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Information, communication and technological competencies in a digital working environment:

A case study in the Netherlands Defence Organization

A thesis by

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ANNEXURE D

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RESEARCH ETHICS COMMITTEE

CLEARANCE CERTIFICATE	**CLEARANCE NUMBER : CS06/03/13**
DEGREE AND PROJECT	PhD CIE Supporting the development of academic competencies in a digital learning environment.
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Abstract

This research is an attempt to obtain insight in the influence of ICT and the information society on the labour environment of the officers of the Netherlands Defence Organization and to determine the competence of those officers in a number of information, communication and technological areas associated with the changed ways of working in the information society as they are discussed in the literature. What was found is that a substantial number of officers are not fully prepared to participate in the new ways of working required in the information society. The implications of those findings for a digital learning environment for the Netherlands Defence Academy are discussed and a general model for information, communication and technological competencies for managers in the information society is proposed based on the results of the case study.

Keywords: ICT-competencies, information society, digital learning environment, learning organization, knowledge management, competency management, ICT-security awareness, change management, innovation management, e-leader.

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List of Abbreviations

Abbreviation	Dutch	English
BaMa	Bachelor Master	Bachelor Master
DLE	Digitale leeromgeving	Digital learning environment
ELO	Elektronische leeromgeving	Electronic learning environment
FMW	Faculteit der militaire wetenschappen	Faculty of Military Sciences
GOO	Gemeenschappelijke officiers opleiding	Combined officer training
HRD	Human resource development	Human resource development
ICT	Informatie en communicatie technologie	Information and communication technology
IDL	Instituut Defensie leergangen	Netherlands Defence College
KIM	Koninklijk Instituut voor de Marine	Royal Netherlands Naval College
KMA	Koninklijke Militaire Academie	Royal Military Academy
NLDA	Nederlandse defensie academie	Netherlands Defence Academy
NLDO	Nederlandse defensieorganisatie	Netherlands Defence Organization

Chapter 1 Introduction

1.1 Organizations and the Netherlands Defence Organization in the information society

Organizations are confronted with many changes as a result of the information society. Information Technology has created many opportunities for alternative ways of working, managing and communicating information, as well as cooperating with international partners in a global world. At the same time information security risks have increased as a consequence of the implementation and potential of Information Technology (Siponen, 2001; Elletson, 2005; Bonatti, e.a., 2006). Information management has proven to be very complex and managers struggle to define their role in the new setting (Beijen, Broos & Lucas, 2003). However literature shows that managers play an essential role in implementing ICT in the organization (Hargrove, 2001; Kluytmans, 2005; Boonstra, 2005).

According to Florijn (2001) the differences between various kinds of organizations like professional organizations, production businesses and traditional line organizations are fading. The Netherlands Defence Organization (NLDO) is thus confronted with similar changes compared to other organizations in the information society. A military organization however has a different primary vision from regular corporate business organizations. They are not primarily economically driven and their value is primarily to be available in a variety of national and international crisis situations and to be sufficiently prepared in dealing with those crisis situations. To work effectively was an important criterion in the past, but in the current political climate in the Netherlands, society and politics demand efficiency whenever possible. The NLDO has to be transparent and accountable (Sandee, 2004). Often outsourcing is considered and civil contracts are sought to justify the costs of specialized departments and hence concurrence has also become part of the military organization. Finding relevant information when needed, knowledge management, competency management, organizational changes and innovations, electronic Human Resource Management as

well as establishing a learning organization have become just as important for the NLDO as they are for other civil organizations in the information society.

Research has shown that alternative ways of working through ICT-technology require employees in general to develop new competencies (Dhondt & Kraan, 2001). This is especially true for managers who require new competencies in order to become effective managers of information, influence strategy in this regard and inspire their staff to participate in the new ways of working and learning (Hargrove, 2001; Yukl, 2006). The top of organizations set out the strategy for the new ways of working and select suitable applications. At an organization level jobs are created for information professionals and project teams are established to help the implementation of the new applications and ways of working, but it is at the level of the individual managers that the day to day implementation needs to happen and success is determined (Boonstra, 2005). Furthermore, managers have to inspire and coach their staff to participate in the new ways of working.

Many employees of the NLDO have been sent on ICT-courses to develop a number of important ICT-competencies. However by interviewing a number of senior officers in the NLDO it became clear that this is often insufficient for the complex and varied ICT-related work for which officers in the NLDO are responsible. Furthermore students in their final year of study that have done a module ‘Personnel and ICT’, in which some of the learning aims include that they obtain insight in the influence of ICT on personnel and organizations, indicated that in their opinion they did not have enough ICT-competencies to deal with the complexity of the work environment in the information society.

When addressing the issue if education is suitable for the information society, it is essential to look critically at the curriculum for such education (Plomp, 2006; Zaccaro e.a. 2006; Kessels, 1999). According to Oliver (2002) the use of ICT has fundamentally changed business and governance, but the impact on education lags behind. Plomp (2006) claims that different learning and development strategies are currently needed and Oliver (2002) claims that ICT could play an important role in transforming teaching and learning.

In order to prepare officers in the NLDO properly to work in the information society, it is essential firstly to understand how the information society has influenced the working environment of the officers, secondly to obtain insight in the ICT- and ICT-related competencies that are required by the officers in the NLDO and thirdly to investigate how a digital learning environment could be implemented to support the development of those competencies. Since the Netherlands Defence Academy (NLDA) has stated that innovation in education is an important instrument to improve the quality of education (Onderwijsvisie, 2005), contributions to the evolution of an effective digital learning environment for the Faculty of Military Sciences (FMW) as well as other academic training programmes in the NLDA are encouraged.

Furthermore, it appears worthwhile to investigate whether a need exists for a digital learning environment for officers currently employed in the NLDO who need support in developing the ICT- and ICT-related competencies that they required to function effectively in the information society. According to Kessels & Keursten (2001) it is an important challenge to create an environment where learning and working come together. They argue that both organizations as well as individuals could benefit from such an initiative. A Human resource development programme should be seen as an important aspect in learning and knowledge management in the information society (Harrison & Kessels, 2004).

In summary can be said that managers play a crucial role in implementing new ways of working in organizations in the information society and although a number of managerial competencies currently required have been described in the literature, the specific information, communication and technological competencies for managers in the information society have not been identified and described as a group of competencies, nor for organizations in general nor for military organizations specifically.

1.2 Purpose of this research and the research questions

The objectives of this research are twofold:
Firstly to contribute to the knowledge fields of Organizational Management and ICT, by identifying the influence of ICT and the information society on the labour environment of officers working in the NLDO and creating a conceptual model that contains the ICT- and ICT-related competencies that are currently required by those officers. From the results of the case study a general model of ICT- and ICT-related competencies required by managers in the information society will be suggested. Secondly to contribute to the knowledge field of innovation practice in higher education by considering the implications for a digital learning environment in the NLDA in order to support the development of the identified ICT- and ICT-related competencies.

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 for the officers in the Netherlands Defence Academy?

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

This research is in its essence a holistic investigation into a complex information system in the context of the dynamic systems theory, in which the organization, information and communication technology, the employees and the society each play an important role, are interconnected and influence each other (Boonstra, 2000) as is illustrated in figure 1.1.

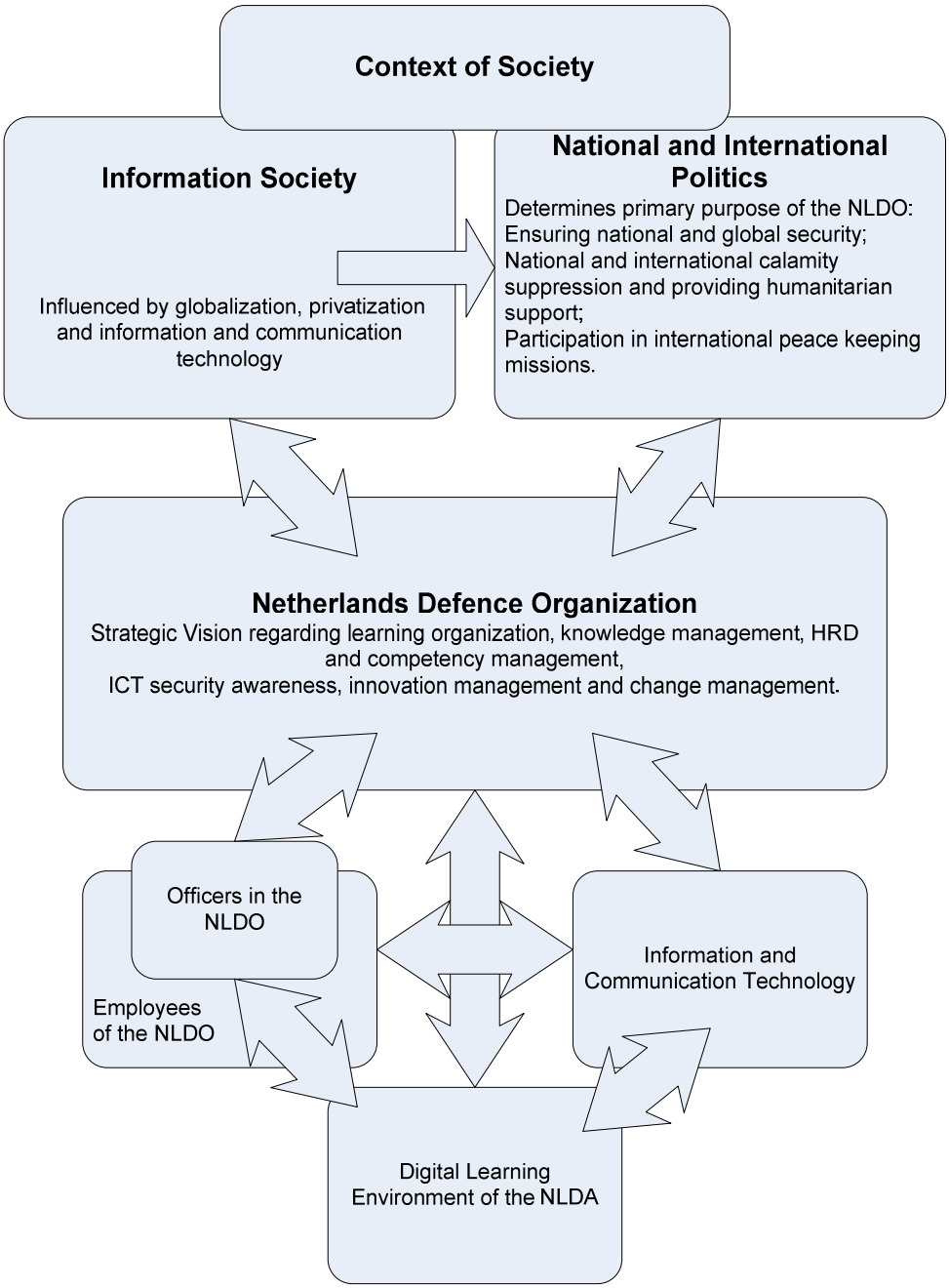


Figure 1.1 an illustration of the complexity of this research

1.3 Terminology

The important terms used in this research are defined in Table 1.1. Where appropriate other terms will be defined in the text.

Table 1.1 Definitions of the important terms used in this research in alphabetical order.

Term	**Meaning**	**Remarks**
Digital learning environment	All digital learning opportunities that are offered to the officers in training and officers currently working in the NLDO. This includes multi-media, electronic communication opportunities, the internet, intranet, mobile learning, tutorials, games, simulations and remedial applications presented to the learning community. A learning management system could be used to structure (part of) the digital learning environment, but this is not a requirement. As such a digital learning environment includes an electronic learning environment.	The focus of this study is on a blended learning environment where contact education (face-to-face teaching) is combined with a digital learning environment for initial training of officers and on an embedded learning environment where officers could learn when they need to in a working environment. Performance support could also be offered via such a digital learning environment or via other means like an Intranet.
Information, communication and technological competencies	Competencies consist of a combination of knowledge and insight, skills and behaviour as well as attitudes. In this research the specific competencies are focused on effective participation of officers in their labour environment, irrespective of field of specialization. To evaluate the required learning competencies it is necessary to describe them in terms of criteria for learning outcomes and to record the progress for each student ideally in a digital student profile.	A distinction is made between **ICT-competencies** which are categorized in this research as operational, structural and strategic ICT-competencies and **ICT-related competencies** which are competencies that are related to the use of ICT in the information society and include a leadership component.

Table 1.1 Definitions of the important terms used in this research in alphabetical order.

Information society	The society in which organizations in modern countries currently are operating. Globalization, privatization and ICT and the opportunities and challenges that come with it, play an important role in the information society. The information society is characterized by a high level of information intensity by the use of technology and organizations in the information society and individuals, organizations and governments are connected internationally.	A number of authors speak about 'the rise of the information society' (Castells, 1996). The researcher recognizes that the information society is continuing to emerge and the participants in it are continuing to learn how to participate, however in this research the term 'information society' will be used. Terms like network society, knowledge society and global society place the focus of the information society on different aspects, but the terms are all closely related to the information society.
Manager, leader	Leadership is stipulated in this research as "*the ability of an individual to influence, motivate and enable others to contribute toward the effectiveness and success of the organization*" (House e.a. In Yukl, 2006:3). Managers in the NLDO can be seen as leaders in the organization who play an important role in influencing the strategy of the organization, communicating the vision and strategy of the organization to their subordinates and coaching their subordinates to work within this strategy and vision.	It is acknowledged that there are differences identified in the literature between leaders and managers. However for the purpose of this research where the context is a military organization it is assumed that most managers need to lead their subordinates as well and therefore no distinction will be made in this research. An officer is seen as a manager who has received a higher education.

1.4 Background to the problem

According to Hornby & Clarke (2003) the term information society is often used without using a clear definition and different perspectives are often used. Some authors even challenge the existence of the information society. Black (2003) as well as Wajcman (2006) argue that there have been many information societies in the past and they object to the technological determination in the current society. They are supported by Muddiman (2003) who argues that the information society is a restructured rather than a transformed social order. However there are also many authors who are of the opinion that the influence of ICT, especially the technology that makes (international) networks possible as well as mobile technologies and globalization is so substantial that the society has indeed changed into an information society (Boonstra, 2005; Hargrove, 2001; Feather, 2004; Town, 2003).

1.4.1 Lack of research about the influence of the information society on the labour environment of managers

Globalization and communication technology in the information age require new competencies from employees working at different levels in organizations. Research has been carried out to determine the influence of the information society and technology on labour in general, mostly from a sociological perspective (Batenburg et al, 2002), but little research has been done to determine the influence of the information society and technology on a managerial level specifically (Yukl, 2006). Yukl claims that such research is necessary. It appears from the literature review that ICT- and ICT-related competencies needed by managers in the information society have not yet been identified as a related group of competencies.

Furthermore, officers often have managerial and leadership roles that have also changed as a result of the information society and ongoing information innovations and changes need to be managed (Boonstra, 2005; Hargrove, 2001). Hargrove (2001) claims that managers play a crucial role in the implementation of ICT in organizations on three different levels:

Firstly in influencing the strategy of the organization in this regard, secondly in implementation of this new strategy, thirdly in influencing their subordinates in participating in the new ways of working and using ICT. It therefore makes sense to investigate the influence of the information society specifically for managers.

1.4.2 The role of the manager in changed ways of working

Since knowledge is rapidly changing and finding relevant information becomes vital in organizations, knowledge including best practices, needs to be managed digitally at all levels in an organization. A manager needs to be able to share and benefit from the knowledge of others himself, but at the same time it is vital for an organization that managers actively encourage participation of their staff in knowledge management, lifelong learning and communities of practice. Awareness of the need to learn in combination with knowing where to find the information is the first step in the right direction (Hargrove, 2001). According to Hargrove, managers play a vital role in communicating a holistic vision and strategy to make the organization more innovative with regard to the management and communication of information. Senge e.a. (1999) claim in this regard that the learning ability of organizations leads to improvements in the organization and that this is especially determined by the way in which managers deal with challenges.

A number of organizations are in the process of describing the competencies that are required at different levels to work effectively in the information society, in an attempt to implement the rather abstract term competency management into a concrete operational form. As organizations often have to work with fewer employees in a more effective way, competency management becomes vital (Kluytmans, 2001). Effective competency management requires a different way of managing the human resources available in the organization. It is important to have a clear insight into the vital competencies of the broader organization as well as the working units within organizations. At the same time a clear picture needs to be available of what the competences are that are available in the current staff of the organization at all levels. Gaps in the required competencies and the available competences need to be identified and development and recruitment programmes need to be adjusted accordingly.

Managers play an important role in this regard especially since employees often do not work within the strict limits of function descriptions of the organizations (role-oriented) any longer, but need to become flexible and task-oriented (Kluytmans, 2005).

Globalization and information and communication technologies bring great opportunities for organizations in the information society, but at the same time contain enormous information security risks and make organizations at many levels vulnerable. Digital security can only be implemented successfully when all employees of an organization become aware of the potential security risks (Peltier, 2005; Parker, 2001; Siponen, 2001; Eckert, 2005; Chalmers, 2006). The managers again play a vital role in establishing an organization in which all employees are sufficiently ICT-security aware.

Organizations in the information society can never just be, but are always in a process of becoming. Aspects like change and innovation management as well as creativity have thus become important competencies and are relevant for managers in organizations in the information society.

1.4.3 Higher education in the information society

Policymakers and teaching staff of Institutes of Higher Education need to establish whether the student learning outcomes are compatible with the competencies and attitudes that are specifically required by managers working at a level where higher education is a requirement in a global information economy (Eaton, 2002). Institutes of Higher Education increasingly realize that they need to evaluate those required competencies and attitudes for individual students, to make sure that students having completed their study are able to function at a managerial level in constantly changing organizations.

Most of the academic institutions in the Netherlands are busy identifying and describing academic competencies in general, but it is noted by the author that ICT- and ICT-related academic competencies are not identified in the same way as that English and Dutch language competencies, Research Methods and Philosophy of Science are identified and given attention to across the curricula. Communication is seen as

important, but communication using ICT technology is somehow not seen as being different from communication through verbal and written language.
A number of specific operational ICT-skills like using MS office and basic knowledge about PCs are in some instances included in introduction programmes of universities, but the author suspected that the ICT- and ICT-related academic competencies required in the information society entail much more than that. It is essential to identify those ICT- and ICT-related competencies and that the development of those competencies need to be given a structural place in the curricula of institutions of higher education. A syllabus for ICT- and ICT-related competencies at institutions of higher education could include competency training for structural and strategic ICT-competencies. Some examples are how to find relevant information on the closed net, how to evaluate the importance and reliability of sources found on the internet and how to use a management information system as well as managerial ICT-related competencies like creating awareness amongst staff regarding innovation, information security and communities of practice as well competencies to participate effectively in strategic decision-making regarding the implementation of ICT and in establishing a learning organization, knowledge management and competency management. The researcher suspects that the development of ICT- and ICT-related competencies will not intuitively be obtained by employees, but needs to be planned and structurally implemented in a training programme. Furthermore, opportunities need to be available for officers in order to develop specific ICT- and ICT-related competencies when the need arises.

The identified ICT- and ICT-related competencies that are required in organizations in the information society, not only have a direct impact on the curricula of the training and development of new employees, but also on the training of current employees in organizations who might be insufficiently prepared to participate fully in the information society. Organizations need to have insight into those competencies so that they can adequately provide learning opportunities for their current managers when needed. Furthermore, it is important for policymakers and educationalists in institutions of higher education to have insight into the required ICT- and ICT-related competencies, since higher institutions of learning need to ensure that the development of those competencies is supported in their learning programmes as the focus of their curricula is increasingly needs-driven (Plomp, 2006). In this sense he claims that a new balance needs to be found between learning as a process and learning as a product.

Students need to develop those competencies that make it possible for them to react adequately to learning contexts with which they are confronted during their study and as life-long learner in their working life (Eaton, 2002). They need to be motivated to act in such a way that they select correct procedures to obtain correct results. ICT- and ICT-related competence needs to mature during the time that the student spends in higher education and those competencies need to be evaluated as part of a student profile. In this context it is also necessary to identify the specific ICT- and ICT-related competencies that need to be part of such a student profile. Furthermore, it needs to be determined to what extend the innovations in the digital learning environment could contribute to developing those competencies. Without the commitment of the teaching staff and students however, the possibilities that the digital learning environment brings to higher education will not be utilized fully (Reeves, Herrington & Oliver, 2005).

1.4.4 New educational environments

In the past decade, there has been an active discussion about new educational environments in higher education where the emphasis is shifting from education by teachers to learning by students. The role of a teacher has changed from deliverer of instruction to the facilitator of learning by designing learning environments (Eaton, 2002; Oliver, 2002). According to Lieberman & Guskin (2002) the role of technology is beginning to change how students learn and will likely transform student learning experiences in the future, as digital technology will be integrated further into the core of education. Many universities have implemented digital learning environments by now and use blended learning techniques where face-to-face education is combined with a digital learning environment. The digital learning environment creates opportunities to set up alternative learning landscapes which could enhance the quality of learning and which could prepare the students to successfully participate in global organizations functioning in the information age (Lieberman & Guskin, 2002; Oliver, 2002; Eaton, 2002).

The question arises if the learning environment has changed in such a way that it does contribute effectively to the learning of the students and if the confidence of teaching

staff and students to use information and communication technology has increased sufficiently to participate in a new learning environment. Early indications are that there are improvements in the learning landscape, but that the possibilities of the digital learning environment are not utilized sufficiently and in such a way that the students obtain the skills and experience needed in a knowledge-based society where often the only constant is the fact that everything changes (Eaton, 2002).

A lot of research has been done in the field of the digital learning environment and instructional design, but more research is required to determine specifically how the development of ICT- and ICT-related competencies could be supported by a digital learning environment. In this regard the focus of the last part of this research will not be on determining the effectiveness of the delivery medium, but rather on the instructional strategies and tasks that could be used to support the development of those ICT- and ICT-related competencies identified in the first part of the research. Furthermore, the factors that have an influence on the outcome of learning need to be understood in order to improve and fully utilize the opportunities of this environment.

It is however clear from the literature that the didactical methods are of more importance than the delivery medium (Clark, 1994; Reeves e.a., 2005), but as Kozma (1994) argues, in the information age there are new skills to be learned and new worlds to be discovered that cannot be learnt without a digital learning environment. ICT- and ICT-related competencies are of such a nature that they need to be learnt in a digital learning environment. The author does however believe that a holistic approach is needed in creating a digital learning environment in that the human factors (teaching staff as well as students), the technology, the required information and content all need to be taken into consideration integrally.

Apart from the opportunities that the digital learning environment creates, reforms are also necessary according to Lieberman & Guskin (2002), because institutions have to deal with reductions in financial resources and increases in costs and demands for accountable student learning outcomes while implementing new higher education models. Lieberman and Guskin continue their argument by stressing the need for Institutes of Higher Education to become accountable for student learning outcomes. Flexible learning routes have also become a necessity, since students have different

study needs and move increasingly between institutes nationally as well as internationally (Oliver, 2002).

It is expected that in the Netherlands a new law for Higher Education and Academic research will be implemented in 2007. Some of the aims of this new law (WHW 2) are to stimulate flexibility and demand-oriented education, but at the same time Institutes of Higher Education will be held accountable for their performance both regarding education and research.

1.5 Summary of the setup of the research

A combination of qualitative and quantitative research methods is used to answer the research questions. A case study was conducted using in-depth expert interviews, a survey to determine the current state of ICT- and ICT-related competencies required by officers of the NLDO as well as a group discussion with some of the students.

The survey was conducted in the NLDO amongst the research population of officers currently working in the NLDO. Civilian employees at a similar working and thinking level in the NLDO were not included in the survey, because the training at the NLDA is exclusively meant for military personnel. It is interesting to do a case study in the NLDO for this research because it also contains its own academy where officers are trained. The vision of the Netherlands Defence Academy (NLDA) is that officers are trained at an academic level since the functions that they will fulfill in the organization are at an academic working and thinking level, however there are also officers in training doing a shorter training programme since they have already concluded a study in higher education or they are trained to fulfill specific tasks for a limited period of time.

The results from the survey, combined with relevant literature review and expert interviews are used to discuss the implications for a digital learning environment for the NLDA where students could be supported optimally to develop the ICT- and ICT-related competencies that are required in the NLDO in the information society.

A general model for ICT- and ICT-related competencies required by managers in the information society is suggested based on the results of the survey using factor analysis. Furthermore, a first instrumentalization for such a model is developed. Although the model is based on just one case, it could be tested and developed in further research.

The theoretical fields of information society, knowledge management, learning organizations, competency management, human research development, information security awareness, innovation and change management, learning in a digital learning environment in higher education, instructional design, mobile learning and simulations and gaming will be drawn upon to create a theoretical framework for this research.

1.6 Background of the organization in which the case study is conducted

The NLDO consists of an army, air force, navy and military police that since November 2005 have been working in a joint organization. The primary tasks of the NLDO are ensuring national security, participating in international peacekeeping forces and providing assistance during national and international disasters. Furthermore, they play a role in the ‘war against terrorism’, drugs control and assisting public and civil organizations within different fields of specialization like diving under dangerous circumstances and optronical designs.

The NLDA consists of three previously independent higher education institutes namely the Royal Netherlands Military Academy (*KMA*) located in Breda, the Royal Netherlands Naval College (*KIM*) located in Den Helder and the Netherlands Defence College (*IDL*) located in The Hague.

Traditionally the KMA is responsible for the training, forming and education of the officers in command that will serve in the army, air force and military police of the NLDO. KIM is responsible for the training, forming and education of the officers who will serve in the navy of the NLDO. The IDL offers career training and specialized job-oriented courses for the officers of all the armed services and civilian personnel of the NLDO, as well as various courses for foreign officers. It also has facilities for conferences,

seminars, meetings and training activities for other defence organizations and affiliated organizations.

The NLDA organization is responsible for the training and education of approximately 2000 students by 200 lecturers and 600 other staff members. The FMW was formed in November 2005, is integrated in the NLDA and is responsible for the initial academic education of the officer as well as academic research. This military application domain is not covered by civil universities because it is characterized by a unique combination of academic forming, character forming as well as military/maritime forming which is guided by a professional profile for the officer, recently updated and provided with a competency dictionary. Close links exist between the faculty and a number of universities in the Netherlands. The FMW is responsible for the training and education of approximately 800 students by 160 staff members.

The structure of the newly formed FMW within the NLDA is mainly grouped in three departments: Military Systems and Technology, is mainly located in Den Helder, Military Sciences, which is mainly located in Breda and Military Organization Sciences, which is mainly located in Breda. The students in those departments follow different academic programmes, however a period of approximately half a year is identified for a combined officers training programme, hereafter referred to as GOO (*Gemeenschappelijke officiers opleiding*), where an introduction of each of the learning areas will be given to all students in addition to training and forming activities. The GOO will take place at the respective higher education institutes. This means that the naval officers in training receive the introduction at the KIM in Den Helder and the officers in training for the air force, army and military police receive a similar introduction at the KMA in Breda.

In each department a number of knowledge areas are identified and grouped together in sections. Each section consists of a combined staff from the institutes mentioned. The responsibilities of the sections are the development and teaching of the curricula of the various subjects and a number of research projects.

1.6.1 Competencies in the NLDO

The NLDO has developed a dictionary with competencies that are seen as important for the organization (Hoofddirectie personeelsbeleid, 2004). In this document competencies are defined as skills and behavioural aspects that make employees suitable for their function. There are 27 competencies identified which are categorized in five clusters: thinking power, personal effectiveness, interpersonal effectiveness, treatment of work and management. Only two competencies are associated with management, namely delegating and development of staff. Leadership is not described as a separate competency since it is seen as a combination of other competencies already described in the competency dictionary. The competencies are described at four levels and the specific level of competence required is determined by the type of function.

Some of the competencies like creativity, analyzing, ability to learn, networking and communication are especially important in the information society, but no specific mention is made about competencies related to ICT, nor the role ICT could play in developing those competencies. This is interesting since ICT is identified as playing an important role in the integral organizational concept in the organization as is illustrated in figure 1.2. A number of other aspects from the organizational concept are specifically identified as competencies, for example vision, planning and organizing.

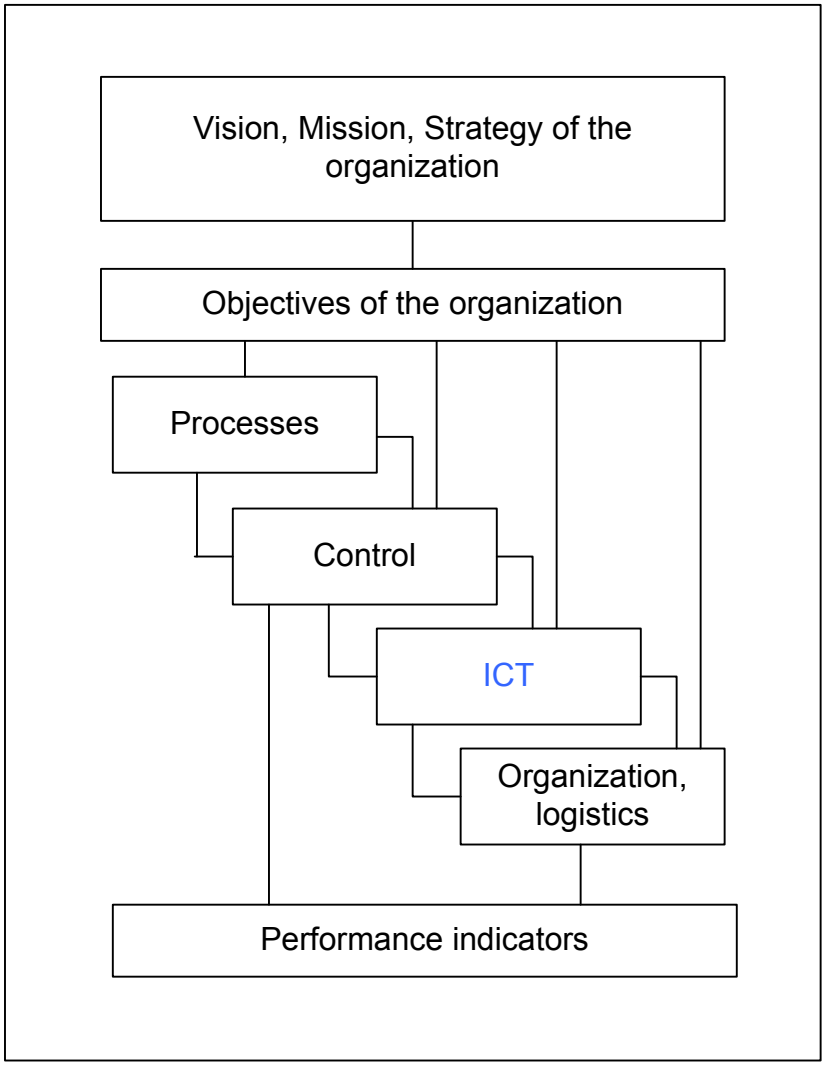


Figure 1.2 The integral organizational concept used in the NLDO

1.6.2 Applications in the NLDO

The officers in the NLDO have access to MS Office and depending on their function area officers are authorized to access specific applications needed to do their work, including a combination of information management systems, decision support systems, logistic support systems and material configuration support systems. Officers could apply for further applications when they indicate a functional need for those. Those applications include for example MindManager and MS Project. Shares with exclusive access by group members are available on request for project groups. Authorization to a number of shares is based on which function an officer has in an organization.

The NLDO is in a process of changing the level of access and in the course of 2007 most of the officers will have access to both the Internet and the Intranet of the NLDO at their working place, although the access for the officers taking part in a mission and during time at sea will still be limited. The Intranet of the NLDA contains a broad variety of information about the organization including authorized access to databases and can be seen as the primary application to manage the knowledge of the organization. The NLDO has selected PeopleSoft as their primary software to manage some HRM processes. All officers have access to this application, although not always on their own workplace. During operational missions officers need to be able to work effectively with command and control as well as battle management applications. A digital care system in which medical and personal information is recorded of all employees is also used by the officers.

1.6.3 Academic forming in the Netherlands and the NLDA

One of the results of a combined Europe is the introduction of common and recognizable university degrees. The Bachelor – Master structure, hereafter referred to as BaMa structure, has recently been introduced in the civil universities of the higher academic institutes in the Netherlands and has officially been introduced in the FMW in the academic year 2004/2005. It needs to be noted that the KMA has started a pilot teaching programme in the BaMa structure in the academic year from 2002/2003. Officer's education programmes in progress before the start of the BaMa structure continue at the respective institutes and will naturally be phased out after a few years. In addition to this, a special situation exists in the Netherlands in that the Bachelor – Master structure is introduced in the Netherlands as a result of extending the cooperation within the European Union and has as aim that it is easier to compare university degrees obtained in the Netherlands with university degrees obtained elsewhere in Europe.

Furthermore, to make it possible for students in Europe to study a variety of domains at different institutes across Europe according to certain conditions and obtain a communal

degree. In the past, accreditation for academic forming in the Netherlands was dependent on the reputation of the university.

The understanding was that anyone who successfully completed a university degree from a recognized university was regarded as being academically formed. However in the new Bachelor-Master structure each Bachelor and Master offered in the Netherlands needs to be accredited by a recognized accreditation organization according to a number of criteria (Douma, 2004). For universities in the Netherlands this means a critical evaluation of academic forming in general and recognition of the fact that substantial criteria needed to be formulated. The technical universities of Eindhoven, Delft and Twente have worked together in a project to describe the general academic criteria for Bachelor and Master Curricula. The criteria described during this project have been reviewed in an extensive pilot project on usability and adjusted on the basis of the results of the pilot. The criteria thus obtained can be regarded as an operationalization of academic forming for the universities that use the Dublin descriptors that are developed in 2002 by the Joint Quality Initiative Informal Group (JQIIG). The Dublin descriptors are used by many policy makers in the Netherlands (Meijers, van Overveld & Perrenet, 2005:3). The Dublin descriptors are described by the NVAO as follows:

- **Knowledge and insight**
- **Applying knowledge and insight**
- **Formation of judgement**
- **Communication**
- **Learning skills**

The descriptors have to be translated for each bachelor study into concrete performance criteria, also referred to as end-terms, before an accreditation organization considers accreditation for the bachelor. Since the FMW aims to obtain accreditation for the bachelor's degrees that they offer, their academic forming is described according to the Dublin descriptors. The FMW abides by the criteria for academic competencies as described by the universities of Delft, Eindhoven and Twente, therefore those are taken as the standard for this discussion. The universities mentioned have identified seven areas of academic competence as follows.

A university graduate can be characterized as someone who:

1. is competent in one or more scientific disciplines
2. is competent in doing research
3. is competent in designing
4. has a scientific approach
5. possesses basic intellectual skills
6. is competent in co-operating and communicating
7. takes account of the temporal and the social context

The above areas are described by Meijers, van Overveld & Perrenet (2005: 4) as follows:

Is competent in one or more scientific disciplines

A university graduate is familiar with existing scientific knowledge and has the competence to increase and develop this through study.

Is competent in doing research

A university graduate has the competence to acquire new scientific knowledge through research. For this purpose, research means: the development of new knowledge and new insights in a purposeful and methodical way.

Is competent in designing

Designing is an activity aimed at the realization of new or modified artifacts or systems with the intention of creating value in accordance with predefined requirements and needs.

Has a scientific approach

A university graduate has a systematic approach characterized by the development and use of theories, models and coherent interpretations, has a critical attitude, and has insight into the nature of science and technology.

Possesses basic intellectual skills

A university graduate is competent in reasoning, reflecting, and forming a sound judgment. These are skills which are learned and sharpened in the context of a discipline, and which are generically applicable.

Is competent in co-operating and communicating

A university graduate has the competence of being able to work with and for others. This requires not only adequate interaction, a sense of responsibility, and leadership, but also good communication with colleagues and other professionals. The graduate is able to participate in a scientific or public debate.

Takes account of the temporal and the social context

Science and technology are not isolated, and have a temporal and social context. Beliefs and methods have their origins; decisions have social consequences in time. A university graduate is aware of this, and has the competence to integrate these insights into their scientific work.

Three main categories of competence can be identified firstly as the domain of the student, secondly as the academic method of thinking and doing and thirdly the context of practicing science.

In order to develop the seven areas of competence further, a distinction is made between competences at the level of Bachelor and Master. For the purpose of this research the focus will be on the competences that are related to the Bachelor, since the students studying in the FMW of the NLDA are required to minimally obtain a Bachelor's degree.

The FMW is in the process of working out those seven areas of academic competence to the level of performance outcomes. Although those seven areas of academic competence have to be achieved throughout the course of the study, a number of

subjects have been identified through which the development of some areas of academic competence is supported.

Communicative skills in the Dutch and English languages are to deal mainly with the communication criteria and ICT is not identified explicitly as such as a means of communication and currently no mention is made about the need of officers in training to develop ICT- or ICT-related competencies. This is remarkable since the literature shows that ICT has a substantial influence on the labour situation of managers and information behaviour is unlikely to change automatically (Davenport & Prusak, 1997). In this regard ICT is seen as a tool to deal effectively with communication as well as information. During the course of the study however some assistance is provided to the students regarding applications like Excel and self-teach modules for other MS Office applications are electronically available to the students. Furthermore the opportunities that ICT offers for example in doing research or cooperating are not explicitly considered.

1.6.4 The electronic learning environment in the NLDA

The board of governors of the NLDA has initiated a workgroup to research how web technology could be included in the education at the NLDA. One of the conclusions of this workgroup is that an educational network needed to be established between KIM, KMA and IDL in order to apply web technology in the educational programmes. The first step towards this network was to create a suitable infrastructure and ICT facilities which has recently been realized. The second step was to select a suitable package to support the electronic learning environment envisaged. After completing a pilot period of two years in 2002 and 2003 and a favorable evaluation, KIM has started an implemented project of a customized electronic learning management system called TeleTop, in January 2004. The other institutes of the NLDA have used different electronic learning environments before, but after an evaluation of TeleTop in comparison with other customized electronic learning management systems, it became the standard application for the NLDA from September 2005 onwards.

The NLDA offers a blended learning environment. In addition to the electronic learning environment where the lecturers enrich their courses by adding to the variety of learning

activities and work forms, it is expected that students with different learning styles are supported by the electronic learning environment in combination with contact education.

Some simulators are used to support the development of military and maritime competencies. For example a bridge simulator forms part of a wider digital learning environment of KIM. The students in the seaman officer's branch are trained to control the bridge. Computers, data projectors with a semi-circular display as well as a replica of the bridge of a ship are used to simulate a variety of situations at sea. The bridge simulator looks like the bridge of a frigate, which is a type of ship in the Netherlands defence organization, but with adjustments bridges of other ships could also be simulated. Sailing and maneuver properties as well as safety situations compare well with reality. Mistakes can be made without having serious and expensive consequences. The students have the opportunity to experience a wide variety of situations at sea through simulations, before they may continue their training under supervision on a real ship.

Within the NLDA a workgroup ICT in Education was formed in November 2005 with the task to answer the question: What can the digital learning environment add to the learning environment of the NLDA? This provides a unique opportunity to critically evaluate the opportunities that are available in this regard and to contribute to the digital learning environment for the FMW, supported by recent research.

1.7 Structure of the chapters in this research report

Table 1.2 illustrates the structure of the research report. It shows how the chapters follow each other and where the main addenda fit in.

Table 1.2 Structure of the research report

	Content	**Addendum**
Chapter 1	Introduction	
Chapter 2	Literature survey	Addendum 1: Results of searches
Chapter 3	Research methodology	Addendum 2: Semi-structured interviews Addendum 3: Questionnaire Addendum 4: Group discussion
Chapter 4	Results of research	Addendum 5: Statistical analysis using SPSS
Chapter 5	Discussion, conclusions and recommendations	

1.8 Summary

The main objective of this research is to contribute to the knowledge fields of Computer Assisted Education, Management and Organization and ICT by doing a case study in the NLDO to determine the influence of ICT and the information society on the labour environment of the officer in the NLDO. A model was created that contains ICT- and ICT-related competencies that are required by officers of the NLDO in the information society and of innovation practice in a digital learning environment by suggesting a digital learning environment that could support the development of the identified ICT- and ICT-related competencies in the NLDA. A practical objective of this research is to contribute to the evolution of an effective digital learning environment of the NLDA in the light of a curriculum suitable for the information society.

A model that could apply in general to the information, communication and technological competencies required by managers in the information society is suggested and a first instrumentalization for this model is provided. The author realizes that such a model could never be static and will need to be adjusted in accordance with further research results and new technologies becoming available. The attempt is a step into structuring the perhaps unstructurable.

The philosophical view underpinning this research is critical realist, conducting a case study applying a survey method, using expert interviews and a questionnaire. A combination of qualitative and quantitative research methods is used.

Chapter 2 Literature Survey

2.1 Introduction

"*The information society can perhaps best be understood as a society that has developed information technology and is learning to use it.*" (Feather, 2004:209).

This research is in its essence a holistic investigation into a complex information system in the context of the dynamic systems theory, in which the organization, information and communication technology, the employees and the society each play an important role, are interconnected and influence each other (Boonstra, 2000). Davenport & Prusak (1997) call this 'information ecology'. The social nature of information systems is seen as an important element in this research. This is in accordance with Nobre (2002), Roode (1999) and Davenport & Prusak (1997) who argue that in order to optimize any information system as a whole the human interaction with the systems as well as their interpretation of the systems has to be investigated in the specific context in order to implement information systems effectively. Roode as well as Davenport argue further that in order to achieve insight in an integrated information system, a multidisciplinary approach is required and hence understanding was sought in the disciplines of Psychology, Sociology, Education, Management & Organization and Information and Communication Technology.

The structure of this literature review leading to and informing the first part of the main research question: ***What is the influence of ICT and the information society on the labour environment of officers in the Netherlands Defence Organization*** is illustrated in figure 2.1.

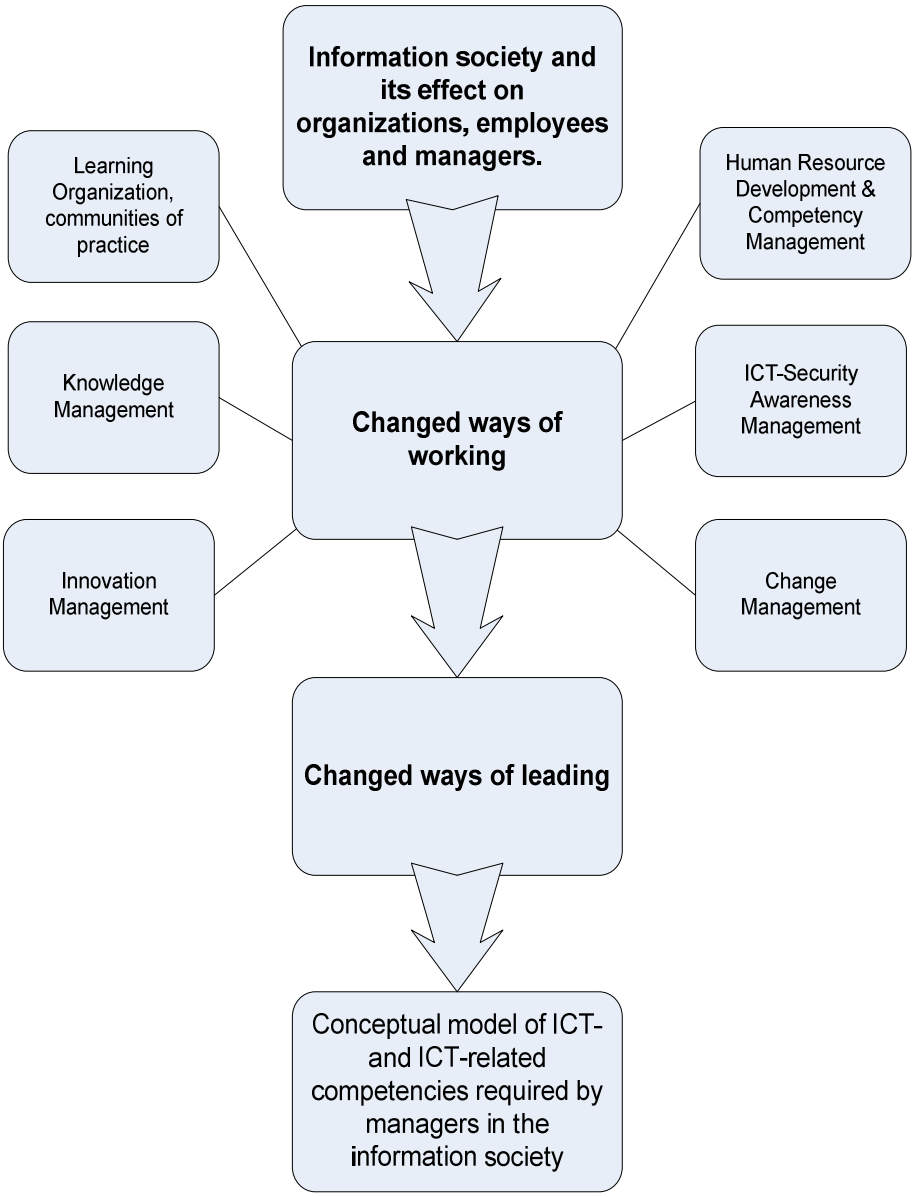


Figure 2.1 Structure of the first part of the literature review

2.1.1 Searching for information

An attempt was made to consult sources from important authors in each of the knowledge fields and thus create a sound interdisciplinary theoretical basis to base the research on. However since this research spreads out over a number of themes and knowledge fields and is thus broad rather than deep, a selection was made from available sources in order to come to a basic understanding of the themes and knowledge fields. Searches were conducted using PiCarta which is a search application that searches in the Netherlands Central Catalogues, in which the collections of most of the libraries, including university libraries, in the Netherlands can be found. PiCarta also searches in Online Contents (OLC), which includes the articles that are included in more that 14 000 academic journals. The OLC is daily updated (Nederhoed, 2004). During the orientation period and course of the research a number of searches were done in PiCarta, using keywords like 'learning organization' or 'information society' and combinations of keywords. Many results were found of which the researcher selected a number of sources during the course of the research in accordance of the guidelines which were used to select literature for this research. The guidelines are described in the next paragraph. The sources thus selected and found to be relevant are listed in the bibliography of the research. The research results that were found by using a combination of at least two concepts are indicated in a table that can be found in addendum one. This table contains the number of the results of the specified searches done in PiCarta when the research was commenced in August 2004.

The researcher used the following guidelines to make a selection from the literature thus found: Textbooks and (journal) articles published from 2000 onwards, selected on relevance for the topic that is being studied, although in some instances older sources were used based on the relevance for this research. The important authors for each subject field were identified on the basis of recurring referencing by authors of mentioned textbooks and (journal) articles. Relevant sources from the important authors in each subject field were then consulted. No restrictions were placed on time of publishing, but a selection was based on the relevance for the specific topic.

2.2 Organizations and managers in the information society

For the purpose of this research the information society is seen as a society in which organizations in modern countries currently need to operate in order to be effective and be able to compete. Globalization, privatization and Information and communication technologies play an important role in the information society (Castells, 1996). The ethical discussion whether the information society is a technological determined and capitalistic ideology that excludes large parts of the world (Muddiman, 2003) is certainly an important discussion, but for the purpose of this research not taken further. The relative value of information technology in organizations is also often debated (Byrd, 2001), but this debate falls outside the scope of this research. However it needs to be noted that the technology of the information society can never replace the social networks and resources that make learning and working possible (Brown & Duguid, 2000).

In the next paragraph is discussed how an organization is affected by ICT and the information society. The focus is on what aspects have changed and why this has occurred.

2.2.1 The effect of ICT technology and the information society on organizations

2.2.1.1 Clear ICT policy on strategic level and management on an operational level

Organizations have been greatly influenced by the opportunities that information technology has added to the economy and this influence continues as new technology is developed in the future and organizations are changing as a result of this (Boonstra, 2005; Hargrove, 2001). Terms like global organizations, knowledge economy, E-economy, interactive-, information-and network society indicate some important changes in the way organizations function in the information society compared to the way they functioned in the industrial society. Florijn (2001) argues that organizations need to develop clear policy in dealing with the required changes. In this sense Rowlands (2003) argues that such information policy ought to be seen as a verb and not

a noun, by which she means that it is a continuing process and can not be a finished product. Feather (2004) and Brown & Duguid (2000) support this notion and argue that it is important that the changing processes need to be carefully managed. Beijen, e.a. (2003) emphasize that management of ICT in organizations should not be seen as exclusive tasks of information specialists, but that managers should share responsibility to implement effective ways of dealing with the ICT in the workplace.

2.2.1.2 Knowledge in organizations

Knowledge is a problematic concept since there are different perceptions about what it entails. Some researchers claim that knowledge can only exist through individual consciousness and reject the idea of a material reality independent of consciousness. However other researchers claim that there is an objective, material world, which exists independently of consciousness and which is knowable by consciousness (Sayers, 1985). The last perception of knowledge makes it possible to believe that knowledge could thus be present in systems, processes as well as in individuals in organizations and as such it is possible to capture the knowledge of an organization digitally or through other means. However it needs to be noted that tacit knowledge is difficult to describe and document (Kessels, 1999) and only possible to achieve if employees understand the importance of this aspect of knowledge and are willing and able to share this.

The importance of knowledge is increasing in the Dutch economy as knowledge has become an important production factor (Florijn, 2001). One of the consequences of this in combination with the technological developments is that if knowledge is not kept up to date, it loses its value (Steyaert, 2000). Knowledge is growing exponentially. Information about concurrency, opportunities on the market and innovations can mean the difference between success and failure (Hargrove, 2001). Globalization, mobility, technological possibilities and growing complexity all contribute towards the need for knowledge (Florijn, 2001). He accentuates that if organizations want to obtain access to the right knowledge at the right time, it is essential that knowledge management is pro-actively pursued and a learning organization created. Wenger (2000) argues that this can best be achieved when an organization is able to design itself as a social learning system and communities of practice are created. Van der Kleij & Ooms (2004) claim that effective communities of practice in organizations improve the quality of decision-making and

transfer of knowledge in such organizations and Swieringa & Elmers (1996) argue that re-organizations need to be avoided as far as possible because re-organizations create a number of problems like troubled relationships, problems in the work processes and dysfunctional teams. They claim that becoming a learning organization is a means to achieve a reduction in the number and intensity of re-organizations. Boonstra (2000) states that a combination of organizing, renewal and learning works best in the information society.

In the Netherlands the knowledge economy means a growing need to a higher trained workforce and thus makes higher education an attractive option (Steijn, 2001).
In the industrial age, employees could often easily be replaced. However in a society where knowledge and expertise is directly connected to individuals, an organization could lose this knowledge as employees become more employable and less dependent on the organization for which they work.

According to Nobre (2002) there are three types of competencies that are important in organizations in the information age: core competencies within an organization, competencies that the intelligent workforce possesses and competencies that the customers as the ultimate decision makers have. This requires a new way of dealing with competencies in an organization.

2.2.1.3 ICT-security in organizations

With improvements of ICT the global security environment has changed dramatically (English, 2005; Elletson, 2005) and education needs to play a vital role in new security solutions. According to Elletson the dominant debate in the military context is global security. It is necessary to deal with the risks in a fundamentally different and more effective way. He argues that the world economy is made strong by privatization, the global economy and systems of mass communication, but at the same time those are the factors that make the current security risks possible. Privatization has gone so far in some countries that even the critical infrastructure is in private hands. At the same time there is an increase in cyber-crime and terrorist threats have greatly increased because of the anonymity, global connectivity and lack of traceability of the Internet (Eckert, 2005). In this sense it is important that employees in organizations are aware of the consequences of the security risks (Parker, 2001).

Security professionals need specialized ongoing training, but this is not enough to ensure the security of an organization (Eckert, 2005). He claims that in an organization each employee needs to be aware of the security risks, since a combination of small security breaches could have major consequences. This is supported by a number of authors (English, 2005; Siponen, 2001; Westby, 2005; Smith, 2005) who claim that information in an organization can not be safe without the awareness of all its employees despite stringent security measures like security personnel and technical solutions.

The recent incidence of a memory stick that contained military secret information and was left in a rented car, illustrates the vulnerability of organizations in the information society (Olde Kater, 2006). A further example is that a spam attack could easily block mail servers and thus seriously influence the flow of information in the organization (Eckert, 2005). Unfortunately security awareness is often neglected, or in the words of Siponen (2001: 26) "*Nothing is done as long as nothing goes wrong.*"

2.2.1.4 Importance of innovation

To optimally exploit the latest ICT- technology, organizations need to adjust their services and improve their working methods continuously (de Jong & den Hartog, 2005). De Jong and den Hartog claim that participation of employees in generating innovative ideas is essential and their research shows that strategic attention to innovation has a positive correlation with innovative behaviour of employees in an organization. Innovation in an organization is further enhanced if the organization is able to attract talented and creative people of diverse backgrounds and is able to create an open working climate (De Pree, 2006). Lee, Florida & Gates (2002) argue similarly based on empirical research that the capacity to innovate for cities or local environments is dependent on whether such environments are able to attract talented people and is open and creative.

A changing world requires individuals and organizations to adapt. Hoekstra & Sluijs (2003) describe adaptation as a process of change as a result of problems and opportunities in the surroundings. Successful adaptation of an organization requires learning, but also un-learning (Rampersad, 2002). Hargrove (2001) takes this argument

even further and argues that new ways of learning are required. Those new ways of learning are further discussed in the next section of this chapter.

In conclusion it can be said that as a result of ICT technology and globalization in the information society, organizations need to fundamentally change in order to continue to function effectively (Hargrove, 2001). One of those changes is that organizations need to become adaptive and flexible (Belasen, 2000) and another fundamental change is the way in which organizations communicate internally and externally (Feather, 2004).

Furthermore, in order for organizations to effectively participate in the information society it is important that they change into learning organizations (Florijn, 2001; Wenger, 2000; Hargrove, 2001; Senge, 1990) and knowledge needs to be managed effectively (Steijn, 2001). Competencies need to be managed differently than before and effective management of human resources becomes essential (Nobre, 2002; Burke & Cooper, 2006). New ways of dealing with information security awareness are necessary (Elletson, 2005; Bailey, 2005; Westby, 2005) and innovations need to be encouraged (de Jong & den Hartog, 2005; Burns, 2003).

In the next paragraph the factors that have an influence on employees and their labour environment are identified and the human factors in the implementation of ICT are emphasized.

2.2.2 The effect of ICT technology and the information society on employees

Implementation of ICT has a substantial influence on working processes and therefore also on individuals and teams in an organization and even the way society functions (Batenburg e.a., 2002). The implementation of new ICT brings many opportunities, but also contains risks, since it has a serious influence on people (Boonstra, 2005; Steijn, 2004; Nobre, 2002) and therefore careful consideration of human factors has become an essential requirement during organizational change like the implementation of ICT. Furthermore, if ICT is not used and managed effectively in an organization it can cause

many problems (Boonstra, 2005). In this regard it is important to note that in the Netherlands most employees work daily in an ICT environment (Schoemaker, 2004).

The technological innovations have caused the production, commerce and service to be more knowledge intensive than before (Hoekstra & Sluijs, 2003) and thus labour in many organizations has been transformed as a direct result, although Steijn (2001) suggests that this should not be exaggerated. Changes as a result of technological innovations are still increasing exponentially (Belasen, 2000) and it is unlikely that this tendency will stop in the near future. Feather (2004) argues that it is therefore expected that the influence on the labour situation of employees will continue to change and hence continuous research in this regard remains necessary.

In table 2.1 the changes that have occurred in many organizations as a result of the introduction of information technology and the effect of those changes on employees in the Netherlands according to some research results are summarized.

Table 2.1 Comparison between labour in the industrial society and the information society, based on research done by Steijn (2001), Boonstra (2002), Schoemaker (2004) and Dhondt & Kraan (2001).

	Industrial society	**Information society**
Working relationship	Permanent loyalty, obedience and discipline, transactional relationship and employer directs career of employee. Employment	No permanent loyalty between an employer and employee. Employability (knowing, wanting and being able to do) is important for employees to control his/her own career and for the employer to create opportunities in order to stay attractive for the employee. Commitment is expected of employees, although employability could have a negative effect on loyalty towards the organization.
Attitude towards learning	Learning the profession before becoming a professional, thereafter learning mainly through experience.	It is necessary to continue to learn after initial training and employment. An attitude of lifelong learning has become essential. But also learning how to learn is emphasized.
Mobility	The working environment was mostly static and dependent on location and time.	Mobility is essential; work is not necessarily dependent on location and time. Just in time learning and access to information when needed is important for all employees.
Communication	Mostly inside the organization, often top-down.	Effective communication has become an essential competency and this includes knowing how to use the tools of communication. Hierarchies in organizations generally decrease.

Table 2.1 (continued) Comparison between labour in the industrial society and the information society

	Industrial society	**Information society**
Type of work	Industrial production. Often limited tasks. Autonomy is regulated.	Knowledge workers. Work has often become complex and tasks have been broadened. Autonomy has increased and is essential to encourage innovation and creativity. Employees expect to participate in interesting projects.
Pressure of workload, work-related stress and work-satisfaction.	Work-satisfaction was often low; this caused work-related stress.	High workload correlates positively with work-related stress. Information overload causes work-related stress. Increase in autonomy and broadening of tasks results in more work-satisfaction.
Working foundation	Working was based on production process and not so much dependent on employees that could relatively easily be replaced. Stability in the working environment.	Working is based on the competence of employees, social capital and ICT. The right person in a function is essential. It is difficult to replace qualified and experienced employees. The employee needs to be flexible since the working environment continues to change.
Characteristics of workforce	Enough work for uneducated employees. Often such employees had to be brought into the Netherlands from other countries. Employment is dependent on employer.	Highly trained workforce required and in some sectors there is not enough supply. Work opportunities for uneducated employees are reduced in the Netherlands, since the economy has changed into a knowledge economy. Employment becomes less dependent on the employer.

According to Batenburg e.a. (2002) there is a complex relationship between technology and labour. They claim that further research in this regard is important in order to increase understanding about the influence of ICT on employees. Some research has been done about the effect of the information society on employees in general, but not specifically for workers at a managerial level. The work of managers often involves leading change and innovations in organizations and in the context of the information society leaders often play a crucial role in establishing those changes for their followers (Hargrove, 2001). The effect of the information society on leaders in the organization is therefore in its essence different from workers in general. This is supported by Boonstra (2005), who claims that it is not ICT itself that determines success, but effective management of ICT and change. Furthermore, Yukl (2006) calls for further research on managerial activities in relationship with the information society. He suspects that managerial activities have been influenced by the information and communication technology. This leads to the first part of the main research question:

What is the influence of ICT and the information society on the labour situation of officers in the NLDO?

In the next few paragraphs the literature review will focus on alternative ways of dealing with information and knowledge, competency management, ICT-security awareness and management of innovation and change in organizations in the information society. The changed ways of working are further investigated in order to understand the context in which the managers have to do their work and to understand how this affects the roles they have to perform in organizations in the information society. Each section will start with defining the new way of working.

2.2.3 New ways of working in organizations in the information society

2.2.3.1 Learning organizations

Defining learning organization

Learning Organizations can be defined from different perspectives. The focus can be placed on learning by an organization as an integral system: "*The learning organization is the capacity of an organization to gain insight from its own experience and the experience of others and to modify the way it functions according to such insight*." (Shaw & Perkins, 1992: 176) or the focus can be placed on learning by individuals in an organization (Senge, 1990; Argyris, 1999). Senge (1990:3) does agree that an organization functions as a dynamic system, but describes a learning organization with the focus on the people as a place '*where people continually expand their capacity to create results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to see the whole together*." The two perspectives are not necessarily contradictory, but could be two sides of a coin, since the organization as an integral system will learn, but so will the individuals in it. Learning and working have become entangled in the information society and the organization as well as the individuals in it will benefit (Kessels & Keursten, 2001) and the strategies and techniques that are available go beyond training alone and include aspects like performance support (Rosenberg, 2006).

Alternative mental models and learning strategies

Senge (1990) places emphasis on the critical search of alternative mental models and improving system thinking by which he stresses the dynamic relations between problems. Argyris (1999) and Hargrove (2001) argue that inadequate mental models prevent people to learn from experiences and feedback. They claim that it is important to learn from experiences without being defensive and having prepositions.

A number of authors regard the cognitive habits and mental models of individuals in the organization as important factors that have an essential influence on the effectivity of a learning organization (Kluytmans, 2001; Yukl, 2006; Senge, 1990). They claim that a

new way of learning, new mental models and a different behaviour is required by individuals in order for an organization to become adaptive.

Hoekstra & Sluijs (2003) argue that carefully selected mental models need to form the core of the thinking and working in an organization itself. This idea is supported by Hargrove (2001) and Kamperman (2005) who places learning in the context of a task, and connects learning processes with the new context of an organization and visionary objectives. Hargrove calls the learning progress in a learning organization transformational learning and identifies three successive learning processes. The first learning process is single-loop learning, which means learning through stepwise improvements to obtain new skills and competencies. In this process assistance is often needed. The second learning process is double-loop learning, which means a fundamental change in the way learners think and behave; Learners can independently reflect on their actions and bring about changes where possible. In the third learning process a transformation in the way learners see themselves and their context takes place.

