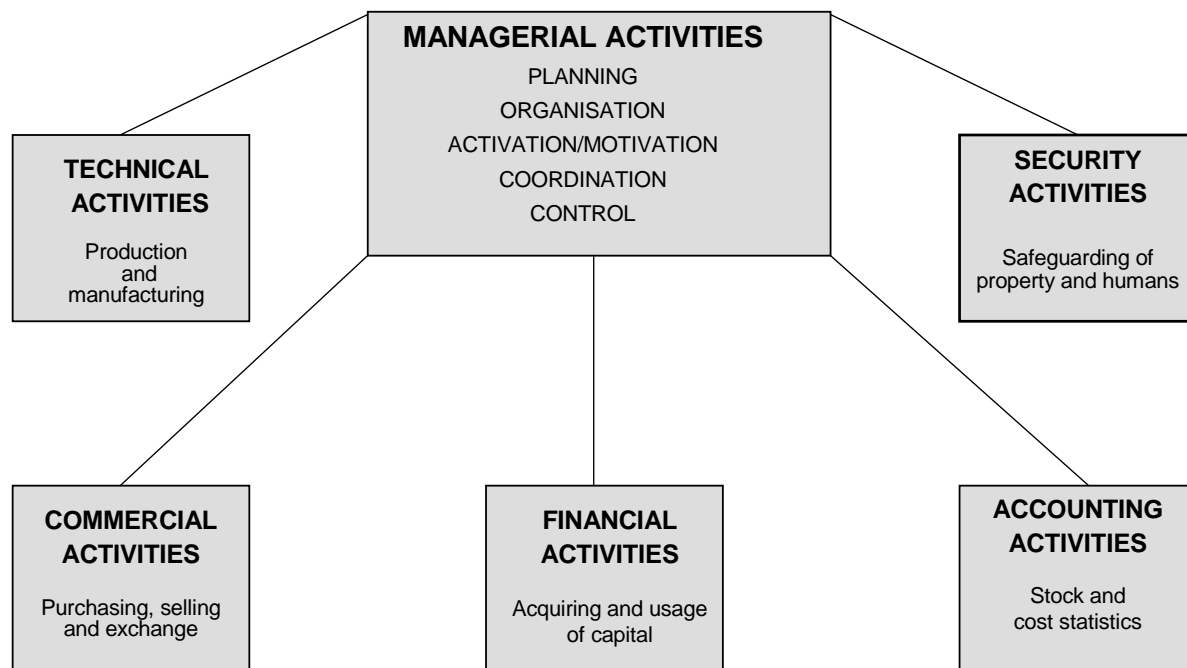
According to Emerson, scientific managerial methods “could save companies millions of dollars a day” (Stevenson, 1999:20). The following principles documented by him, are still essential in modern managerial environments and for this study:

- Formulation of goals.
- Using logics, management must keep to ideals, holistic evaluation of problems and use expert advice.
- Use discipline in the implementation of rules and regulations.
- Relevant updated information and reports must be available to make informed decisions.
- Effective techniques must be used for scheduling and control.
- Documented standards must include time scheduling for the completion of tasks by means of time and action studies, work standards and the positioning of employees in the correct positions.
- Documented work instructions for goal achievement.

**Henri Fayol**, founder of the Classical Managerial Theory in 1925 provided modern managerial environments with ground rules for effective management. Fayol developed a balanced managerial environment (Kroon, 1986:40-45 and Stallard & Terry, 1984:6-7). On the vertical level the managerial hierarchy from top to bottom and horizontally, the different functions like financing, marketing and production.

Fayol documented (cited in Kroon, 1986:43) the managerial functions in figure 4.2 as follows:

**FIGURE 4.2: FAYOL'S MANAGERIAL FUNCTIONS** (Adapted from Kroon, 1986:43)



**Max Weber**, developed more formal and bureaucratic managerial frameworks to operate in. Kroon (1986:45-56) explained in detail the value added by **Urwick, Gulick, Mooney, Reiley** and **Follett** in the 1940's. A more balanced environment was developed by them that included the three different levels of management (top, middle and lower) the workers and the integration of the managerial functions namely planning, organising, activation / motivation and control. Scientific foundations were built on rules, competence, principles of hierarchy for control, technical competence and documentation of administrative functions (Stallard & Terry, 1984:5-6). Allocation of tasks and the appointment of role players are not just the responsibility of top, middle and lower management. During this study the importance of project teams, that operate across and over these levels, will be investigated.

**Harold Koontz** published in 1961 (Kroon, 1986:59) the first documentation about Process Management. Process management is very important for this study. During this study the basic principles together with System and Project Management will be used to develop the managerial process for video conferencing implementation.

Another very important managerial strategy that is important for this study is the System Managerial Strategy. In 1954 Ludwig von Bertalanffy, Kenneth Boulding, Anatol

Rapoport and Ralph Gerard documented the first System Strategy. This was defined by **Chester Barnard** as described by Kroon (1986:61). He defined a system in an organisation as dependable sub-parts that need to function as a whole with specific objectives. Smith *et al* (cited in Kroon, 1986:61) defines it as follows: "... a set of elements together with relationships between the elements connected or related to each other and to their environment in such a manner as to form an entirety or a whole."

Thus it could be argued that various managerial strategies were developed and designed over centuries (as seen in the Bible to more modern managerial strategies, e.g. Project Management) that can be applicable for video conferencing implementation.

Managerial functions (planning, organising, activation or motivation and control) have been applied to manage men, material, machinery, money and time to achieve specific objectives (to change or maintain standards) with the application of processes and methods in order to add value to the organisation.

These managerial strategies, functions and duties had been investigated to design and develop a managerial strategy for video conferencing implementation.

### 4.3 DEFINITIONS

The following video conferencing implementation and managerial concepts (table 4.1) are important to understand the core of chapter 4:

**TABLE 4.1: DEFINITIONS APPLIED IN CHAPTER 4**

CONCEPT	DEFINITIONS
Manage/management	A continuous cycle that is interdependent on different managerial functions namely planning, organising, activation or motivation and control applying resources, material, men and money (capital/budgets) to achieve specific objectives (short, intermediate or long term) according to a set and approved plan within a specific time frame and budget.
Managerial duties	Managerial duties are support actions for managerial functions namely planning, organising, activation and control. The managerial duties consist of decision-making, communication, motivation, coordination, delegation and discipline.
Managerial functions	Managerial functions consist of planning, organising, motivation and control. These functions form the core of the continuous managerial process.

CONCEPT	DEFINITIONS
Managerial strategies	Managerial strategies are plans to ensure that specific managerial actions are completed by allocated people, resources and within specific time frames and budgets. These managerial strategies works within a Total Quality Framework applying process, system, operations or project management to achieve set objectives.

#### 4.4 IMPORTANCE OF THE DIFFERENT CONCEPTS

The following concepts (table 4.2) are important to understand their meaning and also how they will be applied in this chapter:

**TABLE 4.2: IMPORTANCE OF DEFINITIONS APPLIED IN CHAPTER 4**

CONCEPT	APPLICATION OF CONCEPT
Manage/management	Defining the concept of managerial strategies in relation to the managerial functions (planning, organising, activation and control) as well as the managerial duties (decision-making, communication, motivation, coordination, delegation, discipline) in order to design a process for implementation.
Managerial duties	Managerial duties are supportive of the managerial functions and ensure that the continuous managerial cycle is concluded as decisions need to be communicated, role players motivated and delegated actions coordinated to ensure discipline within the managerial process. Video conferencing implementation is a continuous process of implementation and evaluation and is supported by a contentious cycle of managerial duties.
Managerial functions	Planning, organisation, activation/motivation and control form the core of managerial management to start, maintain and conclude a task. See also: manage/management.
Managerial strategies	<p>Is constituted in a holistic and systematic plan on how specific actions will be managed by senior, middle and lower management in order to apply the managerial functions in a specific managerial process to plan, organise, activate (motivate) and control what needs to be done, who will achieve specific set objectives, how and when this will be completed.</p> <p>The managerial strategies applied in this study is:</p> <ul style="list-style-type: none"> <li>• Total Quality Management (TQM)</li> <li>• System Management</li> <li>• Operation Management</li> <li>• Process Management</li> <li>• Project Management</li> </ul>

#### 4.5 DATA AND FINDINGS FROM PREVIOUS RESEARCH

Hussey (1998:11) indicates that the success rate of various managerial strategies, e.g. Business Process Re-engineering, lies only in between 30% - 50%. Crosby (1979:7) states that the typical management decision that causes quality problems results from a “*hunch*”. Compiling a managerial strategy therefore needs to be systematic and logic, based on scientific research. The application of strategies in research “permit experimentation of a kind which is unavailable in many environments ... as it is usually symbolic, it is possible to reduce complex relationships to a form that can be put down on paper ... to consider interrelationships and combinations of circumstances ...” (Cleland & King, 1975:17).

Whittington (1993:25) also adds to Cleland & King by stating that “ strategies ... are a way in which managers try to simplify and order a world which is too complex and chaotic for them to comprehend. The regular procedures and precise quantification of strategic planning are comforting rituals, managerial security blankets in a hostile world.”

According to a ten-year study completed in England by Joan Woodward (cited in McKenna, 1999:247) “results established that there is a strong relationship between the type of technology and the appropriate structure of organisation” selected to manage technology. Due to the complexity of the implementation of a video conferencing network (chapter 3) a systematic and structured managerial strategy (chapter 4) must be defined to support the processes and procedures of video conferencing implementation (chapter 5). Video conferencing implementation is not just the installation of hardware or equipment but also include the implementation of a new operational system that includes time, money, resources and people. Systems are defined as “a planned approach to the activities needs to attain desired objectives” (Littlefield *et al*, 1978:33).

Whittington (1993:27) supports this by stating that “strategy may be a decision-making heuristic, a device to simplify reality into something managers can actually cope with; plans may just be managerial security blankets, providing reassurance as much as guidance; strategy may not precede action but may only emerge retrospectively, once action has taken place; strategy is not just about choosing markets and then policing performance, but about carefully cultivating internal competences.”

#### **4.5.1 STRATEGIC MANAGEMENT**

Wevell (1996:1122) and Craig *et al* (1994:184) define strategy as “a long term plan” or a plan or action “right for a particular purpose.” Whittington (1993:3-5) extends this definition by adding that strategy is a “rationale process of deliberate calculation and analysis, designed to maximize long-term advantage ... to securing the future.” Chandler (cited in Whittington, 1993:14 and Hindle, 2000:206) argues that strategy is “the determination of the basic, long-term goals and objectives of an enterprise, and the adoption of cause of action and the allocation of resources necessary for those goals”.

Strategic planning consists of a vision and mission statement to align project actions with the overall objectives of the organisation - set out by the enterprise and senior management (Hunter *et al*, 1998:80; Kroon, 1986:60-61 and Hindle, 2000:206). The articulation of a vision is essential in order to define a strategic goal (Chandler, cited in Hindle, 2000:206; Flanagan & Finger, 2001:284-285 and Kroon, 1986:162-174).

Marx (cited in Kroon, 1986:2) adds to the importance of acquiring targets (short term) and objectives (long term) of the enterprise. Implementing a video conferencing network commences according to a set strategy. This long term plan can be divided into different phases meaning that both short and long term objectives need to be defined and managed within a managerial process. The setting of objectives is essential as this is an indication of the standards as well as evaluation criteria that will be applied to evaluate the implemented video conferencing network.

It can be argued that strategic planning for video conferencing will include a long term plan that is aligned with the strategic plan of the organisation in order to achieve set objectives of the organisation. In order to achieve these objectives, specific actions, skills, budgets and resources will be required to ensure that these objectives are achieved. This commitment by management is only possible by means of deliberate calculation and analysis of the existing situation and environment of the organisation. Processes and methods are also required to convert the strategic plan into an operational plan to make the overall objective a reality.

“Business strategy and strategic management have long been viewed as the concept and process that links an organisation and its environment” (Smith *et al*, 2000:4). According to Farrell (1993:39-40) strategy is all about the “market need” and “competitive position”. Implementing video conferencing technology as part of the

strategic objective, will therefore aim to enhance the competitive position by means of solid managerial strategies and skills.

With reference to a case study (Annexure C) completed during 2002 by the researcher, Standard Bank South Africa implemented a video conferencing network with the main aim to improve their internal communication infrastructure. As the main objective of Standard Bank is to provide financial banking services, the aim of the video conferencing implementation was interdependent and interlinked with the overall objective of the organisation. The bridge that links these two major principles is the “how” or strategy to obtain the set objective. The defined video conferencing enterprise (chapter 3.4) requires a managerial strategy to ensure that the set objectives for the video conferencing enterprise can be met.

After considering the various definitions quoted above, the researcher defined a video conferencing managerial strategy as follows:

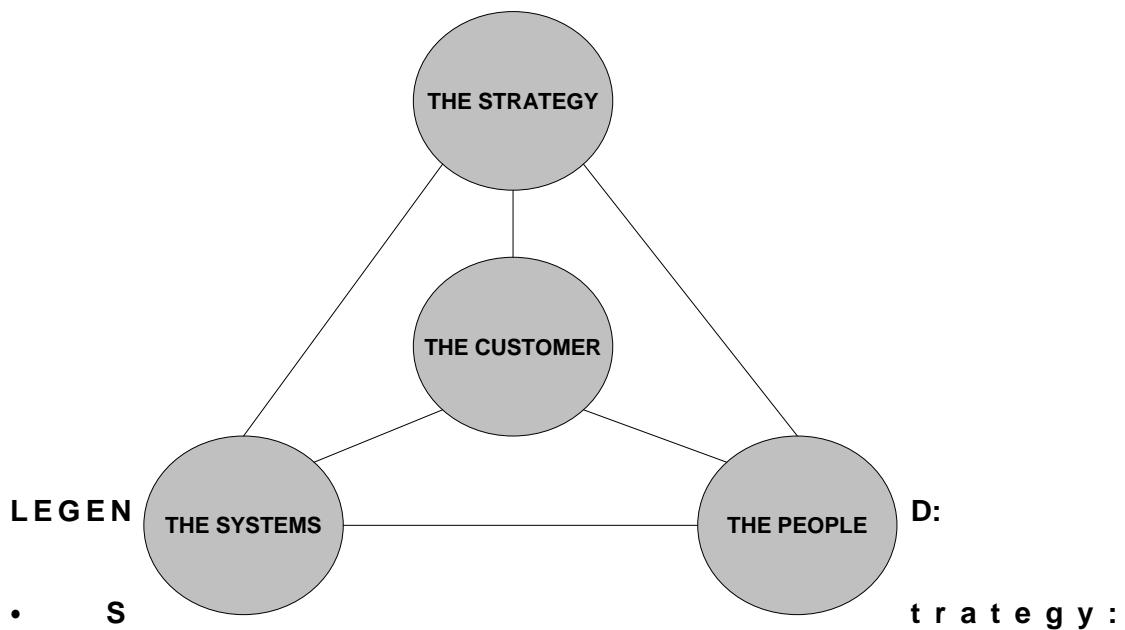
A video conferencing strategy is an approved plan (with long-term implications) by senior and middle management to provide guidance in order to achieve specific objectives (the implementation of a video conferencing network) of the enterprise with allocated people, resources, budgets, set standards and within specific time frames.

Dorrian (1996:55-59) illustrates the various role players and components in strategic development as an interlinked and interdependent action (figure 4.3). Strategic development depends on a formulated and defined strategy (mission and vision on the overall objectives of the company) the systems (how) the strategy will be implemented and maintained and who is involved (employees, contractors, etc.) in order to provide a specific service or product to the end user (the customer). The customers can be internal staff members within an organisation or external clients.

Using this strategic triangle, it can be argued that the implementation of video conferencing is interdependent on various role players (people) and cross-departmental functioning (that can also be customers in the end system) linked by a holistic strategy and made operational by means of processes, procedures and systems.

The researcher adapted the various role players from the strategic triangle explained by Dorrian (1996:55-59). The components can be illustrated into the following strategic triangle (figure 4.3):

**FIGURE 4.3: STRATEGIC TRIANGLE**



- **S** Strategy is the guideline or blue print of set objectives, allocated resources and time frame which a specific action needs to comply with.
- **Systems:** Processes, procedures and quality standards are defined into a support structure to ensure quality of the product or service.
- **People:** Technology implementation is completed by means of people. These groups of people can function cross-departments, e.g. financial support placing orders, telephony specialists assisting with the ISDN infrastructure and data specialists helping with the IP infrastructure.
- **Customer:** Cross-departmental functioning is based on client service and therefore making this group of people your internal client. Designing a video conferencing network also takes the external client, the person who will use the

network from outside the organisation, in consideration.

Strategy commences with a “top-down” approach according to Sloan, CEO of General Motors (cited in Whittington, 1993:14). Whittington (1993:43) gives an alternative and highlights the importance of a “middle-up-down” approach to incorporate more levels of management. Continuous feedback in the design, development, continuous assessment and improvement of set video conferencing implementation strategies are therefore essential among senior and middle management to ensure that the strategic objective of implementing a video conferencing network, is aligned with market trends, expectations (management, staff, clients and even the competition) and set objectives.

Managing the objectives within a specific environment is essential but “future-orientated planning is often irrelevant” (Whittington, 1993:3) - as predictions of future trends and market changes are unpredictable to anticipate effectively. According to Whittington (1993:4) the social system within which strategy may take place, influences the long term achievement of objectives and is “vital to secure the future”. Therefore, it is essential to select and apply the correct managerial strategy for video conferencing implementation.

#### **4.5.2 MANAGEMENT**

Defining management, Whittington (1993:111) supports the creation of structure by stating that “structure should follow strategy”. Fayol (Kroon, 1986:42) defines management and the managerial functions as “to manage is to forecast, to plan, to organise, to command, to co-ordinate and to control.” Defined by Hunter *et al* (1998:83) “management is about creating a structure for fulfilling a purpose, systems and practices to support this. Management is about wise use of resources. Management requires action plans, displays, commitments and promises. Management is about ‘stapling the project into reality’ so it can happen smoothly with nothing left to chance. Management is about knowing how to relate to people. Managerial skills are needed by everyone in the team - to self-manage and to assist others.” Schönsleben (2000:74) states that “all management tasks and activities must support the goals of an enterprise.”

Before any video conferencing implementation planning or actions can commence, people and/or management teams are required to manage or lead the people,

resources, time and budgets to ensure those set objectives are met. Committed and skilled teams and individuals need to be appointed with the specific task of implementing a video conferencing network. In order to ensure that these task teams or individuals know what is expected, the overall strategy and objective must be known. Littlefield *et al* (1978:75) support this by stating that the management of systems are “a group of interrelated and interdependent parts operating in sequence, according to a predetermined plan, in order to achieve a goal or series of goals.”

Management is constituted in the application of a specific or combination of various managerial strategies. These managerial strategies are the guidelines how specific operational actions can be implemented and managed to ensure that the set objectives are met. Applying these managerial strategies, a managerial framework is concluded on how specific actions will be managed according to set standard, policies, rules and regulations.

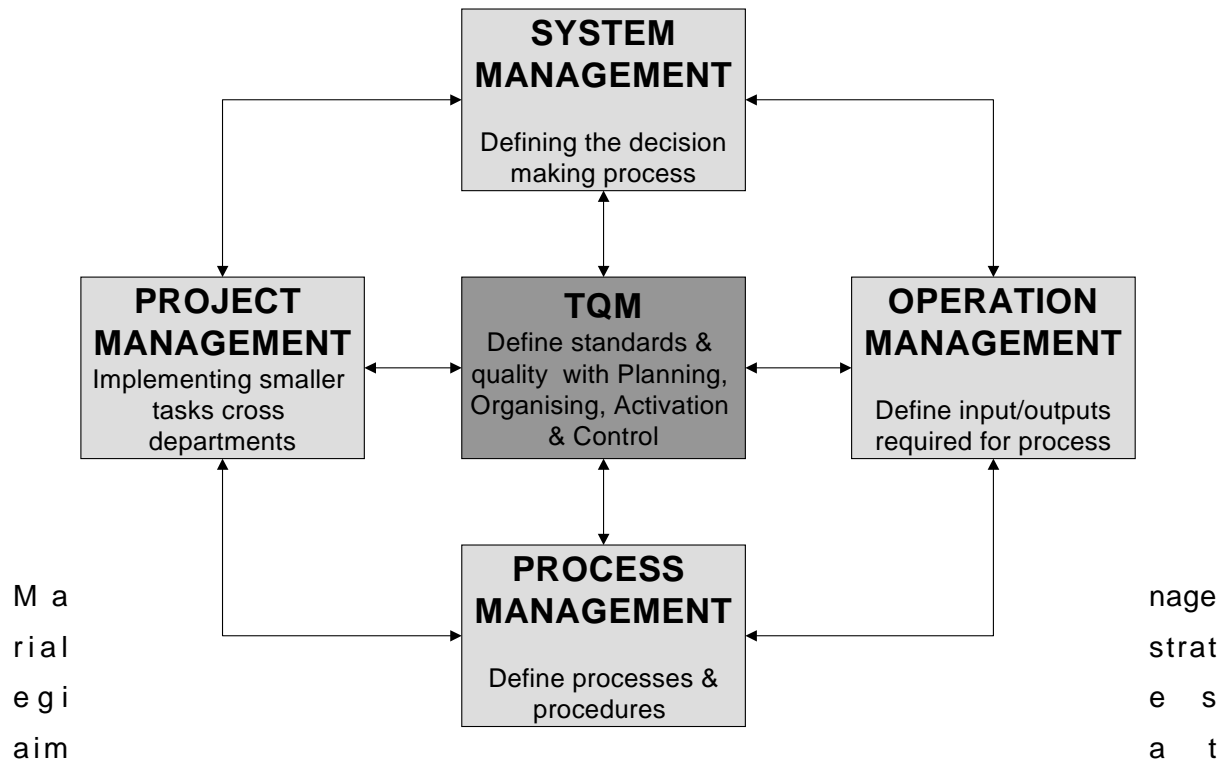
#### **4.5.3 MANAGERIAL STRATEGIES**

Five managerial strategies (figures 4.4 and 4.5) were identified as a basis to design and develop a managerial strategy for video conferencing implementation because all four managerial functions and all six managerial duties were found in these strategies. The managerial strategies are as follows:

- Total Quality Management (TQM);
- System Management;
- Operation Management;
- Process Management; and
- Project Management.

During this research, the critical success factors, the role players as well as the processes followed during the implementation phases of these strategies were identified and analysed in order to design and develop a managerial strategy for video conferencing implementation (chapter 5). Managerial strategies function by means of a dependency (figure 4.4) on different critical success factors within the five identified managerial strategies.

**FIGURE 4.4: DEPENDENCY OF MANAGERIAL STRATEGIES**



managing the short, medium and long term objectives by applying specific critical success factors to achieve set objectives. Standards and quality are defined in a Total Quality Management framework. System Management forms the base of decision-making to support the Operation Management namely the starting (inputs required to begin the process) and ending of the service or production process (outputs required to achieve objective) by means of providing continuous feedback to ensure that accurate and feasible decisions are made. Process Management provides the methods of how things will be done and Project Management ensure that smaller tasks cross departments get completed.

The video conferencing managerial process consist of planning, organising, activation/motivation and control, and is structured into a **Total Quality Managerial (TQM)** framework where quality products, services and processes are required. This is done to improve quality by doing it 'right for the first time' (Reynolds, 1994:15) and therefore decrease production cost. TQM environments design a flexible environment

where solutions can change as the environment or attitudes change (Reynolds, 1994:17 and Naughton, 2002:18). It is essential for a complex video conferencing network and environment to be flexible in order to adapt to new available technologies and also to change existing processes and procedures, e.g. when the strategic plan should change.

TQM is a management system designed to be implemented by the people in organisations who coordinate, enable and control, rather than those who directly do the work by implementing the strategic objective. Senior and middle management does not ignore lower levels of the workforce as TQM operates under the assumption that workers do provide a quality service to their customers “was it not for the obstacles which get in the way” (Reynolds, 1994:13). TQM can be summarised as a holistic planning environment to set objectives, guidelines, standards and expectations from senior management.

TQM is supportive towards the planning phases of video conferencing implementation. Implementation is defined by Crosby (1979:10) as the guided flow of improvement along a paved road. Before any planning can commence, strategic objectives need to be set and approved. The participation of middle management and other staff in the achievement of video conferencing implementation as an objective, needs to be motivated. TQM is build around training to implement and upheld standards (Naughton, 2002:18). According to Crosby (1979:168) “training is a routine activity for all tasks and is particularly integrated into new processes and procedures” especially during and after a new video conferencing network has been implemented.

Systems approach to planning may be viewed “as a logically consistent method of reducing a large part of a complex problem to a simple output which can be used by the decision maker in conjunction with other considerations in arriving at the best decision” (Cleland & King, 1975:18 and 67). **System Management** is a continuous cycle of decisions, communication and feedback of comparing alternatives, analysing, implementation and evaluation (Cleland & King, 1975:74) (figure 4.5).

System Management provides a framework where data is multipurpose and compatible (Littlefield *et al*, 1978:80-83), e.g. cross-departmental activities - one department doing the financial record keeping and purchases. System Management is a very important strategy for video conferencing implementation as the whole organisation is depending

on different elements that need to be managed within the same time frame and with the same resources to ensure that the same objectives and standards are achieved through a systematic process of decision-making.

This is essential as the complex video conferencing network (chapter 3) consists of cross-departmental elements that need to be managed before, during and after implementation. System Management provides a flow of information which is essential for continuous report, e.g. progress reports (Kroon, 1986:61-62 and Littlefield *et al*, 1978:80-83) to ensure that strategic decisions are made on the correct data.

Cleland & King (1975:70) summarise System Management as a "... methodology for analysing and solving decision problems through a systematic examination and comparison of alternatives on the basis of the resource cost and the benefit associated with each. As a part of this examination, explicit consideration is given to the uncertainties involved in decisions which will be implemented in the future" therefore enables the manager to design a total system solution - integrating subsystems, procedures and methods (Littlefield *et al*, 1978:80-83).

**Operation Management** is based on the inputs required to start an action, e.g. a strategic or operational plan, funding, video conferencing venues, etc. and outputs after a specific process was completed, e.g. an implemented video conferencing network, process and procedure standards and training manuals. Feedback from the output or implementation process to the input is required in order to be able to improve on the process (Naughton, 2002:9). Problem solving is very important in an operational cycle. According to Crosby (1979:67) prevention of problems can only happen once there is a clear understanding of the process.

During the planning and implementation of video conferencing technology, continuous decisions are required. Operation Management will be applied for the management of processes and procedures before, during and after the implementation of a video conferencing network. Continuous improvement of processes and procedures requires continuous feedback of the implementation process. "Keeping everybody up to date on the status of the improvement process is something that cannot be left to chance" (Crosby, 1979:164).

**Process Management** forms the heart of management that include planning, organising, activation and control and is essential to define the managerial process for video conferencing. This process begins at the planning phase and goes back to the planning phase. The following factors are important to understand Process Management:

- *Processes* are very important as it is “a group of interrelated activities that together create value for the customer” (Hindle, 2000:179).
- *Procedures* are a specific work sequence that gives an indication who does what, how and when (Littlefield *et al*, 1978:85). In order to define a logical and systematic video conferencing implementation strategy, procedures are essential to ensure that the defined strategy is feasible by breaking it down in smaller tasks or group of activities to be completed by specific people, in a specific way (standard) and on a specific time.
- *Methods* are in contrast to procedures as it is a detailed specification of how to accomplish a single procedural step (Littlefield *et al*, 1978:86).

Slack *et al* (2001:95) summarise the importance of all three by stating that “the design of products, services and processes are interrelated and should be treated together.” Process Management is important for this study as it is used to define the processes, procedures and methods that will be used for video conferencing management after the implementation process has been completed.

As defined by Chandler (cited in Whittington, 1993:14) **Project Management** is the “determination of the basic, long-term goals and objectives of an enterprise, and the adoption of causes of action and the allocation of resources necessary for those goals.” Project Management is used for the management of tasks that can reach over different sections, departments or traditional functional lines (Cleland & King, 1975:18). According to Hunter *et al* (1998:84) and Naughton (2002:51-52), Project Management is an important body of skills.

It helps to know the stages that every project goes through namely formulation, concentration, momentum and completion to clarify the objectives and the range of the

project to ensure that the focus of the project is maintained through set goals, defined budgets and cost structures and quality standards.

Project Management is important for video conferencing implementation as it functions cross departments. Video conferencing is also a once off implementation process as required by Project Management to fulfill one of its criteria.

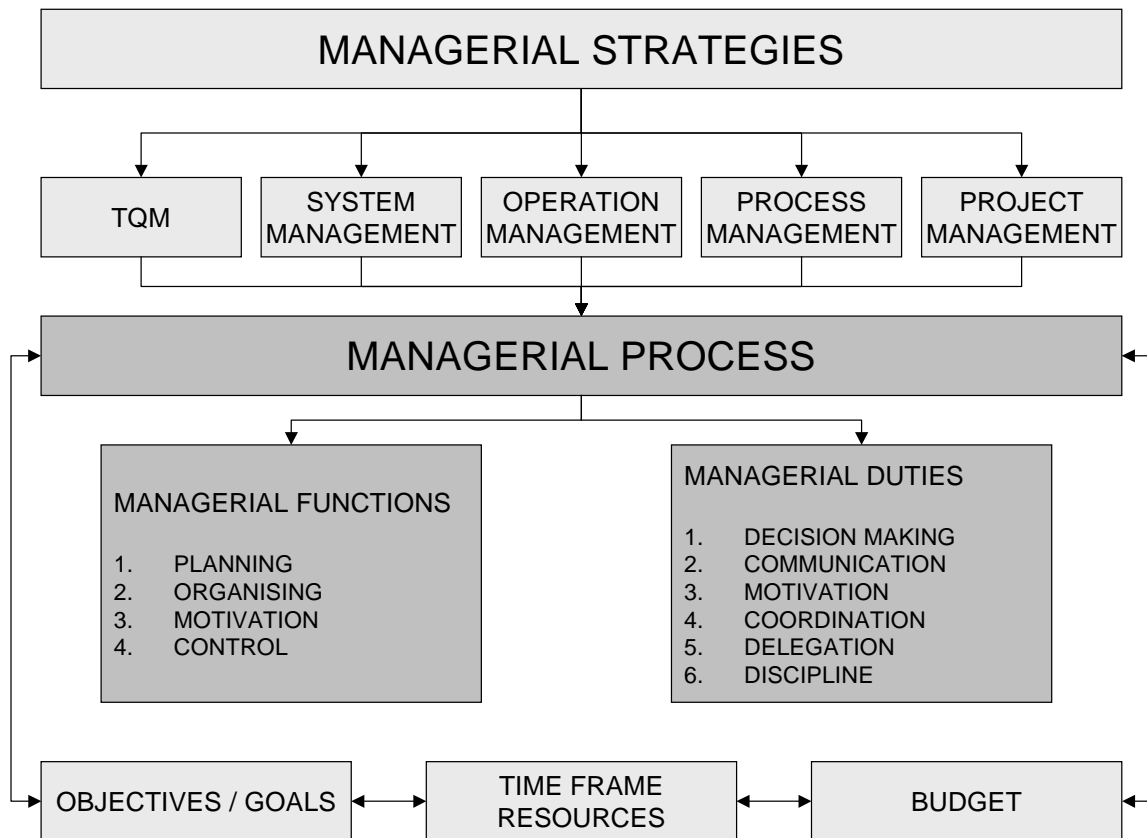
Project Management involves the commitment from project team members and needs to be managed throughout the project. This is done by writing down project plans, distributes copies to every team member and senior management and review these plans frequently. During conflict and disagreements, it is always helpful to go back to the visions and goals (Hunter *et al*, 1998:49 & 81) to ensure that the set objectives and standards are achieved.

#### **4.5.4 MANAGERIAL PROCESS**

Managerial functions and duties form the core of the managerial process (figure 4.5). The four managerial functions are: planning, organising, activation or motivation and control. In managing the implementation strategy of video conferencing technology, these managerial functions were applied.

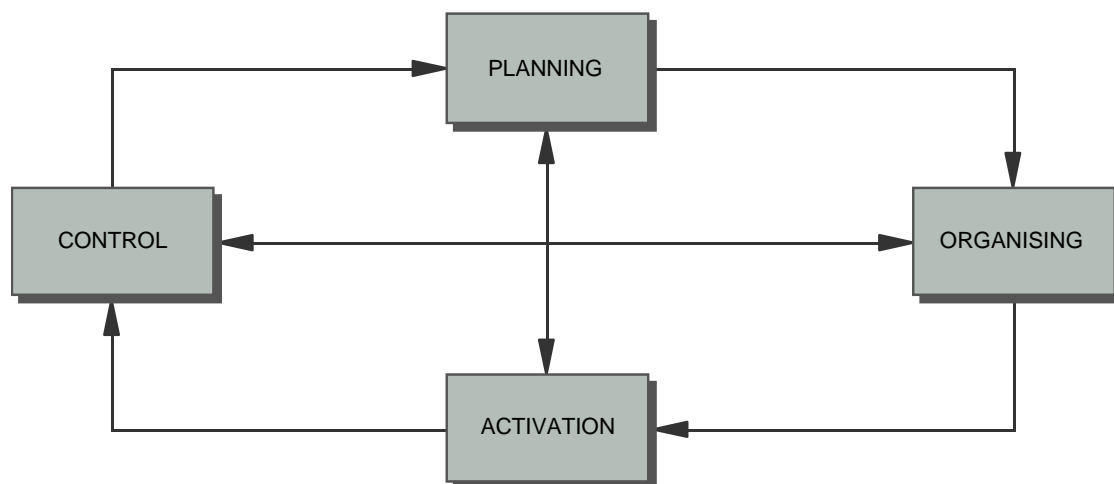
The process for implementation is defined by Crosby (1979:10) as the guided flow of improvement along a paved road in order to put into effect the objective (Wevell, 1996:530) in order to utilise (use and experience the impact) (Directorate for Education and Human Resources, 2002:online) the implemented process or technology through a continuous process of evaluations that contains recommendations (Directorate for Education and Human Resources, 2002:online) to achieve a defined objective at a specific time.

**FIGURE 4.5: MANAGERIAL PROCESS WITHIN A MANAGERIAL STRATEGY FRAMEWORK**



The four managerial functions require a continuous feedback cycle in order to make decisions, set objectives and evaluate progress (figure 4.6).

**FIGURE 4.6: THE MANAGERIAL PROCESS** (Adapted from Kroon, 1986:59)



Applying the managerial definitions as discussed, it can be argued that the managerial

process for video conferencing implementation is a continuous and holistic flow of information by applying a defined managerial platform to set new objectives, implement the set objectives, ensuring the involvement of all role players and evaluating the implemented video conferencing network (hardware and operational processes and procedures).

With every managerial function, e.g. planning, the managerial duties of decision-making, communication, motivation, coordination, delegation and discipline are involved. This is also valid for the other three managerial functions namely organising, motivation/activation and control. The end result is a continuous cycle (figure 4.6) of planning, organising, motivation/activation and control to ensure that set goals are achieved.

Sloan, former CEO of General Motors (cited in Whittington, 1993:12) stated the importance of continued planning as the “strategic aim of a business to earn a return on capital, and if any particular case the return in the long run is not satisfactory, the deficiency should be corrected or the activity, abandoned.” This can only happen if continuous feedback is received from and to all given role players involved in this process. Managerial duties support the managerial functions to ensure that the functions are completed to achieve managerially purpose in an effective and efficient organisation (figure 4.5).

#### **4.5.5 MANAGERIAL FUNCTIONS**

As seen in the literature, the management of a video conferencing network is a continuous cycle that is interdependent on different managerial functions namely planning, organising, activation or motivation and control applying resources, material, men and money (capital/budgets) to achieve specific objectives (short, intermediate or long term) according to a set and approved plan within a specific time frame and budget.

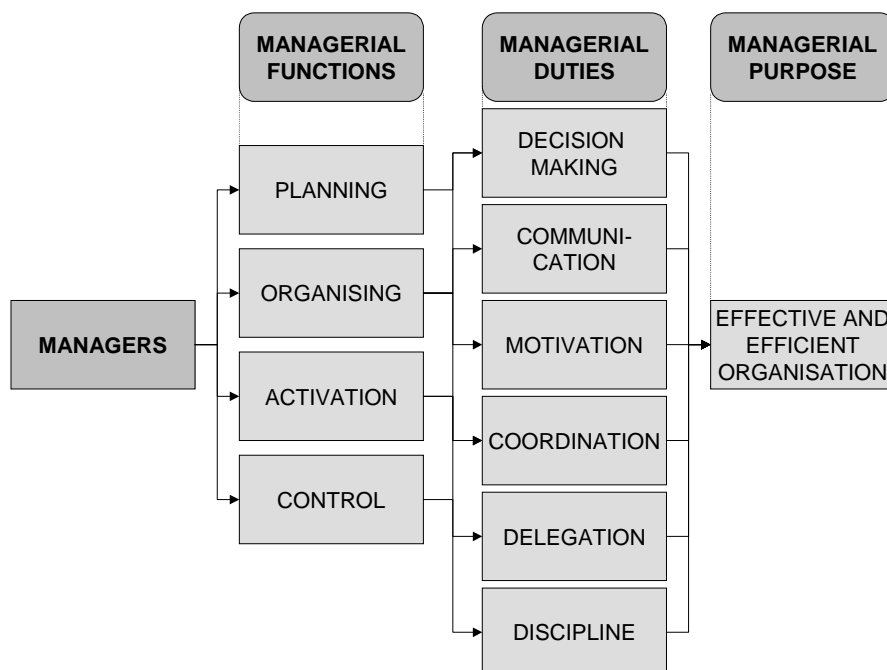
For the purpose of this study, Fayol's four managerial functions (Cleland & King, 1975:9-10 and Kroon, 1986:59) will be applied in the design and development of managerial strategy for video conferencing implementation, namely:

- planning;
- organising;
- activation/motivation; and
- control.

These managerial functions are defined and explained in table 4.3. The planning function is essential as it also includes planning of the other four managerial functions, e.g. planning on what to organise, planning on how to motivate staff, team members, consultants and contracted employees and also planning on how the project will be controlled. The continuous cycle (figure 4.6) and process of applying managerial functions and duties to reach set goals and objectives, is explained in figure 4.7 and is based on the five managerial strategies evaluated.

Managerial functions and duties are interlinked and form together a managerial process for video conferencing implementation. An understanding of the different functions and duties are important before video conferencing management can be understood. In order to obtain a better understanding of the different managerial functions, the four functions (planning, organisation, activation/motivation and control) are discussed by defining the term, identifying the critical success factors as well role players.

**FIGURE 4.7: MANAGERIAL FUNCTIONS AND DUTIES**



**TABLE 4.3: MANAGERIAL FUNCTIONS**

FUNCTION	DEFINITION	DESCRIPTION
Planning	<p>Is the development of a detailed scheme or idea worked out beforehand in accordance with the targets (short term) and objectives (long term), the different actions, resources required documented into an action plan to ensure that the targets and objectives are achieved (Marx cited in Kroon, 1986:5).</p> <p>Fayol in Kroon (1986:43) states planning as: "To foresee and provide means, examining the future and drawing up of the plan of action."</p>	<p>Anticipation of targets (short term) and objectives (long term) that need to be achieved within a specific time frame.</p> <p>Design and development of an achievable plan with clear indications of what, who, where, when and how the targets and objectives are to be achieved.</p> <p>Planning also include policy formulation/interpretation, budgets, schedules, processes, procedures, methods, standards, rules and regulations.</p>
Organising	<p>Organising is the arranging of activities in accordance with the required resources by means of the allocation of duties, authority and responsibilities to people as well as the interaction required among these people to ensure cooperation and efficiency (Kroon, 1986:6)</p> <p>Fayol in Kroon (1986:43) states organising as: "To organise means building up the dual structure, material and human, of the undertaking."</p>	<p>Organising includes the following:</p> <p>The creation of business or organisation structure that includes the communication and authority structures.</p> <p>When more than two people are required to work together their actions, resources and outcomes need to be organised within a specific time frame, budgets, according to standards, rules, regulations, etc.</p>
Activation	<p>Activation is a process of motivation where people are guided to cooperate to ensure that objectives are achieved (Koontz <i>et al</i> cited in Kroon, 1986:6).</p> <p>Fayol in Kroon (1986:43) states activation as: "To command means maintaining activity among the personnel" and "to co-ordinate means binding together, unifying and harmonizing, all activity and effort."</p>	<p>Activation is managed on the following levels:</p> <ul style="list-style-type: none"> <li>• Individuals</li> <li>• Groups</li> </ul> <p>This is the beginning of a work process and also ensures that the process is followed through to achieve the objectives, according to Kroon, 1986:7.</p>
Control	<p>Completed plans and instructions are measured by means of a managerial information system against standards and set objectives. The purpose is to foresee problems and to make corrections to ensure that targets and objectives are achieved (Kroon, 1986:7).</p> <p>Fayol in Kroon (1986:43) states control as: "to control means seeing that everything occurs in conformity with established rule and expressed command."</p>	<p>Standards are formulated from the set objectives during the planning phases.</p> <p>The control process ensures that problems are identified in time and that counter actions are taken to ensure that the objective is achieved according to the set standards.</p> <p>This phase measures the successful implementation of the three managerial functions namely planning, organising and activation.</p>

#### 4.5.6 MANAGERIAL FUNCTION: PLANNING

“Profitability is the supreme goal of business and rationale planning the means to achieve it” (Whittington, 1993:11). The process required to achieve that goal is called management. “Management is, to a large degree, about making things happen. Decisions are of little value unless they lead to actions, and strategies do nothing for an organisation until they are implemented” (Hussey, 1998:7). It is these implemented decisions and processes, which ensure achieved objectives (short and long term), e.g. video conferencing implementation.

As already discussed in the literature, management is a continuous cycle that starts and ends with planning. Planning is concluded on various levels of operations, e.g. senior, middle and lower management. In order to conclude a strategy for video conferencing implementation, planning on strategic, operational, technological and project plan level, needs to be included in the planning cycle for video conferencing implementation.

##### 4.5.6.1 DEFINING PLANNING

Planning is a process to generate a plan that will consist of actions, allocated resources, manpower, time schedules and budgets to achieve a specified outcome or deliverable. A plan is therefore the written outcome of the planning process with specific guidelines and objectives what needs to be accomplished by whom, when and how. “... Good planning is what it takes to master internal and external environments ...” and makes “the difference between long-run success and failure” (Whittington, 1993:3).

##### 4.5.6.2 CRITICAL SUCCESS FACTORS FOR PLANNING

- **Strategic planning** is essential in the planning process as this provides direction and scope (mission and vision) of what is required. NCREL ([S.a.]:online) states that visions should be creative but realistic and that the selected technologies that need to be implemented need to “reflect what an organisation thinks.” Westley and Mintzberg said in 1989 (cited in Whittington, 1993:46) that “visionary leadership inspires the impossible - fiction becomes truth.”

The implementation of a video conferencing network is very expensive and

reflection and strategic formulation why this network is required and how it will add value, must be discussed with all role players involved, the long term implications (upgrading of technology, e.g. within three years) as well as what the expectations are on the return of the investment. According to Anthony & Dearden (cited in Wilson, 1998:160), Hindle (2000:206) and Kroon (1986:116) strategic planning is the process of deciding on the long term goals of the organisation, on changes in the goals, on the resources used to attain these goals, and on the policies that are documented to govern the acquisition, use and disposition of these resources.

Naughton (2002:84) adds a time dimension to this definition by stating that “a strategy is a plan dedicated to achieving an organisation’s long-term aims and objectives.” Porter (cited in Smith *et al*, 2000:47) place a total different view on strategic formulation by stating that “the essence of strategy is choosing to perform activities differently than rivals do.”

No literature was found among the sources applied for this research on the strategic planning process of video conferencing implementation. Van Oostendorp and Arnold ([S.a.]:75) states, the use of strategic planning and decision-making, “influence the character of communication ... due to the reduction and types of verbal and nonverbal cues available to the participants” but did not discuss the planning process. According to the managerial strategies of Kroon and Wilson as discussed, video conferencing implementation should start with top management as a new strategy that is supported by a policy to guide the implementation process. Cleland & King supports this by stating that “the implementation function involves all those things that must be done to achieve objectives once the strategic choices have been made.”

- The setting of **objectives and goals** are essential for video conferencing implementation. Objectives are “the quantifiable criteria that must be met for the project to be considered successful” (Microsoft Project Management, Training tutorial:S.a.) and also to ensure that the described and intended outcome (Directorate for Education and Human Resources, 2002:online) are managed, achieved, directed and measured according to the standards, guidelines and policies of the project.

