

Chapter 3 Research Methodology

"Not everything that counts can be counted and not everything that can be counted counts."

Einstein

3.1 Introduction

This chapter commences with an explanation of the philosophical assumptions of the researcher which influence the research process and interpretation of the results. This is followed by a discussion about the planning of the research. Thereafter a detailed explanation is given about the research techniques, the research population and the research participants. The chapter concludes with a summary.

3.2 Philosophical disposition

This research constitutes an integral investigation into a complex information system in which the organization, information and communication technology, the employees and the society each play an important role, are interconnected and influence each other (Roode, 1999) as is discussed in chapter two. The research design reflects this complexity.

Since the philosophical assumptions of the researcher influence the research design and practice (Hodgkinson-Williams, 2006), it is important to indicate that the philosophical view underpinning this research is critical realist. Ontologically the researcher believes that knowledge and a social reality do exist separately and independently of the individual consciousness, but that this reality can be influenced by the perceptions and cognition of the individuals and societies (Benton & Craib, 2001). Reality cannot be researched in isolation from the individuals and the context in which the individuals are dealing with this reality, since their subjective opinions influence their behaviour and hence could change that reality (Wester & Peters, 2004).

Epistemologically the researcher uses initially a relativist approach towards this research, since in the context of this research the purpose of information systems and the use of ICT are in its essence to contribute towards meaningful work for the officer in order to benefit the Netherlands Defence Organization (NLDO). The researcher believes that it is important to study the impact of ICT and the information society on the labour environment of the officers as well as the ICT competencies from the point of view of the employees directly involved by means of qualitative research methods in order to establish the attitudes of the officers based on their subjective interpretations of the organization, the technology and the information society and how they are influenced by those aspects (Nobre, 2002).

However in order to come closer to the reality that exists outside the employees, their experiences, knowledge and attitudes, a realist approach was used to complement the results of the qualitative research by the results of a survey using a questionnaire that was analyzed using quantitative research techniques, since the mental models of the researcher as well as the participating officers are not necessarily a complete or correct interpretation of reality (Benton & Craib, 2001; Vennix, 2003; Sayers, 1985). In this way a balance is sought between the subjectivity of interpreting qualitative results with the relative objectivity of quantitative research and as such the research is not conducted solely from one of the quadrants described by Burrell & Morgan (1979) where subjectivism is placed diametrically against objectivism and relativism is placed diametrically against realism. As such a combination of qualitative and quantitative research techniques is used in order to obtain a more complete result than which could have been achieved by using either one of the techniques on its own (Nau, 1995). Triangulation in this research can thus be seen as a strategic combination of a number of research methods in order to illuminate and involve perhaps different facets of reality (Wester & Peters, 2004).

The researcher believes that change is built into the essence and structure of the information society and explanations are sought in a cyclic relationship between the officers of the NLDO and their use of and attitude towards the technology, the context of their work situation, the leadership role they play regarding the flow of information in the

context of the information society and what the implication thereof is for the development needs of the officers in training and the officers currently working in the NLDO. On the other hand it is envisaged that the officers will reflect about and influence the use and attitude towards dealing with information using the technology and in the process influence the organizational culture in this regard (Robbins & Coulter, 2003). Perhaps the paradigms as described by Burrell & Morgan (1979) are not necessarily mutually exclusive but could be seen as different perspectives on the social world in which we live and work and thus could co-exist.

A case study is justifiable since a military organization is in its essence different from other organizations and the relationships between the organization, the employees and the technology are sought in this specific context (Verschuren & Doorewaard, 2004). Furthermore a case study is especially suitable for research in organizations when solutions are sought to practical problems according to Wester & Peters (2004).

The research approach was selected in an attempt to deal with the multi-disciplinary nature and complexity of this research topic as follows:

The researcher believes that theoretically an objective reality does exist regarding the influence of ICT and the information society on the labour situation of officers in the NLDO, as well as what the ICT- and ICT-related competencies are that are required by the officers in the NLDO in order to function effectively in the information society.

Therefore it would theoretically be possible to create a conceptual model for a moment in time that contains all the ICT- and ICT-related competencies that are required by the officers in the NLDO to work effectively in the information society. Since the objective reality is influenced by the perceptions and attitudes of the individual as well as the culture of the organization as a community (Boonstra, 2005) an interpretivist perspective is appropriate as a starting perspective for this research, thereafter an attempt was made to come closer to the objective reality by means of a more structuralist perspective.

The researcher has attempted to come as closely as possible to a model of information, communication and technological competencies needed by managers in the current information society by using existing literature and a combination of quantitative and

qualitative research methods which are not seen to be mutually exclusive (Fraser, n.d.) and not opposed, but can be combined in modern social research (Nau, 1995).