Yukl (2006) also states in this regard that an attitude of lifelong learning is not sufficient any longer, but that learning how to learn is increasingly important in organizations and that it is necessary to redefine mental models. He calls this meta-cognition and states that it is different from other thinking and social skills in that it is '*the ability to introspectively analyze your own cognitive processes (e.g., the way you define and solve problems) and to find ways to improve them. It also involves self-awareness, which is an understanding of your own strengths and limitations (including both skills and emotions).*' (Yukl, 2006:203-204). This notion is supported by Zaccaro, e.a. (2004) who claim that effective global leadership skills require different ways of learning and thus different development strategies. Interesting in this regard is also that in a study of military officers by Marshall-Mies and others (2000) in Yukl (2006:204) it was found that meta-cognition has a positive influence on leadership effectiveness.

Factors that influence learning in an organization

According to Kluytmans (2001) learning in an organization is often about obtaining new techniques and ideas. He claims that a number of factors, like the organizational culture

and accessibility to development programmes, have a direct influence on the way workers think, learn and behave in their interaction with others in an organization. Hoekstra & Sluijs (2003) see knowledge and knowledge management as a product of learning; however knowledge and knowledge management can also be seen as an important starting point for new learning by individuals and organizations (Argyris, 1999). According to Rampersad (2002), the learning capacity of an organization can be increased by implementation of a knowledge infrastructure, allowing mistakes and dealing with an integral and systematic approach and working with self-steering teams in a network-organization.

A further aspect of the learning organization is just-in-time learning and the role mobile technology could play in this (Hargrove, 2001; Traxler, 2005). Advantages of mobile technology are their independence of location and time in providing access to essential information when it is needed (Kukulska-Hulme, 2005; Traxler, 2005). However little research has been done to determine what the added value is that mobile technology could bring to managers and their staff in the information society.

Changes require learning, but learning can also inspire change in an individual and an organization (Hargrove, 2001). Especially for large organizations adaptation is essential to survive. Changing a large organization takes a long time, but organizational learning can be developed and implemented incrementally and in fact in the information society learning has become a part of the daily work (Kessels & Keursten, 2001). Effective individuals are continually in a cycle of reflection, action and learning, trying to avoid ineffective routines (Boonstra, 2000; Hoekstra & Sluijs, 2003) and experimental learning often happens in teams. However it is also true that learning organizations demand another strategy and structure than traditional organizations. According to Florijn (2001) learning organizations require another style of leadership and management. The culture of a learning organization needs to support the development and distribution of knowledge in the organization. Trust between staff members and also between staff members and line management is important. Open communication, commitment and a willingness to work together is very important. Kamperman (2005) agrees that a manager plays an important role in this regard.

Changes require learning (Swieringa & Elmers, 1996) but learning also implies change. Hence a learning organization is in its essence a changing organization.
It is important to understand the implications of those changes in particular for staff at managerial level. This argument will be further discussed in paragraph 2.2.3.7 'change management' of this chapter.

Steyaert (2000) argues that life-long-learning in the information society requires ICT as a learning tool for employees and those digital skills have become essential to function effectively in an organization. He claims that in order to have access to the information and knowledge when needed and being able to evaluate the relative importance of information, requires competencies like structural (finding quality information when needed) and strategic (evaluating the relative importance of information and sources) digital skills.

The need for a corporate curriculum and performance support

Kessels & Keursten (2001) argue that since it is agreed that learning is important in organizations then a corporate curriculum would be essential. With a corporate curriculum they do not mean a formal learning programme, but rather a curriculum that makes transforming the daily work environment into an environment where learning and working come together and where just-in-time learning is stimulated and supported for all employees. They claim that it is important for individuals to develop competencies through which they are able to participate in a working environment that is focused on dealing with and the production of knowledge. Rosenberg (2006) and Rossett (2007) argue that performance support, like on-line job-aids to support procedures and information and useful resources are also increasingly important in organizations and could even reduce the need for training away from the job. Gery (2002) argues that performance support could be cheaper and faster than training, since employees could obtain support when needed in their work situation, however Rosenberg (2006) emphasizes that performance support could not entirely replace training, but should be seen as an additional means of learning that could improve performance.

2.2.3.2 Communities of practice and learning

Defining communities of practice

Communities of practice (COPs) are defined in this research as communities that support professional discussion and work by sharing knowledge and experiences, called

best practices. COPs can also be seen as communities of learning and often have some kind of online presence. This definition is partly based on a definition of Preece, Abras & Maloney-Krichmar (2004: 3). *"Online communities that support professional discussion and work."* The definition of Preece e.a. does not say how professional discussion and work are supported and COPs do not necessarily need to be exclusively online, but could also have a physical presence or form.

Factors that influence communities of practice

Team learning can play an important role in learning organizations (Senge, 1990; Rampersad, 2002). This is supported by Wenger (1998) who argues that learning can best be carried out in so-called learning communities, which he defines as social environments in which group members are dependent on each other in order to work together. He claims that if learning communities share a vision, use systems thinking and its members can work in a team, then this will result in communal experience gained and all participants will learn as a consequence.

There are different dimensions identified by Preece e.a. (2004) that influence the nature and success of the COPs. Some of those dimensions are: whether the community exists only virtually or has also a physical presence or form. The form could be face-to-face or via other physical connections like the mobile phone; the primary purpose for the community existing, the type of software environments that support the community, the size of the community and for how long the community has existed.

In order to develop a successful online community it is necessary to consider sociability and usability as important determining factors (Preece e.a., 2004). Participating in a COP is a cognitive and social experience, but in the past little attention was given to social aspects when computer-supported cooperative work systems (CSCW) were designed with a strong task and work focus. In order to evaluate online communities for their effectiveness and to contribute in this regard to instructional design of those communities it is important to develop new evaluation techniques.

Virtual meeting places, project groups and extensive networks are new aspects that many managers and professionals have to deal with on a regular basis. Schoemaker (2004) also argues the importance of organizations as working communities and argues

that working in the information age is based on a mix of competence of employees, social capital and ICT; however he does not identify the specific competencies that employees need to develop. Human networks with cooperation processes remain in tact even if a re-organization takes place (Swieringa & Elmers, 1996) and hence provide some stability in a rapidly changing world.

Wenger (2000) as well as Brown & Duguid (2000) argue that the success of organizations is largely determined by the ability of the organization to create communities of learning and practice. Wenger emphasizes the importance of the role of the leader in such a community and Brown & Duguid (2000) warn that ICT cannot replace the social networks that make working and learning possible but that ICT makes communities of practice more effective and flexible.

2.2.3.3 Knowledge management

Defining knowledge

Knowledge is seen in accordance with the critical realist view in 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). Furthermore, knowledge is seen in this research as a function of information about systems and processes, including experiences of individuals and teams like best practices as well as what is being learnt from mistakes, skills and attitudes in accordance with the definitions of a number of authors (Florijn, 2001; de Vries, 2001) and as such knowledge makes it possible for humans to act. Florijn (2001) describes knowledge as something with which data can be interpreted to information. Knowledge is furthermore needed to apply the information, including having insight in the consequences of using and applying information. Knowledge is hence of a higher level of complexity than information is. It contains not only facts and insight in those facts, but also experiences, attitudes and skills. This tacit knowledge is difficult to transfer (Kessels, 1999).

Defining knowledge management

Knowledge management includes the planning, storing, controlling, using and distributing of knowledge that is important for the organization as well as for the individuals in it (Weggeman, 2000).

Knowledge management is an important theme in management literature. Knowledge is present in systems, processes and individuals and it is important to realize that knowledge is perishable because new information and knowledge is added to the existing knowledge at an exponential rate (Belasen, 2000).

Factors that influence knowledge management

In the industrial age, employees could often easily be replaced. However in a society where knowledge and expertise is directly connected to individuals, an organization could lose this knowledge. Therefore digital knowledge management has become important for an organization and requires a cultural change. Furthermore, in the Netherlands organizations often make it financially attractive for older employees in the organization to go with early retirement when they want to reduce personnel in the organization and since the older employees have years of unique experience and knowledge that has often not been stored and managed electronically, the organization could loose vital knowledge if those employees leave (Feather, 2004). According to Feather one of the key aspects of knowledge management in an organization is to ensure that the informal knowledge that underpins effective operation is included. It is therefore essential that the explicit knowledge of an organization is evaluated continually (Belasen, 2000).

Knowledge management organizes the creation of knowledge, the distribution of knowledge and the exploitation of knowledge. This often requires a cultural change in organizations. In the past people often protected knowledge in order to keep a level of power. In the information society sharing of knowledge has become essential (Belasen, 2000). An important notion in this regard is however that tacit knowledge is difficult to describe and document (Kessels, 1999) and only possible to achieve if employees understand the importance of this aspect of knowledge and are willing and able to share this.

According to Florijn (2001), organizations obtain excellent results when knowledge systems and knowledge technology are introduced. Successful implementation requires a change in the way the organization works and a realization about how difficult it is to manage knowledge. Florijn however does not mention that knowledge management is a cyclic process and that employees need share a vision of the organization in order to continue to participate in this cyclic process (Weggeman, 2000). De Vries (2001) also emphasizes the importance of the employees in this process. Weggeman argues that the first step in knowledge management is to determine what knowledge is needed in the organization.

This need is based on the strategy of the organization. This need is then compared with the available knowledge and the missing knowledge needs to be developed. Hereafter knowledge needs to be shared, applied and evaluated. Based on the evaluation improvements are made where necessary and follows a new cycle of development of knowledge, updating existing knowledge and evaluation. A change in the strategy of the organization also requires this process to be re-evaluated. He sees Knowledge Management as a cyclic continuous process which is illustrated in figure 2.2. The knowledge-value-chain according to Weggeman (n.d.).

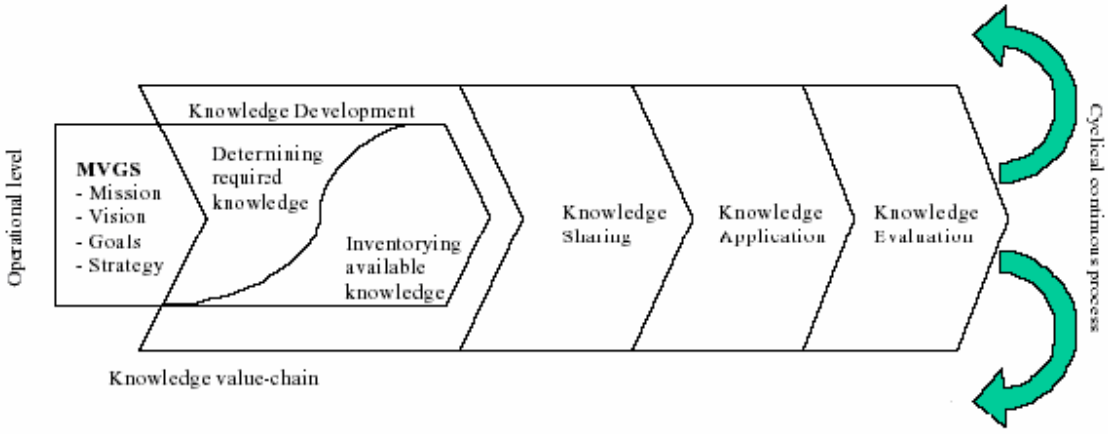


Figure 2.2 The knowledge-value-chain according to Weggeman

Steijn (2004) distinguishes three different approaches towards knowledge management. Firstly the focus can be placed on the technology, secondly on the process and thirdly on the knowledge. Steijn underlines the importance to combine the three approaches.

Nobre (2002) and Schoemaker (2001) argue a combination of those approaches with the importance of human factors and a social systems approach. Meaning that the dimensions: technology, processes, knowledge and human factors are inter-related and need to be studied integrally and holistically. Furthermore, the technology should be focused on processing rapidly changing information and not just on storing knowledge (de Vries, 2001).

From research done by De Long, Davenport and Beers (1996) as described in Florijn (2001:26) there are 7 aspects that are important during an implementation of knowledge management in an organization.

1. Structured knowledge needs to be stored and re-used
2. Work experiences and lessons learnt needs to be stored and shared.
3. Sources and networks for expertise need to be identified.
4. Knowledge that could improve performance needs to be identified and structured.
5. The economic value of knowledge needs to be measured and controlled.
6. Knowledge of external sources needs to be composed and applied.
7. Knowledge needs to be integrated in processes and products.

Hoekstra & Sluijs (2003) see learning more as the production of knowledge and hence regard effective management of knowledge as being more important than learning processes and adaptation of individuals. Other authors (Hargrove, 2001; Senge, 1990; Kessels & Keursten, 2001) place the emphasis more on the importance of the individual learning process. However agreement does exist about the importance of knowledge management in the information society and that the production of knowledge is too important to leave to change (Kessels & Keursten, 2001). Furthermore, it is clear that an organization as well as the individuals in it needs to consider how to best save, distribute and transfer the needed knowledge and expertise in the organization. A distinction can be made between two approaches: technocratic approach and learning-process approach. Since knowledge changes fast and new knowledge is created all the time, a combination of the above approaches is perhaps most appropriate. This is supported by Hoekstra & Sluijs (2003) who argue that a balance needs to be found between managing expertise and knowledge effectively using ICT technology and actualizing knowledge and expertise in individuals.

2.2.3.4 Human resource development and Competency management

Defining Human resource development (HRD)

"HRD is any process or activity that, either initially or over the long term, has the potential to develop adult's work-based knowledge, expertise, productivity and satisfaction, whether for personal or group/team gain, or for the benefit of an organization, community, nation or, ultimately, the whole of humanity."
(McLean & McLean, 2001: 322). This definition was developed by McLean and McLean, after they had collected definitions of HRD worldwide to compare and contrast them in an attempt to propose this global definition of HRD.

Defining Competency management

"*Competency management is a continuous, integrated coordination of strategic aims of an organization translated to competencies, with the competences of the employees*" (Kluytmans, 2001:472).

A competency is a specific ability to perform effectively in a certain task or problem situation (Hoekstra & Sluijs, 2003:30) whereas competence is seen as the unique potential that an individual has to offer to add value to an organization (Kluytmans, 2001:472). 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, commitment and self-confidence) and own perceived need for further knowledge.

Link between HRD and competency management

It appears to be beneficial for an organization to create a harmony in which the potential human resources are optimally available for the organization and at the same time the employability of the employee is increased (Kluytmans, 2001: Harrison & Kessels, 2004). In this sense there appears to be a direct link between HRD and Competency management.

Factors influencing HRD and competency management

Nobre (2002) has analyzed the role of human resources development in the process of organizational innovation and in the context of the knowledge society of the information age. She claims that in the information society any organization should be considered as an information system, where the technology, especially ICT and other production factors should be seen as interrelated factors and a holistic view is needed. She stresses the importance of the human factor in such a system.
Conflicts, controversies and contradictions inherent in the complexity of human environments need therefore to be taken into consideration in organizations in the information society especially when dealing with HRD.

Hoekstra & Sluijs (2003) claim that the relationship between the required expertise and the required behaviour repertoire is the complexity of the tasks, by which they mean that the intensity of knowledge that is required to perform effectively in the information society, makes a flexible behaviour repertoire very important. Management of competencies is therefore increasingly an essential role in the field of Human Resource Management and therefore one aspect of competency management in the context of HRD is that the development of individual competencies of the employees is given enough attention. Managers play an essential role in this (Kessels, 1999).
Effective competency management requires a different way of managing the human resources available in the organization (Kessels, 1999). It is important to have a clear insight into the vital competencies of the broader organization as well as the working units in the organizations. At the same time a clear picture needs to be available of what the competences are that are available in the current staff of the organization at all levels. Gaps in the required competencies and the available competences need to be identified and development and recruitment programmes need to be adjusted accordingly (Harrison & Kessels, 2004). Employees often do not work within the strict limits of function descriptions of the organizations (role-oriented), but need to be flexible and become task-oriented (Kluytmans, 2001).

Koonce (1995) argues that change management should be linked to competency management. When employees have an insight in their potential and limitations of their competences and learn to take responsibility in their own career plan, they could anticipate possible new roles to improve their employability within the organization or

elsewhere. Learning occurs when the focus of the employees is on changing themselves on the basis of opportunities that are or could become available in the future and the focus of the managers is to support those changes but at the same time to steer the aspirations of the employees to harmonize with the competencies needed in the organization in accordance to it strategic vision. Managers need to play a facilitating role in this regard and need to encourage their staff to develop themselves further.
When employees are motivated and committed to develop new competencies it could even have a greater impact on the organization than having a strategic policy in this regard according to Kessels (1999).

Each organization needs thus to develop a competency framework to appropriate for their unique needs according to Shellabear (2002). He describes competency profiling as a method for identifying specific competencies which are required to perform effectively in a task, an activity or a career. A design team could use a competency modeling toolkit. Research has shown that web based instruments could help in designing competency cards (Stoof, 2005).

Research has been done by Van Bemmel, Van Geel & Langefeld (2005) to develop and test a competency framework for a sub organization of the NLDO. This framework contains six areas of competence: cognitive intelligence, emotional intelligence, intuition, instinct, physical and psycho-motor. Their aim was to contribute to the area of competency management in order to increase the effectiveness and efficiency of placing personnel in the organization.

Competency management could be supported by electronic means and organizations select primarily software that facilitates informative applications and applications that are focused on the streamlining and increasing the efficiency of the HRM processes. However according to Cooper (2005) it needs to be avoided that individuals develop their own digital instruments to manage competencies. The organization needs to identify suitable applications in order to harmonize working processes.

2.2.3.5 ICT-security awareness management

Defining ICT-security awareness management

For the purpose of this research the focus is on the general role managers could play in influencing the policy regarding ICT-security issues, the secure management of the information that they are responsible for (in the sense of integrity, availability and exclusivity) as well as the management of ICT-security awareness amongst their staff. Security as such and in particular ICT-security by specialists falls outside the scope of this research.

Factors influencing ICT-security awareness

An important means of dealing with the information security threats is the involvement of managers. They play a vital role in influencing the policy regarding information security issues and making their staff aware of the information security risks (Elletson, 2005). Elletson and English (2001) argue further that policymakers need to have a holistic understanding of the situation in order to make the correct decisions in this regard.

Bonatti, e.a. (2006) argue that one of the most important causes of computer security violations on the Internet is the lack of technical knowledge of the users. They claim that users are typically not aware of the security policies applied by their system. The consequence is that they do not exploit the system's protection facilities appropriately and ignore their computer's vulnerabilities.

The leader plays an important role to make their staff aware of the security risks in the information society and they need to facilitate relevant information regarding the risks and how to prevent those risks. Furthermore, the manager needs to understand the importance of a high quality of information in terms of completeness and collective significance (English, 2005). English defines quality of information in three dimensions;

- The quality of the information architecture should be such that the information is stable, flexible and re-useable.
- The content should be complete, accurate, precise and non-duplicate.
- The presentation should be such that the information is accessible and understandable.

According to English the management of the quality of information is essential in order to what he calls "*connect the dots*" (English, 2005: 19) and thus being able to prevent failure of security. Most importantly managers need to achieve a state of commitment themselves as well as from their staff to the security objectives of the organization so that all employees are intrinsically motivated to participate in ensuring the security, including the quality of information in the organization (Siponen, 2001; English, 2005).

A manager needs to realize what the security threats are in order to influence policy in this regard. To implement security related e-learning and to implement security measures requires continuous investments with no directly visible return. Yet the cost of doing nothing can be huge (Bailey, 2005; Siponen, 2001). Every time that the technology changes, the security policy needs to be evaluated and employees need to become aware of the new threats that come with the new technology. Hence an ideal situation is never possible (Eckert, 2005). In this regard the focus is often on security risks related to crime and unauthorized access, but in the context of this research securing the quality of information and the integrity of data is also included (Peltier, 2005). Siponen (2001) claims that educational institutes should get involved in order to keep such a process going and Elletson (2005) is convinced that e-learning can play a vital role in information security awareness.

2.2.3.6 Innovation management

Defining innovation management

In this research innovation is seen as the creation of new ideas, practices, services and goods that add value to the organization, the individuals in it or the customers it serves.

Factors that influence innovation

Lee, Florida & Gates (2002) argue that innovation is a joint product of human capital, creativity and diversity. They claim that diversity contributes significantly to innovation and that an organization that is able to make the work environment attractive to talented employees of diverse backgrounds is more likely to be innovative.

De Jong & den Hartog (2005) have done research into the characteristics of innovative behaviour in small and medium sized organizations and have found that variation in

work, autonomy and stimulation of innovative behaviour are important work characteristics that contribute positively to innovative behaviour of knowledge workers. Kluytmans (2001) also emphasizes the importance of autonomy. He claims that autonomy stimulates motivation and commitment of employees which are both important in organizations in the information society.

According to Janssen (2002) innovative behaviour could be distinguished in three ways: generating new ideas, promoting new ideas and realizing those new ideas. Generating new ideas is focused on realizing improvements.
New ideas are created by combining information and existing concepts to solve problems. The promotion of those new ideas is necessary to create a basis in the organization for implementation and to ensure that all necessary means are available. The new ideas are realized when the innovative idea is fully implemented in the organization. De Jong & den Hartog (2005) emphasize that each innovation starts with someone in the organization that sees new challenges or is trying to find a solution for a problem in the organization. Creativity is therefore an important factor in initiating innovation and change (Burns, 2003). This idea is supported by Kessels & Keursten (2001) who claim that creative disorder stimulates creativity.

2.2.3.7 Change management

Factors that influence change management

New competencies are required on management level to adjust to the changes that are inevitable in the information society. Managers also need to inspire their subordinates to adjust effectively to change. The manager needs to coach workers to 'want to change', instead of to 'have to change' (Rampersad, 2002; Stoker, 2005). Stoker argues further that the manager needs to change first and find his/her new role in the new organization before he/she can hope to change the behaviour of the subordinates. Stoker claims that research shows that leaders that are an inspiring role model are better able to inspire their subordinates to change and adjust to changes in the organization. Successful change projects in organizations have usually in common that the communication is open and effective and sufficient time is given to individuals that have a resistance against change (Kluytmans, 2001). Effective communication is hence an important competency that is required for managers in the information society. The minimum adaptation required from organizations and individuals in a changing society is

acceptance of change. Anticipating change has become necessary, but being at the forefront of the changes and innovations is best (Hoekstra & Sluijs, 2003). Development programs that foster a leader's ability to manage change will be beneficial to organizations in dynamic environments (Zaccaro, Wood & Herman, 2006).

Boonstra (2000) claims that change management in an organization in the information age could be approached in two different ways and has named them: the design- and the development approach. In table 2.2 the two approaches are compared

Table 2.2 Comparison between the design and development approach in change management according to the ideas of Boonstra (2000).

	Design approach	**Development approach** *"Lerend vernieuwen"* (Boonstra, 2000:3)
Vision on the organization	Formal system, grown shortcomings.	Integral system and source of knowledge, insight and experiences.
Problem orientation	Finding solutions to problems.	Problem directed.
End purpose	Stable end situation.	Enlarging change capacity.
Process course	One-off linear process.	Iterative continuous process.
Rationalization of process	Economical and technical.	Social and politic.
Managing of process	Initiated, coordinated and checked from the top. Tight standards and planning.	Initiative and control is determined in consultation between involved parties.
Decision-making	Formal, structured, large influence of top.	Negotiation and consultation with all parties concerned.
Disagreements	Denied and not discussed.	Discussed openly.
Change method	Task-structural, one approach.	***Combination of process -, negotiation - and task-structural approach.***
Way of working	From abstract models and organization description to concrete working method.	From concrete working method and problems to coordinating aims and abstract models.
Role of the advisor	Expert role.	Changing roles and strategies.
Implementation	Separation design and setting-up. Implementation aims at acceptable making the new situation.	Fluent passage of problem diagnosis to determining the aim and required change.
Participation	Difficult.	Good possibilities.

According to Boonstra (2000) the design approach is appropriate in dysfunctional organizations where drastic changes are needed to overcome a crisis situation. Innovation needs to be carried out quickly for the organization to survive the crisis situation. This approach is suitable in large organization where uniformity in technology and organizational management is required, the aims and norms are clearly described and it is not necessary to adjust those.

The development approach on the other hand is appropriate when an organization functions reasonably, but improvements and adjustments are needed to deal with changing trends in the surroundings. It is possible to gradually deal with adjustments. Flexibility, knowledge and experience are needed to innovate. Boonstra also claims that active involvement and commitment of all employees in an organization is needed to achieve the required changes. He states that when all employees are involved in the process of change *"Organiseren, vernieuwen en leren ontmoeten elkaar dan in een dynamisch proces."* [Organizing, renewal and learning meet each other in a dynamic process] (Boonstra, 2000: 4).

From a number of sources (Boonstra, 2005; Hargrove, 2001; Boonstra, 2000; Belasen, 2000; Yukl, 2006; Burns, 2003; Stoker, 2005) the following important factors are identified to make successful organizational change possible:

- Effective leadership during the period of change, with the emphasis on managing change.
- Commitment of employees in the organization, especially the leaders in the organization.
- Motivation of employees in the organization, especially the leaders in the organization.
- Clear vision and strategy of the organization, supported by the leaders in the organization.
- Effective communication by the leaders in the organization.
- Providing information by the organization and the leaders in the organization.
- Insight by the leaders in the organization in the relative importance of the organizational culture.
- Leaders in the organization should deal effectively with the resistance against change by employees.

The information society requires a different approach to dealing with changes. In a constantly changing organization, the traditional change model like 'unfreezing, changing and freezing' from Lewin (1951) appears very difficult to achieve. Lewin placed the emphasis on a time of stability following a period of change, but in the information society this is often not possible. Hence alternative ways of change management need to be sought. What is clear from the literature however is that managers play a vital role in ensuring the changes in the organization are managed effectively and that they need to change themselves and become role models during the period of change.

It needs to be noted in the context of this study that it is also necessary for a leader to be aware that the latest available technology and software does not always mean an improved working environment. Hype cycles provide a scorecard in this regard to separate hype from reality, but they also provide a model on which organizations could base their decision whether to implement a new technology or not. A hype cycle is a graphical illustration of this process over time. It is important for strategic leaders to be aware of this process. Rubens (2003) claims that three phases could be observed during the introduction of new technology; firstly a phase of enthusiasm, followed by a phase of disillusion and thereafter a phase of gradual improvement.

The changed ways of working in the information society also influence the roles of leaders in organizations. Those new roles are discussed in the following section of the literature review.

2.2.4 The role of leadership in organizations in the information society

Paradigm shift in leadership

Hargrove (2001) argues that in the 21st century mindset, behaviour and ways of being a leader need to drastically change and leadership needs to be rethought in a connected economy. He argues that the e-economy requires a complete paradigm shift in leadership. Hargrove focuses on e-business and making profits. Since a military organization is in its essence a non-profit organization, an entirely new leadership paradigm may not be required in a military context, but it can certainly be argued that a new dimension needs to be added to leadership in the military organization. This new

dimension of leadership is directly related to ICT and functioning effectively in the information society. According to Hargrove (2001) managers in their leading roles in organizations, play a vital role in firstly influencing the strategy of the organization, secondly regarding the implementation of the new way of dealing with information in the organization and thirdly in encouraging their staff to fully participate in the new ways of working and dealing with information in the organization (Kluytmans, 2001). Tijdens & Steijn (2005) found in this regard that an informed ICT strategy of the organization and intensive personnel policy has a positive effect on the willingness to acquire ICT competencies amongst all employees in an organization.

According to Tijdens & Steijn (2005) managers play a vital role in communicating a holistic vision and strategy to make the organization more innovative with regard to the management and communication of information. As organizations change their strategy to make it possible to work effectively in the information society, leaders can influence the policy and play a vital role in the implementation of those policy changes (Conger e.a., 2000). They need to improve the ways to obtain and deal effectively with ICT and the information that they themselves and their staff require. However according to Burns (2003) establishing substantial changes in organizations requires planned leadership. He sees this kind of leadership as a collective effort and interaction between leaders and followers who in turn become empowered and impel their leaders. He claims that in this dynamic way transformation takes place.

In a military organization officers mostly work in managerial positions and influence their staff by being a role model, by communicating the vision of the organization and inspiring the employees to believe in this vision (Vogelaar, 2002). Conger e.a. (2000) argue similarly for organizations in general. According to research done by Vogelaar, Kramer, Metselaar e.a. (1997) it is found that in the Netherlands relatively young officers need to take decisions independently in relative complex circumstances. In order to make the right decisions it has become essential to have access to up-to-date information when needed and to communicate the information effectively.

Changed role in a global environment

Opportunities to communicate effectively both nationally and internationally have increased greatly by ICT especially via web technology. The borders of the economy have expanded and for most organizations it is essential to work effectively across the national borders. This requires a new attitude to work especially for leaders in organizations (Hargrove, 2001). A professional competency of foreign languages, openness to other cultures and diversity have become essential to participate in the information society.

Changed role as a manager of ICT and consequent changes and risks

From the literature review in the previous sections it can be concluded that the implementation of ICT on its own cannot determine success. Effective management of ICT and the changes that occur as a result of the implementation are essential (Boonstra, 2005; Hargrove, 2001; Kluytmans, 2005; Belasen, 2000). Boonstra (2005) claims that this is a complex process that involves changes in power structures, organizational culture, tasks as well as motivation of employees. This is in accordance with the ideas of Davenport & Prusak (1997). A military organization is influenced in similar ways by the information society than other organizations and having the right person in the right function, human resource development and information security awareness are as important for a military organization as those aspects are in other organizations. Furthermore, dealing effectively with information and communication plays a vital role in the success of the military organization. In fact in some situations the stakes are very high; during military operations and in terrorist threats dealing effectively with information and communication may even mean the difference between life and death (English, 2005). Davenport & Prusak (1997) emphasize in this regard that not all important information is obtained via computer systems, but could come from a variety of sources. They argue that the role of a manager is essential in taking notice of the entire information environment.

Changed role in participating in creating a learning organization

Belasen (2000) and Senge e.a. (1999) argue that a leader has a crucial role in establishing a learning organization. Belasen (2000) mentions amongst other more traditional roles (coordinator, director, producer, and monitor) the following roles for managers in this regard:

- Innovator, in the sense that the manager needs to adjust to the environment and help the other employees adjust.
- Broker, in the sense that the manager plays a crucial role in organizing networking in the organization.
- Facilitator, in the sense that the manager plays an important role in enhancing organizational learning.
- Mentor, in the sense that the manager has learnt how to learn and that he/she is involved in coaching his staff to learn how to learn.

A leader also plays an important role in establishing and participating in communities of practice and making their subordinates aware of the importance of such communities. In this sense an awareness of the need to learn in combination with knowing where to find the information is the first step in the right direction (Steijn, 2005). Rosenberg (2006) argues that the following step is to organize and package the knowledge from the employee's point of view and information need.

Changed role in competency management

Competency management as described by Nobre (2002) requires leaders in organization to describe the core competencies required by an organization and the competencies their staff possess clearly and create a development plan for themselves as well as their staff for the benefit of the organization as well as for each employee individually (Kessels & Keursten, 2001).

Changed role in facilitating creativity and innovation

According to Koonce (1995) change management is an activity directly linked with creating innovative organizations that produce optimal results. Burns (2003) and De Pree (2005) place the emphasis on leaders when they claim that the creativity of leaders is the spark that initiates change, although he also recognizes that some subordinates are more creative than their leaders and that leaders need to recognize such potential and ensures especially for such personnel a working environment conductive to innovation. Florida (2002) claims that creativity always leads to innovation and he even claims that economic growth is mainly the result of human creativity and not just production factors like resources and knowledge as is commonly believed (Hospers, 2006).

Changed role as internal advisor

Successful leadership is a complex phenomenon that always takes place in a specific context (Peters, 2004). A leader in a military organization is expected to contribute towards the required changes in the organization by taking on a role as an internal advisor since the military expertise regarding dealing with information, communication and security is developed specifically for the military organization. External advisors will not have the know-how and insight of the specific circumstances.
In some circumstances external advisors could work with internal advisors in the organization, but the role of an internal advisor is to give advice regarding strategic and organizational policy and strategy.

Based on the ideas of Nathans (1997) to obtain results as an internal advisor in an organization, the following competencies are needed in a military organization:

- Effective communication in a variety of situations: standard organizational situations, operational situations, crisis and risks situations, international peacekeeping mission or a war situation.
- Realisation of the subjectivity, influence and impact of one's own paradigms. Cultural sensitivity is required. Observation of paradigms in the countries where the mission takes place as well as the paradigms of international military partners have an important influence on effectivity.
- Knowledge of acceptation strategies in the military organization as well as international military partners.
- Knowledge of policy, strategy of the organization and critical success factors of the military organization.
- Collecting the correct information and sharing this effectively with international military partners.
- Networking within the own military organization, but also with international partners and within the countries in which the operations take place.

The manager in his/her role of internal advisor is hence jointly responsible in providing clear structures, defining and communicating effectively what changes are required in the military context and under which conditions.

Commitment to the new ways of working

New ways of organizing have become necessary (Steijn, 2001) as well as a fundamental change in the ways that organizations are structured and in which the managers need to work differently than before as a result of ICT (Kluytmans, 2001; Boonstra, 2005) and information behaviour needs to change effectively (Davenport & Prusak, 1997). Without commitment of managers, the changes that are required in the information society will often not effectuate (Boonstra, 2005). Yet little research has been done to determine how managers have changed their information behaviour and how committed managers are towards the challenging changes that are required as a consequence of ICT.

From the above discussion it is clear that in order to participate in the information society, more is needed than access to a physical infrastructure, access to computers and connection to the internet. In the Netherlands a few years ago the focus of organizations was often still placed on this physical dimension (Steyaert, 2000), but this is slowly changing and organizations realize that the human factor plays an important role in effective implementation of ICT in an organization (Boonstra, 2005). From the literature it is however not clear how the required digital skills can be developed during the initial training period, or what kind of support is needed for managers to develop those skills on the job. Creative leadership as well as effective adaptability (Zaccaro e.a., 2006) appear to be important factors, since creative insight is transforming (Burns, 2003). Creative leadership according to Burns however lies not in having ideas, but in bringing those ideas of the ideas of others into practice so that the envisaged change occurs. Leadership in this regard means taking on the initiative. Kluytmans (2001) has a similar idea and connects the following tasks to managers in organizations in the information society: initiating, structuring, realizing and evaluating in a cyclic process.

From the literature it is has also become clear what the role of the manager is in the new ways of working that are required in organizations in the information society in order to function effectively. It has also become clear that managers play a crucial role in influencing the strategy and policy of the organization, implementing the new strategy and policy and encouraging their staff to participate in new ways of working. Managers have to change themselves first and thereafter motivate and coach their staff to change in order to participate effectively in a learning organization, communities of practice and knowledge management. Furthermore, it is clear that managers play a crucial role in

human resource development especially competency management and managers have to create an environment conductive to innovation and where sufficient ICT-security awareness prevails. All those changes need to be managed effectively.

Other ways of working and managing require new competencies (Hargrove, 2001). In order to participate effectively in the information society managers need to develop certain ICT- and certain ICT-related competencies to deal effectively with alternative ways of dealing with information, technology and communication. Although a number of managerial competencies have been described, the specific ICT- and ICT- related competencies for managers have not been identified and described as a group of competencies, nor for organizations in general nor for military organizations specifically. The competencies required by managers in the information society is discussed in the next section.

2.2.5 Competencies required by managers in the information society

A discussion about competencies in general in this section is followed by a discussion with the focus on ICT- and ICT-related competencies that managers require to function effectively in the information society according to the literature.
Yukl (2006) emphasizes that training and development need to be based on an analysis of essential competencies. He claims that research and systematic analysis in this regard is necessary. This notion is supported by Zaccaro e.a. (2006). According to Merriënboer, van der Klink, van der & Hendriks (2002), the concept of competencies is introduced to improve the connection between education and professional practice. It forms a basis to move from supply-driven to demand-oriented education. In this regard it is also important to investigate from literature what the changes are in the cognitive requirements of the workforce at an managerial level as a result of the changes that the information society brings in motion.

Such competencies of managers need to be seen in the perspective of the strategy and purpose of an organization according to Hoekstra & Sluijs (2003). They claim that competency profiling is a powerful method to manage performance in the organization as well as to steer organizational changes.

This notion is supported by Van Bemmel e.a. (2005) who argue further that competency management leads to more effective management of personnel because a framework of competencies offers a solid structure to measure competences and make the competencies transparent. Competences can thus more effectively be applied in the different activities connected to human resource management, like recruitment and selection, training, career planning of employees and outflow of personnel (Kluytmans, 2001).

Each organization determines in a unique way how to describe competencies and how to deal with competency management and as a consequence a number of definitions and lists of competencies have emerged (Van Bemmel e.a., 2005). Hence there are also a number of lists of competencies required in the workplace at managerial level. Table 2.3 presents a summary of the lists of Hoekstra & Sluijs (2003), Utrechtse Leercompetentie Inventory (Walter, 2002) and Rampersad (2002). In this regard it is important to note that a selection of competencies could never be final, complete or always correct under all circumstances. Therefore it is important to evaluate regularly if the list that is used, needs to be adjusted (Hoekstra & Sluijs, 2003). Furthermore, for the purpose of this research it is assumed that all students at the level of higher education have the intellectual potential to learn the required competencies. It is noted that a list of competencies does not clearly explain their relative priority, how they are interrelated and how they will be evaluated or achieved. Furthermore, it is important to evaluate regularly if the list needs to be adjusted to accommodate for new technologies or new insights in the information and communication technology, according to Hamel & Prahalad in Hoekstra & Sluijs (2003:17).

Table 2.3 a summary of managerial competencies based on the ideas of Hoekstra & Sluijs (2003), the Utrechtse Leercompetentie Inventory (Walter, 2002) and Rampersad (2002)

Competency	**Performance indicators**
Enterprising	Initiative, Courage, Independency, entrepreneurship
Influencing	Communicating, presenting, strength of conviction, sociability, contracting
Organizing	Planning, organizing, monitoring progress, organization awareness.
Managing	Competent to take decisions, delegating, leading (individuals), leading (groups), carrying out a vision, coaching.
Instilling mutual trust	Integrity, loyalty, responsibility
Performing	Focused on performance, handling characteristics, determination, focused on quality, ambition, energy.
Relating	Customer orientation, listening, cooperation, empathy, negotiating
Analyzing	Creativity, Problem analyses, learning orientation, conceptual thinking.
Transforming	Situational awareness, formation of judgment. Developing a vision, intercultural orientation.
Flexibility, showing impact strength	Adaptability, self-control, stress tolerance, flexibility.

Tasks and problems with which academics will be confronted in organizations have intrinsic characteristics that do not change, but different, sometimes unforeseen circumstances could influence the performance (Hoekstra & Sluijs, 2003). The specific situation, in which the manager will use his /her cognitive competencies, is determined by a number of factors, like the individual workers, circumstances and the characteristics of the task. Hoekstra & Sluijs argue further that generic managerial competencies need to be fine-tuned for the specific situation in which the task needs to be completed. The competency to make those adjustments is therefore also essential. Knowledge and expertise can be learned and behaviour can be adjusted.

According to Hoekstra & Sluijs (2003) it is possible to change and develop a behaviour repertoire and even to change the emotional style through learning. Competencies can be learnt and developed within the limits of the intelligence and temperament of the individual. Each competency can be described at the required level of functioning in the organization. For managers the scale of 'expert' is likely to be used, which is defined by Shellabear (2002) as a level where the task is consistently performed to the required standard, furthermore, the expert looks at ways to improve the working environment, has in-depth understanding and could coach others to obtain the competency. A competency describes behaviour in relation to its orientation to problems.
This is consisted with theories about the origin of behaviour. Problem situations have caused elements of behaviour to be shaped and structured and underlined mutual consistency (Hoekstra & Sluijs, 2003). The functional advantages of working with competencies are that this concept can be recognized and observed, can be evaluated on the basis of minimum criteria, are related to relevant practice and they can be developed within the limits of intelligence and temperament of the individual.

In a knowledge economy most workers at managerial level are required to deal with large amounts of information and have to deal with constant changes of the characteristics of the organization regarding its vision, purpose, culture and structure. Hence self-regulation in combination with effective processing of information has become important managerial competencies (Kluytmans, 2001). Since managers need to stimulate participation and commitment of their workers in order to implement innovations effectively (Boonstra, 2005), interpersonal and communication skills have become essential social competencies for managers in the information age (Kluytmans, 2001). This idea is supported by Yukl (2006). If managers and their employees understand that computer technology can be more than a tool to perform tasks and that ICT can be seen as an extension of their own capabilities, like an individual knowledge management system, extra opportunities are created according to Hoekstra & Sluijs (2003:27).

Yukl identifies four additional competencies that have been redefined over the last few years: emotional intelligence, which he describes as being aware of and being able to manage cognitively one's own feelings and the feelings of others. Social intelligence which he defines as "*the ability to determine the requirements for leadership in a particular situation and select an appropriate response*", systems thinking and the ability to learn (Yukl, 2006:202). Creativity and adaptability are seen by a number of authors as essential competencies for managers especially in a fast changing environment like the information society (Burns, 2003; Yukl, 2006)

In the following sections the focus of the literature review is on creating a theoretical framework which will form the basis for the research method in order to answer the first part of the main research question: ***What is the influence of ICT and the information society on the labour environment of the officers in the Netherlands Defence Organization?*** with a focus on two of the sub-questions: ***What are the ICT- and ICT-related competencies that are required in the information society by managers of the Netherlands Defence Organization?***
The purpose is to operationalize from existing literature the different dimensions and indicators of the main categories of the envisaged ICT- and ICT-related competencies that are required by managers in the information society.

2.3 Conceptual model of ICT- and ICT – related competencies needed by managers in the information society

The focus of this research is on the ICT- and ICT-related competencies that officers in the NDLO need to develop in order to function effectively in the information society. Two models related to ICT-competencies were identified during the literature review. In both models the emphasis is placed on digital skills and computer literacy. In the next section the models are described.

Steyaert (2000) categorizes digital skills as follows: instrumental skills, structural skills and strategic skills. Instrumental skills indicate the operational skills that are needed to deal with ICT technology as such, like using applications, sending someone an e-mail or downloading software from the internet and installing it. It is assumed that students in

higher education in the Netherlands have developed many of those basic ICT skills during high school and since the technology has become user-friendly to such an extent the students in higher education will be able to master the relevant techniques during their time at university. It needs however to be researched further to determine if this assumption is true. The more complex aspects of instrumental digital skills could be essential in a package of managerial competencies. Structural skills are related to the structure in which information is contained. Examples are using appropriate keywords and search engines to find relevant dynamic information via discussion sites, rather than via static information on web sites or finding relevant scientific sources in digital libraries on the section of the internet that is invisible for regular internet users. Strategic skills are focused on pre-actively finding strategic information needed to base decisions on. It includes aspects like critically evaluating information on relevance and integrity and being able to combine a variety of sources that are written on different levels, to a harmonious whole on which decisions can be based (Steyaert, 2000). Since the investments in ICT in organizations are huge, it is necessary to obtain as much value from the technology as possible (Byrd, 2001) by making sure that managers understand the implications of such decisions.

In America and England specific attention is currently given to concepts of ICT Literacy in Higher Education (Martin, 2002; Town, 2003). From the time that the computer was introduced in the 1940s, the perception was that the computer would have a profound impact upon the world. According to Martin the concepts of computer literacy in Higher Education in England has gone through three phases: the Mastery phase (from the 1960s up to the mid-1980s), the Application phase (mid-1980s to late 1990s) and the Reflective phase (late-1990s on). He describes the change of emphasis in the three phases as a gradual change. In the Mastery phase the emphasis is placed on gaining knowledge about the computer with a focus on programming. As the user interface of computer-applications become more user-friendly, in the Application phase the focus of ICT literacy changes to how to use the applications and from then on programming is seen as specialist knowledge. At many Institutes in Higher Education the idea was that students will pick up the necessary skills through regular usage of the applications because they are intelligent and well-motivated enough to identify the skills they need and learn them. The policy of those institutes was on providing enough suitable computers facilities to the students. Sometimes special attention was given to the

training of university staff so that they incorporate computers into their teaching, the notion being that if teachers use the applications, the students will automatically follow.

In the Reflective phase the emphasis changes towards reflective and evaluative aspects of using the computer, which Martin (2002:2) describes as: "*deciding upon appropriate usage of applications, evaluating the data which they give access to, interpreting the information they generate, and deciding upon appropriate use of the resulting document or product.* ". In the United Kingdom the MacFarlane Report motivated in 1992 for a fundamental role for ICT in Higher Education across the curriculum (Martin, 2002). This position was also emphasized in the Dearing report (NCIHE, 1997). Consequently seven pillars for information literacy were identified and placed in a 'seven pillars of information literacy' model. In this model, ICT- and basic library skills were combined. To obtain information literacy is seen as an iterative process and ultimately competency in all seven areas constitutes information literacy (SCONUL, 2004) as is illustrate in figure 2.3.

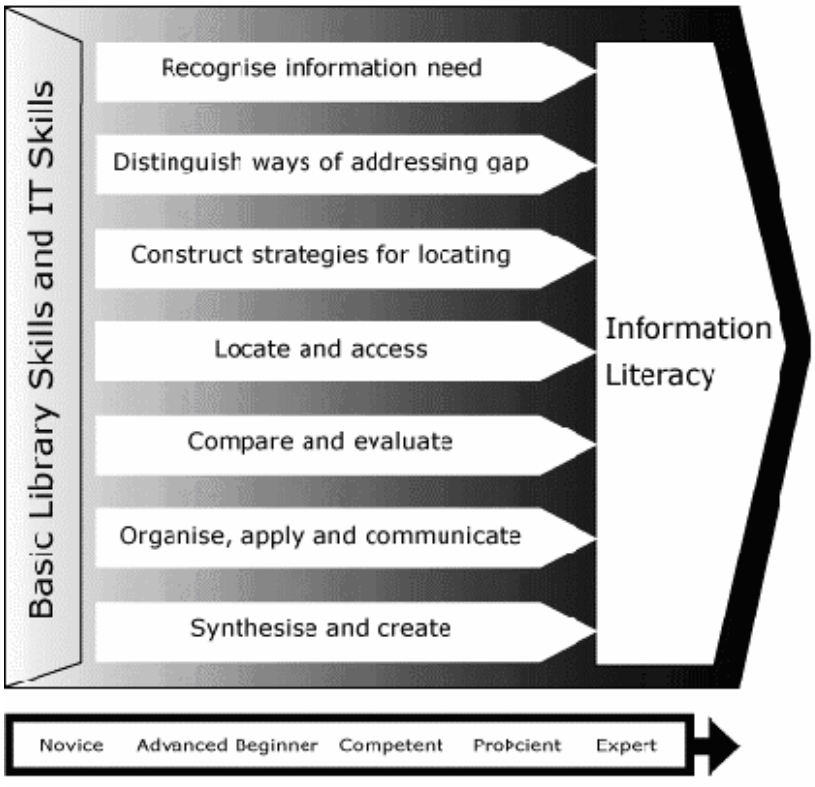


Figure 2.3 The Seven Pillars Model for Information Literacy according to SCONUL

Town (2003) emphasizes that it is important to understand that there is a difference between library skills and IT skills and states that this model will require different interpretations when applied to different subject fields, and to different levels of users. Furthermore, Town notes that the model does not mean that each stage is followed by the next stage, but that the required skills are developed within the model. Town (2003:94-95) explains the seven headline skills as follows:

1 The ability to recognize a need for information.

2 The ability to distinguish ways in which the information 'gap' may be addressed by:
   - Knowledge of appropriate kinds of resources, both print and non-print.
   - Selection of resources with 'best fit' for the task at hand.
   - The ability to understand the issues affecting accessibility of sources.

3 The ability to construct strategies for locating information to:
   - Articulate information need to match against resources.
   - Develop a systematic method appropriate for the need.
   - Understand the principles of construction and generation of databases.

4 The ability to locate and access information to:
   - Develop appropriate searching techniques (e.g. use of Booleans).
   - Use communication and information technologies, including terms for international networks in higher education.
   - Use appropriate indexing and abstracting services, citation indexes and databases.
   - Use current awareness methods to keep up to date.

5 The ability to compare and evaluate information obtained from different sources for:
   - Awareness of bias and authority issues.
   - Awareness of the peer review process and scholarly publishing.
   - Appropriate extraction of information matching the information need.

6 The ability to organize, apply and communicate information to others in ways appropriate to the situation by:
   - Citing bibliographic references in project reports and theses.
   - Constructing a personal bibliographic system.

- Applying information to the problem at hand.
- Communicating effectively using appropriate medium.
- Understanding issues of copyright and plagiarism.

7 The ability to synthesize and build upon existing information, contributing to the creation of new knowledge.

Martin (2002) argues that in the current information society, ICT induction should move beyond the mastery of applications, to include the information competencies as discussed. However no mention is made of wider ICT-related competencies that are needed by academics in order to lead effectively in the information society.

For the purpose of this research two categories of competencies are identified: ICT-competencies which are directly related to using ICT in the working environment and ICT-related competencies which are related to working and leading in the information society and thus containing a leadership component. Change and innovation management competencies are also included in the last category. This last category is important since the literature review has shown the importance of effective management of ICT and changes that occur in the information society as a result of implementing ICT (Boonstra, 2005; Hargrove, 2001; Kluytmans, 2005; Belasen, 2000; Davenport & Prusak, 1997). In the models described in the previous paragraphs the focus is mainly on ICT-competencies and therefore the available models are insufficient to describe fully the ICT- and ICT-related competencies required by managers in the information society, since neither mentions the special role of a leader. ICT-related competencies contain a leadership component and are obtained from topics like the learning organization, knowledge management, competency management, information security awareness management and the vital role a manager plays in establishing a culture of lifelong learning. Furthermore, dealing with organizational changes and innovation in this context is also relevant.

Research has been done related to a combination of some of the ICT-related components of the conceptual model, but little research has been done in order to create a holistic model of ICT- and ICT-related competencies required by managers in the information society. The purpose of the conceptual model is to create an integral model

in a dynamic environment and to establish a theoretical framework for the research. It is envisaged that the conceptual model will need to be adjusted as new research results and technologies become available.

In the next section is explained how the literature review and previous researcher's work is used to build the list of competencies.

Three main dimensions of ICT-competencies are categorized as operational, structural and strategic ICT-competencies based on the ideas of Stayaert (2000), Martin (2002) and the seven pillar model as described by Town (2003).

- Operational ICT-competencies include knowledge about functionalities and limitations of generic and other applications, hardware as well as networks. Mastery of applications is also included in this dimension.
- Structural ICT-competencies include understanding about the structure of the Internet in order to find suitable information.
- Strategic ICT-competencies include evaluating the relative importance of information and sources as well as conceptual insight in ICT in order to participate effectively in decision-making in this regard.

The ICT-related competencies are divided into five distinct categories based on recurring themes related to the information society in the literature review. The first category is 'participating in the learning organization' and includes knowledge management and communities of practice. The other categories are competency management, ICT-security awareness, change management and innovation management. All those dimensions include a leadership component since managers play an important role in implementing the new ways of working in their organizations (Boonstra, 2005; Stoker, 2005; Hargrove, 2001; Belasen, 2000; Davenport & Prusak, 1997; Conger, e.a., 2000).

Four further dimensions were identified in 'participating in the learning organization':

- Willingness to be involved and understanding the organizational value (Steyn, 2001; Kessels & Keursten, 2001; Davenport & Prusak, 1997; Feather, 2004; Belasen, 2000; Senge, 1990).

- Knowledge management (Steyn, 2001; Florijn, 2001; Boonstra, 2005; Weggeman, 2000; Haines & Dunn, 2003; Town, 2003).
- Communities of practice (Preece e.a., 2004; Argyris, 1999; Wenger, 2000; Senge, 1990; Kamperman, 2005; Kluytmans, 2001; Schoemaker, 2004).
- Attitude towards life long learning which includes learning how to learn (Hargrove, 2001; Yukl, 2006; Kommers, 2004).

Based on research done by Nobre (2002) and Kessels (1999) two main dimensions were identified for the category 'competency management':

- Competencies required in the organization.
- Competences and talents of the employees, including the role of the manager. This dimension is related to employability (Hargrove, 2001), insight in the competences and talents of employees (Hoekstra & Sluijs, 2003; Kluytmans, 2001), insight in learning and training needs and a development plan for employees (Kessels & Keursten, 2001; Senge, 1990).

Two dimensions were identified using the literature review for the category 'ICT- security awareness':

- Ensuring security of information in the sense of exclusively, integrity and availability (Siponen, 2001; English, 2005; Peltier, 2005).
- Encouraging ICT-security awareness amongst the subordinates by the manager (Bonatti, e.a., 2006; English, 2005; Siponen, 2001; Westby, 2005; Peltier, 2005; Bailey, 2005; Elletson, 2005).

Three dimensions were identified using the literature review for the category 'change management':

- Change exposure, including knowing the effect of change and ability to deal with change and resistance against change constructively (Hargrove, 2001; Stoker, 2005; Burns, 2003; Yukl, 2006; Rampersad, 2002).

- Communication of the vision of the organization and changes required (Hargrove, 2001; Boonstra, 2000; Belasen, 2000; Yukl, 2006).
- Understanding the effect of organizational culture during change (Boonstra, 2000; Davenport & Prusak, 1997).

Two dimensions were identified for the category ‘innovation management’:

- Autonomy (De Jong & Den Hartog, 2005; Kluytmans, 2001).
- Stimulation of innovative behaviour and work climate (Hoekstra & Sluijs, 2003; De Pree, 2006; Florida, 2002).

In conclusion can be said that from existing literature and research results a number of ICT- and ICT-related competencies were identified that managers need to develop in order to function effectively in the information society and from this a conceptual model was created as is illustrated in table 2.4.

Table 2.4 Conceptual model of ICT- and ICT-related competencies required by managers in the information society, based on the literature review

	Dimensions	**Indicators**
ICT-competencies	Operational	Knowledge about functionalities and limitations of (generic) applications, hardware and networks. Mastery of applications. Conceptual insight in ICT in order to participate effectively in decision-making in this regard.
	Structural	Finding quality information when needed.
	Strategic	Evaluating the relative importance of information and sources.
ICT-related competencies	**Dimensions**	**Indicators**
Learning organization	Willingness to be involved	Recognizing a need for information. Identifying and understanding the organizational value. 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. Managers play a special role in organizing and communicating the knowledge.
	Knowledge management	Ability of the individual to utilize opportunities. Practical accessibility of the information in the organization. Existence of applicable information. Knowledge of internal and external sources of information.
	Communities of practice	The need for networking (sources and networks for expertise need to be identified both nationally and internationally). Participation in COPs Usability (Work experiences and lessons learnt).
	Attitude towards life long learning	Understanding that lifelong learning is essential. Learning how to learn.

Table 2.4 (continued) ICT- and ICT-related competencies required by managers in the information society, based on the literature review

ICT-related competencies	**Dimensions**	**Indicators**
Competency management	Focus on organization.	Insight in competencies required in the organization. This includes requirement for functions, but also across functions.
	Focus on employees	Insight in competences and talents of employees/subordinates. Insight in learning and training needs of subordinates. Development plan for each subordinate. Encouraging employability of subordinates. Use of a competency library in order to match the needs of the organization with development plans for subordinates.
ICT-security awareness	Ensuring security of information.	Holistic understanding of ICT security (exclusivity, integrity, and availability) risks in the organization. Participation in improvement of the ICT-security situation.
	Encouraging information security awareness.	Encouraging ICT- security awareness amongst staff.
Change Management	Change exposure	Knowing the effect of change and ability to deal with change constructively. Dealing with resistance of subordinates against change.
	Communication and vision	Inspiring and motivating staff regarding the vision. Communicating vision and changes required.
	Effect of organizational culture.	Knowing the effect of the organizational culture during change.
Innovation management	Autonomy	Allowing subordinates autonomy in dealing with tasks.
	Stimulation of innovative behaviour and work climate.	Allowing subordinates to make mistakes. Encouraging subordinates to participate in generating new ideas. Being a role model by generating new ideas.

It is established from the literature that certain ICT- and ICT-competencies are important for managers and that their commitment to those aspects is also important in the information society. This leads to the sub-questions:

- How competent are the officers in the NLDO in their own opinion regarding some of the ICT- competencies?
- How competent are the officers in the NLDO in their own opinion regarding the identified ICT- related competencies?

In the information age there are new skills to be learned and new worlds to be discovered that cannot be learnt without a digital learning environment (Kozma, 1994) but without the commitment of the teaching staff and students however, the possibilities the digital learning environment brings to higher education will not be utilized fully (Reeves e.a., 2005). The question arises if the learning environment has changed in such a way that it does contribute effectively to the learning of the students and if the confidence of teaching staff and students to use information and communication technology has increased sufficiently to participate in a new learning environment. Early indications are that there are improvements in the learning landscape, but that the possibilities of the digital learning environment are not utilized sufficiently and in such a way that the students obtain the skills and experience needed in a knowledge-based society (Eaton, 2002) and teaching staff are often insecure in using a digital learning environment which hinders their participance (Adendorff, 2004).

In order to inform the discussion of the second part of the main research question: ***What are the implications of the changed working environment of the officers in the Netherlands Defence Organization for their learning environment?***
a theoretical framework for factors that influence the learning outcome and competencies that are required by teachers in a digital learning environment in higher education is established in conclusion of this chapter. To motivate the selection of the topics from the literature it needs to be noted that in the Netherlands Defence Academy (NLDA) ICT is used in a blended learning environment. Furthermore, although not all officers in training follow the same training programmes, the expressed intention is that officers in general are able to work and think at an academic level.

In paragraph 2.4 'Higher education in the information society' a background is provided by discussing the current situation in the Netherlands. This is followed by the last section of this chapter 'Learning and teaching in a digital learning environment in higher education'.

2.4 Higher education in the information society

"*It is the mark of an educated mind to be able to entertain a thought without accepting it*" Aristotle (384-322 BC).

According to Plomp (2006) it is necessary that education in the information society finds a balance between what is traditionally valued and what is considered important in the information society. In the past the independent Institutes of Higher Education in the Netherlands determined what the students needed to study and why. If a student had finished studying from a respectable institute of learning, the student was regarded academically formed. In the light of the fast changes in the information society and the specific requirements for managers in a knowledge economy, it appears to be important that Institutes of Higher Education re-consider their curricula. In the Netherlands information literacy is a relatively new term. However the understanding that information literacy is an essential study skill at universities is emphasized by the Dutch Association of thirteen university libraries and the National Library of the Netherlands (UKB, n.d.).

Eaton (2002) predicts that in the future the focus in higher education will move from course-based credits to assessment-based mastery of recognized bodies of knowledge and skills. Students will be accountable for attainment of outcomes. This will affect how institutions are organized and how evaluation takes place in educational institutions.
At the moment in the government of the Netherlands there are debates about the main principles for a proposal for a new law for higher education and research. At the moment it is envisaged that this law "Wet voor Hoger Onderwijs en Wetenschappelijk Onderzoek (WHW)" will be implemented in 2007. This law contains similar aspects that are discussed by Eaton (2002), like moving from complete degrees and delimited training to domains of recognized bodies of knowledge, corporate governance, increased flexibility

as well as opportunities for national and international joint degrees and more intensive cooperation between institutions (Studiecentrum voor Bedrijf en Overheid, 2005).
Once the required competencies are identified, the next step is to evaluate whether the competencies are achieved. This needs to be evaluated for each individual and could be recorded in a student competency profile. The term performance outcomes will be used to describe demonstrated competencies. Performance outcomes can be defined as required learning capacities that must be demonstrated and should be specified by stated performances and assessment criteria according to the Human Sciences Research Council [HSRC], which defines performance as follows:
"*Performances are holistic or integrated demonstrations of mental, affective and manual activities. Performances also express particular values. Demonstration of performance for assessment requires completion of specified tasks, as well as explanation of the rationale for doing tasks in particular ways.*" (HSRC, 1995:1).

Performance outcomes indicate what the learners need to be able to do after having completed their studies. The performance outcomes need to be defined further to determine what each learner is expected to do for each performance outcome. Those further refinements are referred to as assessment criteria. A specific list of assessment criteria for each academic competency has to be decided on, before developing learning tasks. A holistic sense of what each learner can do after successfully working through their entire study is however also important:
"…*, the more specific an outcome statement is, the easier it is to determine if a learner has attained it or not. However, if all the outcome statements were defined in great detail, a holistic sense of capability would be lost*." (Clarke, 1997:16 – 18).

It is important to understand that when learner actions are observed, a substantial number of unconscious mental and emotional judgments and decisions that inform or direct the particular action are not seen, but still need to happen in order for the learner to perform. The HSRC (1995:43) states in this regard:
"Information or content interpreted within a particular value orientation through employing particular mental abilities such as problem-posing, problem-solving and judgment or decision-making abilities, is the invisible part or basis of performance (or, to return to our metaphor, the base of the iceberg which is under the water). The visible part of performance (the tip of the iceberg) includes the manipulation of 'tools' and

manual dexterity and occurs within a communicative or interactive context, which includes gesture."