- The setting of **standards** as an objective must also be included in the documented objectives. Control actions produced at one level becomes the targets at the next level. It is important to define what processes for video conferencing implementation needs to be in place before, during and after implementation so that “quantifiable criteria” can measure the success of the implemented network.
- Middle management applies the strategic plan to formulate their **operational plan and strategy** in order to develop short term plans to ensure that the strategic outcomes are achieved. Policies are but one of the tools used to document new decisions and methods to give direction how and who will implement the new strategy or operational plan. Operational implementation needs to be aligned with the strategic objectives (Hunter *et al*, 1998:49). The implementation of new technology can either be part of the strategic or operational strategy and dissemination in the form of a Technology Plan - a plan that only focusses on the implementation of the video conferencing and other technologies that integrate with this network.

In order to achieve the strategic objectives an operational strategy or plan is required to ensure that objectives are met within a specific budget, time frame and allocated resources. Operational planning includes planning to implement the other managerial functions namely organisation, activation/motivation and control. Managerial strategies for the development of processes and procedures (Process Management), Operation Management and Project Managements are the main strategies that ensure that task orientated actions are planned, implemented and that quality control over actions, people, targets and goals are maintained.

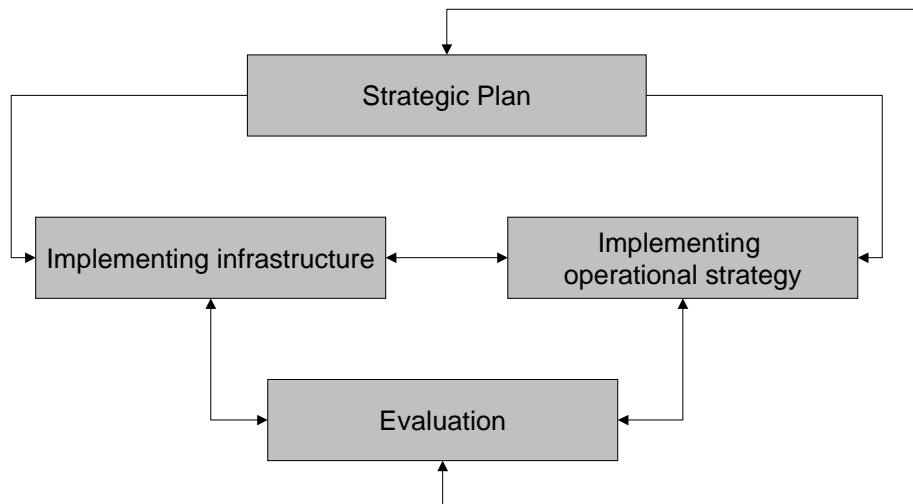
- Planning for **technology and the implementation of infrastructure** is essential not just to achieve the set strategic objective but also to ensure that implementation is not disruptive for other people in the organisation. Cleland & King (1975:10) defines the planning process for implementing technology as a “process of preparing for the commitment of resources in the most economical fashion and by preparing, of allowing this commitment to be made less disruptively.”

Fine (cited in NCREL, [S.a.]:online) supports this by stating that “with technological change occurring at a rapid pace, purchasers of new technology sometimes feel

hard pressed to keep up". The importance of planning for the implementation of new technology is therefore essential as it must be flexible to adapt to any changes, e.g. operational processes or new and available technology.

NCREL ([S.a.]:online) summarised technology planning by stating "the key to technology planning is to make informed decisions." To make these informed decisions, the implementation (figure 4.8) of infrastructures (equipment, software and facilities) as well as the implementation of human resources (who/ how the infrastructure will be managed - operational strategies that also includes training for users and maintenance specialists) needs to be planned, implemented and evaluated.

**FIGURE 4.8: OPERATIONAL IMPLEMENTATION OF VIDEO CONFERENCING**



In order to assist with technology planning, evaluation criteria for successful planning (table 4.4 and figure 4.9) is defined by Wisniewski (1994:135) to ensure successful video conferencing or other technology implementations. The documentation of these criteria is essential before, during and after the implementation process.

The importance lies the identification of team members to test not just their technical ability but also their own self-motivation. As seen in the literature, defining a strategic objective is to do things differently. Planning is therefore important to ensure that the competitive position is monitored to ensure that every stage is quantified by numbers as well as every process, product and service do add the

value that was intended. The essential assessment criteria for planning as defined by Wisniewski (1994:138), are the following:

**TABLE 4.4: ASSESSMENT CRITERIA DURING THE PLANNING PHASE**

ASSESSMENT CRITERIA	IMPACT
Technical feasibility	The selection of video conferencing technology does add a risk, e.g. that the selected hardware does not add value to the set objectives of the company or that the time frame allocated for installation, is longer than planned. The skills of the technical as well as operational staff are not in line or even that there are no leadership to manage these newly implemented technology.
Product champions	The identification of a leader to manage these newly implemented technology, is essential. This person or team must understand the companies vision and objectives, must be flexible to adapt to changing circumstances and have the perseverance to find solutions for technical and operational problems.
Competence of staff	Competence levels of staff is not just having the technical know how to maintain the technology but they also need to be motivated to find the best solutions and applications in the existing network, be able to change and adapt to new technology available and also create opportunities for users of these technology.
Competitive position	By adding or applying technology, the objective must be to improve the competitive position, e.g. to make faster and more realtime decisions. Access to these newly implemented technology are essential as more people get involved more equipment and managerial structures will be required to ensure that quality meetings or training environments are created to ensure that objectives are within a faster time frame.

Figure 4.9 is a diagrammatic representation of how the above factors and mentioned issues can have an influence on the outcome of the set objectives.

- The **planning cycle** (figure 4.10) is completed on two managerial levels namely senior management for the formulation of strategic objectives and middle management for the formulation of short and intermediate objectives (Kroon, 1986:116). In order for this to function properly the input from middle management to top management is required (Whittington,1993:43) as a “middle-up-down” approach that will ensure that the defined objectives are realistic and feasible. Two planning cycles therefore need to be in place namely the setting of strategic objectives and also the formulation of operational plans and objectives. Planning procedure is an ongoing and interlinked process of different actions that is dependant on one another. The various steps in the planning process can also

happen independent of each other. Understanding the phases in the planning cycle of a video conferencing network is essential. The different phases provide a systematic process that can be followed to ensure that everything has been included in the implementation process.

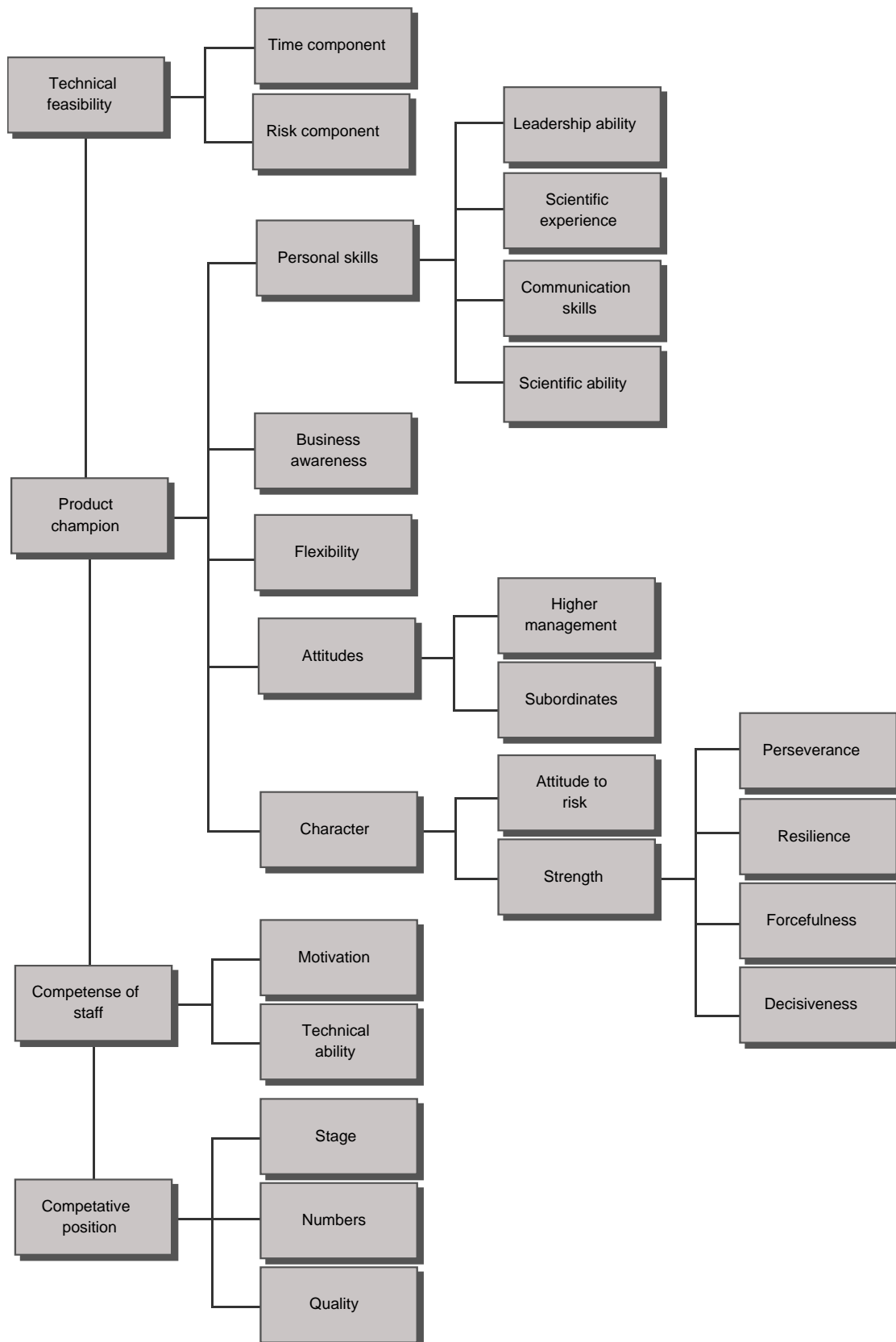
- Part of the planning phase for implementing video conferencing hardware, is the **managerial side of managing resources, people and budgets**. The following three factors must be incorporated in the managerial strategy of video conferencing implementation:

- # **Operational planning** - maintenance, upgrading and replacement of hardware;

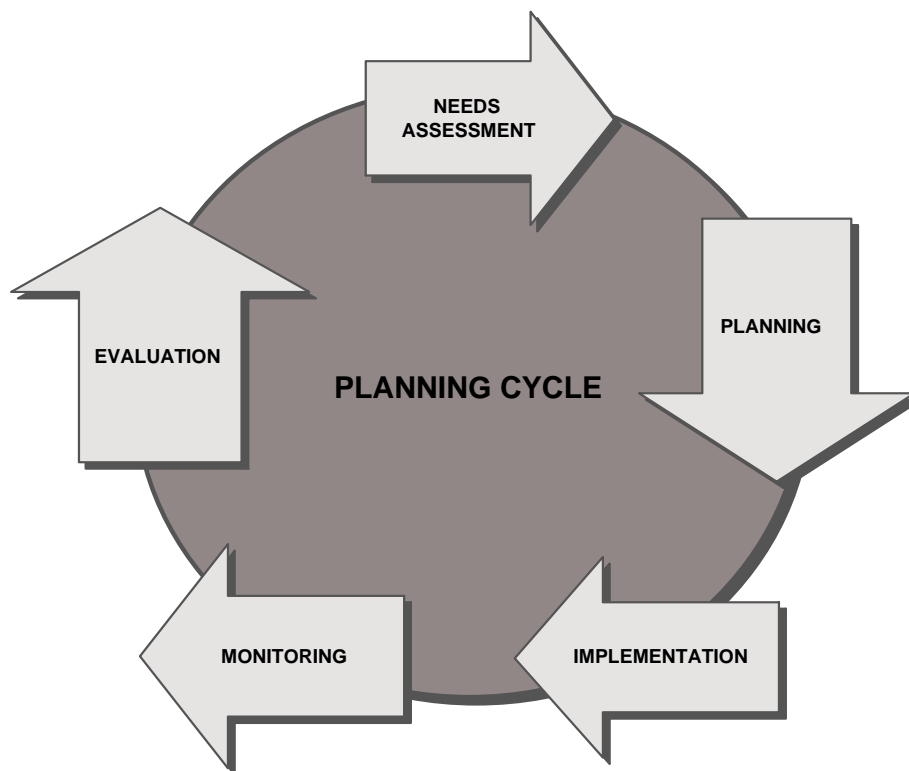
- # The **implementation strategy** - marketing and training (technical staff and users). Documentation, e.g. manuals on how to use the video conferencing and multimedia equipment, as well as how to prepare presentation material, must be included and

- # Strategies for the **evaluation and control** of infrastructure management and maintenance, must be part of this planning cycle (figure 4.9).

**FIGURE 4.9: STRUCTURE FOR TECHNOLOGY PLANNING ASSESSMENT**  
 (Adapted from Wisniewski, 1994:138)



**FIGURE 4.10: PLANNING CYCLE** (Cited and adapted in Rifkin and Pridmore, 2001:9)



The importance for correct planning is essential as this will have a direct influence on the outcome of the implemented video conferencing project. According to Cleland & King (1975:124-125) and McKenzie (1993:online), the following planning concepts (table 4.5) are essential to ensure successful planning and achievement of the strategic or project objective:

**TABLE 4.5: CRITERIA FOR SUCCESSFUL PLANNING**

CRITERIA AND ADVANTAGES	PURPOSE AND IMPORTANCE
Planning is cognitive	It is important to think about the planning phase before any action can commence. Planning only ends when the objective has been achieved.
Futuristic	Objectives need to be defined on the short, medium and long term in order to know what, why, when and how the organisation will do business in future and how to adopt their policies and operational business to achieve their strategic or operational plan - gives direction.
Policies	Policies are general statements of intended behaviour of the organisation - guidelines of what needs to be done, how it needs to be completed and who is responsible.
Procedures	Defined procedures are more specific than policies and provide for a definitive response in the handling of future activities.

<b>CRITERIA AND ADVANTAGES</b>	<b>PURPOSE AND IMPORTANCE</b>
Budgets	A business budget is a plan covering the funding implications for all phases of operations for a definitive period in the future.
Project plans	Project plans are a combination of objectives, policies, procedures, budgets and other elements necessary to carry out a predetermined specific objective. Project plans are the basic building elements of the organisation's system of plans.
Systematic	Processes and procedures are required to ensure that all steps in the planning phase are followed, checked and understood.
Problem/opportunity to be solved	There must be a reason why time, energy, money and resources are used on a specific action.
Targets and objectives	Targets and objectives need to be achieved within specific time frames, standards and with allocated resources. Objectives are the end result to which the organisational activity is directed.
Importance	Planning is important to ensure that the organisation or enterprise work to its optima abilities. It requires an ongoing process of evaluation and measurement to ensure that objectives are met within a specific time frame, budget and standards.
Decision-making	During the planning phase, it is essential to make decisions between the different alternatives available to ensure that the best solution is taken.
Research	Planning starts only after research has been completed and information evaluated.
Coordination/balance among different departments	The different functions across departments need to be co-ordinated to ensure that objectives are met on the time schedule and documented standards.
Limits duplication	Limiting duplication by people, saves money by using fewer resources, manpower and equipment to do the same work.
Connectivity	Must be realtime and valid for the existing projects.
Community	Must not be done in isolation but through collaborative problem-solving.
Coherence	Planning should support all objectives and fit together by making sense.
Integration	Planning should involve objectives, people, resources, budgets, etc., to ensure that overall objectives are met.
Expressiveness	Planning should extend and enhance the experience of all involved.
Access	Planning should give access to all, 365 days of the year. Access to the infrastructure and bandwidth is also important.
Flexibility	Planning should be flexible to replace add new technology, processes and procedures to ensure that objectives are achieved faster and better.
Value	Planning should improve the organisation by achieving objectives.

#### 4.5.6.3 DISADVANTAGES OF PLANNING

Video conferencing management is based on planning. In order to plan successfully it is time consuming, expensive and has an influence on other people and the available resources. Other disadvantages of planning are stated in table 4.6:

**TABLE 4.6: DISADVANTAGES OF PLANNING**

DISADVANTAGE	DESCRIPTION
Time consuming	To do effective planning, will require time because the existing outcome needs to be measured and evaluated.
Expensive	Outcomes and objectives achieved need to be measured against the effort and time spent. If more time is spent on the planning phase and outcomes or profits generated from the planning cost are less, the planning methods and procedures need to be re-evaluated.
Planning does include decision making for the future	Planning has a focus on the future but is more a process to decide what the influence on the decided application will have on the future.
Change management	Planning cannot resist change. It can help to adapt to changes in the different environments.
Stagnation	If planning does not allow changes to take place, the environment will be static and less competitive.

#### 4.5.6.4 ROLE PLAYERS AND TIME FRAME FOR PLANNING

Rifkin and Pridmore (2001:14) start appropriate planning with people. Kroon (1986:116) defines the responsible role players of strategic and operational planning as “,,, **top management** to indicate direction of the organisation over the long term. Strategic planning is used by **middle management** to develop short term and operation plans to ensure that the strategic outcomes are achieved.” This is in line with the definition of Total Quality Management namely the use of senior management as well as labour to achieve the same goals.

Cleland & King (1975:167-175) promotes the use of a cyclical planning process that includes the use of **project teams**. According to Cleland & King (1975:169) planning should “... facilitate a flow of ideas in the organisation, the strategic planning approach should be adaptive and flexible enough to encourage and facilitate the emergence and development of ideas from any source within the organisation, since it is clear that the generation of good ideas is not the sole province of those managers who occupy the top positions in the organisational hierarchy.” Applying project teams will “cut across the

'vertical' functionally ...” (Cleland & King, 1975:171). Crosby (1979:59) states that management has three basic tasks to perform:

- establish the requirements that employees are to meet;
- supply the wherewithal that the employees need in order to meet those requirements, and
- spend all its time encouraging and helping the employees to meet those requirements.

Cleland & King's (1975:174-175) role allocation is done according to staff planning. The basic functions in the planning process are defined in table 4.7:

**TABLE 4.7: ROLE PLAYERS IN THE PLANNING PHASE**

<b>PHASE (WHEN)</b>	<b>ROLE PLAYERS (WHO)</b>	<b>PURPOSE (WHAT)</b>
1	Top management Subject specialists	Provide informational input with regard to specialised knowledge.
2	Project leader/s	He/she acts as the facilitator of the planning process. He/she schedules and carry out all aspects of the process.
3	Line managers	They review/evaluate the various plans for consistency with the assumptions and guidelines that have been laid down. They synthesize them into a plan which is then passed on to other specialists, e.g. financial analysis and then forwarded to top management for final reviewing.
4	Consultant/s	He/she is available throughout the planning process (according to contractual appointment) for interpretations of assumptions and forecasts, clarification of planning guidelines and preliminary evaluation of the feasibility of plans.

Valdez ([S.a.]c:online) and Hunter *et al* (1998:85-86) support the use of teams by exclaiming that “technology planning is a process involving planning **committee members** who work to establish technology implementation directions and priorities.” Hunter *et al* (1998:85-86) defines several types of teams, e.g. project, virtual and cross functional teams that take part in this process.

Part of the committee or project teams are quality specialists or people with “specialised knowledge basis to make sound decisions about the technology infrastructure, resource

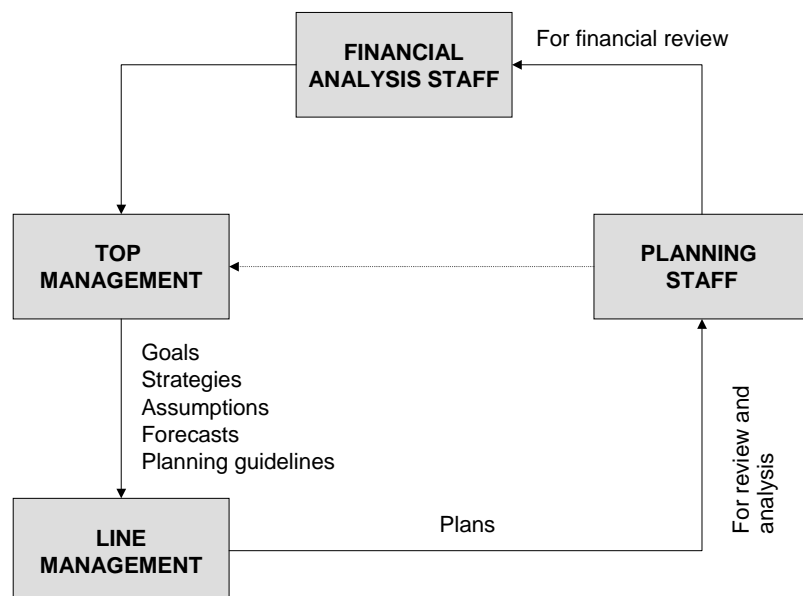
allocations, professional development and successful systematic changes” (Valdez, [S.a.]e:online) to ensure that processes and procedures are documented to add value to the implementation.

The role of the quality specialists is defined by Crosby (1979:106) namely that they are not to design and develop strategy, but rather apply the strategy as a direction to assist with the formulation of a quality work environment. “The quality improvement team should be made up of individuals who can clear road blocks for those who want to improve.”

During preliminary research for this study, the initiative for video conferencing implementation was not always from senior management. It is important to determine before starting with video conferencing implementation, whether it is essential for video conferencing to be part of the organisations strategic objectives or not. In order to understand video conferencing as part of the organisations’ strategies, goal setting and the role of **middle management**, needs to be defined before commencing with video conferencing implementation.

Cleland & King (1975:168) define the continuous planning process with the different role players (senior, middle and line management) as follows in figure 4.11:

**FIGURE 4.11: ROLE PLAYERS FOR THE PLANNING PROCESS** (Cleland & King, 1975:168)



Role players in the defining of objectives do have a specific function. Senior management sets strategic or long-term objectives while line and middle management sets intermediate and short term objectives. Setting of objectives are done according to the different time frames within some specific objective needs to be achieved, e.g. long, medium or short term.

Schönsleben (c2000:130-132) and Schonberger & Knod (1999:240-242) categorise time frame planning as follows in table 4.8:

**TABLE 4.8: TIME FRAMES OF PLANNING CYCLES**

TIME FRAME	DESCRIPTION
Long-term or master planning	<p>“... takes place several months to a year prior to realization. The aim is to forecast total demand for products and processes that will be made of the enterprise from the outside or of the logistics network by consumers. The company can then derive quantities and gain the resources necessary to fulfill demand. These may be persons, production infrastructures or deliveries from third parties” (Schönsleben, 2000:130).</p>
	<p>Master-planning “is another term used for long-term planning. The term emphasizes that this type of planning sets the cornerstones for logistics. These cornerstones determine the marginal conditions and limitations of shorter-term planning (Schönsleben, 2000:131).</p>
Medium-term or area planning	<p><b>Medium-term planning</b> “concerns the months or weeks to come. Its purpose is to forecast demand more precisely along the time axis. Demand for resources must correspond to resources probably available at certain times” (Schönsleben, 2000:131).</p> <p>Schonberger &amp; Knod (1999:241) states that medium term planning can range from a few weeks to 18 months. The importance is, that the medium term planning must fit into the long term plan.</p>
	<p><b>Area planning</b> “is another term for medium-term planning. It reflects the fact that medium-term planning often involves only certain areas of actual production - in industry, assembly or parts production, e.g. - and areas of procurement. But the <b>areas of design</b> and <b>process planning</b> - particularly in the case of production to customer order - are also possible (Schönsleben, 2000:131).</p>
Short-term planning or area control	<p><b>Area control</b> “is another term for short-term planning. The term indicates that this is planning of the implementation phase. With a view to the organisation as a sociotechnical system, however, more apt terms are ‘<b>coordination</b>’ and regulation. The controlled system does indeed yield feedback to the persons controlling the system. In addition, control takes the form of coordination, performed by all persons involved.”</p>

According to Schönsleben (c2000:131-132) long-term and medium-term planning must be checked and re-evaluated for changing forecasts of demand for ‘product family, products, quantities and due dates’. Short-term planning is determined by the flow of goods. The three levels of planning should be divided among different persons - need

to oversee production from different/various perspectives “which will contribute to the quality and realization of planning.”

During this literature study, no guidelines or criteria were found on how much time needs to be spent on the video conferencing planning phase to ensure that planning was comprehensive. Crosby (1979:50) states that when improvements are implemented, e.g. a new video conferencing network, that “it is a process, not a program and it takes a long time for it to become a normal part of the scene.”

#### **4.5.7 MANAGERIAL FUNCTION: ORGANISING**

Organising is the managerial function that balances the objective (the management of video conferencing implementation) that needs to be achieved with the available resources and equipment, allocation of responsibilities to people and structure the authority/communication lines to ensure cooperation and efficiency among the role players involved. In order to maintain this cooperation and efficiency rules, regulations, standards, time frames and budgets need to be defined to guide managers and role players and also to evaluate the success of the implemented network during and after implementation.

##### **4.5.7.1 DEFINING ORGANISING**

Stallard & Terry (1984:363) give a clear indication of the importance of organising. “... it enables managers to enlarge their scope of influence; organising also enables more to be accomplished than can be accomplished when people work alone. Activities are placed into manageable units for which the work can be planned effectively. Teamwork is advanced, and ... the value of each member’s contribution is increased. Confusion about who is to do what work is avoided, and a satisfactory work environment is provided.”

This is achieved as summarised by Kroon (1986:6) namely that organising is the arranging of activities in accordance with the required resources by means of the allocation of duties, authority and responsibilities to people as well as the interaction required among these people to ensure cooperation and efficiency.

#### 4.5.7.2 CRITICAL SUCCESS FACTORS FOR ORGANISING

Analysing organisations and looking at the various elements that make them successful or not, are found in the defined Seven S's (table 4.9). Organising is essential to ensure that resources, activities, people etc. are in place for video conferencing implementation.

The Seven S's are essential to measure the success and failure of the managerial process for video conferencing implementation. As they are interrelated, change in one will cause a ripple effect and must be taken into account simultaneously for improvement of the managerial process. The Seven S's are defined by Hindle (2000:198) as follows in table 4.9:

**TABLE 4.9: SEVEN S's FOR SUCCESSFUL ORGANISING**

SEVEN S's	DESCRIPTION
Strategy	The route the organisation has chosen for its future growth.
Structure	The way in which the organisation is put together; how its different bits relate to each other.
Systems	The formal and informal procedures that govern everyday activity.
Skills	The distinctive capabilities of the people who work for the organisation.
Shared values	The things that influence a group to work together for a common aim.
Staff	The organisation's human resources.
Style	The way in which the organisation's employees present themselves to the outside world, to suppliers and customers.

Table 4.10 is a detailed explanation of the practical implications of organising video conferencing implementation. These will also assist the Researcher in identifying the elements to be tested in chapters 6 and 7.

**TABLE 4.10: ORGANISING FACTORS FOR VIDEO CONFERENCING IMPLEMENTATION**

FACTOR	EXPLANATION
<b>Activities and resources</b> that need to be arranged to put structures, material and human interaction (duties, authority and responsibilities) in place to ensure cooperation and efficiency of a well-planned video conferencing network	A <b>checklist</b> provides video conferencing managers with structure on what to do and how to manage and implement a video conferencing network

FACTOR	EXPLANATION
Allocation of <b>responsibilities</b> to a specific individual/s or group/s	<p><b>Communication and authority structures</b>, communication or line functions need to be determined. The project manager will report to the Project Director and the Project Director to the Executive Members who set video conferencing implementation as an organisational objective, e.g..</p> <p>A communication or report structure needs to be developed to ensure that project implementation is according to the organisations objectives, budget and time frames.</p>
<b>Communication tools</b> for organising the activities, people, resources and budgets	Progress meetings and reports, Gantt charts, project management proposals and plans are but a few of the available communication tools to ensure that the project is according to the set objectives, time frames, budgets, etc.
Define and grant <b>decision-making powers</b> to individual/groups	<p>Decisions on standards, processes, procedures, equipment strategies, operational strategies, etc. is necessary to ensure a successful implemented video conferencing network.</p> <p>If no decision powers were granted to the project team, determine before appointing the project team how decision will be taken.</p>
Define <b>time frames</b> for video conferencing implementation, progress reports etc.	Set a project implementation date according to the designed and documented project plan.
Authorisation of the <b>project team</b>	<p>Authorisation for the creation of a project office will ensure that administrative support is available to the project team/s of all projects that need to be implemented.</p> <p>The different stages of project management and success factors must be in place to ensure that objectives are met within limited time constrains and resources.</p>
Appointment of the <b>project team</b>	It is important to define the role players in a project team as various skills and knowledge is essential to implement a video conferencing network. The following skills and knowledge are essential: venue design, communication and data network specialists, multimedia integration, etc.
Define <b>sub-project teams</b> for operation implementation after the main project has been implemented to ensure successful managerial take-over of the project	<p>Operational strategies (over different departments) need to be managed to ensure that the different activities are completed within the project team's framework.</p> <p>Procurement and tender procedures need to be handled in time to ensure that the installation of ISDN lines and equipment can commence as scheduled.</p> <p>Marketing of the network can only commence during and after completion of the installation. The marketing of the new network is essential to ensure that pilot projects can be selected and launched. The success rate of pilot projects helped to develop operational/maintenance strategies and needs to be continuously evaluated against operational and user manuals. This can only happen once set standards are documented.</p>

Organising is not just limited to the planning phases of the project that needs to be implemented. It is a continued process starting before, during and after the project has been implemented. It requires the cross functioning of departments to ensure that the global vision and objective are met within a specific time frame set for the project.

#### **4.5.8 MANAGERIAL FUNCTION: ACTIVATION OR MOTIVATION**

Implementing a video conferencing network requires the participation of the new management team as well as users to ensure that the newly implemented network is used and maintained. This is done through a deliberate action from management namely activation or motivation.

##### **4.5.8.1 DEFINING MOTIVATION**

Strategic changes and new objectives are set by top and middle management. In order to make these objectives a reality, people need to be motivated to partake in these new ventures in order to achieve the new set of objectives. Cleland & King (1975:11) define this motivational interaction as "... face-to-face leadership between superior and subordinates and between peers and associates". Activation is a process of motivation where people are guided to cooperate to ensure that objectives are achieved (Koontz *et al* cited in Kroon, 1986:6).

Motivation is a continued process and of short duration - a deliberate action by management as stated by Crosby (1979:55) when he wrote: "I never have felt that you could 'motivate' anyone for more than a few days". Motivation is an ongoing process to ensure that employees provide the best inputs and service on a voluntary basis (Marx and Gouws cited in Kroon, 1986:8).

Therefore, motivation is the "willingness to make the effort to achieve a goal or a reward. Motivation implies the existence of motives which lead to actions to satisfy needs or wants. Motives are what cause a person to perform an activity in order to achieve a desired result which is meaningful to the person and for which there is the promise of reward for the person. The reward sought is the fulfilment of a need or want" (Stallard & Terry, 1984:453). "Motivation is the process of being influenced to take action or accomplish a goal" (Littlefield *et al*, 1978:434).

The hierarchy and classification of needs (table 4.11) are defined by Maslow (Stallard & Terry, 1984:454; Littlefield *et al*, 1978:434-435) and is essential for technology implementation. Motivation or the “willingness to make the effort” as stated by Stallard and Terry depends on the needs of the people involved.

Needs of the project team will be on different levels during the process of implementation, e.g. they can feel vulnerable by the new technology as many people feel that technology replaces the human and is not required anymore. Negativity from employees can have a negative influence on the project’s implementation. This needs to be address so that employees and the project team feel safe.

The different levels of needs (table 4.11) are as follows:

**TABLE 4.11: MASLOW’S HIERARCHY OF NEEDS**

LEVEL OF NEEDS	EXPLANATION
1	Survival or physiological needs for food, clothing, shelter, rest and activity
2	Safety needs (protection, economic security and orderly explanation of the surroundings in which the person lives)
3	Social needs (belonging to a group)
4	Esteem needs (self-esteem and esteem for others)
5	Self-realisation (becoming that the person is capable of becoming)

#### 4.5.8.2 CRITICAL SUCCESS FACTORS FOR ACTIVATION/MOTIVATION

Wilson (1998:167), Stallard & Terry (1984:456-457) and Littlefield *et al* (1978:442) identified the following factors that influence motivation:

- Effective personnel relations
- Greater variety in skill requirements in order to make the work more challenging
- Achievement in doing something useful - task significance enhances the meaningfulness of work
- Feedback on the effectiveness of the work efforts

- Recognition of such achievement
- Responsibility for making decisions - greater employee autonomy or self-responsibility in seeing that tasks are completed
- Opportunity to grow and progress

The following factors (table 4.12) as part of the motivational process, must be included before starting with the video conferencing implementation process:

**TABLE 4.12: MOTIVATIONAL FACTORS FOR VIDEO CONFERENCING IMPLEMENTATION**

FACTOR	EXPLANATION
Participation of all employees	Project Management focuses on the allocation of time lines, resources and the human factor. <b>People</b> are required to do the work and continuous management is required so that team members know what is expected, when and how.
Activation/motivation is focussed on <b>groups/teams and specific individuals</b>	A holistic <b>motivational strategy</b> is essential to ensure that every member understands his role in the team and part he or she plays to ensure that objectives are met within time limits and set standards.
<b>Continuous motivational strategies</b> are required to bind, unify and harmonise activity and effort	Difficult and projects stretching over long periods of time require continuous motivation to ensure that morale is high, stress and problems are handled and the individuals feel they are important in the process.
Incentives, e.g. promotions	Incentives of motivational factors that can have an influence on the success rate of video conferencing implementation: <ul style="list-style-type: none"> <li>• Achievement in doing something useful</li> <li>• Recognition of such achievement</li> <li>• Meaningfulness of the work</li> <li>• Responsibility for making decisions</li> <li>• Opportunity to grow and progress</li> <li>• Promises of promotion</li> <li>• Financial gain</li> </ul>

#### 4.5.8.3 CHANGE MANAGEMENT

Managerial processes structured in this research focuses on how change to existing and new video conferencing networks can be managed. Change in the management or process of doing work scares management and also lower levels of employees.

The implementation of new technology, e.g. video conferencing, can be scary for potential users and needs to be managed. Various factors exist that motivates people

to improve on standards, quality and outputs. The motivation of people to get involved needs to be managed. Change management techniques are but one way to ensure that new changes and improvements are accepted by users and employees on all levels.

Hussey (1998:66-83) defines a change management strategy, namely the EASIER Strategy (figure 4.12) to manage changes in a managerial management environment. This strategy is practical and covers the essential factors that need to be managed in a changed environment. The implementation of a new video conferencing network brings along changes in how things will be done in future, e.g. face to face meetings will change into virtual meetings. It is changes like these, which scare people and cause a resistance to the changes in a comfortable environment that they are used to.

The EASIER strategy (table 4.13) as documented by Hussey (1998:66-83) consist of:

**TABLE 4.13: EASIER STRATEGY FOR MOTIVATION**

<b>EASIER STRATEGY</b>	<b>DESCRIPTION</b>
Envisioning	A vision is important to make changes, to define the changes, set objectives, shape expectations and motivate others to follow the new changes.
Activation	Activation is the process (short and long term) of making sure that employees affected by changes share the vision, understand it and are committed to its fulfilment.
Supporting	<p>Supporting is sometimes on the psychological levels, e.g. giving encouragement. Formal support through rearranging responsibilities or adding new resources. Skill development or the lack off required skills can cause fear that needs to be managed.</p> <p>The following will assist with supporting functions:</p> <ul style="list-style-type: none"> <li>• Give individuals new tasks according to their strengths and weaknesses.</li> <li>• Confidence by training/skills development. "People will perform to the set standards they are given, provided that they understand it" (Crosby, 1979:84). Induction, on-the-job or supervisory training create a teaching and learning environment to build skills (Stallard &amp; Terry, 1984:477-484).</li> <li>• Continuous coaching through suggestions, advice and encouragement.</li> <li>• Build confidence by empowering people.</li> <li>• Solve problems with real solutions.</li> <li>• Give credit to people when it is justified.</li> </ul>

EASIER STRATEGY	DESCRIPTION
Installation	<p>The vision needs to be developed and defined into strategies and actions that needs to be implemented. This can be undertaken by the change manager with the support of specialists as part of a more participative process.</p> <p>The aims of installation are as follows:</p> <ul style="list-style-type: none"> <li>• Detail planning is required to implement change.</li> <li>• Assign responsibilities so that those who need to about the changes, know what is expected.</li> <li>• Clarify the detail goals of the plan.</li> <li>• Provide a basis for monitoring progress.</li> <li>• Ensure that the necessary resources of people, facilities and money are determined and made available so that the plan can be implemented.</li> </ul> <hr/> <p>Large projects need to focus on more detail and therefore more intensive planning is required. Additional methods are available that can help to cope and plan for unforeseen circumstances:</p> <ul style="list-style-type: none"> <li>• <b>Scenario planning</b> is the development of alternative project plans based on different scenarios were the outcome of the changes are not known. This will enable managers to act quicker if alternatives are needed.</li> <li>• <b>Sensitivity analysis</b> is looking at what can go wrong and what the impact on the project will be.</li> <li>• <b>Contingency plans</b> are completed alternative plans that can be used in case something goes wrong.</li> </ul>
Ensuring	<p>Ensuring is focussed on the monitoring and controlling progress. Monitoring is the process of collecting information that shows what progress has been made. Controlling is the management task of taking whatever actions are needed when the results deviate fro the plan, and congratulating people when a difficult stage has been successfully completed.</p> <p>The following will assist with the measuring process:</p> <ul style="list-style-type: none"> <li>• Monitoring requires a system for the collection and feedback of data.</li> <li>• Formal data collection methods, e.g. surveys will be required to obtain data and ways to capture the data needs to be put into place.</li> <li>• Regular feedback reports will help to access the realtime progress with the proposed planning.</li> <li>• Electronic formats, e.g. email to be used for the collection of data.</li> <li>• Performance or project meetings need to be help to discuss and access progress.</li> <li>• Control meetings must be in the style of the change management focus.</li> <li>• Self-control for the management team is essential. Negative critics must never stand in the way of the main vision.</li> </ul>

<b>EASIER STRATEGY</b>	<b>DESCRIPTION</b>
Recognising	<p>Recognition is connected with career development and monetary incentives. Recognition is an ongoing process and can be maintained by the following:</p> <ul style="list-style-type: none"> <li>• Make change part of the performance management process.</li> <li>• Praise should be genuine - be specific in what is given credit for.</li> <li>• Public acknowledgment - do not exclude prominent role players.</li> </ul>

Motivation is the ongoing process of ensuring that all the required people are part of and motivated to ensure that the set objectives, e.g. the implementation of a video conferencing network, are met within allocated budgets, time constraints and minimum set standards.

Motivation as one of the managerial functions, is a continuous process of leading people to ensure that they stay willing to achieve the set vision. This is done by coordinating the needs of the individuals and groups with the set objectives and aligning these factors to the benefit of the project.

#### **4.5.9 MANAGERIAL FUNCTION: CONTROL**

Control is the managerial function that begins at the planning of the strategic plan and never ends. This is the one managerial function that is interdependent and interlinked to all the other managerial functions and duties.

Control is the one action within the implementation of the video conferencing network that ascertain problems before they become crises. It evaluate and assist with the process to improve on existing processes and procedures and provides management with managerial data to make informed decisions to ensure that the set objective of implementing a successful video conferencing network is achieved.

##### **4.5.9.1 DEFINING CONTROL**

Fayol in Kroon (1986:43) defines control as "... seeing that everything occurs in conformity with established rule and expressed command." Cleland & King (1975:11) expands on this by stating that "control is the process of making events conform to

plans, i.e., coordinating the action of all parts of the organisation according to the plan established for attaining the objective”.

Wilson (1998:165) supports this by stating that “control ... is the process of implementing the patterns of action produced by the planning process.” According to Crosby (1979:98), control is a journey and a process of installing quality improvement that never ends.

The purpose of control is therefore to measure and take corrective action to ensure that the project stays within the project specifications, time frame and budget limitations. “Corrective action systems have to be based on data that show what the problems are and analyses the causes of the problems. Once the root cause has been determined, it can be eliminated” (Crosby, 1979:113).

#### **4.5.9.2 CRITICAL SUCCESS FACTORS FOR CONTROL**

According to Stallard & Terry (1984:504-541 & 548-570), Schonberger & Knod (1999:544-546) as well as Cleland and King (1975:325) the following is part of the control process when implementing technology - including video conferencing networks:

- Objective or function - purpose of the system;
- Inputs - consisting of information, material or energy;
- Outputs - the end results of the conversion of inputs;
- Sequence - is the precedence of actions for converting inputs into outputs;
- Resources - human/material which assist in the conversion of inputs into outputs;
- Feedback loops - permit the adjustment of input/output to accomplish system objectives;
- Environmental setting - within which communication can be affected to responsible officials to reallocate resources;

- Work measurement;
- Evaluation of what is accomplished;
- Overall control actions, e.g. stock, cost and documentation;
- Time management through PERT techniques;
- Quality and manuals as well as
- Norms and standards need to be linked to the following areas for measurement namely assumptions related to the evaluation of the environment and of the internal resources of the company, areas of particular competence, performance results and priorities.

Monitoring and reporting of actions, e.g. expenditure, availability of resources and funding, needs to be focussed not just on short term operating information but needs to be linked with the strategic planning and strategic control program (Wilson, 1998:162).

“Planning without control is worthless and hence a critical examination of those features, which are regarded as key, in a strategic sense, for the particular company, represents an essential process in the development of measures of performance which can be said to be appropriate. It is then the performance, with respect to these key features, that must be monitored if the management of a company at corporate level to be effective” (Wilson, 1998:162).

McKenna (1999:420) further explains and clarifies this by stating that “control should be concerned with activities and not controlling people”. Dorrian (1996:55-59) stressed the importance of the human factor in any company and network. In order to support the client (internal or external clients or staff members within an organisation) provision during the planning phase is essential and the environment in which the client is functioning needs to be controlled to ensure quality of service.

Operation Management is but one way to apply control. With the input defined, proper directions are set, resources allocated and potential problems anticipated and avoided. During the process, corrective actions need to be taken if anything should change that

is not according to the planning. Outputs focus on the end results and outputs of activities and can form the basis for monetary rewards to workers and for future process and product improvements.

Management by objectives (MBO) is a way of managing by senior management to use their “power of far tighter control over what is done and to what standard” (Morris, 1988:80). Implementation MBO is defined by Hindle (2000:141) as “first, determines the business’s objectives; then plan how to achieve those objectives efficiently; and lastly implement the plan.” According to Hindle (2000:142) objects need to be **SMART**:

**S** = Specific

**M** = Measurable

**A** = Achievable

**R** = Realistic

**T** = Time related

#### **4.5.9.3 CONTROL INSTRUMENTS**

Control in Project Management is exercised through the initial approval of project plans, objectives, scope, budget and by the approval for the appointed project leader. Continuous control by senior management is done by reviewing changes in the budget, scope and progress reports (Ballé, 1994:109). According to Morris (1988:82) measurement aids understanding, but it is the start of the process of management rather than its entirety. The crucial first stage of monitoring according to Wilson (1998:161) is “making decisions about ‘measure of performance’ ... that the definition of these measures determines what it is appropriate to monitor.”

According to Slack *et al* (2001:530-534), project control involves three sets of decisions:

- Project monitoring - check its progress;
- Performance assessment - comparing monitored observations of the project with the project plan and
- Intervening to change the project to align it with the project plan.