The literature review is complemented with the results of the case study in the NLDO in order to obtain a version of reality at a moment in time in this organization.

The research is founded in existing theoretical literature, because it is the opinion of the author that new research especially when conducted by an inexperienced researcher has to be based on existing knowledge in order to be able to contribute to it (Baarda & de Goede, 2001; Vennix, 2003). The researcher attempted to bring together a number of theoretical concepts that are all related to the information society and technology as well as education. As a conclusion to first part of the literature review in chapter two, the author has created a conceptual model of ICT- and ICT-related competencies needed by managers in the current information society. The ICT- and ICT-related competencies as concepts were found in the literature in a variety of combinations, but seldomly as an interrelated group of competencies related to leadership.

The theoretical focus of this research is on making a contribution to the construction of theory about the influence of ICT on the labour situation of officers, including obtaining insight in their behaviour in this new labour environment as well as identifying information, communication and technological competencies needed by managers in the information society. The results of the case study are used to analyze if support is found for the theoretical model by using factor analysis. Furthermore the validity of the questionnaire as an instrument to measure ICT- and ICT-related competence is evaluated. At the same time an attempt is made to contribute to solving a practical problem in that learning environment of the officers is further refined based on a researched need identified in the NLDO. This research was conducted in a socially responsible way (Reeves, Herrington & Oliver, 2005) in that the respondents participated willingly, were properly informed about their role in the research, anonymity was ensured and the research methods are described clearly so that it can be replicated by other researchers.

3.3 Planning to answer the main research question

The main research question is:

What is the influence of ICT and the information society on the labour situation of officers in the Netherlands Defence Organization and what are the implications thereof for a digital learning environment of the officers in the Netherlands Defence Academy?

The main research question contains two parts. In the first part the focus is placed on the influence of ICT as well as the influence of the information society on the labour situation of officers in the Netherlands Defence Organization. In the second part the focus is placed on the implications of the found influence for the learning environment of the officers in the Netherlands Defence Academy.

Insight in the influence of ICT and the information society on the labour environment is obtained by asking questions about what specific ICT applications are used in the working environment (question three), how ICT is used in the working environment (question one) and what the specific ICT- and ICT-related competencies are that officers require in order to work effectively in the information society (question four and six) since Yukl (2006) indicates a need for such research. Furthermore, from the literature review it appears important to investigate if officers are confident in using ICT (Boonstra, 2005), whether they experience info-stress in their work environment as a result of using ICT (Boonstra, 2005), what the effect is of mobility in the work environment (Traxler, 2005; Kukulska-Hulme, 2005) and if using ICT in the work environment influences productivity (Boonstra, 2005) (question two). In order to determine the commitment of officers to the new ways of working in the information society and if there exists a training need for ICT- and ICT-related competencies it appears important to establish if such competencies are developed sufficiently in the working environment (Kamperman, 2005; Boonstra, 2005; Kessels, 1999) (question five and seven). Thus resulting in the following sub-questions:

1. How do officers in the NLDO use ICT in their work situation?
2. What is the influence of ICT regarding info-stress, mobility, productivity and confidence of the officers in the NLDO in their work environment?
3. What are the software applications that officers in the NLDO use in their work environment?

4. What are the ICT- competencies required by officers in the NLDO?
5. How competent are the officers in the NLDO in their own opinion regarding some of the ICT- competencies?
6. What are the ICT- related competencies that are required by officers in the NLDO?
7. How competent are the officers in the NLDO in their own opinion regarding the identified ICT- related competencies?

In order to answer the second part of the main research question: 'what are the implications thereof for a digital learning environment of the officers in the Netherlands Defence Academy', it appears important to establish what the ICT- and ICT-related competencies are that need to be developed during the initial training of officers (question eight) and how such a digital learning environment could be used to develop those competencies (question nine). If a training need exists for officers currently working in the NLDO, it is also important to consider how a digital learning environment could be used to support the development of the identified competencies for this target group (question ten). Thus resulting in the following sub-questions:

8. What are the ICT- and ICT- related competencies that need to be developed during the initial training of the officers in the NLDA?
9. How can a digital learning environment be used to support the development of the ICT- and ICT- related competencies of officers in their initial training in the NLDA?
10. How can a digital learning environment be used to support the development of the ICT- and ICT- related competencies currently working in the NLDO?

Triangulation of the research techniques used to answer the sub-questions of the main research question is illustrated in table 3.1 in matrix form.