The traditional equation
Knowledge & Understanding + Skills + Values & Attitudes = Performance
Needs to be enriched with the understanding that these components operate together in performance or as the HSRC puts it: "*They are undivided and indivisible"* (HSRC, 1995:44).

To describe competencies and performance outcomes clearly, is a complex task and the process of describing the minimum criteria and competencies clearly is followed by the next step, which is to evaluate whether those criteria and competencies are met by each learner individually in a competency profile in which performance outcomes are clearly described.

Although it is recognized that academic institutions need to remain independent, the dialogue with organizations is important in ensuring that the academic competencies that the students develop at those institutions is in accordance with the expectations of future employees working at an academic level in global organizations in a knowledge economy (Merriënboer e.a.,2002). Therefore the identified learning competencies in higher education need to be evaluated and adjusted regularly in order to remain focused on the changing requirements of organizations and to accommodate the latest technological innovations. This idea is supported by Ter Wee & Loog (2005) who emphasize that it is important to have a dynamic basis for a competency profile because the labour context is increasingly dynamic. Institutions of higher education need to generate new knowledge and therefore the term learning organizations is also appropriate in this context. An interesting debate in this regard is if it is acceptable that knowledge management in universities could create a situation which might exclude higher education in developing countries further (D'Antoni, 2005). According to D'Antoni an alternative choice is dealing with knowledge management by creating open resources of quality which could be shared by international communities of higher education and hence making quality education accessible to all. To change to a learning organization and implementation of digital learning environment means a change in the way the teaching and learning occurs. This will be discussed in the next paragraph.

2.5 Learning and teaching in a digital learning environment in higher education

The focus of this research is a digital learning environment (DLE) used in a blended educational setting. In the blended educational context the DLE provides an opportunity for the lecturer to enrich the courses that he/she is responsible for. Courses can be given extra structure by adding learning aims, presentations and important up-to-date information, a mix of work forms and learning activities like self-tests, web links and supporting applications can be used in addition to the contact time that a lecturer has with the students. Thus a blended learning environment provides an extra challenge for the students, who will need to be actively involved and take responsibility for their own learning. At the same time the lecturers also need to be supported in how to use the digital learning environment in such a way that it enriches their courses and the development of relevant competencies are supported.

The ideal model of a digital learning environment includes three broader aspects of the digital learning environment. Firstly the possibilities of **process** as a means of working and studying together in communities of learning, mobile learning, working and studying from home in addition to face-to-face learning, facilitating electronic communication and an electronic learning management system, investigating possibilities of distance education and opportunities for national and international cooperation in research. Secondly the possibilities of the **product** with a focus on the computer-assisted learning environment in general, including simulations and gaming and information repositories. Thirdly as a means of **support** where aspects like electronic remedial teaching, performance support and possibilities of electronic knowledge management and expert centers can be addressed.

Such use of the DLE needs to be coordinated so that enough attention is given to all the different aspects and categories of competence and it is important to anchor such innovative changes in education. According to Geerligs, Mittendorf & Nieuwenhuis (2004) this can be done through guaranteeing the quality of the innovations. Furthermore, innovations require new demands of quality assurance according to Kluytmans (2001).

Steyaert (2000) states that educational institutes need to develop a vision of the purpose of using a DLE in an educational setting and describe in an educational programme how and why to use a DLE. However Dutton e.a. (2004) warn that positive outcomes of e-learning could be hindered by technical, institutional, social and economic constraints on the innovation process. Ter Wee and Loog (2005) state that education is primarily developed serially and is based on regular evaluation techniques, whereas they are of the opinion that education needs to be designed in accordance with personal development plans and individual assessment of competencies, because education would then be more in harmony with the dynamics of the professional context. Ter Wee and Loog argue that the competency profiles of Institutes of Higher Education need to be become dynamic, because the professional context has become dynamic in the information society.

In order to implement a digital learning environment effectively it is essential that both students and staff are commitment to the new learning environment (Boonstra, 2005; Kluytmans, 2001). In order to achieve this commitment it is essential that sufficient support is available to learners and teachers in using and integrating the DLE effectively in learning and teaching. In the next sections of the literature review the focus is therefore placed on the factors that influence learning and teaching in higher education.

2.5.1 Learning in a digital environment

Research in education involves an understanding of what learning is and how learning takes place. In fact the theoretical basis on which learning models are based, affect not only the way in which information is communicated, but also the way in which the learner gives meaning to and constructs new knowledge from the information that is presented (Sherry, 1996). Generally agreement exists today that in an educational setting the focus should be learner-centered.

2.5.1.1 Defining learning

There are many different definitions for learning to be found in the literature. Rampersad (2002) and Ausubel (2000) state that learning is a continuous personal transformation; a cyclic and cumulative process of actualizing of knowledge and changing behaviour in such a way that the learner can function and act well. An essential prerequisite in learning is therefore a willingness to change oneself and as a result of learning change occurs and this should lead to changed and improved behaviour (Swieringa & Elmers, 1996). It could therefore be argued that learning has intellectual (thinking), affective (willingness to change) and pragmatic (doing) dimensions.

Verschaffel (1995) defines learning as a constructive, cumulative, self regulated, targeted, situated, cooperative and individual different process of acquiring knowledge, giving meaning to the knowledge and the development of skills. In this definition the intellectual (constructive, cumulative, giving meaning to the knowledge) and pragmatic (cooperative, acquiring knowledge, development of skills) dimensions are also visible, but in addition to those dimensions learning is also placed in a situation (situated) and a distinction is made between cooperative learning and individual learning. The cyclic dimension in the learning cycle of Kolb (1984) enhances this definition as is illustrated in figure 2.4.

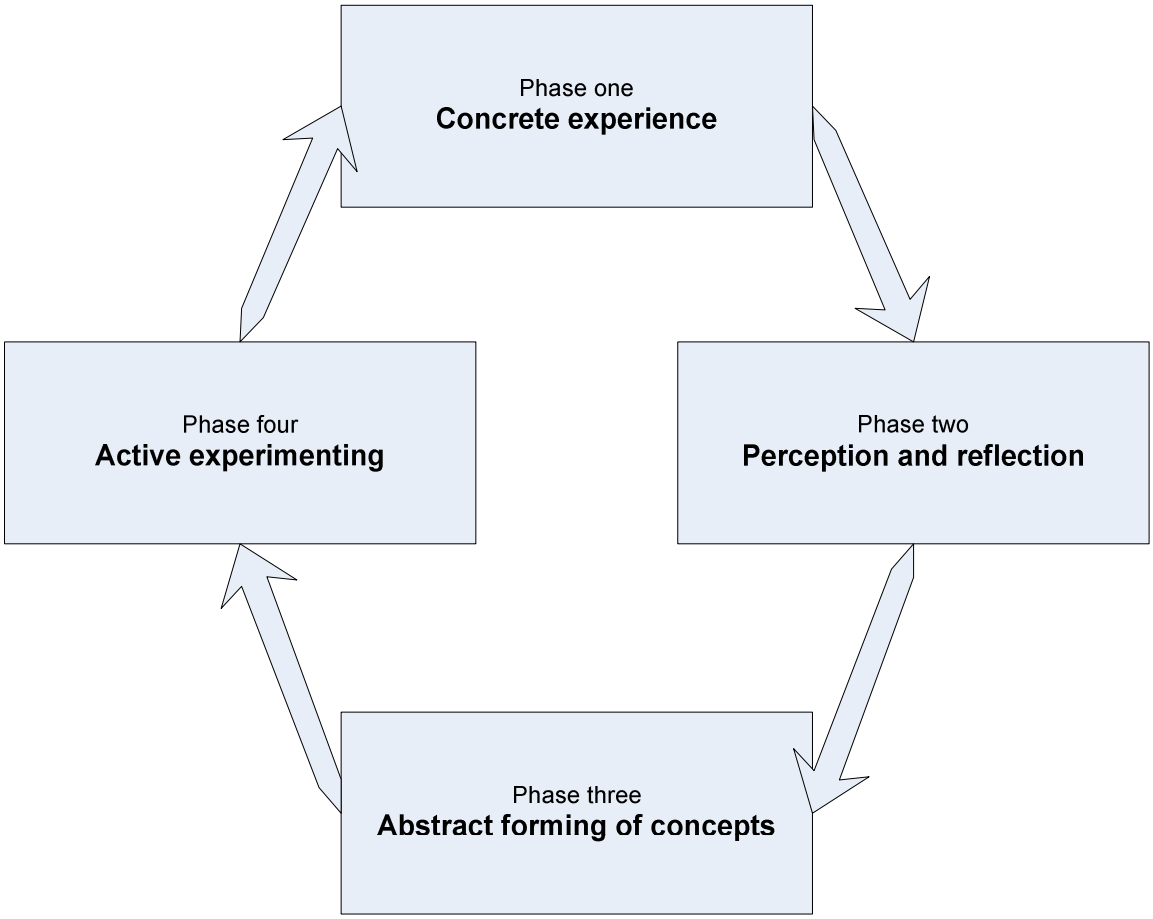


Figure 2.4 Learning cycle of Kolb

Learning is defined by the Human Sciences Research Council (HSRC) as "… *a process which enables a learner to approximate, with increasing success, a capability, which integrates the use of information (or content) with a variety of general abilities (such as problem-posing and problem-solving, tool usage, communication and social interaction) within a context which has an informing value system."* (HSRC, 1995:2).

The capacity to be creative and innovative is important for leaders (Burns, 2003) and especially important in the information society with the emphasis on learning how to learn (Hargrove, 2001). Therefore it appears appropriate to include those aspects in a definition of learning in the context of the digital learning environment in higher education.

For the purpose of this study a number of definitions are combined to create the following definition for learning in an digital learning environment: ***Learning in a digital learning environment is a cyclic and iterative activity with intellectual, affective and pragmatic dimensions, where new knowledge is acquired and given meaning to, existing knowledge enhanced and more available, the capacity to be creative and innovative is expanded and attitudes are adjusted.***

Mobile learning is further defined as learning by using portable devices, such as hand held computers, personal digital assistance (PDAs) and smart phones independent of place and time or in classroom situations (Kukulska-Hulme, 2005).

2.5.1.2 Factors that influence learning

From the literature it becomes clear that a number of factors have an influence on the outcome of learning. The following section leads to figure 2.5 where the identified factors that influence learning are summarized. Firstly the characteristics of the learner that may influence the learning process and learning outcome are discussed, followed by other factors that influence the learning environment.

Learning strategies and learning styles

According to Streumer & Kommers (2002) meta-cognition and existential learning are seen as the vital factors in the longer-term attitude towards learning and cognitive growth. De Villiers (2002) argues that cognitive strategies help with problem solving, decision-making and creativity. Successful learners have a repertoire of meta-cognitive and learning strategies and they are able to transfer the relevant strategy to the specific learning circumstance. As such meaningful learning is even more important than learning meaningful materials (Ausubel, 2000). Ausubel explains that the process of being effective in learning and knowing how to learn is more important than knowing a lot as a product. This idea is supported by Plomp (2006).

Culture and learning expectations

Rogers, Graham & Mayes (2007), MacKeracher (2004) as well as Huai & Kommers (2004) found that the culture of the learner plays a role in how the learner approaches a learning task.

They found that there are differences amongst learners in general cultural and social expectations as well as in learning expectations related to learning tasks. Differences in the use of language and symbols as well as the familiarity with infrastructure and technology can also exist as a result of cultural background. They therefore argue that instructional designers need to be culturally aware and sensitive to cultural differences that may exist in learners.

Self-regulation and locus of control

Yukl (2006) also claims that effective self-management is important for successful learning to take place. Self-management includes both behavioural (for example positive self-talk) and cognitive strategies (for example mental rehearsal). He claims that self-efficiency and internal locus of control (for example taking initiative rather than waiting for things to happen) have an influence on the ability to learn.

Blok & Cuijpers (1999) found that there is a qualitative difference in the way that students regulate their learning process. In their research self regulation activities are identified as orientation, adjustment, reflection, testing, monitoring the process, self-steering and diagnosis. According to Vermeer & Seegers (1998) self-regulation draws on the locus of control of the students and on their motivation to control their own learning. In research conducted by Kluytmans (2001) it is also found that self-regulation has commitment and motivation as a consequence.

Commitment and motivation

According to Jonassen (1996) learners should be able to determine their goals for learning and monitor what and how they best learn. This is especially true for adult learners. Motivation is an important factor that influences learning and learning meaningful materials especially in the context of the working field increases the motivation of learners (Ausubel, 2000). Research conducted by Bidarra, Guimaraes & Kommers (2004) shows that concept mapping and mind mapping are effective tools to improve motivation since the learner has more control over the multimedia materials. Bidarra e.a. further claim that when learners enjoy their learning tasks they are more motivated to participate.

Mental models and willingness to change

Learning is highly affected by the changing attitude of the learner towards learning in such a way that the key factor in learning is a willingness to change oneself (Streumer & Kommers, 2002; Yukl, 2006; Kessels & Keursten, 2001; Hargrove, 2001).

Visual and dyslectic limitations

According to Lieshout and Steyaert (2004) about ten percent of the students in the Netherlands have limitations, like dyslexia and visual handicaps. These students have to overcome great obstacles in studying digital materials. Issues of accessibility have in the past mainly focused on physical infrastructure, extension of courses and modified test environments. Digitalization in higher education creates opportunities for students with mobility problems, however attention needs to be given to create accessibility functions for students with visual and dyslectic limitations. Lecturers need to be made aware of those possibilities and assisted in using them where applicable. Military officers can have minimal functional restrictions, like dyslectics, but serious functional restrictions are not possible because military personnel have operational obligations.

Pre-knowledge

According to Jonassen (1996) and Ausubel (2000) pre-knowledge and the kind of experiences that learners have had and how they have organized those experiences into knowledge structures determines how learners construct new knowledge. The fact that learners give their own meaning to new knowledge is well described by Bellis (1997:6): *"In most areas of human life, policies and process, systems and structures, activities and behaviours are largely determined by the meaning given to central concepts and issues, whether consciously articulated or not."*

Ausubel (2000) claims that when learners actively construct knowledge, it is more meaningful, applicable and memorable.

Learning in a digital environment also requires a number of specific skills of the learners related to encompass information and ICT expertise. McPherson & Nunen (2004) claim that it should not automatically be assumed that the learner can utilize all those skills and support should be given by the teacher when the learner needs it.

In the next sections factors that are not inherent in the learner but also influence the learning outcome, are discussed.

Context of the learning task

According to a number of authors (Collis & Margaryan, 2005; Ausubel, 2000) the context in which learning takes place has an influence on learning in that the more meaningful the context is perceived by the learners, the better is the change on desired learning outcomes. Steinberg (1991) claims that the learner's characteristics and the context and nature of the task interact with each other to affect the outcome of learning.

Teacher and teaching style

Since the teacher has an important influence on the learning process and creative teachers contribute towards creative learning tasks and inspire creative learners (Burns, 2003) a separate section of the literature review (2.5.2) focuses on the teacher and teaching in a digital environment. It is noted however that the teaching style affects the strategy learners use and hence also the learning outcomes. As such the teaching style could facilitate learning, but could also hamper learning (Huai & Kommers, 2004).

Learning communities and social context

According to Wenger (1998) learning can best be carried out in so-called learning communities, which he defines as social environments in which group members are dependent on each other in order to work together. He claims that if learning communities share a vision, use systems thinking and its members can work in a team, then this will result in communal experience gained and all participants will learn as a consequence. If students regularly work in communities of learning, they are better prepared to work in communities of practice that become more prevalent in the information society. Bidarra e.a. (2004) and Slavin (1995) claim that the quality of the learning outcomes increase as a result of learners working in a collaborative way. Slavin claims that this is especially true when learners have to explain to each other and the learning outcome of the group includes ensuring learning of all group members. In this way the group goal is complemented by individual accountability. Preece e.a. (2004) also claim that working in relaxed social environments improve the learning situation.

Research conducted by Cronjé e.a. (2006) identified the affective dimensions of peer support as an important factor in why learners continue with an online course in a non-contact environment.

Content and characteristics of learning task

The emphasis of learning tasks is moving away from learning the content to learning where to find content and how to create content (Eaton, 2002). She emphasizes the importance of helping learners to discover how to frame meaningful questions, identify problems and find solutions to those questions and problems. Self-evaluation and reflection on the learning process by the learner is also seen by Eaton as an important part of the learning task. However when the emphasis is moving away from learning the content, this does not necessarily mean that learning the content is not important any longer. As discussed by Cronjé (2000) the underlying paradigms of objectivism and constructivism are not necessarily opposites, but could complement each other and learning tasks could contain both objectivist and constructivist elements. From this idea a model was developed and evaluated which showed how learning events could contain various combinations of objectivist and constructivist elements depending on the purpose and nature of the learning event (Cronjé, 2006).

Gagne e.a. (1981) claim that simulations are designed to develop problem-solving skills and enhance discovery learning. Zaccaro e.a. (2006) claim that those are very important competencies for leaders in the current information society. Flouris (1989) claims that competencies like problem-solving, decision-making, critical mindedness and meta-cognitive strategies are developed when higher mental processes are stimulated by using simulations. The digital learning environment offers alternative dimensions to such learning tasks and research has indeed shown that gaming and simulations can play an important role in a digital environment. Recently the possibilities of including mobile technology in a wider digital learning environment are also investigated (Abfalter, Mirski and Hitz, 2004) and opportunities in this regard are identified.

The discussion in this section about the important factors that have an influence on the learning process and outcome is summarized in figure 2.5 in a diagram. The assumption is that the learning task is set in a blended learning environment and a learner centered approach is used.

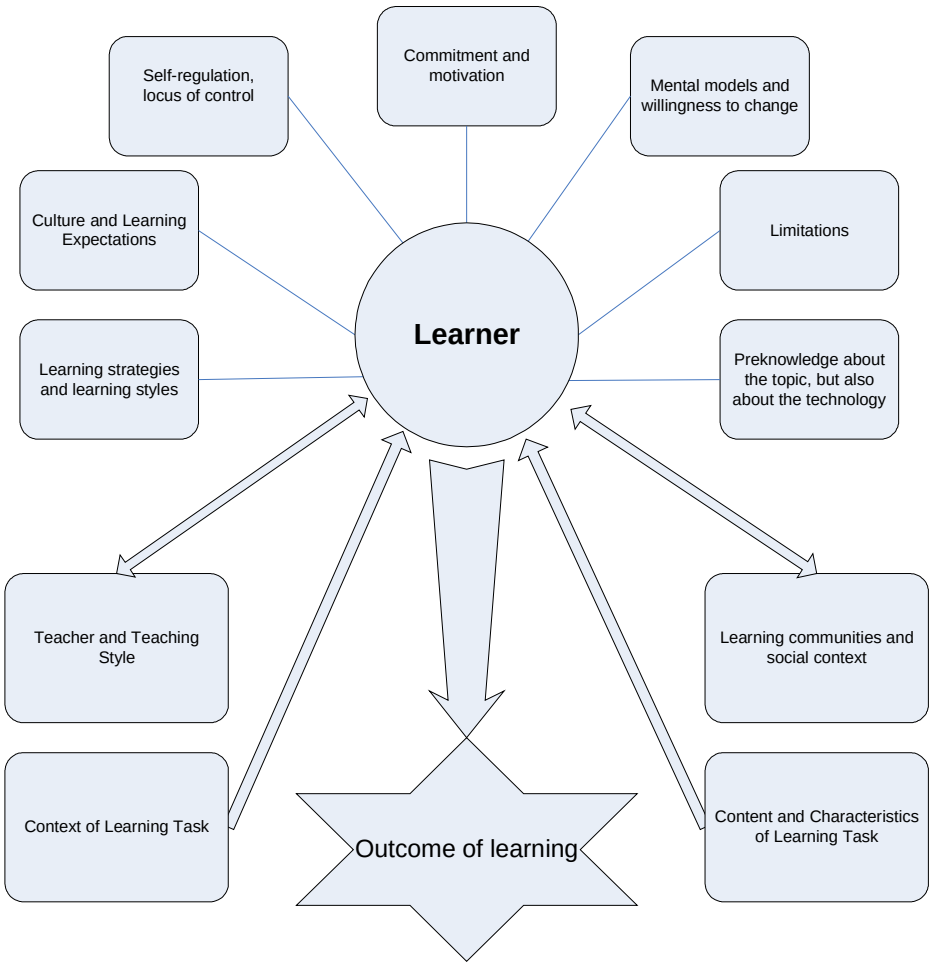


Figure 2.5 Diagram to illustrate factors that have an influence on the outcome of learning

2.5.1.3 Added value of learning in a digital learning environment

Digital innovations could make education dynamic. The digital learning environment could increase efficiency because of the greater density of information, increase in flexibility and increased accessibility (Collis & Moonen, 2001). Collis & Moonen mention five factors where flexibility adds value to a digital learning environment:

- Flexibility in terms of independence from place and time.
- Flexibility in terms of individual study programmes.
- Flexibility in interaction possibilities within a case.

- Flexibility in communication forms.
- Flexibility in study materials.

From existing literature and research it is clear that the didactical methods are more important than the delivery medium (Clark, 1994; Reeves e.a., 2005), but as Kozma (1994) argues, in the information age there are new skills to be learned and new worlds to be discovered that cannot be learnt without a digital learning environment. However if ICT in education is not implemented effectively, the quality of learning could be negatively effected (Merriënboer, 1999).

A number of communication opportunities are offered through a digital learning environment. Those opportunities include e-mail, newsgroup, digital workplaces and mobile technologies. The digital workplaces could be on-line (synchronous) or offline (a-synchronous). Authorized students and staff could participate in those communication opportunities. Feedback from lecturers to individual or groups of students and peer-reviews are possibilities to reflect on the work. The digital learning environment creates an opportunity where courses and curriculum become transparent and information about courses can always be up to date, since changes could be updated immediately as they occur. This makes it easier for teachers to ensure that their courses connect well to related courses. Information sources could be offered to learners in a structured way and learners could become partners in finding suitable information sources and making them available to other students. Independence from time and location offers opportunities for current students to study parts of the course in their own time and at a place that is convenient, even when they are working cooperatively on a task. This network of cooperative learning could continue after the learners have finished with their study and are working.

As discussed earlier Kolb (1984) identifies reflection as an important element in the learning process. In this regard it is interesting that social software tools like web logs, discussion fora and wiki's are becoming increasingly popular (Warburton, 2005). Warburton claims that social presence in web logs allows for reflection, emotional expression, open communication and increases group cohesion. Although it was also found in his research that some students find it a waste of time.

For this research it appears also useful to identify the aspects that play a role in adult education, since all the students are adult learners and place those aspects against the possibilities of a digital learning environment. Peterson (1988) highlights a number of principles that an adult learner needs in a learning environment as follows; Expectations, Experiences, Feedback, Freedom from Anxiety, Immediate application, Independence, Objectives, Open Climate, Participation, Sense of Relevancy, Self-Pace, Sense of Satisfaction and Self-direction. In table 2.5 those principles are placed against advantages that the digital learning environment could bring to the learning situation in order to emphasize the added value of learning in a digital learning environment.

Table 2.5 Adult learning needs against the advantages of learning in a digital learning environment

"13 Powerful Principles for Training Success" **(Peterson, 1988:49)**	**Advantages that the digital learning environment could bring to the learning situation**
Objectives Adults need to be aware of the objectives of instruction.	**Presentation of information** Objectives can be clearly stated for each topic. The adult learner could refer to the objectives at any time and decide what to study or practice next.
Self-direction Adults need to feel in control of their own learning. **Self-pace** **Independence**	**Learner choice** The learning situation can be controlled by the learner. **Adaptation of learning styles** Self management is encouraged and self pacing essential. **Individualized learning opportunities** Adults can control their own learning The learner needs to be **actively involved** in the learning environment and cannot hide behind other learners. **Customized learning materials** Learning materials could be customized according to the individual expectations.
Participation **Expectations** Adults need to know what the expectations are of their teachers and express their own. **Experiences** **Sense of Relevancy** Adults need to see a use for the information	Mastery of recognized bodies of knowledge and skills. Social software could be used. Simulations could link in with prior experiences in new learning endeavours. **Simulation and modeling** Creative learning sessions can be created; including sessions where dangerous situations are simulated or expensive experiments could be practiced as needed.

Table 2.5 (continued) Adult learning needs against the advantages of learning in a digital learning environment

"13 Powerful Principles for Training Success" **(Peterson, 1988:49)**	**Advantages that the digital learning environment could bring to the learning situation.**
Feedback Adults need assistance to assess their learning.	**Intelligent tutoring** Tutorial dialogue is possible and via e-mail feedback could be given by teachers. Via chat rooms fellow students could give feedback. **Communities of learning** **Personalized feedback**
Immediate Application Adults could practice where and when necessary soon after they have learnt it.	**Mastery learning, mobile learning** Possibilities for dual learning – working and learning
Freedom from Anxiety Adults need to be relaxed in learning.	The digital learning environment is a non-threatening environment. Individualized feedback and advice what to study next could be given when needed by the learner. Reassurance can also be given by the teacher by using e-mail.
Sense of Satisfaction Adults need to gain satisfaction from the learning.	**Motivation** The computer and the digital learning environment create a non-threatening environment, giving relevant feedback and remediation and allowing adult learners to make meaningful choices regarding their own learning. They are also able to evaluate their own learning and progress. This leaves a sense of achievement and creates confidence in the own ability. Mind mapping are effective means to improve motivation (Bidarra e.a., 2004)
Open Climate	**Computer conferencing, chatting, social software** Interactive communication increases critical thinking because issues are considered from many different perspectives. Equity of participation encourages adults to share opinions and ask questions. *"Computer conferencing can be used to develop student skills in analysis, constructing and defending an argument, assembling evidence in support of an argument and critiquing the work of other learners."* (Bates, A.W., 1995:207) **Distance education** Lectures can be downloaded from the web or a link send to students. CD's, DVD's and links to other learning sites to be studied in own time and place.

From the literature review, it can be concluded that learning in a digital learning environment can add value to the learning experience. However it is a complex process that is influenced by a number of factors and is dependent on the situation and the context of the learning situation. Merrill (2005:6) emphasizes that *"Measuring performance in complex tasks is in itself a complex task."* It appears to be very important that the teacher is aware of the factors that influence the learning experience and takes them in consideration when designing and facilitating learning in a blended learning environment. At the same time the teacher needs to be aware that change in education is a process that is difficult to manage (Lagerweij, 1994) and that proper preparation in order to participate in such endurable change is essential. Van der Klink, Kallenberg & Valche (2002) emphasize that it is important for teachers to participate as a team of innovators in order to successfully improve education.

2.5.2 Teaching in a digital learning environment in Higher Education

A digital learning environment can be seen as a social system (Koper, 2000) and in this light the interaction between the individuals and groups of people are very important. The teacher especially plays an essential role in this system to instruct and initiate activities and is in this sense a lot more than the provider of learning materials (Lam, Nab, Noorderwier & van Tartwijk, 2001). It is important that teachers see themselves as managers in the sense that they facilitate the learning environment and spend enough time guiding and communicating the learners (Schlusmans, 2001).

Adendorff (2004) claims that teachers are reluctant to implement digital learning environments because they are insecure as to what it is that they need to do. Collis e.a. (2000) have indicated four groups of factors that influence a teacher's likelihood of making use of technological innovation: environment (institutional culture), educational effectiveness (perceived or expected), ease of use and engagement, by which they mean the individual's personal response to technology and change. Fresen (2005) emphasizes the importance of a positive attitude, commitment and motivation from lecturers in order to facilitate quality web-supported learning.

According to Lieberman & Guskin (2002) higher education is marked by new instructional roles in many new educational settings.
This is supported by other authors (Adendorff, 2004; McPherson & Nunes, 2004; Turner, 2005). However different authors present the roles of teachers in a digital learning environment differently.

Lieberman & Guskin identify the roles as

- Expert, presentation, discussion
- Mentoring / reflecting Information guide / guide to resources
- Facilitator of group discussions
- Intensive workshop leader
- Research project leader
- Consultant problem-based experience
- Development of content software / adaptation of “off the shelf” software to local institutions needs
- Partnership between faculty and co-curricular educators

Adendorff (2004) has conducted research to determine the roles and competencies of an online e-learning facilitator and categorized five different roles: social supporter, administrator, instructor, guide and mediator as well as thirteen competencies in three categories: people competencies, thinking competencies and energy competencies. In further research conducted by Cronjé e.a. (2006) the importance of the roles and competencies of the facilitator was emphasized as one of the factors that motivated learners to continue with online courses.

McPherson & Nunes (2004) categorizes four main roles for teachers in e-learning, being pedagogical, social, managerial and technical and emphasize that the teacher should continually reflect about the educational process and the competencies required to participate effectively in this process. Turner (2005) has compiled a comprehensive list of technological competencies that educators should have in order to participate fully in the information society. Those competencies include skills like: word processing, spreadsheet, database, electronic presentation, web navigation, e-mail management, downloading software from the Internet, Learning management systems, deep web knowledge, educational copyright knowledge and security knowledge.

Merrill (2002) has done a meta-analysis regarding instructional strategy principles that are used with success in a digital learning environment and that are "*necessary for effective and efficient instruction*" (Merrill, 2002:44). Based on his research he has identified five instructional strategy principles being the task-centred principle, the activation principle the demonstration principle, the application principle and the integration principle. Merrill (2002:44-45) describes those principles in the following way: *"Learning is promoted when:*

1. *Learners are engaged in solving real-world problems.*
2. *Existing knowledge is activated as a foundation for new knowledge.*
3. *New knowledge is demonstrated to the learner.*
4. *New knowledge is applied by the learner.*
5. *New knowledge is integrated into the learner's world."*

How those principles are connected is illustrated in figure 2.6.

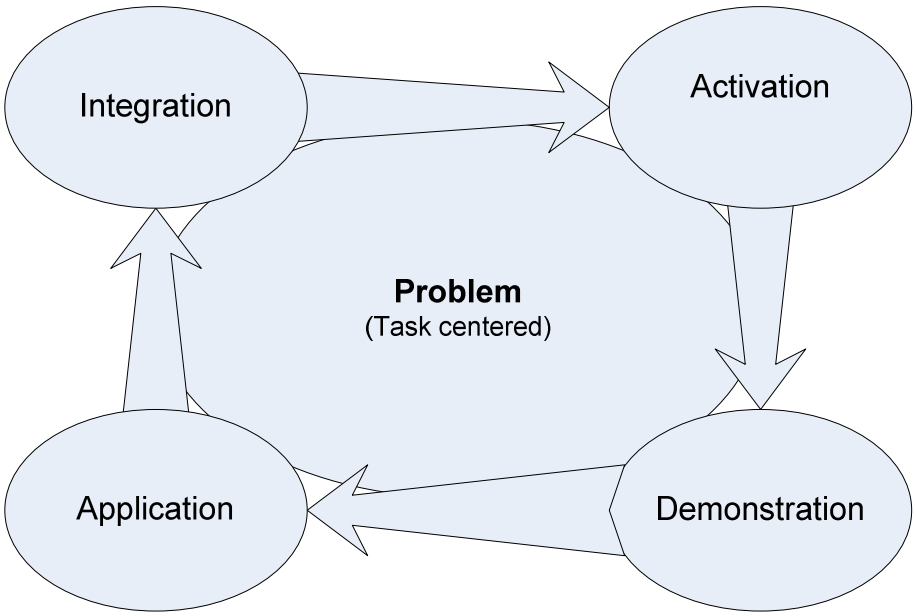


Figure 2.6 Illustration of the principles of instruction according to Merrill (2002)

Collis & Margaryan (2005) agreed that those first principles are necessary for good design regardless of the setting. Merrill's research showed further that the learning outcomes improved in direct proportion to the implementation of those first principles in the learning tasks.

Insight in those principles and knowing how to implement those could thus be seen as important competencies for teachers who teach in a blended learning environment. Furthermore Merrill (2005:6) emphasizes that

"Measuring performance level in complex tasks is in itself a complex task. Too often the measures used assess only component of skill or individual actions rather than level of performance on the whole task."

Collis & Margaryan (2005) have tailored the instructional design principles of Merrill further into what they call the 'Merrill Plus' approach especially for the corporate-learning setting. What they emphasize is that the learning tasks should be in a specific corporate context and evolve around a business problem. They add the following aspects to the learning environment: Collaborations and knowledge sharing should not only be with learners in a specific course but also with colleagues in the workplace; learning objects should be re-useable; differentiation should take place in that learners should be supported according to their individual needs and background; the learners' supervisors should be involved and the technology should be designed effectively.

A summary about the instructional roles and competencies for teachers in a digital learning environment is presented in table 2.6. The summary is based on the ideas of Lieberman & Guskin (2002), Adendorff (2004), McPherson & Nunes (2004), Turner (2005) and Merrill (2002).

Table 2.6 Summary of instructional roles and competencies for teachers in a digital learning environment

Role	Tasks	Required competencies	Motivation for required competencies	Examples
Administrator	Course administration	Managerial competencies Knowledge of LMS	Managing learning activities, clarifying procedural rules and decision-making criteria.	Keeping course particulars up-to-date. Placing presentations in the ELO for students to review or for students who were not able to attend the presentation.
Social supporter, mentor	Feedback, reflecting, motivating	Didactical principles. Interpersonal competencies	Understanding factors that influence the learning outcome.	Teacher ensures privacy and trust when learners use social software, like web logs (online logbooks). Teachers can review and comment on the progress of projects in a workplace, using blasts (quick forms of communication like an idea, attitude or posing a question).
Instructor. Facilitator of the learning process	Presenting courseware. Encourage interactivity so that learners construct new knowledge and are thus empowered.	Didactical principles, like setting objectives and problem-analysis. Instructional design principles. Technological competencies	Understanding factors that influence the learning outcome. Understanding instructional strategy principles. Understanding technological issues like downloading software, incl. e-books. Understanding educational copyright issues.	Workshop leader both for synchronous (e.g. a virtual workshop) and a-synchronous discussions. Encouraging communities of learners e.g. (inter)national research projects using wiki's. Using and adjusting learning repositories. Support could be given by experts.
(Information) guide	Provide additional information. Empower students to find information they need when they need it.	Didactical principles Technological competencies	Understanding factors that influence the learning outcome. Understanding aspects like the Deep Web and navigation skills.	Links can be provided to additional information. Answers to frequently asked questions can be placed on-line. Providing simulations or games.
Evaluator, mediator	Ensure fair play	Didactical principles Competency profile	Evaluating and reflecting if learning outcomes are achieved and how the course could be improved in future.	Teacher forms a partnership between faculty and co-curricular educators. Online assessment Ethical issues like copyright and plagiarism

From the literature review it has become clear that teachers in a digital learning environment require different competencies than those that they require in face-to-face situations. The additional competencies thus identified are:

- Being able to use the learning management system effectively and utilize all the opportunities it offers.
- Being able to apply general didactical principles in a digital learning environment.
- Being able to apply interpersonal competencies in a digital learning environment.
- Being able to implement instructional design principles in a digital learning environment.
- Being able to deal with a basic level of technology in a digital learning environment.
- Being able to deal effectively with a student competency profile.

2.6 Summary

Literature review identified gaps in our knowledge about the influence of ICT and the information society on the work environment of managers, how they are affected by it, how and why they use ICT and what this means for their training environment. The next step was to select a suitable research approach in order to try to narrow this identified gap. This research approach constitutes an integral view into a complex information system in which the organization, the information and communication technology, the employees and in particular the managers play an important role, are interconnected and influence each other. In the context of this research the purpose of the information systems and the use of ICT is in its essence to contribute towards meaningful work for the officer in order to benefit the NLDO. Hence it appears important to commence the research by means of interviews to obtain an insider's perspective of the officers directly involved in the information system as well as to obtain insight in the flow of information in the organization in the NLDO. It is understood that in this way a subjective interpretation of the organization and the role of the technology on the work environment of the employees and managers is obtained.

In order to come closer to a more objective reality the researcher believes exists separately and independently of individuals, it is decided to complement the qualitative research with quantitative research. By means of a questionnaire it is possible to obtain the opinions of a larger group of officers in the NLDO and it is easier to analyze the research data in a quantitative manner. Statistical analysis is also used to arrive at a model for information, communication and technological competencies for managers in the information society. The complete research methodology is described in the next chapter.

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 Burrel & 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 Burrel & 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 (Saunder, 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 citate 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
Influence of ICT on labour situation of officers	Info-stress Home working Mobility Influence on productivity Confidence in using the technology		16,17,19,20,21,22,38 13,44 18,23,29 24*,31*,32*,33,35*,47* 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** **Structural** **Strategic**	Knowledge about functionalities of (generic) applications, hardware and networks. Conceptual insight in ICT in order to participate effectively in decision-making in this regard. Finding quality information when needed. Evaluating the relative importance of information.	25, 26, 27, 28, 34, 35* 31*, 32*, 36, 39, 42, 46, 47*, 81 37, 63
ICT-related competencies	**Dimensions**	**Indicators**	**Item numbers**
Learning organization	***Willingness to be involved*** **Knowledge management** **Communities of practice** **Attitude towards life long learning**	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. 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. The need for networking (sources and networks for expertise need to be identified both nationally and internationally). Usability (Work experiences and lessons learnt). Understanding that lifelong learning is essential.	Scale for learning organization: 29, 40, 41, 43, 48-59, 64, 65, 66, 67, 68, 70, 82-84.

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 $p<=0.05$ 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 $p<=0.05$ 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 officers (excl. Students)	LTZ3-LTZ2OC, ELNT-Kap	114	46.3%	51.4%
	LTZ1, Maj.	67	27.2%	
Head officers	LNTKOL, Overste, KLTZ	51	20.7%	48.6%
	KTZ, KOL	14	5.7%	
Total		246	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.

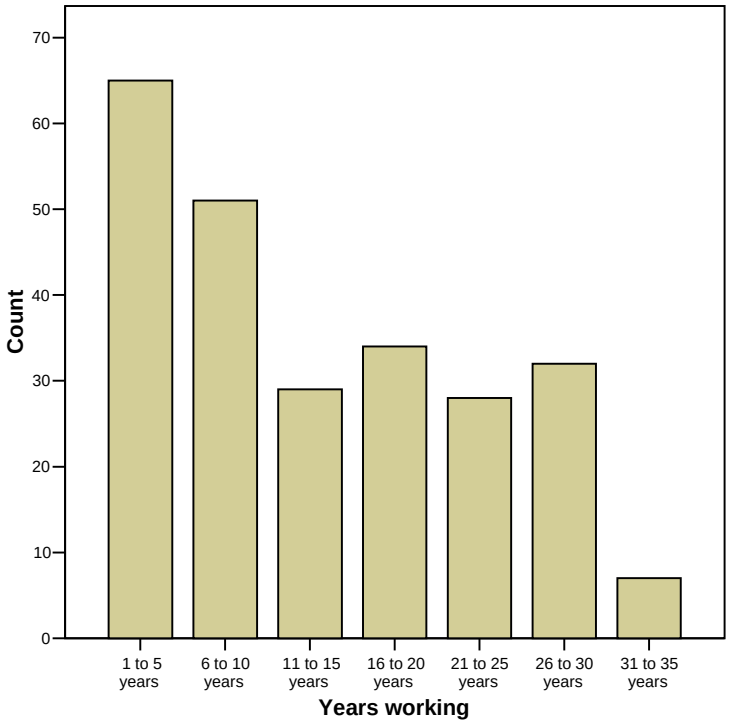
Table 3.6 Specialized initial training of the respondents to the questionnaire

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 purposes[1] 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 Burrel & 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).

Chapter 4 Results of research

"We will have to learn, before understanding any task, to first ask the question, "What information do I need, and in what form, and when?... The next question people have to learn to ask is, "To whom do I owe which information and when and where."

Peter Drucker in Davenport (1997: 28)

4.1 Introduction

This chapter commences with a discussion of the research findings from the interviews, the questionnaire and the discussion group. The results are discussed thematically for each sub-question of the main research question separately. The main research question ***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?*** consists of two distinct parts. Hence the discussion of the findings will also be discussed in two parts as follows: In section 4.2 the sub-questions related to the influence of ICT and the information society on the labour situation of officers in the Netherlands Defence Organization are discussed and in section 4.3 the sub-questions related to the implications of those findings for a digital learning environment of the officers in the Netherlands Defence Academy are discussed. This chapter is concluded with section 4.4 in which the second research question: ***What are the information, communication and technological competencies required for managers in the information society?*** is answered. The results of the questionnaire are further analyzed to evaluate if support is found for a general model for information, communication and technological competencies required by managers in the information society. Furthermore a first instrumentalization of the model is evaluated.

4.2 Results related to the first part of the main research question about the influence of ICT and the information society on the labour situation of officers in the NLDO

The questionnaire included a number of statements. The respondents were asked to indicate how much the statement applied to them by selecting one of five options: ‘does not apply at all’, ‘applies seldomly’, ‘applies partly’, ‘applies mainly’ and ‘applies entirely’. Where the frequencies of the responses are discussed, the options: ‘applies mainly’ and ‘applies entirely’ are combined to indicate a positive score ‘yes’ and the options ‘does not apply at all’ and ‘applies seldomly’ are combined to indicate a negative score ‘no’.

In the following two paragraphs the results related to the sub-question: ‘How do officers in the NLDO use ICT in their work situation?’ are discussed. Firstly the changes in the labour situation are considered and thereafter the use of the PC in the work environment.

4.2.1 Changes in the labour situation

The labour situation has changed for most officers since the introduction of ICT and especially the introduction of the Internet and will continue to change in the future. However not all the officers are directly confronted with those changes or do not experience those changes.

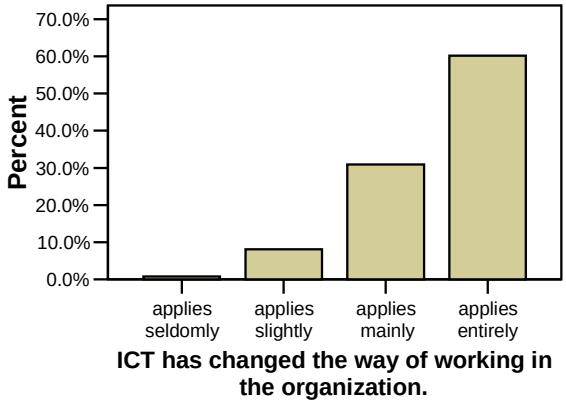
The respondents to the questionnaire indicated that ICT has changed the way of working in the organization. The frequencies of the responses to an explicit statement in this regard: ‘ICT has changed the way of working in the organization’ are summarized in table 4.1. In this table it is shown that 91.1% of the respondents answered positively to this statement. None of the respondents selected the option: ‘does not apply at all’. Interesting to note is however that twenty-two respondents (8.9%) indicated that this statement ‘applies seldomly’ or ‘applies partly’.

Table 4.1 the opinion of respondents regarding if ICT has changed the way of working in the NLDO

ICT has changed the way of working in the organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	applies seldomly	2	.8	.8	.8
	applies slightly	20	8.1	8.1	8.9
	applies mainly	76	30.9	30.9	39.8
	applies entirely	148	60.2	60.2	100.0
	Total	246	100.0	100.0	

In graph 4.1 the response to this statement is illustrated graphically.



Graph 4.1 Response to statement about changed way of working as a result of ICT
N=246

One respondent wrote on the back of the questionnaire: *"ICT is een goed hulpmiddel voor defensie en op hetzelfde moment een belasting. ICT communicatie gaat ten koste van intermenselijke communicatie en persoonlijke interacties. De cultuur en omgangsvormen binnen defensie veranderen."* [ICT is a good tool for the NLDO however at the same time a burden. ICT communication goes at the cost of interpersonal communication and personal interactions. The culture and ambulatory forms within the NLDO are changing].

Some interviewees and respondents indicated that ICT facilities that are available to the operational units lack behind the facilities that are available in the offices. They find this unacceptable since they regard the operational units the 'core business' of the NLDO.

The results of some of the questions of the group discussion of students provide some insight in their opinion regarding the ICT-related issues that are currently playing in the NLDO. The answers given are directly translated from the final answers to the discussion questions that were recorded by the students.

What are the relevant ICT-trends for the NLDO?

- Working with new computer systems, for example PeopleSoft.
- Working on distance: from home or controlling from a distance.
- Networking and communities of practice.
- Bringing different management systems together in one system for the NLDO.

What ICT-management issues are at the moment relevant for the NLDO?

- Trying to find ways of doing the same work with a smaller budget.
- Trying to find ways in making the organization more transparent.
- Improving integral management and control in the organization.
- Bringing the previously separate defence organizations together into a joint defence organization.

What are the important ICT-related opportunities for the NLDO?

- Improving the cooperation between the separate defence organizations by joining the separate ICT-systems.
- Reducing the number of applications so that it is possible to work effectively with a smaller budget.
- If some of the information management systems are combined, integral management will be improved in the organization.

What are the important ICT-related problems for the NLDO?

- Security of the ICT-network and information.
- Availability of applications on location (for example PeopleSoft is not available aboard the ships).

In what way does the NLDO fundamentally change as a result of ICT?

- The organizational structure of the organization is changing because some functions become redundant because administrative tasks can be done by employees themselves using the available systems like PeopleSoft.
- Employees need to be trained sufficiently in order to use the applications.
- Improved networks improve communication in the organization.

What is the influence of ICT on the labour situation of the employees in the NLDO?

- Employees need to be properly trained in order to work with the required applications.
- Some functions change or become redundant because of ICT.
- Employees obtain more responsibilities, for example applying digitally for leave, declarations and applying on-line for other functions in the organization. This increases their autonomy.
- If the applications in the NLDO are comparable to the applications used in the civil society and employees are able to work effectively with those applications, their employability increases to obtain a job outside the military organization.

The influence of ICT and the information society on the labour situation of the officers in the NLDO is further investigated by using the following dimensions: use of the PC, info-stress, mobility, influence on productivity and confidence in using the technology. The research results regarding those dimensions are discussed in the following paragraphs.

4.2.2 Use of the PC

In table 4.2 the use of the PC by respondents is illustrated.

Table 4.2 the use of PC by respondents

	Hours (h) per week			Extreme values
	Mean	**S.D.**	**95 % confidence interval of mean**	
PC use at home (private)	7.6	6.2	6.8 – 8.4	13 resp. >=20 h
PC use at work	20.9	7.5	20 – 21.9	5 resp.>=40 h
Use of Internet at work	2.0	3.0	1.6 - 2.3	4 resp.>=10 h
Use of Intranet of NLDO	3.8	4.1	3.2 – 4.3	14 resp.>=12 h

Interesting to note is that some respondents did not select one average number of hours, but indicated a range of hours for the different items by which they emphasized that the number of hours varied each week. The mean value of such ranges was used in the statistical programme.

No common demographic characteristics are found when the respondents with the extreme results are compared to each other.

Four respondents indicated that they would like to spend more time on the Intranet of the NLDO, but because they are not satisfied with the results using the search engine, they rather use e-mail to request information.

It was investigated if there are significant differences between the use of the PC of respondents and the variables sex, defence organization, rank, initial training and main function.

Significant differences were found between:

- The number of hours that are spent on the computer at home for private use is significantly higher for the officers that are initially trained in communication and

information systems (on average 14.2 hours per week) compared to number of hours similarly spent by the offers that received other fields of initial training (on average between 6.2 and 7.6 hours per week). Since it is expected that officers select their field of initial training on the basis of interest, this is a plausible result. Interesting to note is that no similar correlation is found related to the main function area of the officer.

- The average number of hours per week spent on the computer at work is significantly lower for the function area 'military operational' (18.7) and 'education and training' (18.6) compared to 'information and communication systems' (24.4) and 'technical and electronic design and maintenance' (23.8). This is understandable considering the nature of the function areas. The differences are however relatively small being less than six hours per week.

- The number of hours that officers spend on the Internet during working hours is significantly higher for officers that are initially trained in communication and information systems (on average 4.7 hours per week) compared to number of hours similarly spent by the officers that received other fields of initial training (on average between 1.6 and 1.8 hours per week).
  One exception to this is that officers that are initially trained in the field: 'planning and control, juridical' spend on average 2.3 hours per week on the Internet during working hours and it is not found that this is a significant difference with the field 'communication and information systems'. Interesting to note is that no similar results are found related to the main function area of the officer.

A comparison between the number of hours that the respondents in different function areas spend on the PC at work is illustrated in table 4.3. Interesting to note is the difference in range between the function areas.

Table 4.3 Number of hours per week respondents using the PC at work, a comparison between function areas

Main function	N	Mean	S.D.	Min	Max	95% confidence interval for mean	
						Lower bound	Upper bound
Policy and governing	20	22.25	6.6	12	35	19.2	25.4
Personnel, Human resource management	29	21.72	8.9	6	40	18.3	25.1
Administration, Logistics	35	20.40	6.7	6	30	18.1	22.7
Information and communication systems	24	24.38	6.7	15	40	21.6	27.2
Planning and control, incl. legal issues	22	23.23	7.5	8	36	19.9	26.5
Education and training	36	18.64	8.3	4	40	15.8	21.5
Technical and electronic design and maintenance	19	23.79	4.5	20	36	21.6	26
Military operational	61	18.67	7.2	4	40	16.8	20.5
Total	**246**	**20.92**	**7.5**	**4**	**45**	**20**	**21.9**

Significant positive correlations are found between the number of hours that officers spend on the computer for private use and the number of hours they spend on the computer at work (0.2) as well as on the Internet at work (0.4).
This correlation can most likely be explained in the light of the significant differences found where officers initially trained in ‘communication and information systems’ spend more time on the computer for private use, the computer at work as well as the Internet compared to the officers that are trained in other areas.

4.2.2.1 Number of work-related e-mails per day

Respondents receive on average 19 work-related e-mails per day (standard deviation 12.8, median 19). With 95% confidence it could be stated that the officers in the NLDO receive on average between 17 and 20 e-mails per day.

A number of respondents indicated explicitly that the amount of e-mails varied. Twelve respondents indicated that they received daily more than 48 work-related e-mails.

One significant difference is found:
Subaltern officers receive on average 16 e-mails per day and head officers receive on average 22 e-mails per day.

4.2.2.2 Access to the Internet and Intranet of the NLDO

In table 4.4 the number and percentage of respondents who have access to the Internet and the Intranet of the NLDO is illustrated.

Table 4.4 Internet and Intranet NLDO access of respondents

	Yes		**No**		**Total**	
	Number	Percentage	Number	Percentage	Number	Percentage
Internet access	143	58.1%	103	41.9%	246	100%
Intranet NLDO access	222	90.2%	24	9.8%	246	100%

N=246

One respondent wrote *"De beschikbaarheid/toegankelijkheid van informatie op het Intranet is met de invoering van MULAN[2] zeer sterk afgenomen!!"* [The availability/accessibility of information on the Intranet of the NLDO has strongly decreased after the implementation of MULAN].
However it needs to be noted that a number of ICT implementations occurred simultaneously for example changed security restrictions and servers. Officers might not always have a clear insight in what implementation is responsible for which perceived restriction.

Because of security restrictions it was in the past not possible to have Internet and Intranet of the NLDO available on the same PC. A choice was made between access to the Internet or Intranet NLDO based on the primary functional need of the employee. In some instances two separate computers were available for an employee in his/her workplace.

[2] MULAN is the name for the standard PC workplace for the NLDO in the new situation.

Most of the employees had access to the Internet or Intranet NLDO via a communal PC that was available in a separate location. In the new situation, where a different operating system is used, it is possible to have access to the Internet and Intranet NLDO on one PC, although this is still not in all instances the case.

A number of respondents (N = 16) wrote explicitly on the questionnaire that they experience frustration by not having access to the Internet or Intranet of the NLDO at their regular working place. Some respondents wrote *"Ik kan nergens op het Internet!!!"* [I am not able to access the Internet anywhere!!!]. It is plausible that the multiple use of exclamation marks indicates frustration. Five of those respondents explained that aboard a ship or in operational units there was no access to the Internet and that e-mail is organized via an administrative employee by handing the e-mail out in printed format. Other respondents complained that a number of there subordinates needed to share PC's and that they did not find this conductive to effective use of information. Another respondent wrote that it is sometimes necessary to use the Intranet of the NLDO while aboard of one of the ships. He complained: *"Wil men op het Intranet moet men wachten tot we terug zijn aan wal en dan Intranet zoeken. Veel personeel is ook niet op de hoogte van waar zij wel op het Intranet kunnen op de wal."* [If one wants to use the Intranet you have to wait until we are back ashore and then we need to search for an Intranet facility. Many employees are not aware where they could use the Intranet once ashore].

One respondent wrote that *"De walorganisatie is geheel georiënteerd op het verspreiden van informatie via het Intranet"* [The organization ashore is oriented on spreading information using the Intranet of the NLDO].
According to the respondent hardly any consideration is given to employees that do not have access to the Intranet and *"dit levert in de praktijk dagelijks ongemakken op."* [this produces daily inconveniences in practice].

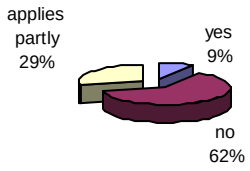
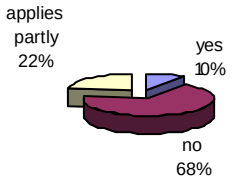
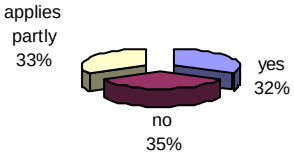
Two respondents wrote on the questionnaire that there is a need to have access to the Intranet of the NLDO including PeopleSoft for employees working at home or when they are placed in foreign countries.

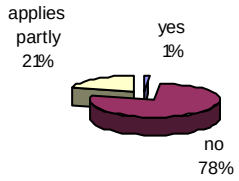
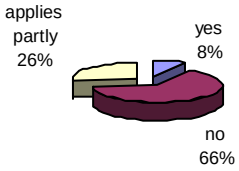
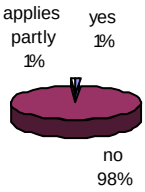
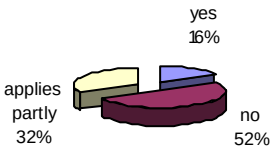
In the next section the research results related to the sub-question: 'What is the influence of ICT regarding info-stress, mobility, productivity and confidence of the officers in the NLDO in their work environment?' are discussed.

4.2.3 Info-stress

The responses to the statements in table 4.5 are combined to determine if respondents experience info-stress in their labour situation. In the table it shows what the frequencies of the responses are to the individual statements. The options: 'applies mainly' and 'applies entirely' are combined to indicate a positive score 'yes' and the options 'does not apply at all' and 'applies seldomly' are combined to indicate a negative score 'no'.

Table 4.5 Response to statements about info-stress

Statement 16 **I receive e-mail that is not directly relevant for my work.** Median and mode: 'applies seldomly'	
Statement 17 **The number of e-mails that I receive make my work stressful.** Median: 'does not apply at all' Mode: 'applies seldomly'	
Statement 19 **I experience stress as a result of using ICT in my work (e.g. software, printers, and availability of network).** Median and mode: 'applies partly'	

Statement 20 **I experience stress as a result of using ICT in my work because I do not have enough knowledge about it.** Median and mode: 'applies seldomly'	
Statement 21 **It happens that I receive important information too late because there are ICT problems.** Median and mode: 'applies seldomly'	
Statement 22 **Using ICT in my work makes me uncertain.** Median and mode: 'does not apply at all'	
Statement 38 **The amount of information that I have to work through daily makes my work stressful.** Median and mode: 'applies seldomly'	

The seven items were combined in a score for info-stress; the Cronbach's alpha for this item is 0.64 which is not high and means that this scale is not very homogeneous but since the Cronbach's alpha is larger than 0.6 the scale can still be used.
The mean value on a Likert scale from one to five is 2.2 (standard deviation 0.53). With 95% confidence it can be said that the average for the research population is between 2.2 and 2.3, which means that most of the officers do not experience info-stress on a regular basis. There are a few officers that experience info-stress on a regular basis, especially one officer that is working 26 years as officer in the NLDO.

Factor analysis was used to investigate if more than one principal component could be extracted from the variables in this scale based on the correlations the variables have with each other. Three principal components are found explaining a total of 65% of variance. Varimax-rotation is used to reorganize the information in a more effective way, making it easier to interpret the components (Ten Berge & Siero, 1997).

The subsequent components are identified:

Amount of information and e-mail, e-mail not relevant for work

Measured with the following three items (explaining 26% of variance)

16 I receive e-mail that is not directly relevant for my work.
.

17 The number of e-mails that I receive make my work stressful.

38 The amount of information that I have to work through daily makes my work stressful.

ICT problems

Measured with the following two items (explaining 21% of variance)

19 **I experience stress as a result of using ICT in my work (e.g. software, printers, availability of network).**

21 It happens that I receive important information too late because there are ICT problems.

Lack of knowledge

Measured with the following two items (explaining 18% of variance)

20 **I experience stress as a result of using ICT in my work because I do not have enough knowledge about it.**

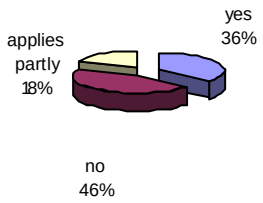
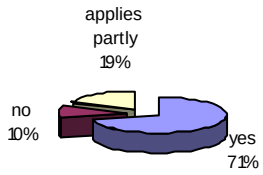
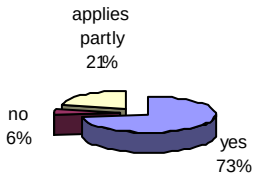
22 Using ICT in my work makes me uncertain.

4.2.4 Mobility

The responses to the statements in table 4.6 are used to obtain an indication of mobility in the labour situation of the officers in the NLDO. In the table it can be seen what the frequencies of the responses are to the individual statements. The options: ‘applies mainly’ and ‘applies entirely’ are combined to indicate a positive score ‘yes’ and the

options ‘does not apply at all’ and ‘applies seldomly’ are combined to indicate a negative score ‘no’.

Table 4.6 Response to statements about mobility

Statement 18 **It is important in my function to communicate internationally via e-mail.** Median: ‘applies partly’ Mode: ‘applies entirely’	
Statement 29 **I do communicate electronically with other professionals about my work.** Median and mode: ‘applies mainly’.	
Statement 23 **It is important that I receive information immediately as it becomes available.** Median: ‘applies mainly’ Mode: ‘applies entirely’.	

For head officers it is significantly more important to communicate internationally via e-mail compared to the subaltern officers. No other significant differences are found related to the responses to the statements in table 4.6.

Home-working during office hours is not common practice in the NLDO as is illustrated in table 4.7. Most officers do not work from home during office hours (median and mode is 0 hours per week). There are 45 officers however that work at least one hour per week at home instead of in the office and a further five officers that work at least ten hours from home.

Table 4.7 Working at home

	Hours (h) per week			Extreme values
	Mean	S.D.	95 % confidence of mean	
Working at home (during working hours)	1.1	3.8	0.6 – 1.6	45 resp. >=1 incl. 5 resp. >=10
Working at home (overtime)	2.4	3.6	2 – 2.9	18 resp.>=10

It was investigated if any common demographic characteristics regarding the background of the respondents with extreme values existed, but this was not the case.

Significant differences were found between:

- The number of hours per week that overtime work is done at home in the military police compared to the other defence organizations. The officers in the military police work at home (overtime) 4.8 hours (S.D. 5.8), in comparison with the average of 2.4 hours (S.D. 3.6) for all the officers in the NLDO. It is interesting to note that two respondents from the military police indicated on the questionnaire that they experienced a very high workload. This aspect was not explicitly included in the questionnaire and no respondents from the other defence organizations wrote a similar remark.

- The number of hours per week that overtime work is done at home is significantly higher for the head officers (average 3.1 hours, S.D. 4.1) compared to the subaltern officers (average 1.7 hours, S.D.2.7). In fact there is a significant positive correlation of 0.25 between number of hours that overtime work is done at home and the rank of the officer, meaning that the higher the rank of the officer, the more hours per week overtime is done at home.

Officers are of the opinion that working at home is productive. In response to the question **“working at home is productive”** 55.6% answered yes with mode and median ‘applies mainly’.
Nothing can be concluded however about working at home being more or less productive than working in the office, since the question was not posed in this way. Therefore this question is not used as an indicator for productivity in the next section.

In the following paragraphs the answers to question three of the interview are discussed: **What is in your opinion the role that mobile technology could play in supporting the working activities in the NLDO at an academic working and thinking level?**

Officers generally agreed that working with mobile technology is important, but most of them also emphasized the security risks. Officers are no longer restricted to their office and working place and as a consequence mobility increases. Blackberry technology is used by higher officers, using the Personal digital assistant, the secure e-mail that can be read on distance and the telephonic options. Two officers said that it is especially useful when traveling by train and thus using the travel time effectively. Two officers said that they do not find it desirable to be available all the time. They claimed that crisis-centers are in place in the NLDO to deal with immediate problems, and that it is under normal circumstances not necessary to be available all the time. They argued that when they are not away on a mission, that they want to limit their working time to office hours.