Controlling or monitoring the video conferencing implementation process requires managerial tools that can support the control process. These managerial tools are structured by applying control instruments (table 4.14). These control instruments are explained in table 4.14:

**TABLE 4.14: INSTRUMENTS FOR CONTROL**

<b>CONTROL INSTRUMENT</b>	<b>DESCRIPTION</b>
Total Quality Management (TQM)	<p>According to Reynolds (1994:11), control in the TQM environment is based on quality control (to check if the product or process is according to standard and rectify the problem) and quality assurance (find reasons what went wrong and solve the problem). The following help to create TQM:</p> <ul style="list-style-type: none"> <li>• Organisational climate, which values honesty, integrity, innovation and equality of opportunity.</li> <li>• The development/maintenance of communication standards.</li> <li>• Continuous monitoring of the expectations customers in respect of reliability, trustworthiness, expertise.</li> <li>• Ensuring that staff treat customers with care and consideration.</li> <li>• Ensuring that all staff receives adequate training.</li> <li>• Adopting a philosophy of continuous improvement in activities.</li> </ul>
Programme Evaluation and Review Technique (PERT)	<p>One computerised method used to plan and control complex projects are PERT (Programme Evaluation and Review Technique). This enables the manager to organise information in order to achieve objectives sooner (Morris, 1988:81-82). Schonberger &amp; Knod, 1999:544-546 sees PERT as more than just a technique, they see PERT as a “management system” as it includes the following subsystems:</p> <ul style="list-style-type: none"> <li>• Project planning and sequencing</li> <li>• Time estimating and path analysis</li> <li>• A project scheduling subsystem</li> <li>• Reporting and updating</li> </ul>
DIRFT	<p>“When the standard is specific like Zero Defects, defect-free or DIRFT (Do It Right The First Time), people will learn to prevent problems” (Crosby, 1979:84). Documenting the processes, procedures and work instructions will help to set and maintain standards.</p>

CONTROL INSTRUMENT	DESCRIPTION
SWOT analysis	The evaluation of new of existing projects can be done using a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis. "Strategy involves building on core competencies, not chasing each and every opportunity" (Whittington, 1993:27). This is done by listing the different activities, actions etc. under the headings and scoring it. This will then help to ascertain the internal, external, positive and negative actions that need to be taken (Hindle, 2000:216). Whittington (1993:71) supports this technique as a tool for corporate planning as it "provides a basis for a more comprehensive and long-term analysis ...", support decision-making and retain profit potential.
Manuals and standards	Littlefield <i>et al</i> (1978:387-389) and Stallard & Terry (1984:548-570) documented the benefits of manuals. Manuals develop a sound organisation, saves time as it can be used for training, manage exceptions, establish control, improve personnel administration and efficiency, reduce office costs and aid supervisors in reviewing and analysing their responsibilities. Policy, employee, procedure and speciality manuals need to be developed to ensure that standards as an objective are documented and a tool is available to measure outputs.
Financial records	"The financial method of measuring nonconformance and conformance costs are used to evaluate processes" (Crosby, 1979:162). According to Wilson (1998:162), "it is exercised .... through financial orientated procedures. Budgetary control is the most common." Budgets include the actual cost or profits achieved, and an analysis of variances will indicate areas where control is required.
Project documentation and review	<p>Cleland &amp; King (1975:336-340) state that documentation and a process of review are essential to support control in project implementation. The following project documentation supports the control process:</p> <ul style="list-style-type: none"> <li>• Master project manual - This manual is the policy framework for the project, e.g. the objectives and is continuously updated as the project grows.</li> <li>• Project status reports - These reports are concerned with the cost, schedule and technical status of the project and are essential to measure control, progress and completion status.</li> <li>• Project review - Periodic formal reviews compare progress with the progress plan. The degree to which project's objectives are met is measured through a continuous decision process, e.g. whether the project should be accelerated, phased down or even discontinued.</li> <li>• Project review team - This mixed team with different skills and knowledge analyse the progress of the project over different boundaries based on problem solving and improvement.</li> <li>• Project management review checklist - Structure is required for project teams to appraise the project. "The checklist technique is used extensively to ensure the proper sequencing in complex jobs" (Cleland &amp; King, 1975:339), are applied.</li> </ul>

#### 4.5.9.4 METHODS OF CONTROL

By applying different instruments, control can be maintained on a continuous base. The following methods in table 4.15, as defined by McKenna (1999:421-422) can be applied.

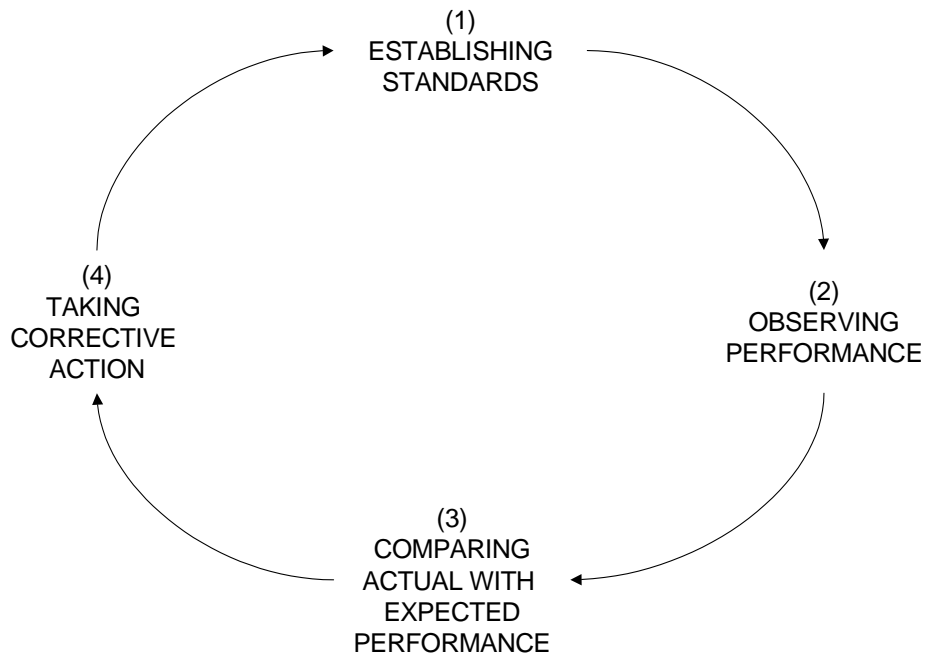
**TABLE 4.15: METHODS OF CONTROL**

METHOD OF CONTROL	DESCRIPTION
Routine control	This is a negative feedback system and should only be used if there are no ambiguities about objects, outputs not measurable, cause-effect relations are known and the activity is repetitive.
Expert control	This is planning/monitoring control in which managers discuss deviations and decide what to do about them.
Trail and error control	When the effect of interventions is not known, routine and expert control will not help. Trail and error methods are applied to eliminate uncertainty.
Intuitive control	When activities are not routine and cause-effect relations are not known, manager should rely on intuition.
Judgmental control	When activities are not routine, cause-effect relationships are uncertain, and outputs are not measurable, control has to be of a subjective, judgmental form.
Political control	Power, persuasion, negotiation and manipulation are applied when objectives are unclear and outcomes of the activity is not known or unclear.

#### 4.5.9.5 CONTROL CYCLE AND STAGES OF CONTROL

Cleland & King (1975:328), Wilson (1998:164) and Naughton (2002:52-53) documented control cycles. The departure points of these researchers are not the same. McKenna (1999:420) indicates that “control should be concerned with activities and not controlling people.” Wilson designed his control cycle around the human interaction while Cleland & King around the activities. Naughton (2002:52-53) designed and developed his control cycle around the scheduling of activities, estimation of cost and stock control. The control cycle of Cleland & King (1975:328) (figure 4.12) consist of establishing standards, observing performance, comparing actual to expected performance, taking corrective action and referring it back to the establishing of standards.

**FIGURE 4.12: THE CONTROL CYCLE** (Adapted from Cleland & King, 1975:328)



According to Wilson (1998:164) (table 4.16), control consists of the following five stages:

**TABLE 4.16: WILSON'S STAGES OF CONTROL**

STAGE	DESCRIPTION
1	The manager discusses with the subordinate, the subordinate's description of his own job.
2	The manager and the subordinate agree to short-term performance targets.
3	The manager and the subordinate discuss periodically the progress made toward meeting of targets.
4	The manager and the subordinate agree to a series of checkpoints that will be used to measure progress.
5	At the end of a defined period (usually one year), the manager discusses with his subordinate his assessment of the results of the subordinate's efforts.

Project control (table 4.17) incorporates scheduling, estimating, cost control and material control (Naughton, 2002:52-53).

**TABLE 4.17: NAUGHTON'S CONTROL CYCLE**

<b>WORK AREA</b>	<b>DESCRIPTION</b>
Scheduling	Development and documentation of starting and ending points of when activities must start and when they are scheduled to be completed.
Estimating	Prediction of project costs, e.g. people, material and equipment.
Cost control	Calculation of ongoing cost to ensure that expenditure is according to the project estimates.
Material control	Focusing on a Just in Time (JIT) stock control, material is only delivered and tracked once it is required in the project thus cutting costs.

The operational strategy (figure 4.8) defines planning as the implementation of both infrastructures as well as human resources. Control for video conferencing implementation is a combination of both these parts. Infrastructure standards, schedules and implementation cost, as well as people's performance with regard to the project plans need to be evaluated on a continuous base in order to take corrective action to ensure that objectives are met within the set time limit and allocated budget.

#### **4.5.10 MANAGERIAL DUTIES**

Managerial functions namely planning, organising, activation/motivation and control are supported by six additional managerial duties (figure 4.7). For every managerial function applied in the video conferencing network a process of the six managerial functions can be applied. Managerial functions and managerial duties are interlinked with each other. In the process of planning the following managerial duties (Kroon, 1986:8-9) will commence in order to conclude the planning process namely:

- decision-making
- communication
- motivation
- coordination
- delegation and
- discipline

Managerial duties are important to ensure that, e.g. in the planning process to implement a video conferencing network decisions are made on what, when, who, how and when the network will be implemented, to communicate all decisions to every role

player, to stay motivated even when it is difficult to find solutions for problems and to delegate responsibilities in order to maintain discipline in the process to ensure that the network is implemented according to set standards, time frames and budgets. Managerial duties are explained in detail in table 4.18:

**TABLE 4.18: MANAGERIAL DUTIES**

MANAGERIAL DUTIES	DEFINITION	EXPLANATION AND DESCRIPTION
Decision-making	Decision-making is measuring and deciding on alternative solutions to ensure that the best solution is reached (Kroon, 1986:8).	Decisions influence the success of an organisation. Therefore, it will have an impact on the future of the organisation, its employees and goals.
Communication	Communication is the transfer of a message among two or more people that involves the activities of the organisation and also the relationship of the involved people (Marx cited in Kroon, 1986:8).	It provides role players with the essential information to ensure that the work cycle keeps on flowing. It also influences the relations among employees, motivation and outputs of the workers.
Motivation	Motivation is an ongoing process to ensure that employees provide the best inputs and service on a voluntary basis (Marx and Gouws cited in Kroon, 1986:8).	The manager needs to know his staff members. Different things or environments motivate different people - for some employees it is money, status or fear of failure.
Coordination	Coordination is a process of linking the different tasks and roles of people to ensure that goals and objectives are achieved (Du Toit and Marx cited in Kroon, 1986:9).	It is an ongoing process, even through the stages of planning, organising, activation and control. This is done to ensure that the different people and departments function as one unit.
Delegation	Delegation is the allocation of duties, authority and responsibility to ensure that work is distributed among people with the required skills so that objectives can be achieved (Du Toit and Marx cited in Kroon, 1986:9).	Work is distributed onto the various levels of employees. This is an ongoing process and can change throughout the managerial process by adding additional responsibilities to different people.
Discipline	Discipline motivates the employees actions to ensure that objectives are achieved.	Marx and Gouws (cited in Kroon (1986:9) identify two categories:  <b>Positive discipline:</b> healthy environment where employees with voluntary efforts adhere to the rules and regulations of the organisation.  <b>Negative discipline:</b> enforced discipline on employees where staff members are given no choice but to adhere to the rules and regulations.

## 4.6 CONCLUSION

Video conferencing implementation depends on a holistic managerial strategy (including a vision and mission statement as well as the defining of the strategic objectives) that involves senior, middle and lower management. The managerial strategy applied for video conferencing implementation will require a tailor-made strategy to support the different phases of implementation. As discussed in this chapter, video conferencing management is summarised as follows, namely:

- a continuous managerial cycle consisting of processes and procedures;
- that is build on four **managerial functions** (planning, organising, activation/motivation and control);
- as well as six **managerial duties** (decision-making, communication, motivation, coordination, delegation and discipline);
- to organise and allocate the different **resources** namely men/women, material, machines, money, methods, measurement and maintenance;
- using **managerial strategies**, e.g. Project, Process, System and Operational Management within a specific management framework of Total Quality Management;
- to reach set **goals and objectives**;
- within a specific **time frame** and **budget**; and
- in a defined enterprise, organisation, institution or company to manage the different transformations (market needs)s, activities and services.

A concept managerial strategy for video conferencing implementation is documented in chapter 5 and will be tested in chapters 6 and 7.

## CHAPTER 5

### PROPOSED CONCEPT STRATEGY AND PROCESS FOR VIDEO CONFERENCING IMPLEMENTATION

*"The mechanisms of running a business are not really that complicated - except for a few thousand details!" (ANON).*

#### 5.1 INTRODUCTION

In this chapter attention is given to the main and third research sub-question of what an ideal strategy and process for video conferencing implementation would be, by applying the information gained from chapters 3 and 4 in the design and development of a concept strategy for video conferencing implementation. This concept strategy will be tested in chapters 6 and 7.

In chapter 3, the researcher has already explained the complexity of what video conferencing is and what constitutes a video conferencing network. Video conferencing, multimedia and computer equipment as well as communication infrastructure, e.g. ISDN, IP and switchboard technology, was also set out. Implementing these different technologies, various skills and cross-departmental planning is essential. Defining a strategy for video conferencing implementation, needs to take this into consideration to ensure a successful implemented network.

In chapter 4, the researcher focussed on what constitutes video conferencing management. Management was defined within the strategic objectives that needs to be achieved. This should ideally be done within a framework of TQM, System, Operation, Process or Project Management applying the four managerial functions namely planning, organising, activation and control. According to the definition of what video conferencing management is, namely a continuous cycle applying four managerial functions and six duties by means of allocated resources, time frames and budgets, specific goals and objectives can be achieved namely a successfully implemented video conferencing network.

In this chapter, the researcher focussed on the processes and procedures required to constitute a managerial strategy for video conferencing implementation. This was done by identifying the main processes and what tasks are required within that main processes to ascertain the procedures to conclude a concept managerial strategy for video conferencing implementation.

## 5.2 BACKGROUND

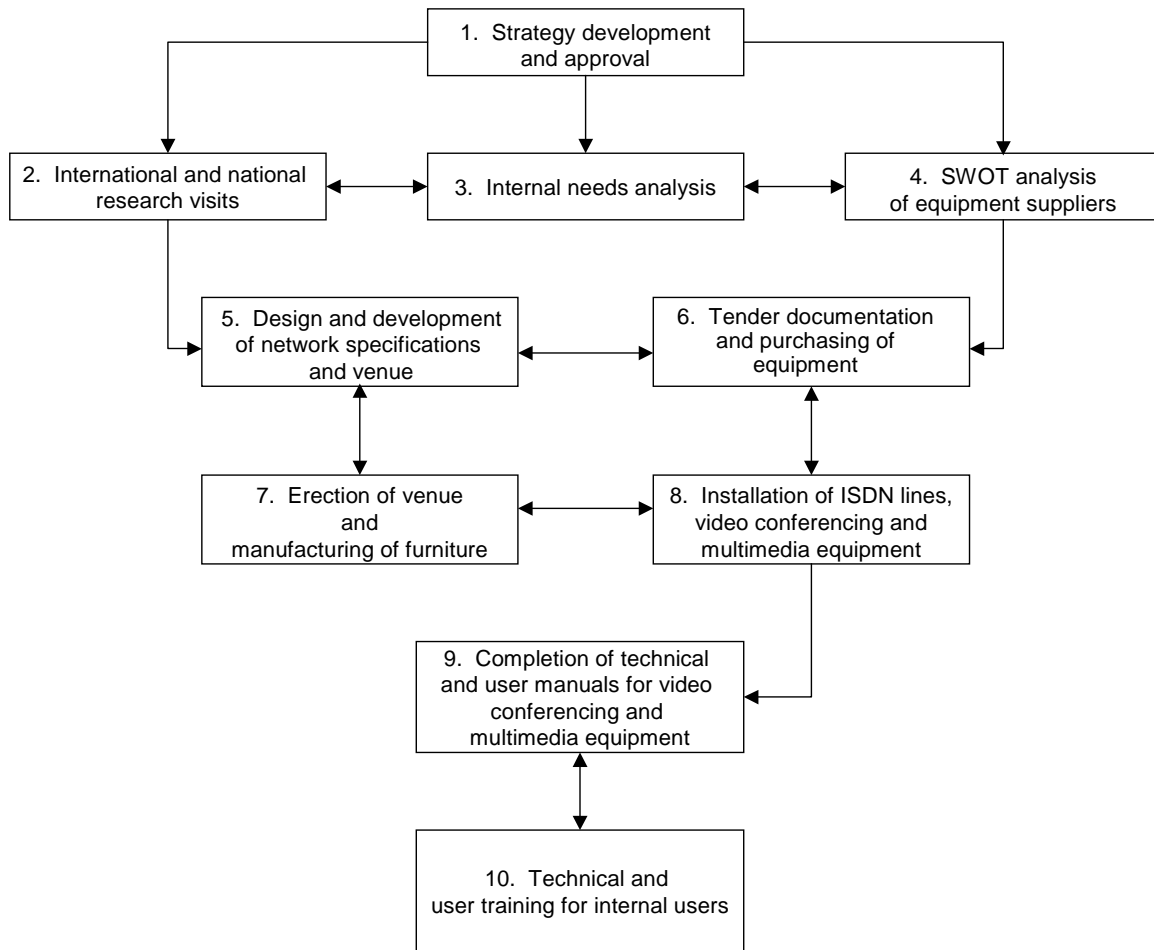
During the 1999/2000 implementation of the seven-site video conferencing network at Telematic Education, TUT in South Africa, the researcher applied various research methods, project management techniques and experience obtained from previous telecommunications, audiovisual and multimedia environments. The implementation process applied, was as follows (table 5.1 and figure 5.1):

**TABLE 5.1: IMPLEMENTATION PROCESS AT TUT**

PHASE	DESCRIPTION
1	A <b>strategy</b> (Integrated Technology Plan), was approved by senior management.
2	<b>Research visits</b> to Australia, Europe and within South Africa were completed before the design of network specifications.
3	An internal <b>needs' analysis</b> was completed inside TUT.
4	A <b>SWOT analysis</b> on the various equipment suppliers in South Africa, was conducted.
5	<b>Network specifications</b> on required hardware were defined
6	<b>Tender documentation</b> was published and a formal acquiring process commenced.
7	<b>Building of a venue</b> and manufacturing of furniture.
8	<b>ISDN lines</b> by Telkom and <b>equipment</b> by the identified supplier were installed.
9	Completion of <b>technical and user manuals</b> on the use of hardware.
10	<b>Internal training</b> to users (technical and user training) started on a continuous basis.

**FIGURE 5.1: VIDEO CONFERENCING NETWORK IMPLEMENTATION AT TSHWANE UNIVERSITY OF TECHNOLOGY**

During the design and development of this implementation process, on paper it seemed



logical, systematic and has all the correct ingredients to ensure a successful implementation. Unfortunately testing the implemented video conferencing network without a pilot project, marketing to potential users took longer than anticipated and the solving of installation problems was a continuous process during the first year with no Service Level Agreements with the video conferencing equipment supplier or Telkom on the ISDN lines.

Three years after the initial installation, and after proving that the network was feasible, replacement and upgrades of new technology was on the table. Lessons learned from this installation process were that additional research on the managerial strategy for video conferencing implementation is essential to prevent the loss of valuable managerial and operational time on future installations.

### 5.3 DEFINITIONS

The following concepts (table 5.2) are important to understand the core of chapter 5. The blue underlined concepts are cross references to the attached glossary.

**TABLE 5.2: DEFINITIONS APPLIED IN CHAPTER 5**

CONCEPT	DEFINITIONS
Process	A series of actions which are carried out in order to achieve a particular result or <u>product</u> ; a <u>method</u> (Craig <i>et al</i> , 1994:155).  A <u>process</u> is usually seen as various <u>tasks</u> progressing in a certain sequence (Schönsleben, 2000: 21-22).
Procedure	A manner or order of doing this, especially an established <u>method</u> (Wevell, 1996:856).

### 5.4 IMPORTANCE OF THE DIFFERENT CONCEPTS

The following concepts (table 5.3) are important to understand their meaning and also how they will be applied in this chapter:

**TABLE 5.3: IMPORTANCE OF DEFINITIONS APPLIED IN CHAPTER 5**

CONCEPT	DEFINITIONS
Processes and procedures	Video conferencing processes are concluded from main phases or steps that need to be followed. Procedures are smaller chronological and systematic tasks applied within that main processes to establish a successful video conferencing implementation cycle.  In order to define the managerial strategy for video conferencing implementation, the main processes and procedures, must be identified.

### 5.5 DATA AND FINDINGS FROM PREVIOUS RESEARCH

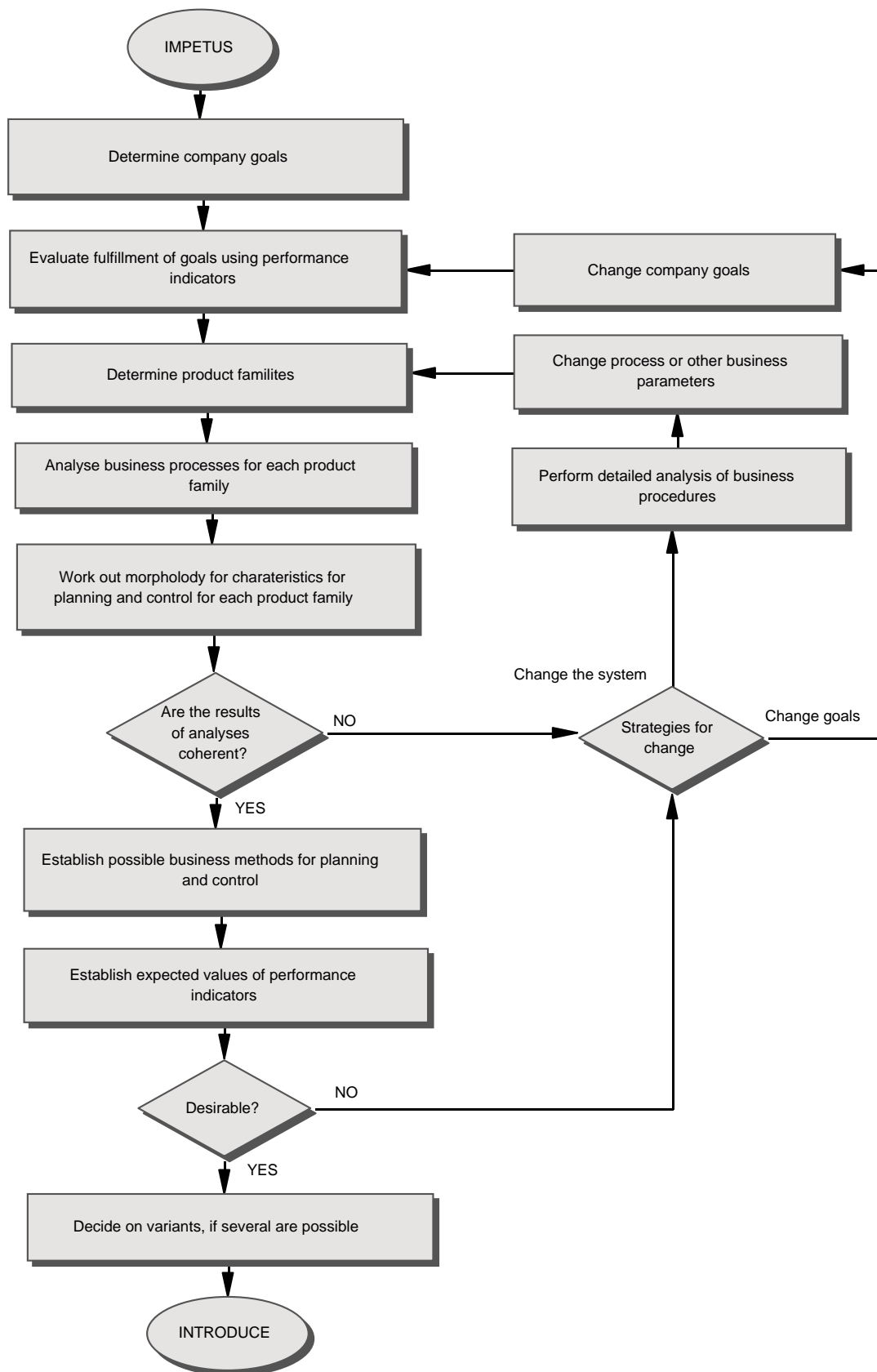
Whittington (1993:3) indicates that the managing of objectives within a specific environment is essential, but “future-orientated planning is often irrelevant” as predictions of future trends and market changes are unpredictable to anticipate effectively. According to Whittington one way to counter act this problem is to apply “strategies ... to simplify and order a world which is too complex and chaotic for them to comprehend” (Whittington, 1993:25). He further warns that the social system within which strategy may take place, influences the long term achievement of objectives and

is “vital to secure the future” (Whittington, 1993:4). Therefore, it is essential to identify and apply the correct managerial strategy for video conferencing implementation.

Project planning for technology implementation, e.g. video conferencing, is defined in phases (Seale & Rius-Riu, 2001:online; NCREL, [S.a.]:online; Massachusetts Software Council, 2000:online and Cleland & King, 1975:15-23). Schönsleben (2000:73) developed a model (figure 5.2) for the implementation of logistical systems. Video conferencing is a logistical system as it has a support function to achieve other objectives in the organisation, e.g. to save costs on travel by having more virtual meetings. Following this model, a managerial strategy for video conferencing implementation is possible. The lack of detail in this model to constitute a process for video conferencing implementation requires that further analysis of the literature needs to be completed to ensure that a comprehensive strategy for video conferencing implementation is concluded. The importance of Schönsleben’s model is that he cautions the video conferencing manager on the following alternatives that need to be investigated before starting with the implementation of technology:

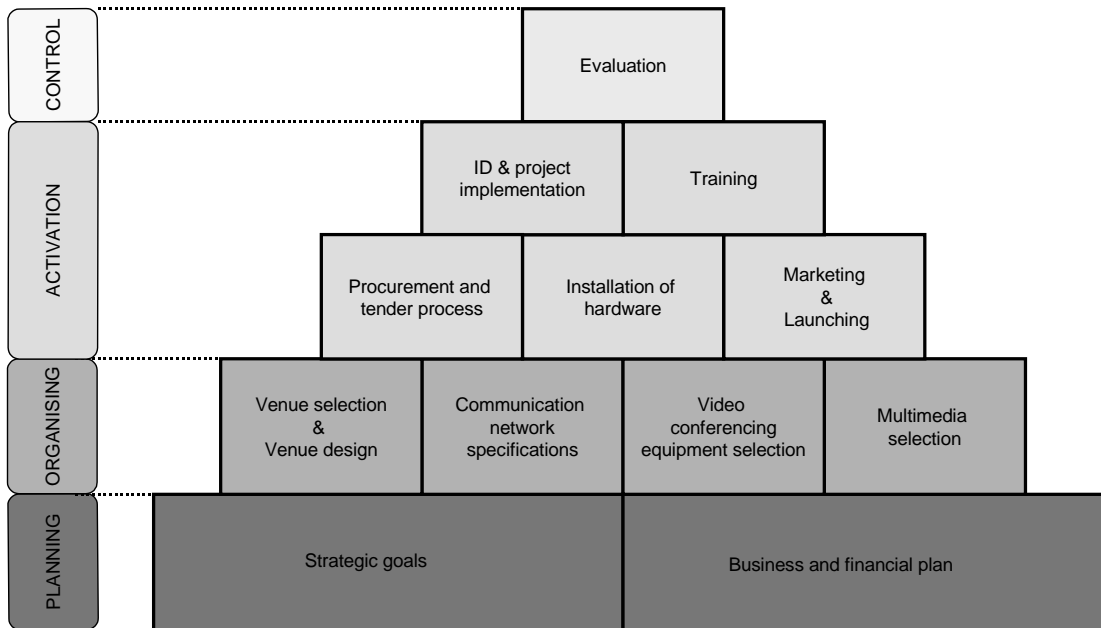
- Explore the possibilities of re-engineering - challenge the existing processes by radically redesigning processes to improve the organisation’s competitiveness;
- Focus on bench marking by finding and implementing best practices. Cited in Flanagan & Finger (2001:308-309), David Kearns (CEO of Xerox) defined bench marking as “ the continuous process of measuring products, services and practices against targeted competitors or those companies regarded as leaders.”
- Contemplating change management procedures - this involves realising the need for change and identifying the right process for it;
- Consider outsourcing - outsourcing should provide access to specialist skills, free up management time to focus on core business and provide cost savings, improved service quality and reduction in staffing;
- Try time-based competition by compressing the time required to propose, develop, manufacture, market and deliver products.

**FIGURE 5.2: APPROACH TO DESIGNING LOGISTICAL SYSTEMS** (Adapted from Schönsleben, 2000:73)



In order to design a managerial strategy and process for implementation, various building blocks (figure 5.3) that are linked to the managerial functions, are required to ensure that the proposed process is logical and systematic.

**FIGURE 5.3: BUILDING BLOCKS FOR A VIDEO CONFERENCING MANAGERIAL STRATEGY**



The building blocks in figure 5.3 applied the four managerial functions. The activities connected within every managerial function has been formulated to start with a solid foundation of what needs to be achieved. The activity of evaluation forms the final building block to ensure that the activities are measured. In order to understand and make this more practically, a managerial process as seen in figure 5.4 provides more detail and will be applied for testing in chapters 6 and 7.

The implementation elements as stated in figure 5.4, is a chronological and systematic process ascertained from the literature discussed in chapters 3 and 4 to ensure that a continues managerial process has been applied (including the four managerial functions of planning, organising, activation and control) to ensure optimum use of resources, time frames and budgets to achieve the set objective of implementing a successful video conferencing network.

These elements for implementation are as follows and constitute the implementation

process and procedure for video conferencing:

### 5.5.1 Strategic planning

Defining a **strategic plan** and objective within a TQM environment (Crosby, 1979:10; Wevell (1996:1122); Craig *et al* (1994:184); Anthony & Dearden (cited in Wilson, 1998:16); Flanagan & Finger (2001:284-285); Naughton (2002:84) and Kroon (1986:116) is a “long term plan” defined by senior management in order to achieve a specific objective.

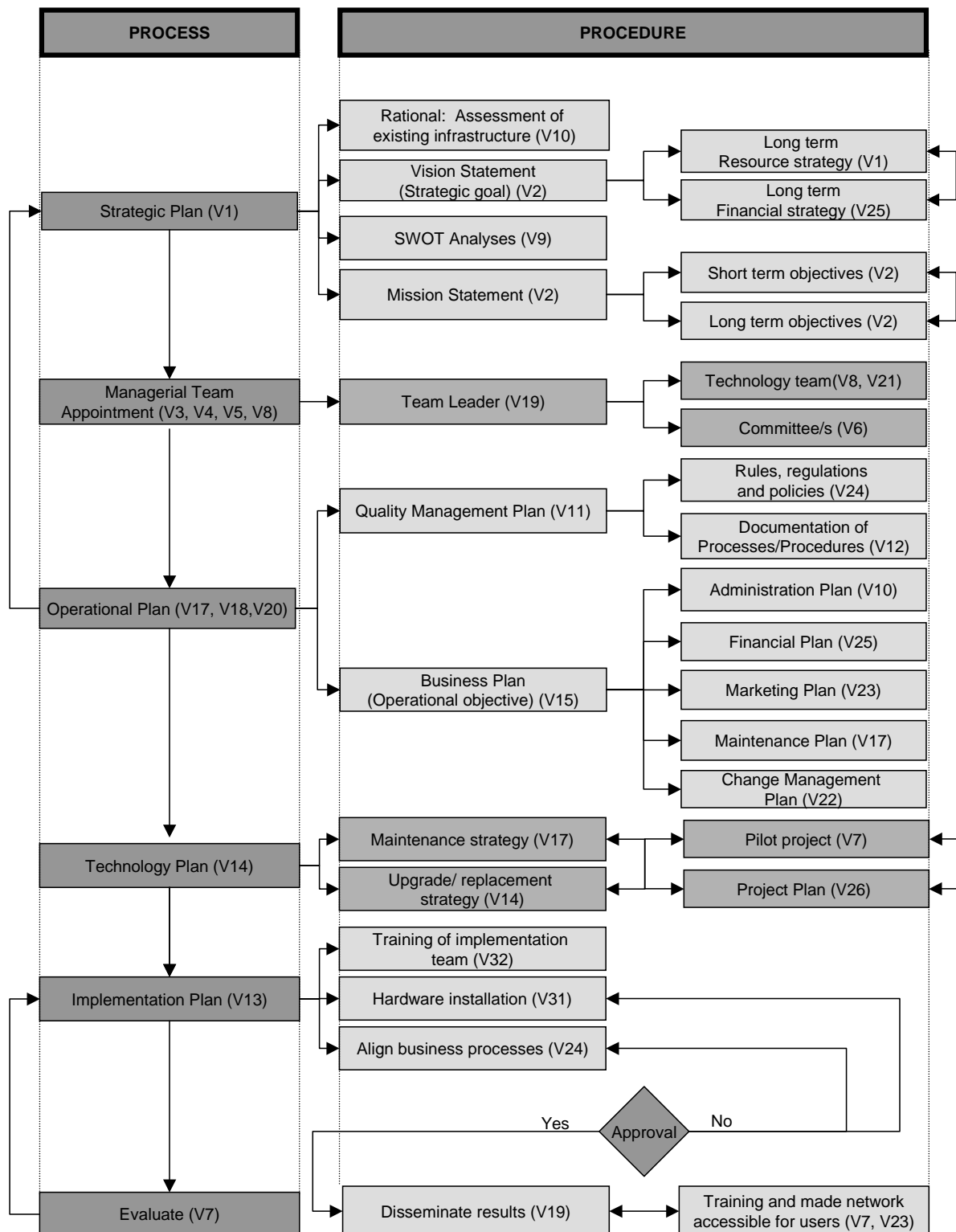
Setting the strategic objective is the starting point but ensuring that funds, resources and skills are available to make this a reality, is also essential. According to Valdez ([S.a.]d:online); Hopey & Harvey-Morgan and Shirley (cited in Valdez, [S.a.]d:online); Flanagan & Finger (2001:350-351), NCREL ([S.a.]d:online) and Pekar & Abraham (cited in Smith *et al*, 2000:47) the design of a new strategy must be **goal and objective** driven rather than by technological developments to ensure that value is added.

The strategic plan is compiled as discussed by Chandler (cited in Hindle, 2000:206); Flanagan & Finger (2001:284-285) and Kroon (1986:162-174) by means of the following systematic phases or steps:

- Develop a **rationale** for use of the new technology by means of audits of existing equipment, current usage and staff development opportunities to ensure those core capabilities are applied and developed to sustain the strategic focus. With reference to Seale & Rius-Riu (2001:online), NCREL ([S.a.]d:online) and Massachusetts Software Council's (2000:online), an **assessment of existing technology** was made before the vision for the new project was defined. The formulation of a vision is essential to ensure that criteria are available to achieve a successful assessment of existing infrastructure according to specific objectives.
- Articulate a **vision** in order to define the strategic goal - be broad but realistic in scope, with economical and technically feasible solutions, taking in account all risks by analysing them and having a plan of action ready to cope with these challenges or risks.

**FIGURE 5.4: PROPOSED MANAGERIAL STRATEGY FOR VIDEO CONFERENCING**

**IMPLEMENTATION** (see also table 6.1 for explanation of variables in brackets)



- Do a Strengths, Weaknesses, Opportunities and Threats (**SWOT**) **analysis** to consider existing and new opportunities (involve all levels of staff) as well as how each **strength and weakness** of the organisation will impact the implementation of technology. Examine all budgetary considerations to ensure that the financial position is liable to sustain the new implementation of video conferencing technology; and
- Develop a **mission statement** by stating short and long term objectives. This can be divided into different, universal, flexible and adaptable (Reynolds, 1994:17; Naughton, 2002:18 and Kroon, 1986:60-61) phases to complete the project. These objectives are essential for setting standards and evaluation criteria before, during and after the implementation process. Taken into account the mission and philosophy of the organisation, administrators, users and team members must have accepted the original strategic focus and all must follow the implementation process.

### 5.5.2 **Managerial teams**

According to Hunter *et al*'s (1998:83) definition of management, a **managerial team** is required to manage the implementation process. Identification of managerial role players by means of Process Management to implement the strategic objectives, are essential. A **team leader** from middle management to guide the project team through the process of implementation, must be appointed before any other phases can be started.

Massachusetts Software Council (2000:online) started their implementation process with the appointment of a **technology team**. This supports Flanagan & Finger's view of starting with the correct attitude. As this is a very logical and systematic way of starting the process (but it will be tested applying questionnaires to video conferencing users and with structured interviews with video conferencing equipment suppliers in chapters 5 and 6) as people are required to manage the process before any activities can begin. Their main purpose is to involve all stakeholders and build ownership of the initiative with the key participants, e.g. constituting **committees**. These committees employ various skills in a TQM environment to ensure holistic planning of the proposed video conferencing network.

### 5.5.3 Operational planning

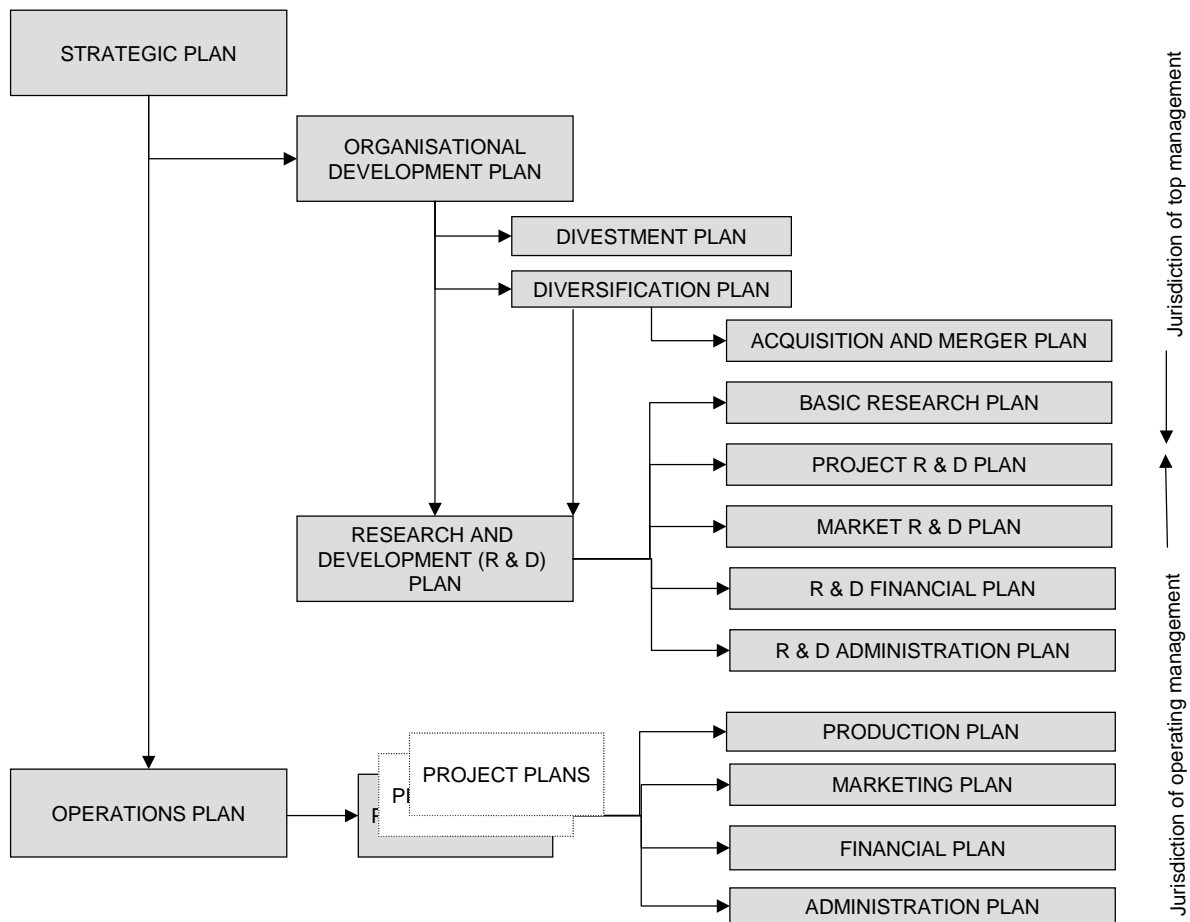
Middle management aligns and converts the operational plan for implementation with the strategic plan (Chandler, cited in Hindle, 2000:206; Flanagan & Finger, 2001:284-285 and Kroon, 1986:162-174). System Management structures the “elements together with relationships between the elements connected or related to each other and to their environment in such a manner as to form an entirety or a whole” (Smith *et al*, 2000:61). According to Slack *et al* (2001:95) operational planning by means of Operations Management can only commence once the strategic objectives have been set. This is accomplished by means of the “design of products, services and processes (that) is interrelated and should be treated together”. The operational strategy should constitute the following:

- set **operational objectives** as this is the “quantifiable criteria that must be met for the project to be considered successful” (Microsoft Project Management, Training Tutorial:[S.a.]) by constructing action matrices - what to do and how.
- a **research and development strategy** will ensure that the best applications, techniques etc are applied to achieve the set objective;
- link the defined plan to a **budget** by allocating funds for long and short term;
- define a strategy to ensure that **resistance to change** is managed;
- middle management defines **rules, regulations, policies and strategies** by applying Process Management - support and gives direction on the holistic strategic and operational plan on who will do what, how and when and also how problems should be solved (Reynolds, 1994:16);
- define the different **processes, procedures and methods** by means of Process Management (Littlefield *et al*, 1978:85);
- allocate **resources**;
- identify **role players**;

- compile a **business plan**. The business plan provides scope for managerial, operational and maintenance strategies and provides the necessary authority and responsibility structures. Operational strategies are well-defined actions that need to be completed within a specific time frame, by specific people and within set standards according to processes and procedures to ensure that the objectives can be achieved. For the implementation of technology, the generic business plan is replaced with a documented technology plan. "... a comprehensive ... technology plan is required long before technology equipment starts arriving. Most research studies on technology implementation show that much of the frustration with technology can be attributed to inadequate or nonexistent planning" (Valdez, [S.a.]d:online).
- commence with **project scheduling**, targets and standards and
- **document, disseminate and implement**.

In order to make the strategic and operational plan a reality, the formulation of different operational strategies, are required. Operational management with continuous feedback by using Process and System Management is achieved by the documentation of long term plans, as seen in figure 5.5 and defined by Cleland & King (1975:41). Project implementation, marketing, financial, administrative and a management information system for accurate information to support decision processes, needs to be in place.

**FIGURE 5.5: STRATEGY OF PLANS** (Adapted from Cleland & King, 1975:41)



#### 5.5.4 Technology plan

In order to support the implementation process, a Technology Plan must be developed. The implementation of technology is in many organisations a once off implementation. After the implementation process has been completed, another department might take responsibility for the maintenance or management of these technologies. Project management is a strategy to ensure that the immediate and short term implementation of video conferencing technology are successful as it is a continuous control process of taking corrective action in order to stay aligned with the main objective. Project Management as a managerial strategy to support once off implementations are an excellent strategy to support the implementation process.

The Technology Plan is structured to function over different departments within the same project and implementation objectives. Valdez (b) ([S.a.]:online) and Odendaal

(1984:205) states the importance of interdepartmental collaboration to ensure that technology is effectively integrated. The integration of other strategies, e.g. maintenance and to upgrade technology, is essential. "A Technology Plan that is not integral to the overall improvement plan is likely to be short-lived" (Cardler, 1996 cited in Valdez, [S.a.]b:online). The strategic and operational strategies of the organisation must be included to ensure that minimum standards, set objectives, time frames, allocated resources, existing skills and budgets are supportive of this strategy and to ensure control of the implementation process.

In order to apply Project Management, the following stages (table 5.4 and figure 5.6) are guidelines for the implementation of a project like video conferencing. These stages are valid for the planning, organising, activation of role players and control process of the implemented technologies. Project Management is applied within the other managerial strategies of TQM, System, Process and Operations Management.

#### 5.5.5 **Pilot projects**

Seale & Rius-Riu (2001:online) and NCREL ([S.a.]:online) made use of pilot projects before defining the project plan. The data obtained during the pilot phases were used to define a better process. Massachusetts Software Council (2000:online) implemented pilot projects as part of the main stream implementation process but ignore the dissemination of project results after evaluation as well as additional marketing to make technology available for other users.