Table 3.1 Matrix to illustrate the triangulation of research techniques used to answer the sub-questions of the main research question

Sub-questions	(Expert) interviews	Survey using a questionnaire	Focus group
1. How do officers in the NLDO use ICT in their work situation?	√	√	√
2. What is the influence of ICT regarding info-stress, mobility, productivity and confidence of the officers in the NLDO in their work environment?	√	√	
3. What are the software applications that officers in the NLDO use in their work environment?	√	√	
4. What are the ICT-competencies that are required by the officers in the NLDO?	√	√	√
5. How competent are the officers in the NLDO in their own opinion regarding some of the ICT-competencies?		√	
6. What are the ICT-related competencies that are required by the officers in the NLDO?	√	√	√
7. How competent are the officers in the NLDO in their own opinion regarding the ICT-related competencies?		√	
8. What are the ICT- and ICT- related competencies that need to be developed during the initial training of the officers in the NLDA?	√	√	√
9. How can a digital learning environment be used to support the development of the ICT- and ICT- related competencies of officers in their initial training in the NLDA?	√	√	
10. How can a digital learning environment be used to support the development of the ICT- and ICT- related competencies currently working in the NLDO?	√	√	

3.4 Expert interviews

Interviews are often used to obtain information about attitudes, opinions and knowledge (Baarda & de Goede, 2001). The advantages of personal interviews are that when one is not exactly sure about all the information that is required, it is possible to explore further in certain aspects of the context of topic. It also provides an opportunity to come to understand the context of the labour situation and information needs in the organization depending on the specific expertise of the interviewee by asking open questions around a number of themes. In-depth interviews are also used to obtain insight in the related topics from the actor's point of view (Wester & Peters, 2004) in accordance with qualitative research techniques. Twenty in-depth expert interviews were conducted with relevant policymakers and experienced officers of the NLDO in order to increase the credibility of the research (Saunders, e.a., 2004) and to obtain a global picture of the current experiences in the organization regarding ICT- and ICT-related competencies required by officers in the NLDO and how in their opinion the development of the identified ICT- and ICT-related competencies could be supported by using a digital learning environment. Insight was also obtained in the flow of information in the organization, the use of ICT by officers and the opinions, knowledge about and commitment of officers towards the NLDO in the information society and their perceived role in it.

The results thus obtained were compared with the conceptual model of ICT- and ICT-related competencies created by using existing theory. Similarities and differences were determined and the conceptual model as well as the questionnaire adjusted accordingly. This is in accordance with the qualitative research approach in which it is allowed to weave research findings in existing theories (Wester & Peters, 2004). Since the questionnaire consisted of structured and mostly closed questions, it was important to come to a deep understanding of the situation and the underlying theory beforehand in order to guarantee the validity of this part of the research (Baarda & de Goede, 2001; Vennix, 2003).

Senior officers were interviewed, since they have experience in a variety of functions and working situations. It has been a policy in the NLDO to rotate functions every three to five years. Senior officers have mostly managing functions, but have also extensive

experience in executive functions within their own fields of expertise in which they graduated. Interviews were held with employees in different types of functions. The functions are categorized according to the main activities which require different information flows as follows: policymaking and governing, personnel (inclusive of human resource management), administration and logistics, information and communication systems, planning and control (inclusive of legal control and advice), education and training, technical and electronic design and maintenance and military operational functions.

In-depth interviews were held with twenty employees with sound experience in different function areas as is illustrated in table 3.2. Care was taken to interview officers working in different sections of the Netherlands Defence Organization (navy, army, air force and military police) in order to increase the credibility of the results. The interviewees were selected by the researcher firstly based on expertise and advice from experts, secondly based on convenience.

Table 3.2 Experience of participants of the in-depth interviews

Main function area of interviewees	N
Policy making	2
Personnel	2
Administration, Logistics	2
Communication and information systems	3
Planning and control	2
Education and training	3
Technical and Electronic design and maintenance	2
Military operational	4
total	20

The semi-structured questions that were asked during the in-depth expert interviews are available in addendum two. The questions are based on the initial conceptual model of the ICT- and ICT-related competencies based on the literature review and were used to determine the opinions of the experts about the current situation in the NLDO for employees at academic working and thinking level regarding:

- The important ICT-competencies that are required, including the use of specific and generic software applications and the operational, structural and strategic use of ICT.
- The ICT-competencies that are required during operational work, for example at sea and to participate effectively internationally during peacekeeping missions.
- The role of mobile technology in supporting the information flow within the NLDO and between military partners internationally.
- The current role of the officer regarding creating a learning organization within the NLDO, the role of communities of practice, knowledge management, competency management, ICT-security awareness management and the management of change and innovation.
- The importance of univocal standards for the provision of information and ICT architecture, including software, hardware and network facilities within the NLDO and internationally between military partners as well as the current situation regarding such univocal standards.
- The way in which a digital learning environment could be used to support the development of required ICT-related competencies for officers in training in the NLDA.
- The perceived need for a digital learning environment for officers currently working in the NLDO.