One officer said that mobile technology could provide an advantage in that important information could be immediately sent out (for example by mobile telephone) to the people who needed to know this information, however another officer warned that:
"Er bestaat een verzadigingsrisico ten aanzien van informatievoorziening."
[There exists a satiety risk in the provision of information].

Some interviewees said that during missions TITAAN (Theater Independent Technical Army and Air force Network) is used. They explained that this is a communication system meant to provide operational headquarters communicative possibilities in a local area network that can be connected to a wide area network via satellite.
Mobile technology can be connected to this system. The improved connection with the home front that is thus possible is seen as important by the officers. Three officers emphasized that it was always necessary to balance the convenience with security aspects.

Furthermore, some interviewees said that mobile technologies are important to illustrate the exact situation to officers when they are in the field, explaining that geographic

position applications make it possible to determine the exact location. Three officers said that during missions they experience a sense of isolation whereas the information need is very large – they said that mobile technology could provide a solution to this. One officer mentioned that if there is a problem with a technical defect, mobile technology makes it possible to make a photo or video from the defective apparatus and send it to the experts and ask for advice on distance.

One officer said that as the size of mobile technology decreases, the security risks increase. Not all information should be released and security awareness is very important, especially during a mission. To illustrate this aspect the officer mentioned that if there is an accident during a mission, it would be easy to make a photo or video of the situation and send this home. This could be traumatic for the family members of possible victims of the accident, who might not have been properly informed by the NLDO yet, but it could also create problems with security of the mission, the media and public relations. Two officers mentioned the role of the officer in making their staff aware of implications of those security risks. They were of the opinion that this has not the necessary attention.

Some interesting quotes in this regard:
"Mobiele technology maakt het makkelijker om mensen aan te sturen en werkzaamheden te coördineren."
[Mobile technology makes it easier to instruct people and to coordinate the activities].

"Je moet als gebruiker wel het gevoel hebben voor de mogelijkheden en onmogelijkheden van mobiele technologie omdat deze niet altijd dezelfde betrouwbaarheid heeft als vaste verbindingen, afhankelijk van de omgeving waar je zit."
[A user of mobile technology needs to have a feeling for the possibilities and impossibilities of mobile technology because they do not always have the same reliability of fixed connections, dependent on the environment where the users are].

"Mobiele technologie is onontbeerlijk, ook ten aanzien van de uitbreiding van sociale aspecten, vooral het contact met het thuisfront."
[Mobile technology is essential, also with regard to the extension of social aspects, especially contact with home].

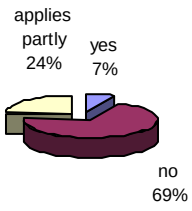
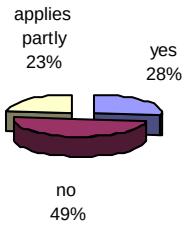
A time-registration system with a handheld scanner was mentioned by one officer as an improvement.

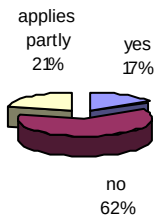
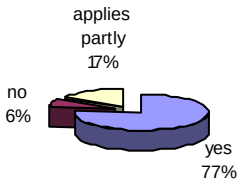
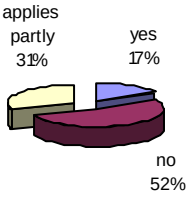
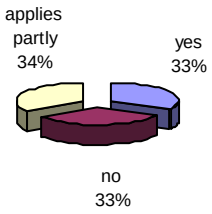
One respondent wrote on the questionnaire that no attention was given to working on distance. It is not exactly sure if the respondent means in the questionnaire or in the NLDO in general. But based on the questions that were added, it is plausible that the NLDO is meant. The respondent included the following questions [translated]:
"If someone lives closer to another defence location than where he/she is placed in the organization, is it not possible to work (part-time) in that defence location? Does this require a cultural change and does this need to be stimulated?"

4.2.5 Influence on productivity

The responses to the statements in table 4.8 are combined to determine the opinion of respondents regarding the influence of ICT on productivity in their labour situation. In the table can be seen what the frequencies of the responses are to the individual statements. The options: 'applies mainly' and 'applies entirely' are combined to indicate a positive score 'yes' and the options 'does not apply at all' and 'applies seldomly' are combined to indicate a negative score 'no'.

Table 4.8 Response to statements about productivity

Statement 24 **I lose production time because I am not familiar with the software applications.** Median and mode: 'applies seldomly'	
Statement 31 **I would like to know how I could find information on the Internet more effectively.** Median: 'applies partly' Mode: 'applies seldomly'	

Statement 32 **I waste time finding relevant information on the Internet.** Median and mode: 'applies seldomly'	
Statement 33 **ICT makes my work more productive.** Median and mode: 'applies mainly'	
Statement 35 **I ask others to help me with ICT.** Median and mode: 'applies seldomly'	
Statement 47 **I waste time finding relevant information on the Intranet of the NLDO.** Median and mode: 'applies partly'	

The answers of the questions were scaled in the same direction. Five items, excluding the direct statement 'ICT makes my work more productive' were thereafter combined in a score for influence on productivity, the Cronbach's alpha for this item is 0.7, which means that the items are acceptably homogeneous to combine them in a scale.
The mean value on a Likert scale from one to five is 3.5 (standard deviation 0.51) and with 95% confidence could be stated that the mean of the research population will be between 3.3 and 3.5. This means that most respondents are of the opinion that ICT in their labour environment has made them more productive. This is consistent with the response to the direct statement 'ICT makes my work more productive' to which 77% of the respondents indicated 'yes'.

Significant differences are found between the main function area as well as the initial training of the officer and the response to the scale productivity. Since a significance relationship was already established between the initial training and the main function area in which the officer is working, only the current main function area will be considered here. The officers currently working in communication and information systems score the highest on this scale (mean 3.8), followed by planning and control, including legal issues (mean 3.7) and thereafter technical and electronic design and maintenance (mean 3.6). The lowest average score was found in the function area: 'personnel and human resource management' (mean 3.2). The higher the mean the more the officers in the specific function area have experienced an increased productivity as a result of ICT.

Three respondents indicated that the slow connection to the Internet influenced their productivity negatively. They wrote that the internet connection was too slow to work constructively and that they used their Internet connection at home especially when they needed to download large files or needed to test certain applications.

One respondent wrote on the questionnaire: *"Ik constateer een brei aan losse toepassingen, een overvloed aan digitalisering, maar slechts een gebrekkige automatisering. Het gevolg is dat het tijd kost in plaats dat het tijd oplevert."* [I observe a mixture of loose applications, an abundance of digitalization, but only a poor automatization. The consequence is that it costs time instead of producing time].

Four interviewees said that they wasted time because they were not able to use all the applications effectively. This was supported by one respondent who wrote next to the statement 'ICT makes my work more productive' *"Indien benodigde kennis voorhanden is"* [If the necessary knowledge is available]. Possibly implying that this is not always the case.

Nine respondents indicated by writing on the questionnaire that it is difficult to find the information they need on the Intranet of the NLDO. Some write that the pages are out of date or complex to understand, but most indicate that they are dissatisfied with the search engine that is used. One respondent writes in this regard*: "Hoewel het Intranet*

van defensie vanaf 1999 zeer sterk verbeterd is, is de effectiviteit van de zoek-engin zeer ondermaats. Een 'google' voor het Intranet zou de frustratie voorkomen en de tijd effectiever besteedbaar maken." [The Intranet of the NLDO has improved considerably since 1999, but the search engine is not effective enough. A 'google' for the Intranet would prevent frustration and improve efficient use of time]. Another respondent indicated that *"De zoekengin op het Intranet geven vrijwel nooit het gevraagde document."* [The search engine on the Intranet provides hardly ever the requested document].

Factor analysis was used to investigate if more than one principal component could be extracted from the variables in this scale based on the correlations the variables have with each other. Two principal components are found explaining a total of 64% of variance. Varimax-rotation is used to reorganize the information in a more effective way, making it easier to interpret the components (Ten Berge & Siero, 1997).
The subsequent components could be identified:

Lack of knowledge

Measured with the following four items (explaining 41% of variance)

24* I lose production time because I am not familiar with the software applications.
31* I would like to know how I could find information on the Internet more effectively.
32* I waste time finding relevant information on the Internet.
35* I ask others to help me with ICT.

The second component contains the following two items, indicating a direct link between finding information on the Intranet when they need it without wasting time and being productive as a result of using ICT.

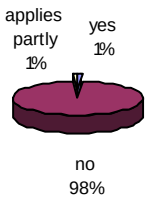
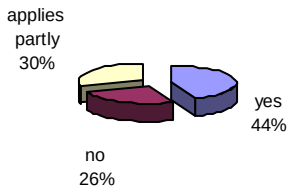
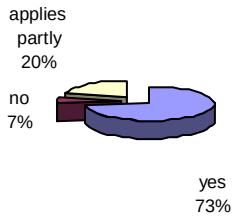
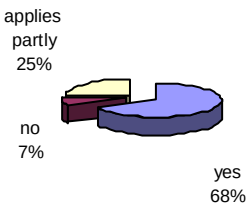
47* I waste time finding relevant information on the intranet of the NLDO.
33 ICT makes my work more productive.

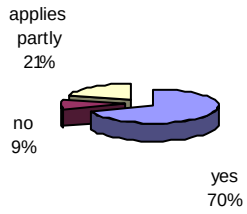
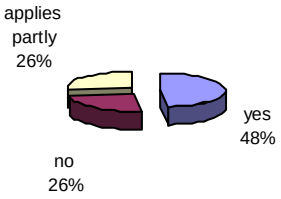
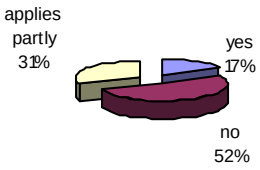
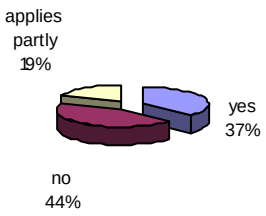
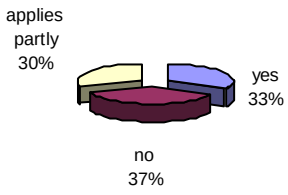
*recoded

4.2.6 Confidence in using ICT

The responses to the statements in table 4.9 are combined to determine the opinion of respondents regarding their confidence in using ICT in their labour situation. In the table can also be seen what the frequencies of the responses are to the individual statements. The options: 'applies mainly' and 'applies entirely' are combined to indicate a positive score 'yes' and the options 'does not apply at all' and 'applies seldomly' are combined to indicate a negative score 'no'.

Table 4.9 Response to statements about confidence in using ICT

Statement 22 **Using ICT in my work makes me uncertain.** Median and mode: 'does not apply at all'.	
Statement 25 **I know enough about ICT networks in order to know what can and cannot be done.** Median: 'applies partly' Mode:'applies mainly'	
Statement 26 **I am able to use all the software applications that I need in my work effectively.** Median and mode: 'applies mainly'.	
Statement 27 **I manage my e-mail effectively.** Median and mode: 'applies mainly'.	

Statement 28 **I organize my information effectively on the computer.** Median and mode: 'applies mainly'.	
Statement 34 **I have enough insight in ICT in order to participate in decision-making in this regard.** Median: 'applies partly' Mode:'applies mainly'	
Statement 35 **I ask others to help me with ICT.** Median and mode: 'applies seldomly'	
Statement 39 **I know where to find information about relevant courses and studies for myself.** Median: 'applies partly' Mode:'applies seldomly'	
Statement 42 **I can always find work-related information on the Internet just in time when I need it.** Median and mode: 'applies partly''	

The answers to the questions were scaled in the same direction so that the higher the score, the more confident the respondents are in using ICT in their labour environment.

The nine items were thereafter combined in a score for confidence in using ICT; the Cronbach's alpha for this item is 0.8, which means that the items are acceptably homogeneous to combine them in a scale. The mean value on a Likert scale from one to five is 3.5 (standard deviation 0.57). With 95% confidence can be said that the average of the research population will be between 3.4 and 3.6. This means that most respondents are fairly confident in using ICT in their labour environment, however it needs to be noted that there is a substantial number of respondents that are not confident in using ICT in their working environment.

Significant differences that are identified using further analysis, and assuming equal variances, are:

- Male employees are slightly more confident in using ICT compared to female employees. Male employees have a combined score of 3.54 (standard deviation 0.6) and female employees have a combined score of 3.16 (standard deviation 0.5).

- Officers that have had their initial training in communication and information systems are more confident with a mean score of 3.98 (standard deviation 0.5) compared to the officers who are trained in the other initial training areas except in the training area of planning and control (incl. juridical) with a mean score of 3.57 (standard deviation 0.6). Similar significant differences are found in the current main function area of the officers.

There is a significant positive correlation of 0.27 between the number of hours that officers use their PC at home for private purposes and the confidence that they have in using ICT at their work.

Factor analysis was used to investigate if more than one principal component could be extracted from the variables in this scale based on the correlations the variables have with each other. Three principal components are found explaining a total of 57% of variance. Varimax-rotation is used to reorganize the information in a more effective way, making it easier to interpret the components (Ten Berge & Siero, 1997).

The subsequent components are identified:

Knowledge about ICT

Measured with the following five items (explaining 26% of variance)

22* Using ICT in my work makes me uncertain.

25 I know enough about ICT networks in order to know what can and cannot be done.

26 I am able to use all the software applications that I need in my work effectively.

34 I have enough insight in ICT in order to participate in decision-making in this regard.

35* I ask others to help me with ICT.

*recoded

Finding information using the Internet

Measured with the following two items (explaining 16% of variance)

39 I know where to find information on the Internet about relevant courses and studies for myself.

42 I can always find work related information on the Internet just in time when I need it.

Organizing information and e-mail (finding information on the Intranet)

Measured with the following three items (explaining 16% of variance)

27 I manage my e-mail effectively.

28 I organize my information effectively on the computer.

46 It is always easy to find relevant information on the Intranet of the NLDO.

In the following paragraphs the research results related to the sub-questions about the software applications that officers use in their work environment as well as the ICT-competencies that officers in the NLDO need in their work environment are considered.

4.2.7 ICT-competencies required by the officers

The discussion group of students answered a question about the ICT-competencies required by officers as follows:

- Obtaining knowledge from developments in the specific branch in which they work, actions of competitors and insight in ICT uses and trends.
- Obtaining insight in the culture, structure, processes and employees of the organization.
- Obtaining insight in current and future ICT applications that are used in the organization as well as insight in the complexities of ICT.

Two interviewees emphasized that the most important ICT-competency is being able to think systematically in terms of information processes and being able to relate this to what it is that you need to achieve.

4.2.8 The importance of software applications in the work environment of the officers

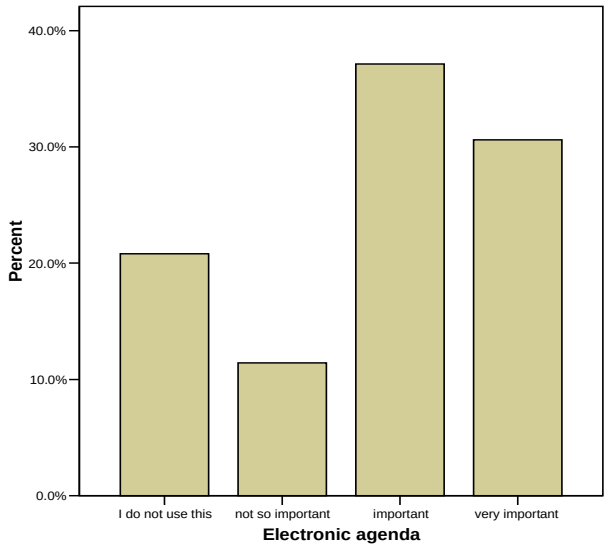
In the questionnaire the respondents were asked to indicate the importance of software applications in their labour situation by selecting one of four options: ‘do not use’, ‘not so important’, ‘important’ and ‘very important’. Their responses to the different items in combination with the answers to the interview question in this regard are discussed in the subsequent sections.
A number of respondents were not familiar with one or more software applications. They indicated this on the questionnaire and did not select one of the options for the corresponding software application(s).

4.2.8.1 Electronic agenda

The standard electronic agenda that is used in the NLDO is one of the features of MS Outlook. An employee can give permission to other employees to read or write in their electronic agenda.
In this way secretaries could for example by comparing the agendas of relevant employees decide on a suitable date and time for a meeting. The electronic agendas of

one employee using different technologies like a PC and a personal digital assistant can be synchronized on demand.

In graph 4.2 it shows that 20.8% of the respondents do not use the electronic agenda in their working situation, 11.4% do not find it important, and 67% of the respondents find it either important or very important in their working situation. The median and the mode are option three: 'important'.

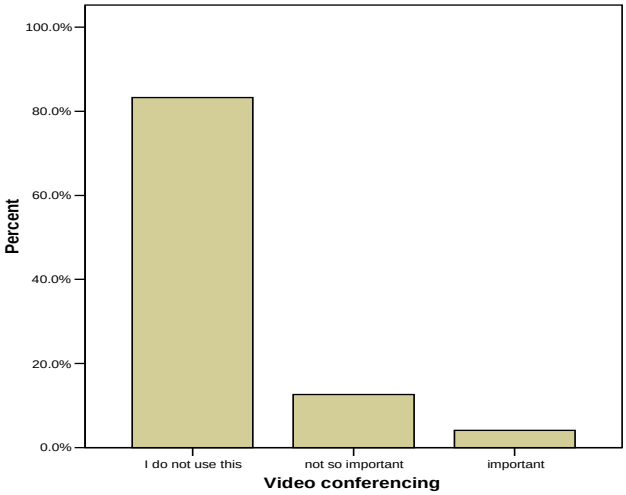


Graph 4.2 The importance of the electronic agenda in the working situation of the respondents

Using the Kruskal-Wallis test it can be concluded that head officers find the electronic agenda more important than the subaltern officers.
In fact a significant positive correlation of 0.2 is found between the importance of the electronic agenda and the rank of the officers using the Spearman measure. According to the results of the Kruskal-Wallis test to find significant differences between the use of the electronic agenda and the current function area of the officer it is found that officers in the main function areas 'policy and governing', 'planning and control, incl. legal issues' and 'communication and information systems' find the electronic agenda more important than the officers in the other function areas. It is found least important by the officers in the function area 'military operational'.

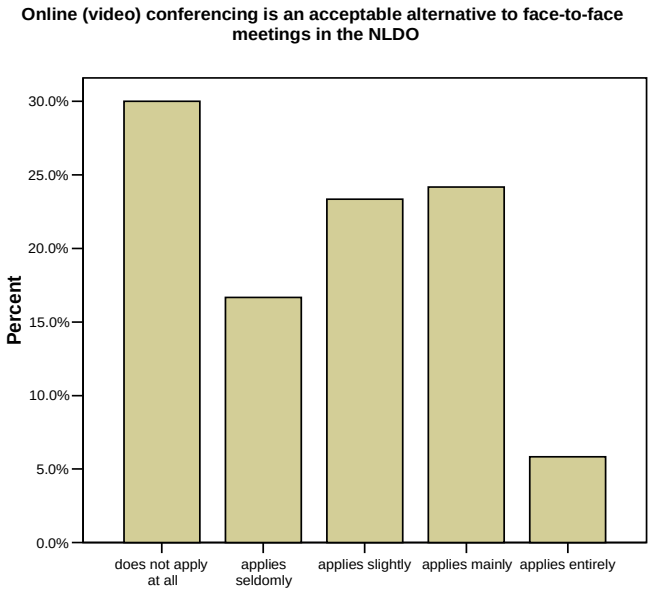
4.2.8.2 Video conferencing

In graph 4.3 it shows that 84.5 % of the respondents do not use video conferencing in their working situation, 10.2 % find it not very important, 4.1% of the respondents find it important and there is no respondent who finds it very important in their working situation. The median and the mode were option one: 'do not use'.



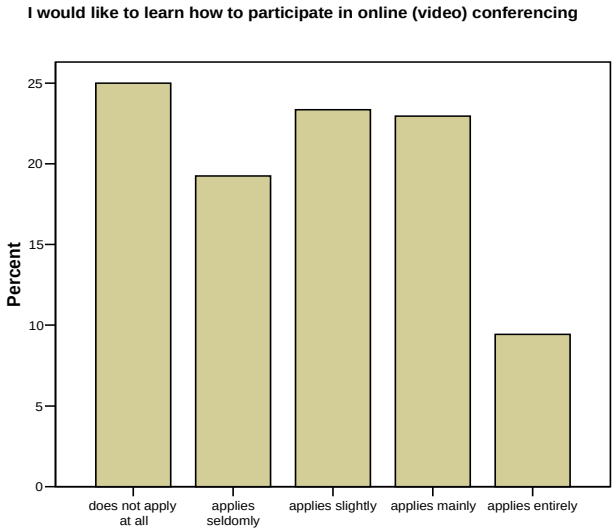
Graph 4.3 The importance of video conferencing in the working situation of the respondents

In graph 4.4 the response to the statement 'Online (video) conferencing is an acceptable alternative to face-to-face meetings in the NLDO' is illustrated. When the options 'applies mainly' and 'applies entirely' are combined into a positive answer yes, it can be concluded that 30% of the respondents find online (video) conferencing an acceptable alternative to face-to-face meetings in the NLDO. The mode of the responses is 'does not apply at all' and the median of the responses is 'applies partly'.



Graph 4.4 Reponses to statement 75 if online video conferencing is an acceptable alternative to face-to-face meetings in the NLDO

In graph 4.6 the response to the statement 76: 'I would like to learn how to participate in online (video) conferencing' is illustrated. When the options 'applies mainly' and 'applies entirely' are combined into a positive answer yes, it can be concluded that 32.4% of the respondents would like to learn how to participate in online (video) conferencing. The mode is 'does not apply at all' and the median of the responses is 'applies partly'.

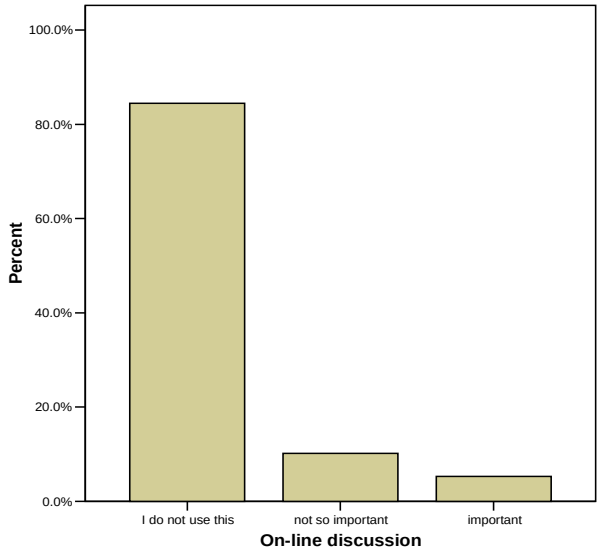


Graph 4.5 Reponses about learning how to participate in online (video conferencing)

In the interview three officers said that video teleconferencing is a way to meet without having to travel. They are of the opinion that in the joint defence organization, where the previously separate defence organizations are spread across the Netherlands, this medium is increasingly important. They said that it requires alternative meeting techniques in terms of chairmanship and participation compared to face-to-face meetings. This is supported by one of the respondents who wrote on the questionnaire: *"Onze eenheid doet het regelmatig."* [Our unit does it regularly].

4.2.8.3 On-line discussion

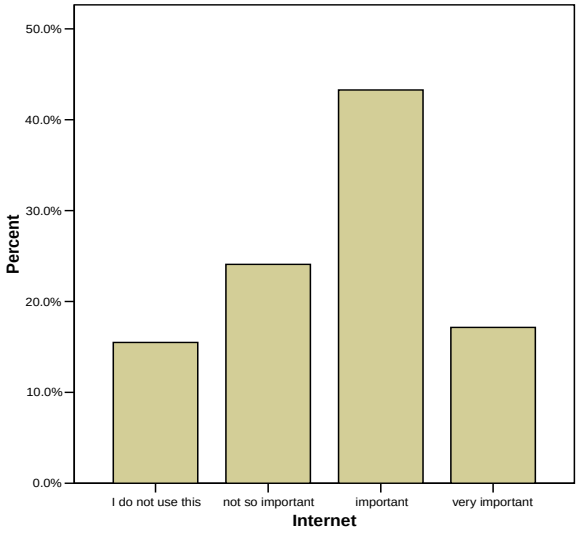
In graph 4.6 it shows that 84.5 % of the respondents do not use on-line discussion in their working situation, 10.2 % do not find it important, 5.3% of the respondents find it important and none of the respondents find it very important in their working situation. The median and the mode are option one: 'do not use'.



Graph 4.6 The importance of on-line discussion in the working situation of the respondents

4.2.8.4 Internet

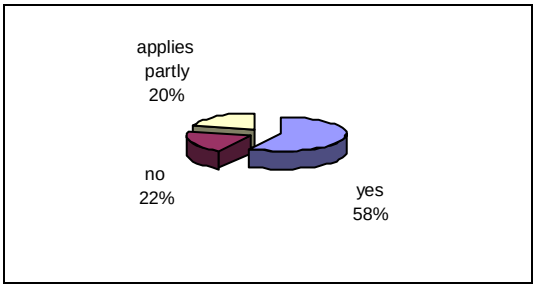
In graph 4.7 it shows that 15.5 % of the respondents do not use the Internet in their working situation, 24.1 do not find it important, and 60.4% of the respondents find it either important or very important in their working situation. The median and the mode are option three: 'important'.



Graph 4.7 The importance of the Internet in the working situation of the respondents

Interesting to note is that head officers in general, but especially officers in the rank of 'LTNTKOL, Overste and KLTZ' find the Internet slightly more important in their working situation than the subaltern officers. This result is significant.

The response to statement 30: 'It is important in my function to find relevant information on the Internet' is illustrated in graph 4.8.



Median and mode: 'applies mainly'

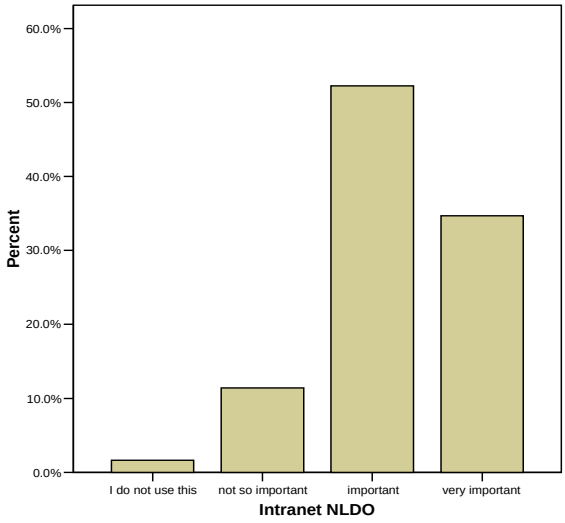
Graph 4.8 Response about importance of finding information on the Internet N=246

Eight interviewees mentioned the importance of the Internet and Intranet NLDO in their labour situation. They said that it was very important to know how to search effectively and find information when needed.

The need to find background information like reports from trade unions, parliament and subject fields were mentioned specifically in this regard. Officers also need to be able to make correct selections in dealing with large quantities of information.

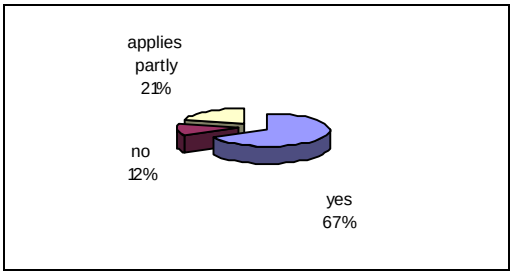
4.2.8.5 Intranet NLDO

In graph 4.9 it shows that 1.6 % of the respondents do not use the Intranet NLDO in their working situation, 11.4% do not find it important, and 86.9% find it either important or very important in their working situation. The median and the mode are option three: 'important'.



Graph 4.9 The importance of the Intranet NLDO in the working situation of the respondents

The response to the statement 45: 'It is important in my function to find relevant information on the Intranet of the NLDO' is illustrated in graph 4.10.



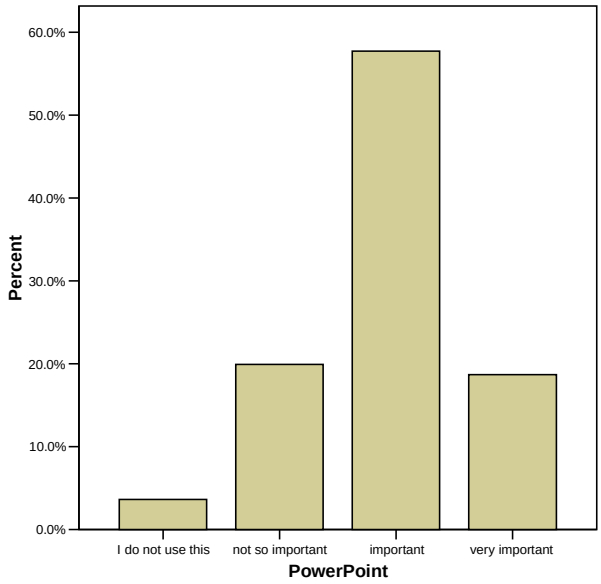
Median and mode: 'applies mainly'

Graph 4.10 Response about importance of finding information on the Intranet of the NLDO, N=246

General agreement existed amongst the interviewees that the MS Office applications needed to be mastered at an advanced level and officers need to have insight in what those applications are capable of.

4.2.8.6 MS PowerPoint

In graph 4.11 it can be seen that only 3.7 % of the respondents do not use MS PowerPoint in their working situation, 19.9 % do not find it important and 76.4% find it either important or very important in their working situation. The median and the mode are option three: 'important'.

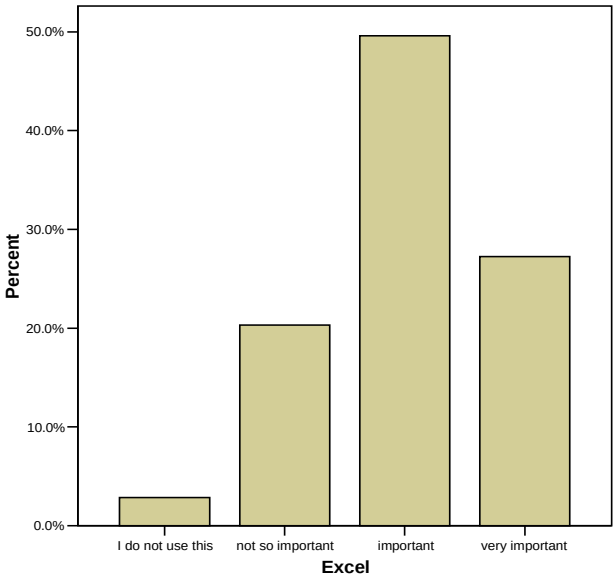


Graph 4.11 The importance of MS PowerPoint in the working situation of the respondents

Head officers find MS PowerPoint slightly more important in their working situation than subaltern officers. This result is significant.

4.2.8.7 MS Excel

In graph 4.12 it can be seen that only 2.8 % of the respondents do not use MS Excel in their working situation, 20.3 % do not find it important and 76.8% find it either important or very important in their working situation. The median and the mode are option three: 'important'.

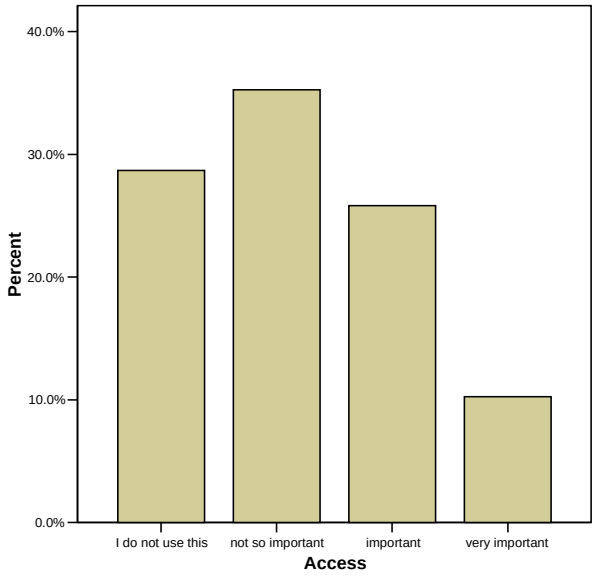


Graph 4.12 The importance of MS Excel in the working situation of the respondents

The head officers in the rank of 'KTZ or KOL' find MS Excel significantly less important in their working situation compared to the officers in the other ranks. Using Spearman's rho a significantly negative correlation of –0.13 is found between the rank of the officer and the use of MS Excel in their work.

4.2.8.8 MS Access

In graph 4.13 it shows that 28.7 % of the respondents do not use MS Access in their working situation, 35.3 % do not find it important and 36 % find it either important or very important in their working situation. The median and the mode are option two: 'not very important'.

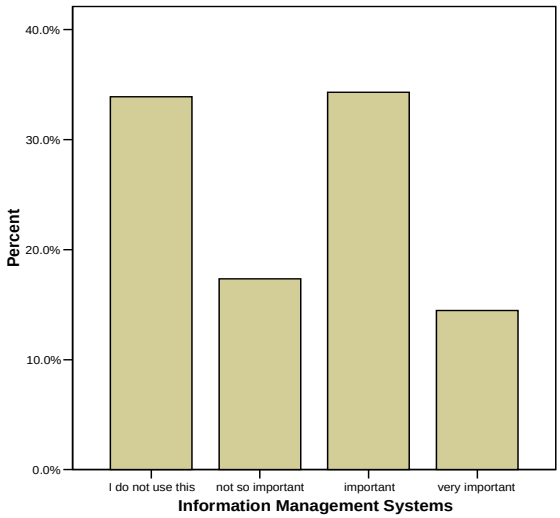


Graph 4.13 The importance of MS Access in the working situation of the respondents

The head officers in the rank of 'KTZ or KOL' find MS Access significantly less important in their working situation compared to the officers in the other ranks. Using Spearman's rho a significantly negative correlation of –0.13 is found between the rank of the officer and the use of MS Access in their work.

4.2.8.9 Information Management System

In graph 4.14 it can be seen that 33.3 % of the respondents do not use an information management application in their working situation, 17.4 % do not find it important and 48.8 % find it either important or very important in their working situation. The median is option two: 'not so important' and the mode is option three: 'important'.



Graph 4.14 The importance of Information Management Systems in the working situation of the respondents

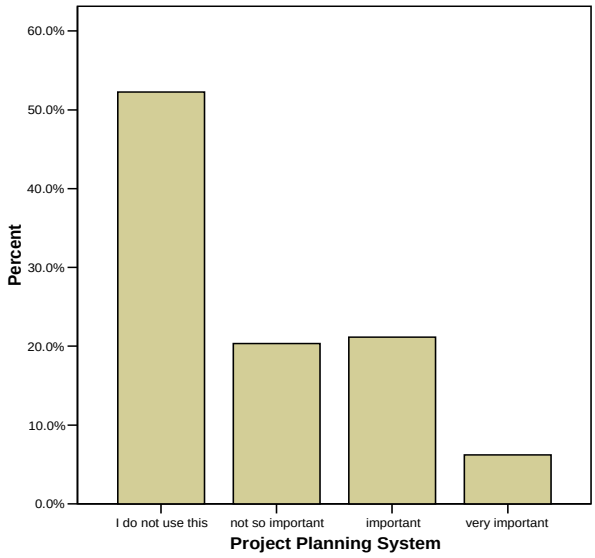
The officers initially trained in the Royal Navy find the use of information management systems significantly less important in their working situation compared to the officers trained in the other sub organizations of the NLDO.

Seven officers specifically mentioned during the interview how important it was to be able to deal effectively with information management systems.

An interesting quote in this regard is:
"Omdat officieren managers zijn is de belangrijkste competentie het effectief aan kunnen wenden van de applicaties ten aanzien van bestuurlijke informatiekennis. Management informatie kan niet meer worden bestuurd zonder ICT."
[Since officers are managers, the most important competency is dealing effectively with management information applications. Management information can not be managed anymore without ICT].

4.2.8.10 Project Planning System

In graph 4.15 it can be seen that 52.3 % of the respondents do not use a project planning application in their working situation, 20.3 % do not find it important and 27.4% find it either important or very important in their working situation. The median and mode are option one: 'I do not use this'.



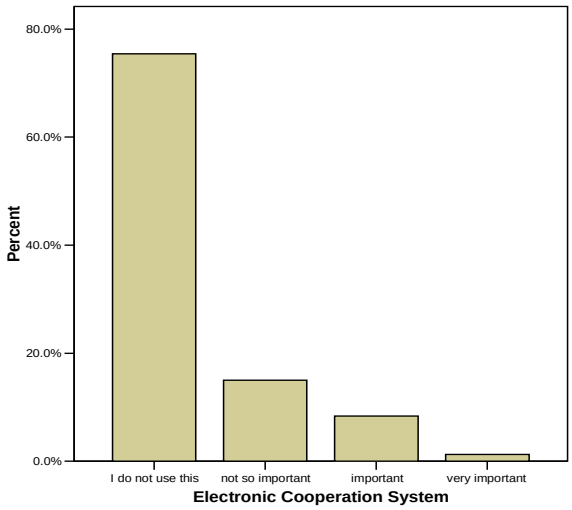
Graph 4.15 The importance of a Project Planning System in the working situation of the respondents

Interesting to note is that the officers currently working in policy and governing found the project planning systems least important, whereas officers working in communication and information systems as well as in technical and electronic design and maintenance found them most important. According to the Kruskal-Wallis test those results are significant.

Some interviewees said that MS Project manager is especially important to be able to make a hierarchical breakdown from the global overview to the detail, with information about the dependencies in projects. They said that projects are often not completed one item after another and that it is difficult to manage complex projects effectively without a digital system. Some interviewees are of the opinion that all officers are in essence project managers.

4.2.8.11 Electronic cooperation system

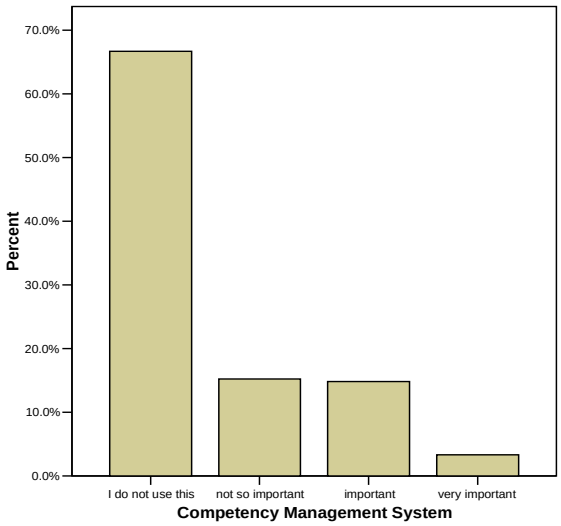
In graph 4.16 it can be seen that 75.4 % of the respondents do not use an electronic cooperation application in their working situation, 15 % do not find it important and 9.6% find it either important or very important in their working situation. The median and mode are option one: 'I do not use this'.



Graph 4.16 The importance of an Electronic Cooperation System in the working situation of the respondents

4.2.8.12 Competency Management System

In graph 4.17 it can be seen that 66.7 % of the respondents do not use a competency management application in their working situation, 15.2 % do not find it important and 18.1 % find it either important or very important in their working situation. The median and mode are option one: 'I do not use this'.



Graph 4.17 The importance of a Competency Management System in the working situation of the respondents

One respondent wrote on the questionnaire that he/she would like to use an automated system to manage competencies. During the interviews six officers said that they regarded PeopleSoft[3] as a competency management system. One interviewee mentioned that resistance existed against this application, because the perception of officers is that the underlying reason for purchasing these systems is cost reduction and not increased effectivity.

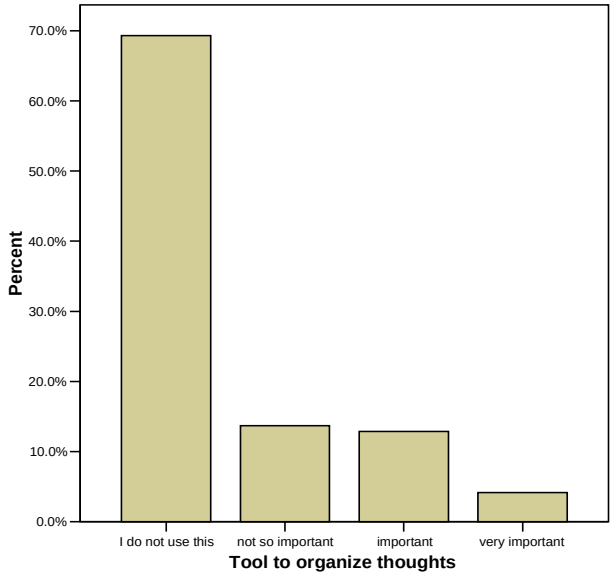
Some interesting quotes in this regard:
"Er zijn officieren die deze systemen in onvoldoende mate gebruiken omdat ze weinig tijd aan administratieve handelingen willen besteden ten koste van andere prioriteiten."
[There are officers that do not use these systems sufficiently because they do not want to spend their time doing administration at the cost of other priorities].

4.2.8.13 Tool to organize thoughts

In graph 4.18 it can be seen that 69.3 % of the respondents do not use a tool to organize their thoughts in their working situation, 13.7 % do not find it important and 17% find it

[3] PeopleSoft is an application that is used to manage personnel administration in the NLDO

either important or very important in their working situation. The median and mode are option one: 'I do not use this'.



Graph 4.18 The importance of a tool to organize thoughts

One interviewee said in this regard: *"Er zijn applicaties die ik nu gebruik, waarvan ik graag eerder had willen weten dat ze beschikbaar waren, zoals Mindmapping. Dit is een belangrijke tool om je gedachten te kunnen ordenen. Dit is waarschijnlijk belangrijk voor alle officieren."* [There are applications that I use now, but I would have liked to know at an earlier stage that they existed. For example Mind mapping. This is an important tool to organize your thoughts. It is most likely important for all officers]. This thought is supported by one of the respondents who wrote on the questionnaire that he/she would like to use a tool to organize thoughts. Another respondent wrote that it was regularly necessary to mind map on paper.

4.2.8.14 Summary of the importance of software applications in the working situation of respondents in order of importance

In table 4.10 the importance of software applications in the working situation is organized in order of importance, from most important to least important. The 95 % confidence interval for the mean illustrates that based on statistical analysis it can be concluded with 95 % certainty that the mean of the research population will fall between the indicated bounds. No significant differences were found related to sex, contract,

defence organization, current function, initial training, rank and number of years working in the NLDO. Five respondents indicated on the questionnaire that they were not familiar with the last six items.

Table 4.10 Response about importance of software applications in the working situation

Software application	Mean (Scale 1-4)	S.D.	95% Confidence Interval for Mean	
			Lower bound	Upper bound
Intranet NLDO	3.20	0.70	3.11	3.29
MS Excel	3.01	0.77	2.92	3.11
MS PowerPoint	2.91	0.73	2.82	3.01
Electronic agenda	2.78	1.10	2.64	2.91
Internet	2.62	0.95	2.50	2.74
Information management system	2.29	1.09	2.16	2.43
MS Access	2.18	0.96	2.05	2.30
Project planning system	1.81	0.98	1.69	1.94
Competency management system	1.55	0.86	1.44	1.66
Tool to organize thoughts	1.52	0.87	1.41	1.63
Electronic cooperation system	1.35	0.69	1.27	1.44
Video conferencing	1.21	0.50	1.15	1.27
On-line discussion	1.21	0.52	1.14	1.27

In this regard an interesting comment was written on the back of a questionnaire by an officer in a senior position with fourteen years of experience (translated):

"I have an ultra modern computer system with many recent applications, but I only use it as a typing and e-mail machine, since I have no insight in how to use the applications. I use pen, paper and the knowledge of my colleagues to do my work. I fall back on stone age technology since I am not familiar with the system."

4.2.9 General discussion on the importance of ICT-competencies in the NLDO based on the results from the interviews

Three questions were asked in the interviews in relation to the importance of ICT-competencies. The results of each question are discussed in this paragraph.

What are in your opinion the most important ICT-competencies that officers need in order to work effectively in the NLDO?

In general during the interviews it was said that specific applications change with time and are dependent on the choices that are made by the organization and that the need for specific applications is dependent on the main function area of the officer. One officer mentioned that it is important to have insight in the different roles that an officer fulfills: project manager, presentor, manager of information, security manager and that ICT should be seen as a tool that could support these roles.

It was also seen as important that officers know how the ICT support is organized in the NLDO in order to know where to seek help when needed. Since there were a number of organizational changes this is not clear in all instances.

The interviewees were generally also of the opinion that officers should be able to analyze information presented by others in applications like MS Excel as well as being able to present management information in an appropriate format, avoiding unnecessary information.

Eight interviewees said that it was important to have a conceptual insight in the generic functionalities of applications or in the context of exchanging data between applications. This means that the interviewees find it important to understand the underlying principles of the applications, what the possibilities are of the applications and how applications can import, export data between the applications and what the reasons are that there are sometimes limitations in doing so. However the opinions are divided regarding this item.

Interesting to note is that some technical and information experts are strongly of the opinion that conceptual insight was not necessary, since the ICT experts dealt with any issues in this regard, whereas some of the interviewees from non-technical function-areas are convinced that this item was very important. They experience a sense of inadequacy in their working environment because they do not understand the possibilities and restrictions of certain applications and can not independently make decisions when necessary. They often have to rely on younger inexperienced officers to make the decisions for them in this regard. This constitutes a situation that they do not find acceptable. Some interviewees motivated the importance of this item by placing emphasis on the requirement of an officer to give clear instructions regarding the information needs and the format in which the information needs to be displayed. However there was also one officer from a non-technical background that indicated that he had no need for conceptual insight in this regard.

Some interesting quotes in this regard:
"*Het is belangrijk om the achterliggende principes van ICT te begrijpen om zodoende de applicaties effectief te kunnen gebruiken*. *De diepgang hiervan hangt af van de rol in de organisatie*"
[It is important to understand the underlying principles of ICT and to be able to apply the software applications effectively. The depth of this understanding depends on the role in the organization].

"De officier moet kunnen onderscheiden wanneer hij/zij expertise in moet winnen. Een goed begrip van de procesgang achter de ICT techniek en diepgaand inzicht in de functionaliteiten moeten alle officieren hebben, maar de officier kan niet alles weten en dat hoeft ook niet."
[An officer needs to be able to distinguish when he/she needs to consult expertise. All officers need to have a sound understanding of the process behind the ICT technique and thorough insight in the functionalities, but an officer cannot know everything and that is also not necessary].

Four officers said that officers need to be able to structure personal and shared documents and e-mail effectively.

One interviewee mentioned that it is important to make a selection in what e-mail was important and needed to be answered and what e-mail could be disregarded.

One interviewee mentioned that in order to use ICT effectively in the role of a leader means communicating effectively using a socially acceptable way in that the manner in which an e-mail is designed is dependent on the role, position, the situation and the topic and needs to be considered carefully. This opinion was supported by another officer who indicated further that information transfer on distance required a different way of communication.

What are in your opinion the ICT- competencies that officers need in order to function effectively during operational missions (Including international cooperation, sharing information and ensuring security of information)?

Some interviewees mentioned that the essence of the operational information need is primarily the responsibility of the strategic top of the organization, the officers that are sent out are executive and primarily a link in the process. It was mentioned that network specialists are available and the number of applications are limited, both in number and in access speed. The most common applications, like the MS Office applications that are normally available on the workplace are also available during missions. Some officers (N=4) said that the officer is confronted with unknown applications and that there is limited time for training to use those applications effectively and limited support once the application needs to be used. However since the newer applications are often user-friendly and Windows-based it is easier to learn the new applications than it used to be in the past.

One officer remarked in this respect:
"Omdat de beschikbare tijd en capaciteit tijdens uitzendingen schaars is, is het uiterst belangrijk om de informatiebehoefte tot het essentiële te beperken. Hierin bestaan duidelijke cultuurverschillen tussen de landen."
[Because the available time and capacity during missions is limited, it is very important to limit the information need to the essential. In this respect clear cultural differences exist between countries].

Some interviewees said that the flow of information and knowledge that the officer is responsible for, need to be organized effectively and available to others when required. The competency to find relevant information immediately when you need it, is very important because you are dependent on this information in difficult circumstances as one officer remarked: *"Officers are often looking for pragmatic solutions for immediate problems"*.

Six officers mentioned that command and control systems as well as battle management systems are very important during missions.

One officer said that officers play an important role in dealing with the care system regarding their staff during and after the mission. In this sense it is important that medical and other personal information is recorded in a database and available during a mission. Furthermore, according to this officer it is important that officers are aware of such a database and use it effectively during and after a mission.

What is in your opinion the current status and importance of agreement of univocal standards for provision of information and ICT architecture (regarding software, hardware and networks) nationally in the NLDO and internationally between military partners?

The interviewees agreed that univocal standards and uniformity in applications, is an important aspect in order to be able to share information and work together effectively. In the NLDO there are many projects in progress that will ensure uniformity in this regard and as a consequence improved integral management information and control in the near future.

Some officers explained that internationally univocal NATO standards exist regarding communication and connections between navies of countries, air forces of countries and armies of countries, but different connections are still in place for air forces, armies and navies because in the past they were working in different operational situations. Currently cooperation between the different defence organizations becomes more important, also internationally. The changes that are required receive the necessary priority.

This is a complex process however and solutions take time to implement internationally. One officer said that striving towards standardized and univocal international systems is desirable, but perhaps not attainable. However the interviewees also agreed that knowledge about the underlying technique is in this case the responsibility of specialists, therefore this item was not included in the questionnaire. However one respondent indicated that it was unfortunate that this item was not included.

In the next section the research results related to the sub-question: 'How competent are officers in the NLDO in their own opinion regarding the identified ICT-related competencies?' are discussed.

4.2.10 Results related to how competent the officers evaluate themselves regarding some ICT-competencies

4.2.10.1 Identifying specific ICT-competence

In the following paragraphs specific ICT-competencies of respondents are described. Competencies are seen as a combination of knowledge and insight, skills and behaviour as well as attitude and commitment. The respondents evaluated themselves and no specific performance indicators are used.

4.2.10.2 Operational ICT-competence

The scores of the following six items are combined to determine if the respondents could use the ICT-technologies required in their working environment in the NDLO effectively. This is indicated by operational ICT-competence. Since the frequencies of the responses to the items are described for each question in the sections before, they will not again be mentioned.

- I know enough about ICT networks in order to know what can and cannot be done.
- I am able to use all the software applications that I need in my work effectively.
- I manage my e-mail effectively.
- I organize my information effectively on the computer.

- I have enough insight in ICT to participate in decision-making in this regard.
- I ask others to help me with ICT.

One respondent indicated that he was not able to evaluate how effective he was regarding the first five items by writing next to those items: *"kan ikzelf niet beoordelen"* [I am not able to evaluate this].

The last item is re-coded in order to scale it in the same direction as the other statements, so that the higher the score the better the respondents know how to deal with the ICT that is required in their working environment. The Cronbach's alpha for this scale is 0.8 which means that the items are homogeneous enough to combine them in a scale. The mean of the scale is 3.5 on a Likert scale from one to five with standard deviation 0.6. With 95% confidence can be said that the mean of the officers will be between 3.4 and 3.6. This means that the answer is somewhere between 'applies partly' and 'applies mainly'. It can thus be concluded that although half of the officers is sure how to use ICT in their working environment about half of the respondents is often not sure how to use ICT in the labour environment. This has certainly a consequence for the training environment of the officer. There are four respondents that have a very low score for this scale (<=1.8).

Significant differences that are identified using further analysis, and assuming equal variances are:

- Male employees score higher on this scale than female employees. Male employees have a combined score of 3.6 (standard deviation 0.6) and female employees have a combined score of 3 (standard deviation 0.6). Which means that male employees evaluate themselves more competent in using ICT in their labour environment compared to the self-evaluation of their female colleagues.

Significant correlations that are identified using further analysis, and assuming equal variances are:

- There is a positive correlation of 0.2 between the private use of the computer and the operational ICT-competencies, which means that the more hours the employees spend on the computer for private use, the more competent they evaluate themselves in using ICT in their work-environment.

Some interviewees and respondents indicated that archiving e-mail constitutes a problem and that they are sometimes unable to retrieve the required e-mails when needed. In response to the statement 'I manage my e-mail effectively' in the questionnaire, 8.5 % of the respondents selected a negative response, 25.2% selected the option 'applies partly' and 67.3% selected a positive response.

Factor analysis was used to investigate if more than one principal component could be extracted from the variables in this scale based on the correlations the variables have with each other. Two principal components are found explaining a total of 66% of variance. Varimax-rotation is used to reorganize the information in a more effective way, making it easier to interpret the components (Ten Berge & Siero, 1997).
The subsequent components are identified:

Using software effectively

Measured with the following three items (explaining 33% variance)

26 I am able to use all the software applications that I need in my work effectively.

27 I manage my e-mail effectively.

28 I organize my information effectively on the computer.

Knowledge about ICT (software, networks and hardware)

Measured with the following three items (explaining 33% variance)

25 I know enough about ICT networks in order to know what can and cannot be done.

34 I have enough insight in ICT in order to participate in decision-making in this regard.

35* I ask others to help me with ICT.

*recoded

4.2.10.3 Structural ICT-competence

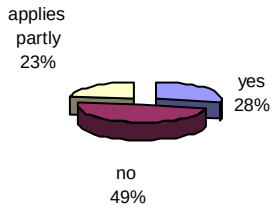
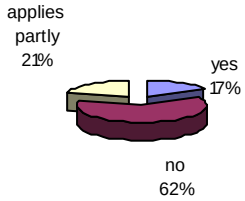
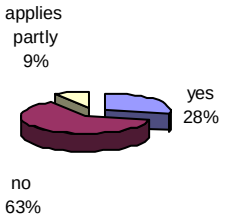
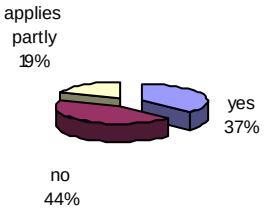
Structural ICT-competence is stipulated in this research as competence to find quality information when needed using the Internet and Intranet of the NLDO. There were no questions related to finding quality information in other information management

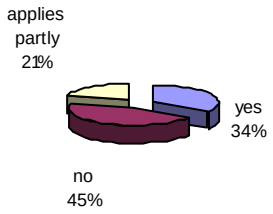
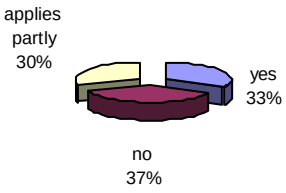
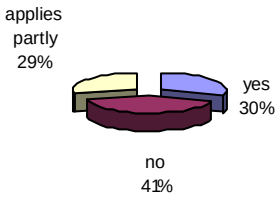
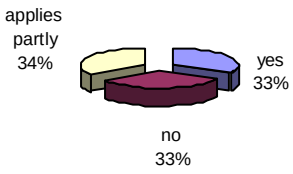
systems. In table 4.11 the frequencies of the responses to individual statements is illustrated.

The options: 'applies mainly' and 'applies entirely' are combined to indicate a positive score 'yes' and the options 'does not apply at all' and 'applies seldomly' are combined to indicate a negative score 'no'.

The eight items in the table are combined to determine a scale 'structural ICT-competence'.

Table 4.11 Response to statements about structural ICT-competencies

I would like to know how I could find information on the Internet more effectively. Median: 'applies partly' Mode: 'applies seldomly'	
I waste time finding relevant information on the Internet. Median and mode: 'applies seldomly'.	
I know how to obtain access to work related sections of the Internet for which you need special authorization. Median and mode: 'does not apply at all'.	
I know where to find information on the Internet about relevant courses and studies for myself. Median: 'applies partly' Mode: 'applies seldomly	

I know where to find information on the Internet about relevant courses and studies for my subordinates. Median: 'applies partly' Mode: 'applies mainly'	
I can always find work-related information on the Internet just in time when I need it. Median and mode: 'applies partly'	
It is always easy to find relevant information on the Intranet of the NLDO. Median: 'applies partly' There are two modes: 'applies seldomly' and 'applies partly'	
I waste time finding relevant information on the Intranet of the NLDO. Median and mode: 'applies partly'	

Where applicable the responses to the statements are re-coded in order to scale them in the same direction as the other statements, so that the higher the score the better the respondents are able to find quality information when needed. The Cronbach's alpha for this scale is 0.63 which is not high and means that this scale is not very homogeneous but since the Cronbach's alpha is larger than 0.6 the scale can still be used. The mean is 2.9 on a Likert scale from one to five with standard deviation 0.6. With 95 % confidence could be said that the mean of the research population will be between 2.9 and 3.0.

The answer is close to ‘applies partly’, which means that more than half of the officers are often not sure how to find quality information when needed. It needs to be noted however that at the time of the research a substantial percentage (42%) of the officers did not have access to the Internet at work. It is plausible that this could have influenced the result. Since 107 respondents indicated that they do not have subordinates that they are responsible for and their opinions were therefore not taken into consideration, it was decided to exclude the statement that related to subordinates and recalculate the scale, but in the new scale the Cronbach’s alpha was slightly lower and the means still the same, hence this was not further investigated.

One significant difference was identified using further analysis: Officers working in the function area ‘communication and information systems’ score slightly higher compared to officers working in the function areas ‘logistics’, ‘military operational’ and ‘education and training’. The differences between the groups are however relatively small and all groups have an average close to the option ‘applies partly’.

There is a relatively small significant correlation of 0.17 between private use of the computer and structural ICT-competence, which means that the more the respondents spend time on the computer for private use, the better they are able to find quality information when needed in their working situation.

Factor analysis was used to investigate if more than one principal component could be extracted from the variables in this scale based on the correlations the variables have with each other. Three principal components are found explaining a total of 68% of variance. Varimax-rotation is used to reorganize the information in a more effective way, making it easier to interpret the components (Ten Berge & Siero, 1997).

The subsequent components are identified:

Finding information on the Internet

Measured with the following four items (explaining 27% variance)

36 I know how to obtain access to work related sections of the Internet for which you need special authorization.

39 I know where to find information on the Internet about relevant courses and studies for myself.

42 I can always find work related information on the Internet just in time when I need it.

81 I know where to find information on the Internet about relevant courses and studies for my subordinates.

Need to learn about finding information on the Internet

Measured with the following three items (explaining 23% variance)

31* I would like to know how I could find information on the Internet more effectively.

32* I waste time finding relevant information on the Internet.

*recoded

Finding information on the Intranet of the NLDO.

Measured with the following three items (explaining 18% variance)

47* I waste time finding relevant information on the Intranet of the NLDO.

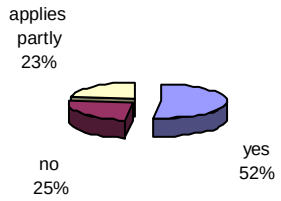
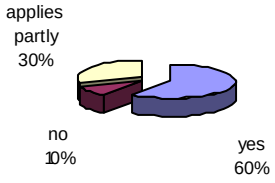
46 It is always easy to find relevant information on the Intranet of the NLDO.

*recoded

4.2.10.4 Strategic ICT-competences

Strategic ICT-competence is stipulated in this research as competence in evaluating the relative importance and credibility of information. A summary of the responses is illustrated in table 4.12. The options: ‘applies mainly’ and ‘applies entirely’ are combined to indicate a positive score ‘yes’ and the options ‘does not apply at all’ and ‘applies seldomly’ are combined to indicate a negative score ‘no’.

Table 4.12 Response to statements about strategic ICT-competencies

Statement 37 **It is easy for me to evaluate the credibility of the information I find on the Internet.** The median and mode: 'applies mainly'	
Statement 63 **I identify and recognize important information in the information rich environment.** The median and mode: 'applies mainly'	

Remarkable is that a relatively large number of the respondents (48%) experience some difficulty in evaluating the credibility of the information they find on the Internet and although more than half of the respondents is able to identify and recognize important information, a relatively large percentage (40%) experience some difficulty in this regard.

Significant differences that are found using further analysis:

- Female officers score lower compared to their male colleagues on both statements.
- Subaltern officers score lower compared to the head officers for the statement 'It is easy for me to evaluate the credibility of the information I find on the Internet'.

In the next section the research results related to the sub-question: 'What are the ICT-related competencies that are required by officers in the NLDO?' are discussed.

4.2.11 ICT-related competencies required by the officers in the NLDO

ICT-related competencies are stipulated as competencies (indicated by a combination of knowledge and insight, skills and behaviour as well as attitudes) which are related to working and leading in the information society and thus containing a leadership component.

Since organizations in the information society are characterized by changes often as a result of new technology being implemented, change management plays an increasingly important role officers have to fulfill. The ICT-related competencies could thus also be described as information society related competencies.

The officer in the NLDO plays an important role in influencing the strategy regarding those items, implementing the strategy and influencing their subordinates in participating in the strategy, firstly by being a role model, secondly by explaining the importance of the items and thirdly by coaching where necessary.

Using the interview results insight was obtained in the role of the officer regarding creating a learning organization, the role of communities of practice, knowledge management, competency management, creating security awareness amongst their staff and the management of changes and innovation.