#### 5.5.6 **Project plans**

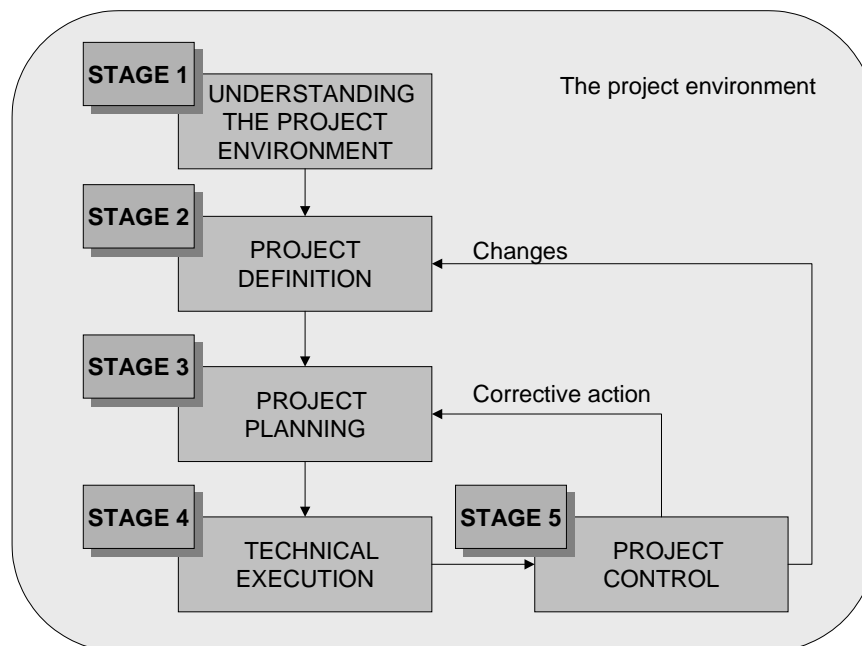
Project Management involves the commitment from project team members and needs to be managed throughout the project. This is done by writing down project plans, distributes copies to every team member and senior management and frequent reviewing of these plan. During conflict and disagreements, it is always helpful to go back to the visions and goals (Hunter *et al*, 1998:49 & 81).

Project Management stages are as follows:

#### **TABLE 5.4: PROJECT MANAGEMENT IMPLEMENTATION STAGES**

STAGE	NAME	DESCRIPTION
Stage 1	Formulation, definition and planning of the project environment	Strategic decisions are made, e.g. purpose and vision. These can be influenced by internal and external factors.
Stage 2	Define the project	Setting of objectives, scope and strategy. Generate a list of actions for each goal. Prepare a time-line and schedule for action to be completed within. Identify problems and possible solutions. Assign tasks and estimate costs.
Stage 3	Concentration and implementation	This formal project execution - team members will implement and fine-tune action plans. This is a high energy, 'all shoulders to the wheel' time. It takes more energy to start the wheel rolling than at any other time.
Stage 4	Momentum	This is the technical execution. If the concentration stage has been effective, the project will move into momentum and needs to be steered. Progress monitoring will help team members to feel a sense of accomplishment.
Stage 5	Completion	This is the last state of the project, when the final results are collected and all the loose ends are tied up. Final evaluations and control measures are carried. Acknowledgments are given and received and successes celebrated. A completion ritual is carried out.

**FIGURE 5.6: SLACK ET AL'S PROJECT MANAGEMENT MODEL** (Adapted from Slack *et al*, 2001:519)



5.5.7 Impl  
n strategies

ementatio

A quality implementation strategy is required to ensure that implementation is done according to set standards in the policy, rules and regulation documentation in a TQM environment (Reynolds, 1994:16 and Crosby, 1979:77). NCREL ([S.a.]:online) declares that the implementation of infrastructure, e.g. video conferencing technology consists of two parts namely human resources (users and maintenance specialists) and technology (equipment, software and facilities). Part of Project Management's implementation phase, is training to increase individuals' skills and worth and also to add value to the newly implemented project (Hunter *et al*, 1998:419 and Crosby, 1979:169). Training is not just essential to teach and learn how to use, maintain and manage the newly implemented network, but also for the team who will be responsible for the implementation as they need training in how the implementation will be done, what managerial tools, processes and procedures as well as documentation needs to be formulated during the implementation phase.

The implementation strategy must ensure that the resources, people, time and budgets are according to the set framework required for implementation. The following elements are essential to ensure a systematic implementation strategy:

**TABLE 5.5: ORGANISING FACTORS FOR VIDEO CONFERENCING IMPLEMENTATION**

FACTOR	EXPLANATION
<b>Activities and resources</b> that need to be arranged to put structures, material and human interaction (duties, authority and responsibilities) in place to ensure cooperation and efficiency of a well-planned video conferencing network	A <b>checklist</b> provides video conferencing managers with structure on what to do and how to manage and implement a video conferencing network
Allocation of <b>responsibilities</b> to a specific individual/s or group/s	<b>Communication and authority structures</b> , e.g. communication or line functions need to be determined. The project manager will report to the Project Director and the Project Director to the Executive Members who set video conferencing implementation as an organisational objective e.g..  A communication or report structure needs to be developed to ensure that project implementation is according to the organisations objectives, budget and time frames.
<b>Communication tools</b> for organising the activities, people, resources and budgets	Progress meetings and reports, Gantt charts, project management proposals and plans are but a few of the available communication tools to ensure that the project is according to the set objectives, time frames, budgets, etc.

FACTOR	EXPLANATION
Define and grant <b>decision-making powers</b> to individual/groups	Decisions on standards, processes, procedures, equipment strategies, operational strategies, etc. is necessary to ensure a successful implemented video conferencing network. If no decision powers were granted to the project team, determine before appointing the project team how decision will be taken.
Define <b>time frames</b> for video conferencing implementation, progress reports etc.	Set a project implementation date according to the designed and documented project plan.
Authorisation of the <b>project team</b>	<p>Authorisation for the creation of a project office will ensure that administrative support is available to the project team/s of all projects that need to be implemented.</p> <p>The different stages of project management and success factors must be in place to ensure that objectives are met within limited time constraints and resources.</p>
Appointment of the <b>project team</b>	Identify different role players in a project team as various skills and knowledge is essential to implement a video conferencing network. The following skills and knowledge are essential: venue design, communication and data network specialists, multimedia integration, etc.
Define <b>sub-project teams</b> for operation implementation after the main project has been implemented to ensure a successful managerial take-over of the project	<p>Operational strategies (over different departments) need to be managed to ensure that the different activities are completed within the project team's framework.</p> <p>Procurement and tender procedures need to be handled in time to ensure that the installation of ISDN lines and equipment can commence as scheduled.</p> <p>Marketing of the network can only commence during and after completion of the installation. The marketing of the new network is essential to ensure that pilot projects can be identified and launched.</p> <p>The success rates of pilot projects will help to develop operational and maintenance strategies. These strategies need to be measured and documented against operational and user manuals. Evaluation of pilot projects and the implemented video conferencing network can only happen once set standards are documented.</p>

### 5.5.8 Quality policies and managers

Implementation starts with the documenting of a quality policy and appointing quality managers. Quality improvement teams are appointed that “consists of representatives from different departments in an organisation who get together for a fixed number of meetings to resolve a particular quality problem” (Reynolds, 1994:16).

#### **5.5.9 Procedures and methods**

The formalisation of procedures and methods for making technology decisions, including the setting of priorities and the purchase, evaluation, upgrading and use of technology are part of the implementation strategy but is also essential during the control phase.

#### **5.5.10 Project progress and reports**

Project progress or the measurement of achieved milestones are essential as “a team needs ways to mark progress and achievement. Celebration has a ritual element and can include marking special moments through declaration, enjoying results achieved and also having fun and letting off steam together. Celebration also increases intimacy” (Hunter *et al*, 1998:83) and is essential to give recognition to team members after the conclusion of the implemented project.

#### **5.5.11 Training**

Develop a strategy for staff training, professional and opportunity development. This training include training for the user, manager and technical support staff. Administrative staff, e.g. the people making reservations need to understand the process and how the international video conferencing network functions in order to make the correct bookings involving also international video conferencing sites.

#### **5.5.12 Operating policies**

Guarantee access to technical and professional support by defining and documenting an operating policy.

#### **5.5.13 Dissemination of project results**

Dissemination of results of the implemented project whether the project was successful or not.

#### **5.5.14 Accessibility of the implemented network**

Widening participation and increase accessibility by making the network available to other users - from industry, partnerships, video conferencing booking agencies, etc.

#### **5.5.15 Control and evaluation**

The final control and evaluation phase (figure 5.11) include the final phases of the implementation strategy namely:

- evaluate and take corrective actions if the implementation of the network is not according to set rules, regulations, standards or policies;
- complete progress reports and disseminate information on the success of the implemented video conferencing network to align the final implemented video conferencing network with the set objectives; and
- align the final implemented video conferencing network with the operating policies, e.g. writes the training and final user manuals to ensure that the operating policies are practical and up to date.

### **5.6 CONCLUSION**

The final implementation strategy consists of main processes and procedures (smaller tasks or activities) that needs to be followed to ensure successful video conferencing implementation. The six main processes are:

- the formulation of a Strategic Plan;
- appointment of a managerial team;
- Operational Plan;
- Technology Plan;
- Implementation Plan and a

- Evaluation Strategy.

Concluding the final evaluation process, alignment of the achieved results to the strategic objectives need to be made to measure the success of the implemented video conferencing network. Progress reports are therefore essential from the project team, to middle and senior management.

The proposed process and procedures constitute a proposed managerial strategy for video conferencing implementation. This proposed managerial strategy were tested in chapter 6 (with other video conferencing network managers) and chapter 7 (video conferencing equipment suppliers).

## CHAPTER 6

### RESULTS OF DATA COLLECTION BY MEANS OF QUESTIONNAIRES AMONG VIDEO CONFERENCING NETWORK MANAGERS

*“Management is doing this right; leadership is doing the right things” (Peter Drucker)*

#### 6.1 INTRODUCTION

Video conferencing network managers make the final decision on what the newly implemented video conferencing network will look like and how it will be managed. They are therefore critical role players in the implementation of video conferencing technology.

Testing the proposed video conferencing implementation strategy with the video conferencing network managers, was therefore essential. Their experience and knowledge on what can be applied and what is successful will help to test and formulate the final implementation strategy for video conferencing.

#### 6.2 RESEARCH METHODOLOGY BACKGROUND (See also chapter 2)

Video conferencing network managers were identified from a national database. This database was compiled from different sources, e.g. the Internet as well as from the video conferencing reservation agency, Bureau Connect. A representative sample (see point 2.6.2 for detail) was randomly drawn from the population of video conferencing network managers in Gauteng.

Measurement consists of obtaining respondents' perceptions and interpretations of what is happening in their own video conferencing environments and by applying their own experiences. Stepwise regression was applied to obtain data from questionnaires (see point 2.3.2 and 2.6.2 for detailed explanation).

As defined in paragraph 2.3.3, Stepwise regression was used in this study as a

statistical method identifying which independent or predictor variables contribute most to a successful process of video conferencing implementation. According to Shtatland *et al*, S.a., “Stepwise ... builds models in a sequential manner and it allows for the examination of a collection of models which might not otherwise have been examined.” All variables included in the final models were significant at the 0.1 ( $p < 0.1$ ) level.

Predictor variables (i.e. elements of the concept video conferencing implementation strategy) were entered into the SAS System’s Stepwise regression software programme to assess their association with the various dependent variables. Variables were designed to indicate some aspect of success when conducting video conferencing as measured by the questionnaire. Separate regression procedures were conducted for each of eight possible success factors (see table 6.1), namely:

- Strategic support (V27);
- Financial viability (V28);
- Operational support (V29);
- Marketing support (V30);
- Technical support (V31);
- Training strategy (V32);
- Planning support (V33); and
- Authority structures (V34).

In each of these eight regression procedures, an iterative process was followed in which the contributions of different combinations of the predictor variables were calculated and an optimum model was obtained.

Table 6.1 gives a summary of which of a list of 26 (V1 - V26) independent variables (the 26 elements of the concept video conferencing strategy, figure 5.4) were found to be significantly associated with each of the eight indicators of a successful video conferencing implementation i.e. the eight dependent variables, V27 - V34.

The figures in the table represent the contribution (partial  $R^2$ ) of independent variables to the optimum model found for each success factor. Only statistically significant contributions ( $p < 0.1$ ) were included in the final model. The table presents the combined result of eight Stepwise regression procedures - one for each success factor. The

typical regression model investigated for each success factor was:

$\alpha_1 V1 + \alpha_2 V2 + \dots + \alpha_{24} V26 + \text{Intercept} = \alpha_{27}$  (success factor) (where  $\alpha_1, \alpha_2 \dots \alpha_{24}$  represent statistically significant  $R^2$  contributions of the various independent variables V1, V2 ... V24).

### 6.3 RESEARCH RESULTS

The data in table 6.1 can be interpreted as follows:

- 6.3.1 It was found that the independent variables (V7, V8 and V26) were significantly associated with success factor V27 (successful strategy support). The three figures in the V27 column indicate the size of the contributions of each of the three independent variables to this type of success. The blank spaces in the rest of the column indicate that no other independent variable played a significant role to be included in the final model for success variable V27.
- 6.3.2 Similarly, from the second column (under variable V28), it can be seen that there were four elements at the concept video conferencing strategy (namely variables V3, V6, V22 and V24) that contributed significantly to successful financial viability of video conferencing.
- 6.3.3 Successful operational support (variable V29) in column three, was significantly associated with the independent variables V17, V18, V20 and V23. Variable V23 (defining of a marketing strategy) was found to be the element most significantly associated with successful operational support.
- 6.3.4 Two elements from the concept managerial strategy supported variable V30 (marketing support) in column four. Defining of incentives (variable V25) was associated with V30 on a higher level of significance than variable V3 (senior management involvement). Association of both with variable V30 will be included in the final strategy for video conferencing implementation.
- 6.3.5 Ten elements (variables V1, V4, V5, V6, V7, V12, V13, V15, V17, V26) from the concept video conferencing strategy were associated with successful technical

support (V31) in column five. The three variables that were most highly associated with successful technical support, are senior managerial involvement (V3), piloting and testing of the network (V7) and the development of a project plan (V13).

- 6.3.6 Variable V32 (successful training strategy) in column six, was associated with four elements in the concept managerial strategy. Successful training was associated with the variables V7, V15, V17 and V23. It can be argued that the marketing strategy (variable V23) is the most important element and needs to be included when developing the training strategy.
- 6.3.7 Successful planning support (variable V33) in column seven, was associated with five elements (variables V1, V10, V16, V24 and V26) of the concept managerial strategy for video conferencing implementation. Planning around specific starting and ending times for the implementation project (V26) and applying of managerial strategies (V16) were highly associated with successful planning support.
- 6.3.8 Two elements were associated with successful authority structures (V34). These elements were the defining of a motivational strategy (V22) and the granting of decision powers (V20).

In summary it was found that most of the elements of the concept managerial strategy for video conferencing implementation were associated with one or more indicators for successful video conferencing implementation.

The only exceptions were independent variables V2 (vision/mission statements), V9 (SWOT analysis), V14 (upgrades of technology defined in the technology plan), V19 (authority and reporting structures) and V21 (defining of sub-project teams). These elements were not significantly associated with any of the dependent variables (V27 - V34).

**TABLE 6.1: THE ROLE OF DIFFERENT ELEMENTS ®<sup>2</sup>) OF THE CONCEPT VIDEO CONFERENCING STRATEGY (INDEPENDENT VARIABLES V1 - V26) WITH REGARD TO DIFFERENT TYPES OF VIDEO CONFERENCING SUCCESSES (V27 - V34)**

INDEPENDENT VARIABLES THAT INFLUENCE THE VIDEO CONFERENCING PROCESS		DEPENDENT VARIABLES WITHIN THE MANAGERIAL PROCESS							
		SUCCESS FACTORS FOR THE VIDEO CONFERENCING MANAGERIAL STRATEGY							
		V27	V28	V29	V30	V31	V32	V33	V34
		STRATEGIC SUPPORT	FINANCIAL VIABILITY	OPERATIONAL SUPPORT	MARKETING SUPPORT	TECHNICAL SUPPORT	TRAINING STRATEGY	PLANNING SUPPORT	AUTHORITY STRUCTURES
V1	Strategic formulation					0.046		0.041	
V2	Vision/mission statement								
V3	Senior management involvement		0.1669		0.093	0.2241			
V4	Middle management involvement					0.064			
V5	Lower management involvement					0.037			
V6	Equipment supplier involvement		0.417						
V7	Pilot projects for testing network	0.092				0.2228	0.2003		
V8	Utilization of project teams	0.3158							
V9	SWOT analysis								
V10	Holistic planning approach							0.048	
V11	Appointment of quality managers		0.091						
V12	Quality manuals					0.046			
V13	Defining of project plan					0.1967			
V14	Upgrades defined in technology plan								
V15	Operations defined in business plan					0.062	0.08		
V16	Incorporated managerial strategies							0.207	
V17	Maintenance strategy (SLA)			0.058		0.037	0.1205		
V18	Managerial tools (Gantt charts)			0.026					
V19	Authority and reporting structures								
V20	Decision powers (individual/team)			0.1394					0.1068
V21	Sub-project teams								
V22	Defining a motivational strategy								0.6313
V23	Defining a marketing strategy			0.6413			0.2642		
V24	Changing of existing strategies		0.077					0.037	
V25	Defining of incentives				0.5311				
V26	Project starting/ending time	0.1745				0.017		0.5348	
<b>TOTAL</b>		<b>0.5821</b>	<b>0.7519</b>	<b>0.8646</b>	<b>0.6243</b>	<b>0.9529</b>	<b>0.665</b>	<b>0.8669</b>	<b>0.7381</b>

Table 6.2 gives an indication of the degree in which the different success factors were

supported by the elements of the concept video conferencing strategy. Two types of indicators were provided. Firstly the combined R<sup>2</sup> contribution (level of association) of these significant independent variables to each optimum model. Secondly the number of independent elements/variables that significantly support the dependent variables compiled by the Stepwise regression procedure.

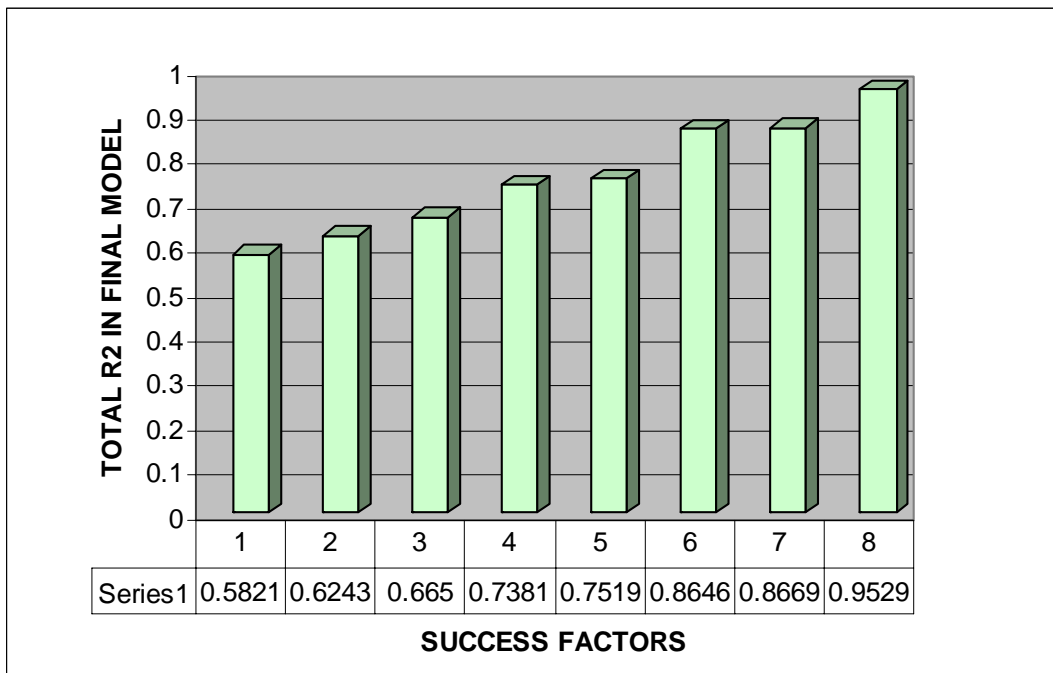
It was found that the concept managerial strategy supported success factor 'technical support', the most. In all the 26 variables, representing elements of the concept strategy played a significant role in this type of strategy. The cumulative R<sup>2</sup> contribution of these variables to the optimum regression model was 0.95. The success factor 'strategic support' was least supported by the strategy with only two elements/variables that played a significant role and the cumulative R<sup>2</sup> for the model being 0.58.

**TABLE 6.2: DEGREE OF SUPPORT GIVEN TO THE DIFFERENT SUCCESS FACTORS**

FACTORS	QUESTION	TOTAL R <sup>2</sup> IN FINAL MODEL	NUMBER OF INDEPENDENT VARIABLES CONTRIBUTING SIGNIFICANTLY
Strategic support	V27	0.5821	3
Marketing support	V30	0.6243	4
Training strategy	V32	0.665	4
Authority structures	V34	0.7381	2
Financial feasibility	V28	0.7519	10
Operational support	V29	0.8646	4
Planning support	V33	0.8669	5
Technical support	V31	0.9529	2

The data in table 6.2 is visually presented in figure 6.1. It is important to understand that all eight success factors are important in the implementation strategy for video conferencing.

**FIGURE 6.1: DEGREE OF SUPPORT GIVEN TO THE DIFFERENT SUCCESS FACTORS**



## 6.4 CONCLUSION

Stepwise regression was used to identify which elements of the concept video conferencing implementation strategy supported different types of successful implementation processes the most. Technical support was found to be the success factor supported mostly by the elements of the concept strategy, while the elements in the concept strategy were least associated with the success factor of strategic support.

Designing and developing a managerial strategy around the 21 variables is therefore essential. It was found that 21 of the 26 elements of the concept video conferencing implementation strategy were associated with one or more indicators of successful video conferencing implementation.

The identification of these elements was done for the benefit to both the video conferencing manager and equipment supplier. The equipment supplier could make use of this information to ensure that video conferencing network managers manage their networks to ensure optimal usage of the technology.

According to the results of this research strategic planning of such a network forms the

core of implementing a video conferencing network. This holistic planning is supported by financial and operational strategies to ensure that the strategic planning is executed. This is done by providing incentives to users, technical support and the distribution of information, e.g. marketing of availability of such a network. To ensure that sustainability of such a network is maintained authority structures are required to ensure that all parties involved in the implementation and maintenance of such a network stay focussed and motivated.

## CHAPTER 7

### RESULTS OF DATA COLLECTED BY MEANS OF STRUCTURED INTERVIEWS AMONG VIDEO CONFERENCING EQUIPMENT SUPPLIERS

*“Business’, is a magical word, it turns out. It implies autonomy, practicality, action-taking, self-sufficiency, and self-responsibility. In our biggest bureaucracies (private and public), these ideas have been absent for too long” (Tom Peters, 1993).*

#### 7.1 INTRODUCTION

The importance and impact that video conferencing equipment suppliers have on the implementation process, needs to be ascertained. Being part of the implementation process, their function and influence in the implementation of a video conferencing network cannot be ignored. As seen in the literature, video conferencing network managers are not always knowledgeable what a video conferencing network constitutes of. Suppliers of video conferencing equipment influence video conferencing network managers (who are implementing video conferencing) to make decisions namely what to buy and how to implement their networks. Unfortunately video conferencing equipment suppliers distanced themselves from the design of a managerial strategy namely how to manage and maintain this newly implemented video conferencing network.

In order to obtain a holistic approach for video conferencing implementation, the role and impact of the video conferencing equipment supplier, needs to be evaluated in order to ensure that the recommended video conferencing implementation strategy also includes them and the way that they function as a major role player.

## 7.2 RESEARCH METHODOLOGY

Structured interviews were applied with video conferencing equipment suppliers who are the main importers of the different brand names of codecs. The focus of the structured interviews was to obtain and evaluate the impact that they have as suppliers on the implementation of video conferencing networks. The interviews were structured by asking the same questions to all suppliers.

The focus was on the six main codec brand names namely Sony, Tandberg, Polycom, Aethra, VTel and VCon. The installation of VTel and VCon codecs were not included in this research. Both codecs are imported by the same company. Because of their limited influence in the video conferencing market (sales were limited to four codecs in 2002), all data obtained from them was disregarded.

The video conferencing equipment suppliers that were used, is as follows:

**TABLE 7.1: VIDEO CONFERENCING CODEC SUPPLIERS**

SUPPLIER	CODEC
Sony South Africa	Sony
Questek	Tandberg
ETA Audiovisual <sup>4</sup>	Polycom
MCT Telecommunications	Aethra

Measurement is by obtaining perceptions and interpretations of what is happening in their own video conferencing environments and by applying their own experiences. Where possible data was quantified in percentages in order to make comparisons and to calculate averages. Explanations from these suppliers will be used to argue and understand what is happening and what is required to improve existing processes and strategies for video conferencing implementation.

## 7.3 RESEARCH RESULTS

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This research started in 2002 when ETA Audiovisual was identified as main and national supplier of Polycom codecs. During 2003 ETA Audiovisual lost their main right as sole importer of Polycom codes. Kathea South Africa is now the main and sole importer for Polycom codecs. The data obtained from ETA Audiovisual will be used to complete this study.

The research questions (Annexure B) were designed to investigate the implementation process - actions to plan, organise, motivate participants and control resources, time and budgets. Some questions are a cross reference to ensure accurate answers and interpretations. The questions supported the managerial functions as follows:

**TABLE 7.2: RESEARCH QUESTIONS FOR STRUCTURED INTERVIEWS**

<b>MANAGERIAL FUNCTIONS</b>	<b>MANAGERIAL ACTION AND ACTIVITY</b>	<b>QUESTION</b>
Planning	Identifying of strategic objectives	7.3.1
	Design and development of managerial strategies	7.3.3
	Compiling of needs analysis	7.3.6
	Appointment of quality specialists	7.3.7
	Drafting of Service Level Agreements (SLA)	7.3.9
	Development of managerial tools, e.g. project plans	7.3.10
	Drafting of flow diagrams, before and after implementation	7.3.11
Organising	Involvement of the different role players	7.3.2
	Design and development of managerial strategies, including the people that will who will draft this	7.3.3
	Rating of success for individual or group participation	7.3.5
Activation	Design and development of managerial strategies, including the people that will who will draft this	7.3.3
	Rating of success for individual or group participation	7.3.5
	Development of managerial skills to manage the network	7.3.13
Control	Testing of hardware after installation and involvement during pilot projects	7.3.4
	Appointment of quality specialists	7.3.7
	Drafting of quality manuals with minimum standards	7.3.8
	Drafting of Service Level Agreements (SLA)	7.3.9
	Development of managerial tools, e.g. project plans	7.3.10
	Drafting of flow diagrams, before and after implementation	7.3.11
	Control measure to ensure standards, time frames and budgets	7.3.12

The managerial cycle of planning, organisation, activation and control is valid for both the video conferencing equipment supplier and network manager. The implementation process applied by video conferencing equipment suppliers influence the final product

that needs to be managed by the video conferencing network manager. Mistakes made during this implementation process have an impact on the network and needs to be investigated to ensure that an holistic approach is applied when implementing a video conferencing network.

The following questions were asked during the structured interviews:

7.3.1 *Before starting with the planning phase for video conferencing implementation, what percentage of the potential network's strategic objectives were known?*

The purpose of this question was to ascertain what and where the starting point for planning of a video conferencing network begins. As seen in the literature study (see 2.5.3), strategic objectives guide management to achieve long term objectives. Taken this into consideration it is important to determine if video conferencing equipment suppliers see video conferencing as part of this long term objective and also is it applied in the operational environment to ensure that long term objectives are achieved?

**TABLE 7.3: STRATEGIC OBJECTIVES**

SUPPLIER	CODECS	ANSWER IN PERCENTAGE
Sony South Africa	Sony	70%
Questek	Tandberg	50%
ETA Audiovisual	Polycom	0%
MCT Telecommunications	Aethra	100%
<b>AVERAGE</b>		<b>55%</b>

The strategic objective of the client and potential video conferencing network is known in only 55% of the implemented networks. As stated by Aethra, implementing video conferencing is “the provision of a business solution”. Three out of the four suppliers agreed that knowing the strategic objective is important but that systems are designed according to the client’s needs. Specific tailor-made systems are designed, developed and implemented. A special research focus by Aethra during the planning phase is applied to ensure a successful implemented network.

Tandberg put another emphasis on the reality of implementing a video conferencing network. According to Tandberg, the implementation of video conferencing is a generic

action with a few tailor-made technology applications. It is not the supplier who influences the process but the client who manipulates the implementation by providing video conferencing network details and specifications. The supplier only works around these specifications to fulfill a specific need of the client.

It can be argued that the strategic objective by implementing the video conferencing network is important to both video conferencing managers and video conferencing equipment suppliers. Although only 55% of the implemented networks took strategic objectives into account, overall, for holistic planning, it cannot be disregarded.

The video conferencing network manager can also only influence and manipulate the video conferencing implementation process if he/she is knowledgeable in the design, development and application of video conferencing technology. If this is the first network that a video conferencing manager implements, video conferencing managers make use of knowledgeable people in this field (starting with the video conferencing equipment supplier) to provide the manager with the know-how, what is available and how this can be applied to solve a specific problem, enhance a focus area or support a strategic objective. The network is then designed around this problem or focus area of the video conferencing manager and the proposed solution from the video conferencing equipment supplier.

The person who influences the implementation process is therefore the video conferencing equipment supplier as the objectives of this network need to be defined in order to implement a video conferencing network fit for purpose of the defined problem or focus area. It can be argued that the strategic objective needs to be known and defined by both role players (video conferencing equipment suppliers and managers) in order to design and develop a network that will support the specific strategic objective.

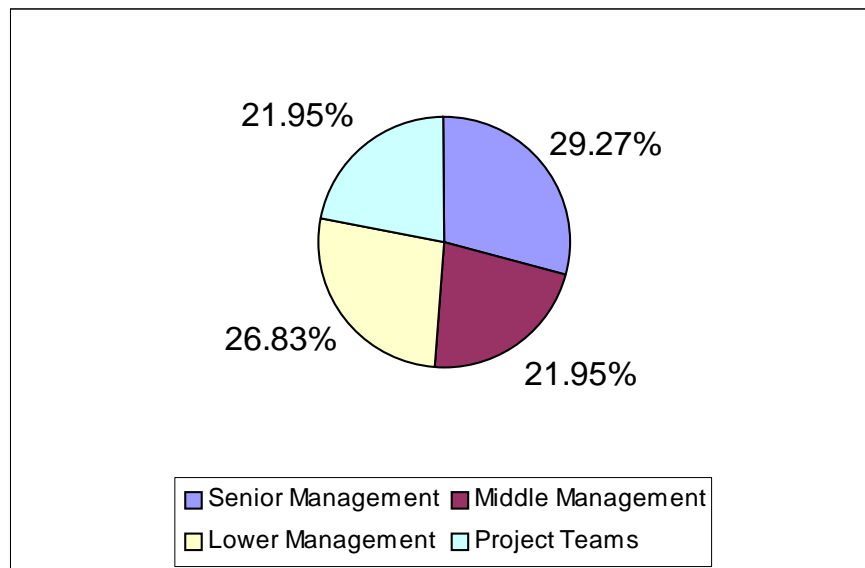
7.3.2 During the video conferencing implementation process, what percentage were the following managerial groups involved in the process?

**TABLE 7.4: LEVELS OF MANAGEMENT**

SUPPLIER	CODECS	LEVELS OF MANAGEMENT			
		Senior Management	Middle Management	Lower Management	Project teams
Sony South Africa	Sony	40%	20%	30%	10%
Questek	Tandberg	10%	20%	70%	0%
ETA Audiovisual	Polycom	60%	40%	0%	0%
MCT Telecommunications	Aethra	10%	10%	0%	80%
<b>AVERAGE</b>		<b>30%</b>	<b>22.5 %</b>	<b>25.0 %</b>	<b>22.5 %</b>

During the literature study, the different role players (table 7.4) were identified but their function in the implementation process were still vague. According to the video conferencing equipment suppliers, a well-balanced average is maintained in industry as indicated in table 7.4 and figure 7.1.

**FIGURE 7.1: LEVELS OF MANAGEMENT**



The importance of senior management as indicated by Polycom and Sony is essential

as this is a good indication that video conferencing technology is required to support the strategic objective of their functions. Sony and Tandberg indicated that video conferencing networks are sometimes initiated by lower management as seen with the average of 25.0 % involvement of lower management.

Project management is task oriented and focusses on a specific short term action, e.g. the implementation of a video conferencing network. It is mainly Aethra that makes use or is part of official project teams for the implementation of video conferencing networks. In question 7.3.5, Tandberg indicated that the participation of groups during the implementation phases ensures a more successful video conferencing network. The formulation of a group function is therefore important for implementation purposes.

As seen by the obtained data, all four role players are equally important during the implementation of a video conferencing network. Senior management to set the strategic objective, middle management to comply and design the operational managerial strategy, e.g. appointing project teams to implement this network and lower management to maintain and support this newly implemented network.

7.3.3 *What percentage of installations do you, as the supplier, get involved in the design and development of a business or managerial strategy for video conferencing implementation on behalf of the client?*

**TABLE 7.5: DESIGN OF BUSINESS STRATEGIES FOR CLIENTS**

SUPPLIER	CODECS	ANSWER IN PERCENTAGE
Sony South Africa	Sony	0%
Questek	Tandberg	0%
ETA Audiovisual	Polycom	0%
MCT Telecommunications	Aethra	15%
<b>AVERAGE</b>		<b>3.75 %</b>

According to Tandberg, suppliers need to sell equipment in order to survive in the video conferencing industry. Providing such a service is not included in the normal functions and duties of an equipment supplier. This is also supported by Sony and Polycom. Tandberg can provide such a service by means of consultation experts. Additional commission is then payable according to the value of the contract.

Aethra does provide such a service as this is part of the holistic planning approach that they follow. This is supported by their view in 7.3.1 that strategic objectives are known in 100% of their installations and that a managerial strategy needs to be in place to support the strategic objective. It is also important that the client will be able to maintain this network and according to Aethra a documented managerial strategy or business plan provides guidelines to manage this network.

According to this data, the role of the video conferencing equipment suppliers ends after the hardware has been implemented. On average, only 3.75 % of the networks implemented were important enough to ensure that the client is able and do have the knowledge to maintain this network. One of the four video conferencing network suppliers (MCT Telecommunications) indicated a 15 % knowledge base of video conferencing network managers do have the skills. If the average data is taken in consideration video conferencing network managers, especially when implementing their first video conferencing network, do not have enough managerial skills and experience to maintain such a newly implemented network.

It can be argued that if only 3.75 % of the installations were provided with a managerial strategy, the impact and influence of the video conferencing equipment supplier, is very limited or nothing at all. Additional research by the video conferencing network manager is essential to ensure that video conferencing network managers know how to design, develop and implement such a managerial business strategy to ensure efficiency and effectiveness of this network.

*7.3.4 In your opinion, what percentage are you as the supplier involved in testing the video conferencing equipment after installation was completed?*

The purpose of this question was to ascertain the involvement of the video conferencing equipment supplier after the installation of the hardware. The assumption was that if the video conferencing equipment supplier was still involved in the final testing of the proposed video conferencing network, they can still influence the implementation process.

The assumption that the installation process is only complete after the hardware has been tested either by furrow testing or by a pilot project, needs to be evaluated and tested with the equipment suppliers.

**TABLE 7.6: TESTING OF EQUIPMENT AFTER HARDWARE INSTALLATIONS**

<b>SUPPLIER</b>	<b>CODECS</b>	<b>ANSWER IN PERCENTAGE</b>
Sony South Africa	Sony	10%
Questek	Tandberg	5%
ETA Audiovisual	Polycom	100%
MCT Telecommunications	Aethra	15%
<b>AVERAGE</b>		<b>32.5 %</b>

The video conferencing equipment supplier is only in 32.5 % of the installations involved in the final testing and piloting of video conferencing networks. Sony is involved in the first preliminary testing of hardware but not involved in the first projects, e.g. pilots to test the total system. Tandberg only gets involved on request of the client and Aethra will test the session by means of a few connections to their main office and during technical training of the equipment. Polycom is the only supplier that assists the video conferencing network supplier with full backup during such pilot projects.

It can be argued that the video conferencing equipment suppliers do not see themselves as being part of the total implementation process. According to the video conferencing equipment suppliers, their role and function ends after the installation of the hardware. Faults in the first planning phases, e.g. the positioning and selection of cameras, additional equipment for integration of multimedia, etc. will only be known after installation and the trial or pilot projects. Not being part of this evaluation process leaves the video conferencing network manager with the problems and not the promised business solutions as committed by the video conferencing equipment suppliers.

The continuous support of the video conferencing equipment supplier is required, especially for the manager who is implementing video conferencing for the first time. The implementation of a network is sometimes done in phases. Because of international communication standards on the different codecs, different codecs can be used in the same network. By not being part of this network on a continuous basis, the video conferencing equipment supplier excludes himself from future business opportunities, e.g. the purchase of document cameras, expansion of future phases in a network, etc.

The final implementation and testing of video conferencing are not just the sole responsibility of the video conferencing manager. Selling a business solution as indicated by Aethra, there is also a responsibility from the supplier to ensure that the recommendations made by them are feasible and support the client's problem or focus area. Therefore the involvement of the video conferencing equipment supplier cannot end after the installation of the hardware but is essential to complete the total process of installation - until final testing and rectifying of installation mistakes.

7.3.5 *Who implement more successful video conferencing networks, individuals or groups?*

The purpose and focus of this question were to cross reference the importance that project teams (question 7.3.2) plays in the implementation of video conferencing.

**TABLE 7.7: IMPLEMENTATION OF INDIVIDUAL OR GROUP PARTICIPATION**

SUPPLIER	CODECS	INDIVIDUALS	GROUPS
Sony South Africa	Sony	✓	
Questek	Tandberg		✓
ETA Audiovisual	Polycom	✓	
MCT Telecommunications	Aethra	✓	

The preference of Sony, Polycom and Aethra is based on a shorter communication process. According to these suppliers, group dynamics and decisions making sometimes hampers the progress of the implementation of the network. According to Tandberg and Aethra it is in only 5% of the installations that they influence the process to make use of project teams/groups to ensure a successful installation. This is also only done when implementing major networks.

Cross referencing this data to question 7.3.2, Aethra indicated that 80% of their installations are done using project teams. This is not in relation to data obtained in 7.3.5. This raises the question how successful their installations are. If 80% of their installations are completed by means of project teams but individuals implement more successful projects, the question can be raised namely how are they ensuring that installations by means of groups are successful?

Tandberg prefers to be part of a group in order to make use of different skills

simultaneously. Data, telephony, lighting, acoustic and ergonomic designers work together to design and implement a video conferencing network. According to Tandberg the integration of the different skills and knowledge ensure those network specifications will support the objective of the video conferencing network.

Cross referencing this to question 7.3.2, Tandberg indicated that they do not make use of project teams or groups - this is in direct conflict with what they said namely that they work 0% with project teams when implementing video conferencing.

During the literature study (see identified elements in 4.5.7.2), it became clear that the integration of different skills and knowledge when implementing a video conferencing network, is absolutely essential. According to Tandberg, they influence only 5% of the clients to form and work within project teams. As stated by Sony, Polycom and Aethra working with individuals make their function easier - not necessarily the implementation more efficient. The role and impact of the video conferencing equipment supplier are therefore not to put a managerial strategy or platform in place to ensure a successful implemented network but rather to make the implementation smooth and easy for themselves.

According to the video conferencing equipment suppliers, it is the role and function of the video conferencing network manager to form a project team to incorporate the different skills, knowledge and resources from other people - especially when implementing a major video conferencing network.

**7.3.6** *What percentage of installations do you assist the client with a scientific needs analysis in order to plan for a video conferencing network?*

The purpose of this question was to ascertain the planning process followed by the video conferencing equipment supplier before implementation. The assumption was that a scientific needs' analysis by the equipment supplier will help to design project criteria and objectives.

**TABLE 7.8: ASSISTANCE WITH SCIENTIFIC NEEDS ANALYSIS FOR PLANNING**

SUPPLIER	CODECS	ANSWER IN PERCENTAGE
Sony South Africa	Sony	10%
Questek	Tandberg	20%
ETA Audiovisual	Polycom	0%
MCT Telecommunications	Aethra	5%
<b>AVERAGE</b>		<b>8.75 %</b>

Only 8.75 % of needs analysis are compiled and done on the behalf of the client by the video conferencing equipment suppliers. According to Sony, video conferencing network managers will only come to the video conferencing equipment supplier once the needs' analysis has been completed by the company themselves. The data or future project specifications are then designed around these criteria or need of the video conferencing manager.

It can be argued that the video conferencing network manager needs to be part of the group of people responsible for the defining of the strategic objective of the organisation and the strategic objective of the video conferencing network. Only after this action has been completed will the video conferencing equipment supplier be part of the planning process.

### 7.3.7 *What percentage of installations is a quality specialist part of the project team?*

The purpose of this question was to define additional role players that can help to add specific skills to the implementation process. The responsibility to implement a video conferencing network is based on international equipment standards as well as standards for video, data transmission and audio, e.g. specific decibels. Technical installation standards are also defined, e.g. that data and power cables are not installed in the same channelling. The assumption was that a specific person needs to ensure that the defined minimum standards are implemented and adhered to - that needs to be evaluated and tested with one of the main role players in the implementation process namely the video conferencing equipment supplier.

**TABLE 7.9: EQUIPMENT SUPPLIER'S INVOLVEMENT IN PROJECT TEAMS**

SUPPLIER	CODECS	ANSWER IN PERCENTAGE
Sony South Africa	Sony	0%
Questek	Tandberg	2%
ETA Audiovisual	Polycom	0%
MCT Telecommunications	Aethra	5%
<b>AVERAGE</b>		<b>1.75 %</b>

Aethra makes use of the cross-departmental planning and incorporation of skills from different sectors and departments to maintain quality. A defined quality specialist with the main task to oversee just this one function, is limited. Quality is maintained by several people - all experts in their field of experience, e.g. telephony or data specialists will oversee the installation of the ISDN lines and NT boxes. It can be argued that quality and the maintaining of specific standards are not a priority with video conferencing equipment suppliers. If not working in project teams where several expert skills are incorporate, maintaining quality standards are the sole and main responsibility of the video conferencing network manager.

It can therefore be argued that from the video conferencing equipment supplier's point of view, the requirement to work with an expert to maintain quality standards is not a necessity. This role and function are handled by the experts in their different fields of expertise. This question is also a cross reference to question 7.3.8 namely the importance of quality manuals.

**7.3.8** *What percentage of installations are clients provided with a manual stating the minimum specifications and standards for installations?*

This question is a cross reference to 7.3.7 namely the role of the quality specialist in the project team. As seen in 7.3.7, the importance of the quality specialist is not relevant for the video conferencing equipment supplier. The role of the video conferencing network manager is to design, develop and maintain minimum standards to operate the video conferencing network in. In order to ensure that this is done, these standards need to be defined in a quality manual according to the video conferencing network managers in several Australian video conferencing networks.

During a research visit in 1992 to the University of Melbourne, the researcher obtained

a quality manual with minimum installation specifications. These specifications are important to define how a video conferencing network will be implemented. All areas, e.g. lighting, sound, multimedia integration, marketing, corporate branding, furniture design etc. were defined. The importance and availability of such a quality manual need to be determined within the South African framework of network design and implementation. These is an area that requires further research to ensure that scientific specifications are available.

**TABLE 7.10: QUALITY MANUAL AND INSTALLATION STANDARDS**

SUPPLIER	CODECS	ANSWER IN PERCENTAGE
Sony South Africa	Sony	0%
Questek	Tandberg	0%
ETA Audiovisual	Polycom	0%
MCT Telecommunications	Aethra	0%
<b>AVERAGE</b>		<b>0%</b>

Video conferencing network managers do not compile any documentation on the minimum implementation standards required. According to Aethra, 40% of the major projects and 5% of the smaller projects where official tender procedures are used, installation standards are defined as guidelines or terms of conditions of a tender procedure.

According to Tandberg, a control sheet or evaluation form is used to ensure that all video conferencing standards from their own point of view is adhered to. The chronological installation of a network is defined in this control form. Installation expectations, rather than standards are defined, how training should be handled, when the client needs a following up visit and also input from the head office in Norway. Only after the client has signed this release form, will an invoice to the client be issued.

This is a positive control measurement tool to put specific control actions and measurements in place. Unfortunately it does not help to define the minimum standards that need to be in place to ensure a successful implemented network. It can be argued that the role of the video conferencing network manager needs to be developed to ensure that they are capable to design, develop and implement such a document.