The results of the in-depth interviews cannot be generalized and are used by the researcher firstly to obtain an initial insight in how the labour situation of the officers has changed as a result of ICT and the information society. Secondly to obtain insight in the ICT- and ICT-related competencies required in different function areas and in different defence organizations in order to increase the content validity of the questionnaire (Saunders, Lewis & Thornhill, 2004) and thirdly to complement the results obtained from the questionnaire in order to answer the main research question.

The interviews were conducted in a qualitative manner in that the interview questions and topics were not dictating the interview, but were rather used as discussion themes (Wester & Peters, 2004). The interviewees were allowed to discuss what they wanted to discuss in relation to the research themes.

The interviews started with a general explanation of the research area and the terms were explained in accordance with the definitions stipulated in chapter one and two. Where necessary further explanations were given during the interview. Great care was taken in recording the opinions of the interviewees correctly. During the first four interviews notes were written down by the researcher as the interview progressed, a conversation report was completed afterwards using the notes taken and sent to the interviewees for corrections and further comments.

After four interviews were held, the researcher decided that it would be an improvement to have an interactive face-to-face conversation with the interviewees and from thereon the interviews were recorded on cassette and the discussion was recorded after the interview was completed. This made it also possible to cite where appropriate and concentrate better on the discussion (Saunders, Lewis & Thornhill, 2004). The opinions of the interviewees are interpreted by the researcher, although where appropriate the direct quote of the interviewees will be used in Dutch, the language of the interviewees, followed by a translation in English. This is in accordance with qualitative research methods and is called 'the actor's point of view'. The purpose is to capture the meaning that is enclosed in the language of those involved (Wester & Peters, 2004). The interviewer tried not to influence the answers of the interviewees by making suggestions or mentioning what other interviewees had said.

The results of the in-depth interviews were analyzed in a qualitative manner. Each sub-question was considered separately. Firstly the predominant themes were identified for a sub-question. Thereafter the answers of the interviewees were compared to each other in order to obtain insight in the relative importance of the opinions about those themes. Interesting quotes that illustrated the variety of opinions were then selected for each of the identified themes. The opinions of the interviewees about the themes thus identified are discussed in chapter four for each of the sub-questions.

3.5 Group discussion of students

A semi-structured group discussion took place with nine students that had recently completed a course named 'Personnel and ICT' in which the influence of the information society and ICT on employees had been studied as well as the changes that occur in organizations as a result of ICT. The results of the focus group discussion was to obtain some insight into a student perspective in current ICT-related issues for the NLDO, the important ICT-related competencies for managers in the NLDO and what they regard as important to learn in this regard. It is recognized that those students have a limited working experience of between six months and a year practical organizational introduction in the NLDO and that they are no means representative for the student body

The following questions were discussed in the group in order to obtain a better understanding of what the students regard as relevant ICT-related issues in the organization, the ICT-related competencies and what they would have liked to learn during their study in this regard:

- What are the relevant ICT-trends for the NLDO?
- What ICT-management issues are at the moment relevant for the NLDO?
- What are the important ICT-related opportunities for the NLDO?
- What are the important ICT-related problems for the NLDO?
- In what way does the NLDO fundamentally change as a result of ICT?
- What is the influence of ICT on employees in the NLDO?
- What are the ICT-related competencies that are required by officers in the NLDO?

- Discuss how students in training could develop the identified ICT-related competencies.
- What would you have liked to learn about ICT during your study and did not?

After discussing a question, the students were asked to reach consensus on the answers and formulate one common answer for each of the questions. Those answers were written down by one of the students, resulting in a set of written answers to the discussion questions which were used to enrich the results for some of the sub-questions and can be found in chapter four.

3.6 Survey using a questionnaire

After having investigated what the opinions were of some officers in the NLDO regarding ICT-related competencies required in the information society using interviews, it was further investigated if the found opinions are also applicable to a wider community of officers of the NLDO by means of a questionnaire. Advantages of using a questionnaire are that a large sample of the research population can be reached and that statistics could be used to analyze homogeneity of the questions that are used to measure a concept, to determine relevant frequencies of responses and to determine the relative significance of the differences and correlations of the found results (Baarda & de Goede, 2001). A further dimension was added to this questionnaire in order to determine more specifically the influence of ICT on the labour situation of the officers of the NLDO in the information society.