The following direct question was asked in the interview in this regard:
What is in your opinion the role of the officer regarding creating a learning organization within the NLDO, the role of communities of practice, knowledge management, competency management, creating ICT-security awareness amongst their staff and the management of changes and innovation?

Some officers explained that strategic policy is currently made jointly at the top of the organization and that it is currently more difficult for officers to influence this policy than before. In the previously separate defence organizations it was easier to influence the policy via the network of contacts that existed. Those contacts hardly exist in the new

situation since the organization is arranged differently. In some instances advice regarding certain topics is asked from relevant project groups, for example the Head Directorate of Personnel asked a project group to determine the required competencies for different kind of staff officials. In this way one could still influence the policy, but this is only for certain topics. Some interviewees are of the opinion that often no advice is asked and decisions are made by policymakers without having enough insight in what the implications are of those decisions for the work floor. Interviewees indicated that it was sometimes difficult to implement those decisions.

One officer said in this regard:
"Ik zou graag willen zien dat er meer overleg wordt gevoerd voorafgaand aan besluitneming."
[I would like to see that more consultation takes place before decision-making].

Another interesting quote in this regard:
"De officier is de spil waarom dit soort zaken draait. Een belangrijk gevaar is dat ICT hobbyisten de macht overnemen."
[The officer is the center of those aspects. An important danger is that ICT-hobbyists take over the power].

The interviewees mentioned that the NLDO has a number of project groups in place that specifically deal with most of those aspects and that in some instances research is initiated by the defence organization in this regard, for example regarding the role that communities of practice could play in the navy, or opportunities that team learning could bring in the NLDO.

The results for each of the items mentioned above will be discussed in separate paragraphs.

4.2.11.1 Competencies related to creating and participating in a learning organization, communities of practice and knowledge management

Some of the interviewees indicated that it is essential that the NLDO becomes a learning organization and said that the organization was slowly moving in this direction. It was mentioned that *"Levenslang leren"* [Life-long learning] is one of the visions of the

government in the Netherlands and that this vision influences the NLDO on a strategic level. One of the interviewees mentioned an initiative IDOP[4] as one of the initiatives to accompany and facilitate learning in the organization. One interviewee mentioned that the process of becoming a learning organization was hindered by the many changes in the organization and that currently the focus of the organization is more on a 'wide' solution than a 'deep' solution, by which he meant that certain expertise in the organization is disregarded in order to build new expertise.
Another interviewee said in this regard that the organization places the focus on 'now' and not enough on the future. He explained that there is currently not enough time to reflect on what needs to be realized in the future. Another interviewee said that the establishment of a learning organization was hindered by financial restrictions and that innovative ideas in this regard are not always seen as being financially feasible.

One interviewee explained that an officer can learn by analyzing mistakes that are made and reflect on why they occurred and how they could be prevented in the future. These experiences could be recorded and shared with others via a 'lessons learned' database. Another interviewee mentioned that such a database already existed in a number of areas, but that it costs time to fill such a database and that such efforts in the past have not really succeeded. He also explained that the problems are of such complexity and hardly ever exactly the same compared to previous situations; therefore he argued that officers are trained to find independently pragmatic solutions to problems as they happen.

Three interviewees remarked that a cultural change was required in that especially during reorganizations and consequent staff reductions, some officers might either not want to admit having made a mistake in order to avoid risking their careers or not want to share their expertise from a viewpoint of "*diegene die beschikken over de informatie is keizer*" [The person who has the information is emperor]. Another officer remarked that officers needed a change in attitude in order to participate in a learning organization. Furthermore, it was acknowledged that knowledge expires faster than in the past and that it was therefore essential that employees are trained accordingly. One interviewee suggested that regular short modular courses would perhaps be a way to achieve this.

[4] Integral development organization planning

The interviewees are of the opinion that communities of practice could play an important role in the NDLO. The Royal Navy has initiated research in this regard specifically to investigate the role communities of practice could play in the Royal Navy. Some officers said that benchmarking is an important concept in the NLDO in this regard in the sense that it is important to compare best practices and lessons learnt. There was general agreement that officers do play an important role in this regard, but the officers were also of the opinion that there are not enough communities of practice at the moment to fulfill the need in this regard.
Some interviewees mentioned that a pilot was currently carried out whereby generalists are on the ships and a community of experts in various fields is available as a community of practice to those generalists. When problems occur that the generalists cannot solve on their own they are to make contact with the relevant experts that via on-line video-teleconferencing, give instructions towards a suitable solution. In this way it is anticipated that in the future it will not be necessary to have specialists of all the installations and equipment aboard a ship.

One interviewee said that it is also important to have communities of practice in a wider context across the borders of a particular function area to share information and knowledge in order to improve integral management in the organization.

General agreement existed amongst the interviewees that it is very important for the organization to have a sound insight in the knowledge of the organization, especially in the light of many reorganizations currently taking place in the NLDO. Staff reduction is one of the objectives of the current reorganization and as a consequence a number of employees are leaving the organization, taking with them important knowledge. It was emphasized however that initiatives like a ‘best practice’ database could only work if the knowledge and information is kept up to date and made easily accessible to interested parties. Furthermore, agreement must be reached as to how the knowledge needs to be managed. Officers need to consider the information flow in the organization and participate in presenting information sources. Management of knowledge about experiences was also mentioned by some interviewees in this regard. One respondent wrote on the back of the questionnaire that officers also need to give enough attention to: *“translating or making available reports to the employees at the work floor”.*

Two interviewees did not believe that proper knowledge management is achievable, because generally officers do not have the time to participate in such initiatives and they believed that there is not enough *"draagvlak"* [commitment] in the organization, since the advantages of such systems do not balance with the amount of time that it costs to keep them up to date. Another interviewee disagreed with the concept of knowledge management since he believed that knowledge is primarily anchored in "*de hoofden van mensen*" [the heads of people].
He argued that if knowledge is stored in systems it distorts to a technical institutionalized means and that it could never replace the knowledge that people have, since knowledge is only useful if it is used and interpreted by people.

It was generally believed that knowledge management was not yet systematically regulated, although some interviewees regarded the Intranet of the NLDO as an important application to manage the knowledge in the organization. A number of interviewees did not regard the Intranet as a very effective way to obtain information and knowledge and mentioned that it was very difficult to search for up-to-date information in this application. One interviewee emphasized that commitment to the organization was important and that in some instances a cultural change was required so that the officers participated in the sharing of knowledge. He argued further that correct and structured information promotes motivation and that this in turn encourages participation and innovative behaviour.

The interviewees said that officers also need to play a role in preventing a *"wildgroei in informatie"* [uncontrolled increase in information] and one officers said *"least is best",* trying to emphasize the importance of critically managing the knowledge of the organization, evaluation the knowledge that is shared, keeping it up to date and removing outdated knowledge and information from a common database.

Three interviewees mentioned that cooperation existed between the NLDO, the FMW and TNO[5] and that a number of research projects are implemented in this regard and

[5] TNO is an independent knowledge organization that forms a link between scientific research and organizations

another interviewee said that there was a narrow link with the current implementation of the quality of control system (INK) in the NLDO. He explained that one of the requirements of INK is dealing with the information and knowledge of the organization in a structured manner and making this available to interesting parties. However this interviewee was not convinced that INK was being implemented everywhere in the organization at the moment.

Some interesting quotes in this regard:

- *"Hoe verder de NLDO vordert naar een lerende organisatie toe, hoe beter kan het kennismanagement worden georganiseerd."*
  [The further the NLDO progressed into becoming a learning organization, the better knowledge management could be organized].

- *"Effectief kennismanagement leidt tot creativiteit en dit leidt weer tot innovatie."*
  [Effective knowledge management leads to creativity and this leads to innovation].

- *"In een werkend innovatief systeem, wordt er vooruit gedacht (door strategisch management). Applicaties die nodig zijn, worden dan tijdig aangeboden en is het niet nodig om binnen de organisatie zelf applicaties te ontwikkelen."*
  [In a working innovative system, strategic management thinks proactively. Applications that are required will be offered swiftly and therefore it will not be necessary within the organization to develop applications].

One interviewee had an opposing opinion to the previous quote in that he believed that innovation is stimulated by giving employees freedom to develop applications to solve certain information needs. He opposed the idea that employees were restricted in this regard. He thought that capacity could be hired to deal with compatibility problems between applications.

4.2.11.2 Competencies related to competency management

According to some interviewees this aspect had a high priority in the NLDO, but was not optimally in place yet. They argued that more time is required to implement competency management in the new organization effectively and concretely. Some interviewees argued that the focus of the organization is currently mostly on competencies related to functions in a standard design for the organization and not enough on the talents and competence of the employees, this was regarded as unfortunate.

However one of the objectives in the organization is that officers are to play a significant role in this in the sense that they are to obtain insight in the talents and competencies of their staff and that they reach agreement with each member of staff about a development plan. Each employee has also a responsibility to work towards a career development plan.

Most interviewees were of the opinion that competencies were effectively managed in the previously separate defence organizations. It was argued that the organization had a clear picture of who the employees were and what they could achieve. The personnel officer was also involved with the employees he/she was responsible for, but those responsibilities are shifted to the line-managers in the new organization and the personnel officer's role has changed more to an advising role for a much larger group of employees that in the past. In the new application PeopleSoft a complete record of the courses obtained by an employee is stored and an automatic warning is given when a course needs to be renewed.

Furthermore, before the current reorganizations it was clearly described what the requirements were for the different functions in the organization, but since many functions have changed the NLDO is in a process of describing the competencies required for the current functions.

Job rotation is a way that is used in some of the function areas to achieve that employees are flexible and obtain a broader insight in the variation of tasks in the organization.

Employability is seen as a responsibility of the employee but also of the organization because there are no job guarantees in the NLDO any longer.

4.2.11.3 Competencies related to ICT-security awareness

The interviewees agreed that the security of information is essential in the NLDO and that it has a high priority in the organization. Furthermore, there was general agreement that everyone in the organizations needs to be aware of the security risks regarding ICT and information and that the officers play an important role in this regard.
Firstly in improving the security situation of the information they are responsible for, including the integrity of data, secondly in ensuring that their subordinates are aware of the security risks and thirdly in creating a culture of security. Securing the information is often a matter of discipline and being perceptive all the time in this regard. Some interviewees mentioned that there is a reduction of staff and as a consequence increased pressure on the remaining employees. This creates a situation in which there is not always enough time to reflect on the security of information and the implications thereof. One interviewee emphasized the importance of reflection on the security of information especially in *"een groter geheel"* [integrally] to determine risks and weaknesses. He explained that sometimes a combination of information could constitute a security risk.

Creating new rules is seen as one way to improve the security situation, but as one interviewee said: *"Verbieden draagt niet bij aan een cultuur van betrokkenheid. Een betere manier is het werken aan een beveiligingscultuur waardoor medewerkers 'beveiligings-minded' worden."* [To prohibit does not contribute to a culture of involvement. A better way is to work towards a culture of security in which the employees become 'security-minded'].
In this regard it was also said that it works contra-productive to restrict authorizations via the network in the NLDO. The interviewees gave a few examples that illustrate this point:

- If it is not possible to mail a document that is ensured with a password, the document would be sent without a password and thus creating an increased security risk and

- If memory sticks are prohibited, employees will send documents via mail to their home computers. It was suggested that a better solution in this regard would be to use memory sticks with encryption.

One interviewee suggested that information should be available to all employees in which is clearly explained what the security risks are and how the security situation could be improved. He also said that employees in the organization need to learn to address each other regarding security aspects. There was a general agreement that if employees understand the security risks, they will act more responsibly. One interviewee mentioned that a sound understanding of ICT was necessary in order to understand the security risks.
One respondent wrote on the questionnaire that: "*Er wordt onvoldoende geappelleerd aan de individuele verantwoordelijkheden van officieren in de beveiliging van ICT systemen.*" [Officers need to be held individually responsible for the security of ICT systems".

Some interesting quotes in this regard:
"Faciliteiten moeten worden gecreëerd om het werk mogelijk te maken in een beveiligde omgeving zonder om het werken moeilijker te maken."
[Facilities need to be created in order to make working possible in a secure environment without complicating the working process].

"Thuiswerken zou via een client-server geregeld kunnen worden om het beveilingsniveau te beschermen. Indien er adequate verbindingssnelheden worden geregeld, is de verwachting dat thuiswerkers hiervan gebruik zullen maken."
[Home-working could be arranged via a client-server in order to protect the level of security. If there is adequate connection speed, the expectation is that home-workers use this].

"Het risico van hacken wordt onderschat en er wordt te weinig nagedacht over de mogelijke gevolgen als het fout zou gaan, als informatie in verkeerde handen komt."
[The risk of hacking is underestimated and there is insufficient reflection about the possible risks if things go wrong as a consequence of information comes in the wrong hands].

"Hoe kleiner de technologie wordt, hoe moeilijker is het om de beveiliging te beheren." [The smaller the technology, the harder to control the security].

4.2.11.4 Competencies related to change management

The interviewees agree that there are many changes occurring in the organization. Two important changes that were mentioned are firstly the integration of the previous separate defence organizations into one NLDO and secondly increased cooperation internationally.

The interviewees mentioned that special competencies are required by officers to manage changes effectively, for example regarding dealing with resistance against change and that officers need to receive training in order to develop those competencies. Some interviewee's are of the opinion that this aspect does not receive enough attention. This is supported by one respondent who wrote on the questionnaire that communication during change in the organization "*vindt veel te weinig plaats!*" [does not occur sufficiently].

Two officers mentioned that top management needs to make sure that officers understand the reasons for certain changes in the organization, so that they are able to explain them to their staff.

4.2.11.5 Competencies related to innovation management

There is general agreement amongst the interviewees that innovation in the organization is important. According to some interviewees innovation is not yet structured within the organization. They argue that therefore freedom needs to be given to innovative employees to experiment and look for solutions for existing information problems. This could mean that there are sometimes problems with converting data between applications, but according to them those could be solved by experts[6].

[6] In the NLDO the vision is generally that this is an undesirable development since applications need to be evaluated according to their functionality, maintainability and reliability. Furthermore, there should be no conflicts with other applications and scripting applications according to those standards is relatively expensive.

One interviewee said in this regard:*"Als een organisatie niet vooruit kan denken, maar ook niet toelaat dat werknemers zelf initiatief nemen, is het gevolg gefrustreerde werknemers."* [If an organization cannot think ahead, and at the same time prohibits employees to take initiative, then the consequence is that employees are frustrated]. One respondent noted in this regard that in the operational units a lack of tools and authorizations exists and that this makes it impossible to implement innovative ideas.

Other interviewees were of the opinion that there are ways in which the organization encourages innovations, for example innovative ideas can be handed in for evaluation. If such ideas are implemented, the employee receives a financial reward.
They said that it is important that officers are aware of such innovative policy and seize the opportunities themselves as well as encouraging their staff to participate in finding more effective and efficient ways of working. One interviewee said in this regard: *"Officieren moeten zelf vernieuwingen en verbeteringen creëren en/of doorvoeren. Een officier is geen goede officier indien hij/zij dit niet zou kunnen."* [Officers need to create and implement renewals and improvements themselves. An officer is no good officer if he/she is not able to do this].

In the next section the research results related to the sub-question 'How competent are officers in the NLDO in their own opinion regarding the identified ICT-related competencies?' are discussed.

4.2.12 Results related to how competent the officers in their own opinion are regarding the ICT- related competencies

In the following sections insight is sought in the current level of competence of officers in full-filling the role identified in question four: 'What are the ICT-competencies required by officers in the NLDO?', using the results of the questionnaire. It needs to be noted that the competence of officers is a self-evaluation and not done according to specific performance criteria. In this research ICT-related competencies are also related to the commitment that officers have towards creating and participating in a learning organization, communities of practice, knowledge management, competency management, ICT-security awareness and innovation. In this light commitment is seen

as an indicator of willingness to change behaviour (Kluytmans, 2001; Robins & Coulter, 2003).

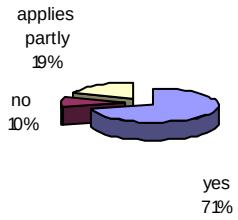
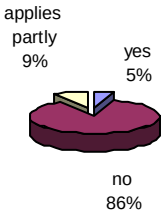
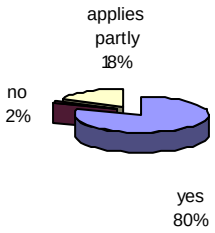
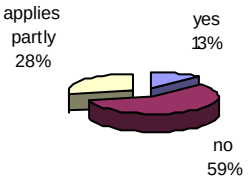
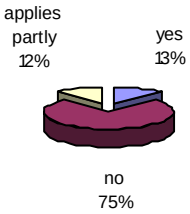
4.2.12.1 Competence in creating and participating in a learning organization, communities of practice and knowledge management

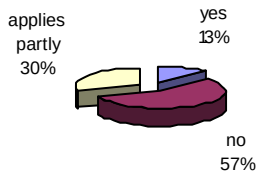
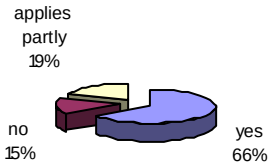
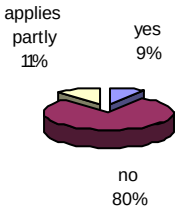
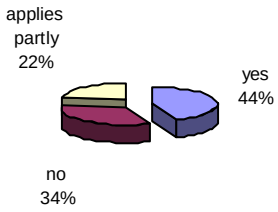
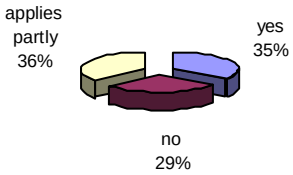
The competence in creating and participating in a learning organization, communities of practice and knowledge management were operationalized for the questionnaire by using the following dimensions:

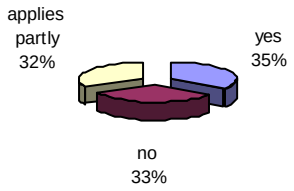
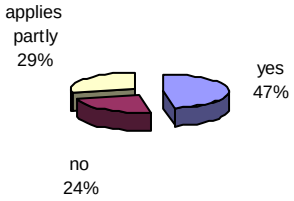
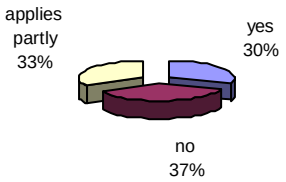
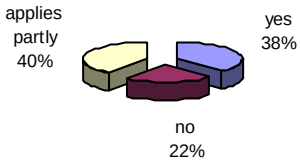
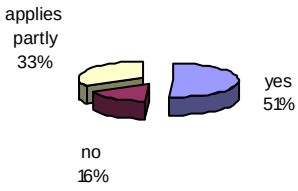
- Willingness to be involved.
- Knowledge management, including understanding the organizational value of sharing knowledge and information, the ability of the individual to utilize opportunities and participate in making the information that the individual is responsible for in the organization accessible to others. Knowledge management is thus seen as storing, using, sharing, evaluating and improving the knowledge of the organization.
- Dependency, which means the need for networking and usability and is thus related to communities of practice.
- Attitude towards life-long learning, including learning how to learn and in which reflection plays an important role.

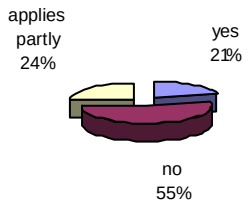
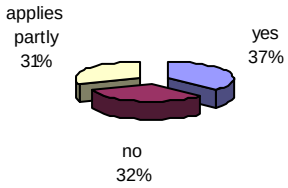
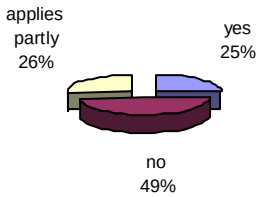
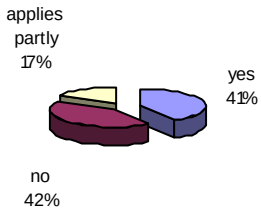
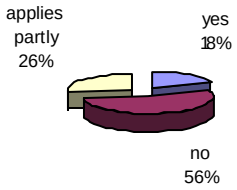
The competence of the respondents is measured using a scale created by combining the responses of a number of statements that can be seen as indicators of the dimensions identified above. The frequencies of the responses to the separate statements are summarized in table 14.13. The options: ‘applies mainly’ and ‘applies entirely’ are combined to indicate a positive score ‘yes’ and the options ‘does not apply at all’ and ‘applies seldomly’ are combined to indicate a negative score ‘no’.

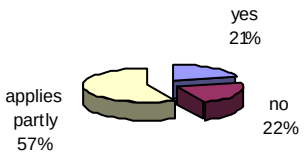
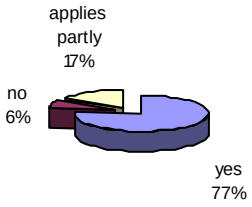
Table 4.13 Response to statements about the learning organization

Statement 29 **I do communicate electronically with other professionals about my work.** Median and mode: 'applies mainly'	
Statement 40 **I have the opportunity to learn via the Internet during working hours.** Median and mode: 'does not apply at all'	
Statement 41 **In my function it is important to continue to learn all the time.** Median: 'applies mainly' Mode: 'applies entirely'	
Statement 43 **I obtain ideas from the work of others that I find on the Internet to improve my own work.** Median: 'applies seldomly' Mode: 'does not apply at all'	
Statement 48 **I participate in keeping the information on the Intranet of the NLDO up to date.** Median and mode: 'does not apply at all'	

Statement 49 **I obtain ideas from the work of others that I find on the Intranet of the NLDO to improve my own work.** Median: 'applies seldomly' Mode: 'applies partly'	
Statement 50 **It is important to store the knowledge of my section electronically.** Median and mode: 'applies mainly'	
Statement 51 **I have the opportunity to learn via the Intranet of the NLDO during working hours.** Median and mode: 'does not apply at all'	
Statement 52 **It would be useful if the Intranet of the NLDO could be used to study or take courses directly related to my work.** Median: 'applies partly' Mode: 'applies mainly'	
Statement 53 **I share my work-related knowledge with others electronically using a share.** Median and mode: 'applies partly'	

Statement 54 **I spend time to organize electronically the working knowledge of the unit that I am responsible for.** Median and mode: 'applies partly'	
Statement 55 **I think of ways to improve the sharing of information electronically.** Median: 'applies partly' Mode: 'applies mainly'	
Statement 56 **I spend time to improve the sharing of organizational knowledge electronically.** Median and mode: 'applies partly'	
Statement 57 **I benefit from colleagues who share their experiences/lessons learnt with me.** Median and mode: 'applies partly'	
Statement 58 **I share the mistakes that I made and what I learnt from it with my colleagues.** Median and mode: 'applies mainly'	

Statement 59 **I play an important role in managing the knowledge of the organization electronically.** Median: 'applies seldomly' Mode: 'does not apply at all'	
Statement 64 **I reflect on how information can be managed more effectively.** Median and mode: 'applies partly'.	
Statement 65 **I play an important role in organizing the flow of information in my unit.** Median: 'applies partly' Mode: 'applies seldomly'	
Statement 66 **Dealing with organizational knowledge effectively in the NLDO needs to improve.** Median: 'applies partly' Mode: 'applies seldomly'	
Statement 67 **It is important for my organization unit to share working knowledge and information with international partners.** Median and mode: 'applies seldomly'	

Statement 68 **I implement new ways of working with information in the organization.** Median: 'applies seldomly' Mode: 'does not apply at all'	
Statement 70 **I reflect about the integrity of the information that I am responsible for.** Median and mode: 'applies mainly'	

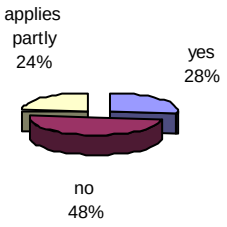
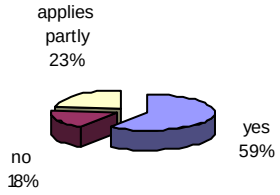
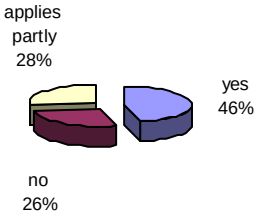
Three respondents wrote on their questionnaires next to the statement 'In my function it is important to continue to learn all the time' that this statement is applicable to every function in the organization. Four respondents indicated that they would like to learn using the Internet, but stated that this was not possible since they experience a high workload and regard their work as a higher priority. Interesting is that all four respondents are working in the Royal Military Police.

One respondent emphasized that with the current technology available on board there are no facilities to communicate in a network and that this was a minimum condition in order to realize knowledge management.

A reliability analysis was done to determine if the items are homogeneous enough to be combined in one score. The Cronbach's alpha is 0.87 which means that the items are homogeneous enough to combine them in a scale. The mean score is 2.9 with standard deviation 0.6 on a scale from one to five. With 95% confidence could be stated that the average of the research population for this scale will be between 2.8 and 2.9. This means that the central tendency of the response to this scale is: 'applies partly' which is not very high considering that officers are managers and leaders in the organization and all have received a higher education.

A second scale was created for officers that have subordinates. In this scale the responses to the statements that are illustrated in table 14.14 were also included.

Table 4.14 Response to statements about the learning organization including questions about subordinates

Statement 82 **I allow my subordinates to learn via the Internet during working hours.** Median: 'applies partly' Mode: 'does not apply at all'	
Statement 83 **I encourage my subordinates to share their working knowledge with others electronically.** Median and mode: 'applies mainly'	
Statement 84 **I discuss the advantages of sharing working knowledge electronically with my subordinates.** Median: 'applies partly' Mode: 'applies mainly'	

One respondent wrote on the questionnaire next to the statement 'I allow my subordinates to learn via the Internet during working hours' that he/she was not aware that this was possible.

The Cronbach's alpha for this scale is 0.9 which means that the items are homogeneous enough to combine them in a scale. The mean of the scale is also 2.9 with a standard deviation of 0.6. This result corresponds with the results of the first scale in this regard.

Two significant differences are found that apply to both scales equally:

- Male officers obtained a higher score compared to their female colleagues in the scale 'creating and participating in a learning organization' (2.9 compared to 2.5 respectively, both with standard deviation 0.5), which means that male officers evaluate themselves more competent in this regard than female officers evaluate themselves.

- Officers from the main function area 'communication and information systems' evaluate themselves more competent in this respect than the officers working in the main function areas 'personnel', 'logistics', 'education and training' and 'military operational' do (3.2 compared to 2.8 of the other function areas with standard deviation between 0.5 and 0.6).

A significant positive correlation of 0.3 is found between the number of hours per week that respondents work on the computer for private use (at home) and their commitment towards the learning organization. This correlation was found in both scales.

Factor analysis was used to investigate if more than one principal component could be extracted from the variables in this scale based on the correlations the variables have with each other. Six principal components are found explaining a total of 65% of variance. Varimax-rotation is used to reorganize the information in a more effective way, making it easier to interpret the components (Ten Berge & Siero, 1997).
The subsequent components are identified:

Knowledge management (understanding the importance and participating in it)

Measured with the following eleven items (explaining 26% variance)

50 It is important to store the knowledge of my section electronically.

55 I think of ways to improve the sharing of information electronically.

56 I spend time to improve the sharing of organizational knowledge electronically.

59 I play an important role in managing the knowledge of the organization electronically.

64 I reflect on how information can be managed more effectively.

65 I play an important role in organizing the flow of information in my organization unit.

67 It is important for my organization unit to share working knowledge and information with international partners.

68 I implement new ways of working with information in the organization.

82 I allow my subordinates to learn via the Internet during working hours.

83 I encourage my subordinates to share their working knowledge with others electronically.

84 I discuss the advantages of sharing working knowledge electronically with my subordinates.

Communities of practice (understanding the importance and participating in it)

Measured with the following items (explaining 11% variance)

29 I do communicate electronically with other professionals about my work.

53 I share my work-related knowledge with others electronically using a share.

54 I spend time to organize electronically the working knowledge of the unit I am responsible for.

57 I benefit from colleagues who share their experiences/ lessons learnt with me.

Opportunity to learn during working hours (using the Internet or Intranet)

Measured with the following items (explaining 8% variance)

40 I have the opportunity to learn via the Internet during working hours.

51 I have the opportunity to learn via the Intranet of the NLDO during working hours.

Attitude towards learning

Measured with the following items (explaining 7% variance)

41 In my function it is important to continue to learn all the time.

43 I obtain ideas from the work of others that I find on the Internet to improve my own work.

Understanding the importance of the Intranet of the NLDO

Measured with the following items (explaining 6% variance)

48 I participate in keeping the information on the Intranet of the NLDO up to date.

49 I obtain ideas from the work of others that I find on the intranet of the NLDO to improve my own work.

66 Dealing with organizational knowledge effectively in the NLDO needs to improve.

No common theme is identified for the sixth component.

Measured with the following items (explaining 6% variance)

52 It would be useful if the intranet of the NLDO could be used to study or take courses directly related to my work.

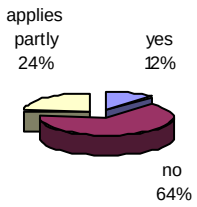
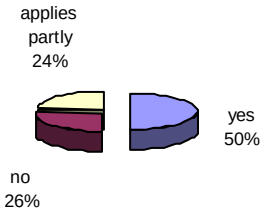
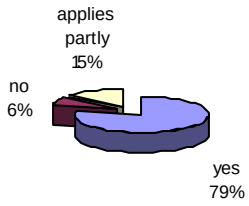
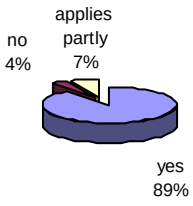
58 I share the mistakes that I made and what I learnt from it with my colleagues.

70 I reflect about the integrity of the information that I am responsible for.

4.2.12.2 Competence in competency management

Competence in competency management in the organization using digital means, is considered firstly from the perspective of the organization and secondly from the perspective of the employees in the organization. Four statements for this aspect were included in the questionnaire. The frequencies of the responses to the separate statements are illustrated in table 4.15. The options: ‘applies mainly’ and ‘applies entirely’ are combined to indicate a positive score ‘yes’ and the options ‘does not apply at all’ and ‘applies seldomly’ are combined to indicate a negative score ‘no’.

Table 4.15 Response to statements about the competency management

Statement 60 **I use my computer to obtain insight in the competencies needed in the organization.** Median and mode: 'applies seldomly'	
Statement 85 **I use my computer to store relevant information about the potential of my subordinates.** Median: 'applies partly' Mode: 'applies mainly'	
Statement 88 **I recognize development needs of my subordinates.** Median and mode: 'applies mainly'	
Statement 89 **I facilitate the development needs of my subordinates.** Median and mode: 'applies mainly'	

The three items that place the focus on competency management of the subordinates are combined in a scale. The Cronbach's alpha is 0.7 which means that the items are homogeneous enough to combine them in a scale. The mean of the scale is 3.8 with standard deviation 0.7. With 95% confidence can be said that the average for the research population will be between 3.7 and 3.9. This indicates that the respondents are reasonably committed to managing the competencies of their subordinates.

Some respondents indicated that they did store relevant information about the potential of their subordinates by using other means for example a personnel file.

Two significant differences are found:

- Male officers evaluate themselves more competent on this scale (3.9 with standard deviation 0.6) compared to the self-evaluation of the female officers (3.6 with standard deviation 0.5).

- Head officers evaluate themselves slightly more competent on this scale (3.9 with standard deviation 0.6) compared to the self-evaluation of the subaltern officers (3.8 with standard deviation 0.6).

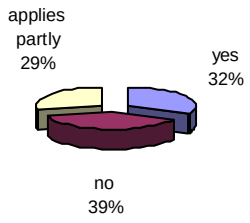
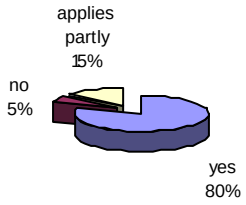
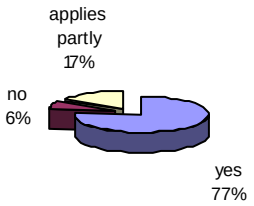
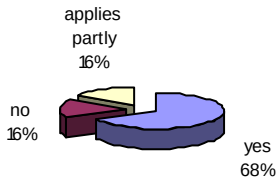
Factor analysis was used to investigate if more than one principal component could be extracted from the variables in this scale based on the correlations the variables have with each other. Only one principal component is found explaining a total of 53% of variance.

4.2.12.3 Competence in ICT-security awareness

Competence towards ICT-security awareness is stipulated in this research as an understanding of the ICT-security risks in the organization related to integrity, availability and the exclusivity of the data and information. Competence in this regard is also seen as participation in improvement of the ICT-security situation as well as encouraging ICT-security awareness amongst the staff by the respondents.

Four statements for this aspect were included in the questionnaire. The frequencies of the responses to the separate statements are illustrated in table 4.16. The options: ‘applies mainly’ and ‘applies entirely’ are combined to indicate a positive score ‘yes’ and the options ‘does not apply at all’ and ‘applies seldomly’ are combined to indicate a negative score ‘no’.

Table 4.16 Response to statements about ICT-security awareness

Statement 61 **I reflect on the security of information in the NLDO.** Median and mode: 'applies partly'	
Statement 62 **I know what the security risks of the Internet are.** Median and mode: 'applies mainly'	
Statement 70 **I reflect about the integrity of the information that I am responsible for.** Median and mode: 'applies mainly'.	
Statement 87 **I encourage ICT-security awareness amongst my subordinates.** Median and mode: 'applies mainly'.	

When the statements are combined in a scale for ICT-security awareness, the Cronbach's alpha is 0.76 which means that the items are homogeneous enough to combine them in a scale, however it needs to be noted that there are only four items in this scale. The mean for this scale is 3.6 on a scale from one to five, with standard deviation 0.8. With 95% security can be said that the average of the research population will be between 3.5 and 3.7. The scores of two respondents are considered extremely low <1.5.

One significant difference is found:
Male respondents scored 3.7 on this scale with standard deviation 0.74 and female respondents scored 3.2 with standard deviation 0.75. It can be concluded with 95% certainty that those differences apply for the research population as well.

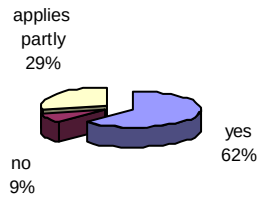
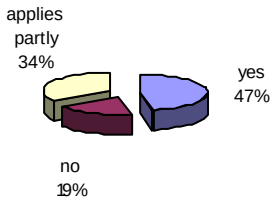
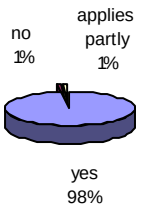
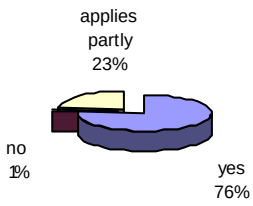
A significant correlation of 0.21 is found between the number of hours per week that respondents work on the PC for private use (at home) and their self-evaluation about competence in ICT-security awareness.

Factor analysis was used to investigate if more than one principal component could be extracted from the variables in this scale based on the correlations the variables have with each other. Only one principal component is found explaining a total of 59% of variance.

4.2.12.4 Competence in change management

Competence in change management is stipulated in this research as a combination of knowledge about the effects of change and the ability to deal with change constructively. The officers in the NLDO play a special role in the organization regarding inspiring and motivating their staff regarding the vision of the organization, being a role model in implementing the vision and communicating the vision and changes required to their subordinates. Four statements for this aspect were included in the questionnaire. The frequencies of the responses to the separate statements are illustrated in table 4.17. The options: ‘applies mainly’ and ‘applies entirely’ are combined to indicate a positive score ‘yes’ and the options ‘does not apply at all’ and ‘applies seldomly’ are combined to indicate a negative score ‘no’.

Table 4.17 Response to statements about change management

Statement 72 **I know how to manage change effectively.** Median and mode: 'applies mainly'	
Statement 74 **I know how I can accompany changes in the organization effectively.** Median: 'applies partly' Mode: 'applies mainly'	
Statement 77 **Communication is important during a change in the organization.** Median and mode: 'applies entirely'	
Statement 92 **I know how I can deal with the resistance my subordinates have against changes in the organization.** Median and mode: 'applies mainly'	

When the four statements are combined in a scale for change management competence, the Cronbach's alpha is 0.72 which means that the items are homogeneous enough to combine them in a scale, however it needs to be noted that there are only four items in this scale. The mean for this scale is 3.9 on a scale from one to five, with standard deviation 0.6. With 95% confidence can be said that the mean for the research population will be between 3.8 and 4.0. The scores of three respondents are considered extremely low <2.3. No common demographic characteristics are found when the respondents are compared.

Two significant differences are found

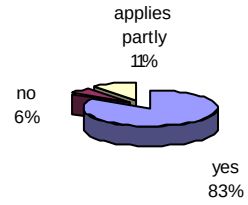
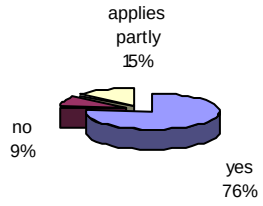
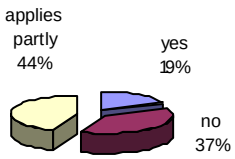
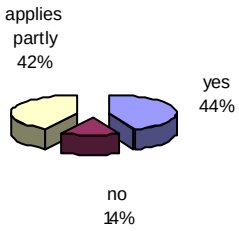
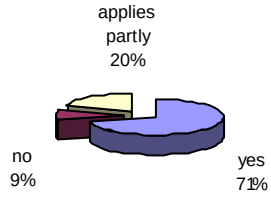
- Male respondents scored 3.9 on this scale with standard deviation 0.6 and female respondents scored 3.6 with standard deviation 0.5. It can be concluded with 95% certainty that those differences apply for the research population as well.
- Head officers score slightly higher on this scale (3.9 with standard deviation 0.6) compared to the subaltern officers (3.8 with standard deviation 0.6).

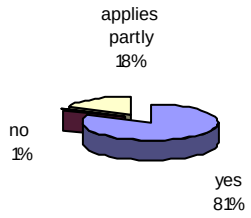
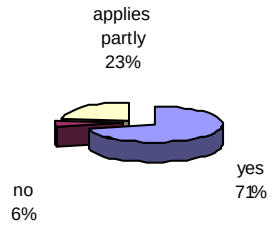
Factor analysis was used to investigate if more than one principal component could be extracted from the variables in this scale based on the correlations the variables have with each other. Only one principal component is found explaining a total of 55% of variance.

4.2.12.5 Competence in innovation management

Competence in innovation management is stipulated for the questionnaire by a combination of stimulating autonomy and creativity in the working situation, seeing renewal projects as a challenge and allowing mistakes where possible. Seven statements for this aspect were included in the questionnaire. The frequencies of the responses to the separate statements are summarized in table 4.18. The options: ‘applies mainly’ and ‘applies entirely’ are combined to indicate a positive score ‘yes’ and the options ‘does not apply at all’ and ‘applies seldomly’ are combined to indicate a negative score ‘no’.

Table 4.18 Response to statements about innovation management

Statement 71 **I consider renewal projects as a challenge.** Median and mode: 'applies mainly'	
Statement 69 **I have enough autonomy to work in the way I find best.** Median and mode: 'applies mainly'	
Statement 73 **Support in developing new ideas is always found in the NLDO.** Median and mode: 'applies partly'	
Statement 79 **I use creative ideas to improve the working method.** Median and mode: 'applies partly'	
Statement 86 **I encourage my subordinates to participate in the thinking process about improving the working processes.** Median and mode: 'applies mainly'	

Statement 90 **I allow my subordinates to work in the way they find best.** Median and mode: 'applies mainly'	
Statement 91 **I allow my subordinates to make mistakes.** Median and mode: 'applies mainly'	

One respondent wrote on the questionnaire next to the statement 'I allow my subordinates to work in the way they find best' that this depends on how effective the staff deals with their work and another respondent emphasized the importance of international cooperation and that it was therefore necessary to extend innovative solutions and improvement in ICT-use by investigating what happens in other countries and sharing the innovative solutions of the NLDO with other countries.

When the seven statements are combined in a scale for innovation management competence, the Cronbach's alpha is 0.64 which is not high and means that this scale is not very homogeneous but since the Cronbach's alpha is larger than 0.6 the scale can still be used. The mean for this scale is 3.7 on a scale from one to five, with standard deviation 0.5. With 95% confidence can be said that the mean of the research population will be between 3.6 and 3.7. The scores of two respondents are considered extremely low <2.0.

One significant difference is found: Male respondents scored 3.7 on this scale with standard deviation 0.5 and female respondents scored 3.3 with standard deviation 0.5. It can be concluded with 95% certainty that those differences apply for the research population as well.

Factor analysis was used to investigate if more than one principal component could be extracted from the variables in this scale based on the correlations the variables have with each other. Two principal components are found explaining a total of 52% of variance. Varimax-rotation is used to reorganize the information in a more effective way, making it easier to interpret the components (Ten Berge & Siero, 1997).
The subsequent components are identified:

Innovation management (including a perception that the work environment is conductive to innovation)

Measured with the following five items (explaining 31% variance)

69 I have enough autonomy to work in the way that I find best.
71 I consider renewal projects as a challenge.
73 Support in developing new ideas is always found in the NLDO.
79 I use creative ideas to improve the working method.
86 I encourage my subordinates to participate in the thinking process about improving the working processes.

Allowing autonomy to subordinates

Measured with the following items (explaining 21% variance)

90 I allow my subordinates to work in the way they find best.
91 I allow my subordinates to make mistakes.

4.3 Results related to the second part of the main research question about the implications of the changed labour environment for the training of officers

4.3.1 What ICT- and ICT-related competencies need to be developed during the initial training of officers?

The interviewees agreed that it was important to deal with the development of a number of ICT- and ICT-related competencies during the initial training. However there was no agreement about all the different items, neither the level of training. One interviewee said that it was unfortunate that choices have to be made regarding the curriculum of the officers in training and that the issues discussed during the interview are often of a lower priority than other issues.

In the interviews it was said that understanding of the philosophy behind an application in order to fully understand the functionalities and possibilities of an application is important for officers to have clear insight in the possibilities and impossibilities that are part of ICT in general. Two respondents agreed with this and emphasized by writing on the questionnaire that the theory behind the applications was more important than the applications themselves. Sound insight in the vulnerabilities of mobile technologies and the Internet is also seen as important.

A number of interviewees emphasized the necessity of spending sufficient time during the initial training on the development of digital competencies and not to wait until the officers are participating in the higher management trainings. In the following sections various items that were seen as important to be trained during the initial training are highlighted and discussed.

The students as well as one interviewee emphasized that it was important for officers to have insight in the influence of ICT on labour and employees in general.

MS Office applications

The expectation is that these skills are sufficiently mastered during high school; however it is important to make sure that the students have mastered those applications sufficiently. Suggested was that a list of competencies for each of the MS applications need to be compiled and the competence of each student regarding those items should be evaluated during the course of the study. Students who have not mastered those competencies sufficiently should be given support in developing those competencies. The respondents indicated especially MS Word (74.3%), MS PowerPoint (72.2%) en MS Excel (68,4%) are important items to be included in the initial training, whereas only 44.3% of the respondents indicated that MS Access needed to be included.

Management of information and information management systems

According to the interviewees the students should have insight in the difference between data and management information and being able to present the information that they are responsible for in a suitable format as well as interpret information presented effectively. One respondent wrote on the questionnaire: *"The rol van de officier zie ik vooral in het managen van informatie en de officier in opleiding moet hierop worden voorbereid."* [The role of the officer is in my opinion primarily the management of information and the officer in training needs to be prepared for this]. One respondent wrote: *"Leidinggevenden moeten ervan doordrongen zijn dat informatievoorziening belangrijk is ter ondersteuning van het bedrijfsproces en dat het constante aandacht nodig heeft. Bovendien is samenwerking met alle defensieonderdelen hierin erg belangrijk."* [Leaders need to be convinced that the provision of information is important to support the business process and that this requires constant attention. Furthermore, cooperation with all the defence organizations is very important]. One respondent emphasized that students should learn a basic insight in models for provision of information and control.

Some interviewees emphasized that students should be able to deal effectively with information management systems and they should master those systems as a tool in managing and coordinating information. In this regard practical experience using simulations with management information systems in certain projects was mentioned by a number of officers. A majority of the respondents (65.4%) indicated that 'effective management of information and knowledge in an organization' is an important item to

teach during the initial training and more than half the respondents (50.6%) indicated that the students should learn how to use an information management application. Latex was named by one officer as a suitable application to make common reports. He thought it would be useful for the students to learn this and practice with this during their study. Another officer disagreed with this and mentioned in this regard that Latex had certain limitations that made working together difficult.

Searching and evaluation skills using the Internet

Searching the Internet effectively and to be critical about the sources that are found on the Internet. Students often select the first source listed by a search engine after a search using a single keyword. Officers need to make a distinction between useful information and unreliable information. Students need to learn to find the information relevant to their work.

Communication on various levels using e-mail

This aspect is emphasized by a number of interviewees who are of the opinion that students need to learn how to communicate appropriately using digital media.

Archiving of documents and e-mail

A number of interviewees indicated that it was necessary to receive useful guidelines on how to digitally archive documents and e-mail. They indicated that although it was easy to save documents and e-mails it was often very hard to find those again when needed. This was supported by a respondent who wrote: *"Information can easily be stored, but finding it afterwards is difficult".*

Command supporting systems or Command & control information system

These applications support decision-making processes. They contain graphical projections of digital maps with tactical symbols, it contains information about own and hostile units (materially, staff, position). Currently officers receive training in using these systems just before they need to use the systems operationally, it would be an improvement if the students could practice these systems at an earlier stage and develop a basic understanding about the underlying principles. It makes the training more realistic and the actual training time for using a specific system operationally will be reduced. According to the interviewees the students should use gaming and simulations

regarding to practice principles and methods in order to understand underlying principles. 41.5% of the respondents indicated that this item is important in the initial training.

Project management

One respondent wrote on the questionnaire that especially models for effective project management are important in the initial training. Some interviewees regarded practical experience with a digital project management application as an important item. 39.2 % of the respondents indicated that this item should be included.

Management of information and knowledge in an organization

Based on the results of the scale for 'creating and participating in a learning organization' as well a direct question in the questionnaire and the in-depth interviews it appears necessary to include this item in the initial training of officers.

Change management

The interviewees agreed that change management is inherent to a leadership position and therefore needs to be included in the initial officers training. This is supported by the results of the group discussion where the students indicated that officers need to receive training in *"dealing effectively with changes in the organization"*. Furthermore, the majority of respondents (60.3%) indicated that this item should be included in the initial training.

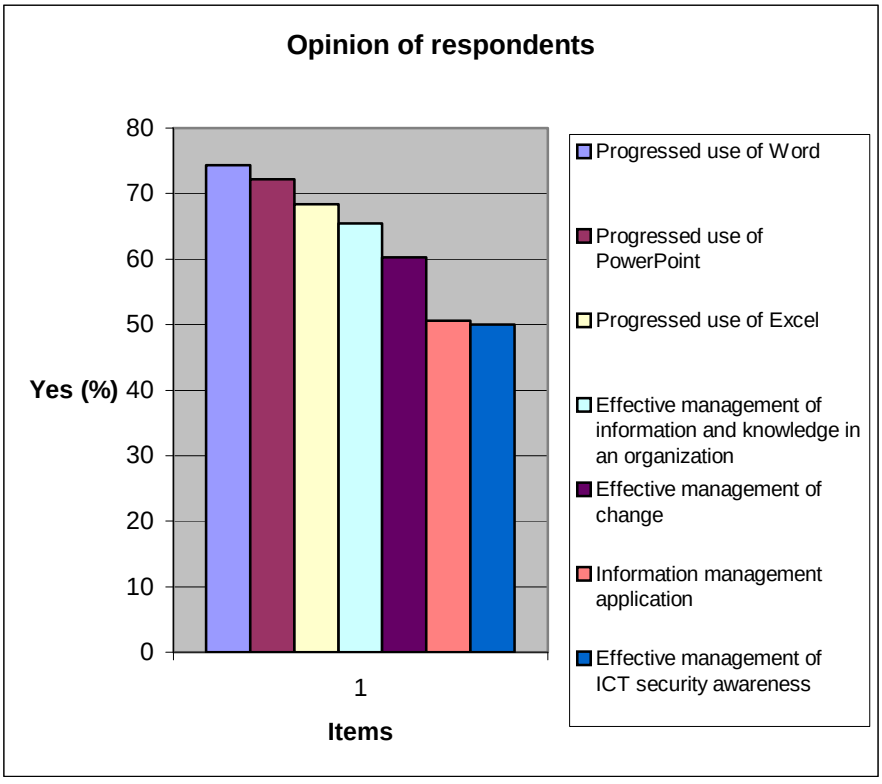
One respondent remarked in this regard: "*Verandermanagement moet meer aandacht krijgen. Defensie is groot en daardoor traag bij veranderingen. Aanpassing van de cultuur is de basis van geslaagde veranderingen*." [Change management needs to receive more attention. The defence organization is large and as a result, slow at implementing changes. Adaptation of culture is the basis of succeeded changes].

Effective management of ICT-security awareness

Half of the respondents (50%) indicated that this item should be included in the training. During the interview a number of officers emphasized the importance of this item in the initial training. It is also supported by the results from the group discussion.

Summary of the opinions of respondents regarding a number of ICT- and ICT-related items

In the questionnaire the respondents were given a number of ICT- and ICT-related items based on the results of the literature and interviews with officers and asked to indicate which items in their opinion needed to be taught during the initial training to officer. In graph 4.19 is illustrated which items were selected by at least half of the respondents and in graph 4.20 is illustrated which items were selected by less than half of the respondents.



Graph 4.19 Opinion of respondents regarding the items that need to be taught during the initial study (at least 50%)

One respondent wrote that where applicable the applications need to be taught in the context of the main function area that the officer is trained for.

Another respondent wrote next to 'progressed use of MS PowerPoint': *"Nee, juist niet, alstublieft!"* [No, rather not, please!]. Perhaps this respondent wanted to indicate some frustration about the multiple uses of MS PowerPoint presentations in the organization? No significant differences between demographic variables are found.

Graph 4.20 Opinion of respondents regarding the items that need to be taught during the initial study (less than 50%)

Five respondents indicated that the aspects illustrated in graph 4.20 should rather be taught during specific function trainings and at a later stage during management development trainings and not during the initial study.

Three respondents indicated that they are not familiar with many of the items listed in the questionnaire and that they would like to know more about those applications.

Two questions related to this research question were posed to the discussion group of students:

Discuss how students in training could develop the identified ICT-related competencies

- The students need to be kept informed about the developments in ICT. Not only within the NLDO but also outside the organization.
- More attention needs to be given to aspects regarding ICT and the influence this has on employees.

What would you have liked to learn about ICT during your study and did not?

- The students concluded their discussion with saying that the ICT training was superficial and that more attention should be given to using ICT in the work environment.

A number of respondents wrote on the questionnaire that ICT needs to be regarded as a tool and that military leadership needs to remain the focus of the initial officers training. An interesting statement in this regard: *"Leidinggeven is het allerbelangrijkste. Het*

werken met mensen in plaats van verstoppen achter een computer." [Leadership is the most important. Working with people instead of hiding behind a computer].

4.3.2 How can a digital learning environment be used to support the development of the required ICT- and ICT-related competencies for officers in training in the NLDA?

Two interviewees emphasized the importance of the digital learning environment being user-friendly and providing added value to the education. It should also provide advantages to the student as well as the lecturers.

In general, interviewees indicated that the different ICT- and ICT-related competencies need to be developed integrally in the context of the various subjects in a blended learning environment.

One of the interviewees emphasized that there exists a need for distance training, especially for employees that follow a shorter version of the officers training and would like to follow this part-time in combination with their current work.

4.3.3 How can a digital learning environment be used to support the development of the required ICT and ICT-related competencies for officers currently working in the NLDO?

In general the interviewees were of the opinion that adequate training in this regard should be available to the officers currently working within the NDLO, however the interviewees had different ideas regarding how this should take place. One officer said that there are a number of management development courses in the NLDO where the important training aspects for a further career path are taken into consideration and that he thought that officers in general did not see the importance of such training via a digital learning environment. User friendliness was seen by one interviewee as a minimum condition of such a learning environment.

A number of interviewees indicated that they have taught themselves how to use the general applications, but that they would like advanced courses since they lacked essential insight in the functionalities of those applications. The general applications can in this regard be seen as MSOffice applications like MS Word, MS PowerPoint and MS Excel and in a lesser degree MS Access, MS project manager, Internet and Mind Manager.

One interviewee said that he uses a number of new applications like DIDO and PeopleSoft because he is obliged to. He said that he does not have any insight in the functionalities of those applications. He finds the applications "*clinical and cold*".

One interviewee mentioned that productivity could be increased when enough time is invested in training officers in dealing with ICT effectively. Another officer said that a cultural change was necessary in order for officers to be able to develop competencies and learn on the workplace using the Internet.

The following were named as possible ways:

- VTC offers opportunities for education and training.
- The Internet.
- The Intranet of the NLDO was mentioned as a way to offer suitable courses to the officers.
- The digital learning environment of the NLDA could perhaps be used for alumni.
- An expertise and research center for the NLDO could perhaps bring renewal and provide the required training.
- A digital learning environment containing a knowledge database, limited to crucial issues that could be found easily when needed and immediately applied in the work environment.

Some interesting quotes in this regard:
"Ik denk wel dat aanbod de vraag genereert" [I think that offering (the resources) will generate the need]. The interviewee explained that when suitable training was offered on-line and officers were to be made aware of such training that the officers would recognize the value thereof and consequently start using it. The interviewee also believed that this would be the case in communities of practice, he remarked in this

regard: *"als officieren zien dat zo'n samenwerkingsforum toegevoegde waarde heeft, zullen ze daaraan gaan deelnemen."* [When officers see that such a cooperation forum has added value, they will participate in it].

One respondent wrote: *"Ik wil graag meer leren over diverse onderwerpen, maar dan niet individueel achter mijn beeldschermpje. Een klaslokaal met vele invloeden, kruisbestuivingen en invalshoeken werkt mijns inziens veel beter!"* [I would like to learn more about a number of topics, but rather not individually behind my computer screen. A classroom with many influences, angles and perspectives works much better in my opinion].

It was mentioned that the training for specific applications needed for a specific function needed not to be included in such an initiative, since it is generally not adequately provided for by the organization.

4.4 Results related to the second research question about the information, communication and technological competencies required by managers in the information society.

The results of the survey are used to obtain a propose a general model for the information, communication and technological competencies required by managers in the information society. A distinction is made between **ICT-competencies** which are categorized in this research as specific ICT-competencies like operational, structural and strategic ICT-competencies and **ICT-related competencies** which are competencies that are related to the use of ICT in the information society and include a leadership component. Furthermore, factor analysis is used as a means to evaluate the scales that could measure those competencies. It needs to be noted that since the information society and the technology continue to change that such a model remains dynamic and will be subject to change as a result.

4.4.1 Identifying the principal components for ICT-competencies

Factor analysis is used to obtain a set of principal components that are extracted from the results of the items about ICT-competence. Factor analysis sorts the variables in homogeneous groups based on the correlations the variables have with each other. The components are selected in such a way that they do not correlate with each other. Each component can thus explain a section of the variance of the results. The items about the Intranet NLDO are excluded from this factor analysis since this aspect is specifically connected to the case study. Three principal components are found with an initial Eigenvalue > 1, explaining a total of 56% variance. Varimax-rotation is thereafter used to reorganize the information in a more effective way so that it is easier to interpret the components (Ten Berge & Siero, 1997).

The subsequent components are identified:

Operational knowledge and insight in ICT

Measured with the following five items and explaining 22% of variance:

25 I know enough about ICT networks in order to know what can and cannot be done.

26 I am able to use all the software applications that I need in my work effectively.

27 I manage my e-mail effectively.

28 I organize my information effectively on the computer.

34 I have enough insight in ICT in order to participate in decision-making in this regard.

The Cronbach's alpha of this scale is 0.74

Finding and evaluating quality information when needed

Measured with the following five items and explaining 19% of variance:

36 I know how to obtain access to work related sections of the Internet for which you need special authorization.

39 I know where to find information on the Internet about relevant courses and studies for myself.

42 I can always find work related information on the Internet just in time when I need it.

37 It is easy for me to evaluate the credibility of information I find on the Internet.

63 I identify and recognize important information in an information rich environment.

The Cronbach's alpha of this scale is 0.7

Attitude towards learning about ICT and using the Internet effectively

Measured with the following three items and explaining 16% of variance:

35* I ask others to help me with ICT.

31* I would like to know how I could find information on the Internet more effectively.

32* I waste time finding relevant information on the Internet.

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

The Cronbach's alpha of this scale is 0.71

Interesting to note is that item 35, 'I ask others to help me with ICT' appears to be more an indication of being positively involved with ICT and not necessarily an indication of lack of knowledge about ICT as was the initial intention of the item.

4.4.2 Identifying the principal components for ICT-related competencies

Factor analysis is used to obtain a set of principal components that are extracted from the results of questions about ICT-competence in the same way as described in section 4.8.1.

The items that are specifically connected to the case study are not taken into consideration (questions 45 – 49, 51, 52). Nine principal components are found with an initial Eigen value > 1, explaining a total of 69% variance. Varimax-rotation is thereafter used to reorganize the information in a more effective way so that it is easier to interpret the components (Van Knippenberg & Siero, 1997).

Items are placed with the component with which they have the greatest correlation and are mentioned underneath the component with which they have a correlation of 0.3 or more.

The subsequent components are identified:

Participating in the learning organization

Measured with the following ten items and explaining 16% of variance:

55 I think of ways to improve the sharing of information electronically.

56 I spend time to improve the sharing of organizational knowledge electronically.

58 I share the mistakes that I made and what I learnt from it with my colleagues.

59 I play an important role in managing the knowledge of the organization electronically.

60 I use my computer to obtain insight in the competencies needed in the organization.

61 I reflect on the security of information in the NLDO.

64 I reflect on how information can be managed more effectively.

65 I play an important role in organizing the flow of information in my unit.

67 It is important for my organization unit to share working knowledge and information with international partners.

68 I implement new ways of working with information in the organization.

The Cronbach's alpha of the scale for this component is 0.9

Items 50, 53, 54, 79, 82, 83 and 84 also have a correlation of at least 0,3 with this component. When included, the Cronbach's alpha of the scale is 0.93

Innovation and change management

Measured with the following five items and explaining 10% of variance:

71 I consider renewal projects as a challenge.

72 I know how to manage change effectively.

74 I know how I can accompany changes effectively in the organization.

79 I use creative ideas to improve the working method.

92 I know how I can deal with the resistance my subordinates have against changes in the organization.

The Cronbach's alpha of this scale is 0.84

Items 64, 70 and 77 also have a correlation of 0,3 or more with this component. When included, the Cronbach's alpha of the scale is 0,84.

Knowledge management in own unit, including communication about it.

Measured with the following six items and explaining 8% of variance:

50 It is important to store the knowledge of my unit electronically.

54 I spend time to organize electronically the working knowledge of the unit I am responsible for.

77 Communication is important during a change in the organization.

83 I encourage my subordinates to share their working knowledge with others electronically.

84 I discuss the advantages of sharing working knowledge electronically with my subordinates.

86 I encourage my subordinates to participate in the thinking process about improving the working processes.

The Cronbach's alpha for this scale is 0,83.

Items 55, 56, 58, 59 and 79 also have a correlation of at least 0,3 with this component. When included, the Cronbach's alpha of the scale is 0,9.

Item 77 appears to be an odd item, but item 83, 84 and 86 also include elements of communication. It is plausible that although 'change' in item 77 was meant in general, the respondents have seen it more in the context of the rest of the questionnaire in the sense of change in dealing with information and knowledge in the organization.

Participating in communities of practice

Measured with the following three items and explaining 7% of variance:

29 I do communicate electronically with other professionals about my work.

53 I share my work-related knowledge with others electronically using a share.

57 I benefit from colleagues who share their experiences/ lessons learnt with me.

The Cronbach's alpha of this scale is 0.7

Items 50, 54 and 58 also have a correlation of at least 0,3 with this component. When included, the Cronbach's alpha of the scale is 0,75.

ICT-security awareness

Measured with the following three items and explaining 6% of variance:

62 I know what the ICT security risks of the Internet are.

70 I reflect about the integrity of the information that I am responsible for.

87 I encourage ICT security awareness amongst my subordinates.

The Cronbach's alpha of this scale is 0.7

Item 61 'I reflect on the security of information' also has a correlation of at least 0,3 with this component. When included, the Cronbach's alpha of the scale is 0,76.

Competency management

Measured with the following three items and explaining 6% of variance:

85 I use my computer to store relevant information about the potential of my subordinates.

88 I recognize development needs of my subordinates.

89 I facilitate the development needs of my subordinates.

The Cronbach's alpha of this scale is 0.7

Items 58 and 92 also have a correlation of at least 0,3 with this component. When included, the Cronbach's alpha of the scale is 0,66.

The following components have only two items each in the scale and a Cronbach's alpha < 0,6.