7.3.9 *What percentage of installations include a Service Level Agreement (SLA) and does it enhance the success of their video conferencing networks?*

The purpose of this question was to ascertain the involvement of the video conferencing equipment supplier after the installation of hardware has been completed. Video conferencing equipment suppliers do have a role to play in the maintenance and support after installation. To what degree this involvement is, is uncertain.

**TABLE 7.11: MAINTENANCE (SLA) OF VIDEO CONFERENCING NETWORKS**

SUPPLIER	CODECS	SLA's	INCREASED SUCCESS RATE
Sony South Africa	Sony	15%	No
Questek	Tandberg	100%	Yes
ETA Audiovisual	Polycom	5%	Yes
MCT Telecommunications	Aethra	10%	Yes
<b>AVERAGE</b>		<b>32.5 %</b>	<b>-</b>

Only 32.5 % of SLA's are included in the implementation of a video conferencing network. Seventy five percent of the suppliers indicate the importance of such a SLA namely that it influences the success rate of the implementation.

- The importance of an SLA is explained by Tandberg - no equipment is delivered without an SLA. This entitles the video conferencing network manager to free upgrades of software and corrections in faulty software that is not part of the one year guarantee on equipment. This SLA can be renewed after one year and is optional after the first year's after implementation.
- Sony provides SLA's as an additional support mechanism in Europe but not in South Africa. Polycom is not dependent on SLA's as it only enhances the success "to a degree".
- Aethra provides only the major installations with SLA's and the smaller networks are maintained by the video conferencing network manager.

It can be argued that the provision of an SLA does help the video conferencing equipment supplier to be involved in the maintenance of the network after

implementation of hardware. In order to adhere to the contractual agreement stipulated in this contract, the video conferencing equipment supplier needs to be involved to fulfill the obligations in this contract.

7.3.10 *What percentage of installations apply managerial tools, e.g. Gantt charts, project proposals and plans to document the planning of the implementation of the proposed video conferencing network?*

**TABLE 7.12: MANAGERIAL TOOLS FOR VIDEO CONFERENCING PLANNING**

SUPPLIER	CODECS	ANSWER IN PERCENTAGE
Sony South Africa	Sony	0%
Questek	Tandberg	2%
ETA Audiovisual	Polycom	0%
MCT Telecommunications	Aethra	0%
<b>AVERAGE</b>		<b>0.5 %</b>

The purpose of this question is to measure whether video conferencing managers do put their planning actions on paper by means of, e.g. project plans. Project plans are managerial tools to measure specific milestones, e.g. things that need to be completed on specific time schedules, with specific allocated budgets and by specific people or groups. According to the video conferencing equipment suppliers, it is the role of the video conferencing network manager to apply these tools. If a project plan is created, the video conferencing network managers see these as confidential information and do not share this with the video conferencing equipment suppliers.

It can be argued that although the video conferencing network managers obtain installation and implementation information from the video conferencing equipment suppliers, they do not see the importance to appoint these suppliers as shareholders in their implementation and running of their video conferencing networks.

7.3.11 *What percentage of installations (before and after) do you provide the client with flow diagrams on where and how the final installation was completed?*

The purpose of this question was to ascertain the involvement of video conferencing equipment suppliers after the completion of the installation. This is also an indication of their future commitment to ensure that the implemented network is on standard. Existing flow diagrams are support mechanisms applied by the video conferencing network manager to solve problems and expand future applications.

The purpose of a flow diagram is essential, especially in the planning phases, as it helps to understand the complexity of the installation. Mistakes and installation problems are identified before the installation and therefore save time and budgets.

**TABLE 7.13: FLOW DIAGRAMS FOR DOCUMENTATION OF INSTALLATION**

<b>SUPPLIER</b>	<b>CODECS</b>	<b>ANSWER IN PERCENTAGE</b>
Sony South Africa	Sony	0%
Questek	Tandberg	5%
ETA Audiovisual	Polycom	0%
MCT Telecommunications	Aethra	0%
<b>AVERAGE</b>		<b>1.25 %</b>

Tandberg provides this services only on major installations. No records are kept of where the cables run, e.g. data, ISDN, video or audio cables. Further more this is only completed on request of the client when an upgrade strategy is defined, e.g. the implementation of a second phase.

According to Sony, Polycom and Aethra no or limited attention is given to quality and the maintenance of documented standards because installations need to be completed as fast as possible. As these are not defined there is any reason to maintain or adhere to these standards.

It can be argued that in-depth planning by means of these tools can be improved. During the implementation of the video conferencing network by the researcher, the Polycom supplier did provide flow diagrams to ensure that all equipment was included and that a logical flow of cabling was done in the network. According to the product manager of Polycom, no flow diagrams are provided to clients. This is in direct conflict

with what happened during an installation.

7.3.12 *What control measures are applied to ensure that the installation is done according to set standards, time frames and budgets?*

- Sony provides the video conferencing network manager with a document that needs to be signed by the client that the implementation was done to the satisfaction of the client. As seen in question 7.3.8, no standards from the client were identified. It is difficult to say that the document provided by Sony will enhance the quality of the installation as these control measures were not identified before the implementation of the network. It can be argued that this control form is not a control measure but rather a document to sign off the installation to cover the video conferencing equipment supplier from any future problems and commitments.
- Tandberg does not have any control measures that are used before, during or after implementation. According to Tandberg the fact that the “installation was completed and that the ISDN lines work” is enough indication that the implementation was successful. In question 7.3.8 Tandberg did have a form that needs to be completed after installation. Again as with Sony, this is just a tool to measure the satisfaction of the client and not to monitor the standards, budgets or time frames of the video conferencing network that needs to be implemented.
- Polycom does not even have a client satisfactory document to sign off the project. Control measures in 7.3.8 have never been applied or implemented from themselves or from video conferencing network managers that they do business with.
- Aethra makes use of an installation checklist. This checklist is a time frame planner that provides all role players with an indication when what needs to happen. Implementing this checklist, training is essential and is part of the process before starting with the implementation and also afterwards to manage the network. As seen in 7.3.8, cross-departmental management of different task teams are used and applied to ensure that the specialists are available as a control measurement. Being on time with the implementation schedule, helps to limit unnecessary and unplanned implementation costs.

Video conferencing suppliers are not committed to standards. All control measures put

in place by them are mainly documents to ensure that clients sign the installation off to prevent future conflict situations if something in the network goes wrong. From the point of view of the video conferencing equipment supplier it measures the customer's satisfaction. No control measures are applied by video conferencing equipment suppliers or enforced by video conferencing network managers.

7.3.13 *Is it the supplier's responsibility to make sure that the video conferencing network manager knows how to manage the newly implemented video conferencing network?*

**TABLE 7.14: MANAGEMENT OF VIDEO CONFERENCING NETWORK**

SUPPLIER	CODECS	ANSWER: YES OR NO
Sony South Africa	Sony	Yes
Questek	Tandberg	No
ETA Audiovisual	Polycom	Yes
MCT Telecommunications	Aethra	Yes

- According to Sony, as video conferencing equipment supplier they can only provide guidelines on how to manage this newly implemented network. The skills and knowledge need to be developed and obtained by the managers themselves.
- Tandberg's role ends with the implementation of the hardware. According to them their role does not include the managerial side of a video conferencing network. As seen with the inclusion of an SLA, Tandberg will be involved in the technical maintenance of the network but not in the managerial side thereof.
- Polycom is of the point of view that the management of the video conferencing is part of the initial training process. The long term management is the user and video conferencing manager's responsibility.
- Aethra handles this during the implementation phase by means of a training session. This training includes first level support, knowledge in the technical maintenance and uses (dial up and troubleshooting) as well as video conferencing etiquette. The management of the network, e.g. financial planning, how to calculate dial-up costs, etc. is not included in this training.

The role of the video conferencing equipment supplier can be summarised by saying

that there is a clear distinction between the technical responsibility and their responsibility to ensure that video conferencing network managers are able to manage the new implemented network. As long as these managers can handle the network technically correct, the equipment supplier has fulfilled its role. The management of a video conferencing network entails more than just effective technical handling. Financial planning and management, long term strategic planning, e.g. the upgrade and replacement of technology and training of users to apply this network in their daily activities etc. is not handled and should be part of the implementation phase.

#### 7.3.14 *What makes a newly implemented video conferencing network, a successful network?*

The following according to the equipment suppliers, makes a video conferencing network successful if:

- the network as a whole functions including, e.g. the lines from Telkom and other partners in the network and not just the video conferencing equipment implemented of the equipment supplier.
- the designed and implemented network are user friendly and easy to use by the users.
- the video conferencing network and integrated multimedia is reliable.
- there is commitment from the managerial team as well as users to ensure that everything is working and operational.
- the customer from a previous implemented video conferencing network returns to the same equipment supplier, it means that the previous implemented network worked and adheres to previous specifications.
- training was completed.
- the client's expectations are met.
- the implemented network does what was intended, e.g. saving costs on unnecessary travel around the globe.

## 7.4 CONCLUSION

The role players identified for the implementation of a video conferencing network were senior, middle, lower and project managers. The identified project team also included the video conferencing equipment supplier. During the structured interviews, it became clear that the video conferencing equipment suppliers do not see themselves being part of the whole implementation process as defined by the researcher or even part of the official project team.

The researcher defined implementation process as a continuous cycle namely that after the installation of the hardware and evaluation of the video conferencing network, the achievement of the strategic objectives is revisited and revised if necessary. After the implementation process has been completed, the whole process of implementing, maintaining and upgrading of the video conferencing network will be part of this continuous cycle or process.

The researcher identified the video conferencing equipment supplier as one of the main role players in the design and development of the video conferencing network. According to the video conferencing equipment suppliers, constructing a needs' analysis and understanding the strategic objectives of the organisation are not essential to plan a video conferencing network. According to the video conferencing equipment suppliers, the defined project criteria, as concluded by the video conferencing network manager, are enough to design and implement a video conferencing network.

The video conferencing equipment suppliers clearly stated that their involvement in the management or training to manage a video conferencing network, is not their responsibility. The drafting of a managerial or business plan or even project plans to implement this network, are the responsibilities of the video conferencing network manager. Acquiring these skills are therefore the responsibilities of the video conferencing network manager.

Training provided by the video conferencing equipment suppliers focuses on the technical know-how in operating the hardware. Training does not include any managerial or financial strategies, dial up calculations, exchange rate conversions or time difference calculations to manage and plan different connections. Future

replacement or upgrade of technology is not discussed - excluding themselves from any future business opportunities.

Defining control measures and implementation standards, drafting flow diagrams during the planning phases to ensure that all equipment is included as requested by the video conferencing network manager, appointing a quality specialist and also constructing a way to test the implemented network, is mainly the responsibility of the video conferencing network manager. The final technical testing of the implemented hardware is not defined by the video conferencing network managers or equipment suppliers. Mistakes made during the planning process will therefore not be known until late after the installation process - this could mean that the guarantee periods have lapsed and mistakes only rectified at a costly price.

The involvement of the equipment supplier after the installation by means of an SLA to support the video conferencing network manager, is also limited to only 32.5 % of the total implemented networks. By not signing an SLA with the video conferencing network manager, the video conferencing equipment supplier excludes them from future business opportunities. Being part of this network as one of the main role players, SLA's helps to understand the business of the video conferencing network manager to ensure that a relevant and realtime business solution is maintained and upgraded as strategic and operational objectives of the video conferencing network change.

The researcher made the assumption that project teams will ensure that experts can work cross-departmental levels to ensure that different role players are involved and that skills are shared to support the objectives of the project namely the implementation of the video conferencing network. From the data obtained, 75% of the equipment suppliers preferred to work with individuals. Their motivation lies in the ease of installation for them and not necessarily to improve the standard of installations.

Critical success factors (CSF) identified by the video conferencing equipment suppliers are limited to a view essentials. This CSFs are based on customer satisfaction and whether the implemented hardware and ISDN lines work. Implementing cutting edge technology requires more than just what the video conferencing equipment supplier thinks the video conferencing network manager wants. Project and installation standards need to be defined before starting with the implementation process. The defined quality and implementation standards are agreed between the video

conferencing network manager and equipment suppliers are supposed to be the CFS's to evaluate the installation.

Video conferencing implementation as a holistic approach is not shared and defined by the different role players as the same process. Different view points from the video conferencing equipment suppliers and the researcher is clearly illustrated. According to the video conferencing equipment supplier, their role ends after the installation of the hardware. Additional research is required to ascertain the point of view of the video conferencing network manager on this point.

## CHAPTER 8

### DISCUSSION AND RECOMMENDATIONS

*“To be considered effective, a chosen strategy must be implemented successfully. The ability to translate the strategic plan into actions and generate positive outcomes can itself be a source of competitive advantage.” (Smith et al, 2000)*

#### 8.1 INTRODUCTION

The focus of this research was to answer the main research question namely what constitutes an effective managerial strategy for video conferencing implementation. In order to answer this question the following research sub-questions first had to be answered:

- *What is video conferencing and what constitutes a video conferencing network?* In chapter 3, the complexity of a video conferencing network was underlined by the importance of cross-departmental functioning, required equipment and infrastructure. Different skills are required to ensure that all functions are included and that quality of services is achieved on all levels. The different skills identified were the skills of experts in the fields of data, telephony, audiovisual, ergonomic, acoustic, lighting and furniture design.

In order to understand what constitutes a video conferencing network, the integration of video conferencing equipment, e.g. codecs, computer and multimedia equipment was discussed in detail. Communication infrastructures, e.g. ISDN and IP were also defined in order to describe the video conferencing enterprise (figure 3.3) or environment.

- *What is video conferencing management?* The literature study in chapter 43 identified that video conferencing management involved four managerial functions (planning, organising, activation or motivation and control) and six managerial duties. These were applied within a Total Quality Management framework that also included System, Operations, Process and Project Management managerial

strategies. As seen in the literature study (chapter 4), management is about putting the four managerial functions in action in order to achieve objectives.

- *What constitutes an effective process for video conferencing implementation?* After concluding what video conferencing management is (chapter 4), the five managerial strategies were applied in order to investigate what managerial processes and procedures were required to implement and manage video conferencing technology optimally. A concept managerial strategy (figure 5.4) was formulated. This concept managerial strategy for video conferencing implementation was tested (see chapter 6) with video conferencing network managers by means of questionnaires and (with video conferencing equipment suppliers by means of structured interviews (see chapter 7).

The concept managerial strategy consists of 26 elements (represented as 26 independent variables) in the statistical procedures used in this study. To determine which factors/elements were significantly associated with eight factors representing successful video conferencing implementation, Stepwise regression was applied as a statistical method to analyse the relationship between the 26 elements and the 8 success factors. Those elements (table 6.1) found to be significantly associated with success will be included in the final strategy for video conferencing implementation.

## **8.2 DISCUSSION**

The statistical analysis of this study was based on various critical success factors being identified that are relevant to video conferencing managers. The eight critical success factors included in the Stepwise regression procedures were:

- Technical support
- Planning support
- Operational support
- Financial feasibility
- Authority structures
- Training strategy
- Marketing strategy
- Strategic support

This section firstly consists of a discussion on how these eight success factors function in relation to the various managerial functions identified. Secondly, for each of these eight success factors the detailed implications are discussed of what it means that certain elements of the proposed strategy are significantly associated with that success factor.

### 8.2.1 THE RELATIONSHIP BETWEEN MANAGERIAL FUNCTIONS AND THE VIDEO CONFERENCING SUCCESS FACTORS IDENTIFIED

In order to conclude a systematic, logical and scientific managerial strategy for video conferencing implementation, the identified critical success factors need to be aligned with the managerial functions, namely planning, organising, motivation and control (table 8.1). As seen from the literature studies, with every critical success factor, all four managerial functions are required to ensure that managerial process is followed through.

**TABLE 8.1: CRITICAL SUCCESS FACTORS AND MANAGERIAL FUNCTIONS FOR A VIDEO CONFERENCING IMPLEMENTATION STRATEGY**

CRITICAL SUCCESS FACTOR/S	MANAGERIAL FUNCTION/S	DESCRIPTION
Technical support	Planning	Planning to ensure that the selected hardware add value and support the defined objects, are important. The following must be included in the planning of the implementation of a video conferencing network: <ul style="list-style-type: none"> <li>to develop support and maintenance skills for technical and operational staff to support the defined operational plan;</li> <li>time frame planning namely the duration of the installation (defining definite starting and ending times); and</li> <li>development of leader skills.</li> </ul>
	Organising	Appointment of people to ensure that quality technical support is possible.
	Activation	Appointment of people and allocation of resources to design and develop and manage a maintenance strategy to ensure that minimum quality standards are achieved.
	Control	The appointment of quality specialists, signing of SLA contracts with the aim to support specific and critical areas of risk. The formulation of minimum standards by documenting quality manuals are essential.

<b>CRITICAL SUCCESS FACTOR/S</b>	<b>MANAGERIAL FUNCTION/S</b>	<b>DESCRIPTION</b>
<b>Planning support</b>	Planning	Before starting on the design and development of a new video conferencing network, a clear understanding of what is required (the need) must be defined. A needs analysis is required.
	Organising	This can be achieved by the company (if the skills exist) or by appointing companies who specialise in business analyses.
	Activation	Define the areas that will be included in the needs analysis and develop a managerial strategy to manage the SWOT analysis process.
	Control	Define documentation and evaluation criteria to ensure that the needs analysis is done within a specific time frame and that specific information can be obtained from this process.
<b>Operational support</b>	Planning	Defining the operational and quality management plan is essential. This include planning for the appointment of people and allocation of resources. Operational support includes the following: <ul style="list-style-type: none"> <li>• Administrative plan</li> <li>• Financial plan</li> <li>• Marketing plan</li> <li>• Maintenance plan</li> <li>• Change management plan</li> <li>• Rules, regulations and policies</li> <li>• Documentation of processes/procedures (business alignment)</li> </ul>
	Organising	The appointment of people and allocation of resources to ensure that the operational support strategy can be sustained.
	Activation	This is a continuous process of assessing the people with regard to skills required to achieve specific objectives. If the required skills do not exist, a training program needs to be developed to ensure that the overall objective can be achieved.
	Control	The appointment of quality specialist is included in the planning for a supportive operational strategy.
<b>Financial feasibility</b>	Planning	Financial strategies need to be supported by people, sound financial and auditing processes.
	Organising	Appointment of people/department to manage the project funding to ensure that the implementation is according to set budgets.
	Activation	Implementation of strategies to ensure that the financial effectiveness of the implementation is according to what was budgeted for.
	Control	Auditing processes to ensure that financial expenditures are according to set budgets.

CRITICAL SUCCESS FACTOR/S	MANAGERIAL FUNCTION/S	DESCRIPTION
<b>Authority structures</b>	Planning	<p>The appointment of senior, middle and lower management is essential. Project teams or even committees can be appointed to ensure that specific objectives are managed and controlled.</p> <p>Processes and procedures are also required to support these managerial teams, e.g. documentation, meetings, quality standards, project and business plans, etc.</p>
	Organising	<p>Knowing who is responsible to do what is essential. This is not just about task allocation but also to ensure that the communication infrastructures are in place. This is essential as this ensures that the required leadership is identified and problems can be addressed as soon as they arise.</p>
	Activation	<p>The identification of a leader to manage the newly implemented video conferencing network is essential. This person or team must understand the vision/mission and objectives, must be flexible to adapt to changing circumstances and have the perseverance to find solutions for technical and operational problems.</p>
	Control	<p>Progress reports are but one way to ensure that the objectives set out in the project or business plan are achieved according to set quality standards.</p>
<b>Training strategy</b>	Planning	<p>A well-defined training strategy is required to develop the required skills to manage the newly implemented video conferencing network.</p>
	Organising	<p>Appointing/identifying people to do specific task related training (managerial and technical). The development of training material by applying the quality manuals is essential. These two processes need to be aligned with each other.</p>
	Activation	<p>Competence levels of staff is not just having the technical knowledge to maintain the technology but they also need to be motivated to find the best solutions and applications in the newly implemented network, be able to change and adapt to new technology available and also create opportunities for users of these technology.</p>
	Control	<p>Testing and evaluation (assessment) are essential to ensure that minimum standards can be achieved. This can be done by theoretical examinations and even hands-on training sessions.</p>
<b>Marketing strategy</b>	Planning	<p>Planning for the introduction of the newly implemented network is essential. This is also a strategy to support the operational functioning of the network.</p>
	Organising	<p>Appointment of people (in-house or outside company) who will take responsibility for the marketing strategy is essential.</p>

CRITICAL SUCCESS FACTOR/S	MANAGERIAL FUNCTION/S	DESCRIPTION
	Activation	The development of a marketing strategy (allocation of funding and resources) is essential. This needs to be aligned with the implementation and operational strategy to ensure that the overall objectives of the organisation are achieved.
	Control	Client satisfaction is but one way of evaluating the success rate of the implemented network. Other techniques for evaluation need to be planned and included in the marketing strategy.
<b>Strategic support</b>	Planning	Defining a strategic support strategy also includes the formulation of strategic objectives, vision and mission statements as well as strategies required to ensure that the set objectives are achieved.
	Organising	The appointment of people to manage the process and also give required feedback to senior management is essential. As video conferencing is part of the strategic objectives, senior management needs to be informed on the progress and success rate of the implementation.
	Activation	Allocation of resources to support the managerial team is essential. Aligning project plans with progress reports is one way of ensuring that the alignment with strategic objectives are possible.
	Control	In order to analyse the enterprise, a SWOT analysis of the enterprise and objectives is required in order to manage the goals, objectives (long term) and targets (short term).

## 8.2.2 RELATIONSHIP BETWEEN SUCCESS FACTORS AND ELEMENTS OF THE CONCEPT STRATEGY

Management of the various elements includes the four managerial functions namely planning, organising, activation (motivation) and control. Although only the elements and their functionality are listed below it is important to keep in mind that every element will include these four functions to ensure that the managerial cycle is concluded within every element.

8.2.2.1 According to the data obtained from the Stepwise regression, **technical support** is the success factor that is supported the most significantly by the concept strategy. This is a factor that could 'make or break' a newly implemented video conferencing network. There are ten variables that influence the technical support factor. Technical support (dependent variable 31) is supported significantly by the independent variables in the following regression equation:

$$0.04(V1) + 0.22(V3) + 0.06(V4) + 0.03(V5) + 0.22(V7) + 0.05(V12) + 0.19(V13) + 0.06(V15) + 0.03(V17) + 0.01(V26) + \text{intercept} = 0.95(V31).$$

**TABLE 8.2: ELEMENTS OF CONCEPT STRATEGY CONTRIBUTING SIGNIFICANTLY TO THE TECHNICAL SUPPORT SUCCESS FACTORS**

ELEMENTS OF CONCEPT STRATEGY	VARIABLE	PARTIAL CONTRIBUTION (R <sup>2</sup> ) TO OPTIMUM MODEL
Senior management involvement	V3	0.2241
Pilot projects for testing network	V7	0.2228
Defining of project plan	V13	0.1967
Middle management involvement	V4	0.064
Operations defined into a business plan	V15	0.0622
Quality manuals	V12	0.0461
Strategic formulation	V1	0.046
Maintenance strategy (SLA)	V17	0.0373
Lower management involvement	V5	0.0371
Project starting and ending times	V26	0.0166

It can be argued from the data that the following elements of the proposed video conferencing managerial strategy are important for achieving success with regard to technical support:

- The involvement of all levels of management (senior, middle and lower) is important. In this managerial strategy, the role of the video conferencing supplier (independent variable V6) was excluded by the video conferencing network managers.
- The three most significant elements of the concept strategy include the involvement from senior management (independent variable V3). Senior management stating the vision (independent variable V2) will assist with defining the project plan (independent variable V26). As seen in previous literature, the project plan is the vision of what is required, how to achieve it and with what resources and by whom. Testing the network with a pilot project (independent variable V7) is essential, as seen from the data. This quality measurement will ensure that future problems and differences from the original planning can be rectified. From the literature study, a “top-down” (Sloan, cited in Whittington,

1993:14) and even a “middle-up-down” process (Whittington, 1993:43) were suggested.

From this data it is important to realise the importance of all three managerial levels. These three are interdependent upon each other. It is more a continuous cycle of communication and dependency. Strategic goals (independent variable V2) from senior management are defined into operational strategies (independent variables V12, V15, V17, V22, V23 and V25) by middle management to ensure that lower management can function within set processes, procedures and standards (independent variable V24).

- Middle management (independent variable V4) is responsible for the implementation of operational strategies (independent variable V2, V12, V15, V17, V22, V23 and V25). The involvement of middle management and defining of a business plan (operational strategy) are interlinked and interdependent upon each other. Kroon (1986:116) clearly indicated that middle management is responsible for the development of short term strategic and operational development. The importance here is the alignment (independent variable V24) of the operational and the strategic plans in order to support the overall objects of the organisation.
- According to the literature study, lower management (independent variable V5) is responsible for the executing of activities. Defining the maintenance strategy (independent variables V14 and V17), that includes the use of a Service Level Agreement (SLA), is a clear indication of the importance of maintenance and also who is responsible for the execution thereof. A technology team (Massachusetts Software Council, 2000:online) (independent variables V8 and V21), e.g. can be the responsible group of people on this managerial level.
- Operational planning (independent variables V11, V12, V15, V17, V22, V23 and V25) is extremely important when designing the technical support strategy (variables V1, V3, V4, V5, V7, V12, V13, V15, V17 and V26). From this data, it is clear that the operational planning will include links to the strategic plan (independent variable V1) - this was supported by Hunter *et al*, 1998:49. This will form the basis of what is required (goals and objectives) (independent variable V2) and who will be responsible for execution of the objectives (policies, rules and

regulations) (independent variable V24).

The operational plan is defined in a business plan (independent variable V15) that is linked to quality manuals (independent variable V12) and maintenance strategies (independent variable V17) that include service level agreements. Minimum standards are quantified and defined in these documentation. Operational planning is very important as seen from this data. The researcher expected the formulation of a Technology Plan to be very important but this was disregarded by the video conferencing network managers.

- The formulation of a strategy is quantified in the quality manual (independent variable V12). These manuals ensure that minimum standards for implementation and operation are maintained. By quantifying the minimum standards, e.g. how and what the training strategy should consist of, the overall strategic strategy is documented and implemented. By documenting quality procedures, training documentation can be derived from these information.
- The importance of time management lies within starting and ending times (independent variable V26) of implementation. These are managed with a well-defined project plan (independent variable V13) to ensure that activities happen in a specific sequence with specific resources and people.
- According to the data obtained by means of structured interviews with video conferencing suppliers, there are a well-balanced involvement from senior (22.41%), middle (6.4 %), lower management and project teams (table 7.4). It can be argued that alignment with the overall strategic objectives of the organisation is essential as senior management does not get involved in the operational activities of the organisation. This is supported by the use of 4.6% of the sample that incorporates the strategic objectives.

In order to define the technical support strategy, control and supportive strategies need to be in place. According to video conferencing suppliers, they only get involved in 3.75 % (table 7.5) of projects assisting managers with the formulation of managerial strategies. According to video conferencing managers, project plans (19.67%) and business plans (6.22%) are applied with quality manuals

(4.61%) and SLA (3.73%) to ensure that the maintenance strategy will provide minimum quality standards. According to video conferencing equipment suppliers, they have not received any quality specifications (table 7.10) before or after a newly implemented video conferencing network. Video conferencing equipment suppliers indicated that video conferencing network managers make use of SLAs in 32.5 % of installations.

It can be argued that if the minimum standards defined by the video conferencing managers, were not in place and sustained, the technical support strategy has failed. It is also concluded that video conferencing network managers make use of these SLA contracts in order to manage their risks especially to support design mistakes. Future research will have to include the defining of standards and quality manuals as it is not clear how quality is measured by both parties involved.

8.2.2.2 The **planning process** is supported by the formulation of a strategic strategy (independent variable V1) by means of a holistic managerial approach (independent variable V10) by incorporating various managerial strategies (independent variable V16) to assist with the implementation of change management to align existing strategies (independent variable V24) to ensure that starting and ending times (independent variable V26) are met.

The planning process factors/elements (dependant variable 33) (table 8.3) are supported significantly by the independent variables in the following regression equation:

$$0.04(V1) + 0.04(V10) + 0.20(V16) + 0.03(V24) + 0.53(V26) + \text{intercept} = 0.86(V33).$$

**TABLE 8.3: ELEMENTS OF CONCEPT STRATEGY CONTRIBUTING SIGNIFICANTLY TO THE PLANNING PROCESS SUCCESS FACTORS**

<b>ELEMENTS OF CONCEPT STRATEGY</b>	<b>VARIABLE</b>	<b>PARTIAL CONTRIBUTION (R<sup>2</sup>) TO OPTIMUM MODEL</b>
Project starting and ending times	V26	0.5348
Incorporated managerial strategies	V16	0.207
Holistic planning approach	V10	0.048
Strategic formulation	V1	0.0406
Changing of existing strategies	V24	0.0365

According to the literature studies completed in chapters 3 and 4, video conferencing management is based on various managerial strategies (independent variable V16). The managerial strategies include System, Process, Project, Total Quality Management etc. In applying these different strategies, a holistic planning (independent variable V10) approach can be followed. A holistic managerial approach can only be followed if the total picture is known and understood.

A SWOT analysis (independent variable V9) i.e. a breakdown of the strengths, weaknesses, opportunities and threats was disregarded by the video conferencing network managers. However, according to the video conferencing equipment suppliers, the use of a SWOT analysis is important to determine what is required within the newly planned network. This is essential as it assists with objective identification (4.05%) and ensures that a holistic planning approach (4.80%) is possible.

Managerial strategies (20.70%) can be included to support the objectives by identifying possible problem areas before starting with the implementation. SWOT analysis data also gives a clear indication of existing strategies that is not included or even existing strategies (3.65%) that need to be changed. Change management strategies, e.g. can be included in the final managerial strategy. The involvement of the video conferencing equipment supplier is limited to only 8.75% (table 7.8). It can be argued that the needs analysis is completed by managers in-house or by appointed specialists.

SWOT analysis also gives a clear indication of the urgency of the project. Project starting and expected ending times (53.48%) are identified from the potential users and managers. It can be argued that gaining this type of information from potential users

is essential as they require the network to address specific critical objectives in their own environments. This will assist the video conferencing network manager/team with valuable information on how to constitute the project plan for implementation.

As seen from this data (table 8.4) the importance of applying change management (independent variable V22) techniques is essential as the implementation of a new strategy requires the changing of existing strategies. This will be essential in order to align (independent variable V24) the newly formulated managerial strategy with the existing strategic plan (independent variable V1).

From the data (table 8.4) obtained with Stepwise regression the use of managerial strategies (independent variable V16) form the core to ensure that planning is successful. According to this data, the changing of existing strategies (independent variables V22 and V24) is also essential. In order to apply a holistic planning (independent variable V10) approach, a well-defined strategy (independent variable V1) needs to be formulated. Successful planning as seen in this documentation is essential to ensure that the project starts and ends (independent variable V26) as scheduled.

The identification of a single managerial strategy, e.g. only Process or Project Management, was not important. The formulation of a systematic and logical managerial strategy that will support the managerial functions within a Total Quality Managerial framework, was important. As seen in the literature studies, this was supported by Cleland & King (1975:9-10); Kroon (1986:13 & 56); Stallard & Terry (1984:5-6) and Wilson (1998:159).

From the literature studies, an assessment of existing infrastructures by means of audits was essential to develop and sustain the strategic focus (Seale & Rius-Riu, 2001:online; NCREL, [S.a.]:online and Massachusetts Software Council's, 2000:online). This was required to formulate a vision and mission statement. Data obtained in the questionnaires disregarded the importance of separate vision and mission statements for video conferencing implementation but included the overall strategic objective of the organisation.

**8.2.2.3 Operational support** is essential to ensure that infrastructure and actions are in place to start an action, e.g. the implementation of video conferencing technology. Without

these support strategies overall strategic objectives cannot be achieved.

The following independent variable factors/elements support the operational strategy (dependent variable 29) significantly in the following regression equation:

$$0.05(V17) + 0.02(V18) + 0.13(V20) + 0.64(V23) + \text{intercept} = 0.86(V29).$$

As seen from the data (table 6.5), it can be argued that a marketing strategy (dependent variable V30) is essential. Users can only make use of the network if the existence and availability of the network is known. Supporting the marketing strategy is a well-maintained video conferencing network. Marketing a newly implemented network also implies that the network is stable and will improve the professionalism of the potential user. The maintenance strategy (independent variable V17) is therefore essential to support the services marketed by the marketing strategy.

Operational strategies are supported by the use of managerial tools (independent variable V18), e.g. business (independent variable V15) or project plans (independent variable V26). This documentation gives a clear indication of what objectives need to be achieved, by whom, what allocated resources are required and defined budgets.

Successful operational strategies are based on a continuous communication process to ensure that decisions are made in advance and is based on accurate information (Crosby, 1979:164). Executing the operational strategy, decision-making powers (independent variable V20) are required to ensure that prompt decisions can be made to ensure that objectives are achieved. Authority structures are therefore important in order to act on operational problems and areas where fast decisions are required.

**TABLE 8.4: ELEMENTS OF CONCEPT STRATEGY CONTRIBUTING SIGNIFICANTLY TO THE OPERATIONAL SUPPORT SUCCESS FACTORS**

ELEMENTS OF CONCEPT STRATEGY	VARIABLE	PARTIAL CONTRIBUTION (R <sup>2</sup> ) TO OPTIMUM MODEL
Defining a marketing strategy	V23	0.6413
Granting of decision-making powers (individuals/groups)	V20	0.1394
Maintenance strategy (including the SLA)	V17	0.0578
Managerial tools e.g. Gantt charts/project plans	V18	0.0261

The proposed managerial strategy for video conferencing implementation (figure 5.4), was built around the formulation of various **operational strategies**, e.g. marketing, financial, administrative and quality strategies. The purpose was to achieve holistic planning by including operational strategies, people with relevant skills to ensure quality of service, budgets and time lines.

From the data obtained from video conferencing equipment suppliers, the defining of authority structures (13.94%) is a prerequisite to ensure that these strategies can be executed. There is also a dependency on other strategies, e.g. a well-defined marketing strategy (64.13%) as well as maintenance strategy (5.78%). It can be argued that to manage a video conferencing effectively, the network manager cannot operate in isolation but needs to include other strategies to ensure success. In order to function to its maximum efficiency, even cross-departmental functioning will be required, e.g. contracting the services of a marketing department or agency.

8.2.2.4 Strategic (independent variable V1) and operational strategies require sufficient funding to ensure that they can be maintained. **Financial feasibility** (dependent variable V28) of the newly implemented video conferencing network is therefore essential. Financial management is the responsibility of senior management. Their involvement in the implementation of a video conferencing network is therefore important. Although they are not directly involved in the physical installation, their presence and executive decision-making powers are reflected by the appointment of quality managers (independent variable V11).

The role of the quality manager is important to ensure that the highest standards are achieved and maintained. The quality manager can also consist of a quality committee (independent variable V6) (Valdez, [S.a.]c:online and Hunter et al, 1998:85-86). According to video conferencing network suppliers, it is in only 1.75 % of their installations that organisations appoint quality specialists. The data is not a clear indication of the real picture and will have to be investigated in future research.

In order to achieve the objectives, it is important to adapt (independent variable V24) old processes and procedures in order to ensure that the newly defined objectives are met. This is achieved by applying Process Management (independent variable V16). The four managerial functions of planning, organisation, motivation and control are

interrelated and should be treated and managed together (Slack *et al*, 2001:95) in order to make changes to existing processes and procedures. As seen from the data obtained (table 8.5), financial feasibility requires that existing strategies be changed (independent variable V24). Change management (independent variable V22) in this holistic planning (independent variable V10) and management will therefore be important and need to be researched, namely how this can be incorporated.

The following financial feasibility data (dependent variable 28) (table 6.6) is supported significantly by the independent variables in the following regression equation:

$$0.16(V3) + 0.41(V6) + 0.09(V11) + 0.07(V24) + \text{intercept} = 0.75(V28).$$

**TABLE 8.5: ELEMENTS OF CONCEPT STRATEGY CONTRIBUTING SIGNIFICANTLY TO THE FINANCIAL FEASIBILITY SUCCESS FACTORS**

ELEMENTS OF CONCEPT STRATEGY	VARIABLE	PARTIAL CONTRIBUTION (R <sup>2</sup> ) TO OPTIMUM MODEL
Equipment supplier involvement	V6	0.417
Senior management involvement	V3	0.1669
Appointment of quality managers	V11	0.0914
Changing of existing strategies	V24	0.0766

Managing a video conferencing network requires a re-engineering of existing processes, procedures and ways of doing business. Changing and adaption of existing strategies (7.66%) are essential to ensure that the set objectives are achieved.

It can be argued that financial feasibility is not just control of expenditures and making of a profit. It is also the correct and specific application of technology for the purpose it was intended for, therefore the specific inclusion of senior management and the equipment supplier.

8.2.2.5 Making the right decisions are essential. In order to make the right decisions, **authority structures** (dependent variable 34) need to be in place. It is important to know who is responsible for making the required decision(s). The speed with which a decision is made can also cost and/or save money. Long extended decisions can be the reason for losing an opportunity. Decision-making powers therefore need to be granted and documented as part of the planning process for implementing video conferencing. This

is also supported by Hunter *et al* (1998:83) in their statement that a managerial team is required to manage the implementation process. According to video conferencing equipment suppliers the granting of decision powers to the managerial team or project leader is only found in 10.68 % of the projects they are working on.

Authority structures are also a motivational factor. Knowing who the leaders are (who to turn to when problems arises) will ensure that people stay focussed. The lack of authority structures causes a lack of leadership and ownership - with nobody to take responsibility the implementation of the video conferencing network cannot be on time.

The following authority structure factors/elements (dependent variable 34) (table 8.6) are supported significantly by the independent variables in the following regression equation:

$$0.10(V20) + 0.63(V22) + \text{intercept} = 0.73(V34).$$

**TABLE 8.6: ELEMENTS OF CONCEPT STRATEGY CONTRIBUTING SIGNIFICANTLY TO THE AUTHORITY STRUCTURE SUCCESS FACTORS**

ELEMENTS OF CONCEPT STRATEGY	VARIABLE	PARTIAL CONTRIBUTION (R <sup>2</sup> ) TO OPTIMUM MODEL
Defining a motivational strategy	V22	0.6313
Granting of decision-making powers (individual and groups)	V20	0.1068

8.2.2.6 The **training strategy** (dependent variable 32) is more than just a strategy to ensure that users make use of the newly implemented video conferencing technology. From the Stepwise regression data, additional factors are identified to make training strategy complete. When compiling a training strategy, the business plan (independent variable V15) needs to be consulted. The business plan gives guidelines of who the target market is, what the purpose of the network is (give indication of what kind of training is required) and how extensive the training must be (how many people, how fast and what qualification is required afterwards).

Technical training to support the maintenance strategy (independent variable V17) will

be a requirement. SLA contracts do not include all technical areas. First line troubleshooting is normally the responsibility of the client and needs to be included in the training strategy. User training and training to those responsible for evaluation of the network during the pilot phases are essential. The piloting of projects (independent variable V7) is also an opportunity to test the training strategy to ensure that every facet is documented in the training manuals.

Training will also support the marketing strategy (independent variable 23) and vice versa. The marketing strategy can only promote the factors that can add value to the end user. These marketed factors must already be implemented and training available when the need arises.

The following factors/elements are essential to constitute a well-developed training strategy (dependent variable 32) (table 8.7) and are supported significantly by the independent variables in the following regression equation:

$$0.20(V7) + 0.08(V15) + 0.12(V17) + 0.26(V23) + \text{intercept} = 0.66(V32).$$

**TABLE 8.7: ELEMENTS OF CONCEPT STRATEGY CONTRIBUTING SIGNIFICANTLY TO THE TRAINING STRATEGY SUCCESS FACTORS**

ELEMENTS OF CONCEPT STRATEGY	VARIABLE	PARTIAL CONTRIBUTION (R <sup>2</sup> ) TO OPTIMUM MODEL
Defining a marketing strategy	V23	0.2642
Piloting of project for testing the network	V7	0.2003
Maintenance strategy including SLA	V17	0.1205
Operations defined in a business plan	V15	0.0801

According to video conferencing equipment suppliers in 26.42% of the network implementations, the training strategy is aligned with the marketing strategy. It can be argued that this is essential to promote the newly implemented network to potential newly users. If the availability and potential use or applications of the new network are not known, the objectives of the organisation cannot be achieved.

As part of the implementation strategy, a training strategy is used to set and implement minimum standards. It is critical to test the network after installation to ensure that

minimum installation standards were achieved. Evaluation criteria during the pilot phases (20.03%) are also defined in the training strategy. According to video conferencing managers, the involvement of the video conferencing equipment suppliers (32.5%), are critical. From the data obtained from the video conferencing suppliers, they do not get involved in the management of the network, but only in the training with regard to technical factors (table 7.14).

Maintaining minimum standards are essential. The training strategy is therefore also dependent on other operational strategies, e.g. the operational (8.01%) and maintenance (12.05%) strategies. It can be argued that any infrastructure or operational changes, e.g. upgrading of new technology or changes in processes or procedures, will influence the way the users are trained. These changes will therefore influence the training strategy and will require that training manuals be adapted to accommodate the changes.

**8.2.2.7 Marketing** (dependent variable V30 and independent variable 23) is one managerial tool applied by senior management to ensure that a return on the financial investment is possible. According to video conferencing equipment suppliers the involvement of senior management (9.32%) and the defining of incentives (53.11%) were important to conclude the marketing strategy. From the data it can be argued that the support for the newly implemented network from senior management must be promoted to other users. If senior management supports this new venture, it will be seen as trust and that it is included in the overall managerial strategies.

One promotion technique applied by other video conferencing network managers was the use of incentives (independent variable V25) to ensure that users do make use of the network. These incentives were not identified and will have to be researched. From discussions with other video conferencing network managers, savings on budgets, e.g. travel expenditure, were included in the performance evaluation of staff. These incentives include:

- Saving of travel cost and time being on the road (own family and private time);
- Saving of departmental budgets - incentives, e.g. salary increases on performance bonuses are paid at the end of the year to individuals.

The following independent variable elements (table 8.8) are significantly supported by marketing strategies (dependent variable 30) in the following regression equation:

$$0.09(V3) + 0.53(V25) + \text{intercept} = 0.62(V30).$$

**TABLE 8.8: ELEMENTS OF CONCEPT STRATEGY CONTRIBUTING SIGNIFICANTLY TO THE MARKETING STRATEGY SUCCESS FACTORS**

ELEMENTS OF CONCEPT STRATEGY	VARIABLE	PARTIAL CONTRIBUTION (R <sup>2</sup> ) TO OPTIMUM MODEL
Defining of incentives	V25	0.5311
Senior management involvement	V3	0.0932

8.2.2.8 Defining the strategic plan (independent variable V1) is essential to ensure that role players (independent variable V19) know what is involved in the newly defined video conferencing implementation strategy. **Strategic support** (dependent variable V27) for the new video conferencing implementation strategy is essential. In order to ensure that the new strategy is successful, various other factors are required to support the strategy.

The use of project teams (independent variables V6, V8, V19 and V21) is essential to ensure that pilot projects (independent variable V7) are applied to test the new video conferencing network. This will ensure that the implemented network is in accordance with the installation specifications (independent variable V26). Working with project teams also require a well-defined project plan (independent variable 26) and contracts to stipulate contractual (independent variables V12 and V24) requirements, e.g. the starting and ending times of activities. Strategic support (table 6.10) (dependent variable 27) is supported significantly by the independent variables in the following regression equation:

$$0.09(V7) + 0.31(V8) + 0.17(V26) + \text{intercept} = 0.58(V27).$$

**TABLE 8.9: ELEMENTS OF CONCEPT STRATEGY CONTRIBUTING SIGNIFICANTLY TO THE STRATEGIC SUPPORT SUCCESS FACTORS**

ELEMENTS OF CONCEPT STRATEGY	VARIABLE	PARTIAL CONTRIBUTION (R <sup>2</sup> ) TO OPTIMUM MODEL
Utilisation of project teams	V8	0.3158
Project starting and ending times	V26	0.1745
Piloting of project to test the new network	V7	0.0918

**Strategic support** is not just the inclusion of supportive strategies, e.g. operational and marketing strategies. According to video conferencing equipment suppliers, the inclusion of specialists (31.58%) to ensure that project specifications are identified and implemented in order to ensure quality control, is critical. The appointment and organising of a managerial team and project leader by senior management are critical before the process for video conferencing implementation can commence.