A survey was conducted amongst officers in the NLDO. The aim of the survey was firstly to determine how officers in the NLDO use ICT in their working environment, secondly what the influence is of ICT on officers in the NLDO and thirdly to compare the conceptual model for ICT- and ICT-related competencies, initially based on existing literature and thereafter adjusted by using the results of expert interviews, with the opinions of officers, to explore the relationship between ICT- and ICT-related competencies in the model, to determine what ICT- and ICT-related competencies, in the opinion of officers, need to be developed during the initial training of officers in the NLDA including the FMW and to determine how competent the officers of the NLDO

evaluate themselves regarding establishing a learning organization, participating in a community of practice, managing knowledge and competencies, managing security awareness as well as change and innovation.

The survey was used as follows:

- To determine how the officers in the NLDO use ICT in their work situation.
- To determine what the influence of ICT and the information society is on the labour situation of officers in the NLDO regarding info-stress, mobility, productivity and confidence.
- To determine what software applications are used by officers in the NLDO.
- To determine the operational, strategic and structural ICT-competencies required by officers in the NLDO.
- To obtain insight in the competence (self-evaluation) of officers of the NLDO towards a learning organization, communities of practice, knowledge management, competency management, security awareness and change and innovation management.
- To explore similarities and differences between the opinions of the experts that are interviewed, the respondents to the questionnaire and the focus group of some students.
- To explore correlations and differences related to gender regarding the research items.
- To explore correlations and differences between the sub-organizations Royal Navy (KM), Royal Air force (Klu), Royal Army (KL) and Royal Military Police (KMar) regarding the research items.
- To explore correlations and differences between the officers of the NLDO with different fields of expertise obtained during initial training regarding the research items.
- To explore if there exist correlations and differences between officers in the NLDO who work in different function areas regarding the research items.
- The results of the questionnaire will also be compared to the conceptual model of ICT- and ICT-related competencies for officers that form a conclusion of the literature review.

- The results will also be used to explore the training needs regarding ICT- and ICT-related competencies for officers in training and officers currently working in the NLDO.

3.6.1 The development of the questionnaire for officers in the NLDO

By studying relevant literature, the results of the in-depth interviews and the conceptual model thus created, the main categories and initial structure of the questionnaire were determined. The ICT- and ICT-related competencies were operationalized using existing literature when possible in order to increase the validity of the questionnaire (Vennix, 2003). Dimensions were identified and thereafter indicators. A number of questions were then formulated based on the identified dimensions and/or indicators. The questionnaire was thereafter evaluated by colleagues and some officers of the intended research population to increase the face-validity (Vennix, 2003). Where scores of questions are totalled to obtain a single score for a dimension, a Cronbach's alpha was found to ensure that the questions that contribute to those dimensions are acceptably homogeneous. When the value of the Cronbach's alpha is ≥ 0.7 it could be argued that the questions related to a dimension are homogeneous and the scale can be seen as reliable (Baarda & de Goede, 2001). However scores > 0.6 are also commonly used in literature especially if research is exploratory (Van der Velde, Jansen & Telting, 2000; Reynaldo & Santos, 1999). When questions negatively influence the Cronbach's alpha they are removed before determining the score for the specific scale.

For the purpose of this research 'competence' is stipulated based on the ideas of Robins & Coulter (2003) as a combination of knowledge about and insight (including understanding of the importance thereof), skills and behaviour including the use of ICT as well as attitude towards (this includes opinion about and self confidence) and own perceived need for further knowledge. It is argued that attitude towards a factor influences the behaviour regarding that factor. It needs to be noted however that in all cases where competence is measured, the level of competence is not determined based on clear performance criteria as such, but on the opinion of the respondents regarding their own competence.

Competence is determined for officers of the NLDO for the following items:

- Use of ICT (operational, structural and strategic)
- Participation in establishing a learning organization, communities of practice and knowledge management
- Competency management
- ICT-security awareness management
- Change management
- Innovation management

In table 3.3 is indicated how the categories for the questionnaire were operationalized in dimensions and indicators and which questions were used to investigate the identified categories. Some questions were used in more than one category. The questionnaire is available in addendum three.