Attitude towards learning at work

40 I have the opportunity to learn via the Internet during working hours.

82 I allow my subordinates to learn via the Internet during working hours.

Creating an innovative working environment for subordinates

90 I allow my subordinates to work in the way they find best.

91 I allow my subordinates to make mistakes.

Attitude towards lifelong learning

41 In my function it is important to continue to learn all the time.

43 I obtain ideas from the work of others that I find on the Internet to improve my own work.

4.4.3 Creating a model for information, communication and technological competencies required by managers in the information society

Using factor analysis, a set of principal components for ICT- and ICT-related competencies are extracted from the results of the questionnaire as illustrated in figure 4.1. This shows that smaller adjustments need to be made to some of the ICT- and ICT-related competencies that were identified based on the literature review. However, support is found for the main areas of competence.

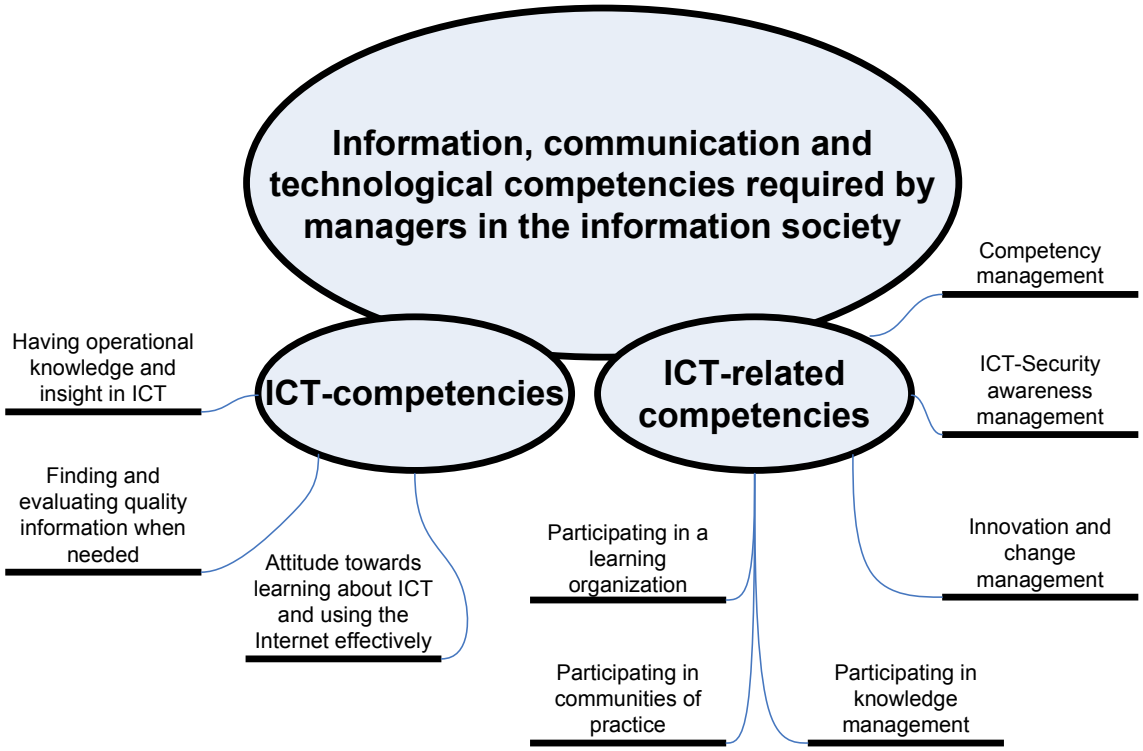


Figure 4.1 Model for information, communication and technological components identified from the responses to the questionnaire

4.5 Summary

The research results show that the implementation of ICT in the working environment of officers in the NLDO is a complex process and has a substantial influence on the working processes but also on the individuals in this organization. This emphasizes the importance of careful consideration of human factors during the implementation of ICT in the working environment as well as the need to re-evaluate the curriculum for officers in training in the NLDA. A need for further development of ICT- and ICT-related competencies for officers currently working in the NLDO is also shown and the importance of effective management of the work processes, information as well as communication using ICT is highlighted.

A general model for information, communication and technological competencies required by managers in the information society is suggested and a first instrumentalization for this model is provided.

In the last chapter a summary of the research results are presented, followed by a discussion about the research findings and the implications thereof. Recommendations are made for consideration by the NLDA and the NLDO as well as for further research.

Chapter 5 Summary, discussion, recommendations and conclusion

5.1 Introduction

This chapter starts with a summary of this research in paragraph 5.2 followed by a discussion and reflection about the theoretical and practical contribution of this research in paragraph 5.3. The final paragraph 5.4 contains recommendations for policy and practice as well as for further research.

5.2 Summary

Research has been done about the influence of ICT and the information society on the labour environment of employees in general, but limited research has been done to the influence of ICT and the information society specifically for managers, whereas a need for such research exists (Yukl, 2006). Furthermore, research about the influence of the information society and ICT on the labour of employees is often conducted with the focus on one of a limited number of aspects that are considered new ways of working in the information society. In this research an attempt was made to obtain a global overview of all the aspects that are related to this topic for the officers in the Netherlands Defence Organization (NLDO) with a focus of the implications thereof for the development needs of the officers. Educational research founded in practice and translated to education is encouraged by Reeves e.a. (2005). Hence this research appears to have relevance both for the development of theory as well as for practical implementation in the Netherlands Defence Academy (NLDA).

The theoretical purpose of this research was to contribute to the knowledge field of management and ICT by obtaining insight in the influence of ICT and the information society on the labour environment of managers in general and officers in the NLDO specifically, by answering the first part of the main research question:

What is the influence of ICT and the information society on the labour situation of officers in the Netherlands Defence Organization?

as well as the second research question:

What are the information, communication and technological competencies required by managers in the information society?

The first part of the main research question is answered by answering the following sub-questions:

- How do officers in the NLDO use ICT in their work situation?
- What is the influence of ICT regarding info-stress, mobility, productivity and confidence of the officers in the NLDO in their work environment?
- What are the software applications that officers in the NLDO use in their work environment?
- What are the ICT- competencies required by officers in the NLDO?
- How competent are the officers of the NLDO in their own opinion regarding some of the ICT-competencies?
- What are the ICT-related competencies required by officers in the NLDO?
- How competent are the officers in the NLDO in their own opinion regarding the identified ICT-related competencies?

The second research question is answered by analyzing the results of the questionnaire in order to evaluate if support is found for a general model for a general model for information, communication and technological competencies required by managers in the information society.

The practical purpose of this research was to contribute to the innovation practice of the implementation of a digital learning environment in the Netherlands Defence Academy (NLDA) by considering the implications of the changed labour environment, changed ways of working and required competencies in relation to the training need of officers by answering the second part of the research question:

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

By answering the following sub-questions:

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

The research was conducted in the NLDO by having twenty in-depth interviews with experienced officers from a variety of function areas in order to obtain a expert perspective from the working field, followed by a questionnaire that was send to an a-select random sample of 700 officers in order to obtain an overall perspective from the working field. The questionnaire was completed by 246 respondents. A discussion group consisting of nine students concluded the collection of research data in order to obtain a perspective from newcomers in the working field. The research results were analyzed using a combination of qualitative and quantitative techniques.

5.2.1 How officers in the NLDO use ICT in their work situation

The implementation of ICT has brought about considerable changes in the labour situation of most of the officers in the NLDO and the officers expect that their labour situation will continue to change as a result of changes in ICT in the future. Dealing effectively with information has always been important in the NLDO, but the way in which the organization deals with the information has changed considerably as a result of the implementation of ICT technology. Communication has also changed as a result of using ICT in the work environment and effective communication using ICT is increasingly important in the NLDO.

Most of the officers in the NLDO spend a substantial proportion of their time using the PC; on average between 20 and 21.9 hours per week. Differences do however exist between the average use of the PC and the main function area of the officers. Officers use on average between 1.6 and 2.3 hours per week on the Internet and between 3.2

and 4.3 hours per week on the Intranet of the NLDO. Officers receive on average between 17 and 20 e-mails per day, although this amount varies considerably.

Officers working in the operational units often experience frustration because ICT-facilities are in their opinion sometimes insufficient to their needs and inferior to the facilities that are available to their colleagues that are in office functions. They find this especially frustrating since they regard their work as 'core business' and the work of their colleagues in the offices as supportive of operational units. However, without the administrative support of the colleagues in the offices the operational units would not be able to operate effectively.

5.2.2 The influence of ICT regarding info-stress, mobility, productivity and confidence on the officers in the NLDO

In table 5.1 the results in the respective scales measuring info-stress, productivity and confidence are illustrated.

Table 5.1 The results of the scales measuring info-stress, productivity and confidence

ICT-related competence Scale	Central tendency	95% confidence interval for mean		Cronbach's alpha
		Lower bound	Upper bound	
Info-stress	Applies seldomly	2.2	2.3	0.64
Productivity	Applies partly	3.3	3.5	0.7
Confidence	Applies*	3.4	3.6	0.8

*between 'applies partly' and 'applies mainly'

Despite the changed ways of dealing with information in the organization using the available technology and applications, most officers do not experience serious info-stress, although some officers do experience stress since they are not able to work effectively with the available technology and applications. Furthermore, the amount of information and e-mail that officers receive as well as ICT problems cause info-stress.

Working from home instead of the office is not common practice for officers in the NLDO, although a few officers do work from home. The officers find working at home in general productive. Officers work on average between 2 and 2.9 hours per week overtime at home in addition to their regular office hours. Officers working in the Royal Military Police work on average 4.8 hours overtime which corresponds with other results in this research whereby officers working in this sub-organization indicate that they have a very high workload. During the day they are mostly busy with fieldwork and the administration is often done at home during the evening hours.

More than half of the officers communicate via e-mail internationally and communicate with other professionals about their work. Most officers experience a need to receive information immediately as it becomes available and regard mobile technology as an opportunity to facilitate this. Mobile technology is thus regarded as important in the working environment, especially during missions and officers are in general aware of the security risks in this regard. Some officers use mobile technology to use their travel time effectively, for example when they travel by train. Video-teleconferencing and online conferencing is not generally seen as an alternative to face-to-face meetings, which is surprising since the organization is dispersed over many locations across the Netherlands and both time and expenses could be saved when such methods are used instead of face-to-face meetings. However about a third of the officers does see the advantages of this means of conferencing. Mobile technology is also seen as a means to instruct subordinates and coordinate activities and e-mail is regularly used. When the officers take part in a mission they are always contactable, therefore some officers prefer working office hours only when they are not away on a mission and do not want to be permanently available.

Most officers have the opinion that ICT in their labour environment has made them more productive, although about a third of the officers lose production time because they are not familiar enough with the software applications they are required to use. A number of respondents have indicated that in their opinion the perceived slow connection to the Internet influences their productivity negatively. A number of officers indicated that they find it difficult to find the required information on the Intranet of the NLDO and especially

the search engine used on the Intranet was indicated as an important negative factor in this regard.

Most officers are fairly confident in using ICT in their labour environment; however there are a substantial number of officers that are not confident in using ICT. The lack of confidence is often caused by a lack of knowledge about ICT and not being able to find required information using the Internet. Interesting to note is that male officers are slightly more confident in using ICT compared to their female colleagues. Furthermore, there exists a positive correlation between the private use of the PC by the officers and the confidence in using ICT in the labour environment.

In table 5.2 is shown what the results are of using factor analysis on the scales for info-stress, productivity and confidence. Knowledge about ICT appears to be an important factor in all three the scales.

Table 5.2 Principal components extracted from the scales measuring info-stress, productivity and confidence

Scale	**Principal components**	**Explained variance**	**Number of items**
Info-stress (65% of variance explained)	Amount of information and e-mail as well as e-mail not relevant for work	26%	3
	ICT-problems	21%	2
	Lack of knowledge	18%	2
Productivity (41% of variance explained)	Lack of knowledge	41%	4
Confidence (57% of variance explained)	Knowledge about ICT	26%	5
	Finding information using the Internet	16%	2
	Organizing information, e-mail and the Intranet of the NLDO	16%	3

5.2.3 Software applications that officers use in their work environment

In general it can be said, based on the results from the interviews, that applications change with time, are dependent on the choices that are made by the top in the organization and that the need for applications is dependent on the main function area of the officer. It is interesting to note however that the results of the quantitative research only showed a few minor significant differences in the use of general applications related to the main function area of the officer. The perceived importance of some of the applications in the labour situation does however seem to relate to the rank of the officer.

5.2.4 ICT-competencies required by the officers in the NLDO

Officers need to be able to think systematically in terms of the information processes and translate this into relevant information products. Officers indicate that those processes and products are different in different function areas.

In general it can be concluded from the research results that most officers need to be able to use the MS Office applications to an advanced level, although MS Access is not required by all officers. Working effectively with the electronic agenda that is included in MS Outlook is also regarded as important. Dealing effectively with archiving e-mail and other documents as well as dealing effectively with shared documents is also found to be important. Furthermore, the officer needs to communicate in a socially acceptable way using e-mail dependent on the role, position, the situation and the topic and the officers need to be able to communicate effectively using the technology, for example in presenting management information in a correct format.

The Internet as well as the Intranet of the NLDO are seen as important sources of information and being able to search effectively is regarded as an important ICT-competency.

Information management systems, including management information systems are seen to be either important or very important by a large number of officers in the working situation, although about a third of the respondents to the questionnaire do not use those systems. MS Excel is often used to present management information and officers need to be able to analyze information presented by others using applications like MS Excel as well as being able to present management information in an appropriate format avoiding unnecessary information. It is also seen as important that officers are able to give clear instructions to subordinates regarding information needs as well as the required format in which the information needs to be presented.

Project planning applications are not widely used, although the officers that do use those systems regard it as an important tool in the NLDO since they are of the opinion that most officers have an important role as project manager.

Electronic cooperation systems, competency management systems and tools to organize the thoughts like Mind Manager, are not widely used yet. A number of officers indicated that they were unfamiliar with these systems. The officers who used these systems regarded them as important and some indicated that they would have liked to know earlier in their working life that they existed.

Furthermore, a conceptual insight in generic functionalities of applications and exchange of data between applications was seen to be important although some officers thought that this aspect should be covered by experts. Officers that were not able to use some of the applications effectively experienced a sense of inadequacy in their working environment because the implication is that they cannot make decisions independently when necessary. Some officers said that the officer is often confronted with unknown applications when participating in an operational mission and that there is limited time to learn those applications. This aspect enhances the need for conceptual insight in generic functionalities so that it is easier to learn to use applications effectively. During operational missions officers need to be able to work effectively with command and control as well as battle management applications. One officer emphasized the importance of a digital care system in which medical and personal information is recorded and which is used by officers during missions.

5.2.5 Competence of the officers regarding some ICT-competencies

It needs to be noted that in this section competence is not measured against specific performance criteria, but is an indication of commitment (attitude), knowledge about as well as skills and behaviour using ICT in the labour environment in the opinion of the officer of the NLDO.

5.2.5.1 Operational ICT-competence

In general officers have the opinion that they are fairly competent in using the applications effectively and that they have enough insight to deal effectively with ICT in their working environment, although there are a substantial number of officers (at least 30%) that have indicated that they are often not sure how to use ICT, including applications in their labour environment effectively. It is not investigated to the level of specific applications. Male officers evaluate themselves more competent in using ICT than their female colleagues do.

There is a positive correlation between the private use of the computer and operational ICT competence.

5.2.5.2 Structural ICT-competence

Remarkable is that more than half of the respondents have indicated that they are not competent to find the quality information that they require for their work when needed, using the Internet and Intranet of the NLDO.

There is a positive correlation between the private use of the computer and structural ICT competence.

In table 5.3 is shown what the results are of using factor analysis on the scales for ICT-competence. Knowledge about ICT, using software effectively and being able to find information effectively are identified as important components.

Table 5.3 Principal components extracted from the scales measuring ICT-competence

Scale	Principal components	Explained variance	Number of items
Operational ICT-competence	Using software effectively	33%	3
	Knowledge about ICT (software, networks and hardware)	33%	3
Structural ICT-competence	Finding information on the Internet	27%	4
	Need to learn about finding information on the Internet	23%	2
	Finding information on the Intranet of the NLDO	18%	2

5.2.5.3 Strategic ICT-competence

About half of the officers are in their opinion able to evaluate the credibility of information on the Internet and are able to identify and recognize important information. However a relatively large proportion of officers experience difficulty in this regard.

Female officers have a lower score for the questions in this section compared to their male colleagues.

5.2.6 ICT-related competencies required by the officers in the NLDO

ICT-related competencies are stipulated in this research as competencies (indicated by a combination of knowledge and insight, skills and behaviour as well as attitude) related to changed ways of working as a result of the changes brought about by the information society, especially in dealing with new opportunities and challenges that are created by the information and communication technology and globalization. These competencies include a leadership component.

Changed ways of working in the organization are identified in the following areas:

- Creating and participating in a learning organization, including knowledge management and communities of practice
- Competency management
- ICT-security awareness management
- Management of change
- Management of innovation

It is recognized that the mentioned items have played a role in organizations before the introduction of information and communication technology, but especially since the creation of networks and mobile technology the importance of dealing with those aspects digitally and often with a changed focus is emphasized. The role of the officer in influencing the strategy, implementing the strategy and influencing their subordinates in participating in the new ways of working was investigated as well as their role in managing change and innovation. From the interviews however, it became clear that the strategic top of the organization, often from the rank of Colonel and higher take the important strategic decisions and are responsible in selecting suitable applications and technology for the organization. Project groups are often involved in advising on those issues and some of the officers have the opportunity in influencing the strategy through participating in those project groups. However the officers from the research population have indicated that they have limited influence on a number of important decisions in this regard. Some officers find that more consultation before decision-making would be an improvement, since the officers are familiar with the situation on the work floor and they play an important role in implementing the strategic changes.
The officers do have influence on the strategy on a smaller scale in the section of the organization where they are working. When no formal applications are offered by the organization, they sometimes create or initiate the creation of their own applications using the facilities available, for example using MS Excel or MS Access.

The NLDO is in a continuing process of change and many changes are occurring simultaneously. Previously, separate defence organizations were joined into one defence organization and are increasingly working together, which also means harmonizing the applications and technologies that are used. International cooperation is increasing which also has implications for the choice of information and

communication technologies. The situation is furthermore complicated since the defence budget is under pressure and serious personnel reductions have taken place over the last few years, which has as a consequence that more needs to be done by fewer people.

In general it became clear from the interviews and the comments written on the questionnaires that the officers understand the importance of the new ways of working and are dedicated to creating and participating in a learning organization. Life-long learning is seen as an important aspect with benefits for the organization but also for their own careers and the careers of their subordinates both in the organization as having the opportunity to find employment outside the NLDO. However there are also a number of obstacles varying from cultural issues like that it is better for the career not to share lessons learnt and thereby indicating that mistakes have been made or the knowledge that they have obtained gives the officer perceived power and they do not want to make themselves redundant. Some officers also have limited time to improve the way that is dealt with the information they are responsible for. This is also sometimes seen as an administrative issue and not 'core business'. The Intranet of the NLDO is seen by some officers as a means to store and distribute organizational knowledge, but some officers are also using a communal database to share information and best practices and manage the knowledge of the organizational unit they are responsible for. A number of knowledge management systems are in use whereby best practices are shared, and some communities of practice are established. Generally it was agreed that knowledge management is crucial for the NLDO. When knowledge is not stored effectively it can be seen as a threat to the NLDO.

Furthermore, the importance of a pro-active approach of the strategic top of the organization was emphasized by the officers in that applications that could be used in this regard are selected and made timely available to the officers so that it is not necessary for the officers or their employees to develop applications themselves.

From the interviews and the comments written on the questionnaires it can be concluded that although competency management is given a high priority in the organization, a number of officers are of the opinion that improvements are necessary in order to obtain

an effective digital implementation in this regard. The officers have indicated that the officer plays an important role in competency management.

In general it can be said that officers regard dealing effectively with the security of information as essential in the NLDO and that the officer plays an important role in managing ICT-security awareness.

Since many changes occur simultaneously in the NLDO and the expectation of officers is that this will continue to happen, the officers find change management an important competency for officers.

Participation in innovation is encouraged in the organization and subordinates are given autonomy where possible in an environment where it is accepted that mistakes are sometimes made. In general it can be said that the officers are aware of the importance of innovations and see therein a role for themselves in terms of creating and implementing improvements especially in the flow of information they are (partly) responsible for.

5.2.7 Competence of the officers regarding ICT-related competencies

In table 5.4 the results in the respective scales measuring ICT-related competence are illustrated.

Table 5.4 The results of the scales measuring ICT-related competence

ICT-related competence Scale	Central tendency	95% confidence interval for mean		Cronbach's alpha
		Lower bound	Upper bound	
Creating and participating in a learning organization	Applies partly	2.8	2.9	0.9
Competency management	Applies mainly	3.7	3.9	0.7
ICT-security awareness	Applies mainly	3.5	3.7	0.8
Change management	Applies mainly	3.8	4.0	0.7
Innovation management	Applies mainly	3.6	3.7	0.64

Remarkable is that although officers are aware that it is important that the NLDO becomes an effective learning organization, they score on average relatively low on the scale for ‘creating and participating in a learning organization’ with the central tendency being ‘applies partly’.

Another remarkable result is that male officers evaluate themselves more competent in the scales than their female colleagues do. The differences are significant, which means that with 95% certainty could be said that similar results will be found in the research population.

Officers working in the function area ‘information and communication systems’ score significantly higher on the scale ‘creating and participating in a learning organization’ compared to the officers working in the function areas ‘personnel’, ‘logistics’, ‘education and training’ as well as ‘military operational’, which could indicate that the specialized training that they have received has prepared the officers better for participation in this regard.
Officers in the higher ranks, categorized as ‘head officer’, score slightly higher in the scales ‘competency management’ and ‘change management' compared to the officers in the lower ranks categorized as ‘subaltern officer’. Although those differences are significant, they are relatively small.

Furthermore, a positive correlation is found between the private use of the PC and the scales ‘creating and participating in a learning organization’ and ‘ICT-security awareness’.

In table 5.5 is shown what the results are of using factor analysis on the scales for ICT-related competence.

Table 5.5 Principal components extracted from the scales measuring ICT-related competence

Scale	Principal components	Explained variance	Number of items
Creating and participating in a learning organization	Knowledge management (understanding the importance resulting in participating)	26%	11
	Communities of practice	11%	4
	Opportunity to learn during working hours	8%	2
	Attitude towards learning	7%	2
	Understanding the importance of the Intranet of the NLDO	6%	3
Competency management	Competency management	53%	4
ICT-security awareness	ICT-security awareness	59%	4
Change management	Change management	55%	4
Innovation management	Innovation management (including the perception that the work environment is conductive to innovation)	31%	5
	Allowing autonomy to subordinates	21%	2

5.2.8 ICT- and ICT-related competencies that need to be developed during the initial training of officers in the NLDA

From the research results it has become clear that it is important to develop a number of ICT- and ICT-related competencies during the initial training of the officers. However there is no agreement about all the different items, neither the level of training. An understanding of the functionalities and possibilities of applications, networks, mobile technology as well as an understanding of the importance of knowledge management

appear to be important competencies for all the officers. Furthermore, a training need does exist for officers currently employed in the NLDO.

From the research results the following items appear also to be important to include in an initial training programme for officers in the NLDO:

- MS Office applications

  The expectation is that these skills are sufficiently mastered during high school; however it is important to make sure that the students have mastered those applications sufficiently. A list of specific performance criteria in each of the applications could be compiled and the competence of each student regarding those items should be evaluated during the course of the study.
- Searching and evaluation skills using the Internet

  Students need to learn to find and evaluate critically the information relevant to their work.
- Management of information and information management systems

  Students should have insight in the difference between data and management information and being able to present the information that they are responsible for in a suitable format as well as interpret information presented effectively. Furthermore, students should be able to deal effectively with information management systems and they should master those systems as a tool in managing and coordinating information.
- Communication on various levels using e-mail

  This aspect is emphasized by a number of interviewees who are of the opinion that students need to learn how to communicate appropriately using digital media.
- Archiving of documents and e-mail
- Commando supporting systems or Commando & control information system

  Students could practice these systems during their initial training and develop a basic understanding about the underlying principles.
- Effective project management
- Effective management of information and knowledge in organizations
- Change management
- Effective management of ICT-security awareness

- Knowledge about the influence of ICT on employees
- The students need to be kept informed about the developments in ICT. Not only within the NLDO but also outside the organization.
- Attention needs to be given to aspects regarding the influence of ICT on employees.

5.2.9 Using a digital learning environment to support the development of ICT- and ICT-related competencies of officers in their initial training of the officers in the NLDA

It is emphasized by the interviewees that a digital learning environment should be user-friendly and provide added value to the education. It should also provide advantages to the student as well as the lecturers.

In general, interviewees indicated that the different ICT- and ICT-related competencies need to be developed integrally in the context of the various subjects and the role of the leader needs to be emphasized throughout. ICT needs to be seen as a tool to achieve effective leadership especially with regard to dealing with information and communication.

A need for distance training provided by the NLDA is identified, especially for employees that follow a shorter version of the officer's training and would like to study part-time and continue with their current work.

Using the literature review, insight is obtained in factors that have an influence on learning and teaching in a digital learning environment and it can be concluded that teachers in a digital learning environment require different competencies than they require in face-to-face situations. These factors are especially important since the NLDA is still in an implementation phase of an electronic learning environment. In order to fully utilize the opportunities it offers, it appears important that the teaching staff is properly prepared to deal with this adjusted way of teaching, being it in a programme to support the development of ICT- and ICT-related competencies or in the other programmes they are responsible for.

5.2.10 Providing a digital learning environment to support the development of the required ICT- and ICT-related competencies for officers currently working in the NLDO

A need for the development of some of the ICT- and ICT-related competencies is established for the officers currently working within the NLDO and therefore it appears to be important to provide a digital learning environment for officers currently working in the NLDO so that they can develop the ICT- and ICT-related competencies that they require. Some officers have however indicated that they would prefer a blended learning environment. Furthermore the NLDA could consider providing a system of performance support related to the required competencies for those officers.

5.2.11 Developing an instrument to measure Information, communication and technological competencies required by managers in the information society

Using factor analysis, a set of principal components for ICT- and ICT-related competencies are extracted from the results of the questionnaire as illustrated in figure 5.1. This shows that smaller adjustments need to be made to some of the ICT- and ICT-related competencies that were identified based on the literature review. However, support is found for the main areas of competence.

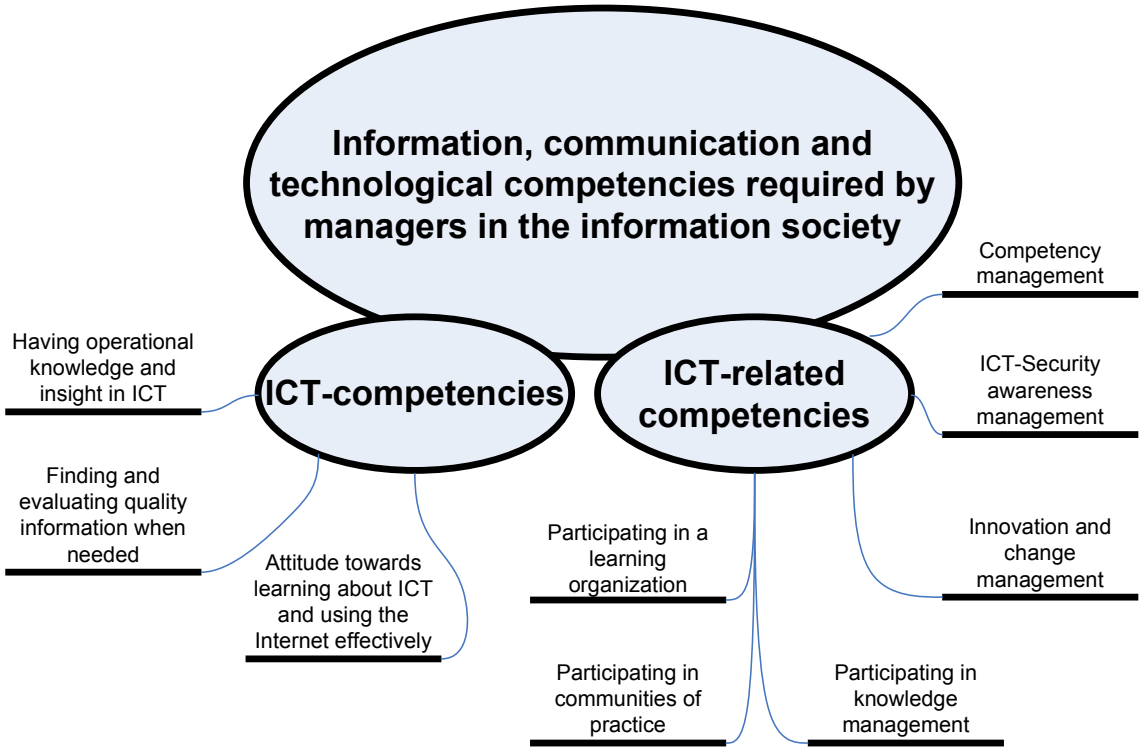


Figure 5.1 Model for information, communication and technological components for managers in the information society

When the organization specific statements are omitted from the questionnaire, the questionnaire appears to be a valid instrument to measure ICT- and ICT-related competence for managers in organizations by means of a self-evaluation. In table 5.6 the reliability of the scales for each competency are shown. The last three components have only two items each, it is recommended that at least one further item for each of those components is added.

Table 5.6 Reliability of the scales to measure ICT- and ICT-related competence

ICT-competencies	**Explained variance**	**Number of items**	**Cronbach's alpha**
Operational knowledge and insight in ICT	22%	5	0.74
Finding and evaluating quality information when needed	19%	5	0.7
Attitude towards learning about ICT and using the Internet effectively	16%	3	0.71
ICT-related competencies	**Explained variance**	**Number of items**	**Cronbach's alpha**
Participating in the learning organization	16%	10	0,9
Innovation and change management	10	5	0.84
Knowledge management in own unit, including communication about it.	8	6	0.83
Participating in communities of practice	7	3	0.7
ICT-security awareness	6	3	0.71
Competency management	6	3	0.7
Attitude towards learning at work	6	2	<0.6
Creating a working environment conductive to innovation	5	2	<0.6
Attitude towards lifelong learning	4	2	<0.6

5.3 Discussion

This research has shown that the effects of the information society and information and communication technology require adjustments in the way officers work and manage their subordinates in the NLDO. From this it can be concluded that the changed ways of working have implications for the training of officers in the NLDA. Especially the results from the interviews as well as the comments written on the questionnaires provided insight in how the officers experienced the changed ways of working in the information society. Hence this research shows both a need for and a demand to develop ICT- and ICT-related competencies which seems especially important in the light of the officers spending on average between 20 and 22 hours per week behind a computer.

5.3.1 Developing ICT- and ICT-competencies across the curriculum

The conclusion can be drawn from this research that when the technology is available it does not automatically happen that people know how to use it effectively. This is in accordance with the experience of Harrison & Kessels (2004) and Davenport & Prusak (1997). Furthermore, from this research can be concluded that using software effectively in the context of the work situation is very important in order to function effectively. This is in accordance with the research results from Boer & Hövels (2003). It has also become clear that communication using technology is not per definition the same as communication through languages (Hart-Davidson, 2000) and a number of participants have indicated that they are often not sure how to communicate using ICT. They indicated that they found it difficult to represent data effectively using the technology. Hence, it appears to be important to design a specific learning programme so that learners could master the new format, content and variety of dealing with information effectively in the information society (Town, 2003) in the context of the work field. However, such a learning programme needs to be re-evaluated over relative short periods of time, along with corresponding competency models (Zaccaro e.a., 2006).

According to Town (2003) a first step in finding a solution for the need for what he calls 'information literacy' is that policymakers recognize that the labour situation has changed and that adjustments in the training are necessary.
A sound starting point for determining what aspects should be covered in such a learning programme could be the seven pillars model (SCONUL, 2004) which is further explained in the literature review, but it is important to adjust this model in accordance with the recommendations of Town (2003) to specify the elements in this model in the context of the working environment of the officers and include not only library skills but also specific IT skills. This model could be extended for the officers in training in the NLDO since it does not include aspects like ICT-security awareness management where integrity, availability and exclusivity of information play a role. This is especially important for military organizations, but most likely for other organizations as well. The achievement of information literacy should not be seen as merely a training of competence, but needs to be recognized as an educational challenge (Town, 2003).

Whether information, communication and technology competencies as a learning module needs to be taught integrated across the curriculum within the formal academic programmes or whether it needs to be taught as a specific subject or a combination of both is the question. In the United Kingdom the practice varies since the issue crosses professional boundaries between teaching and library staff (Town, 2003). However, the participants have indicated that they prefer an integrated approach regarding the development of ICT- and ICT- related competencies in the sense that they prefer that the applications are used in the context of the defence organization across the curriculum.

5.3.2 The role of the teacher in a digital learning environment

It needs to be noted however that innovation and change in education is a difficult process (Lagerweij, 1994) and that it has a serious impact on all the actors (van der Klink, Kallenberg & Valcke, 2002). The role of the teaching staff is especially important in the case an integrated approach is selected and therefore it is important to establish their training needs as well, since online instruction is different from its face-to-face counterpart (Adendorff, 2004; Rosenberg, 2006). To implement a successful digital

learning programme across the curriculum it is important to ensure that the quality is acceptable. Geerligs, Mittendorf & Nieuwenhuis (2004) found in this regard that when the quality of such innovations is not ensured innovations often do not last.
In this sense it is also important to make sure that the participating teachers are able and motivated to deliver the required quality (Fresen, 2005).

From research done by Steyn (2001) about staff development it can be concluded that existing attitudes and learning cultures do not allow for self-development and that comprehensive staff development interventions are necessary. However, he has concluded that this is a complex problem and that different staff members will have different preferences in terms of developmental approach. Therefore, it is advisable that a variety of methods are used. For example workshops, communities of practice where especially best practices are discussed. Hence an ideal situation appears to be to create a learning organization where as many staff as possible can seize opportunities and participate to create a blended learning environment where the students could develop the ICT- and ICT-related competencies that they need in order to work effectively in the NLDO. In this light the results of the research done by Agelink (2004) are also relevant. He concluded that a community of practice for teachers offers advantages for the organization, the teachers as a team as well as for individuals.

According to Steyn (2001), time constraints of teachers who want to become involved in such a development programme need to be solved. Furthermore, the increased workload as a result of participating in new ways of teaching needs to be taken into consideration (Adendorff, 2004). Another hindrance of teachers becoming involved in new initiatives is often a lack of confidence (Burns, 2003). This is a further motivation for a staff development intervention. Burns claims that teachers need to be empowered by giving them proper training, making resources available and giving encouragement so that teachers can become creative. He argues further that creative teachers can inspire students to become creative themselves and prepare them to become creative leaders. Creativity is one of the most important competencies of leaders in the current information society (Robbins & Coulter, 2003; Zaccaro e.a. 2006; Burns, 2003 and Yukl, 2006). Hence it appears important that students receive support in developing creativity. According to De Villiers (2002) creativity could be enhanced in a digital learning

environment. She claims that creative and innovative learning experiences motivate the students to participate as well as stimulate creative cognitive processes.

McPherson & Nunes (2004) argue that if learners are expected to develop high cognitive skills such as reflective analysis and meta-cognition, teachers should have these skills themselves. Zaccaro e.a. (2006) claim that adaptive performance like handling emergencies, crisis situations or unpredictable work situations could be enhanced using simulations and gaming. This is supported by Geurts e.a. (2000).

5.3.3 Gender and ICT- and ICT-related competence

Female officers indicate that they are less confident and evaluate their own competence in most of the items that are researched lower compared to how their male colleagues evaluate themselves. The expectation is not that female employees are less competent than their male colleagues (Arun & Arun, 2002; Whitworth, 2007; Fox, 2006), but that female employees have less self confidence or perhaps are more realistic about their own abilities. This conclusion is supported by Meyers (2006) who found in her research that gender does appear to be an indicator of confidence. She suspects that this is not only related to using ICT, but in general. Meyers found that women tend to underrate their skills and men tend to overrate their skills compared to actual results. Anderson e.a. (2006) claim that empirical studies about gender differences in assessment centers related to management are evenly split between studies that show no significant differences between men and women and studies that show that women score somewhat higher than men, mostly in gender-typed roles like interpersonal leadership roles.

Wasburn & Miller (2006) as well as Meyers (2006) claim that when women study in non traditional areas such as computer science, there appears to be little difference in skills and confidence related by gender. This last result is supported by Rosen (2007) who has experience as a computer applications developer. He claims that women are very capable in that profession and that they are also confident about their own abilities. Wajcman (2006) however suggests that it is difficult for women to access senior levels of management in ICT. She suspects that the male culture associated with technical and

managerial expertise still has a negative effect on gender equality in those fields. In this light it is also interesting to mention that the Women in Technology in the European Community (WiTEC) have offered a postgraduate distance-learning programme in the field of information technology management to address the lack of confidence of women and to increase the number of woman IT managers (Chivers & McPherson, 1994). This programme ran successfully at the University of Sheffield until about three years ago after which it was closed since it was felt that this was no longer a problem (McPherson, 2007).

5.3.4 Establishing a learning organization and lifelong learning

Establishing a learning organization in which knowledge is effectively managed is difficult and a complex process (Harrison & Kessels, 2004; Florijn, 2001). They claim that changes in processes, product and structures are required as well as changes in management and culture in organizations. The directions set out by the strategic top of the organization need to be clear in this regard including a reflection about an integral approach across an organization whereby selections are made regarding suitable applications to support such initiatives. Clear is however that officers play a crucial role in establishing a successful learning organization and that learning how to participate in a learning organization is one of the important aspects that needs attention in a training programme for all officers. Harrison & Kessels (2004) argue that effective knowledge management will not happen automatically, but that HRD programmes should deal with those aspects. The results of this research support this notion.

Although lifelong learning is generally accepted by the officers, Yukl (2006) states that this is not sufficient any longer, but that individuals as well as organizations as a system need to learn how to learn and in this regard it is necessary to redefine and continue to redefine mental models which he names meta-cognition. Hargrove (2001) and Kamperman (2005) state that learning processes of an organization need to adjust to the new context of an organization and visionary objectives. In this light it is interesting to note that Oliver (2002) as well as Collis & Margaryan (2005) have found in their research that using ICT changes the way learning takes place in the sense that it has become possible to focus more on the process of learning and finding information instead of

learning content. Providing effective performance support for learners and employees in organizations is becoming increasingly important and could complement training (Rosenberg, 2006; Rossett, 2007). As such providing performance support could be seen as a component of knowledge management in an organization where the learner could access knowledge and information from a variety of resources (Rosenberg, 2003).

5.3.5 The influence of culture in a learning organization

Some of the officers regard their experience, knowledge and even information as their property and as such provide them with a sense of power.
This is also found in other organizations by Davenport & Prusak (1997) who found that jealousy over resources and political battles frustrate the sharing of information. They claim that organizations need to develop an overall strategy for the use and sharing of information in which these aspects are taken into consideration. Some important questions in this regard are whether information must be seen as a commodity or a process, and whether it belongs to an individual or to the organization by which the individual is employed.

A sound information management system is crucial towards establishing a successful knowledge environment that underpins integrated and cooperative working according to Haines & Dunn (2003). Certainly it can be argued that the officers play an important role in establishing this. Furthermore, Arun & Arun (2002) identify culture as one of the factors that influence the use of ICT. It would be interesting to know what the influence of culture is on the outcome of the scale for 'creating and participating in a learning organization'. The score for this scale is rather disappointing with a central tendency of 'applies partly' but there could be a number of contributing factors to this, for example lack of time or perceived benefits.

It is clear that the culture of a learning organization needs to support the development and distribution of knowledge in the organization (Rosenberg, 2006; Florijn, 2001). They claim that trust between staff members and also between staff members and line management is important in a spirit of open communication, commitment and a willingness to work together for a common goal. A further cultural change is embedding

the concept of lifelong learning in the labour environment of the officer. An important aspect of learning how to learn is certainly the ability of self-directed learning (Yukl, 2006; Poole & Axman, 2002).

5.3.6 The relation between using ICT and ICT- and ICT-related competence

In many of the scales there was a positive correlation between the number of hours that the computer was used at home for private purposes and the various ICT- and ICT-related items. This could support the notion that the more the computer is used by the officers during the course of their training, the better prepared they are to deal with ICT in their working situation.
However, spending more time on the computer for private use could also indicate a special interest in ICT in general which could also reflect on the use of ICT in the working situation.

5.3.7 Examples of integrating ICT- and ICT-related competencies across the curriculum

Online-self-teach modules that are freely available could be used to form a theoretical basis for such a learning programme. Examples of such modules are http://www.enterprise-ireland.com/ebusiness/default.asp and http://www.vts.intute.ac.uk/. In table 5.7 examples are given how the identified ICT- and ICT-related competencies could be integrated in a digital learning environment. It is an advantage if applications are used in the context of the future work situation (Collis & Margaryan, 2005). It needs to be noted that the theory of a number of the identified items is currently included in the curricula of some of the bachelor programmes of the NLDA. However, the argument remains that the ICT- and ICT-related competencies identified are essential for all officers and that they should be developed integrally across the curriculum.

Table 5.7 Examples of how the development of the identified ICT-and ICT-related competencies could be integrated in a digital learning environment

Item	**Examples of integration of the item in a digital learning environment. Some of those aspects are applicable for the academic forming but could also extend to the military forming**
MS Office applications	Self teach manuals available to the learners on-line, whereby taught sessions are initiated when the need arises. Integration of various applications where appropriate. MS Word and MS PowerPoint are already integrated in some subjects MS Excel can be integrated with subjects like Mathematics, Statistics, Methods and techniques of research. Since searches are often done in databases using keywords – some practical experience in MS Access seems appropriate
Searching and evaluation skills using the Internet, including the 'Deep Web'.	Online guidelines could be provided and practical exercises whereby critical search methods and critical evaluation regarding the reliability and credibility of the sources are a requirement could be integrated in a number of subjects and projects. Furthermore, the students could be encouraged to use a variety of databases like PiCarta and subject specific on-line databases. Examples of specialized online educational resources like online periodicals or textbook supplements could be used so that learners get an idea about what is available on the Internet that could support their study and research (Waterhouse, 2005).
Management of information and information management systems	Students can be encouraged to present management information in an acceptable way Management games and simulations could be used where case and scenarios could be used with increasing complexity.
Communication on various levels using e-mail	Participation in an international project, could also prepare students to deal with cultural differences. This is an aspect officers have to deal with when they participate in an international operation. Students could also experience working in an international community of learning.
Archiving of documents and e-mail	Guidelines could be provided and some practical exercises could be done by students in order to master this item.
Commando supporting systems or commando & control information systems	Simulations and games could be used. This could be part of the military forming.

Table 5.7 (continued) Examples of how the development of the identified ICT-and ICT-related competencies could be integrated in a digital learning environment

Item	**Examples of integration of the item in a digital learning environment. Some of those aspects are applicable for the academic forming but could also extend to the military forming**
Project management	When the students have a project to do, they could be required to use an application that so that the students understand what such a system could mean in practice. Prince 2 is the standard in the NLDO – a beginner self-teach manual could be designed. Ter Wee & Loog (2005) introduce the concept of an electronic meeting room where a combination of oral consultation is offered as well as a scala of tools to support each type of process and decision forming effectively.
Knowledge management	Collaboration software like wiki's could be used to encourage students to share knowledge with each other. A communal database like wikipedia could be used to explain the principles of a database.
Change management	Students could participate in a virtual change management project. Theory about factors that influence change management could be offered in the context of the NLDO.
ICT-security awareness management	An online self-test could provide some insight in ICT-awareness. Such a test could include hypertext with explanations about certain ICT-security issues; students could only learn what is relevant for them.
Influence of ICT on employees in general	A learning module where research results in this regard are presented could be used.
Latest developments of ICT, possibilities and opportunities	Students could be involved in a project where they have to investigate this item online within their own field of expertise.
Learning how to learn In this sense the computer could be seen as a cognitive tool and can be seen as a "*prosthesis for thinking, reasoning, estimating, experimenting and learning*" (Kommers, 2004:24).	(Online) learning journals like web logs could be used to encourage the students to reflect about what they have learnt, this enhances transfer of knowledge according to Ausubel (2001). Students could reflect about models of meta-cognition about learning and thus increase their understanding about their own learning (Yukl, 2006). Students could start a personal digital library of sources and abstracts of those sources and start creating a digital network. Students could be introduced to applications like CATPAC or Copernic Summarizer, which are intelligent programs that read text and summarize its main ideas. Student could be introduced to applications like Endnote that help them manage their sources digitally. Providing performance support or learning support online could also be

	seen as a means to improve learning how to learn (Rosenberg, 2006).

There are a number of ICT- and ICT-related competencies that the majority of officers do not find important enough to be included in an initial training programme of officers, but those items are seen as important by other officers. In table 5.8 examples are given how those ICT- and ICT-related items could be developed and integrated in a digital learning programme.

Table 5.8 Examples of how the development of alternative ICT-and ICT-related competencies could be integrated in a digital learning environment

Item	**Examples of integration of the item in the digital learning environment**
Tools to organize the thoughts	Students could be asked to brainstorm in a project group, whereby a tool like Mind Manager is used or they could be asked to use such a tool to summarize the important aspects of a subject/topic using a mind map. Interesting is that mind-mapping is seen as a creativity enhancing activity (Beijen, e.a., 2003).
Mobile learning	Short pieces of text and/or tests named pod casts could be available to mobile technology, to encourage collaboration wiki's could be used, for individual use are online journals like web logs (blogs) available. RSS News feed (an xml-based format to easily share content on the Internet) could be used. A number of learning materials could be provided via those media and the learners can select what they want to learn when it suits them. Further research results and examples can be found in Kukulska, Hulme & Traxler (2005).
On-line conferencing	Students could participate in synchronous (e.g. a virtual workshop using Breeze web conferencing or Skype) and a-synchronous discussions.
Teleconferencing	Participation in an international project whereby students could at least once use teleconferencing facilities.
Online networking	Students could be encouraged to create an online network with fellow students in a joint project across the various sub organizations. Experience in working in a virtual team could thus be obtained.

5.3.8 Reflection on the methodology used

The combination of qualitative and quantitative techniques as well as the order in which they were conducted seems to have worked well. In agreement with Fraser (n.d.) this research was an investigation in mere a reflection of the changed labour environment of the officer in the NLDO, but the attempt was certainly to make the reflection as clearly as possible. Peters (2004: 28) argues that in a lot of leadership research the rational is over-emphasized ignoring what he calls *"messiness of what is"*. This research was an attempt to combine the two.

For this global descriptive and exploratory research about the changed labour environment of the officer of the NLDO can be said that the qualitative techniques used were fairly credible and that the quantitative techniques were sufficiently valid and reliable for the purpose of this research. When the purpose of the research would have been to investigate deeply on certain issues rather than broadly, a critical note could certainly be given to some of the scales and the number of in-depth interviews, although the comments written on the questionnaire as well as the results of the discussion group of the students also contributed to the qualitative research data. The quantitative research techniques provided an opportunity to generalize some of the results of the case study.

5.3.9 Contribution of the research

This research has provided some insight in what the influence of ICT and the information society is on the labour situation of officers in the NLDO. The complexity of the current work environment is emphasized. Furthermore, a model was created from a combination of the literature and results of the interviews, discussion group and questionnaire for the ICT- and ICT-related competencies that are required by the officers of the NLDO in their changed roles in the information society.

Although the results of this research can not be generalized it could provide a basis from which further research amongst managers in organizations could be conducted. Many of the results might be of a general nature and emphasize the importance of employers

being aware of the influence of implementing and applying ICT in their organizations. When some adjustments are made to the questionnaire, it appears to be a valid instrument to measure ICT- and ICT-related competence for managers in the information society. Furthermore a general model for information, communication and technological components required by managers in the information society was created, thus making a contribution to the knowledge of organizational management and ICT.

Some insight was also obtained in how competent the officers evaluate themselves in relation to the identified ICT-competencies as well as towards their participation in a learning organization, communities of practice and knowledge management, competency management, ICT-security awareness and management of innovation and change.

An unexpected research result was that female officers evaluate themselves less confident and less competent in a number of ICT- and ICT-related items which might have implications for the gender policy in the NLDO.

The contribution to computer- assisted education is that in the case study the need for some applications is established in the labour environment and this could be used as a motivator to use those applications in education and ways can be sought in computer assisted education to satisfy those identified needs. This kind of research is encouraged by Frowein & Kan (2003). In general the research results can be seen as a needs analysis regarding ICT- and ICT-competencies for the training of officers, which has clearly implications for their training environment. In this sense a learning programme in this regard can be seen as a demand-driven innovation in the education of officers.

Some insight is obtained in how a digital environment can be used to develop ICT- and ICT-related competencies in higher education. This research may have some relevance for higher education in general and as such a contribution is made to the field of innovation practice in education.

The research results indicate that there is a positive correlation between the private use of the computer and the confidence in using ICT. It is plausible that the more a computer is used the more confident and competent a person becomes in using ICT, which could

be a further motivator to use the computer in the training environment. Tijdens & Steijn (2005) have found in this regard that the willingness of employees to acquire ICT-competencies are primarily influenced by the use of ICT, an informed ICT-strategy of the organization and an intensive personnel policy which seem to emphasize the findings of this research.

5.3.10 Limitations of the research

This research was an attempt to provide a global overview and the focus was therefore broad instead of deep and focussed. The focus of this research was on management of ICT from a human resource development perspective and not from the perspective of business-information management.

The research questions turned out more complex than anticipated and a selection had to be made to make the research manageable, whereby not in all instances the right decisions were made. For example it was decided to reduce the number of personal questions in the questionnaire; A direct question about age was left out since it was anticipated that the number of years that officers are working in the NLDO could be used as an indicator of age, but it turned out not to be a solid enough indicator of age to base any conclusions on. It was therefore not possible to verify if younger officers who have grown up with computers evaluated themselves more competent than older officers in the various ICT- competencies like finding information on the Internet. Since learning and knowledge management is seen as especially important in the information society a substantial number of questions were used in this scale and fewer questions in the other scales, which means that they were in some instances rather superficial. In hindsight it would perhaps have been better to balance the number of questions more evenly over all the scales.

Furthermore, it would have been better to include a direct question about whether the officers had received the short or long version of the officer's training since officers with a long version of the training are trained at an academic level in the FMW and other officers are not necessarily trained at an academic level although many of them did complete a higher education. Although it is assumed that the head officers have

completed the long version of the training that is currently offered by the FMW of the NLDA, there might be a few exceptions since the organization currently offers excelling officers with a shorter training programme, similar contracts to officers with a longer training. In the past those contracts were exclusively reserved for officers with the longer training.

Although some of the scales for example on creating and participation in the learning organization are sound, some aspects of the research, for example the scales about info-stress, change management and innovation management are rather superficial because only a few items were used and hence not deeply focused enough to obtain meaningful results on a detailed level but rather provide an indication of the current situation.

Competence of the officers was not measured against specific performance criteria, but was used as an indication of commitment (attitude), knowledge about as well as skills and behaviour in the opinion of the officer themselves. Since competence was not evaluated according to a set of performance criteria the results can only be seen as an indication of competence and no further conclusions can be drawn. When the results show that female officers evaluate themselves as less competent compared to how their male colleagues evaluate themselves it can therefore not be concluded that they are in fact less competent. From the literature it seems as if other factors influence their own evaluation like a lower self confidence or perhaps their evaluation is more realistic than the evaluation of their male colleagues. Further research is therefore needed in order to make any firm conclusion in this regard.

One respondent wrote on the questionnaire that it was unfortunate that the NATO – ICT systems like CRONOS were not included in the research, since in his opinion those systems are similar to the Intranet and Internet of the NLDO and are equally important.

5.4 Recommendations

5.4.1 Recommendations for the NLDA

In order to deal with a competence profile for the students it would be necessary to determine specific performance criteria for the identified ICT- and ICT-related competencies so that individual students could be evaluated against those performance criteria.

It is recommended that a subject or learning trajectory is created in the NLDA that covers all the aspects of ICT- and ICT-related competencies. This subject could be named for example 'ICT for managers'. Furthermore, a member of staff could be made responsible to develop the curriculum for this subject, teach the theoretical aspects and oversees and consolidates the development of the identified ICT- and ICT-related competencies in an integrated approach across the curriculum. Aspects of the programme could fall outside the academic forming and be included in the military forming. Different approaches could be implemented for the different officer's training programmes, since some of the programmes have already been altered recently in order to include some of the identified aspects. The responsible member of staff could also investigate what available digital learning materials could be used and/or adjusted in such a learning programme. Furthermore, the NLDA could obtain access to open source digital learning modules and use what is applicable and available. The learning modules and/or –objects could be adjusted where necessary to make them more suitable for the context in which they are used. Furthermore, the staff members of the NLDA could be encouraged to contribute towards such initiatives in a database with learning objects, which are flexible and learner-centered. Openness in terms of sharing and cooperation could be encouraged amongst staff. Furthermore, ethical aspects of using information like understanding legal issues like copyright could be included in such a development programme as well as e-literacy skills identified by Town (2003).

In order to facilitate the aspects that are thought of across the curriculum it is necessary that a number of teaching staff participate in the newly envisaged learning programme. In order to prepare the teaching staff sufficiently to participate in this programme, it is

proposed that a development programme for teaching staff will be made available. In this regard it is recommended that the NLDA works towards becoming a learning organization where staff development and –support should be in constant demand. Improvements in teaching in and beyond the learning management system TeleTop that is used in the NLDA. Opportunities to develop on-line facilitating skills should be included as well as aspects like instructional design. The member of staff taking on the responsibility of the learning programme 'ICT for managers' could be involved in such a development programme for staff and encourage staff to participate in this learning programme across the curriculum as well as offering assistance in instructional design principles. Furthermore, it could be investigated further if and in way performance support could be provided online to teachers in the NLDO.

The FMW is in principle an institution of higher education where blended learning is used, but it could be investigated whether there exists a justifiable need for a digital learning environment as a means of distance education for some students that have been employed by the NLDO for a longer period of time and have received a military/maritime as well as personal forming in the organization, but have been selected to do a shorter version of the academic programme in order to become officers. Especially in the marines such a need was expressed.

A distance learning programme consisting of a number of modules could be developed so that the officers currently working in the NLDO could participate in the modules that they require in order to function more effectively in their current working environment. This could be complemented by occasional face-to-face meetings. Such learning programme could perhaps be facilitated via the NLDA. It could also be investigated if the Human Resource Academy that commenced the 1st of July 2006, and is part of the NLDA could offer digital learning modules related to for example competency management. Furthermore, it could be investigated further if and in what way information, communication and technological performance support could be provided online to the officers in the NLDO.

It needs to be noted however that changes in education should be seen as a process (Plomp, 2006) and therefore it is recommended that the development programmes

recommended earlier for both learners and teachers need to be continually evaluated and adjusted where necessary.

5.4.2 Recommendations for the NLDO

The NLDO is in a process of changing into a learning organization which is a complex process and requires a professional approach (Brophy, 2003; Rosenberg, 2006). The complexity of obtaining a clear picture of the communication patterns, networks and systems in an organization (Robbins & Coulter, 2003) motivates for a further investigation into the roles of information professionals in the organization. In this regard Stoker (2005) argues that managers have a need for professional advisors who could reduce the complexity of the information they have to deal with on a regular basis. This idea is supported by Ausubel (2000). Such professionals could further investigate what kind of performance support could be made available on-line to officers in the NLDO.

Based on the research results it appears to be important to investigate ways to improve the search facilities of the Intranet of the NLDO. Since research has shown that an effective ICT- infrastructure yields sustained competitive advantage for organizations (Byrd, 2001) it might also be important to investigate further the perceived slow connection to the Internet.

Since a number of officers in the operational units and/or participating in a mission indicated their frustrations about the ICT-facilitities that are currently available. It appears worthwhile to investigate whether the current ICT-facilities are indeed adequate for the changed ways of working that are required in the information society. Interesting to note in this regard is that the trade unions FVNO/ MHB[7] included the following phrase in their proposal for negotiations about a new collective labour agreement for 2007-2008: "... en het vervangen van verantwoordelijkheid door overdreven regelgeving en slechte ICT zijn denigrerend." (FVNO/MHB, 2007:1). [... and replacing responsibility by exaggerated legislation and bad ICT is denigratory].

[7] The FVNO/MHB is the federation of the Netherlands officers and middle and higher civilian staff of the Netherlands Defence Organization.

This phrase also indicates frustration about the excessive legislation in response to ICT-security breaches. This frustration was also mentioned by some of the officers which indicated that they understand and are willing to take on the responsibility with regards to ICT-security.

5.4.3 Recommendations for further research

The approach of this research was to create a wide overview in the field and therefore it was not possible to focus deeply on the various items themselves. It is recommended that further specialized research is done in the separate items in order to determine the specific performance criteria that need to be included in a student competency profile.

Since adaptivity, creativity and learning how to learn are seen as essential competencies for leaders in a fast changing environment (Yukl, 2006; Zaccaro, 2006; Hargrove, 2001; Robbins & Coulter, 2003) it appears important to obtain further insight in how those competencies could be developed and what the role of a digital learning environment could be in supporting the development of those competencies. Ausubel (2001) claims in this regard that creativity can only be achieved through continuing attention.

It appears worthwhile to research what kind of information, communication and technological online performance support would be useful to officers in the NLDO and how this could be made available to the officers. This could limit the amount of training time away from the workplace and could provide support at the time that it is required (Rosenberg, 2006; Rosett, 2007).

The results of this case study are used to suggest a general model for information, communication and technological competencies required by managers in the information society and offers a first instrumentalization for this model, this model might have implications for the development needs for students in higher education in general. This could be researched further.

Furthermore, the research instruments could be slightly adjusted by removing military specific topics and repeated in a civil large organization to investigate whether there are

differences between a military organization and a civil organization regarding the influence of ICT on the labour situation of managers.

Female officers evaluate their competence on a number of ICT- and ICT-related items lower compared to how male officers evaluate themselves. This could indicate that female officers have less self-confidence or are more realistic in their self-evaluation. However, it could also mean that they are less competent. This might have implications for the gender policy in organizations and appears to be an important issue for further research.

Further research appears to be necessary about how organizational culture is related to what information and knowledge is and to whom or what it belongs. In order to make changed and more effective ways of working in the information society possible it appears to be necessary to adjust aspects of the current culture of the organization in this regard.

The teaching staff is an essential role player in implementing the digital learning environment (Reeves e.a., 2005). From the literature it is not clear how teaching staff become committed to the digital learning environment in such a way that they fully face the challenges of integrating the digital learning environment with their more traditional methods of teaching. Further research is necessary in this regard in order to utilize the opportunities of the digital learning environment in institutions of higher education.

5.5 Conclusion

In conclusion it can be said that this research shows that ICT and the information society have a serious influence on the labour situation of the officers for which the officers are not in all instances prepared. Therefore it can be said that the changed labour environment makes it necessary to revisit the curriculum as well as the role of ICT in the learning environment of the officers doing their initial training in the Netherlands Defence Academy as well as for the officers currently working in the Netherlands Defence Organization. This also has implications for the development programme for teachers in the Netherlands Defence Academy.

Furthermore, a general model for information, communication and technological competencies required by managers in the information society is suggested and a first instrumentalization for this model is provided. This model will need to be adjusted in accordance with further research results and new technologies becoming available.

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Addendum 1 Results of searches

In the table is indicated what the relevant results were of searches done in PiCarta when the research was commenced in January 2005. The combination of keywords used are only indicated in English but were also translated and used in the Dutch language. The research results reflect all results from 2000 that were found in English and Dutch sources in relation to a combination of keywords used which were compared with the title words and keywords connected to the documents. For a number of terms synonyms or alternative terms were used as is indicated by the footnotes.

Combinations of keywords used	**Results in Picarta**	
	Number found according to the criteria	**Number relevant to this research**
'academic' and 'competencies'	28	4
'academic' and 'competencies' and 'leadership[1]'	5	2
'academic' and 'competencies' and 'management[2]'	14	3
'competencies' and 'knowledge management'	8	4
'competencies' and 'knowledge management' and 'academic'	4	0
'competencies' and 'knowledge management' and 'management'	7	3
'competencies' and 'learning organization[3]'	3	1
'ICT[4]' and 'competencies' and 'academic'	6	0
'ICT' and 'competencies' and 'management'	2	1
'ICT' and 'competencies' and 'leadership'	1	1
'ICT' and 'competencies'	9	4
'ICT' and 'security' and 'awareness'	11	8
'ICT' and 'security' and 'leadership'	3	1
'ICT' and 'security' and 'management'	28	11
'Information society' and 'academic competencies'	1	0
'Information society' and 'competency management'	0	0

[1] Leadership, leader
[2] Management, managerial
[3] Organization, organisation
[4] ICT, information technology

‘informaton society’ and ‘change’	66	9
‘informaton society’ and ‘change’ and ‘leadership’	3	0
‘informaton society’ and ‘change’ and ‘management’	9	3
‘Information society’ and ‘knowledge management’	6	2
‘Information society’ and ‘learning organization’	1	1
‘information behaviour’ and management	9	0
‘innovation’ and ‘ict’ and ‘competencies’	2	1
‘innovation’ and ‘management’ and ‘competencies’	3	3
‘innovation’ and ‘leadership’ and ‘competencies’	1	1

Addendum 2 Semi-structured interviews

Introduction and explanation of the purpose of the research and the role the interviews play in the research

In short is the purpose of the research to determine the influence of ICT on the labour situation of the officer in the Netherlands Defence Organization (NLDO). Furthermore to obtain insight in the ICT and ICT-related competencies that are required at academic working and thinking level in the NLDO. The results of this research will be used to support the implementation of a digital learning environment of the Faculty of Military Sciences of the Netherlands Defence Academy. The results of the research will be processed anonymously.