As seen from the data obtained, there is a close cooperation among senior and middle management in the formulation of strategic objectives. The traditional “top-down” approach as described by Whittington (1993:43) is not relevant in this case but rather an interdependency of all managerial levels that include senior, middle and lower management. Specialists and committees are also included.

### 8.3 RECOMMENDATIONS

The proposed managerial strategy for video conferencing implementation (figure 5.4) needs to be adapted to ensure that a holistic planning approach is included in the strategy. It is also essential that this strategy is not rigid but flexible. The following changes to the concept managerial strategy are proposed (figure 8.1):

#### 8.3.1 MAIN RECOMMENDATION

The final video conferencing implementation strategy should be structured along the lines of the representation in figure 8.1. The representation also illustrates that the strategy consists of a continuous cycle of interrelationships among different levels of management (senior, middle and lower management) as well as project teams. The newly implemented video conferencing network is an integration with existing strategies and managerial functions. Change management is included to align the old managerial

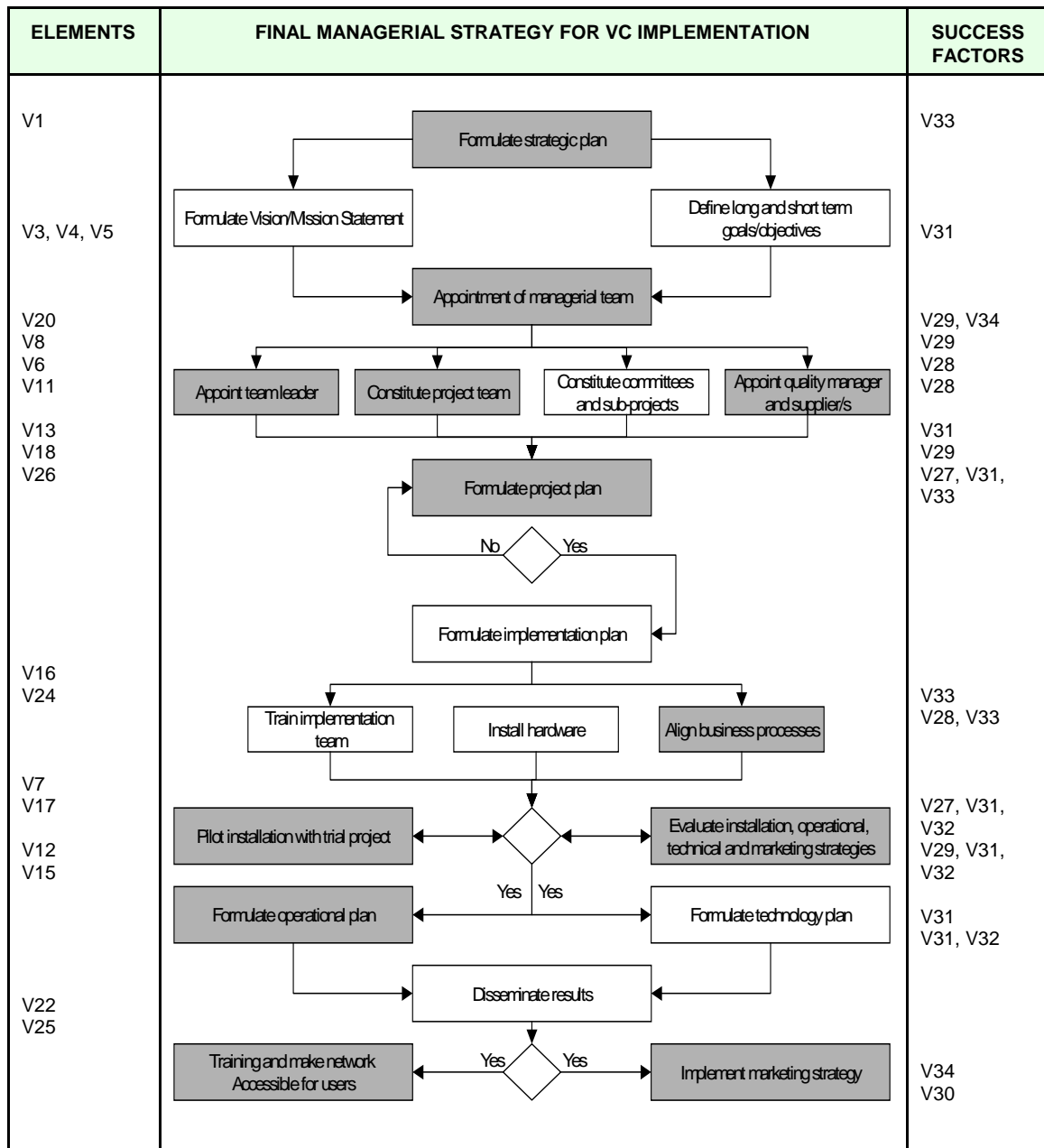
strategies, policies, rules and regulations with the newly implemented network.

The significant elements in figure 8.1 are shaded. Each success factor (table 6.1) significantly associated with the element/s in the concept strategy for video conferencing implementation were shaded.

### 8.3.2 OTHER RECOMMENDATIONS

- The implementation of video conferencing should not be a rigid process of following a checklist approach but rather a *continuous process with interrelationships* with other departments, people and strategies.
- A *pilot project* to test the implementation strategy before a project plan is defined, needs to be conducted.
- The use of a *trial project* to test the implemented network, needs to be included at the end of the project.
- *Control measures* should be documented to ensure that assessment criteria for installations, training, implementation, marketing, etc, are in place. This is not a confidential document and should be communicated to the video conferencing equipment supplier.
- Implementation of technology is based on the set objectives and what needs to be achieved. In order to ensure that the set objectives are achieved a *continuous process of evaluation and approval* is required in order to take corrective action. This will be included in the new strategy.
- Project teams implementing the video conferencing network should not necessarily be the managerial team of the network. At the end of the implementation process, an official *completion, update and handover* of the implemented network to the managerial team is required. This will be included in the new managerial strategy for video conferencing implementation.

**FIGURE 8.1: FINAL MANAGERIAL STRATEGY FOR VIDEO CONFERENCING (VC) IMPLEMENTATION**



### SUCCESS FACTORS

V27 = Strategic support  
 V28 = Financial feasibility  
 V29 = Operational support  
 V30 = Marketing support

V31 = Technical support  
 V32 = Training strategy  
 V33 = Planning support  
 V34 = Authority structures

It is recommended that the final managerial strategy should function as follows:

- First, the strategic objective and plan are formulated.

- A SWOT analysis is applied next in order to evaluate what was formulated in the strategic plan. The strengths, weaknesses, opportunities and threats are analysed and the strategic plan adapted in order to accommodate these findings.
- The general approval from senior management is required before the planning for implementation can commence. Approval of the strategic objective is concluded in a vision and mission statement.
- This vision and mission statement guide the management team to appoint the project team that will ensure that the strategic objectives are achieved.
- Before the project plan is defined, the implementation should be tested using smaller pilot project in order to test the implementation strategy.
- A pilot project should be conducted to assist the management team to draw up operational and final implementation strategies. Project details, especially the implementation of smaller tasks cross departments, should be included in a project plan.
- The operational, implementation and project plans define the standards and business process. The compiling of quality manuals that include the maintenance strategy, training, business rules and regulations, etc. are essential in order to have evaluation criteria to measure minimum standards during the implementation process.
- Implementation of the hardware should be followed with the alignment of existing business processes. Existing training strategies need to incorporate training in the use, management and maintenance of the video conferencing network.
- An evaluation according to the set criteria is essential, and approval from the project and management teams is required before the implementation process can be finalised.

- The preliminary approved implementation process must be tested with a trial or pilot project to ensure that all factors (training strategy, equipment, lines, lighting, acoustics, etc.) are according to project specifications.
- Final training of the managerial team (middle and lower management) needs to take place to ensure that they understand the new network. The participation of the video conferencing equipment supplier is essential.
- The dissemination of the implemented network to senior management is essential even if the implementation was not successful.
- The project team needs to dissolve and officially hand over the project to the new management team. This will include the final concluded documentation, e.g. training manuals, equipment and installation flow diagrams, guarantee documentation, signed SLA's, and identified problem areas in the form of an acceptance letter.
- The implemented video conferencing network should apply the aligned managerial strategies, e.g. a marketing strategy and scheduling strategy, to ensure that the network is used by the identified users within the organisation and even external users - depending on the original and set objectives.

#### **8.4 FUTURE RESEARCH**

The following issues as indicated in this research, will require further research:

- 8.4.1 Vision and mission statements for video conferencing implementation were found not to be significantly associated with what video conferencing network managers perceived as success. Other ways of defining objectives need to be investigated.
- 8.4.2 Factors and incentives that could motivate video conferencing users to ensure that they do make use of the implemented network need to be investigated.
- 8.4.3 It is not clear whether the maintenance strategy by means of the inclusion of an SLA does influence the success rate of the implemented network. Additional research on

maintenance strategies is required in order to find valid data or to make decisions on this issue.

- 8.4.4 Work study methods could be applied in a more systematic examination of what is required in order to increase the effectiveness of the implemented network. This could result in a more task orientated and detailed planned network. This could also assist with more effective time planning, resource allocation and budget expenditure.
- 8.4.5 Change management strategies and techniques could be applied to adapt existing strategies within a video conferencing management strategy. To ensure financial feasibility, existing strategies should be adapted. Further research is required on what/how it is to be implemented.
- 8.4.6 The identified managerial process for video conferencing is specifically designed to support the implementation process for video conferencing. Research will be required to test if this strategy will also support other technology implementation processes.

## **8.5 CLOSURE**

The application of the four managerial functions (planning, organising, activation/motivation and control) was done in the defining of a managerial strategy for video conferencing implementation. The formulation of a strategy for video conferencing implementation is not an isolated function. The following points are important:

- Across-departmental functioning
- Continuous communication and feedback processes
- Interdependency of all support and operational strategies
- Inclusion of all levels of management (senior, middle and lower)
- The inclusion of project teams, committees and quality specialists
- The inclusion of the video conferencing network supplier
- Strategic management (goal/objective achievement)

As seen in the literature study and figures 5.4 and 8.1, the implementation of hardware is but one part of the implementation process. Implementation needs to be aligned with the business processes, e.g. the operational strategies. This has an influence on the

way people will get involved in the use and management of this network. Motivating people to make use of this network begins before and during the implementation of the video conferencing network and continuous thereafter.

The communication and authority structure that are put in place will influence the success rate of the network. As seen in the literature studies (chapters 3 and 4) it is essential that the communication structures and marketing strategies are aligned and supportive to each other to ensure that potential video conferencing users know what will be expected from them in the future. It can be argued that these strategies need to be aligned with operational strategies in order to ensure that change is managed.

Video conferencing implementation needs to be completed according to a set strategy (long term plan) with close cooperation between senior and middle management and the inclusion of a project team in order to function across departments and to include these different people and skills to ensure that the set objectives from the strategic plan are achieved by means of operational and implementation strategies. This needs to be achieved within specific project criteria, budgets and time frames.

Video conferencing implementation is a continuous cycle of communication, defining of structures and standards. It is further a continuous alignment with existing processes and procedures, authority structures, project implementation, project plans, etc. Video conferencing implementation strategy is based on all managerial strategies, e.g. System, Operation, Process and Project Management to ensure that holistic planning is achieved in a Total Quality Management framework.

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## ABBREVIATIONS

Full definitions and descriptions are explained in the Glossary (page 194).

<b>ABBREVIATION</b>	<b>DESCRIPTION</b>
<b>ATM</b>	Asynchronous Transmission Mode
<b>ADSL</b>	Asymmetric Digital Subscriber Line
<b>CAD</b>	Computer Aided Design
<b>CPU</b>	Central Processing Units
<b>cd</b>	Compact disc
<b>DVD</b>	Digital Versatile Disc(DV-player)
<b>e.g.</b>	For example
<b><i>et al</i></b> (and others)	After the first author when there are more than three authors
<b>FTF</b>	Face-to-face
<b>ICT</b>	Information and Communication Technology
<b>i.e.</b>	That is
<b>IP</b>	Internet Protocol
<b>ISDN</b>	Integrated Digital Systems Network
<b>LAN</b>	Local Area Network
<b>LCD</b>	Liquid Crystal Display (LCD panels)
<b>PABX (POTS)</b>	Plain Old Telephone Service
<b>PC</b>	Personal computer
<b>PIP</b>	Picture-in-Picture
<b>S.a.</b>	No date indicated in reference or source
<b>S.I</b>	No place of publication indicated in the source
<b>s.n.</b>	No publisher indicated in the source
<b>SWOT</b>	Strong, Weak, Opportunities and Threats
<b>TUT</b>	Tshwane University of Technology
<b>TQM</b>	Total Quality Management
<b>VGA</b>	Video Graphics Array
<b>WAN</b>	Wide Area Network

# GLOSSARY

For effective use of this glossary, take note of the following:

1. Words and concepts are in alphabetical order.
2. Words printed in [blue](#), cross reference to another word in the same glossary.
3. Words has the same meaning even used with different tenses, e.g. past, present and future as well as plurals and diminutives.
4. Words underlined together, must be read/understand one concept, e.g. [video conferencing](#).
5. Definitions are linked to the glossary and are available on CD-ROM attached to the study. All underlined expressions, definitions or descriptions on the CD-ROM are linked to the glossary for a better understanding of their meaning. It can be accessed by 'double clicking' on the underlined concept and it will automatically linked it to description in the glossary. This is valid for cross referencing in the glossary and also from the five chapters in the thesis to the glossary.

## WORD or CONCEPT

## DESCRIPTION or DEFINITION

### ABSTRACT

To isolate a particular [feature](#) or [quality](#) of something and ignore, for the time begin, its other [features](#) or qualities. (Craig *et al*, 1994:1)

A short [summary](#) of an academic article or text. (Craig *et al*, 1994:1)

### ACCURATE/ACCURACY

The extent to which an [evaluation](#) is truthful or [valid](#) in what it says about a program, project, or material. (Directorate for Education and Human Resources, 2002:online)

### ACHIEVEMENT

Performance as [determined](#) by some type of [assessment](#) or testing. (Directorate for Education and Human Resources, 2002:online)

### AGENDA

A list of items of business, arranged in the order in which they will be dealt with at a meeting. (Odendaal, 1984:196)

### ALGORITHM

A step-by-step problem-solving [procedure](#). Transmission of [compressed video](#) over a [communications network](#) requires sophisticated compression algorithms. Some [video conferencing systems](#) offer both [proprietary](#) and [standard compression algorithms](#). (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)

### ALLOCATE/ALLOCATION

The percentage of a resource's capacity designated for a specific assignment (Microsoft Project Management, Training tutorial, Compact Disc [cd]).

<b>ANALOG SIGNALS</b>	Audio/video signals currently used in broadcasting where the signal is represented by variable measurable physical quantities (such as voltage). Current TV and radio signals are analog, as are many telephone lines in contrast with <a href="#">digital</a> . (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)
<b>ANALYSE/ANALYSIS</b>	To take apart or break down the whole into its <a href="#">component</a> part. (Craig <i>et al</i> , 1994:6)
<b>ANONYMITY</b> (provision for)	Evaluator action to ensure that the identity of <a href="#">subjects</a> cannot be ascertained during the course of a study, in study reports, or in any other way. (Directorate for Education and Human Resources, 2002:online)  See also: <a href="#">Subject/s</a>
<b>APPROACH</b>	The way that people think about or regard something, the way they behave. (Craig <i>et al</i> , 1994:9)
<b>ASSESS OR ASSESSMENT</b>	To make a <a href="#">decision</a> about something, to <a href="#">examine</a> or test the performance of individuals. (Craig <i>et al</i> , 1994:13)  To <a href="#">evaluate</a> or judge on the basis of criteria such as correctness, <a href="#">validity</a> and <a href="#">empirical evidence</a> . (Craig <i>et al</i> , 1994:13)  Often used as a synonym for <a href="#">evaluation</a> . The term is sometimes recommended for restriction to <a href="#">processes</a> that are <a href="#">focussed</a> on <a href="#">quantitative</a> and/or testing <a href="#">approaches</a> . (Directorate for Education and Human Resources, 2002:online)  See also: <a href="#">Evaluate or evaluation</a> See also: <a href="#">Impact evaluation</a> See also: <a href="#">Implementation evaluation</a> See also: <a href="#">Formative evaluation</a> See also: <a href="#">Mixed method evaluation</a> See also: <a href="#">Performance evaluation</a> See also: <a href="#">Planning evaluation</a> See also: <a href="#">Qualitative evaluation</a> See also: <a href="#">Quantitative evaluation</a> See also: <a href="#">Summative evaluation</a> See also: <a href="#">Triangulation</a>
<b>ASSUMPTION</b>	To accept something as <a href="#">fact</a> , even in the absence of <a href="#">proof</a> , and to proceed from that basis. (Craig <i>et al</i> , 1994:14)  An implicit or explicit basis from which we proceed. (Craig <i>et al</i> , 1994:14)
<b>ATM</b>	Asynchronous Transfer Mode. A specification from the <a href="#">ISDN</a> standards for providing cell-relay services; a high- <a href="#">bandwidth networking</a> standard. (Atlas Informationbase Glossary, 2002:online)
<b>ATTITUDE</b>	A person's mental set toward another person, thing, or state (Directorate for Education and Human Resources, 2002:online).  A positive or negative disposition towards something or someone, a way of approaching . (Craig <i>et al</i> , 1994:15)

<b>ATTRITION</b>	A reduction in the number of participants during the course of a study. If more participants withdraw from one group than another group, this can introduce <a href="#">bias</a> and threaten the <a href="#">internal validity</a> of the <a href="#">research</a> . (Project Gold - Research Methods Glossary, [S.a.]:online)
<b>AUDIENCE(S)</b>	Consumers of the <a href="#">evaluation</a> ; those who will or should read or hear of the <a href="#">evaluation</a> , either during or at the end of the <a href="#">evaluation process</a> . Includes those persons who will be guided by the <a href="#">evaluation</a> in making <a href="#">decisions</a> and all others who have a stake in the <a href="#">evaluation</a> (see stakeholders). (Directorate for Education and Human Resources, 2002:online)
<b>BACKGROUND</b>	The <a href="#">contextual information</a> that <a href="#">describes</a> the <a href="#">reasons</a> for the project, including its goals, <a href="#">objectives</a> and stakeholders' <a href="#">information</a> needs. (Directorate for Education and Human Resources, 2002:online)
<b>BANDWIDTH</b>	In casual use, the amount of <a href="#">information</a> that can be transmitted in an <a href="#">information</a> channel. High bandwidth Internet access means those web graphics load quickly on Netscape. High bandwidth <a href="#">video conferencing</a> means that the picture and sound will be clear. In computers, the speed at which <a href="#">data</a> can be transmitted on a <a href="#">communications</a> frequency. In telecommunications, the maximum frequency (spectrum) measured in Hertz or cycles per second, between the two <a href="#">limiting</a> frequencies of a channel. (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)
<b>BAR CHART</b>	A bar chart is a way of summarising a set of categorical data. It is often used in exploratory data analysis to illustrate the major features of the distribution of the data in a convenient form. It displays the data using a number of rectangles, of the same width, each of which represents a particular category. The length (and hence area) of each rectangle is proportional to the number of cases in the category it represents, e.g., age groups, religious affiliation. (Easton & McColl, [S.a.]:online)
<b>BAR DIAGRAM</b>	See: <a href="#">Gantt Chart</a>
<b>BASELINE</b>	<a href="#">Facts</a> about the <a href="#">condition</a> or performance of <a href="#">subjects</a> prior to treatment or <a href="#">intervention</a> . (Directorate for Education and Human Resources, 2002:online)
<b>BASIC RATE INTERFACE</b>	See: <a href="#">BRI</a>
<b>BIAS</b>	Any <a href="#">influence</a> that distorts the results of a <a href="#">research</a> study. (Project Gold - Research Methods Glossary, [S.a.]:online)  A consistent alignment with one point of <a href="#">view</a> . (Directorate for Education and Human Resources, 2002:online)
<b>BIT</b>	<b>B</b> inary <b>digi</b> T. The smallest unit of <a href="#">information</a> with 2 possible states. 1 or 0, yes or no, on or off. (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)
<b>BIVARIATE ANALYSIS</b>	Pertaining to two <a href="#">variables</a> only. (Portland State University, [S.a.]:online)
<b>bps</b>	<a href="#">Bits</a> per second (lower case is significant) (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)

<b>Bps or BPS</b>	(8-bit) bytes per second (upper case is significant) (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)
<b>BROADBAND</b>	A high-capacity <a href="#">communication</a> circuit/path/ It usually implies a speed greater than 1.544 <a href="#">Mbps</a> . (Contrast with <a href="#">wideband</a> and <a href="#">narrowband</a> ). (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)
<b>BRI</b>	Basic Rate Interface ( <a href="#">ISDN</a> ) 3 <a href="#">digital signals</a> over a single pair of copper wires: 2 voice (B) channels and 1 signal (D) channel. (E.g. voice and fax on a single pair of wires). (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)  <a href="#">ISDN</a> connection providing (2B+D) two B channels and 1 D channel. (Atlas Informationbase Glossary, 2002:online)
<b>CASE STUDY</b>	A <a href="#">method</a> of <a href="#">data production</a> involving detailed examination of a particular example or instance. (Craig <i>et al</i> , 1994:22)  An intensive, detailed <a href="#">description</a> and <a href="#">analysis</a> of a single project, program, or instructional material in the <a href="#">context</a> of its <a href="#">environment</a> . (Directorate for Education and Human Resources, 2002:online)
<b>CATEGORY</b>	A class or division into which similar things can be grouped according to general, typical or <a href="#">characteristic features</a> . (Craig <i>et al</i> , 1994:23)  To group things in order to <a href="#">compare</a> and contrast. (Craig <i>et al</i> , 1994:23)
<b>CENTRAL TENDENCY</b>	A measure of the typicality of centrality of a set of scores; the three main measures of central tendencies are <a href="#">mean</a> , <a href="#">median</a> and <a href="#">mode</a> . (Project Gold - Research Methods Glossary, [S.a.]:online)
<b>CHARACTER or CHARACTERISTIC</b>	The nature of someone or something, its kind, type or style. (Craig <i>et al</i> , 1994:27)  A broad term for what is a distinctive or typical <a href="#">feature</a> (or an important aspect) or someone or something. (Craig <i>et al</i> , 1994:27)
<b>CHECKLIST APPROACH</b>	Checklists are the principal <a href="#">instruments</a> for practical <a href="#">evaluation</a> , especially for investigating the thoroughness of implementation. (Directorate for Education and Human Resources, 2002:online)
<b>CLASSIFY or CLASSIFICATION</b>	To order, group or arrange a thing or things. (Craig <i>et al</i> , 1994:30)
<b>CODEC</b>	<b>Coder-Decoder.</b> <a href="#">Video conferencing</a> hardware that codes the outgoing video and audio signals and decodes the incoming signals. Prior to transmission, the <a href="#">codec</a> converts <a href="#">analog signals</a> to <a href="#">digital signals</a> and compresses the <a href="#">digital signals</a> . Incoming audio and video must be decompressed and converted from digital back to analogue. (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)  See also: <a href="#">Compressed video</a>
<b>CODING</b>	A <a href="#">procedure</a> for transforming raw <a href="#">data</a> into a standardised format for <a href="#">data analysis purposes</a> . Coding <a href="#">qualitative data</a> involves <a href="#">identifying</a> recurrent words, concepts or <a href="#">themes</a> . In

positivist [research](#), coding involves attaching numerical [values](#) to categories. (Project Gold - Research Methods Glossary, [S.a.]:online)

To translate a given set of [data](#) or items into descriptive or analytic categories to be used for [data](#) labelling and retrieval. (Directorate for Education and Human Resources, 2002:online)

**COLLECTIVE**

A group of people with a common goal. (Craig *et al*, 1994:31)

The opposite of a free enterprise or capitalist system. (Craig *et al*, 1994:14)

**COMMITTEE**

One or more persons, appointed by authority or elected to represent others, who are [collectively](#) accountable for their decisions and/or their recommendations to those who have appointed or elected them. (Odendaal, 1984:198)

**COMMUNICATION**

Communication is a means of making contact. The contact may be between people, organisations or between places. IT is the [process](#) by which the business passes [knowledge](#), [information](#) and even items to others. In this respect communication may take written, oral, visual or physical form. (Whitcomb, 1995:235)

See: [Telecommunication](#)

**COMPARE or COMPARISON**

To [examine](#) one or more things in order to [determine](#) similarities and differences. (Craig *et al*, 1994:34)

To [examine](#) competing [theories](#) or claims in order to [determine](#) their [relative](#) merit. (Craig *et al*, 1994:34)

**COMPONENT/S**

A physically or temporally discrete part of a whole. It is any segment that can be combined with others to make a whole. (Directorate for Education and Human Resources, 2002:online)

**COMPRESSED VIDEO**

When the vast amount of [information](#) in a normal TV transmission is squeezed into a fraction of its former [bandwidth](#) by a [codec](#), the resulting [compressed video](#) can be transmitted more economically over a smaller carrier. Some [information](#) is sacrificed in the [process](#), which may result in diminished picture and sound [quality](#). (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)

**CONCEPT or CONCEPTUALISE**

An idea or notion resting on a rich and often complex history of thought - concept. (Craig *et al*, 1994:38)

To engage in a [process](#) of working with ideas, of [reflective](#) thinking and rethinking - to conceptualise. (Craig *et al*, 1994:38)

Describing that which is mental and involves the activity of conceptualising - conceptual. (Craig *et al*, 1994:38)

**CONCLUSIONS** (of an [evaluation](#))

Final judgements and [recommendations](#). (Directorate for Education and Human Resources, 2002:online)

**CONDITION(S)**

A requirement; that which is necessary for something to occur. (Craig *et al*, 1994:39)

Also the circumstances or [environmental factors](#) which exert an [influence](#). (Craig *et al*, 1994:39)

## CONFIDENCE INTERVAL

A confidence interval identifies a [range](#) of [values](#) that includes the true [population value](#) of a particular [characteristic](#) at a specified probability level (usually 95 %). (Project Gold - Research Methods Glossary, [S.a.]:online)

## CONSTANT COMPARATIVE METHOD

A [procedure](#) used during [grounded theory research](#) whereby newly gathered [data](#) are continually [compared](#) with previously collected [data](#) in order to refine the [development](#) of theoretical categories. (Project Gold - Research Methods Glossary, [S.a.]:online)

## CONSTRAINT(S)

A restriction or [limitation](#) that you or Microsoft Project set on the start or finish date of a [task](#). E.g., you can specify that a [task](#) must start on a particular date or finish no later than a particular date. When you add a new [task](#) to a project that is [scheduled](#) from the start date, Microsoft Project automatically assigns the As Soon As Possible constraint. Conversely, when you add a new [task](#) to a project that is [scheduled](#) from the finish date, Microsoft Project automatically assigns the As Late As Possible constraint. (Microsoft Project Management, Training tutorial)

## CONSTRUCT

- (a) Something that exists theoretically but is not directly observable. (Portland State University, [S.a.]:online)
- (b) A concept [developed](#) ([constructed](#)) for describing [relations](#) among phenomena or for other [research purposes](#). (Portland State University, [S.a.]:online)
- (c) A theoretical [definition](#) in which concepts are [defined](#) in terms of other concepts. E.g., intelligence cannot be directly observed or measured; it is a [construct](#). (Portland State University, [S.a.]:online)

## CONTENT ANALYSIS

A [procedure](#) for organising narrative, [qualitative data](#) into emerging [themes](#) and concepts.

A [process](#) using a parsimonious [classification system](#) to [determine](#) the [characteristics](#) of a body of material or practices. (Directorate for Education and Human Resources, 2002:online)

## CONTEXT or CONTEXTUAL (of an [evaluation](#))

The combination of [factors](#) accompanying the study that may have [influenced](#) its results, including geographic location, timing, political and social climate, economic [conditions](#), and other [relevant](#) professional activities in progress at the same time. (Directorate for Education and Human Resources, 2002:online)

## CONTINUOUS VARIABLE

A variable that can take on an infinite [range](#) of [values](#) along a specific continuum (e.g. weight, height, etc.) (Project Gold - Research Methods Glossary, [S.a.]:online)

## CONTROL

To have the power to direct or regulate a course of events.

(Craig *et al*, 1994:49)

[Processes](#) employed to hold the [conditions](#) under which an investigation is carried out uniform or constant. In a true [experimental design](#), the [control group](#) is the group that does not receive the [intervention](#) or treatment under investigation. The scores on the [dependent variable](#) for the [control](#) and the [experimental](#) groups are used to [evaluate](#) the effect of the [independent variable](#). In other [experimental designs](#), this group may be referred to as the [comparison](#) group. (Project Gold - Research Methods Glossary, [S.a.]:online)

See also: [Control group/s](#)

See also: [Monopolise](#)

**CONTROL GROUP(S)**

In [experimental research](#), a group that, for the sake of [comparison](#), does not receive the treatment the experimenter is interested in. (Portland State University, [S.a.]:online)

**CONTROVERSY**

The result of conflicting opinions.

**CONVENTION or CONVENTIONAL**

A custom or practise, an accepted norm or rule describing that which is governed by [convention](#). (Craig *et al*, 1994:51)

**COORDINATE or COORDINATION**

To bring or put two or more things into [relation](#); to [organise](#) different [components](#) or parts of a [task](#) - to coordinate. (Craig *et al*, 1994:52)

The coherent bringing together of different parts - coordination. (Craig *et al*, 1994:52)

**CORE CATEGORY**

The central [category](#) that is used to integrate all the categories identified in [grounded theory research](#). (Project Gold - Research Methods Glossary, [S.a.]:online)

**CORRELATION**

The extent to which two or more things are related ("co-related") to one another. This is usually expressed as a [correlation coefficient](#). (Portland State University, [S.a.]:online)

The degree of association between two [variables](#). A tendency for variation in one variable to be linked to variation in a second variable. (Project Gold - Research Methods Glossary, [S.a.]:online)

See also: [Positive Correlation](#)

See also: [Negative Correlation](#)

**CORRELATION COEFFICIENT**

A measure of the degree of [relationship](#) between two [variables](#). A correlation coefficient lies between +1.0 (indicating a perfect positive [relationship](#)), through 0 (indicating no [relationship](#) between two [variables](#)) to -1.0 (a perfect negative [relationship](#)). (Project Gold - Research Methods Glossary, [S.a.]:online)

**COST**

The total [scheduled](#) cost for a [task](#), resource, or assignment or for an entire project. This is sometimes referred to as the current cost, or budget. (Microsoft Project Management, Training tutorial)

**CRITERIA RO CRITERION**

A standard (or standards) by which something is [assessed](#), judged or [evaluated](#). (Craig *et al*, 1994:53)

A criterion (variable) is whatever is used to measure a

successful or unsuccessful [outcome](#), e.g. grade point average. (Directorate for Education and Human Resources, 2002:online)

**CRITICAL PATH**

The series of [tasks](#) that must be completed on [schedule](#) for a project to finish on [schedule](#). Each [task](#) on the critical path is a critical [task](#). (Microsoft Project Management, Training tutorial)

**DATA**

The known [facts](#) which become the basis for [analysis](#) and further data collection. (Craig *et al*, 1994:58)

[Information](#) collected by a researcher. (Data is the plural term; datum the singular). Data are often thought of as statistical or [quantitative](#), but they may take many other forms as well - such as transcripts of [interviews](#) or videotapes of social [interactions](#). Non-[quantitative data](#) such as transcripts or videotapes are often coded or translated into numbers to make them easier to [analyse](#). (Portland State University, [S.a.]:online)

The things given, e.g. facts. (Odendaal, 1984:199)

**DATA BASE**

A collection of [data organised](#) for rapid search and retrieval, usually by a computer; often a consolidation of many records previously stored separately. (Portland State University, [S.a.]:online)

See also: [Data](#)

**DATA DISPLAY**

A compact form of organizing the available [information](#), e.g. graphs, charts, matrices. (Directorate for Education and Human Resources, 2002:online)

**DATA SET**

A collection of related [data](#) items, such as answers given by respondents to all questions on a [survey](#). (Portland State University, [S.a.]:online)

**DECISION(S) or  
DECISION-MAKING**

Can be [viewed](#) as one step (the choice) in a problem-solving [process](#). If the problem is to improve sales, then the entire [process](#) of collecting [data](#), evaluating alternatives, and deciding on the proper [strategy](#) is problem-solving. (Turban, 1994:4)

**DEDUCTIVE REASONING**

A [logical process](#) of [developing](#) specific predictions (hypotheses) from general principles. This type of [reasoning](#) moves from the general to the particular. (Project Gold - Research Methods Glossary, [S.a.]:online)

See also: [Inductive reasoning](#)

**DEFINITION OR DEFINE**

A precise [description](#) of something. (Craig *et al*, 1994:62)

Describing that which is final, clear, definite or unambiguous. (Craig *et al*, 1994:62)

**DELIVERABLE(S)**

A tangible and measurable result, [outcome](#), or item that must be produced to complete a project or part of a project. Typically, the project team and project stakeholders agree on project deliverables before the project begins. (Microsoft Project Management, Training tutorial)

<b>DEPENDENT</b>	<p>Describing or implying a reliance on someone or something. (Craig <i>et al</i>, 1994:63)</p> <p>Implying <a href="#">control</a> or determination and a subordinate <a href="#">relationship</a>. (Craig <i>et al</i>, 1994:63)</p>
<b>DEPENDENT VARIABLE</b>	<p>(a) The presumed effect in a study; so called because it “depends” on another variable. (Portland State University, [S.a.]:online)</p> <p>(b) The variable whose <a href="#">values</a> are predicted by the <a href="#">independent variable</a>, whether or not caused by it. E.g., in a study to see if there is a <a href="#">relationship</a> between students’ drinking of alcoholic beverages and their grade point averages, the drinking behaviour would be the presumed cause (<a href="#">independent variable</a>); the grade point average would be the effect (<a href="#">dependent variable</a>). (Portland State University, [S.a.]:online)</p> <p>(c) In <a href="#">experimental research</a>, the dependant variable is the variable presumed within the <a href="#">research hypothesis</a> to depend on (be caused by) another variable (the <a href="#">independent variable</a>); it is sometimes referred to as the <a href="#">outcome</a> variable. (Project Gold - Research Methods Glossary, [S.a.]:online)</p>
<b>DESCRIBE OR DESCRIPTION</b>	To <a href="#">objectively identify</a> the most distinctive <a href="#">features</a> of something. (Craig <i>et al</i> , 1994:63)
<b>DESCRIPTIVE DATA</b>	<a href="#">Information</a> and findings expressed in words, unlike statistical <a href="#">data</a> , which are expressed in numbers. (Directorate for Education and Human Resources, 2002:online)
<b>DESCRIPTIVE STATISTICS</b>	<p><a href="#">Statistics</a> that summarise a <a href="#">data set</a> e.g. <a href="#">mean</a>, <a href="#">median</a>, <a href="#">mode</a>, standard deviation. (Portland State University, [S.a.]:online)</p> <p>Statistical <a href="#">methods</a> used to <a href="#">describe</a> or summarise <a href="#">data</a> collected from a specific sample, e.g. <a href="#">mean</a>, <a href="#">median</a>, <a href="#">mode</a>, <a href="#">range</a>, standard deviation. (Project Gold - Research Methods Glossary, [S.a.]:online)</p>
<b>DESIGN</b>	The <a href="#">process</a> of stipulating the investigatory <a href="#">procedures</a> to be followed in doing a specific <a href="#">evaluation</a> . (Directorate for Education and Human Resources, 2002:online)
<b>DESKTOP VIDEO CONFERENCING</b>	<a href="#">Video conferencing</a> on a personal computer. Most appropriate for small groups or individuals ( <a href="#">compare</a> with <a href="#">room-based video conferencing</a> ). Many desktop <a href="#">video conferencing systems</a> support <a href="#">document sharing</a> . (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)
<b>DETERMINE</b>	<p>To establish a decisive <a href="#">relationship</a> between events and to make a <a href="#">decision</a> based on the available <a href="#">evidence</a>. (Craig <i>et al</i>, 1994:65)</p> <p>The belief that everything is caused by specified <a href="#">factors</a> (antecedent <a href="#">factors</a>) in a predictable way rather than haphazardly; a key <a href="#">assumption</a> within the positivist <a href="#">paradigm</a>. (Project Gold - Research Methods Glossary, [S.a.]:online)</p> <p>See also: <a href="#">Decision-making</a></p>

<b>DEVELOP OR DEVELOPMENT</b>	To foster, advance, mature or promote, e.g. develop an argument. (Craig <i>et al</i> , 1994:66)												
<b>DIFFERENTIATE</b>	To recognise a difference. (Craig <i>et al</i> , 1994:68)												
<b>DIGITAL SIGNAL(S)</b>	Audio/video signals represented by discrete variations (in voltage, frequency, amplitude, location, etc.) A digital clock, e.g. displays the time as discrete numeric <a href="#">values</a> rather than angular displacement of analog hands. In general, digital signals can be transmitted faster and more <a href="#">accurately</a> than analogue signals. As an example, music from digital CD's are usually more clear than music from analog records (Contrast with <a href="#">analog signals</a> ). (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)												
<b>DISCUSS or DISCUSSION(S)</b>	To <a href="#">examine</a> through argument or debate and to give <a href="#">meaning</a> to a <a href="#">definition</a> and <a href="#">description</a> of something through illustration and the balancing of <a href="#">viewpoints</a> . (Craig <i>et al</i> , 1994:70)												
<b>DISSEMINATION</b>	The <a href="#">process</a> of communicating the <a href="#">information</a> to specific <a href="#">audiences</a> for the <a href="#">purpose</a> of extending <a href="#">knowledge</a> and, in some cases, with a <a href="#">view</a> to modifying policies and practices. (Directorate for Education and Human Resources, 2002:online)												
<b>DOCUMENT or DOCUMENTATION</b>	Any written or recorded material not specifically prepared for the <a href="#">evaluation</a> . (Directorate for Education and Human Resources, 2002:online)												
<b>DOCUMENT SHARING</b>	A <a href="#">feature</a> supported by many <a href="#">desktop video conferencing systems</a> that allows participants at both ends of a video conference to <a href="#">view</a> and edit the same computer <a href="#">document</a> . (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)  See also: <a href="#">Room-based video conferencing</a>												
<b>DRAFT</b>	A bill of exchange which has not yet been accepted (Odendaal, 1984:200)  A preliminary form of a document. (Odendaal, 1984:200)												
<b>DURATION</b>	The total span of active working time required to complete a <a href="#">task</a> . This is generally the amount of working time from the start to finish of a <a href="#">task</a> , as <a href="#">defined</a> by the project and resource calendar. Elapsed <a href="#">duration</a> is the amount of time a <a href="#">task</a> will take to finish, based on a 24-hour day and a 7-day week, including holidays and other non-working days; minutes, hours, days, and weeks can be entered in elapsed <a href="#">duration</a> . 0 = A <a href="#">duration value</a> is followed by a time unit abbreviation:  <table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: left;"><b>Working time</b></th> <th style="text-align: left;"><b>Elapsed time</b></th> </tr> </thead> <tbody> <tr> <td>min = minute</td> <td>emin = elapsed minutes</td> </tr> <tr> <td>hr = hour</td> <td>ehr = elapsed hours</td> </tr> <tr> <td>day = day</td> <td>edays = elapsed days</td> </tr> <tr> <td>wk = week</td> <td>ewk = elapsed weeks</td> </tr> <tr> <td>mo = month</td> <td>emo = elapsed months</td> </tr> </tbody> </table> (Microsoft Project Management, Training tutorial)	<b>Working time</b>	<b>Elapsed time</b>	min = minute	emin = elapsed minutes	hr = hour	ehr = elapsed hours	day = day	edays = elapsed days	wk = week	ewk = elapsed weeks	mo = month	emo = elapsed months
<b>Working time</b>	<b>Elapsed time</b>												
min = minute	emin = elapsed minutes												
hr = hour	ehr = elapsed hours												
day = day	edays = elapsed days												
wk = week	ewk = elapsed weeks												
mo = month	emo = elapsed months												
<b>ECHO-CANCELLATION</b>	<a href="#">Process</a> of eliminating acoustic echo in a <a href="#">video conferencing</a> room. (Pacific Bell - Videoconferencing Glossary,												

	[S.a.]:online)
<b>EFFECTIVE or EFFECTIVENESS</b>	Refers to the conclusion of a goal <a href="#">achievement evaluation</a> . “Success” is its rough equivalent. (Directorate for Education and Human Resources, 2002:online)
<b>EMPHASISE</b>	To make something stand out; to underline or stress something’s importance. (Craig <i>et al</i> , 1994:74 - 75)
<b>EMPIRICAL</b>	Describing that which is tangible, concrete and measurable through <a href="#">observation</a> , <a href="#">experience</a> and/or experimentation. (Craig <i>et al</i> , 1994:75)
	Also the thesis or <a href="#">theory</a> that certain kinds of <a href="#">knowledge</a> come from <a href="#">experience</a> . (Craig <i>et al</i> , 1994:75)
<b>EMPOWER OR EMPOWERMENT</b>	Empowerment means creating opportunities and inspiration for those who are powerless. Empowerment is when the powerless gain the <a href="#">experience</a> and confidence needed to <a href="#">influence</a> the <a href="#">decisions</a> that affect their own daily lives, and is the foundation on which partnerships must be built. Professionals cannot give power to those without power. Those who are powerless must take and exercise power for themselves. (Rifkin and Pridmore, 2001:3)
<b>ENVIRONMENT or ENVIRONMENTAL</b>	The objects and <a href="#">conditions</a> which surround and <a href="#">influence</a> things. (Craig <i>et al</i> , 1994:76 - 77)
<b>ERGONOMICS</b>	The <a href="#">science</a> of the relationship between man and his working environment, aimed at achieving optimum productivity by ensuring satisfactory working conditions, tools, equipment, etc.; also known as Human Engineering. (Odendaal, 1984:200)
<b>ERROR</b>	The difference between an observed score and a predicted or estimated score. Symbolised as e or E. (Portland State University, [S.a.]:online)
<b>ESTIMATE</b>	An estimate is an indication of the value of an unknown quantity based on observed data. (Easton & McColl, [S.a.]:online)
<b>ETHICS</b>	A <a href="#">system</a> of moral principles concerning right and wrong behaviour. (Craig <i>et al</i> , 1994:78)
<b>EVALUATE or EVALUATION</b>	To put <a href="#">value</a> to something, to <a href="#">assess</a> its worth and to <a href="#">analyse</a> and <a href="#">assess</a> the <a href="#">role</a> or <a href="#">function</a> of something. (Craig <i>et al</i> , 1994:79)
	See also: <a href="#">Assess or assessment</a> See also: <a href="#">Impact evaluation</a> See also: <a href="#">Implementation evaluation</a> See also: <a href="#">Formative evaluation</a> See also: <a href="#">Mixed method evaluation</a> See also: <a href="#">Performance evaluation</a> See also: <a href="#">Planning evaluation</a> See also: <a href="#">Qualitative evaluation</a> See also: <a href="#">Quantitative evaluation</a> See also: <a href="#">Summative evaluation</a> See also: <a href="#">Triangulation</a>
<b>EVIDENCE</b>	<a href="#">Information</a> which tends to prove <a href="#">facts</a> . (Craig <i>et al</i> , 1994:80)
<b>EXAMINE or EXAMINATION</b>	To study something closely or in-depth or to be <a href="#">assessed</a> .