Table 3.3 Development of the questionnaire for officers of the NLDO

	Dimensions	Indicators	Item numbers
<i>Influence of ICT on labour situation of officers</i>	Info-stress		16,17,19,20,21,22,38
	Home working		13,44
	Mobility		18,23,29
	Influence on productivity		24*,31*,32*,33,35*,47*
	Confidence in using the technology		22*,25, 26, 27, 28,34, 35*, 39,42,46
Use of ICT	Use of ICT technologies	Software applications used (Since Word and Outlook are widely used they were not included in the list) Working time spend on PC. Work has changed.	15, 26, 27, 28
ICT-competencies	Operational	Knowledge about functionalities of (generic) applications, hardware and networks. Conceptual insight in ICT in order to participate effectively in decision-making in this regard.	25, 26, 27, 28, 34, 35*
	Structural	Finding quality information when needed.	31*, 32*, 36, 39, 42, 46, 47*, 81
	Strategic	Evaluating the relative importance of information.	37, 63
ICT-related competencies	Dimensions	Indicators	Item numbers
<i>Learning organization</i>	<i>Willingness to be involved</i>	Understanding the organizational value and recognizing a need for information. Addressing the information gap in organizations. Individual concern: individuals need to participate in storing and using the knowledge, sharing the knowledge, applying the knowledge and evaluating the knowledge.	Scale for learning organization: 29, 40, 41, 43, 48-59, 64, 65, 66, 67, 68, 70, 82-84.
	Knowledge management	Ability of the individual to utilize opportunities. Practical accessibility of the information in the organization. Existence of applicable information/knowledge. Knowledge of internal and external sources.	
	Communities of practice	The need for networking (sources and networks for expertise need to be identified both nationally and internationally). Usability (Work experiences and lessons learnt).	
	Attitude towards life long learning	Understanding that lifelong learning is essential.	



Table 3.3 (continued) Development of the questionnaire for officers of the NLDO

ICT-related competencies	Dimensions	Indicators	Item numbers
Competency management	Focus on organization. Focus on subordinates	Insight in competencies required in the organization (incl. requirement for functions). Insight in competences and talents of subordinates. Insight in learning and training needs. Development plan for each subordinate. Employability Use of a competency library.	60 85 89 88
ICT-Security awareness	Ensuring security of information. Encouraging information security awareness.	Holistic understanding of ICT security (exclusivity, integrity, and availability) risks in the organization. Participation in improvement of the ICT-security situation. Encouraging ICT-security awareness amongst staff.	61, 62, 70, 87
Change Management	Change exposure Communication and vision Effect of organizational culture.	Knowledge about effect of change and ability to deal with change constructively. Dealing with resistance of subordinates against change. Inspiring en motivating staff regarding the vision. Being role model in implementing the vision. Knowing the effect of the organizational culture during change.	72, 74, 77, 92
Innovation management	Autonomy Stimulation of innovative behaviour and work climate	Allowing subordinates autonomy in dealing with tasks. Allowing mistakes. Encourage subordinates to participate in generating new ideas.	69, 71, 73, 79, 86, 90, 91

*Answers to the items are recoded in order to scale them in the same direction as the answers to the other items.

The questionnaire was evaluated by three colleagues in order to increase the validity of the content and the context in accordance to research principles as described in Vennix (2003) after which the questionnaire was adjusted in accordance to the comments given. Thereafter a pilot study was conducted by handing out questionnaires in various parts of the organization to 15 members of the research population in order to improve the reliability of the questionnaire (Baarda & de Goede, 2001) by checking if the Cronbach's alphas of the intended scales were acceptable according to the criteria described earlier in this chapter and to make sure that the questions were understandable and understood in the same way as intended. The participants of the pilot study were selected from the research population on the basis of convenience. The questionnaire was thereafter adjusted according to statistical findings and comments of the participants in the pilot. An expert in quantitative research methods has checked if the statistical methods were used appropriately.

The responses to the questionnaire were analyzed in a quantitative manner using the statistical package SPSS version 12 and 13. An extended version of the statistical analysis done is available per item in addendum four. Only significant results are included in this addendum. A confidence interval of 95% was used, meaning that if $p \leq 0.05$ it could be argued with 95 % certainty that differences and correlations found in the sample will also apply to the research population (Huizingh, 2004). When the statistical analysis was done using the One-way Anova and a significant difference between groups was thus established, the results were further analyzed using the PostHoc tests LSD to investigate further between which groups specifically the significant differences are found.

Although the researcher had taken care in controlling the completeness of the questionnaire, three respondents indicated that the last page of the questionnaire was omitted. The statistical application SPSS will disregard the answers of those respondents where the measured outcomes are affected by the omitted answers, which means that for some analyses $N < 246$. The data-entries were verified in order to ensure correctness and thus ensuring the validity of the research results in this regard (Huizingh, 2004). Hereafter a frequency analysis was done in order to check omitted or unexpected answers. Where answers were not answered by the respondents, the data-entry was left blank.

3.6.2 The research population

The research population for the survey is officers working in the NLDO. It was decided to select officers from the ranks of subaltern officer (lieutenants) to colonel. Military officers with higher rankings are relatively few and do specialized work for which they follow special managerial development programs. The level of specialization required for military staff with higher rankings is not developed at the military academy of the NLDO, but in specialized higher management training programmes.