1. What are in your opinion the important ICT-competencies that officers need in order to function effectively in the NLDO? Which ICT generic and specific applications are necessary, how is ICT used at an operational, structural and strategic level?

2. What are in your opinion the ICT-competencies that officers need in order to function effectively during operational missions (Including international cooperation, sharing information and ensuring security of information)?

3. What is in your opinion the role that mobile technology could play in supporting the working activities in the NLDO at an academic working and thinking level?

4. What is in your opinion the role of the officer regarding creating a learning organization within the NLDO, the role of communities of practice, knowledge management, competency management , creating security awareness amongst their staff and the management of changes and innovation as a result of implementation of ICT.

5. What is in your opinion the current status and importance of agreement of univocal standards for provision of information and ICT-architecture (regarding

software, hardware and networks) nationally in the NLDO and internationally between military partners?

6. How could in your opinion a digital learning environment be used to support the development of the required ICT and ICT-related academic competencies within the Faculty of Military Sciences of the Netherlands Defence Academy.

7. What is in your opinion the need for a digital learning environment for current academic employees of the NLDO?

Any further comments?

Addendum 3 Questionnaire

Supporting the development of ICT- related academic competencies in a digital learning environment.

Dear Participant

You are invited to participate in a research project aimed at determining the influence of ICT on the working environment and to determine the ICT-related competencies that are required at academic working and thinking level in the Netherlands Defence Organization (NLDO). The results of this research will be used to support the implementation of a digital learning environment of the Faculty of Military Sciences of the Netherlands Defence Academy.

Your participation in this research project is voluntary and confidential. The questionnaire will take approximately 25 minutes to complete.

If you are willing to participate in this study, please sign this letter as a declaration of your consent, i.e. that you participate in this project willingly and that you understand that you may withdraw from the research project at any time.

Your participation in this research project is highly appreciated.

Participant's name :.....

Participant's signature :…….. Date:……..

Yours Sincerely

drs. E. Broos
e-mail: e.broos@kim.nl

Date: June 2006

Section A

This section contains personal questions that will be used to determine if there exist differences in the results related to gender, different defence organizations and different functions.

1. Indicate your gender:
   - O Female
   - O Male

2. Indicate full time or part time:
   - O Full time (at least 36 hours per week)
   - O Part time

3. Indicate for which section of the Netherlands Defence Organization you were initially trained:
   - O Navy
   - O Army
   - O Airforce
   - O Military Police

4. Indicate your current rank:……

5. How many years have you been working as an officer? …….

6. For which service profession were you trained?……

7. Select the category that indicates best the kind of work you do in your current function:

   - O Policymaking
   - O Personnel
   - O Logistics
   - O Communication and information systems
   - O Planning and control
   - O Education and training
   - O Technical and Electronical design and maintenance
   - O Military operational

   - O Other, please specify: ……

8. Please indicate if you have access to the Internet and/or the Intranet of the NLDO:

Internet	O Yes	O No
Intranet of the NLDO	O Yes	O No

9. On average how many hours do you spend on the computer per week for private use? ..

Section B

The following questions will be used to determine your opinion about the influence of ICT on your working environment, the use of ICT required in your function and the ICT-related competencies that are required in your function.

10. On average how many hours do you spend on the computer per week for your work? ….

11. On average how many hours do you spend on the Internet per week for your work? ….

12. On average how many hours do you spend on the Intranet of the NLDO per week? ….

13. On average how many hours per week do you work at home during working hours? Regular:..... Overtime:.....

14. On average how many work-related e-mails do you receive each working day?.....

15. **Please indicate the importance of the following software applications in your working situation.**

Software application	Do not use	Not so important	Important	Very important
Electronic agenda	O	O	O	O
Video conferencing	O	O	O	O
On-line discussion	O	O	O	O
Internet	O	O	O	O
Intranet NLDO	O	O	O	O
PowerPoint	O	O	O	O
Excel	O	O	O	O
Access	O	O	O	O
Information Management System	O	O	O	O
Project planning system	O	O	O	O
Electronic cooperation system	O	O	O	O
Competency management system	O	O	O	O
Tool to organize your thoughts	O	O	O	O

Please indicate to what extent the following statements apply to you in your working situation.

To what extent do the following statements apply to you in your working situation?	Does not apply at all	Applies seldomly	Applies partly	Applies mainly	Applies entirely
16. I receive e-mail that is not directly relevant for my work.	O	O	O	O	O
17. The number of e-mails that I receive make my work stressful.	O	O	O	O	O
18. It is important in my function to communicate internationally via e-mail.	O	O	O	O	O
19. I experience stress as a result of using ICT in my work (e.g. software, printers, availability of network).	O	O	O	O	O
20. I experience stress as a result of using ICT in my work because I do not have enough knowledge about it.	O	O	O	O	O
21. It happens that I receive important information too late because there are ICT problems.	O	O	O	O	O
22. Using ICT in my work makes me uncertain.	O	O	O	O	O
23. It is important that I receive information immediately as it becomes available.	O	O	O	O	O
24. I lose production time because I am not familiar with the software applications.	O	O	O	O	O

To what extent do the following statements apply to you in your working situation?	Does not apply at all	Applies seldomly	Applies partly	Applies mainly	Applies entirely
25. I know enough about ICT networks in order to know what can and cannot be done.	O	O	O	O	O
26. I am able to use all the software applications that I need in my work effectively.	O	O	O	O	O
27. I manage my e-mail effectively.	O	O	O	O	O
28. I organize my information effectively on the computer.	O	O	O	O	O
29. I do communicate electronically with other professionals about my work.	O	O	O	O	O
30. It is important in my function to find relevant information on the Internet.	O	O	O	O	O
31. I would like to know how I could find information on the Internet more effectively.	O	O	O	O	O
32. I waste time finding relevant information on the Internet.	O	O	O	O	O
33. ICT makes my work more productive.	O	O	O	O	O
34. I have enough insight in ICT in order to participate in decision-making in this regard.	O	O	O	O	O
35. I ask others to help me with ICT.	O	O	O	O	O
36. I know how to obtain access to work related sections of the Internet for which you need special authorization.	O	O	O	O	O
37. It is easy for me to evaluate the credibility of the information I find on the Internet.	O	O	O	O	O
38. The amount of information that I have to work through daily makes my work stressful.	O	O	O	O	O
39. I know where to find information on the Internet about relevant courses and studies for myself.	O	O	O	O	O
40. I have the opportunity to learn via the Internet during working hours.	O	O	O	O	O
41. In my function it is important to continue to learn all the time.	O	O	O	O	O

To what extent do the following statements apply to you in your working situation?	Does not apply at all	Applies seldomly	Applies partly	Applies mainly	Applies entirely
42. I can always find work related information on the Internet just in time when I need it.	O	O	O	O	O
43. I obtain ideas from the work of others that I find on the Internet to improve my own work.	O	O	O	O	O
44. Working at home is productive.	O	O	O	O	O
45. It is important in my function to find relevant information on the Intranet of the NLDO.	O	O	O	O	O
46. It is always easy to find relevant information on the Intranet of the NLDO.	O	O	O	O	O
47. I waste time finding relevant information on the Intranet of the NLDO.	O	O	O	O	O
48. I participate in keeping the information on the Intranet of the NLDO up to date.	O	O	O	O	O
49. I obtain ideas from the work of others that I find on the intranet of the NLDO to improve my own work.	O	O	O	O	O
50. It is important to store the knowledge of my section electronically.	O	O	O	O	O
51. I have the opportunity to learn via the Intranet of the NLDO during working hours.	O	O	O	O	O
52. It would be useful if the intranet of the NLDO could be used to study or take courses directly related to my work.	O	O	O	O	O
53. I share my work-related knowledge with others electronically using a share.	O	O	O	O	O
54. I spend time to organize electronically the working knowledge of the unit I am responsible for.	O	O	O	O	O
55. I think of ways to improve the sharing of information electronically.	O	O	O	O	O
56. I spend time to improve the sharing of organizational knowledge electronically.	O	O	O	O	O

To what extent do the following statements apply to you in your working situation?	Does not apply at all	Applies seldomly	Applies partly	Applies mainly	Applies entirely
57. I benefit from colleagues who share their experiences/ lessons learnt with me.	O	O	O	O	O
58. I share the mistakes that I made and what I learnt from it with my colleagues.	O	O	O	O	O
59. I play an important role in managing the knowledge of the organization electronically.	O	O	O	O	O
60. I use my computer to obtain insight in the competencies needed in the organization.	O	O	O	O	O
61. I reflect on the security of information in the NLDO.	O	O	O	O	O
62. I know what the ICT security risks of the Internet are.	O	O	O	O	O
63. I identify and recognize important information in an information rich environment.	O	O	O	O	O
64. I reflect on how information can be managed more effectively.	O	O	O	O	O
65. I play an important role in organizing the flow of information in my organization unit.	O	O	O	O	O
66. Dealing with organizational knowledge effectively in the NLDO needs to improve.	O	O	O	O	O
67. It is important for my organization unit to share working knowledge and information with international partners.	O	O	O	O	O
68. I implement new ways of working with information in the organization.	O	O	O	O	O
69. I have enough autonomy to work in the way that I find best.	O	O	O	O	O
70. I reflect about the integrity of the information that I am responsible for.	O	O	O	O	O
71. I consider renewal projects as a challenge.	O	O	O	O	O
72. I know how to manage change effectively.	O	O	O	O	O
73. Support in developing new ideas is always found in the NLDO.	O	O	O	O	O

To what extent do the following statements apply to you in your working situation?	Does not apply at all	Applies seldomly	Applies partly	Applies mainly	Applies entirely
74. I know how I can accompany changes effectively in the organization.	O	O	O	O	O
75. Online (video) conferencing is an acceptable alternative to face-to-face meetings in the NLDO.	O	O	O	O	O
76. I would like to learn how to participate in online (video) conferencing.	O	O	O	O	O
77. Communication is important during a change in the organization.	O	O	O	O	O
78. ICT has changed the way of working in the organization.	O	O	O	O	O
79. I use creative ideas to improve the working method.	O	O	O	O	O

If you currently do not have subordinates, please continue with section C.

80. Indicate if your subordinates have access to the Internet and/or the Intranet of the NLDO:

Internet	O Yes	O No
Intranet of the NLDO	O Yes	O No

To what extent do the following statements apply to you in your working situation?	Does not apply at all	Applies seldomly	Applies partly	Applies mainly	Applies entirely
81. I know where to find information on the Internet about relevant courses and studies for my subordinates.	O	O	O	O	O
82. I allow my subordinates to learn via the Internet during working hours.	O	O	O	O	O
83. I encourage my subordinates to share their working knowledge with others electronically.	O	O	O	O	O
84. I discuss the advantages of sharing working knowledge electronically with my subordinates.	O	O	O	O	O
85. I use my computer to store relevant information about the potential of my subordinates.	O	O	O	O	O
86. I encourage my subordinates to participate in the thinking process about improving the working processes.	O	O	O	O	O
87. I encourage ICT security awareness amongst my subordinates.	O	O	O	O	O

To what extent do the following statements apply to you in your working situation?	Does not apply at all	Applies seldomly	Applies partly	Applies mainly	Applies entirely
88. I recognize development needs of my subordinates.	O	O	O	O	O
89. I facilitate the development needs of my subordinates.	O	O	O	O	O
90. I allow my subordinates to work in the way they find best.	O	O	O	O	O
91. I allow my subordinates to make mistakes.	O	O	O	O	O
92. I know how I can deal with the resistance my subordinates have against changes in the organization.	O	O	O	O	O

Section C

Please indicate which of the following items in your opinion need to get sufficient attention during the initial study at the FMW of the NDLA (KIM, KMA or IDL).

O (On-line) video conferencing.
O Advanced use of presentation software (PowerPoint).
O Advanced use of a spreadsheet (Excel).
O Advanced use of a database (Access).
O Advanced use of Word.
O Use of digital command and control software.
O Use of Management Information software.
O Use of a computer supported project planning system.
O Use of a computer supported competency management system.
O Use of a computer supported cooperative work system.
O Use of a computer supported tool to organize your thoughts (MindManager).
O Making a contribution to a learning organization.
O Effective management of information and knowledge in an organization.
O Effective management of competencies in an organization.
O Effective management of ICT security awareness.
O Effective management of innovations.
O Effective management of change.

If you have further comments you are welcome to place them at the back of this questionnaire.
Thank you for your participation!

Addendum 4 Group discussion

1. What are the relevant ICT-trends for the NLDO?

2. What ICT-management issues are at the moment relevant for the NLDO?

3. What are the important ICT-related opportunities for the NLDO?

4. What are the important ICT-related problems for the NLDO?

5. In what way does the NLDO fundamentally change as a result of ICT?

6. What is the influence of ICT on employees in the NLDO?

7. What are the ICT-related competencies that are required by officers in the NLDO?

8. Discuss how students in training could develop the identified ICT-related competencies.

9. What would you have liked to learn about ICT during your study and did not?

Addendum 5 Statistical analysis using SPSS

1.1 Background information of the respondents

Main function area	Code group	Code	Explanation
Personnel	1	MSD ARB P&O GKD SPR ARS	Militair psychological Arbo Personnel Health service Sport training Medical
Administration, logistic	2	ADM BEZ MLO LOG INT	Administration Business economical Mat/log Logistics Intendance
Communication and information systems	3	MET LUV VBD	Meteorology Air force information Connection service
Planning and control	4	JUR MJD F&E MIV	Juridical Military Juridical Financial economical Management of information and security
Technical and electronic design and maintenance	5	GEN TD WD, GL ELC	Genie Technical Weapons Electronic
Military Operational	6	INF ART CAV ZEE MRN FP SPD KMR OPD VLG	Infantry Artillery Cavalry Sea service Marines Force protection Special service Military police Operational service Pilots

1.1.1 Significant correlations related to background information of respondents

Correlation between the variables 'sex' and 'contract'

Sex * Contract Crosstabulation

Count

		Contract		
		Full-time	Part-time	Total
Sex	Male	219	1	220
	Female	22	4	26
Total		241	5	246

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	26,030[b]	1	,000		
Continuity Correction[a]	19,072	1	,000		
Likelihood Ratio	13,749	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	25,924	1	,000		
N of Valid Cases	246				

a. Computed only for a 2x2 table

b. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,53.

Initial_Training * Main_function Crosstabulation

Count

		Main_function								
		Policy and governing	Personel, Human resource management	Logistics	Information and communication systems	Planning and control, incl. legal issues	Education and training	Technical and electronic design and maintenance	Military operational	Total
Initial_Training	Personnel	0	15	1	1	0	3	0	1	21
	Administrative, logistic	4	4	24	3	11	4	1	2	53
	Communication and information systems	1	0	0	9	0	1	1	2	14
	Planning and control, juridical	1	0	0	0	3	1	0	1	6
	Technical and electronic design and maintenance	8	3	9	3	7	7	16	2	55
	Military operational	6	7	1	8	1	20	1	53	97
Total		20	29	35	24	22	36	19	61	246

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	1.123	.000
	Cramer's V	.502	.000
N of Valid Cases		246	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Correlation between the variables 'years working as officer' in the NLDO and the rank of officer.

Correlations

			Y_workOff (Banded)	Rank
Spearman's rho	Y_workOff (Banded)	Correlation Coefficient	1,000	,843**
		Sig. (2-tailed)	.	,000
		N	246	246
	Rank	Correlation Coefficient	,843**	1,000
		Sig. (2-tailed)	,000	.
		N	246	246

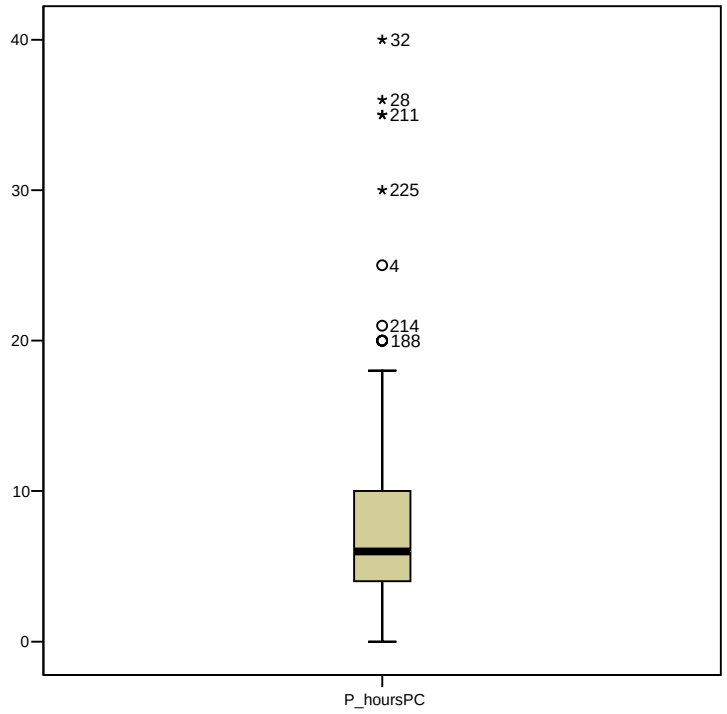
**. Correlation is significant at the 0.01 level (2-tailed).

1.2 Use of the PC

1.2.1 Private use of the PC at home

Descriptives

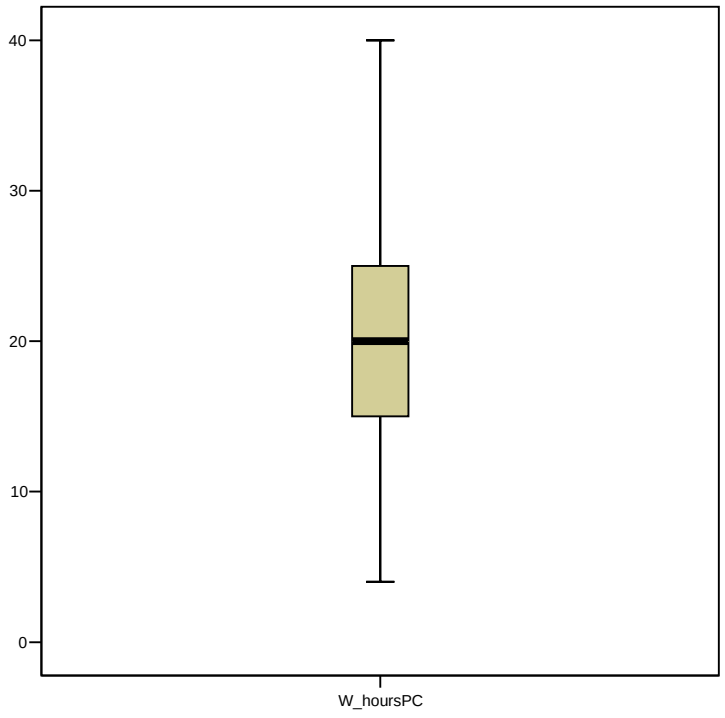
			Statistic	Std. Error
P_hoursPC	Mean		7.56	.402
	95% Confidence Interval for Mean	Lower Bound	6.77	
		Upper Bound	8.35	
	5% Trimmed Mean		6.87	
	Median		6.00	
	Variance		38.956	
	Std. Deviation		6.241	
	Minimum		0	
	Maximum		40	
	Range		40	
	Interquartile Range		7	
	Skewness		2.155	.157
	Kurtosis		6.990	.312



1.2.2 PC use at work

Descriptives

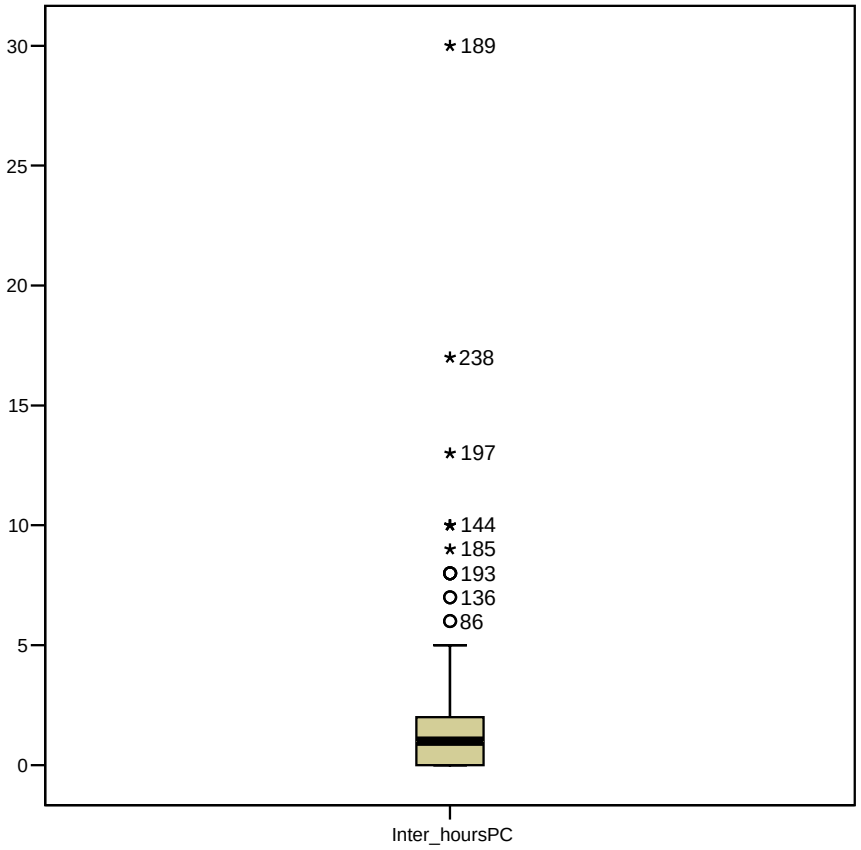
			Statistic	Std. Error
W_hoursPC	Mean		20,90	,475
	95% Confidence Interval for Mean	Lower Bound	19,97	
		Upper Bound	21,84	
	5% Trimmed Mean		20,88	
	Median		20,00	
	Variance		55,533	
	Std. Deviation		7,452	
	Minimum		4	
	Maximum		40	
	Range		36	
	Interquartile Range		10	
	Skewness		,044	,155
	Kurtosis		-,023	,309



1.2.3 Use of the Internet at work

Descriptives

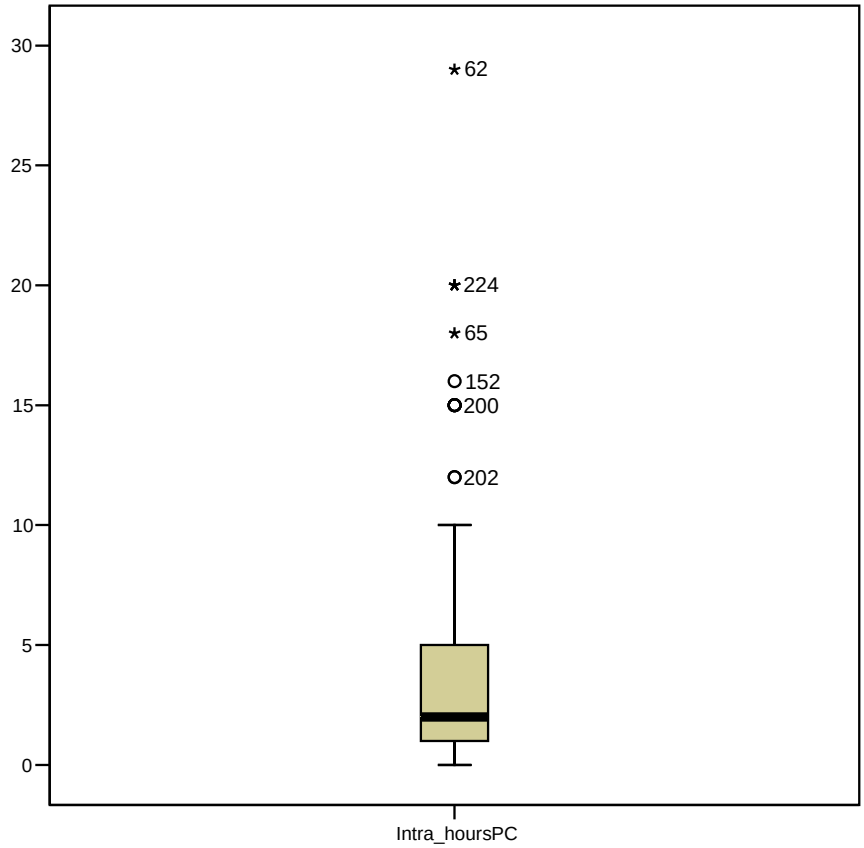
			Statistic	Std. Error
Inter_hoursPC	Mean		1.97	.192
	95% Confidence Interval for Mean	Lower Bound	1.59	
		Upper Bound	2.34	
	5% Trimmed Mean		1.54	
	Median		1.00	
	Variance		8.925	
	Std. Deviation		2.987	
	Minimum		0	
	Maximum		30	
	Range		30	
	Interquartile Range		2	
	Skewness		4.738	.156
	Kurtosis		34.825	.311



1.2.4 Use of the Intranet of the NLDO

Descriptives

			Statistic	Std. Error
Intra_hoursPC	Mean		3.77	.265
	95% Confidence Interval for Mean	Lower Bound	3.24	
		Upper Bound	4.29	
	5% Trimmed Mean		3.20	
	Median		2.00	
	Variance		17.118	
	Std. Deviation		4.137	
	Minimum		0	
	Maximum		29	
	Range		29	
	Interquartile Range		4	
	Skewness		2.567	.156
	Kurtosis		8.584	.310



1.2.5 Significant differences related to use of the PC

Initial training

ANOVA

P_hoursPC

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	627,292	5	125,458	3,380	,006
Within Groups	8722,086	235	37,115		
Total	9349,378	240			

Descriptives

P_hoursPC

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Personnel	21	6,19	4,802	1,048	4,00	8,38	1	20
Administrative, logistic	52	7,54	3,963	,550	6,44	8,64	2	20
Communication and information systems	13	14,15	11,459	3,178	7,23	21,08	1	40
Planning and control, juridical	5	7,00	5,385	2,408	,31	13,69	2	15
Technical and electronic design and maintenance	59	7,05	5,625	,732	5,59	8,52	0	35
Military operational	91	7,31	6,611	,693	5,93	8,68	0	36
Total	241	7,56	6,241	,402	6,77	8,35	0	40

Multiple Comparisons

Dependent Variable: P_hoursPC

LSD

(I) Initial_Training	(J) Initial_Training	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Personnel	Administrative, logistic	-1,348	1,575	,393	-4,45	1,76
	Communication and information systems	-7,963*	2,150	,000	-12,20	-3,73
	Planning and control, juridical	-,810	3,032	,790	-6,78	5,16
	Technical and electronic design and maintenance	-,860	1,548	,579	-3,91	2,19
	Military operational	-1,117	1,475	,450	-4,02	1,79
Administrative, logistic	Personnel	1,348	1,575	,393	-1,76	4,45
	Communication and information systems	-6,615*	1,889	,001	-10,34	-2,89
	Planning and control, juridical	,538	2,853	,850	-5,08	6,16
	Technical and electronic design and maintenance	,488	1,159	,674	-1,80	2,77
	Military operational	,231	1,059	,828	-1,86	2,32
Communication and information systems	Personnel	7,963*	2,150	,000	3,73	12,20
	Administrative, logistic	6,615*	1,889	,001	2,89	10,34
	Planning and control, juridical	7,154*	3,206	,027	,84	13,47
	Technical and electronic design and maintenance	7,103*	1,867	,000	3,43	10,78
	Military operational	6,846*	1,806	,000	3,29	10,40
Planning and control, juridical	Personnel	,810	3,032	,790	-5,16	6,78
	Administrative, logistic	-,538	2,853	,850	-6,16	5,08
	Communication and information systems	-7,154*	3,206	,027	-13,47	-,84
	Technical and electronic design and maintenance	-,051	2,838	,986	-5,64	5,54
	Military operational	-,308	2,798	,913	-5,82	5,21
Technical and electronic design and maintenance	Personnel	,860	1,548	,579	-2,19	3,91
	Administrative, logistic	-,488	1,159	,674	-2,77	1,80
	Communication and information systems	-7,103*	1,867	,000	-10,78	-3,43
	Planning and control, juridical	,051	2,838	,986	-5,54	5,64
	Military operational	-,257	1,018	,801	-2,26	1,75
Military operational	Personnel	1,117	1,475	,450	-1,79	4,02
	Administrative, logistic	-,231	1,059	,828	-2,32	1,86
	Communication and information systems	-6,846*	1,806	,000	-10,40	-3,29
	Planning and control, juridical	,308	2,798	,913	-5,21	5,82
	Technical and electronic design and maintenance	,257	1,018	,801	-1,75	2,26

*. The mean difference is significant at the .05 level.

Main function and the use of the computer at work

ANOVA

W_hoursPC

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1119.195	7	159.885	2.996	.005
Within Groups	12702.338	238	53.371		
Total	13821.533	245			

Descriptives

W_hoursPC

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Policy and governing	20	22,25	6,616	1,479	19,15	25,35	12	35
Personel, Human resource management	29	21,72	8,940	1,660	18,32	25,12	6	40
Logistics	35	20,40	6,713	1,135	18,09	22,71	6	30
Information and communication systems	24	24,38	6,665	1,360	21,56	27,19	15	45
Planning and control, incl. legal issues	22	23,23	7,451	1,589	19,92	26,53	8	36
Education and training	36	18,64	8,312	1,385	15,83	21,45	4	40
Technical and electronic design and maintenance	19	23,79	4,504	1,033	21,62	25,96	20	36
Military operational	61	18,67	7,222	,925	16,82	20,52	4	40
Total	246	20,92	7,511	,479	19,98	21,87	4	45

Multiple Comparisons

Dependent Variable: W_hoursPC
LSD

(I) Main_function	(J) Main_function	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Policy and governing	Personel, Human resource management	,526	2,123	,805	-3,66	4,71
	Logistics	1,850	2,048	,367	-2,18	5,88
	Information and communication systems	-2,125	2,212	,338	-6,48	2,23
	Planning and control, incl. legal issues	-,977	2,257	,665	-5,42	3,47
	Education and training	3,611	2,037	,078	-,40	7,62
	Technical and electronic design and maintenance	-1,539	2,340	,511	-6,15	3,07
	Military operational	3,578	1,882	,059	-,13	7,29
Personel, Human resource management	Policy and governing	-,526	2,123	,805	-4,71	3,66
	Logistics	1,324	1,834	,471	-2,29	4,94
	Information and communication systems	-2,651	2,016	,190	-6,62	1,32
	Planning and control, incl. legal issues	-1,503	2,066	,467	-5,57	2,57
	Education and training	3,085	1,823	,092	-,51	6,68
	Technical and electronic design and maintenance	-2,065	2,156	,339	-6,31	2,18
	Military operational	3,052	1,648	,065	-,19	6,30
Logistics	Policy and governing	-1,850	2,048	,367	-5,88	2,18
	Personel, Human resource management	-1,324	1,834	,471	-4,94	2,29
	Information and communication systems	-3,975*	1,936	,041	-7,79	-,16
	Planning and control, incl. legal issues	-2,827	1,988	,156	-6,74	1,09
	Education and training	1,761	1,734	,311	-1,66	5,18
	Technical and electronic design and maintenance	-3,389	2,082	,105	-7,49	,71
	Military operational	1,728	1,549	,266	-1,32	4,78
Information and communication systems	Policy and governing	2,125	2,212	,338	-2,23	6,48
	Personel, Human resource management	2,651	2,016	,190	-1,32	6,62
	Logistics	3,975*	1,936	,041	,16	7,79
	Planning and control, incl. legal issues	1,148	2,156	,595	-3,10	5,40
	Education and training	5,736*	1,925	,003	1,94	9,53
	Technical and electronic design and maintenance	,586	2,243	,794	-3,83	5,00
	Military operational	5,703*	1,760	,001	2,24	9,17
Planning and control, incl. legal issues	Policy and governing	,977	2,257	,665	-3,47	5,42
	Personel, Human resource management	1,503	2,066	,467	-2,57	5,57
	Logistics	2,827	1,988	,156	-1,09	6,74
	Information and communication systems	-1,148	2,156	,595	-5,40	3,10
	Education and training	4,588*	1,977	,021	,69	8,48
	Technical and electronic design and maintenance	-,562	2,288	,806	-5,07	3,95
	Military operational	4,555*	1,817	,013	,98	8,13
Education and training	Policy and governing	-3,611	2,037	,078	-7,62	,40
	Personel, Human resource management	-3,085	1,823	,092	-6,68	,51
	Logistics	-1,761	1,734	,311	-5,18	1,66
	Information and communication systems	-5,736*	1,925	,003	-9,53	-1,94
	Planning and control, incl. legal issues	-4,588*	1,977	,021	-8,48	-,69
	Technical and electronic design and maintenance	-5,151*	2,072	,014	-9,23	-1,07
	Military operational	-,033	1,535	,983	-3,06	2,99
Technical and electronic design and maintenance	Policy and governing	1,539	2,340	,511	-3,07	6,15
	Personel, Human resource management	2,065	2,156	,339	-2,18	6,31
	Logistics	3,389	2,082	,105	-,71	7,49
	Information and communication systems	-,586	2,243	,794	-5,00	3,83
	Planning and control, incl. legal issues	,562	2,288	,806	-3,95	5,07
	Education and training	5,151*	2,072	,014	1,07	9,23
	Military operational	5,117*	1,919	,008	1,34	8,90
Military operational	Policy and governing	-3,578	1,882	,059	-7,29	,13
	Personel, Human resource management	-3,052	1,648	,065	-6,30	,19
	Logistics	-1,728	1,549	,266	-4,78	1,32
	Information and communication systems	-5,703*	1,760	,001	-9,17	-2,24
	Planning and control, incl. legal issues	-4,555*	1,817	,013	-8,13	-,98
	Education and training	,033	1,535	,983	-2,99	3,06
	Technical and electronic design and maintenance	-5,117*	1,919	,008	-8,90	-1,34

*. The mean difference is significant at the .05 level.

The main function area of the officer and the use of the Internet at work

Descriptives

Inter_hoursPC

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Personnel	21	1,81	2,522	,550	,66	2,96	0	10
Administrative, logistic	53	1,64	1,982	,272	1,10	2,19	0	10
Communication and information systems	14	4,71	7,995	2,137	,10	9,33	0	30
Planning and control, juridical	6	2,33	3,386	1,382	-1,22	5,89	0	9
Technical and electronic design and maintenance	60	1,82	2,281	,294	1,23	2,41	0	13
Military operational	89	1,84	2,426	,257	1,33	2,35	0	17
Total	243	1,97	2,987	,192	1,59	2,34	0	30

ANOVA

Inter_hoursPC

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	115,338	5	23,068	2,674	,023
Within Groups	2044,398	237	8,626		
Total	2159,737	242			

Multiple Comparisons

Dependent Variable: Inter_hoursPC

LSD

(I) Initial_Training	(J) Initial_Training	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Personnel	Administrative, logistic	,168	,757	,825	-1,32	1,66
	Communication and information systems	-2,905*	1,013	,005	-4,90	-,91
	Planning and control, juridical	-,524	1,360	,700	-3,20	2,15
	Technical and electronic design and maintenance	-,007	,745	,992	-1,47	1,46
	Military operational	-,033	,713	,963	-1,44	1,37
Administrative, logistic	Personnel	-,168	,757	,825	-1,66	1,32
	Communication and information systems	-3,073*	,883	,001	-4,81	-1,33
	Planning and control, juridical	-,692	1,265	,585	-3,18	1,80
	Technical and electronic design and maintenance	-,175	,554	,752	-1,27	,92
	Military operational	-,201	,510	,693	-1,21	,80
Communication and information systems	Personnel	2,905*	1,013	,005	,91	4,90
	Administrative, logistic	3,073*	,883	,001	1,33	4,81
	Planning and control, juridical	2,381	1,433	,098	-,44	5,20
	Technical and electronic design and maintenance	2,898*	,872	,001	1,18	4,61
	Military operational	2,872*	,844	,001	1,21	4,54
Planning and control, juridical	Personnel	,524	1,360	,700	-2,15	3,20
	Administrative, logistic	,692	1,265	,585	-1,80	3,18
	Communication and information systems	-2,381	1,433	,098	-5,20	,44
	Technical and electronic design and maintenance	,517	1,258	,682	-1,96	2,99
	Military operational	,491	1,239	,692	-1,95	2,93
Technical and electronic design and maintenance	Personnel	,007	,745	,992	-1,46	1,47
	Administrative, logistic	,175	,554	,752	-,92	1,27
	Communication and information systems	-2,898*	,872	,001	-4,61	-1,18
	Planning and control, juridical	-,517	1,258	,682	-2,99	1,96
	Military operational	-,026	,491	,958	-,99	,94
Military operational	Personnel	,033	,713	,963	-1,37	1,44
	Administrative, logistic	,201	,510	,693	-,80	1,21
	Communication and information systems	-2,872*	,844	,001	-4,54	-1,21
	Planning and control, juridical	-,491	1,239	,692	-2,93	1,95
	Technical and electronic design and maintenance	,026	,491	,958	-,94	,99

*. The mean difference is significant at the .05 level.

1.2.6 Significant correlations related to use of the PC

Correlations

		P_hoursPC	W_hoursPC	Inter_ hoursPC	Intra_ hoursPC
P_hoursPC	Pearson Correlation	1	,198**	,427**	-,021
	Sig. (2-tailed)		,002	,000	,741
	N	241	241	238	239
W_hoursPC	Pearson Correlation	,198**	1	,201**	,149*
	Sig. (2-tailed)	,002		,002	,020
	N	241	246	243	244
Inter_hoursPC	Pearson Correlation	,427**	,201**	1	-,030
	Sig. (2-tailed)	,000	,002		,646
	N	238	243	243	243
Intra_hoursPC	Pearson Correlation	-,021	,149*	-,030	1
	Sig. (2-tailed)	,741	,020	,646	
	N	239	244	243	244

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

1.2.7 Number of work related e-mails

1.2.7.1 Significant differences related to the number of e-mails

Group Statistics

	Rank2	N	Mean	Std. Deviation	Std. Error Mean
W_emails	Subaltern officers	112	15,62	10,617	1,003
	Head officers	130	21,55	13,821	1,212

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
W_emails	Equal variances assumed	6,431	,012	-3,697	240	,000	-5,930	1,604	-9,090	-2,770
	Equal variances not assumed			-3,769	237,013	,000	-5,930	1,573	-9,030	-2,830

1.3 Info-stress

I receive e-mail that is not directly relevant for my work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	35	14,2	14,2	14,2
	applies seldomly	117	47,6	47,6	61,8
	applies partly	71	28,9	28,9	90,7
	applies mainly	12	4,9	4,9	95,5
	applies entirely	11	4,5	4,5	100,0
	Total	246	100,0	100,0	

median and mode: “applies seldomly”.

The number of e-mails that I receive make my work stressful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	84	34,1	34,1	34,1
	applies seldomly	83	33,7	33,7	67,9
	applies partly	54	22,0	22,0	89,8
	applies mainly	13	5,3	5,3	95,1
	applies entirely	12	4,9	4,9	100,0
	Total	246	100,0	100,0	

median:”does not apply at all”.
mode:”applies seldomly”.

I experience stress as a result of using ICT in my work (e.g. software, printers, availability of network.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	23	9.3	9.3	9.3
	applies seldomly	64	26.0	26.0	35.4
	applies partly	81	32.9	32.9	68.3
	applies mainly	47	19.1	19.1	87.4
	applies entirely	31	12.6	12.6	100.0
	Total	246	100.0	100.0	

median and mode: “applies partly”.

I experience stress as a result of using ICT in my work because I do not have enough knowledge about it.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	88	35.8	35.8	35.8
	applies seldomly	104	42.3	42.3	78.0
	applies partly	51	20.7	20.7	98.8
	applies mainly	2	.8	.8	99.6
	applies entirely	1	.4	.4	100.0
	Total	246	100.0	100.0	

median and mode: “applies seldomly”

It happens that I receive important information too late because there are ICT problems.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	36	14.6	14.6	14.6
	applies seldomly	127	51.6	51.6	66.3
	applies partly	63	25.6	25.6	91.9
	applies mainly	7	2.8	2.8	94.7
	applies entirely	13	5.3	5.3	100.0
	Total	246	100.0	100.0	

median and mode: “applies seldomly”

Using ICT in my work makes me uncertain.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	194	78.9	78.9	78.9
	applies seldomly	46	18.7	18.7	97.6
	applies partly	3	1.2	1.2	98.8
	applies mainly	1	.4	.4	99.2
	applies entirely	2	.8	.8	100.0
	Total	246	100.0	100.0	

median and mode: “does not apply at all”.

'he amount of information that I have to work through daily makes my work stressful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	36	14.6	14.6	14.6
	applies seldomly	92	37.4	37.4	52.0
	applies partly	79	32.1	32.1	84.1
	applies mainly	30	12.2	12.2	96.3
	applies entirely	9	3.7	3.7	100.0
	Total	246	100.0	100.0	

median and mode: “applies seldomly”.

1.3.1 The scale of info-stress

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.642	.636	7

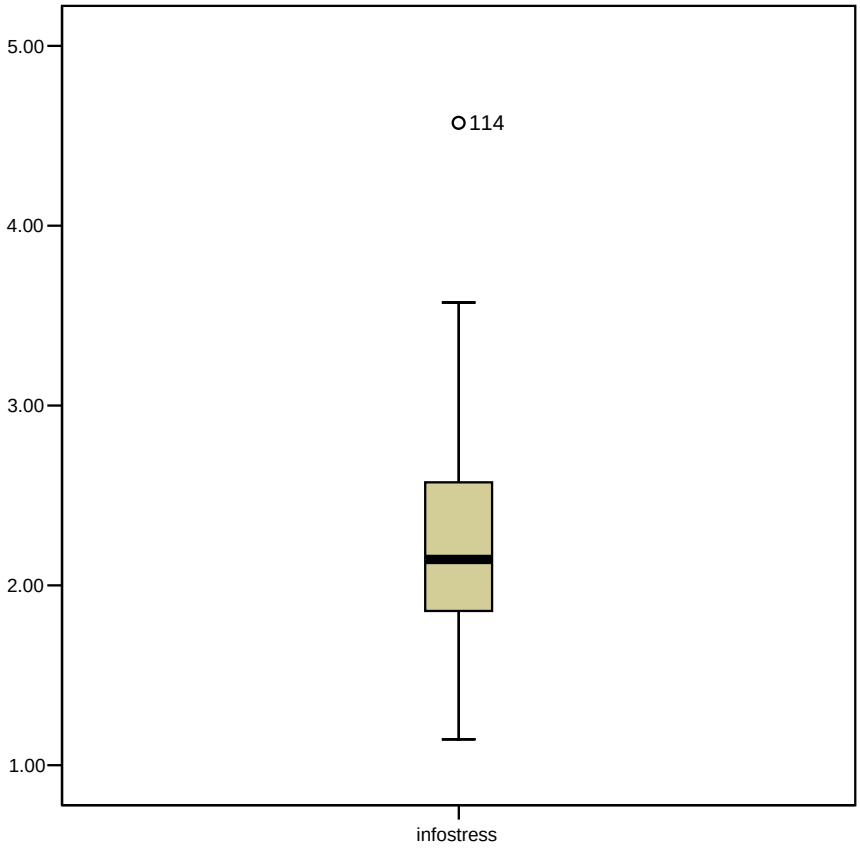
Descriptives

			Statistic	Std. Error
infostress	Mean		2.2131	.03404
	95% Confidence Interval for Mean	Lower Bound	2.1461	
		Upper Bound	2.2802	
	5% Trimmed Mean		2.2046	
	Median		2.1429	
	Variance		.285	
	Std. Deviation		.53386	
	Minimum		1.14	
	Maximum		4.57	
	Range		3.43	
	Interquartile Range		.71	
	Skewness		.407	.155
	Kurtosis		.744	.309

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	2.213	1.256	2.996	1.740	2.385	.298	7

The covariance matrix is calculated and used in the analysis.



In the boxplot can be seen a few respondents experience info-stress, in particular one respondent (26 years working as officer), but that most of the respondents do not experience info-stress on a regular basis.

1.3.2 Factor analysis related to info-stress

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,245	32,075	32,075	2,245	32,075	32,075	1,798	25,682	25,682
2	1,312	18,739	50,814	1,312	18,739	50,814	1,486	21,223	46,905
3	1,003	14,322	65,136	1,003	14,322	65,136	1,276	18,231	65,136
4	,889	12,705	77,841						
5	,726	10,378	88,218						
6	,460	6,576	94,794						
7	,364	5,206	100,000						

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component		
	1	2	3
q16	,570	,078	,004
q17	,879	,043	,063
q19	,159	,825	,161
q20	,125	,245	,714
q21	,029	,854	,051
q22	,037	-,015	,842
q38	,811	,084	,157

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 4 iterations.

1.4 Mobility

Statement 18

It is important in my function to communicate via e-mail internationally.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	56	22.8	22.8	22.8
	applies seldomly	57	23.2	23.2	45.9
	applies partly	44	17.9	17.9	63.8
	applies mainly	31	12.6	12.6	76.4
	applies entirely	58	23.6	23.6	100.0
	Total	246	100.0	100.0	

Statement 29

I do communicate electronically with other professionals about my work.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	7	2.8	2.8	2.8
	applies seldomly	18	7.3	7.3	10.2
	applies partly	47	19.1	19.1	29.3
	applies mainly	116	47.2	47.2	76.4
	applies entirely	58	23.6	23.6	100.0
	Total	246	100.0	100.0	

Statement 23

It is important that I receive information immediately as it becomes available.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	4	1.6	1.6	1.6
	applies seldomly	11	4.5	4.5	6.1
	applies partly	51	20.7	20.7	26.8
	applies mainly	88	35.8	35.8	62.6
	applies entirely	92	37.4	37.4	100.0
	Total	246	100.0	100.0	

1.4.1 Significant differences related to the questions about mobility

Ranks

	Rank2	N	Mean Rank	Sum of Ranks
q18	Subaltern officers	114	101,29	11547,00
	Head officers	132	142,68	18834,00
	Total	246		
q29	Subaltern officers	114	119,52	13625,00
	Head officers	132	126,94	16756,00
	Total	246		
q23	Subaltern officers	114	120,11	13692,50
	Head officers	132	126,43	16688,50
	Total	246		

Test Statistics[a]

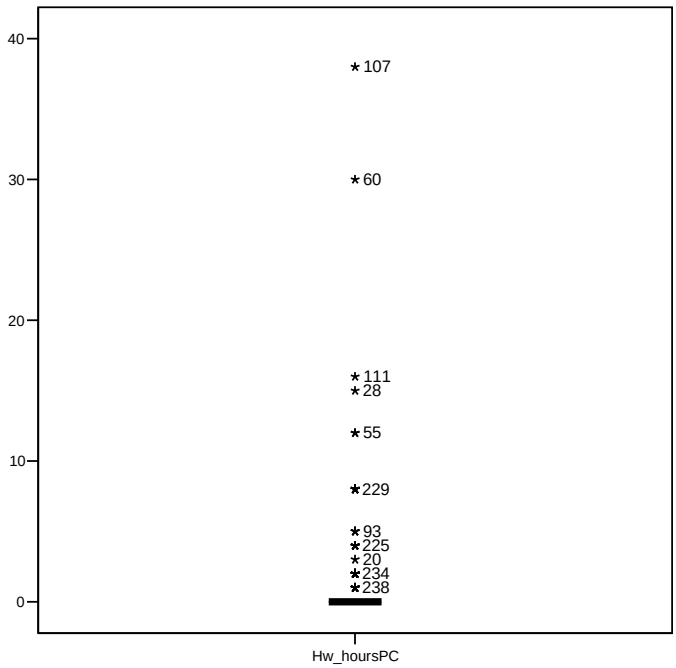
	q18	q29	q23
Mann-Whitney U	4992,000	7070,000	7137,500
Wilcoxon W	11547,000	13625,000	13692,500
Z	-4,656	-,872	-,735
Asymp. Sig. (2-tailed)	,000	,383	,462

a. Grouping Variable: Rank2

1.4.2 Working at home (during working hours)

Descriptives

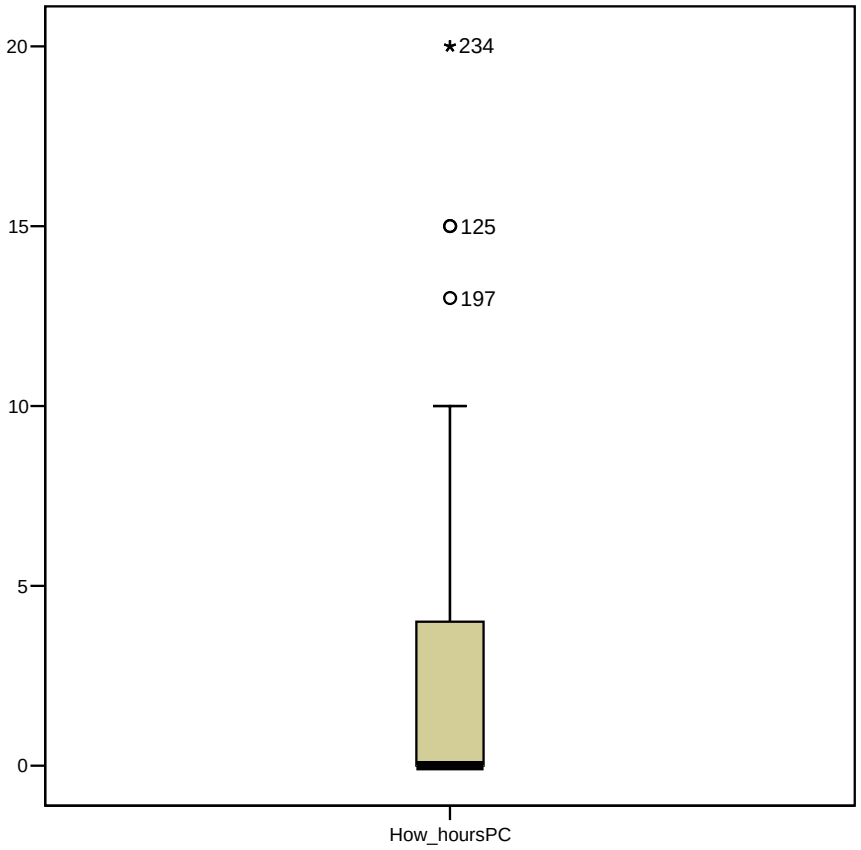
			Statistic	Std. Error
Hw_hoursPC	Mean		1.07	.245
	95% Confidence Interval for Mean	Lower Bound	.59	
		Upper Bound	1.56	
	5% Trimmed Mean		.41	
	Median		.00	
	Variance		14.683	
	Std. Deviation		3.832	
	Minimum		0	
	Maximum		38	
	Range		38	
	Interquartile Range		0	
	Skewness		6.312	.156
	Kurtosis		49.471	.310



1.4.3 Working overtime (at home)

Descriptives

			Statistic	Std. Error
How_hoursPC	Mean		2.40	.231
	95% Confidence Interval for Mean	Lower Bound	1.95	
		Upper Bound	2.86	
	5% Trimmed Mean		1.96	
	Median		.00	
	Variance		12.981	
	Std. Deviation		3.603	
	Minimum		0	
	Maximum		20	
	Range		20	
	Interquartile Range		4	
	Skewness		2.015	.156
	Kurtosis		4.857	.310



Statement 44

Working at home is productive.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	40	16.3	16.5	16.5
	applies seldomly	34	13.8	14.0	30.5
	applies slightly	34	13.8	14.0	44.4
	applies mainly	89	36.2	36.6	81.1
	applies entirely	46	18.7	18.9	100.0
	Total	243	98.8	100.0	
Missing	System	3	1.2		
Total		246	100.0		

1.4.4 Significant differences and correlations related to mobility

Descriptives

How_hoursPC

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Royal Army	101	2,42	3,403	,339	1,75	3,09	0	13
Royal Airforce	67	2,15	2,862	,350	1,45	2,85	0	10
Royal Navy	57	1,86	3,598	,477	,91	2,81	0	20
Royal Military Police	19	4,84	5,757	1,321	2,07	7,62	0	20
Total	244	2,40	3,603	,231	1,95	2,86	0	20

ANOVA

How_hoursPC

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	134,209	3	44,736	3,555	,015
Within Groups	3020,277	240	12,584		
Total	3154,487	243			

Multiple Comparisons

Dependent Variable: How_hoursPC

LSD

(I) Defence_component	(J) Defence_component	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Royal Army	Royal Airforce	,272	,559	,628	-,83	1,37
	Royal Navy	,561	,588	,341	-,60	1,72
	Royal Military Police	-2,421*	,887	,007	-4,17	-,67
Royal Airforce	Royal Army	-,272	,559	,628	-1,37	,83
	Royal Navy	,290	,639	,651	-,97	1,55
	Royal Military Police	-2,693*	,922	,004	-4,51	-,88
Royal Navy	Royal Army	-,561	,588	,341	-1,72	,60
	Royal Airforce	-,290	,639	,651	-1,55	,97
	Royal Military Police	-2,982*	,940	,002	-4,83	-1,13
Royal Military Police	Royal Army	2,421*	,887	,007	,67	4,17
	Royal Airforce	2,693*	,922	,004	,88	4,51
	Royal Navy	2,982*	,940	,002	1,13	4,83

*. The mean difference is significant at the .05 level.

Descriptives

How_hoursPC

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
LTZ3 - LTZ2OC, ELTN - KAP	113	1,65	2,685	,253	1,15	2,16	0	10
LTZ1, Maj	67	2,28	4,238	,518	1,24	3,31	0	20
LNTKOL, Overste, Kltz	50	3,66	3,788	,536	2,58	4,74	0	15
KTZ of KOL	14	4,57	4,380	1,171	2,04	7,10	0	13
Total	244	2,40	3,603	,231	1,95	2,86	0	20

ANOVA

How_hoursPC

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	209,156	3	69,719	5,681	,001
Within Groups	2945,330	240	12,272		
Total	3154,487	243			

Group Statistics

	Rank2	N	Mean	Std. Deviation	Std. Error Mean
How_hoursPC	Subaltern officers	113	1,65	2,685	,253
	Head officers	131	3,05	4,141	,362

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
How_hoursPC	Equal variances assumed	14,476	,000	-3,067	242	,002	-1,395	,455	-2,291	-,499
	Equal variances not assumed			-3,161	225,455	,002	-1,395	,441	-2,264	-,525

Correlations

			Rank	How_ hoursPC
Spearman's rho	Rank	Correlation Coefficient	1,000	,247**
		Sig. (2-tailed)	.	,000
		N	246	244
	How_hoursPC	Correlation Coefficient	,247**	1,000
		Sig. (2-tailed)	,000	.
		N	244	244

**. Correlation is significant at the 0.01 level (2-tailed).

1.5 Influence of productivity

I lose production time because I am not familiair with the software applications

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	62	25.2	25.2	25.2
	applies seldomly	109	44.3	44.3	69.5
	applies partly	59	24.0	24.0	93.5
	applies mainly	14	5.7	5.7	99.2
	applies entirely	2	.8	.8	100.0
	Total	246	100.0	100.0	

median and mode: “applies seldomly”.

I would like to know how I could find information on the Internet more effectively

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	40	16.3	16.3	16.3
	applies seldomly	80	32.5	32.7	49.0
	applies partly	57	23.2	23.3	72.2
	applies mainly	42	17.1	17.1	89.4
	applies entirely	26	10.6	10.6	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

median:”applies partly” and mode:”applies seldomly”.

I waste a lot of time finding relevant information on the Internet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	60	24.4	24.5	24.5
	applies seldomly	93	37.8	38.0	62.4
	applies partly	51	20.7	20.8	83.3
	applies mainly	24	9.8	9.8	93.1
	applies entirely	17	6.9	6.9	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

median and mode:"applies seldomly".

I ask others to help me with ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	22	8.9	8.9	8.9
	applies seldomly	106	43.1	43.1	52.0
	applies partly	76	30.9	30.9	82.9
	applies mainly	33	13.4	13.4	96.3
	applies entirely	9	3.7	3.7	100.0
	Total	246	100.0	100.0	

median and mode:"applies seldomly".

I waste time finding relevant information on the Intranet of the NLDO

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	16	6.5	6.6	6.6
	applies seldomly	65	26.4	26.6	33.2
	applies partly	82	33.3	33.6	66.8
	applies mainly	58	23.6	23.8	90.6
	applies entirely	23	9.3	9.4	100.0
	Total	244	99.2	100.0	
Missing	System	2	.8		
Total		246	100.0		

1.5.1 The scales related to productivity

The first scale which is not used

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.688	.677	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
q24recoded	17.1728	10.920	.526	.317	.618
q31recoded	17.7778	9.107	.559	.480	.593
q32recoded	17.4115	9.251	.591	.488	.581
q35recoded	17.6379	11.158	.425	.248	.646
q47recoded	18.0617	11.529	.289	.098	.691
q33	17.1440	13.363	.132	.026	.720

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
21.0412	14.759	3.84170	6

The second scale which is used

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,720	,721	5

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3,429	2,979	3,868	,889	1,298	,116	5

The covariance matrix is calculated and used in the analysis.

Scale Statistics

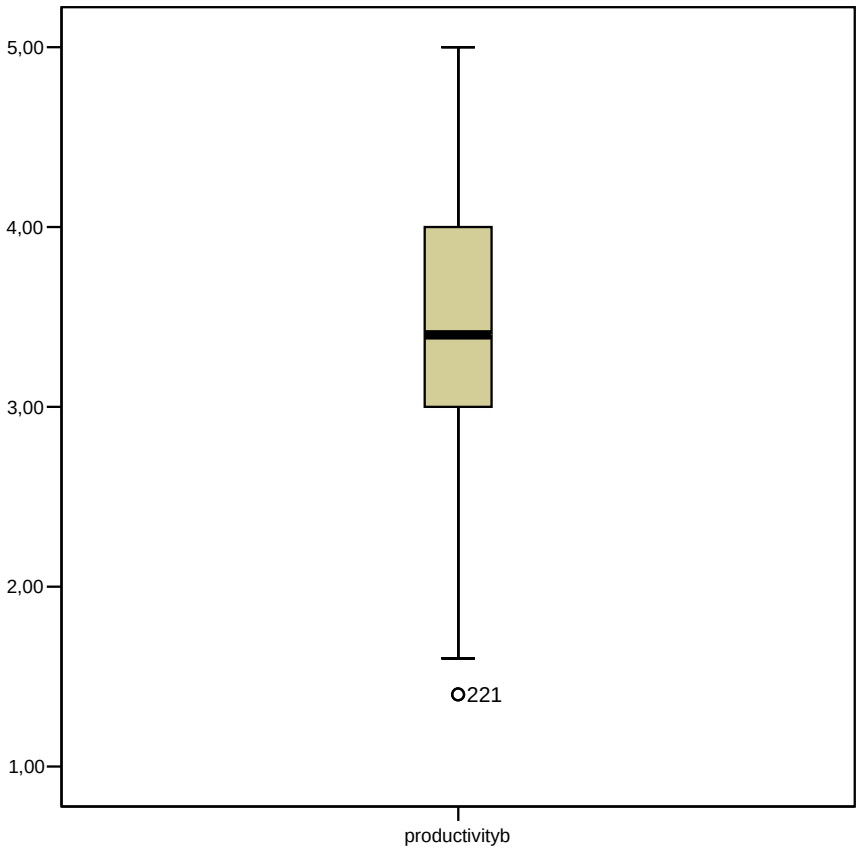
Mean	Variance	Std. Deviation	N of Items
17,1440	13,363	3,65561	5

Descriptive Statistics

	N	Minimum	Maximum	Mean		Std.
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
productivitya	246	1,40	5,00	3,4304	,04690	,73566
Valid N (listwise)	246					

Descriptives

			Statistic	Std. Error
productivityb	Mean		3,4304	,04690
	95% Confidence Interval for Mean	Lower Bound	3,3380	
		Upper Bound	3,5227	
	5% Trimmed Mean		3,4509	
	Median		3,4000	
	Variance		,541	
	Std. Deviation		,73566	
	Minimum		1,40	
	Maximum		5,00	
	Range		3,60	
	Interquartile Range		1,00	
	Skewness		-,376	,155
	Kurtosis		-,028	,309



Direct question 'ICT makes my work more productive'

ICT makes my work more productive

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	1	.4	.4	.4
	applies seldomly	14	5.7	5.7	6.1
	applies partly	42	17.1	17.1	23.2
	applies mainly	141	57.3	57.3	80.5
	applies entirely	48	19.5	19.5	100.0
	Total	246	100.0	100.0	

median and mode:"applies mainly".