(Craig *et al*, 1994:81)

**EXECUTIVE SUMMARY**

A nontechnical [summary](#) statement [designed](#) to provide a quick overview of the full-length report on which it is based. (Directorate for Education and Human Resources, 2002:online)

See also: [Abstract](#)

**EXPERIENCE**

Actual [observation](#) or participation; practical acquaintance with [facts](#) or events. (Craig *et al*, 1994:81)

To see for oneself. (Craig *et al*, 1994:81)

**EXPERIMENT/EXPERIMENTAL**

A [controlled](#) event or situation [designed](#) in order to study a [phenomenon](#). (Craig *et al*, 1994:82 - 83)

**EXPLAIN OR EXPLANATION**

To make sense of something and obscurities about it. (Craig *et al*, 1994:83)

To provide the [reasons](#) for something being or happening in a particular way. (Craig *et al*, 1994:83)

To give a causal account of something. (Craig *et al*, 1994:83)

**EXTERNAL VALIDITY**

The extent to which the findings or a study are [relevant](#) to [subjects](#) and settings beyond those in the study. Another term for [generalizability](#). (Portland State University, [S.a.]:online)

**FACT(S)**

Something which is known to exist, to be true or to have occurred. (Craig *et al*, 1994:85)

**FACTOR(S)**

(a) In [analysis](#) of variance, an [independent variable](#), that is, a variable presumed to cause or [influence](#) another variable. (Portland State University, [S.a.]:online)

(b) In factor [analysis](#), a cluster of related [variables](#) that are distinguishable [components](#) of a larger set of [variables](#). (Portland State University, [S.a.]:online)

(c) A number by which another number is multiplied, as in the statement: real estate [values](#) increased by a factor of three, [meaning](#) they tripled. (Portland State University, [S.a.]:online)

**FEASIBILITY STUDY**

A detailed enquiry into the practicality of pursuing a proposed course of action. (Odendaal, 1984:200)

**FEATURE(S)**

That which is distinctive or [characteristic](#) or something; that which makes it different. (Craig *et al*, 1994:86)

**FIELD**

A location in a sheet, form, or chart that contains a specific kind of [information](#) about a [task](#) or resource. E.g., in a sheet, each column is a field. In a form, a field is a named box or a place in a column. In the [Network](#) Diagram, fields are contained in each [Network](#) Diagram box. (Microsoft Project Management, Training tutorial)

**FIELD NOTES**

Notes taken by researchers to record unstructured [observations](#) they make 'in the [field](#)' and their [interpretation](#) of those [observations](#). (Project Gold - Research Methods)

Glossary, [S.a.]:online)

[Observer's](#) detailed [description](#) of what has been observed. (Directorate for Education and Human Resources, 2002:online)

**FILTER**

Specifies which [task](#) or resource [information](#) should be displayed or highlighted in a [view](#). E.g., when you apply the Critical filter, only critical [tasks](#) are displayed. (Microsoft Project Management, Training tutorial)

**FLOW CHART**

A diagram that shows, by means of symbols and interconnecting lines, the general sequence of operations in a particular routine. (Odendaal, 1984:200)

**FOCUS**

To direct attention to something or to a particular aspect or [feature](#) of that thing. (Craig *et al*, 1994:89)

**FORMATIVE EVALUATION**

Evaluation [designed](#) and used to improve an [intervention](#), especially when it is still being [developed](#). (Directorate for Education and Human Resources, 2002:online)

See also: [Assess or assessment](#)

See also: [Evaluate or evaluation](#)

See also: [Impact evaluation](#)

See also: [Implementation evaluation](#)

See also: [Mixed method evaluation](#)

See also: [Performance evaluation](#)

See also: [Planning evaluation](#)

See also: [Qualitative evaluation](#)

See also: [Quantitative evaluation](#)

See also: [Summative evaluation](#)

See also: [Triangulation](#)

**FRAME RATE**

Frequency in which video frames are displayed on a monitor, typically [described](#) in frames-per second (fps). Higher frame rates improve the appearance of video motion. Broadcast TV ([full motion video](#)) is 30 frames-per-second. (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)

**FRAMEWORK**

That part of a structure that gives shape and support. (Craig *et al*, 1994:93)

A particular philosophy, set of [assumptions](#) and [methods](#) used in enquiry. (Craig *et al*, 1994:93)

**FREQUENCY DISTRIBUTION**

A visual display of numerical [values](#) ranging from the lowest to the highest, showing the number of times (frequency) each [value](#) occurs. (Project Gold - Research Methods Glossary, [S.a.]:online)

**FULL DUPLEX AUDIO**

2-way audio simultaneously transmitted and received without any interference or "clipping." A common [feature](#) of [room-based video conferencing systems](#). Contrast with [half duplex audio](#). (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)

**FULL MOTION VIDEO**

Full motion video is equivalent to broadcast television video with a [frame rate](#) of 30 fps. Images are sent in real time and motion is continuous. (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)

**FUNCTION(S) OR FUNCTIONAL**

That which is [dependent](#) upon or [determined](#) by something else. (Craig *et al*, 1994:94)

That which contributes or works towards something else. (Craig *et al*, 1994:94)

Describing something which operates or works. (Craig *et al*, 1994:94)

**GANTT CHART**

A [bar diagram](#) used to [schedule work](#) by portraying, against a time [scale](#), the periods of time [allocated](#) to the performance of major [tasks](#) involved in the completion of a complex project.

**GENERALISABILITY**

The extent to which you can come to [conclusions](#) about one thing (often a [population](#)) based on [information](#) about another (often a sample). (Portland State University, [S.a.]:online)

**GROUNDING THEORY**

A [research approach](#) used to [develop](#) conceptual categories/[theory](#) about social [processes](#) inductively from real-world [observations](#) ([data](#)) from a selected group of people. The researcher may subsequently make further [observations](#) to test the [developed](#) categories/[theory](#). (Project Gold - Research Methods Glossary, [S.a.]:online)

**H.320 STANDARD**

A widely-used video compression [standard](#) that allows a wide variety of [video conferencing systems](#) to communicate. (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)

**HALF DUPLEX AUDIO**

2-way audio transmitted and received in turn (rather than simultaneously) so only one site can speak at a time. Contrast with [full duplex audio](#). (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)

**HIERARCHY**

An organisational structure having various, graded levels. (Craig *et al*, 1994:97)

**HOLISTIC**

The [theory](#) that certain wholes are greater than the sum of the individual parts. (Craig *et al*, 1994:99)

Describing an all-inclusive [approach](#). (Craig *et al*, 1994:99)

**HYPOTHESIS**

(a) A proposition made as a basis for further [reasoning](#) or [research](#). (Craig *et al*, 1994:99)

(b) [Variables](#) (specifically the [relationship](#) between the independent and [dependent variables](#)). A hypothesis may be directional or non-directional:

Directional hypothesis (or one-tailed hypothesis)

A hypothesis that makes a specific prediction about the nature and direction of the [relationship](#) between the independent and [dependent variables](#).

Non-directional hypothesis (or two-tailed hypothesis)

A hypothesis that does not specify the nature and direction of the [relationship](#) between the independent and [dependent variables](#).

(Project Gold - Research Methods Glossary, [S.a.]:online)

See also: [Deductive reasoning](#)

See also: [Inductive reasoning](#)

<b>HYPOTHESIS TESTING</b>	The standard <a href="#">model</a> of the classical <a href="#">approach</a> to scientific <a href="#">research</a> in which a <a href="#">hypothesis</a> is formulated before the <a href="#">experiment</a> to test its truth. (Directorate for Education and Human Resources, 2002:online)
<b>IDENTIFY</b>	To find, locate or recognise; to establish. (Craig <i>et al</i> , 1994:101)
<b>IMPACT EVALUATION</b>	<p>An evaluation <a href="#">focussed</a> on <a href="#">outcomes</a> or payoff. (Directorate for Education and Human Resources, 2002:online)</p> <p>See also: <a href="#">Assess or assessment</a>  See also: <a href="#">Evaluate or evaluation</a>  See also: <a href="#">Implementation evaluation</a>  See also: <a href="#">Formative evaluation</a>  See also: <a href="#">Mixed method evaluation</a>  See also: <a href="#">Performance evaluation</a>  See also: <a href="#">Planning evaluation</a>  See also: <a href="#">Qualitative evaluation</a>  See also: <a href="#">Quantitative evaluation</a>  See also: <a href="#">Summative evaluation</a>  See also: <a href="#">Triangulation</a></p>
<b>IMPLEMENTATION</b>	To carry out or to put into effect (Wevell, 1996:530)
<b>IMPLEMENTATION EVALUATION</b>	<p><a href="#">Assessing</a> program delivery (a subset of <a href="#">formative evaluation</a>). (Directorate for Education and Human Resources, 2002:online)</p> <p>See also: <a href="#">Assess or assessment</a>  See also: <a href="#">Evaluate or evaluation</a>  See also: <a href="#">Impact evaluation</a>  See also: <a href="#">Formative evaluation</a>  See also: <a href="#">Mixed method evaluation</a>  See also: <a href="#">Performance evaluation</a>  See also: <a href="#">Planning evaluation</a>  See also: <a href="#">Qualitative evaluation</a>  See also: <a href="#">Quantitative evaluation</a>  See also: <a href="#">Summative evaluation</a>  See also: <a href="#">Triangulation</a></p>
<b>INDEPENDENT VARIABLE</b>	<p>The presumed cause in a study. Also a variable that can be used to predict the <a href="#">values</a> of another variable. <a href="#">Compare dependent variable</a>. Some authors use the term "independent variable" for <a href="#">experimental research</a> only, for non-<a href="#">experimental research</a>, they use predictor variable. (Portland State University, [S.a.]:online)</p> <p>The variable (or antecedent) that is assumed to cause or <a href="#">influence</a> the <a href="#">dependent variable(s)</a> or <a href="#">outcome</a>. The independent variable is <a href="#">manipulated</a> in <a href="#">experimental research</a> to observe its effect on the <a href="#">dependent variable(s)</a>. It is sometimes referred to as the treatment variable. (Project Gold - Research Methods Glossary, [S.a.]:online)</p>
<b>IN-DEPTH INTERVIEW</b>	A guided conversation between a skilled interviewer and an interviewee that seeks to maximize opportunities for the expression of a respondent's feelings and ideas through the use of open-ended questions and a loosely <a href="#">structured interview</a> guide. (Directorate for Education and Human Resources, 2002:online)
<b>INDUCTION</b>	A <a href="#">process</a> of <a href="#">reasoning</a> that goes from the particular to the general. (Craig <i>et al</i> , 1994:107)

	See also: <a href="#">Deductive reasoning</a> See also: <a href="#">Inductive reasoning</a>
<b>INDUCTIVE REASONING</b>	A <a href="#">logical process</a> of <a href="#">reasoning</a> used to <a href="#">develop</a> more general rules from specific <a href="#">observations</a> ; this type of <a href="#">reasoning</a> moves from the specific to the more generalised. (Project Gold - Research Methods Glossary, [S.a.]:online)
<b>INFER OR INFERENCE(S)</b>	To reach a conclusion from known <a href="#">facts</a> or by a <a href="#">process</a> of <a href="#">reasoning</a> . (Craig <i>et al</i> , 1994:108)  The <a href="#">process</a> by which you reach a <a href="#">decision</a> about something, using the available <a href="#">information</a> . (Craig <i>et al</i> , 1994:108)
<b>INFERENTIAL STATISTICS</b>	<a href="#">Statistics</a> that allow a researcher to make <a href="#">inferences</a> about whether <a href="#">relationships</a> observed in a sample are likely to occur in the wider <a href="#">population</a> from which that sample was drawn. <a href="#">Inferential statistics</a> use <a href="#">logic</a> and mathematical <a href="#">processes</a> in order to test hypotheses relating to a specific <a href="#">population</a> based on <a href="#">data</a> gathered from a sample of the <a href="#">population</a> of interest. (Project Gold - Research Methods Glossary, [S.a.]:online)
<b>INFLUENCE OR INFLUENTIAL</b>	The power to affect another's <a href="#">character</a> , beliefs or actions. (Craig <i>et al</i> , 1994:108)  Describing that which affects the ideas and behaviour of others. (Craig <i>et al</i> , 1994:108)
<b>INFORMATION</b>	Information means gaining <a href="#">facts</a> about the things we need to know. (Rifkin and Pridmore, 2001:3)
<b>INFRASTRUCTURE</b>	Public goods and services supplied by the state; that on which a sound structure is built. (Craig <i>et al</i> , 1994:110)
<b>INSTITUTION or INSTITUTIONAL</b>	A society or organisation established for a specific <a href="#">purpose</a> . (Craig <i>et al</i> , 1994:111)
<b>INSTRUMENT(S)</b>	An <a href="#">assessment</a> device (test, questionnaire, protocol, etc.) adopted, adapted, or <a href="#">constructed</a> for the <a href="#">purpose</a> of the <a href="#">evaluation</a> . (Directorate for Education and Human Resources, 2002:online)
<b>INTENTION</b>	A mental plan, aim, goal or <a href="#">reason</a> that precedes an action. (Craig <i>et al</i> , 1994:113)
<b>INTERACTION</b>	The mutual <a href="#">influence</a> or effect of two or more people or things. (Craig <i>et al</i> , 1994:114)
<b>INTERNAL</b>	Describing that which is inside or interior to another thing. (Craig <i>et al</i> , 1994:115)
<b>INTERNAL VALIDITY</b>	The extent to which the results of a study (usually an <a href="#">experiment</a> ) can be attributed to the treatments rather than a flaw in the <a href="#">research design</a> ; in other words, the degree to which one can draw <a href="#">valid conclusions</a> about the casual effects of one variable on another.
<b>INTERVAL SCALE</b>	See also: <a href="#">Likert scale</a>
<b>INTERVENTION</b>	Project <a href="#">feature</a> or innovation <a href="#">subject</a> to <a href="#">evaluation</a> . (Directorate for Education and Human Resources, 2002:online)

<b>INTERVIEW</b>	<p>A <a href="#">method</a> of <a href="#">data</a> collection involving an interviewer asking questions of another person (a respondent) either face-to-face or over the telephone. (Project Gold - Research Methods Glossary, [S.a.]:online)</p> <p>See also: <a href="#">Structured Interview</a> See also: <a href="#">Unstructured Interview</a></p>
<b>ISDN</b>	<p>Integrated Services Digital Network. ISDN is essentially a digital <a href="#">network</a> that will provide seamless <a href="#">communications</a> of voice, video, and text between individual <a href="#">desktop video conferencing systems</a> and group or <a href="#">room-based video conferencing systems</a>. ISDN is expected to replace current telephone lines. (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)</p>
<b>ISDN2</b>	<p>British Telecom's name for <a href="#">Basic Rate ISDN</a>. (Atlas Informationbase Glossary, 2002:online)</p>
<b>ISO</b>	<p>International Standards Organisation. (Atlas Informationbase Glossary, 2002:online)</p>
<b>INTERPRET</b>	<p>To make sense of something, to bring out its <a href="#">meaning</a>. (Craig <i>et al</i>, 1994:116)</p>
<b>INVESTIGATE or INVESTIGATION</b>	<p>See also: <a href="#">Analyse or analysing</a></p>
<b>IP</b>	<p>Internet Protocol</p>
<b>KNOWLEDGE</b>	<p>Awareness or familiarity, <a href="#">information</a> and understanding. (Craig <i>et al</i>, 1994:120)</p> <p><a href="#">Interpreting</a> and using <a href="#">information</a> in a specific situation. (Rifkin and Pridmore, 2001:3)</p>
<b>LAN</b>	<p>Local Area Network</p>
<b>LIKERT SCALE</b>	<p>A <a href="#">method</a> used to measure <a href="#">attitudes</a>, which involves respondents indicating their degree of agreement or disagreement with a series of statements. Scores are summed to give a composite measure of <a href="#">attitudes</a>. (Project Gold - Research Methods Glossary, [S.a.]:online)</p>
<b>LIMIT OR LIMITATION</b>	<p>To restrict or constrain. (Craig <i>et al</i>, 1994:124)</p> <p>That which restricts or stipulates something. (Craig <i>et al</i>, 1994:124)</p>
<b>LOGIC OR LOGICAL</b>	<p>The study of argument, <a href="#">reasoning</a> and thinking; the soundness or correctness of an argument. (Craig <i>et al</i>, 1994:126)</p> <p>Describing that which follows a chain of <a href="#">reasoning</a> or consistency in argument or movement of thought. (Craig <i>et al</i>, 1994:126)</p>
<b>MACRO-ANALYSIS</b>	<p>Large, large-scale or broad <a href="#">analysis</a>, <a href="#">focussing</a> on the whole. (Craig <i>et al</i>, 1994:128)</p>
<b>MANAGE, MANAGEMENT OR MANAGERIAL</b>	<p>The administration of an enterprise or any part thereof. (Odendaal, 1984:203 - 204)</p>

A generic term applied to the group of top level managers who together are responsible for the [work](#) of the enterprise. (Odendaal, 1984:204)

**MANAGEMENT BY EXCEPTION (MBE)**

The management technique which concentrates upon elements the performance of which reveals a significant adverse variance as compared with the target, standard or budget figure laid down. (Odendaal, 1984:204)

**MANAGEMENT BY OBJECTIVES (MBO)**

The method of management in which the objectives to be achieved are established by consultation between a manager and his subordinates, but in which the means to be utilised are determined by the subordinates. (Odendaal, 1984:204)

**MANAGER**

A member of an organisational structure having authority to appoint and dismiss subordinates and to determine subordinates and to determine their duties, and for whose [work](#) he is accountable to some higher authority. (Odendaal, 1984:204)

**MANIPULATE OR MANIPULATION**

[Control](#) or [management](#) - to [control](#) people's actions. (Craig *et al*, 1994:128 -129)

**MATRIX**

An arrangement of rows and columns used to display multi-dimensional [information](#). (Directorate for Education and Human Resources, 2002:online)

**MEAN**

A descriptive statistic used as a measure of [central tendency](#). All scores in a set of scores are added together and divided by the number of [subjects](#). (Project Gold - Research Methods Glossary, [S.a.]:online)

**MEANING**

That which is expressed by a word, action or idea; the significance or importance of something. (Craig *et al*, 1994:130)

**MEASURE or MEASUREMENT**

Determination of the magnitude of a [quantity](#) (Directorate for Education and Human Resources, 2002:online).

The element of the control function of management that provides information regarding the quantity and quality of output and the economical use of resources in the performance of a task. (Odendaal, 1984:204)

**MEASUREMENT SCALE**

Assigning a number or [category](#) to represent it. The [methods](#) used to display and/or [analyse](#) numerical ([quantitative](#)) [data](#) will depend on the type of [scale](#) used to measure the variable(s). There are four [scales](#) of [measurement](#): nominal, ordinal, interval and ratio. The [data](#) associated with each measurement [scale](#) are referred to as nominal [data](#), ordinal [data](#), interval [data](#) and ratio [data](#) respectively.

[Nominal scale](#): the lowest level of [measurement](#) that involves assigning [characteristics](#) into categories which are mutually exclusive, but which lack any intrinsic order, e.g. [classification](#) by gender or by the colour of a person's hair or eyes.

[Ordinal scale](#): these categories can be used to rank order a variable, but the intervals between categories are not equal or fixed, e.g. strongly agree, agree, neither agree nor

disagree, disagree, strongly disagree; social class I professional, II semi-professional, IIIa non-manual, IIIb manual, IV semi-skilled, and V unskilled.

Interval scale: the categories are ordered and there are equal intervals between points on the scale, but the zero point on the scale is arbitrary so that a particular measure cannot be said to be 'twice as' large as another measure on the same scale, e.g. degrees Centigrade.

Ratio scale: scores are assigned on a scale with equal intervals and also a true zero point, e.g. measurement in yards, feet and inches or in metres and centimetres.

(Project Gold - Research Methods Glossary, [S.a.]:online)

## MEDIAN

A descriptive statistic used to measure central tendency. The median is the score/value that is exactly in the middle of a distribution (i.e. the value above which and below which 50 % of the scores lie). (Project Gold - Research Methods Glossary, [S.a.]:online)

## META-ANALYSIS

A statistical technique for combining and integrating the data derived from a number of experimental studies undertaken on a specific topic. (Project Gold - Research Methods Glossary, [S.a.]:online)

## METHOD, METHODICAL OR METHODOLOGY

A particular way of doing something. (Craig *et al*, 1994:132)

Doing something in a particular order or according to a particular method. (Craig *et al*, 1994:132)

The study, science or theory of method. (Craig *et al*, 1994:132)

Systematic procedure or technique. Orderly development often in steps (Schönsleben, 2000:23)

## MICRO-ANALYSIS

Small-scale analysis focussing on the detail or the constituent parts rather than the whole. (Craig *et al*, 1994:128)

## MILESTONE

A reference point marking a major event in a project and used to monitor the project's progress. Any task with zero duration is automatically displayed as a milestone; you can also mark any other task of any duration a milestone. (Microsoft Project Management, Training tutorial)

## MIXED METHOD EVALUATION

An evaluation of which the design includes the use of both quantitative and qualitative methods for data collection and data analysis. (Directorate for Education and Human Resources, 2002:online)

See also: Assess or assessment

See also: Evaluate or evaluation

See also: Impact evaluation

See also: Implementation evaluation

See also: Formative evaluation

See also: Performance evaluation

See also: Planning evaluation

See also: Qualitative evaluation

See also: Quantitative evaluation

See also: Summative evaluation

	See also: <a href="#">Triangulation</a>
<b>MODE</b>	A descriptive statistic that is a measure of <a href="#">central tendency</a> ; it is the score/ <a href="#">value</a> that occurs most frequently in a distribution of scores. (Project Gold - Research Methods Glossary, [S.a.]:online)
<b>MODEL</b>	A three-dimensional object which is a representation of something. (Craig <i>et al</i> , 1994:133)  A <a href="#">system</a> of ideas. (Craig <i>et al</i> , 1994:133)  To imitate or copy; to shape or fashion something. (Craig <i>et al</i> , 1994:133)
<b>MONOPOLISE</b>	To <a href="#">control</a> and own, to have exclusive possession. (Craig <i>et al</i> , 1994:134)  To dominate and prevent others from participating. (Craig <i>et al</i> , 1994:134)
<b>MULTIPOINT VIDEO CONFERENCE / - CONFERENCING</b>	Video conference with more than two sites. The sites must connect via a <a href="#">video bridge</a> . <a href="#">Compare</a> with <a href="#">point-to-point video conference</a> . (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)
<b>NARROWBAND</b>	A low-capacity <a href="#">communications</a> circuit/path. It usually implies a speed of 56 <a href="#">Kbps</a> or less. Contrast with <a href="#">wideband</a> and <a href="#">broadband</a> . (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)
<b>NEGATIVE CORRELATION</b>	A <a href="#">relationship</a> between two <a href="#">variables</a> where higher <a href="#">values</a> on one variable tend to be associated with lower <a href="#">values</a> on the second variable; sometimes referred to as an inverse <a href="#">relationship</a> , e.g. age of non-vintage cars and their market <a href="#">value</a> . (Project Gold - Research Methods Glossary, [S.a.]:online)
<b>NETWORK</b>	A complex <a href="#">system</a> or <a href="#">infrastructure</a> in which various things are connected. (Craig <i>et al</i> , 1994:139)  The interrelationship of the various tasks or ' <a href="#">milestones</a> ' involved in the completion of a project. (Odendaal, 1984:205)
<b>NOMINAL SCALE</b>	See also: <a href="#">Likert scale</a>
<b>NON-SIGNIFICANT RESULT</b>	The result of a <a href="#">statistical test</a> which indicates that the <a href="#">outcome</a> of an <a href="#">experimental research</a> study could have occurred through random variation (or chance) at a specified level of significance, rather than as a result of <a href="#">manipulation</a> of the <a href="#">independent variable</a> . (Project Gold - Research Methods Glossary, 2000:online)
<b>NT1</b>	<a href="#">Network</a> Terminator. (Atlas Informationbase Glossary, 2002:online)
<b>NTSC</b>	Standard for scanning television signals. Used in the US, Canada and Japan. Contrast with <a href="#">PAL</a> . (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)
<b>NULL HYPOTHESIS</b>	A statement that there is no <a href="#">relationship</a> between the independent and <a href="#">dependent variables</a> and that any

[relationship observed](#) is due to chance or fluctuations in [sampling](#). (Project Gold - Research Methods Glossary, [S.a.]:online)

See also: [Hypothesis](#)

## OBJECTIVE(S)

A specific [description](#) of an intended [outcome](#). (Directorate for Education and Human Resources, 2002:online)

The quantifiable [criteria](#) that must be met for the project to be considered successful. Objectives must include, at least, [cost](#), [schedule](#), and [quality](#) measures. Unquantified objectives, e.g. "customer satisfaction", increase the risk that the project won't meet them. (Microsoft Project Management, Training tutorial)

The declared goal to which activities are directed. (Odendaal, 1984:205)

See also: [Criteria Ro Criterion](#)

## OBSERVE OR OBSERVATION(S)

To see, watch or witness something, to notice or become aware of it. (Craig *et al*, 1994:142)

A [method](#) of [data](#) collection in which [data](#) are gathered through visual observations. This is done by means of structured and unstructured observation:

Structured observation: the researcher [determines](#) at the outset precisely what behaviours are to be [observed](#) and typically uses a standardised checklist to record the frequency with which those behaviours are [observed](#) over a specified time period. See also: [checklist approach](#).

Unstructured observation: The researcher used direct observation to record behaviours as they occur, with no preconceived ideas of what will be seen; there is no predetermined plan about what will be [observed](#).

(Project Gold - Research Methods Glossary, [S.a.]:online)

See also: [Determine](#)

The [process](#) of direct sensory inspection involving trained [observers](#). (Directorate for Education and Human Resources, 2002:online)

## OPERATIONAL DEFINITION

The [procedures](#) or operations used to [observe](#) or measure a specific concept. Operationalisation is the [process](#) of translating specific [research](#) concepts into observable phenomena that are measurable. (Project Gold - Research Methods Glossary, [S.a.]:online)

## ORDINAL SCALE

See also: [Likert scale](#)

## ORGANISE

To put something into working order, to prepare it, to arrange it in a [system](#). (Craig *et al*, 1994:145)

To plan actions and carry them out [methodically](#). (Craig *et al*, 1994:145)

## ORGANISATION AND METHODS (O & M)

The analytical study of the organisation structure and operational methods of an enterprise with the object of

simplifying and improving them. (Odendaal, 1984:205)

<b>OUTCOME(S)</b>	Post-treatment or post- <a href="#">intervention</a> effects. (Directorate for Education and Human Resources, 2002:online)
<b>p VALUE</b>	p is the symbol for the probability that is associated with the <a href="#">outcome</a> of a test of the null <a href="#">hypothesis</a> (i.e. it is the probability that an <a href="#">observed</a> inferential statistic occurred through chance variation). If the p <a href="#">value</a> is less than or equal to the stated <a href="#">significance level</a> - often set at 5 % ( $p < 0.05$ ) or 1 % ( $p < 0.01$ ) - then the researcher concludes that the results are unlikely to have occurred by chance and are more likely to have occurred because of the <a href="#">manipulation</a> of the <a href="#">independent variable</a> ; the results are said to be 'statistically significant'. If the p <a href="#">value</a> is greater than the <a href="#">significance level</a> , the researcher concludes that the results are likely to have occurred by chance variation, and the results are said to be 'non-significant'. (Project Gold - Research Methods Glossary, [S.a.]:online)
<b>PAL</b>	Standard for scanning television signals. Used in most European countries and South Africa. See contrast <a href="#">NTSC</a> . (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)
<b>PARADIGM</b>	The <a href="#">framework</a> of beliefs and practices within which scientists <a href="#">work</a> . (Craig <i>et al</i> , 1994:148)  A general conception, <a href="#">model</a> , or "world <a href="#">view</a> " that may be <a href="#">influential</a> in shaping the <a href="#">development</a> of a discipline or sub-discipline. (E.g., "The classical, positivist social <a href="#">science paradigm</a> in <a href="#">evaluation</a> .)" (Directorate for Education and Human Resources, 2002:online)
<b>PARAMETER(S)</b>	A <a href="#">characteristic</a> of a <a href="#">population</a> , e.g. the <a href="#">mean</a> age of all nurses studying the MSc in Nursing by distance learning with the RCN Institute. (Project Gold - Research Methods Glossary, [S.a.]:online)  A parameter is a value, usually unknown (and which therefore has to be estimated), used to represent a certain population characteristic, e.g. the average value of a quantity (Easton & McColl, [S.a.]:online)
<b>PERFORMANCE EVALUATION</b>	A <a href="#">method</a> of <a href="#">assessing</a> what skills students or other project participants have acquired by examining how they accomplish complex <a href="#">tasks</a> or the <a href="#">products</a> they have created, e.g., poetry, artwork. (Directorate for Education and Human Resources, 2002:online)  See also: <a href="#">Assess or assessment</a> See also: <a href="#">Evaluate or evaluation</a> See also: <a href="#">Impact evaluation</a> See also: <a href="#">Implementation evaluation</a> See also: <a href="#">Formative evaluation</a> See also: <a href="#">Mixed method evaluation</a> See also: <a href="#">Planning evaluation</a> See also: <a href="#">Qualitative evaluation</a> See also: <a href="#">Quantitative evaluation</a> See also: <a href="#">Summative evaluation</a> See also: <a href="#">Triangulation</a>
<b>PERSPECTIVE(S)</b>	<u>Literally</u> : A three-dimensional drawing or representation of an object which makes it life-like. (Craig <i>et al</i> , 1994:149)

	<p><u>Figuratively</u>: A particular way of thinking about, considering, viewing or <a href="#">approaching</a> something. (Craig <i>et al</i>, 1994:149)</p>
<b>PHENOMENON</b>	<p>A <a href="#">fact</a> or occurrence of something. (Craig <i>et al</i>, 1994:150)</p> <p>The object of a person's perception; that which the senses or mind notice. (Craig <i>et al</i>, 1994:150)</p>
<b>PIE CHART</b>	<p>A pie chart is a way of summarising a set of categorical data. It is a circle which is divided into segments. Each segment represents a particular category. The area of each segment is proportional to the number of cases in that category. (Easton &amp; McColl, [S.a.]:online)</p>
<b>PLANNING EVALUATION</b>	<p>Evaluation planning is necessary before a program begins, both to get <a href="#">baseline data</a> and to <a href="#">evaluate</a> the program plan, at least for availability. Planning avoids <a href="#">designing</a> a program that cannot be <a href="#">evaluated</a>. (Directorate for Education and Human Resources, 2002:online)</p> <p>See also: <a href="#">Assess or assessment</a>  See also: <a href="#">Evaluate or evaluation</a>  See also: <a href="#">Impact evaluation</a>  See also: <a href="#">Implementation evaluation</a>  See also: <a href="#">Formative evaluation</a>  See also: <a href="#">Mixed method evaluation</a>  See also: <a href="#">Performance evaluation</a>  See also: <a href="#">Qualitative evaluation</a>  See also: <a href="#">Quantitative evaluation</a>  See also: <a href="#">Summative evaluation</a>  See also: <a href="#">Triangulation</a></p>
<b>POINT-TO-POINT VIDEO-CONFERENCE</b>	<p>Video conference between two sites. <a href="#">Compare</a> with <a href="#">multipoint video conference</a>. (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)</p>
<b>POPULATION</b>	<p>A population relates to the entire set of <a href="#">data</a> that is of interest to us. (Wisniewski, 1994:74)</p> <p>A group of persons that one wishes to <a href="#">describe</a> or about which one wishes to generalize. To generalize about a population, one often studies a <a href="#">sample</a> that is meant to be representative of the population. Also called "universe." (Portland State University, [S.a.]:online)</p> <p>A well-<a href="#">defined</a> group or set that has certain specified properties, e.g. all registered midwives working full-time in Scotland. (Project Gold - Research Methods Glossary, [S.a.]:online)</p> <p>All persons in a particular group. (Directorate for Education and Human Resources, 2002:online)</p> <p>A population is any entire collection of people, animals, plants or things from which we may collect data. It is the entire group we are interested in, which we wish to describe or draw conclusions about. (Easton &amp; McColl, [S.a.]:online)</p>
<b>PROJECT</b>	<p>A detailed plan involving a number of interrelated tasks, usually having a specific completion date and often constituting part of a broader plan designed to achieve a stated objective. (Odendaal, 1984:206)</p>

<b>PROJECT CONSTRAINT</b>	<p>A <a href="#">factor</a> that will <a href="#">limit</a> the <a href="#">project management</a> team's options. E.g., a predefined budget is a <a href="#">constraint</a> that may <a href="#">limit</a> the team's <a href="#">scope</a>, staffing, and <a href="#">schedule</a> options. (Microsoft Project Management, Training tutorial)</p> <p>See also: <a href="#">Constraint</a> See also: <a href="#">Define and definition</a></p>
<b>PROMPT</b>	<p>Reminders used by interviewers to obtain complete answers. (Directorate for Education and Human Resources, 2002:online)</p>
<b>PROOF</b>	<p>See also: <a href="#">Evidence</a></p>
<b>PROPRIETARY COMPRESSION ALGORITHM</b>	<p>A vendor-specific <a href="#">algorithm</a> for compression of a video signal. A <a href="#">video conferencing system</a> using a <a href="#">proprietary algorithm</a> can only communicate with a remote site using the same <a href="#">algorithm</a>. Many vendors also adhere to <a href="#">standard compression algorithms</a> to facilitate <a href="#">communication</a> across platforms.</p>
<b>POSITIVE CORRELATION</b>	<p>A <a href="#">relationship</a> between two <a href="#">variables</a> where higher <a href="#">values</a> on one variable tend to be associated with higher <a href="#">values</a> on the second variable, e.g. physical activity level and pulse rate. (Project Gold - Research Methods Glossary, [S.a.]:online)</p>
<b>PROCEDURE(S)</b>	<p>A manner or order of doing this, especially an established <a href="#">method</a> (Wevell, 1996:856).</p>
<b>PROCESS or PROCESSES</b>	<p>A series of actions which are carried out in order to achieve a particular result or <a href="#">product</a>; a <a href="#">method</a>. (Craig <i>et al</i>, 1994:155)</p> <p>A <a href="#">process</a> is usually seen as various <a href="#">tasks</a> progressing in a certain sequence (Schönsleben, 2000: 21-22).</p>
<b>PRODUCT(S) OR PRODUCTION</b>	<p>The end result or final object of something that is made or produced. (Craig <i>et al</i>, 1994:156)</p> <p>A <a href="#">process</a> of producing or creating something that is sometimes traded. (Craig <i>et al</i>, 1994:156)</p>
<b>PRODUCT FAMILY</b>	<p>It is a group of <a href="#">products</a> having similar <a href="#">features</a> (such as form or material) or similar <a href="#">functions</a>, similar <a href="#">product</a> structures with a high percentage of the same <a href="#">components</a> or <a href="#">components</a> from the same family, and a high percentage of the same <a href="#">processes</a> in the <a href="#">process</a> plan. (Wisniewski, 1994:76)</p>
<b>PROJECT MANAGEMENT</b>	<p>Project management is the <a href="#">process</a> of planning, organising, and managing <a href="#">tasks</a> and <a href="#">resources</a> to accomplish a <a href="#">defined objective</a>, usually within <a href="#">constraints</a> on time, <a href="#">resources</a>, or <a href="#">cost</a>. (Microsoft Project Management, Training tutorial)</p> <p>That which something is supposed to do, be, <a href="#">mean</a> or achieve. (Craig <i>et al</i>, 1994:158)</p> <p><a href="#">Intention</a>, <a href="#">reason</a> or motive. (Craig <i>et al</i>, 1994:158)</p> <p>Determination, or the ability to form plans and adhere to them. (Craig <i>et al</i>, 1994:158)</p>
<b>QUALITATIVE DATA</b>	<p><a href="#">Information</a> gathered in narrative (non-numeric) form, e.g. a transcript of an <a href="#">unstructured interview</a>. (Project Gold -</p>

Research Methods Glossary, [S.a.]:online)

## QUALITATIVE EVALUATION

The [approach](#) to [evaluation](#) that is primarily descriptive and [interpretative](#). (Directorate for Education and Human Resources, 2002:online)

See also: [Assess or assessment](#)

See also: [Evaluate or evaluation](#)

See also: [Impact evaluation](#)

See also: [Implementation evaluation](#)

See also: [Formative evaluation](#)

See also: [Mixed method evaluation](#)

See also: [Performance evaluation](#)

See also: [Planning evaluation](#)

See also: [Quantitative evaluation](#)

See also: [Summative evaluation](#)

See also: [Triangulation](#)

## QUALITATIVE RESEARCH

(a) When referring to [variables](#), “qualitative” is another term for categorical or nominal. (Portland State University, [S.a.]:online)

(b) When speaking of kinds of [research](#), “qualitative” refers to studies of [subjects](#) that are hard to quantify, such as art history. Qualitative [research](#) tends to be a residual [category](#) for almost any kind of non-[quantitative research](#). (Portland State University, [S.a.]:online)

## QUALITY OR QUALITATIVE

The degree of excellence. (Craig *et al*, 1994:161)

The particular [features](#), [characteristics](#) or properties which make something distinctive. (Craig *et al*, 1994:161)

Describing the kind of [analysis](#) which [focuses](#) on [meaning](#). (Craig *et al*, 1994:161)

## QUALITY CONTROL

The regular and systematic inspection of products to ensure that variances from prescribed standards do not exceed specified limits. (Odendaal, 1984:206)

## QUANTITATIVE DATA

[Information](#) gathered in numeric form. (Project Gold - Research Methods Glossary, [S.a.]:online)

## QUANTITATIVE EVALUATION

The [approach](#) to [evaluation](#) involving the use of numerical [measurement](#) and [data analysis](#) based on statistical methods. (Directorate for Education and Human Resources, 2002:online)

See also: [Assess or assessment](#)

See also: [Evaluate or evaluation](#)

See also: [Impact evaluation](#)

See also: [Implementation evaluation](#)

See also: [Formative evaluation](#)

See also: [Mixed method evaluation](#)

See also: [Performance evaluation](#)

See also: [Planning evaluation](#)

See also: [Qualitative evaluation](#)

See also: [Summative evaluation](#)

See also: [Triangulation](#)

## QUANTITATIVE RESEARCH

Said of [variables](#) or [research](#) that can be handled numerically. Usually (too sharply) contrasted with qualitative [variables](#) and [research](#). (Portland State University,

	[S.a.]:online)
<b>QUANTITY OR QUANTITATIVE</b>	The amount of something. (Craig <i>et al</i> , 1994:162)  Describing the kind of <a href="#">analysis</a> which <a href="#">focuses</a> on <a href="#">measurement</a> . (Craig <i>et al</i> , 1994:162)
<b>RANDOMISATION</b>	The random assignment of <a href="#">subjects</a> to <a href="#">experimental</a> and <a href="#">control groups</a> (i.e. the <a href="#">allocation</a> to groups is <a href="#">determined</a> by chance). (Project Gold - Research Methods Glossary, [S.a.]:online)
<b>RANDOM SAMPLING</b>	A <a href="#">process</a> of selecting a <a href="#">sample</a> whereby each member of the <a href="#">population</a> has an equal chance of being included. (Project Gold - Research Methods Glossary, [S.a.]:online)  Drawing a number of items of any sort from a larger group or <a href="#">population</a> so that every individual item has a specified probability of being chosen. (Directorate for Education and Human Resources, 2002:online).  <a href="#">Random sampling</a> is a sampling technique where we select a group of subjects (a sample) for study from a larger group (a population). Each individual is chosen entirely b chance and each member of the population has a known, but possibly non-equal, chance of being included in the sample (Easton & McColl, [S.a.]:online).  A measure of variability indicating the difference between the highest and lowest <a href="#">values</a> in a distribution of scores. (Project Gold - Research Methods Glossary, [S.a.]:online)  See also: <a href="#">Confidence interval</a>
<b>RATIONAL</b>	Describing that which is supported by <a href="#">reason</a> rather than by emotion, <a href="#">experience</a> , prejudice or habit. (Craig <i>et al</i> , 1994:164)
<b>RATIO SCALE</b>	See also: <a href="#">Likert scale</a>
<b>REASON(S)</b>	That which <a href="#">explains</a> why something else happens. (Craig <i>et al</i> , 1994:166)  The <a href="#">evidence</a> or <a href="#">proof</a> which supports a claim. (Craig <i>et al</i> , 1994:166)  The power or ability to understand and form opinions. (Craig <i>et al</i> , 1994:166)
<b>REASONING</b>	See also: <a href="#">Deductive reasoning</a> See also: <a href="#">Inductive reasoning</a>
<b>RECOMMENDATIONS</b>	Suggestions for specific actions derived from analytic <a href="#">approaches</a> to the program <a href="#">components</a> . (Directorate for Education and Human Resources, 2002:online)
<b>REFLECT OR REFLECTION</b>	The action or <a href="#">process</a> of thinking, especially about thinking itself. (Craig <i>et al</i> , 1994:167)
<b>RELATION OR RELATIONSHIP(S)</b>	A connection or association between two or more things. (Craig <i>et al</i> , 1994:168)  The <a href="#">logical</a> or causal link between two or more things. (Craig <i>et al</i> , 1994:168)

<b>RELATIVE</b>	Describing that which is connected or related to something else. (Craig <i>et al</i> , 1994:169)
<b>RELEVANT</b>	Describing that which has bearing on or reference to a situation or <a href="#">context</a> . (Craig <i>et al</i> , 1994:170)
<b>RELIABILITY</b>	<p>The consistency or stability of a measure or test from one use to the next. When repeated <a href="#">measurements</a> of the same thing give identical or very similar results, the measure is said to be reliable. (Portland State University, [S.a.]:online)</p> <p>Reliability is concerned with the consistency and dependability of a measuring <a href="#">instrument</a>, i.e. it is an indication of the degree to which it gives the same answers over time, across similar groups and irrespective of who administers it. A reliable measuring <a href="#">instrument</a> will always give the same result on different occasions assuming that what is being measured has not changed during the intervening period.</p> <p>A number of techniques can be used to ensure the reliability of a standardised measuring <a href="#">instrument</a> such as an <a href="#">attitude</a> questionnaire, personality test or pressure sore risk calculator. These include test-retest, split-half and alternate forms. There are also <a href="#">statistical tests</a> that can be used to <a href="#">assess</a> reliability such as Cronbach Alpha and the Spearman <a href="#">correlation coefficient</a> test (Project Gold - Research Methods Glossary, [S.a.]:online).</p>
<b>RESEARCH</b>	A systematic <a href="#">process</a> of investigating ideas, events or phenomena to make possible the <a href="#">development</a> of <a href="#">knowledge</a> . (Craig <i>et al</i> , 1994:172)
<b>RESEARCH DESIGN</b>	The <a href="#">science</a> and art of planning <a href="#">procedures</a> for conducting studies so as to get the most <a href="#">valid</a> findings. Called " <a href="#">design</a> " for short. When <a href="#">designing</a> a <a href="#">research</a> study, one draws up a set of instructions for gathering <a href="#">evidence</a> and for <a href="#">interpreting</a> it. (Portland State University, [S.a.]:online)
<b>RESEARCH METHODOLOGY</b>	Different <a href="#">approaches</a> to systematic inquiry <a href="#">developed</a> within a particular <a href="#">paradigm</a> with associated epistemological <a href="#">assumptions</a> , e.g. <a href="#">experimental</a> research, <a href="#">grounded theory</a> , ethno-methodology. (Project Gold - Research Methods Glossary, [S.a.]:online)
<b>RESEARCH METHOD</b>	Specific <a href="#">procedures</a> used to gather and <a href="#">analyse</a> research <a href="#">data</a> . (Project Gold - Research Methods Glossary, [S.a.]:online)
<b>RESEARCH QUESTION</b>	A clear statement in the form of a question of the specific issue that a researcher wishes to answer in order to address a <a href="#">research</a> problem. A <a href="#">research</a> problem is an issue that lends itself to systematic investigation through <a href="#">research</a> . (Project Gold - Research Methods Glossary, [S.a.]:online)
<b>RESOURCES</b>	The people, equipment, and material used to complete <a href="#">tasks</a> in a project. (Microsoft Project Management, Training tutorial)
<b>RESPONSE RATE</b>	The proportion (percentage) of those invited to participate in a <a href="#">research</a> study who actually do so. (Project Gold - Research Methods Glossary, [S.a.]:online)
<b>ROLE</b>	The position or place occupied, or <a href="#">function</a> served, by a

person in the [institutional network](#) of a society. (Craig *et al*, 1994:174)

## ROOM-BASED VIDEO CONFERENCING

[Video conferencing](#) using a sophisticated [system](#). Appropriate for large groups. [Compare](#) to [desktop video conferencing](#). (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)

## SAMPLE(S)

A sample is a (representative) part of that [population](#). (Wisniewski, 1994:76)

A group of [subjects](#) selected from a larger group in the hope that studying this smaller group (the sample) will reveal important things about the larger group. (Portland State University, [S.a.]:online)

A part of the [population](#). (Directorate for Education and Human Resources, 2002:online)

## SAMPLING

A sample is a group of units selected from a larger group (the population). By studying the sample it is hoped to draw valid conclusions about the larger group. (Easton & McColl, [S.a.]:online)

Represent the entire [population](#). There are several different types of sampling, including:

[Simple random sampling](#): this probability sampling [method](#) gives each eligible element/unit an equal chance of being selected in the sample; random [procedures](#) are employed to select a sample using a [sampling frame](#).

[Systematic sampling](#): a probability sampling [strategy](#) involving the selection of participants randomly drawn from a [population](#) at fixed intervals, e.g. every 20<sup>th</sup> name from a [sampling frame](#).

[Cluster sampling](#): a probability sampling [strategy](#) involving successive sampling of units (or clusters); the units sampled progress from larger ones to smaller ones, e.g. health authority/health board, trust, senior managers.