3.6.3 Selecting a representative sample of the research population

A random sample of 700 officers from the research population was taken from the list of officers currently working in the NLDO and in accordance with the described research population by an independent research organization within the NLDO. Each of the thus selected employees received a questionnaire at their home address. The questionnaire was returned by 246 respondents. This constitutes 35% of the sample, which is slightly more than the response rate of 30% which can normally be expected from a posted questionnaire according to Saunders e.a. (2004). No non-response analysis was done and no measures were taken to increase the response rate further. The realized sample was found to be sufficiently representative as is illustrated in table 3.4.

The responses to the questionnaire were analyzed in a quantitative manner using the statistical package SPSS version 12 and 13. An extended version of the statistical analysis done is available per item in addendum four. Only significant results are included in this addendum. A confidence interval of 95% was used, meaning that if $p \leq 0.05$ it could be argued with 95 % certainty that differences and correlations found in the sample will also apply to the research population (Huizingh, 2004). When the statistical analysis was done using the One-way Anova and a significant difference between groups was thus established, the results were further analyzed using the PostHoc tests LSD to investigate further between which groups specifically the significant differences are found.

Although the researcher had taken care in controlling the completeness of the questionnaire, three respondents indicated that the last page of the questionnaire was omitted. The statistical application SPSS will disregard the answers of those respondents where the measured outcomes are affected by the omitted answers, which means that for some analyses $N < 246$. The data-entries were verified in order to ensure correctness and thus ensuring the validity of the research results in this regard (Huizingh, 2004). Hereafter a frequency analysis was done in order to check omitted or unexpected answers. Where answers were not answered by the respondents, the data-entry was left blank.

3.6.4 Background information of the respondents

In the following section the background information of the respondents to the questionnaire is analyzed. The results are illustrated in table 3.4. In the last column of this table can be seen that the respondents are fairly representative in comparison to the research population and therefore it was decided not to use a weighting factor in the statistical analysis. It needs to be noted that the survey was done during June and July 2006 and actual numbers of the research population were obtained in January 2007.

Table 3.4 Background information of the respondents to the questionnaire

Variable	Categories	Frequency	Percentage	Percentage of officers in service January 2007 N=9143
Sex	Male	220	89.4%	92%
	Female	26	10.6%	8%
Total		246	100%	100%
Contract	Full-time	241	98%	*
	Part-time	5	2%	
Total		246	100%	
Defence sub- organization	Royal Army	101	41.1%	46.6%
	Royal Air force	68	27.6%	26.1%
	Royal Navy	58	23.6%	20%
	Royal Military Police	19	7.7%	7.3%
Total		246	100%	100%
Rank	Subaltern	114	46.3%	51.4%
	officers (excl. Students)			
	Head officers	67	27.2%	48.6%
		51	20.7%	
Total	14	5.7%	100%	100%

*Not applicable. Since the type of contract 'part-time' contains only five respondents and a positive correlation is found between sex and contract, the researcher decided not to include this item in the rest of the research.

In table 3.5 the frequencies are indicated for the categories that describe the main activities in the current function of the respondents to the questionnaire. The selection of categories was based on expected difference in information flows and needs. It is important to note however that the function of an officer in the NLDO often requires activities in a combination of the mentioned function areas.

Two of the respondents emphasized this by in addition to selecting a particular function area also writing next to the option 'other': *"Een mengelmoes van bovenstaande punten"* [A mixture of above points].

Table 3.5 Main function area of the respondents to the questionnaire

Main function area of respondents	Frequency	Percentage
Policy and governing	20	8.1%
Personnel, human resource management	29	11.8%
Administration, logistics	35	14.2%
Information and communication systems	24	9.8%
Planning and control, incl. legal issues	22	8.9%
Education and training	36	14.6%
Technical and electronic design and maintenance	19	7.7%
Military operational	61	24.8%
Total	246	100.0%

A substantial section of the academic training of the officers is specialized based on a number of function areas. In table 3.6 the frequencies are indicated for the categories that describe the initial specialized training of the respondents.

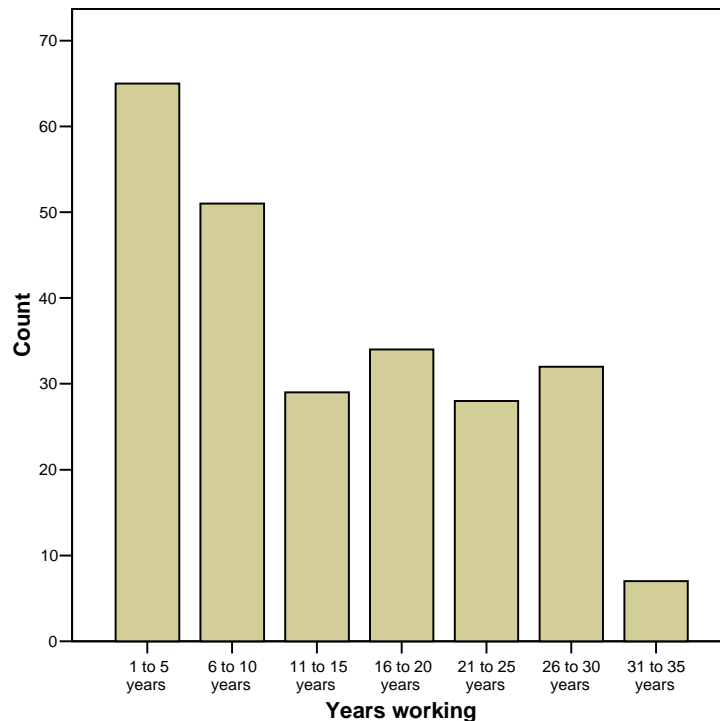
Table 3.6 Specialized initial training of the respondents to the questionnaire

Specialized initial training of respondents	Frequency	Percentage
Personnel	21	8.5%
Administration, logistics	53	21.5%
Information and communication systems	14	5.7%
Planning and control, juridical	6	2.4%
Technical and electronic design and maintenance	55	22.4%
Military operational	97	39.4%
Total	246	100.0%

Some respondents indicated on the questionnaire that the initial specialism is often not related to the main function area that the officer is currently working in.

Phi and Cramér's V cross table was used to establish insight in the relationship between the two nominal variables 'initial training' and 'main function area' (Hoekstra, 2004) and from this cross table it can be concluded that there is a significant relationship between the initial specialized training of officers and the main function area in which they are working, however there are some officers that are currently not working in the function area that is related to their initial training. Furthermore, it needs to be noted that experienced officers move into the main function area 'Policy and governing' and officers with appropriate experience can apply to obtain a function in 'Education and training'.

In graph 3.1 the number of years that respondents are working in the NLDO as officers is illustrated. One respondent indicated that he was working 36 years in the NLDO, for statistical purposes¹ he was grouped with the group '31-35 years'.



Graph 3.1 The number of years that respondents are working as officers in the NLDO

¹ A group needs to contain more than one element in order to carry out a Post Hoc test after using One way Anova.

As is expected there does exist a significant positive correlation of 0.843 between the rank of the officer and the number of years that the employee is working as officer in the NLDO. Which indicates that the longer the employee is working as an officer in the NLDO the higher his/her rank will be in most cases. Where appropriate the variable 'years working' is used to determine if certain outcomes have a relationship with the time that officers are working in the NLDO. The number of years that an officer is working in the NLDO is also taken as an indicator of age. The longer officers are working in the NLDO, the older they are. However the opposite 'the shorter the officers work the younger they are' is not always true. Employees could become officers at different ages. Most officers however start their officer's training directly after they have finished high school.

Interesting to note is that 106 respondents (43.1%) indicated that they do not have subordinates in their current working situation. Since officers are rotating jobs every few years, it is plausible that they will all at some stage in their careers deal with subordinates. All officers have been trained to become leaders in the organization.

On the questionnaire was stated that the respondents could include written comments. A number of respondents chose to write comments on the questionnaire which were also analyzed thematically for each sub-question in a similar manner as was used to analyze the data from the in-depth interviews and are also included in the text from chapter four in order to further complement the statistical research findings.

3.7 Planning to answer the second research question

The second research question is: ***What are the information, communication and technological competencies required by managers in the information society?***

This research question is answered by generalizing the results of the case study using the statistical procedure factor analysis available in the statistical package SPSS version 13. A first instrumentalization of this model is based on the quantitative results of the case study.

3.8 Summary

The philosophical disposition of the research is founded in the critical realist paradigm. Insight is sought in the changes in the labour environment of the officers in the NLDO as a result of ICT and the information society as well as the ICT- and ICT-related competencies that are required by officers in the NLDO in order to function effectively.

The research methodology does not fall clearly in a specific paradigm as described by Burrell & Morgan (1979), but tries to investigate the situation in turn from different perspectives, which are seen as being complementary instead of contradictory. Thus a combination of qualitative and quantitative research methods was selected. Furthermore triangulation of research methods is seen as a strategic means to involve different aspects of reality (Westers & Peters, 2004). The chapter is concluded with a description of the background information of the respondents to the questionnaire.

In the next chapter the research findings are discussed and the implications of the outcomes of the research for the development need of the officers in training and of the officers currently working in the NLDO are considered. A general model for information, communication and technological competencies is suggested in the last section of the chapter. The research was conducted in a socially responsible way as described by Reeves, Herrington & Oliver (2005).