[Convenience sampling](#): (also referred to as accidental sampling) a non-probability sampling [strategy](#) that uses the most easily accessible people (or objects) to participate in a study. [Purposive/purposeful sampling](#): a non-probability sampling [strategy](#) in which the researcher selects participants who are considered to be typical of the wider [population](#) (sometimes referred to as judgmental sampling).

[Quota sampling](#): a non-probability sampling [strategy](#) where the researcher identifies the various strata of a [population](#) and ensures that all these strata are proportionately represented within the sample to increase its representativeness.

[Snowball sampling](#): a non-probability sampling [strategy](#) whereby referrals from earlier participants are used to gather the required number of participants.

[Theoretical sampling](#): the selection of individuals within a naturalistic [research](#) study, based on emerging findings as the study progresses to ensure that key issues are

adequately represented.

(Project Gold - Research Methods Glossary, [S.a.]:online)

**SAMPLING BIAS**

Distortion that occurs when a sample is not representative of the [population](#) from which it was drawn. (Project Gold - Research Methods Glossary, [S.a.]:online)

**SAMPLING ERROR**

The fluctuation in the [value](#) of a statistic from different samples drawn from the same [population](#). (Project Gold - Research Methods Glossary, [S.a.]:online)

**SAMPLING FRAME**

A list of the entire [population](#) eligible to be include within the specific [parameters](#) of a [research](#) study. A researcher must have a sampling frame in order to generate a random sample.

**SCALE**

A group of related measures of a variable. The items in a scale are arranged in some order of intensity or importance. A scale differs from an index in that the items in an index need not be in a particular order and each item usually has the same weight or importance. (Portland State University, [S.a.]:online)

**SCHEDULE**

The timing and sequence of [tasks](#) within a project. A [schedule](#) consists mainly of [tasks](#), [task dependencies](#), [durations](#), [constraints](#), and time-oriented project [information](#). (Microsoft Project Management, Training tutorial)

**SCIENCE**

The [organised](#) activities of researchers, involving the [methods](#) used to obtain [data](#) and the [theories developed](#) to [explain](#) phenomena. (Craig *et al*, 1994:177)

Describing an [approach](#) which applies the general rules and principles of science. (Craig *et al*, 1994:177)

**SCOPE**

The combination of all project goals and [tasks](#), and the [work](#) required to accomplish them. (Microsoft Project Management, Training tutorial)

**SIGNIFICANCE LEVEL**

Established at the outset by a researcher when using [statistical analysis](#) to test a [hypothesis](#), e.g. 0.05 level or 001 [significance level](#). A [significance level](#) of 0.05 indicates the probability that an observed difference or [relationship](#) would be found by chance only 5 times out of every 100 (1 out of every 100 for a [significance level](#) of 0.01). It indicates the risk of the researcher making a Type I [error](#) (i.e. an [error](#) that occurs when a researcher rejects the null [hypothesis](#) when it is true and concludes that a statistically significant [relationship](#)/difference exists when it does not). (Project Gold - Research Methods Glossary, [S.a.]:online)

**STANDARD COMPRESSION ALGORITHM**

An [algorithm convention](#) for compression of a video signal. Adherence to standards allows [communication](#) among a wide variety of [video conferencing systems](#), though not with the same clarity as two similar [systems](#) using a [proprietary algorithm](#). [H.320](#) is the most widely accepted standard in use today. (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)

**STATISTICS**

Numerical [data](#) which are collected and [analysed](#) in order to [infer](#) trends and patterns. (Craig *et al*, 1994:182)

An estimate of a [parameter](#) calculated from a set of data gathered from a sample. (Project Gold - Research Methods Glossary, [S.a.]:online)

A statistic is a quantity that is calculated from a sample of data. It is used to give information about unknown values in the corresponding population. (Easton & McColl, [S.a.]:online)

## STATISTICAL ANALYSIS

Most statistical [analysis](#) is based on the principle of gathering [data](#) from a sample of individuals and using those [data](#) to make [inferences](#) about the wider [population](#) from which the sample was drawn. (Project Gold - Research Methods Glossary, [S.a.]:online)

## STATISTICAL INFERENCE

A [procedure](#) using the laws of probability to [infer](#) the attributes of a [population](#) based on [information](#) gathered from a sample. (Project Gold - Research Methods Glossary, [S.a.]:online)

## STATISTICAL SIGNIFICANCE

A term used to indicate whether the results of an [analysis](#) of [data](#) drawn from a sample are unlikely to have been caused by chance at a specified level of probability (usually 0.05 or 0.01). (Project Gold - Research Methods Glossary, [S.a.]:online)

## STATISTICAL TEST(S)

A statistical [procedure](#) that allows a researcher to [determine](#) the probability that the results obtained from a sample [reflect](#) true [parameters](#) of the underlying [population](#). (Project Gold - Research Methods Glossary, [S.a.]:online)

## STRATEGY

A carefully thought out plan aimed at a particular result or goal. (Craig *et al*, 1994:184)

A systematic plan of action to reach predefined goals. (Directorate for Education and Human Resources, 2002:online)

See also: [Define](#)

## STRUCTURED INTERVIEW

The interviewer asks the respondents the same questions using an [interview schedule](#) - a formal [instrument](#) that specifies the precise wording and ordering of all the questions to be asked of each respondent. (Project Gold - Research Methods Glossary, [S.a.]:online)

An [interview](#) in which the interviewer asks questions from a detailed guide that contains the questions to be asked and the specific areas for probing. (Directorate for Education and Human Resources, 2002:online)

## SUBJECT(S)

An individual that is studied. (Portland State University, [S.a.]:online)

A term most often used in positivist [research](#) to [describe](#) those who participate in [research](#) and provide the [data](#). (Project Gold - Research Methods Glossary, [S.a.]:online)

See also: [Anonymity](#)

## SUMMARY

An abbreviated piece of writing. (Craig *et al*, 1994:188)

To rewrite or rephrase something in condensed or abbreviated form. (Craig *et al*, 1994:188)

A short restatement of the main points of a report. (Directorate for Education and Human Resources, 2002:online)

See also: [Abstract](#)

## SUMMATIVE EVALUATION

[Evaluation designed](#) to present [conclusions](#) about the merit or worth of an [intervention](#) an [recommendations](#) about whether it should be retained, altered, or eliminated. (Directorate for Education and Human Resources, 2002:online)

See also: [Assess or assessment](#)

See also: [Evaluate or evaluation](#)

See also: [Impact evaluation](#)

See also: [Implementation evaluation](#)

See also: [Formative evaluation](#)

See also: [Mixed method evaluation](#)

See also: [Performance evaluation](#)

See also: [Planning evaluation](#)

See also: [Qualitative evaluation](#)

See also: [Quantitative evaluation](#)

See also: [Triangulation](#)

## SURVEY

A [research design](#) is which a sample of [subjects](#) is drawn from a [population](#) and studied (usually interviewed) to make [inferences](#) about the [population](#). This [design](#) is often contrasted with the true [experiment](#) in which [subjects](#) are randomly assigned to [conditions](#) or treatments. (Portland State University, [S.a.]:online)

## SURVEY RESEARCH

A [research approach designed](#) to collect systematically [descriptions](#) of existing phenomena in order to [describe](#) or [explain](#) what is going on; [data](#) are obtained through direct questioning of a sample of respondents. (Project Gold - Research Methods Glossary, [S.a.]:online)

## SYNCHRONOUS

No or very small time differences (Van Oostendorp and Arnold, [ S.a.]:77)

Happens at the same time. (Bosman *et al*, 1999:1244)

## SYSTEM(S) OR SYSTEMATIC

The way in which a set of related or connected parts is [organised](#). (Craig *et al*, 1994:190)

## TABLE

A set of columns that shows specific [information](#) about [tasks](#), [resources](#), and assignments in a sheet view. (Microsoft Project Management, Training tutorial)

## TASK(S)

An activity that has a beginning and an ending. The completion of a [task](#) is important to the project's completion. Projects are made up of [tasks](#). (Microsoft Project Management, Training tutorial)

## TASK DEPENDENCIES

The nature of the [relationship](#) between two linked [tasks](#). You link [tasks](#) by defining a dependency between their finish and start dates. E.g., the "Contact caterers" [task](#) must finish before the start of the "Determine menus" [task](#). There are four kinds of [task dependencies](#) in Microsoft Project:

### Task

#### dependency      Example Description

Finish-to-start      (FS)      Task (B) cannot start until task

(A) finishes.  
 Start-to-start (SS) Task (B) cannot start until task (A) starts.  
 Finish-to-finish (FF) Task (B) cannot finish until task (A) finishes.  
 Start-to-finish (SF) Task (B) cannot finish until task (A) starts.  
 (Microsoft Project Management, Training tutorial)

**TECHNOLOGY**

Technology involves applying [knowledge](#) and understanding, skills, and awareness to address specific needs and achieve human goals by means of investigating ([researching](#)), [designing](#), [developing](#) and evaluating [products](#), [processes](#) and [systems](#) (Sadie, 2003).

**TELECONFERENCING**

Teleconferencing [systems](#) can broadly be classified as:

- (a) **Video conferencing systems:** conferencing with video feedback of the participants. [Video conferencing](#) enables participants to see and hear each other.
- (b) **Text conferencing systems:** participants communicate by typing their contributions on a keyboard without video feedback. (Van Oostendorp and Arnold, [S.a.]:75 - 76)

**THEME(S)**

A recurring issue that emerges during the [analysis](#) of [qualitative data](#). (Project Gold - Research Methods Glossary, [S.a.]:online)

**THEORY or THEORIES**

In idealised form, a body of law-like generalisations [logically](#) linked to one another to [explain empirical](#) phenomena. (Craig *et al*, 1994:193)

An ordered set of ideas, [assumptions](#) and concepts which tells us something about the world, ourselves or an aspect or reality. (Craig *et al*, 1994:193)

In its most general sense a [theory describes](#) or [explains](#) something. Often it is the answer to 'what', 'when', 'how' or 'why' questions. (Project Gold - Research Methods Glossary, [S.a.]:online)

**TRIANGULATION**

This term is used in a [research context](#) to [describe](#) the use of a variety of [data](#) sources or [methods](#) to [examine](#) a specific [phenomenon](#) either simultaneously or sequentially in order to produce a more accurate account of the [phenomenon](#) under investigation. (Project Gold - Research Methods Glossary, [S.a.]:online)

In an [evaluation](#), [triangulation](#) is an attempt to get a fix on a [phenomenon](#) or [measurement](#) by [approaching](#) it via several (three or more) independent routes. This effort provides redundant [measurement](#). (Directorate for Education and Human Resources, 2002:online)

- See also: [Assess or assessment](#)
- See also: [Evaluate or evaluation](#)
- See also: [Impact evaluation](#)
- See also: [Implementation evaluation](#)
- See also: [Formative evaluation](#)
- See also: [Mixed method evaluation](#)

See also: [Performance evaluation](#)  
See also: [Planning evaluation](#)  
See also: [Qualitative evaluation](#)  
See also: [Quantitative evaluation](#)  
See also: [Summative evaluation](#)

## TRUSTWORTHINESS

A term used to [describe](#) whether naturalistic [research](#) has been conducted in such a way that it gives the reader confidence in the findings. It can be [assessed](#) using the following [criteria](#):

- (a) [Credibility](#): With its connotations of 'truth', credibility can be [compared](#) with [internal validity](#) in positivist [research](#). A study's credibility is said to be confirmed when the reader recognises the situation [described](#) by a [research](#) study as closely related to their own [experience](#) (sometimes referred to as confirm ability).
- (b) [Dependability](#): The dependability of a study is [evaluated](#) if it meets the associated criterion of audit ability. Audit ability is achieved when a researcher provides a sufficiently clear account of the [research process](#) to allow others to follow the researcher's thinking and [conclusions](#) about the [data](#) and thus [assess](#) whether the findings are dependable.
- (c) [Transferability](#): Equivalent to [external validity](#) in positivist [research](#) (it may also be referred to as applicability). A study is said to be transferable if the findings 'fit' [contexts](#) beyond the immediate study situation. In order to transfer the findings elsewhere, readers need sufficient [information](#) to be able to [assess](#) the extent to which a specific [research](#) setting is similar to other settings. (Project Gold - Research Methods Glossary, [S.a.]:online)

## UNSTRUCTURED INTERVIEW

The researcher asks open-ended questions which give the respondent considerable freedom to talk freely on the topic and to [influence](#) the direction of the [interview](#) since there is no predetermined plan about the specific [information](#) to be gathered from those being interviewed. (Project Gold - Research Methods Glossary, [S.a.]:online)

See also: [Determine](#)

## UTILISATION OF (evaluations)

Use and impact are terms used as substitutes for utilisation. Sometimes seen as the equivalent of implementation, but this applies only to [evaluations](#) that contain [recommendations](#). (Directorate for Education and Human Resources, 2002:online)

## VALID, VALIDATE OR VALIDITY

In its general sense, describing that which is legitimate or acceptable. (Craig *et al*, 1994:201)

Describing an argument in which the conclusion fits or accords with the premises. (Craig *et al*, 1994:201)

To confirm or make something [valid](#). (Craig *et al*, 1994:201)

A term to [describe](#) a [measurement instrument](#) or test that measures what it is supposed to measure; the extent to which a measure is free of systematic [error](#). E.g., a bathroom scale provides a reliable measure cannot give a

	<p><a href="#">valid</a> measure of height. (Portland State University, [S.a.]:online)</p> <p>The soundness of the <a href="#">inferences</a> made from the results of a <a href="#">data</a>-gathering <a href="#">process</a>. (Directorate for Education and Human Resources, 2002:online)</p> <p>In <a href="#">research</a> terms <a href="#">validity</a> refers to the <a href="#">accuracy</a> and truth of the findings and <a href="#">research</a>. (Project Gold - Research Methods Glossary, [S.a.]:online)</p>
<b>VALUE(S)</b>	<p>The usefulness, worthiness or desirability of something. (Craig <i>et al</i>, 1994:202)</p>
<b>VARIABLES</b>	<p>That which is considered important or good by individuals and society. (Craig <i>et al</i>, 1994:202)</p> <p>The term variables refers to whatever <a href="#">characteristic</a> we are investigating or analysing. So, e.g. the variable in question might relate to company profits, number of employees, salaries, length of service, customer <a href="#">attitudes</a> and so on. (Wisniewski, 1994:76)</p> <p>An attribute or <a href="#">characteristics</a> of a person or an object that takes on different <a href="#">values</a> (i.e. that varies) within the <a href="#">population</a> under investigation, e.g. age, weight, pulse rate. (Project Gold - Research Methods Glossary, [S.a.]:online)</p> <p>See also: <a href="#">Criteria Ro Criterion</a></p>
<b>VERIFY</b>	<p>To test the truth or <a href="#">accuracy</a> of something by obtaining <a href="#">proof</a> or supporting <a href="#">evidence</a>. (Craig <i>et al</i>, 1994:203)</p>
<b>VERIFICATION</b>	<p>Revisiting the <a href="#">data</a> as many times as necessary to cross-check or confirm the <a href="#">conclusions</a> that were drawn. (Directorate for Education and Human Resources, 2002:online)</p>
<b>VIDEO BRIDGE</b>	<p>Computerized switching <a href="#">system</a> which allows <a href="#">multipoint video conferencing</a>. (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)</p>
<b>VIDEO CONFERENCING</b>	<p>See also <a href="#">Teleconferencing</a> and <a href="#">video teleconference</a>.</p> <p>A <a href="#">teleconference</a> that includes video <a href="#">communications</a>.</p> <p>Pertaining to a two-way electronic <a href="#">communication system</a> that permits two or more persons in different locations to engage in the equivalent of face-to-face audio and video <a href="#">communications</a>. Note: Video teleconferences may be conducted as if all of the participants were in the same room. (Telecom Glossary, [S.a.]:online)</p> <p><a href="#">Communications</a> across long distances with video and audio contact that may also include graphics and <a href="#">data</a> exchange. (Pacific Bell - Videoconferencing Glossary, [S.a.]:online)</p> <p><b>NOTE:</b> Certain sources spell <a href="#">video conferencing</a> as <a href="#">videoconferencing</a>. For the <a href="#">purpose</a> of this thesis, the spelling throughout the documentation will be spelt as <a href="#">video conferencing</a> (two words) unless directly quoted.</p>
<b>VIEW(S) OR VIEWPOINT(S)</b>	<p><u>Literally:</u> The position, angle or <a href="#">perspective</a> from which you look at something. (Craig <i>et al</i>, 1994:203)</p>

Figuratively: An [approach](#), way of thinking or outlook. (Craig *et al*, 1994:203)

The combination of one or more [views](#) ([Gantt Chart](#), Resource Sheet, and so on) and, if applicable, a [table](#) and a [filter](#). Using [views](#), you can enter, organise, and [examine information](#) in a variety of formats.

There are three types of [views](#):

- (a) [Charts or graphs](#) represent [information](#) graphically. The [Gantt Chart](#), [Network Diagram](#), Resource Graph, and Calendar [views](#) are charts or graphs.
- (b) Sheets represent [information](#) in rows and columns. Each row contains [information](#) about an individual [task](#) or resource. Each column contains a [field](#) where you enter specific [information](#) about [tasks](#) or [resources](#). (Columns in Microsoft Project are typically referred to as [fields](#).)
- (c) Forms represent [information](#) in a format similar to a paper form. Forms show [information](#) about only one [task](#) or resource at a time. (Microsoft Project Management, Training tutorial)

## WAN

Wide Area Network

## WORK

For [tasks](#), the total labour or "person-hours" required (in terms of minutes, hours, days, weeks, or months) for all [resources](#) to complete a [task](#). For assignments, the amount of [work](#) to which a resource is assigned for a specific [task](#). For [resources](#), the total amount of [work](#) to which a resource is assigned for all [tasks](#). [Work](#) is different from [task duration](#). E.g., a resource may require 32 hours of [work](#) to complete a [task](#), but the [task](#) may be [scheduled](#) with a [duration](#) of 2 days. This indicates that more than one resource needs to be assigned to this [task](#), namely two. Working 8 hours a day on the [task](#), two people would complete the [task](#) in 2 days. (Microsoft Project Management, Training tutorial)

## WORK STUDY

The systematic examination of a job or operation, embracing method study and [work](#) measurement, and aiming at increased effectiveness, greater economy of time, material and effort, and hence lower costs. (Odendaal, 1984:209)

## ANNEXURE A

### QUESTIONNAIRE AMONG VIDEO CONFERENCING NETWORK MANAGERS

Questionnaires can be returned by faxing it to (012) 335-4373 or via email: [sadie@ibi.co.za](mailto:sadie@ibi.co.za)

<b>Answer the following questions by stating to what extent each of the following statements are applicable to <u>your own</u> video conferencing * (VC) environment/experience and not to the ideal situation that you want to function in</b>		1: Not applicable at all 2: Applicable to a very small extent 3: Applicable to an average extent 4: Applicable to a high extent 5: Applicable to a very high extent				
* VC is used as an abbreviation for video conferencing throughout this questionnaire		LOW		HIGH		
Implementing our video conferencing (VC) network, ....		1	2	3	4	5
1	..., VC was defined as a strategic initiative of our organisation.					
2	..., the purpose (goals and objectives) of our VC network was documented with a specific vision and mission statement.					
3	..., the involvement of senior management was essential.					
4	..., the involvement of middle management was essential.					
5	..., the involvement of lower management was essential.					
6	..., VC equipment suppliers did partake in the formulation of a managerial (business and operational) strategy to ensure a successful VC network.					
7	..., a pilot/trail project was used to test the implemented VC network.					
8	..., a project team was appointed to implement VC.					
9	..., a needs/SWOT analysis supported the formulation of project criteria.					
10	..., a holistic approach toward VC planning was applied. Cross-departmental planning included data/ telephony networks, training, acoustics, lighting, furniture and ergonomic designers as well as audiovisual specialists.					
11	..., a quality manager was appointed to ensure that the project was implemented according to set standards and project specifications.					
12	..., quality manuals were compiled that included minimum implementation standards, managerial guidelines, training for users and maintenance staff and evaluation criteria to measure outputs.					
13	..., an implementation strategy was compiled by documenting a project plan.					
14	..., a technology plan was defined on how VC will be replaced and upgraded after installation, e.g., after three years.					
15	..., a business plan was formulated before starting with the implementation.					
16	..., the business plan was designed around specific managerial strategies, e.g. Project, Process, System or Operation Management.					
17	..., the maintenance strategy included a Service Level Agreement (SLA) with the equipment supplier.					
18	..., management tools were applied to support the activities of implementation, available resources, people and budgets, e.g. Gantt charts, project plans and project proposals.					
19	..., communication and authority structures, e.g. who report to whom and how often were defined before starting on the planning of your VC network.					
20	..., decision powers were granted to the responsible implementation individual or project team..					

<b>Answer the following questions by stating to what extent each of the following statements are applicable to <u>your own</u> video conferencing * (VC) environment/experience and not to the ideal situation that you want to function in</b>  * VC is used as an abbreviation for video conferencing throughout this questionnaire		1: Not applicable at all 2: Applicable to a very small extent 3: Applicable to an average extent 4: Applicable to a high extent 5: Applicable to a very high extent				
		LOW		HIGH		
Implementing our video conferencing (VC) network, ....		1	2	3	4	5
21	..., sub-project teams developed operational strategies, e.g. training.					
22	..., a motivational strategy was required to ensure participation of VC users.					
23	..., a marketing strategy was required to ensure a return on our investment.					
24	..., policies were changed to ensure participation of VC users, e.g. travel allowances were cut or minimized because of the availability of VC to ensure higher usage of the newly implemented VC network.					
25	..., incentives, e.g. sharing by employees in the saving of travel time/budgets by the organisation helped to increase the usage of the VC network.					
26	..., a project starting and ending time for installation was defined.					

<b>Evaluate the <u>success rate</u> of <u>your own</u> video conferencing network, by answering the questions to what extent the following criteria add to the success rate of your video conferencing network</b>		1: Not applicable at all 2: Applicable to a very small extent 3: Applicable to an average extent 4: Applicable to a high extent 5: Applicable to a very high extent				
		LOW		HIGH		
Our VC network is successful because ...		1	2	3	4	5
27	..., VC supported and enhanced the strategic objectives of my organisation.					
28	..., our VC network is financially viable.					
29	..., the operational strategy supports short and long term operational objectives.					
30	..., marketing strategy ensures frequent use of the network - limited down time.					
31	..., no or few interruptions during transmissions are experienced.					
32	..., user and technical training ensure quality presentations.					
33	..., a needs and SWOT analysis helped to design project specifications.					
34	..., authority structures and allocated people take responsibility for tasks/actions					

Thank you for your participation in assisting me to obtain quality data for my research. Your participation is greatly appreciated.

## ANNEXURE B

### STRUCTURED INTERVIEWS AMONG VIDEO CONFERENCING EQUIPMENT SUPPLIERS

ANSWER THE QUESTIONS WITH REGARD TO <i>YOUR OWN</i> VIDEO CONFERENCING EXPERIENCE AND NOT THE IDEAL SITUATION THAT YOU WANT TO HAVE IN PLACE		ANSWER BY THE VC EQUIPMENT SUPPLIER
1	In how many installation do you know the strategic objective of the installation?  Is it important to know the strategic objective of a potential VC network or is the installation of a VC network a generic thing with a few tailor-made applications?	%  Yes / No
2	In how many installations do you work with the following managerial groups when planning and implementing a VC network:	Senior management - % Middle management - % Lower management - % Project team/s - %
3	In how many installations do you get involved in the design and development of a business/managerial strategy for VC implementation on behalf of the client?  If yes, how and when is this process complete?	%  Yes / No
4	In how many cases are you involved to test the equipment with projects after the completion of the installation?	%
5	Who of the two (individuals or groups) implement more successful VC networks?  Do you influence the formulation of project teams - if the client does not work in project teams, do you promote this?	Teams / Groups  Yes / No
6	In how many installations do you assist the client with a scientific needs analysis before starting with the planning of a VC network?	%
7	In how many installations are you as the equipment supplier part of the project team when implementing VC?  Will your involvement increase the effectiveness of the project team?	%  Yes / No
8	On how many of the projects that you worked on, is a quality specialist part of the project team?	%
9	In how many installations did you receive a manual for installation standards from your clients before starting with the planning of a VC network?	%
10	The inclusion of a Service Level Agreement (SLA) with the clients implementation plans, does it enhance the success of their VC networks?  How many clients do include a SLA with their installation contracts?	Yes / No  %
11	How many of the clients make use of managerial tools, e.g. Gantt charts, project proposals and project plans to plan and implement a VC network?	%
12	In how many installations (before and after) do you provide the client with flow diagrams on where and how the final installation was done?	%
13	What control measures do you apply to ensure that the installation is done according to set standards, time frames and budgets?	
14	Do you think it is you as supplier's responsibility to make sure that the client knows how to manage the newly implemented VC network?	Yes / No
15	What makes a newly implemented VC network, a successful VC network?	

## CASE STUDIES

### NATIONAL AND INTERNATIONAL EVALUATIONS

#### 1. INTRODUCTION

Video conferencing networks in Australia, Europe and South Africa were evaluated before starting with this research. Six video conferencing sites were investigated. These sites included:

- 1.1 University of Melbourne (Australia)
- 1.2 Australian National University (Australia)
- 1.3 University of Nancy (France)
- 1.4 University of Valencia (Spain)
- 1.5 Standard Bank (South Africa)
- 1.6 Tshwane University of Technology (Previously Technikon Pretoria) (South Africa)

Case studies applied during this research, investigated the existing managerial processes used during their video conferencing implementation process and the effect that it had on their success rates.

#### 2. PROBLEM STATEMENT AND RESEARCH QUESTION

What would constitute a managerial process for effective video conferencing implementation and management in South Africa?

The following sub-questions need to be answered to constitute a managerial process for video conferencing implementation before the main research question can be answered:

- 2.1 What is **video conferencing** and what constitutes a **video conferencing network**?
- 2.2 What constitutes a complete **planning process**?
- 2.3 What constitutes a complete **organisational process**?

2.4 What constitutes a complete **activation and motivational process**?

2.5 What constitutes a complete **control process**?

### **3. POPULATION AND SAMPLES**

#### **3.1 UNIVERSITY OF MELBOURNE (AUSTRALIA)**

The purpose of the video conferencing network at the University of Melbourne in Australia is to support their Teleteaching (distance learning) strategy, administrative support (meetings) and connection to other campuses as well as conferences. The network consists of video conferencing venues in Melbourne that can seat from 20 - 493 people simultaneously. Additional venues over a vast geographical location include Burnley, Gilbert-Chandler, Dookie, Glenormiston, Longernong and Geelong.

The video conferencing network is a fully integrated network into existing operational and strategic strategies. In order to work over different departments, standards are documented into minimum installation and operational standards. These manuals (Colebatch, 1996:s.n.) are available for contractors, consultants etc. that needs to work on existing and future networks.

The documented manual includes how projects are structured, who are on project teams, what is the purpose of every role player on the team and also how communication, decision and authority structures formulated. The following is also part of this manual:

3.1.1 Documentation, e.g. letters for acceptance, unsuccessful tenders, final release of projects, contracts, etc.

3.1.2 Building and building design standards with regard to acoustics, lighting, disability facilities (special equipment for hearing-impaired audience members) etc.

3.1.3 Standards for furniture and final finishes.

3.1.4 Mechanical services, e.g. air conditioning, pipe works, electrical requirements, alarms, etc.

3.1.5 Communication structures, e.g. data, telephony, PABX standards include specifications, installation standards etc.

3.1.6 Occupational health and safety include ergonomic guidelines.

3.1.7 Energy management to conserve energy.

3.1.8 Audiovisual design guidelines, equipment configurations and the installation of telephone lines in every venue to ensure technical support to limit time losses during interruptions and to increase on response times.

Users receive special training before using video conferencing technology. An on-line booking system is also available to ensure that bookings are done without additional paperwork and when convenient for the users.

Video conferencing is not an extension to communication or multimedia services. Video and audio conferencing is an integral part of providing realtime and live communication infrastructures. The success rate and value added by the University of Melbourne with regard to video conferencing, helped them to receive special grants from their government. The University of Melbourne is also responsible and a member of the Australian Teleconferencing Association.

According to the case study template used for the holistic evaluation of the network, a score of **90 %** was obtained.

## **3.2 NATIONAL AUSTRALIAN UNIVERSITY**

The Australian National University (ANU) is in the centre of Canberra, capital city of Australia. As one of the main Australian universities, the ANU is equipped with a five-site video conferencing network. Although video conferencing documentation on the process used was not in place, the ANU has achieved high success levels in the use and applications of video conferencing in Australia.

Large student groups, lectures and conferences can be accommodated. Group sizes from 1 - 496 are handled in fully equipped video conferencing and state-of-the-art integrated multimedia equipment. These facilities are also used by external and community users, e.g. corporate companies. These networks are also used for meetings, interviews as well as special applications for hearing-impaired learners and conference attendees. Special focuses were given to the multimedia applications and control panels to ensure ease of use.

According to the case study template used for the holistic evaluation of the network, a score of **45 %** was obtained.

### **3.3 UNIVERSITY OF NANCY (FRANCE)**

Video conferencing was part of a strategic and operational strategy of five different universities in Europe. Before starting with the implementation of these networks, video conferencing was part of a vast research project among these institutions. The institutions (Hegarty, 1998:192-224) included:

- University College Dublin (Ireland)
- Katholieke Universitat Leuven (Belgium)
- Universite Nancy (France)
- Politecnico di Milano (Italy)
- Helsinki University of Technology (Finland)

The research before starting with video conferencing implementation, focussed on the technical as well as the teaching and learning environments. Special care was taken to design an environment away from the traditional class environment. Technology was used to design a venue that support the teaching and learning environment especially equipment that support the presenter. These environments proved to be very successful as fully interactive classrooms were developed. Although the focus was on smaller groups, every four to six students shared a monitor, making visibility easier. Microphones also created a more interactive environment using “cueing” and voice activation to follow students and therefore give every member in the audience the opportunity to participate.

Dissemination of the research project was concluded in a comprehensive manual that included the following:

3.3.1 Designing of the video conferencing venue that included lighting, security, acoustics, etc.

3.3.2 Purchasing specifications and guidelines for equipment selection.

3.3.3 Furniture selection and guidelines for installation (making provisions for cables under the tables as every table was equipped with a microphone).

3.3.4 Installation standards, checklists for installations, etc.

3.3.5 Management guidelines for technical maintenance, cleaning specifications, training and how

to manage the marketing and the appointment of people with special skills to work on video conferencing networks.

The video conferencing network among the five different countries still functions together. Special research projects and case studies are done on a continuous base to ensure a continuous process of sharing knowledge, experience and ensure that skills and venues are updated according to the existing needs of their clients.

According to the case study template used for the holistic evaluation of the network, a score of **80 %** was obtained.

### **3.4 UNIVERSITY OF VALENCIA (SPAIN)**

The University of Valencia in Spain specialises in the application of special visual communication structures especially for the hearing impaired. This institution has done extensive research on the different video conferencing and multimedia equipment that is required in a network. Special applications for teaching, learning as well as communication with deaf business environments, have been done. On-line resources for deaf people with regard to Sign Language have been made.

8 000 different signs have been documented on the Internet as an on-line directory. Both video and graphics has been used for this.

Video conferencing is the realtime and interactive medium that is used to ensure that a platform is created for people over vast distances can “talk” to each other by using signs or “finger spelling”.

Although they are leaders in this field, no documentation on the managerial processes required to design, implement or maintain such a network is available. No planning or official network design was done. Sporadic development and implementation were done according to the existing needs.

According to the case study template used for the holistic evaluation of the network, a score of **45 %** was obtained.

### **3.5 STANDARD BANK**

Standard Bank as a national provider of banking services makes use of satellite connections to transmit video images to different branches and training centres. A five-site video conferencing network was installed during 2000 to counteract as an alternative for possible Y2K problems. This network is mainly used for national and international meetings with suppliers of banking equipment. Although the five sites are ISDN connected, their focus is changing from ISDN to IP-BASED connections.

The video conferencing network started as an initiative from the Information Technology Manager with the support and funding from management. No interested and specific goals from management were set and little progress reporting was done on the implementation thereof. The installation focus of this network implementation was done with a 'trail and error' foundation. No formal strategy or process were followed during this installation. The data obtained from this video conferencing site is still valid as this is one of the biggest video conferencing networks in South Africa - video streaming is done at the moment to 10 000 users nationally.

According to the case study template used for the holistic evaluation of the network, a score of **15 %** was obtained.

### **3.6 TSHWANE UNIVERSITY OF TECHNOLOGY (SOUTH AFRICA)**

TUT in South Africa, implemented video conferencing and other educational technology as part of their strategic technology plan. The purpose of this strategic shift was to use technology to ensure that this tertiary institutions' market share is increased and also to support strategic changes from being a Technikon to become a University of Technology.

The video conferencing network consists of seven video conferencing sites. These sites included remote campuses in Pietersburg, Nelspruit and Witbank. Additional sites in Pretoria included the Arcadia Campus and also venues on the main campus. The venues on the main campus included a formal boardroom that seats 25 people, an interactive video classroom that seats 30 people and an auditorium that seat 400 people.

Video conferencing network implementation started with funds and approval of senior management. Planning phases took close to 12 months before equipment installations begin. A very formal tender process took around three months to complete as the financial specifications stated that the supplier must support own funding and that only a monthly usage fee will be paid. This excludes a lot of suppliers and only a few tenders - limited the selection and available suppliers.

No official projects were identified after the completion of the installation and two years were spent on marketing and training in the use of this technology before any main successes were achieved. The implementation process also excluded manuals during the implementation process, a specific maintenance program or upgrade strategy for new technology.

According to the case study template used for the holistic evaluation of the network, a score of **35 %** was obtained.

#### **4. RESEARCH METHODOLOGY AND DESIGN**

Case studies are defined by various researchers. Tellis (1997:online) defined case studies as an ideal methodology when a holistic, in-depth investigation is needed. McBurney (2001:214) added that case studies are an “exploratory study of an existing situation as a means of creating and testing a hypothesis”. In order to investigate existing situations, a description of the cases is required before starting with these case studies.

Meyers (1997:online) defines a case study as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and context are not clearly evident. McNamara, [S.a.]:online, states that case studies enable researchers to conduct comprehensive examination through cross comparison of cases.

SLAIS ([S.a.]:online) define case studies as “the collection and presentation of detailed information about a particular participant or small group, frequently including the accounts of subjects themselves. A form of qualitative descriptive research, the case study looks intensely at an individual or small participant pool, drawing conclusions only about that participant or group and only in that specific context. Researchers do not focus on the discovery of a universal, generalizable truth, nor do they typically look for cause-effect relationships, instead, emphasis is placed on exploration and description.”

For the purpose of this research, case studies are defined as follows:

Case studies are a methodology that gives a descriptive holistic overview over small groups where in-depth investigation is required to explore the research phenomena in order to gain empirical data to understand the phenomena and the relationship or causes and effects of the phenomena on each other.

Case study evaluation of the six video conferencing sites was concluded as follows:

- 4.1 A template was used to test the **holistic overview** of the video conferencing sites with regard to the phases of the managerial strategy and research questions. Percentage calculations are used as qualitative data to give meaning to the success rate of the video conferencing site if tested against the research questions.
- 4.2 The same template and research questions were used to test the **frequency** with which the different phases and aspects are used in existing video conferencing managerial strategies. The frequency gives an indication on the importance of every phase used by the different video conferencing managers.
- 4.3 Questions on the template are a **cross reference** to the research questions and focussed on the following:  
  
Planning: questions 1, 2, 3, 8, 9 and 11.  
Organising: questions 4, 5, 6, 7 and 10.  
Activation/motivation: questions 12, 16 and 17.  
Control: questions 13, 14 and 15.
- 4.4 The following **templates** were used for holistic overview and frequency testing:

**TABLE 1: CASE STUDY HOLISTIC PROCESS ANALYSIS**

DATA COLLECTION AND ANALYSING OF CASE STUDY DATA								
HOLISTIC PROCESS ANALYSIS								
CRITERIA		-	AUSTRALIA		EUROPE		SOUTH AFRICA	
		WEIGHT 100 %	University of Melbourne	ANU #	University of Nancy	University of Valencia	Standard Bank	TUT
1	Was video conferencing implementation part of the <b>strategic objectives and policies</b> of the enterprise?	5 %	✓		✓			✓
2	Was a <b>technology and business plan</b> approved before starting with the implementation?	5 %	✓	✓	✓	✓		✓
3	Were specific <b>project goals and objectives set by senior management</b> ?	10 %	✓		✓	✓		
4	Was a trained <b>project leader</b> appointed?	10 %	✓		✓			
5	Was authority and <b>decision-making powers</b> granted to this person?	5 %	✓		✓			
6	Was a <b>project team/office</b> appointed?	5 %	✓		✓			
7	Were <b>specialists</b> for venue design, multimedia integration and ISDN incorporated in the planning?	5 %	✓	✓	✓	✓	✓	✓
8	Were project <b>proposals/plans</b> developed according to budgets, time frames and resources?	10 %	✓	✓	✓	✓		✓
9	Were project and <b>installation standards</b> documented before starting with the project?	5 %	✓					
10	Was there a definite <b>process for approval</b> of the project plan?	5 %	✓	✓	✓			✓
11	Were project <b>time frames</b> set, e.g. a definite completion date?	5 %	✓	✓	✓	✓	✓	
12	Were continuous <b>progress reports</b> sent to senior management?	5 %						
13	Were project objectives measured and <b>alternative steps</b> taken to ensure that project targets and objectives are met?	5 %	✓	✓		✓		
14	Were <b>project evaluation</b> part of the implementation process?	5 %	✓		✓			
15	Were evaluation <b>standards and criteria</b> documented before starting with the project?	5 %	✓		✓			
16	Was <b>marketing</b> done during the implementation process of the network that such a network will be available?	5 %		✓				✓

CRITERIA		-	AUSTRALIA		EUROPE		SOUTH AFRICA	
		WEIGHT 100 %	University of Melbourne	ANU #	University of Nancy	University of Valencia	Standard Bank	TUT
17	Was a <b>training strategy and manuals</b> completed during the implementation phase?	5 %	✓	✓	✓	✓	✓	
<b>TOTAL</b>		<b>100 %</b>	<b>90 %</b>	<b>45 %</b>	<b>80 %</b>	<b>45 %</b>	<b>15 %</b>	<b>35 %</b>

# ANU: Australian National University

**TABLE 2: CASE STUDY FREQUENCY ANALYSIS**

DATA COLLECTION AND ANALYSING OF CASE STUDY DATA									
FREQUENCY ANALYSIS									
CRITERIA		AUSTRALIA		EUROPE		SOUTH AFRICA		TOTAL	
		University of Melbourne	ANU #	University of Nancy	University of Valencia	Standard Bank	TUT	FREQUENCY	WEIGHT
1	Was video conferencing implementation part of the <b>strategic objectives and policies</b> of the enterprise?	✓		✓			✓	3	50 %
2	Was a <b>technology and business plan</b> approved before starting with the implementation?	✓	✓	✓	✓		✓	5	83.3 %
3	Were specific <b>project goals and objectives set by senior management</b> ?	✓		✓	✓			3	50 %
4	Was a trained <b>project leader</b> appointed?	✓		✓				2	33.3 %
5	Was authority and <b>decision-making powers</b> granted to this person?	✓		✓				2	33.3 %
6	Was a <b>project team/office</b> appointed?	✓		✓				2	33.3 %
7	Were <b>specialists</b> for venue design, multimedia integration and ISDN incorporated in the planning?	✓	✓	✓	✓	✓	✓	5	83.3 %
8	Were project <b>proposals/plans</b> developed according to budgets, time frames and resources?	✓	✓	✓	✓		✓	5	83.3 %

CRITERIA		AUSTRALIA		EUROPE		SOUTH AFRICA		TOTAL	
		University of Melbourne	ANU #	University of Nancy	University of Valencia	Standard Bank	TUT	FREQUENCY	WEIGHT
9	Were project and <b>installation standards</b> documented before starting with the project?	✓						1	16.6 %
10	Was there a definite <b>process for approval</b> of the project plan?	✓	✓	✓			✓	4	66.6 %
11	Were project <b>time frames</b> set, e.g. a definite completion date?	✓	✓	✓	✓	✓		5	83.3 %
12	Were continuous <b>progress reports</b> sent to senior management?							0	0 %
13	Were project objectives measured and <b>alternative steps</b> taken to ensure that project targets and objectives are met?	✓	✓		✓			3	50 %
14	Were <b>project evaluation</b> part of the implementation process?	✓		✓				2	33.3 %
15	Were evaluation <b>standards and criteria</b> documented before starting with the project?	✓		✓				2	33.3 %
16	Was <b>marketing</b> done during the implementation process of the network that such a network will be available?		✓				✓	2	33.3 %
17	Was a <b>training strategy and manuals</b> completed during the implementation phase?	✓	✓	✓	✓	✓		5	83.3 %

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## 5. CONCLUSIONS AND RECOMMENDATIONS

5.1 The case study to get a **holistic overview** of the success rate according to the questions for the different video conferencing sites, were as follows:

**TABLE 6.3: HOLISTIC EVALUATION OF CASE STUDIES**

INSTITUTION	RATING
University of Melbourne (Australia)	90 %
Australian National University (Australia)	45 %
University of Nancy (France)	80 %
University of Valencia (Spain)	45 %
Standard Bank (South Africa)	15 %
Tshwane University of Technology (South Africa)	35 %

Both the University of Melbourne and Nancy implemented their video conferencing sites with defined managerial strategies. Using the questions in the case study to evaluate their published documentation, both institutions scored very high indicating a that planning, organising, activation and control need to be part of the whole process.

5.2 Analysing the questions according to the different phases namely planning, organising, activation and control, the following data was obtained:

- **Planning: 61 %** of the sites plan effectively. Planning is one of the main phases when implementing a project. If fewer mistakes are made during this phase, better results are obtained and objectives will be met.
- **Organising: 33.3 %** define communication structures, appoint knowledgeable project leaders and teams and specialists to ensure that different skills are obtained to ensure that all aspects are covered in the project.
- **Activation: 38.86 %** sees that progress reports, marketing and training are essential and that different levels and departments of the organisation needs to be involved.
- **Control: 38.46 %** defined control standards or implement measurements to ensure that objectives are measured in order to take alternative steps in case of deviation from project goals.

5.3 The following conclusions were also drawn from the information that needs to be rectified in the proposed managerial strategy:

5.3.1 Fifty percent video conferencing sites were included in the strategic planning.

5.3.2 Fifty percent set goals for the video conferencing implementation. 83.3 % state that project, business and technology plans are developed for implementation. Defining a project plan

include goal, target and objective setting according to specific time frames, budgets and resources. The difference indicates that there is a problem that needs to be rectified in the proposed managerial strategy.

5.3.3 Thirty three point three percent of the sites were implemented by using a knowledgeable project leader and project teams.

5.3.4 Sixteen point six percent defined installation standards before starting with the implementation of the network.

5.3.5 Thirty three point three percent defined evaluation criteria and only 50 % made alternative steps during the implementation process.

5.3. Sixty percent updated management of the progress of the project. 50 % state that video conferencing is part of the strategic objectives. The management of strategic objectives is the responsibility of senior management. If there is a problem, this needs to be rectified in the proposed managerial strategy.

5.3.7 Eighty three point three percent indicated that specialists are included in the project teams. Only 33.3 % indicated that marketing was done. As part of the proposed managerial strategy, marketing needs to be included and will be rectified in the proposed managerial process.

5.4 Project Gold (2002:online) also indicates that the researcher may subsequently make **further observations to test the developed** categories/theory, e.g. video conferencing users that will be tested by means of questionnaires. These questionnaires will be open-ended questions to enable users to explain in their own words. Structured interviews will be closed-ended questions to limit the respondents to certain alternatives to make measurement and comparing of the answers possible.

Qualitative data obtained from the research will be used to design and develop a managerial strategy for video conferencing implementation. This will be tested by means of structured interviews to video conferencing equipment suppliers and questionnaires to video conferencing managers.

## 6. CONCLUSION

The qualitative data obtained gives a clear indication that existing video conferencing networks need more structure for their planning, organising, motivation and control processes. The

percentages of the holistic overviews state that improvement is possible to ensure that new and existing managerial strategies are improved to ensure that objectives are achieved in shorter time frames and according to standards.

**ONLY THOSE WHO HAVE THE PATIENCE  
TO DO SIMPLE THINGS PERFECTLY,  
WILL ACQUIRE THE SKILL TO DO  
DIFFICULT THINGS EASILY**

*Friedrich von Schiller*