1.5.2 Significant differences related to productivity

Descriptives

productivitya

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Personnel	21	3,0857	,84041	,18339	2,7032	3,4683	1,60	4,60
Administrative, logistic	53	3,3774	,64290	,08831	3,2002	3,5546	1,40	5,00
Communication and information systems	14	3,8286	,64621	,17271	3,4555	4,2017	2,60	4,80
Planning and control, juridical	6	3,5111	,58373	,23831	2,8985	4,1237	2,67	4,40
Technical and electronic design and maintenance	60	3,6200	,63213	,08161	3,4567	3,7833	1,80	4,80
Military operational	92	3,3500	,80254	,08367	3,1838	3,5162	1,40	5,00
Total	246	3,4304	,73566	,04690	3,3380	3,5227	1,40	5,00

ANOVA

productivitya

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7,654	5	1,531	2,941	,013
Within Groups	124,937	240	,521		
Total	132,591	245			

Multiple Comparisons

Dependent Variable: productivitya

LSD

(I) Initial_Training	(J) Initial_Training	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Personnel	Administrative, logistic	-,29164	,18604	,118	-,6581	,0748
	Communication and information systems	-,74286*	,24894	,003	-1,2332	-,2525
	Planning and control, juridical	-,42540	,33399	,204	-1,0833	,2325
	Technical and electronic design and maintenance	-,53429*	,18294	,004	-,8946	-,1739
	Military operational	-,26429	,17449	,131	-,6080	,0794
Administrative, logistic	Personnel	,29164	,18604	,118	-,0748	,6581
	Communication and information systems	-,45121*	,21681	,038	-,8783	-,0241
	Planning and control, juridical	-,13375	,31078	,667	-,7460	,4785
	Technical and electronic design and maintenance	-,24264	,13601	,076	-,5106	,0253
	Military operational	,02736	,12442	,826	-,2177	,2725
Communication and information systems	Personnel	,74286*	,24894	,003	,2525	1,2332
	Administrative, logistic	,45121*	,21681	,038	,0241	,8783
	Planning and control, juridical	,31746	,35206	,368	-,3761	1,0110
	Technical and electronic design and maintenance	,20857	,21415	,331	-,2133	,6304
	Military operational	,47857*	,20698	,022	,0708	,8863
Planning and control, juridical	Personnel	,42540	,33399	,204	-,2325	1,0833
	Administrative, logistic	,13375	,31078	,667	-,4785	,7460
	Communication and information systems	-,31746	,35206	,368	-1,0110	,3761
	Technical and electronic design and maintenance	-,10889	,30893	,725	-,7174	,4997
	Military operational	,16111	,30401	,597	-,4378	,7600
Technical and electronic design and maintenance	Personnel	,53429*	,18294	,004	,1739	,8946
	Administrative, logistic	,24264	,13601	,076	-,0253	,5106
	Communication and information systems	-,20857	,21415	,331	-,6304	,2133
	Planning and control, juridical	,10889	,30893	,725	-,4997	,7174
	Military operational	,27000*	,11973	,025	,0342	,5058
Military operational	Personnel	,26429	,17449	,131	-,0794	,6080
	Administrative, logistic	-,02736	,12442	,826	-,2725	,2177
	Communication and information systems	-,47857*	,20698	,022	-,8863	-,0708
	Planning and control, juridical	-,16111	,30401	,597	-,7600	,4378
	Technical and electronic design and maintenance	-,27000*	,11973	,025	-,5058	-,0342

*. The mean difference is significant at the .05 level.

Descriptives

productivitya

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Policy and governing	20	3,5300	,73778	,16497	3,1847	3,8753	2,40	4,80
Personel, Human resource management	29	3,2483	,61564	,11432	3,0141	3,4825	2,40	4,60
Logistics	35	3,2914	,62937	,10638	3,0752	3,5076	1,60	4,20
Information and communication systems	24	3,8417	,74828	,15274	3,5257	4,1576	1,80	4,80
Planning and control, incl. legal issues	22	3,7091	,48884	,10422	3,4924	3,9258	2,40	4,60
Education and training	36	3,2685	,73748	,12291	3,0190	3,5180	1,40	4,80
Technical and electronic design and maintenance	19	3,5895	,74974	,17200	3,2281	3,9508	2,20	5,00
Military operational	61	3,3475	,83339	,10670	3,1341	3,5610	1,40	5,00
Total	246	3,4304	,73566	,04690	3,3380	3,5227	1,40	5,00

ANOVA

productivitya

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	9,447	7	1,350	2,608	,013
Within Groups	123,144	238	,517		
Total	132,591	245			

Multiple Comparisons

Dependent Variable: productivitya

LSD

(I) Main_function	(J) Main_function	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Policy and governing	Personel, Human resource management	,28172	,20907	,179	-,1301	,6936
	Logistics	,23857	,20163	,238	-,1586	,6358
	Information and communication systems	-,31167	,21778	,154	-,7407	,1174
	Planning and control, incl. legal issues	-,17909	,22224	,421	-,6169	,2587
	Education and training	,26148	,20061	,194	-,1337	,6567
	Technical and electronic design and maintenance	-,05947	,23044	,797	-,5134	,3945
	Military operational	,18246	,18534	,326	-,1827	,5476
Personel, Human resource management	Policy and governing	-,28172	,20907	,179	-,6936	,1301
	Logistics	-,04315	,18062	,811	-,3990	,3127
	Information and communication systems	-,59339*	,19850	,003	-,9844	-,2024
	Planning and control, incl. legal issues	-,46082*	,20337	,024	-,8615	-,0602
	Education and training	-,02024	,17948	,910	-,3738	,3333
	Technical and electronic design and maintenance	-,34120	,21231	,109	-,7594	,0770
	Military operational	-,09927	,16225	,541	-,4189	,2204
Logistics	Policy and governing	-,23857	,20163	,238	-,6358	,1586
	Personel, Human resource management	,04315	,18062	,811	-,3127	,3990
	Information and communication systems	-,55024*	,19064	,004	-,9258	-,1747
	Planning and control, incl. legal issues	-,41766*	,19571	,034	-,8032	-,0321
	Education and training	,02291	,17075	,893	-,3135	,3593
	Technical and electronic design and maintenance	-,29805	,20498	,147	-,7018	,1058
	Military operational	-,05611	,15253	,713	-,3566	,2444
Information and communication systems	Policy and governing	,31167	,21778	,154	-,1174	,7407
	Personel, Human resource management	,59339*	,19850	,003	,2024	,9844
	Logistics	,55024*	,19064	,004	,1747	,9258
	Planning and control, incl. legal issues	,13258	,21231	,533	-,2857	,5508
	Education and training	,57315*	,18956	,003	,1997	,9466
	Technical and electronic design and maintenance	,25219	,22089	,255	-,1829	,6873
	Military operational	,49413*	,17332	,005	,1527	,8356
Planning and control, incl. legal issues	Policy and governing	,17909	,22224	,421	-,2587	,6169
	Personel, Human resource management	,46082*	,20337	,024	,0602	,8615
	Logistics	,41766*	,19571	,034	,0321	,8032
	Information and communication systems	-,13258	,21231	,533	-,5508	,2857
	Education and training	,44057*	,19466	,025	,0571	,8240
	Technical and electronic design and maintenance	,11962	,22528	,596	-,3242	,5634
	Military operational	,36155*	,17889	,044	,0091	,7140
Education and training	Policy and governing	-,26148	,20061	,194	-,6567	,1337
	Personel, Human resource management	,02024	,17948	,910	-,3333	,3738
	Logistics	-,02291	,17075	,893	-,3593	,3135
	Information and communication systems	-,57315*	,18956	,003	-,9466	-,1997
	Planning and control, incl. legal issues	-,44057*	,19466	,025	-,8240	-,0571
	Technical and electronic design and maintenance	-,32096	,20397	,117	-,7228	,0809
	Military operational	-,07902	,15118	,602	-,3768	,2188
Technical and electronic design and maintenance	Policy and governing	,05947	,23044	,797	-,3945	,5134
	Personel, Human resource management	,34120	,21231	,109	-,0770	,7594
	Logistics	,29805	,20498	,147	-,1058	,7018
	Information and communication systems	-,25219	,22089	,255	-,6873	,1829
	Planning and control, incl. legal issues	-,11962	,22528	,596	-,5634	,3242
	Education and training	,32096	,20397	,117	-,0809	,7228
	Military operational	,24193	,18898	,202	-,1304	,6142
Military operational	Policy and governing	-,18246	,18534	,326	-,5476	,1827
	Personel, Human resource management	,09927	,16225	,541	-,2204	,4189
	Logistics	,05611	,15253	,713	-,2444	,3566
	Information and communication systems	-,49413*	,17332	,005	-,8356	-,1527
	Planning and control, incl. legal issues	-,36155*	,17889	,044	-,7140	-,0091
	Education and training	,07902	,15118	,602	-,2188	,3768
	Technical and electronic design and maintenance	-,24193	,18898	,202	-,6142	,1304

*. The mean difference is significant at the .05 level.

Kruskal-Wallis Test

Ranks

	Initial_Training	N	Mean Rank
productivityb	Personnel	21	95,48
	Administrative, logistic	53	116,14
	Communication and information systems	14	164,04
	Planning and control, juridical	6	129,25
	Technical and electronic design and maintenance	60	142,15
	Military operational	92	115,43
	Total	246	

Test Statistics[a,b]

	productivityb
Chi-Square	13,819
df	5
Asymp. Sig.	,017

a. Kruskal Wallis Test

b. Grouping Variable: Initial_Training

Kruskal-Wallis Test

Ranks

	Main_function	N	Mean Rank
productivityb	Policy and governing	20	128,68
	Personel, Human resource management	29	101,03
	Logistics	35	109,50
	Information and communication systems	24	166,88
	Planning and control, incl. legal issues	22	152,32
	Education and training	36	106,97
	Technical and electronic design and maintenance	19	136,76
	Military operational	61	118,68
	Total	246	

Test Statistics[a,b]

	productivityb
Chi-Square	19,914
df	7
Asymp. Sig.	,006

a. Kruskal Wallis Test

b. Grouping Variable: Main_function

1.5.3 Factor analysis related to productivity

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,151	43,023	43,023	2,151	43,023	43,023	2,037	40,730	40,730
2	1,026	20,526	63,550	1,026	20,526	63,550	1,141	22,820	63,550
3	,837	16,732	80,282						
4	,665	13,290	93,572						
5	,321	6,428	100,000						

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component	
	1	2
q24recoded	,646	,261
q32recoded	,869	,061
q31recoded	,865	,005
q47recoded	,332	,528
q33	-,069	,889

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

1.6 Confidence in using ICT

Using ICT in my work makes me uncertain

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	194	78.9	78.9	78.9
	applies seldomly	46	18.7	18.7	97.6
	applies partly	3	1.2	1.2	98.8
	applies mainly	1	.4	.4	99.2
	applies entirely	2	.8	.8	100.0
	Total	246	100.0	100.0	

median and mode:'does not apply at all'

I know enough about ICT networks in order to know what can and cannot be done

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	13	5.3	5.3	5.3
	applies seldomly	52	21.1	21.1	26.4
	applies partly	73	29.7	29.7	56.1
	applies mainly	89	36.2	36.2	92.3
	applies entirely	19	7.7	7.7	100.0
	Total	246	100.0	100.0	

median:'applies partly', mode:'applies mainly'.

I am able to use all the software applications that I need in my work effectively

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	4	1.6	1.6	1.6
	applies seldomly	14	5.7	5.7	7.3
	applies partly	49	19.9	19.9	27.2
	applies mainly	134	54.5	54.5	81.7
	applies entirely	45	18.3	18.3	100.0
	Total	246	100.0	100.0	

median and mode:'applies mainly'.

I manage my e-mail effectively

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	3	1.2	1.2	1.2
	applies seldomly	15	6.1	6.1	7.3
	applies partly	62	25.2	25.3	32.7
	applies mainly	127	51.6	51.8	84.5
	applies entirely	38	15.4	15.5	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

median and mode:'applies mainly'.

I organize my information effectively on the computer

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	4	1.6	1.6	1.6
	applies seldomly	18	7.3	7.3	9.0
	applies partly	52	21.1	21.2	30.2
	applies mainly	138	56.1	56.3	86.5
	applies entirely	33	13.4	13.5	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

median and mode:'applies mainly'.

I have enough insight in ICT in order to participate in decisionmaking in this regard

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	13	5.3	5.3	5.3
	applies seldomly	52	21.1	21.1	26.4
	applies partly	64	26.0	26.0	52.4
	applies mainly	94	38.2	38.2	90.7
	applies entirely	23	9.3	9.3	100.0
	Total	246	100.0	100.0	

median:'applies partly' and mode:'applies mainly'.

I ask others to help me with ICT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	22	8.9	8.9	8.9
	applies seldomly	106	43.1	43.1	52.0
	applies partly	76	30.9	30.9	82.9
	applies mainly	33	13.4	13.4	96.3
	applies entirely	9	3.7	3.7	100.0
	Total	246	100.0	100.0	

median and mode:'applies seldomly'.

I know where to find information about relevant courses and studies for myself

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	38	15.4	15.6	15.6
	applies seldomly	70	28.5	28.7	44.3
	applies partly	47	19.1	19.3	63.5
	applies mainly	69	28.0	28.3	91.8
	applies entirely	20	8.1	8.2	100.0
	Total	244	99.2	100.0	
Missing	System	2	.8		
Total		246	100.0		

median:'applies partly', mode:'applies seldomly'.

I can always find work-related information on the Internet just in time when I need it

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	45	18.3	18.4	18.4
	applies seldomly	45	18.3	18.4	36.9
	applies partly	72	29.3	29.5	66.4
	applies mainly	71	28.9	29.1	95.5
	applies entirely	11	4.5	4.5	100.0
	Total	244	99.2	100.0	
Missing	System	2	.8		
Total		246	100.0		

median and mode:'applies partly'.

1.6.1 The scale related to confidence in using ICT

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.770	.777	9

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.505	2.831	4.744	1.913	1.676	.349	9

The covariance matrix is calculated and used in the analysis.

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
q22recoded	26.8017	24.575	.273	.121	.770
q35recoded	28.1446	22.091	.392	.187	.757
q25	28.3471	20.294	.562	.492	.730
q26	27.7231	21.861	.494	.325	.743
q27	27.8099	21.657	.531	.557	.738
q28	27.8264	21.605	.530	.529	.738
q34	28.2975	20.085	.565	.484	.729
q39	28.6983	21.041	.356	.292	.769
q42	28.7149	20.645	.424	.307	.755

Item Statistics

	Mean	Std. Deviation	N
q22recoded	4.7438	.58372	242
q35recoded	3.4008	.95135	242
q25	3.1983	1.01948	242
q26	3.8223	.84814	242
q27	3.7355	.83759	242
q28	3.7190	.84699	242
q34	3.2479	1.04886	242
q39	2.8471	1.21768	242
q42	2.8306	1.16671	242

1.6.2 Significant differences and correlations related to confidence in using ICT

ANOVA

confidenceinICT

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4,985	5	,997	3,022	,012
Within Groups	79,172	240	,330		
Total	84,157	245			

Group Statistics

	Sex	N	Mean	Std. Deviation	Std. Error Mean
confidenceinICT	Male	220	3.5487	.58135	.03919
	Female	26	3.1624	.51662	.10132

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
confidenceinICT	Equal variances assumed	.058	.810	3.239	244	.001	.38631	.11925	.15141	.62121
	Equal variances not assumed			3.556	32.958	.001	.38631	.10863	.16528	.60734

Descriptives

confidenceinICT

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Personnel	21	3,2419	,62671	,13676	2,9566	3,5271	1,86	4,22
Administrative, logistic	53	3,5178	,57692	,07925	3,3588	3,6768	2,22	5,00
Communication and information systems	14	3,9762	,52330	,13986	3,6740	4,2783	3,00	4,78
Planning and control, juridical	6	3,5688	,62713	,25602	2,9107	4,2269	2,56	4,22
Technical and electronic design and maintenance	60	3,5574	,46761	,06037	3,4366	3,6782	2,67	4,67
Military operational	92	3,4553	,62531	,06519	3,3258	3,5848	1,78	5,00
Total	246	3,5079	,58609	,03737	3,4343	3,5815	1,78	5,00

Multiple Comparisons

Dependent Variable: confidenceinICT

LSD

(I) Initial_Training	(J) Initial_Training	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Personnel	Administrative, logistic	-,27595	,14810	,064	-,5677	,0158
	Communication and information systems	-,73432*	,19817	,000	-1,1247	-,3439
	Planning and control, juridical	-,32691	,26587	,220	-,8507	,1968
	Technical and electronic design and maintenance	-,31553*	,14563	,031	-,6024	-,0287
	Military operational	-,21344	,13890	,126	-,4871	,0602
Administrative, logistic	Personnel	,27595	,14810	,064	-,0158	,5677
	Communication and information systems	-,45837*	,17259	,008	-,7984	-,1184
	Planning and control, juridical	-,05096	,24740	,837	-,5383	,4364
	Technical and electronic design and maintenance	-,03959	,10827	,715	-,2529	,1737
	Military operational	,06251	,09904	,529	-,1326	,2576
Communication and information systems	Personnel	,73432*	,19817	,000	,3439	1,1247
	Administrative, logistic	,45837*	,17259	,008	,1184	,7984
	Planning and control, juridical	,40741	,28026	,147	-,1447	,9595
	Technical and electronic design and maintenance	,41878*	,17047	,015	,0830	,7546
	Military operational	,52088*	,16477	,002	,1963	,8455
Planning and control, juridical	Personnel	,32691	,26587	,220	-,1968	,8507
	Administrative, logistic	,05096	,24740	,837	-,4364	,5383
	Communication and information systems	-,40741	,28026	,147	-,9595	,1447
	Technical and electronic design and maintenance	,01138	,24592	,963	-,4731	,4958
	Military operational	,11347	,24200	,640	-,3633	,5902
Technical and electronic design and maintenance	Personnel	,31553*	,14563	,031	,0287	,6024
	Administrative, logistic	,03959	,10827	,715	-,1737	,2529
	Communication and information systems	-,41878*	,17047	,015	-,7546	-,0830
	Planning and control, juridical	-,01138	,24592	,963	-,4958	,4731
	Military operational	,10209	,09531	,285	-,0857	,2898
Military operational	Personnel	,21344	,13890	,126	-,0602	,4871
	Administrative, logistic	-,06251	,09904	,529	-,2576	,1326
	Communication and information systems	-,52088*	,16477	,002	-,8455	-,1963
	Planning and control, juridical	-,11347	,24200	,640	-,5902	,3633
	Technical and electronic design and maintenance	-,10209	,09531	,285	-,2898	,0857

*. The mean difference is significant at the .05 level.

Descriptives

confidenceinICT

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Policy and governing	20	3,7333	,59279	,13255	3,4559	4,0108	2,44	4,67
Personel, Human resource management	29	3,3946	,52334	,09718	3,1956	3,5937	2,11	4,33
Logistics	35	3,3873	,48982	,08279	3,2190	3,5556	2,22	4,56
Information and communication systems	24	3,9015	,62040	,12664	3,6395	4,1634	1,86	4,78
Planning and control, incl. legal issues	22	3,6364	,48636	,10369	3,4207	3,8520	2,56	4,33
Education and training	36	3,3973	,63920	,10653	3,1810	3,6135	1,78	4,56
Technical and electronic design and maintenance	19	3,5673	,60394	,13855	3,2762	3,8583	2,67	5,00
Military operational	61	3,4026	,57455	,07356	3,2554	3,5497	2,22	5,00
Total	246	3,5079	,58609	,03737	3,4343	3,5815	1,78	5,00

ANOVA

confidenceinICT

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7,162	7	1,023	3,163	,003
Within Groups	76,995	238	,324		
Total	84,157	245			

Multiple Comparisons

Dependent Variable: confidenceinICT

LSD

(I) Main_function	(J) Main_function	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Policy and governing	Personel, Human resource management	,33870*	,16532	,042	,0130	,6644
	Logistics	,34603*	,15943	,031	,0320	,6601
	Information and communication systems	-,16812	,17221	,330	-,5074	,1711
	Planning and control, incl. legal issues	,09697	,17573	,582	-,2492	,4431
	Education and training	,33607*	,15862	,035	,0236	,6486
	Technical and electronic design and maintenance	,16608	,18221	,363	-,1929	,5250
	Military operational	,33078*	,14656	,025	,0421	,6195
Personel, Human resource management	Policy and governing	-,33870*	,16532	,042	-,6644	-,0130
	Logistics	,00733	,14282	,959	-,2740	,2887
	Information and communication systems	-,50682*	,15695	,001	-,8160	-,1976
	Planning and control, incl. legal issues	-,24173	,16081	,134	-,5585	,0751
	Education and training	-,00263	,14192	,985	-,2822	,2770
	Technical and electronic design and maintenance	-,17262	,16788	,305	-,5033	,1581
	Military operational	-,00791	,12829	,951	-,2606	,2448
Logistics	Policy and governing	-,34603*	,15943	,031	-,6601	-,0320
	Personel, Human resource management	-,00733	,14282	,959	-,2887	,2740
	Information and communication systems	-,51415*	,15074	,001	-,8111	-,2172
	Planning and control, incl. legal issues	-,24906	,15475	,109	-,5539	,0558
	Education and training	-,00996	,13502	,941	-,2759	,2560
	Technical and electronic design and maintenance	-,17995	,16208	,268	-,4992	,1393
	Military operational	-,01525	,12061	,899	-,2528	,2223
Information and communication systems	Policy and governing	,16812	,17221	,330	-,1711	,5074
	Personel, Human resource management	,50682*	,15695	,001	,1976	,8160
	Logistics	,51415*	,15074	,001	,2172	,8111
	Planning and control, incl. legal issues	,26509	,16788	,116	-,0656	,5958
	Education and training	,50419*	,14989	,001	,2089	,7995
	Technical and electronic design and maintenance	,33420	,17466	,057	-,0099	,6783
	Military operational	,49890*	,13705	,000	,2289	,7689
Planning and control, incl. legal issues	Policy and governing	-,09697	,17573	,582	-,4431	,2492
	Personel, Human resource management	,24173	,16081	,134	-,0751	,5585
	Logistics	,24906	,15475	,109	-,0558	,5539
	Information and communication systems	-,26509	,16788	,116	-,5958	,0656
	Education and training	,23910	,15392	,122	-,0641	,5423
	Technical and electronic design and maintenance	,06911	,17813	,698	-,2818	,4200
	Military operational	,23381	,14145	,100	-,0448	,5125
Education and training	Policy and governing	-,33607*	,15862	,035	-,6486	-,0236
	Personel, Human resource management	,00263	,14192	,985	-,2770	,2822
	Logistics	,00996	,13502	,941	-,2560	,2759
	Information and communication systems	-,50419*	,14989	,001	-,7995	-,2089
	Planning and control, incl. legal issues	-,23910	,15392	,122	-,5423	,0641
	Technical and electronic design and maintenance	-,16999	,16129	,293	-,4877	,1477
	Military operational	-,00528	,11954	,965	-,2408	,2302
Technical and electronic design and maintenance	Policy and governing	-,16608	,18221	,363	-,5250	,1929
	Personel, Human resource management	,17262	,16788	,305	-,1581	,5033
	Logistics	,17995	,16208	,268	-,1393	,4992
	Information and communication systems	-,33420	,17466	,057	-,6783	,0099
	Planning and control, incl. legal issues	-,06911	,17813	,698	-,4200	,2818
	Education and training	,16999	,16129	,293	-,1477	,4877
	Military operational	,16470	,14943	,271	-,1297	,4591
Military operational	Policy and governing	-,33078*	,14656	,025	-,6195	-,0421
	Personel, Human resource management	,00791	,12829	,951	-,2448	,2606
	Logistics	,01525	,12061	,899	-,2223	,2528
	Information and communication systems	-,49890*	,13705	,000	-,7689	-,2289
	Planning and control, incl. legal issues	-,23381	,14145	,100	-,5125	,0448
	Education and training	,00528	,11954	,965	-,2302	,2408
	Technical and electronic design and maintenance	-,16470	,14943	,271	-,4591	,1297

*. The mean difference is significant at the .05 level.

Correlations

		P_hoursPC	confidencein ICT
P_hoursPC	Pearson Correlation	1	.271**
	Sig. (2-tailed)		.000
	N	241	241
confidenceinICT	Pearson Correlation	.271**	1
	Sig. (2-tailed)	.000	
	N	241	246

**. Correlation is significant at the 0.01 level (2-tailed).

1.6.3 Factor analysis related to confidence

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3,365	33,649	33,649	3,365	33,649	33,649	2,538	25,382	25,382
2	1,270	12,698	46,347	1,270	12,698	46,347	1,614	16,144	41,527
3	1,109	11,089	57,435	1,109	11,089	57,435	1,591	15,909	57,435
4	,951	9,508	66,944						
5	,855	8,552	75,496						
6	,785	7,847	83,343						
7	,588	5,876	89,219						
8	,511	5,110	94,330						
9	,311	3,111	97,441						
10	,256	2,559	100,000						

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component		
	1	2	3
q22recoded	,494	-,114	,124
q25	,795	,199	-,005
q26	,631	,025	,337
q27	,471	,079	,709
q28	,422	,169	,668
q34	,775	,226	,003
q39	,082	,841	,040
q42	,125	,825	,140
q46	-,165	,042	,700
q35recoded	,464	,293	,057

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

1.7 Descriptive results for the use of ICT by respondents

1.7.1 Significant differences and correlations related to the use of ICT

1.7.1.1 Electronic agenda

Kruskal-Wallis Test

Ranks

	Rank	N	Mean Rank
E_agenda	LTZ3 - LTZ2OC, ELTN - KAP	114	109,49
	LTZ1, Maj	67	127,19
	LNTKOL, Overste, Kltz	50	140,05
	KTZ of KOL	14	152,07
	Total	245	

Test Statistics[a,b]

	E_agenda
Chi-Square	10,587
df	3
Asymp. Sig.	,014

a. Kruskal Wallis Test

b. Grouping Variable: Rank

Descriptives

E_agenda

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
LTZ3 - LTZ2OC, ELTN - KAP	114	2,54	1,176	,110	2,32	2,75	1	4
LTZ1, Maj	67	2,88	,977	,119	2,64	3,12	1	4
LNTKOL, Overste, Kltz	50	3,04	1,049	,148	2,74	3,34	1	4
KTZ of KOL	14	3,29	,726	,194	2,87	3,71	2	4
Total	245	2,78	1,099	,070	2,64	2,91	1	4

Kruskal-Wallis Test

Ranks

	Rank2	N	Mean Rank
E_agenda	Subaltern officers	114	109,49
	Head officers	131	134,76
	Total	245	

Test Statistics[a,b]

	E_agenda
Chi-Square	8,522
df	1
Asymp. Sig.	,004

a. Kruskal Wallis Test

b. Grouping Variable: Rank2

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	,274			,031
	Cramer's V	,158			,031
Interval by Interval	Pearson's R	,218	,058	3,488	,001[c]
Ordinal by Ordinal	Spearman Correlation	,207	,062	3,305	,001[c]
N of Valid Cases		245			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Kruskal-Wallis Test

Ranks

	Main_function	N	Mean Rank
E_agenda	Policy and governing	20	150,65
	Personel, Human resource management	29	116,09
	Logistics	35	115,67
	Information and communication systems	24	148,19
	Planning and control, incl. legal issues	22	152,09
	Education and training	36	116,14
	Technical and electronic design and maintenance	18	128,67
	Military operational	61	103,40
	Total	245	

Test Statistics[a,b]

	E_agenda
Chi-Square	17,097
df	7
Asymp. Sig.	,017

a. Kruskal Wallis Test

b. Grouping Variable: Main_function

Descriptives

E_agenda

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Policy and governing	20	3,20	1,005	,225	2,73	3,67	1	4
Personel, Human resource management	29	2,72	,960	,178	2,36	3,09	1	4
Logistics	35	2,69	1,051	,178	2,32	3,05	1	4
Information and communication systems	24	3,17	1,007	,206	2,74	3,59	1	4
Planning and control, incl. legal issues	22	3,23	,973	,207	2,80	3,66	1	4
Education and training	36	2,67	1,121	,187	2,29	3,05	1	4
Technical and electronic design and maintenance	18	2,83	1,200	,283	2,24	3,43	1	4
Military operational	61	2,44	1,162	,149	2,14	2,74	1	4
Total	245	2,78	1,099	,070	2,64	2,91	1	4

1.7.1.2 Internet

Mann-Whitney Test

Ranks

	Rank2	N	Mean Rank	Sum of Ranks
Internet	Subaltern officers	114	113,07	12889,50
	Head officers	131	131,65	17245,50
	Total	245		

Test Statistics[a]

	Internet
Mann-Whitney U	6334,500
Wilcoxon W	12889,500
Z	-2,162
Asymp. Sig. (2-tailed)	,031

a. Grouping Variable: Rank2

Kruskal-Wallis Test

Ranks

	Rank	N	Mean Rank
Internet	LTZ3 - LTZ2OC, ELTN - KAP	114	113,07
	LTZ1, Maj	66	121,95
	LNTKOL, Overste, Kltz	51	148,67
	KTZ of KOL	14	115,32
	Total	245	

Test Statistics[a,b]

	Internet
Chi-Square	10,162
df	3
Asymp. Sig.	,017

a. Kruskal Wallis Test

b. Grouping Variable: Rank

Descriptives

Internet

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
LTZ3 - LTZ2OC, ELTN - KAP	114	2,46	1,023	,096	2,28	2,65	1	4
LTZ1, Maj	66	2,62	,907	,112	2,40	2,84	1	4
LNTKOL, Overste, Kltz	51	3,00	,663	,093	2,81	3,19	2	4
KTZ of KOL	14	2,50	1,019	,272	1,91	3,09	1	4
Total	245	2,62	,945	,060	2,50	2,74	1	4

1.7.1.3 PowerPoint

Mann-Whitney Test

Ranks

	Rank2	N	Mean Rank	Sum of Ranks
PowerPoint	Subaltern officers	114	110,70	12620,00
	Head officers	132	134,55	17761,00
	Total	246		

Test Statistics[a]

	PowerPoint
Mann-Whitney U	6065,000
Wilcoxon W	12620,000
Z	-2,944
Asymp. Sig. (2-tailed)	,003

a. Grouping Variable: Rank2

Kruskal-Wallis Test

Ranks

	Rank	N	Mean Rank
PowerPoint	LTZ3 - LTZ2OC, ELTN - KAP	114	110,70
	LTZ1, Maj	67	128,41
	LNTKOL, Overste, Kltz	51	147,78
	KTZ of KOL	14	115,75
	Total	246	

Test Statistics[a,b]

	PowerPoint
Chi-Square	12,749
df	3
Asymp. Sig.	,005

a. Kruskal Wallis Test

b. Grouping Variable: Rank

Descriptives

PowerPoint

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
LTZ3 - LTZ2OC, ELTN - KAP	114	2,76	,813	,076	2,61	2,91	1	4
LTZ1, Maj	67	2,97	,627	,077	2,82	3,12	1	4
LNTKOL, Overste, Kltz	51	3,20	,601	,084	3,03	3,37	2	4
KTZ of KOL	14	2,86	,535	,143	2,55	3,17	2	4
Total	246	2,91	,726	,046	2,82	3,01	1	4

1.7.1.4 Excel

Ranks

	Rank	N	Mean Rank
Excel	LTZ3 - LTZ2OC, ELTN - KAP	114	131,50
	LTZ1, Maj	67	118,95
	LNTKOL, Overste, Kltz	51	125,56
	KTZ of KOL	14	72,64
	Total	246	

Test Statistics[a,b]

	Excel
Chi-Square	10,488
df	3
Asymp. Sig.	,015

a. Kruskal Wallis Test

b. Grouping Variable: Rank

Descriptives

Excel

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
LTZ3 - LTZ2OC, ELTN - KAP	114	3,10	,775	,073	2,95	3,24	1	4
LTZ1, Maj	67	2,97	,758	,093	2,79	3,16	1	4
LNTKOL, Overste, Kltz	51	3,06	,645	,090	2,88	3,24	2	4
KTZ of KOL	14	2,36	,929	,248	1,82	2,89	1	4
Total	246	3,01	,769	,049	2,92	3,11	1	4

Correlations

			Rank	Excel
Spearman's rho	Rank	Correlation Coefficient	1,000	-,133*
		Sig. (2-tailed)	.	,038
		N	246	246
	Excel	Correlation Coefficient	-,133*	1,000
		Sig. (2-tailed)	,038	.
		N	246	246

*. Correlation is significant at the 0.05 level (2-tailed).

1.7.1.5 Access

Kruskal-Wallis Test

Ranks

	Rank	N	Mean Rank
Access	LTZ3 - LTZ2OC, ELTN - KAP	112	127,37
	LTZ1, Maj	67	130,56
	LNTKOL, Overste, Kltz	51	115,92
	KTZ of KOL	14	68,93
	Total	244	

Test Statistics[a,b]

	Access
Chi-Square	10,844
df	3
Asymp. Sig.	,013

a. Kruskal Wallis Test

b. Grouping Variable: Rank

Descriptives

Access

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
LTZ3 - LTZ2OC, ELTN - KAP	112	2,26	1,046	,099	2,06	2,45	1	4
LTZ1, Maj	67	2,27	,863	,105	2,06	2,48	1	4
LNTKOL, Overste, Kltz	51	2,08	,913	,128	1,82	2,34	1	4
KTZ of KOL	14	1,43	,514	,137	1,13	1,73	1	2
Total	244	2,18	,963	,062	2,05	2,30	1	4

Correlations

			Rank	Access
Spearman's rho	Rank	Correlation Coefficient	1,000	-,127*
		Sig. (2-tailed)	.	,048
		N	246	244
	Access	Correlation Coefficient	-,127*	1,000
		Sig. (2-tailed)	,048	.
		N	244	244

*. Correlation is significant at the 0.05 level (2-tailed).

1.7.1.6 Information management systems

Kruskal-Wallis Test

Ranks

	Defence_component	N	Mean Rank
MIS	Royal Army	100	121,33
	Royal Airforce	68	137,99
	Royal Navy	56	94,39
	Royal Military Police	18	144,50
	Total	242	

Test Statistics[a,b]

	MIS
Chi-Square	15,464
df	3
Asymp. Sig.	,001

a. Kruskal Wallis Test

b. Grouping Variable: Defence_component

Descriptives

MIS

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Royal Army	100	2,29	1,057	,106	2,08	2,50	1	4
Royal Airforce	68	2,56	1,042	,126	2,31	2,81	1	4
Royal Navy	56	1,86	1,069	,143	1,57	2,14	1	4
Royal Military Police	18	2,67	1,085	,256	2,13	3,21	1	4
Total	242	2,29	1,086	,070	2,16	2,43	1	4

1.7.1.7 Project planning systems

Kruskal-Wallis Test

Ranks

	Main function	N	Mean Rank
PPS	Policy and governing	20	97,25
	Personel, Human resource management	28	127,91
	Logistics	34	106,62
	Information and communication systems	24	147,31
	Planning and control, incl. legal issues	22	125,59
	Education and training	35	124,41
	Technical and electronic design and maintenance	18	156,06
	Military operational	60	109,13
	Total	241	

Test Statistics[a,b]

	PPS
Chi-Square	16,608
df	7
Asymp. Sig.	,020

a. Kruskal Wallis Test

b. Grouping Variable: Main_function

Descriptives

PPS

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Policy and governing	20	1,45	,759	,170	1,09	1,81	1	3
Personel, Human resource management	28	1,86	,891	,168	1,51	2,20	1	4
Logistics	34	1,62	,954	,164	1,28	1,95	1	4
Information and communication systems	24	2,25	1,113	,227	1,78	2,72	1	4
Planning and control, incl. legal issues	22	1,86	,990	,211	1,42	2,30	1	4
Education and training	35	1,91	1,121	,190	1,53	2,30	1	4
Technical and electronic design and maintenance	18	2,39	1,092	,257	1,85	2,93	1	4
Military operational	60	1,60	,785	,101	1,40	1,80	1	3
Total	241	1,81	,976	,063	1,69	1,94	1	4

1.8 Identifying ICT-competence

1.8.1 Operational ICT-competence

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.785	.788	6

Item Statistics

	Mean	Std. Deviation	N
q25	3.2082	1.02106	245
q26	3.8286	.84640	245
q27	3.7429	.83666	245
q28	3.7265	.84610	245
q34	3.2612	1.05053	245
q35recoded	3.4041	.95599	245

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.529	3.208	3.829	.620	1.193	.073	6

The covariance matrix is calculated and used in the analysis.

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
q25	17.9633	10.036	.608	.493	.733
q26	17.3429	11.292	.528	.293	.755
q27	17.4286	11.041	.588	.537	.741
q28	17.4449	11.150	.557	.515	.748
q34	17.9102	10.016	.585	.475	.740
q35recoded	17.7673	11.704	.366	.162	.793

Scale Statistics

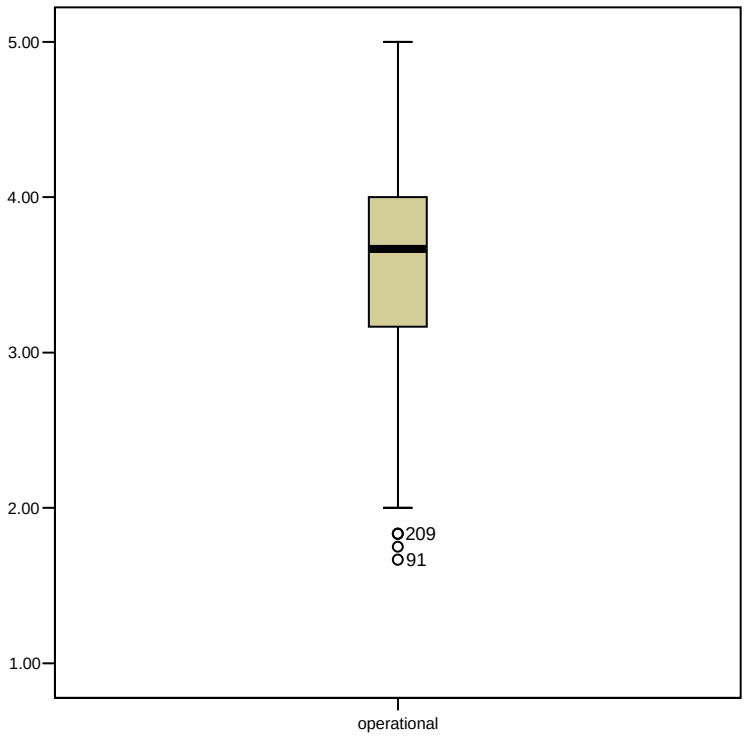
Mean	Variance	Std. Deviation	N of Items
21.1714	15.011	3.87446	6

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
operational	246	100.0%	0	.0%	246	100.0%

Descriptives

			Statistic	Std. Error
operational	Mean		3.5213	.04172
	95% Confidence Interval for Mean	Lower Bound	3.4392	
		Upper Bound	3.6035	
	5% Trimmed Mean		3.5318	
	Median		3.6667	
	Variance		.428	
	Std. Deviation		.65433	
	Minimum		1.67	
	Maximum		5.00	
	Range		3.33	
	Interquartile Range		.88	
	Skewness		-.310	.155
	Kurtosis		.052	.309



1.8.1.1 Significant differences and correlations related to operational ICT-competence

T-Test

Group Statistics

	Sex	N	Mean	Std. Deviation	Std. Error Mean
operational	Male	220	3.5830	.63086	.04253
	Female	26	3.0000	.62716	.12300

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
operational	Equal variances assumed	.147	.701	4.459	244	.000	.58295	.13075	.32541	.84050
	Equal variances not assumed			4.479	31.285	.000	.58295	.13014	.31762	.84829

Descriptive Statistics

	Mean	Std. Deviation	N
operational	3.5213	.65433	246
P_hoursPC	7.56	6.241	241

Correlations

		operational	P_hoursPC
operational	Pearson Correlation	1	.219**
	Sig. (2-tailed)		.001
	N	246	241
P_hoursPC	Pearson Correlation	.219**	1
	Sig. (2-tailed)	.001	
	N	241	241

**. Correlation is significant at the 0.01 level (2-tailed).

1.8.1.2 Factor analysis related to operational ICT-competence

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,946	49,097	49,097	2,946	49,097	49,097	1,996	33,267	33,267
2	1,004	16,731	65,828	1,004	16,731	65,828	1,954	32,560	65,828
3	,825	13,751	79,578						
4	,610	10,168	89,746						
5	,324	5,392	95,138						
6	,292	4,862	100,000						

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component	
	1	2
q25	,206	,849
q26	,543	,429
q27	,882	,192
q28	,893	,141
q34	,273	,771
q35recoded	,091	,631

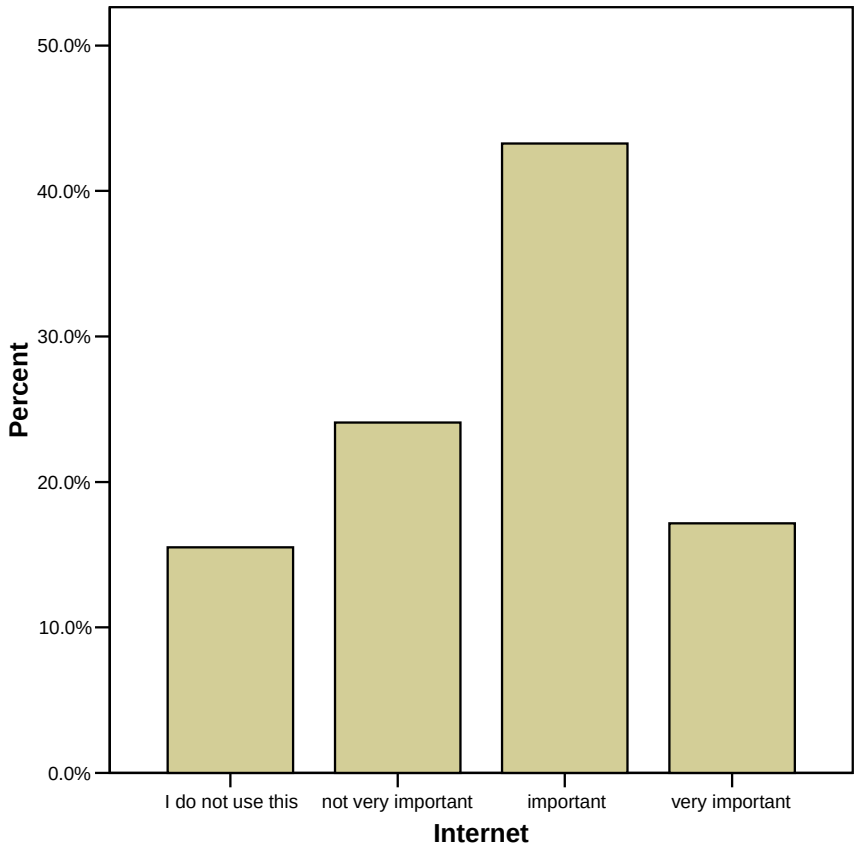
Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

1.8.2 Structural ICT-competence

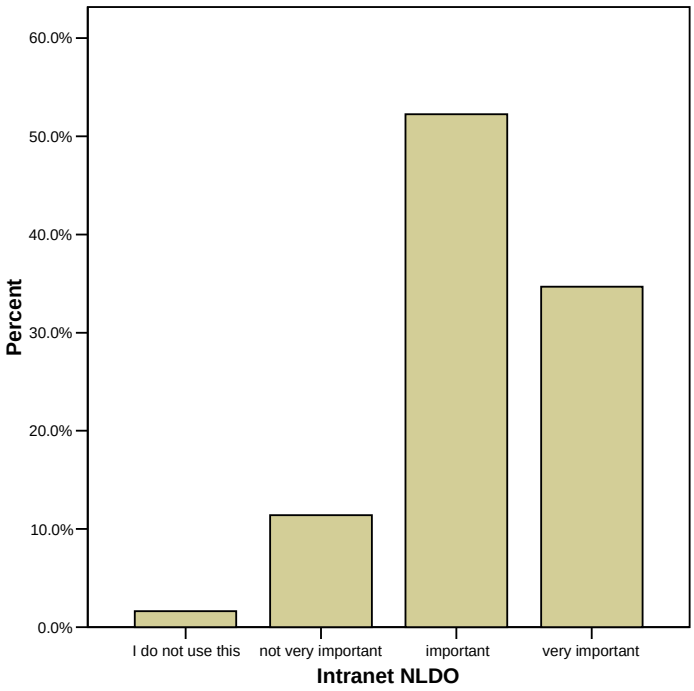
Internet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I do not use this	38	15.4	15.5	15.5
	not very important	59	24.0	24.1	39.6
	important	106	43.1	43.3	82.9
	very important	42	17.1	17.1	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		



Intranetdef

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I do not use this	4	1.6	1.6	1.6
	not very important	28	11.4	11.4	13.1
	important	128	52.0	52.2	65.3
	very important	85	34.6	34.7	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		



I would like to know how I could find information on the Internet more effectively

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	40	16.3	16.3	16.3
	applies seldomly	80	32.5	32.7	49.0
	applies partly	57	23.2	23.3	72.2
	applies mainly	42	17.1	17.1	89.4
	applies entirely	26	10.6	10.6	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

I waste time finding relevant information on the Internet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	60	24.4	24.5	24.5
	applies seldomly	93	37.8	38.0	62.4
	applies partly	51	20.7	20.8	83.3
	applies mainly	24	9.8	9.8	93.1
	applies entirely	17	6.9	6.9	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

know how to obtain access to workrelated sections of the Internet for which you need special authorisation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	126	51.2	51.4	51.4
	applies seldomly	28	11.4	11.4	62.9
	applies partly	23	9.3	9.4	72.2
	applies mainly	36	14.6	14.7	86.9
	applies entirely	32	13.0	13.1	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

know where to find information on the Internet about relevant courses and studies for myself

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	38	15.4	15.6	15.6
	applies seldomly	70	28.5	28.7	44.3
	applies partly	47	19.1	19.3	63.5
	applies mainly	69	28.0	28.3	91.8
	applies entirely	20	8.1	8.2	100.0
	Total	244	99.2	100.0	
Missing	System	2	.8		
Total		246	100.0		

know where to find information on the Internet about relevant courses and studies for my subordinates

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	25	10.2	18.0	18.0
	applies seldomly	38	15.4	27.3	45.3
	applies partly	29	11.8	20.9	66.2
	applies mainly	39	15.9	28.1	94.2
	applies entirely	8	3.3	5.8	100.0
	Total	139	56.5	100.0	
Missing	System	107	43.5		
Total		246	100.0		

I can always find work-related information on the Internet just in time when I need it

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	45	18.3	18.4	18.4
	applies seldomly	45	18.3	18.4	36.9
	applies partly	72	29.3	29.5	66.4
	applies mainly	71	28.9	29.1	95.5
	applies entirely	11	4.5	4.5	100.0
	Total	244	99.2	100.0	
Missing	System	2	.8		
Total		246	100.0		

It is important in my function to find relevant information on the Intranet of the NLDO

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	8	3.3	3.3	3.3
	applies seldomly	22	8.9	9.0	12.3
	applies partly	51	20.7	20.9	33.2
	applies mainly	99	40.2	40.6	73.8
	applies entirely	64	26.0	26.2	100.0
	Total	244	99.2	100.0	
Missing	System	2	.8		
Total		246	100.0		

It is always easy to find relevant information on the Intranet of the NLDO

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	30	12.2	12.3	12.3
	applies seldomly	71	28.9	29.1	41.4
	applies partly	71	28.9	29.1	70.5
	applies mainly	55	22.4	22.5	93.0
	applies entirely	17	6.9	7.0	100.0
	Total	244	99.2	100.0	
Missing	System	2	.8		
Total		246	100.0		

I waste time finding relevant information on the Intranet of the NLDO

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	16	6.5	6.6	6.6
	applies seldomly	65	26.4	26.6	33.2
	applies partly	82	33.3	33.6	66.8
	applies mainly	58	23.6	23.8	90.6
	applies entirely	23	9.3	9.4	100.0
	Total	244	99.2	100.0	
Missing	System	2	.8		
Total		246	100.0		

1.8.2.1 The scale related to structural competence

Case Processing Summary

		N	%
Cases	Valid	137	55.7
	Excluded[a]	109	44.3
	Total	246	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.628	.633	8

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	2.922	2.241	3.664	1.423	1.635	.191	8

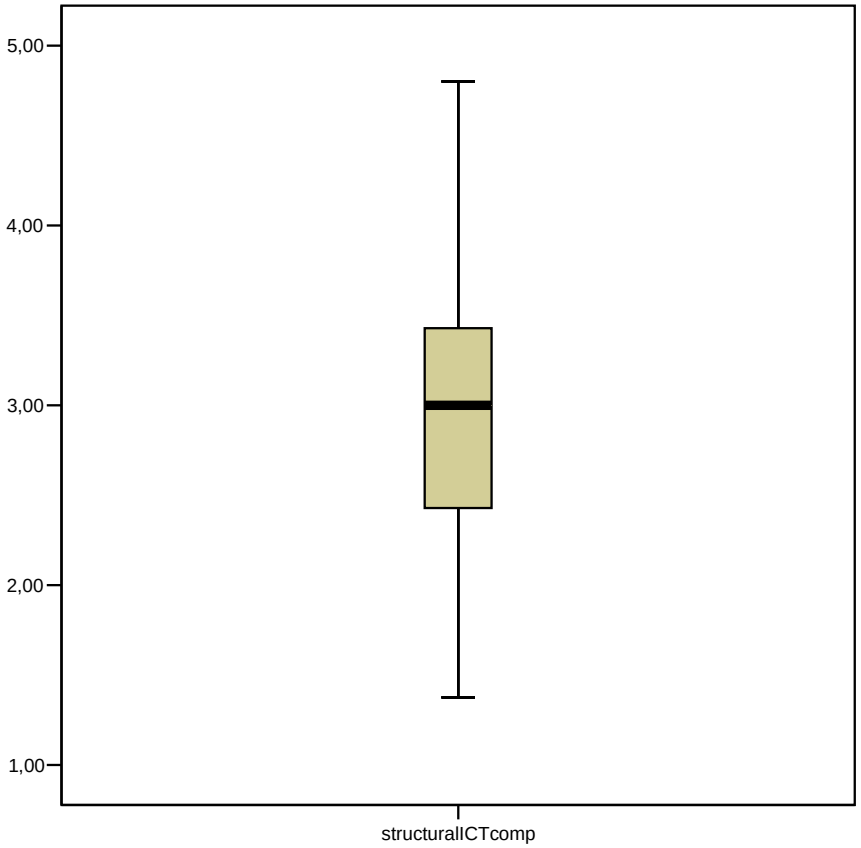
The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
23.3796	25.575	5.05722	8

Descriptives

			Statistic	Std. Error
structuralICTcomp	Mean		2.9359	.04153
	95% Confidence Interval for Mean	Lower Bound	2.8541	
		Upper Bound	3.0177	
	5% Trimmed Mean		2.9336	
	Median		3.0000	
	Variance		.424	
	Std. Deviation		.65144	
	Minimum		1.38	
	Maximum		4.80	
	Range		3.43	
	Interquartile Range		1.00	
	Skewness		.001	.155
	Kurtosis		-.480	.309



1.8.2.2 Significant differences and correlations related to structural ICT-competence

Kruskal-Wallis Test

Ranks

	Main_function	N	Mean Rank
structuralICTcomp	Policy and governing	20	121,80
	Personel, Human resource management	29	140,88
	Logistics	35	99,76
	Information and communication systems	24	162,77
	Planning and control, incl. legal issues	22	146,36
	Education and training	36	101,65
	Technical and electronic design and maintenance	19	131,61
	Military operational	61	116,09
	Total	246	

Test Statistics[a,b]

	structural ICTcomp
Chi-Square	19,550
df	7
Asymp. Sig.	,007

a. Kruskal Wallis Test

b. Grouping Variable: Main_function

Oneway

Descriptives

structuralICTcomp

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Policy and governing	20	2,9223	,65834	,14721	2,6142	3,2304	1,63	4,00
Personel, Human resource management	29	3,0813	,65412	,12147	2,8325	3,3301	1,50	4,14
Logistics	35	2,7439	,54464	,09206	2,5568	2,9310	1,88	4,13
Information and communication systems	24	3,2872	,63565	,12975	3,0188	3,5556	1,38	4,25
Planning and control, incl. legal issues	22	3,1404	,59881	,12767	2,8749	3,4059	2,00	4,29
Education and training	36	2,7227	,62082	,10347	2,5127	2,9328	1,57	3,88
Technical and electronic design and maintenance	19	3,0618	,72308	,16589	2,7133	3,4104	2,00	4,80
Military operational	61	2,8560	,65614	,08401	2,6880	3,0241	1,71	4,29
Total	246	2,9359	,65144	,04153	2,8541	3,0177	1,38	4,80

ANOVA

structuralICTcomp

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8,116	7	1,159	2,879	,007
Within Groups	95,856	238	,403		
Total	103,972	245			

Multiple Comparisons

Dependent Variable: structuralICTcomp
LSD

(I) Main_function	(J) Main_function	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Policy and governing	Personel, Human resource management	-,15896	,18446	,390	-,5223	,2044
	Logistics	,17844	,17789	,317	-,1720	,5289
	Information and communication systems	-,36488	,19214	,059	-,7434	,0136
	Planning and control, incl. legal issues	-,21810	,19607	,267	-,6044	,1682
	Education and training	,19960	,17699	,261	-,1491	,5483
	Technical and electronic design and maintenance	-,13952	,20331	,493	-,5400	,2610
	Military operational	,06629	,16352	,686	-,2558	,3884
Personel, Human resource management	Policy and governing	,15896	,18446	,390	-,2044	,5223
	Logistics	,33740*	,15936	,035	,0235	,6513
	Information and communication systems	-,20592	,17513	,241	-,5509	,1391
	Planning and control, incl. legal issues	-,05914	,17943	,742	-,4126	,2943
	Education and training	,35856*	,15835	,024	,0466	,6705
	Technical and electronic design and maintenance	,01944	,18731	,917	-,3496	,3884
	Military operational	,22525	,14315	,117	-,0567	,5072
Logistics	Policy and governing	-,17844	,17789	,317	-,5289	,1720
	Personel, Human resource management	-,33740*	,15936	,035	-,6513	-,0235
	Information and communication systems	-,54332*	,16819	,001	-,8747	-,2120
	Planning and control, incl. legal issues	-,39654*	,17267	,023	-,7367	-,0564
	Education and training	,02116	,15065	,888	-,2756	,3179
	Technical and electronic design and maintenance	-,31796	,18085	,080	-,6742	,0383
	Military operational	-,11215	,13457	,405	-,3773	,1530
Information and communication systems	Policy and governing	,36488	,19214	,059	-,0136	,7434
	Personel, Human resource management	,20592	,17513	,241	-,1391	,5509
	Logistics	,54332*	,16819	,001	,2120	,8747
	Planning and control, incl. legal issues	,14678	,18732	,434	-,2222	,5158
	Education and training	,56448*	,16724	,001	,2350	,8939
	Technical and electronic design and maintenance	,22536	,19488	,249	-,1586	,6093
	Military operational	,43117*	,15292	,005	,1299	,7324
Planning and control, incl. legal issues	Policy and governing	,21810	,19607	,267	-,1682	,6044
	Personel, Human resource management	,05914	,17943	,742	-,2943	,4126
	Logistics	,39654*	,17267	,023	,0564	,7367
	Information and communication systems	-,14678	,18732	,434	-,5158	,2222
	Education and training	,41770*	,17174	,016	,0794	,7560
	Technical and electronic design and maintenance	,07858	,19876	,693	-,3130	,4701
	Military operational	,28439	,15783	,073	-,0265	,5953
Education and training	Policy and governing	-,19960	,17699	,261	-,5483	,1491
	Personel, Human resource management	-,35856*	,15835	,024	-,6705	-,0466
	Logistics	-,02116	,15065	,888	-,3179	,2756
	Information and communication systems	-,56448*	,16724	,001	-,8939	-,2350
	Planning and control, incl. legal issues	-,41770*	,17174	,016	-,7560	-,0794
	Technical and electronic design and maintenance	-,33912	,17996	,061	-,6936	,0154
	Military operational	-,13331	,13338	,319	-,3961	,1294
Technical and electronic design and maintenance	Policy and governing	,13952	,20331	,493	-,2610	,5400
	Personel, Human resource management	-,01944	,18731	,917	-,3884	,3496
	Logistics	,31796	,18085	,080	-,0383	,6742
	Information and communication systems	-,22536	,19488	,249	-,6093	,1586
	Planning and control, incl. legal issues	-,07858	,19876	,693	-,4701	,3130
	Education and training	,33912	,17996	,061	-,0154	,6936
	Military operational	,20581	,16673	,218	-,1227	,5343
Military operational	Policy and governing	-,06629	,16352	,686	-,3884	,2558
	Personel, Human resource management	-,22525	,14315	,117	-,5072	,0567
	Logistics	,11215	,13457	,405	-,1530	,3773
	Information and communication systems	-,43117*	,15292	,005	-,7324	-,1299
	Planning and control, incl. legal issues	-,28439	,15783	,073	-,5953	,0265
	Education and training	,13331	,13338	,319	-,1294	,3961
	Technical and electronic design and maintenance	-,20581	,16673	,218	-,5343	,1227

*. The mean difference is significant at the .05 level.

Correlations

		P_hoursPC	structural ICTcomp
P_hoursPC	Pearson Correlation	1	.165*
	Sig. (2-tailed)		.010
	N	241	241
structuralICTcomp	Pearson Correlation	.165*	1
	Sig. (2-tailed)	.010	
	N	241	246

*. Correlation is significant at the 0.05 level (2-tailed).

1.8.2.3 Factor analysis related to structural ICT-competence

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,341	29,260	29,260	2,341	29,260	29,260	2,169	27,106	27,106
2	1,789	22,366	51,626	1,789	22,366	51,626	1,808	22,600	49,707
3	1,283	16,040	67,666	1,283	16,040	67,666	1,437	17,960	67,666
4	,779	9,734	77,401						
5	,604	7,549	84,950						
6	,556	6,949	91,899						
7	,393	4,907	96,806						
8	,256	3,194	100,000						

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component		
	1	2	3
q31recoded	,059	,923	,029
q32recoded	-,043	,907	,103
q47recoded	,131	,138	,786
q36	,599	-,237	,152
q39	,796	,239	-,142
q42	,830	-,003	,051
q46	,055	-,019	,835
q81	,680	,028	,252

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 4 iterations.

1.8.3 Strategic ICT-competence

STATEMENT 37

It is easy for me to evaluate the credibility of the information I find on the Internet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	27	11.0	11.1	11.1
	applies seldomly	33	13.4	13.6	24.7
	applies partly	56	22.8	23.0	47.7
	applies mainly	107	43.5	44.0	91.8
	applies entirely	20	8.1	8.2	100.0
	Total	243	98.8	100.0	
Missing	System	3	1.2		
Total		246	100.0		

Statement 63

I identify and recognize important information in the information rich environment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	3	1.2	1.2	1.2
	applies seldomly	20	8.1	8.2	9.4
	applies partly	74	30.1	30.2	39.6
	applies mainly	120	48.8	49.0	88.6
	applies entirely	28	11.4	11.4	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

1.8.3.1 Significant differences related to strategic ICT-competence

Mann-Whitney Test

Ranks

	Sex	N	Mean Rank	Sum of Ranks
q37	Male	217	125,94	27328,00
	Female	26	89,15	2318,00
	Total	243		
q63	Male	219	126,34	27667,50
	Female	26	94,90	2467,50
	Total	245		

Test Statistics[a]

	q37	q63
Mann-Whitney U	1967,000	2116,500
Wilcoxon W	2318,000	2467,500
Z	-2,661	-2,315
Asymp. Sig. (2-tailed)	,008	,021

a. Grouping Variable: Sex

Mann-Whitney Test

Ranks

	Rank2	N	Mean Rank	Sum of Ranks
q37	Subaltern officers	113	110,04	12435,00
	Head officers	130	132,39	17211,00
	Total	243		
q63	Subaltern officers	114	123,21	14046,50
	Head officers	131	122,81	16088,50
	Total	245		

Test Statistics[a]

	q37	q63
Mann-Whitney U	5994,000	7442,500
Wilcoxon W	12435,000	16088,500
Z	-2,609	-,048
Asymp. Sig. (2-tailed)	,009	,962

a. Grouping Variable: Rank2

1.9 Identifying ICT-related competence

1.9.1 Competence related to creating and participating in the learning organization

I do communicate electronically with other professionals about my work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	7	2.8	2.8	2.8
	applies seldomly	18	7.3	7.3	10.2
	applies partly	47	19.1	19.1	29.3
	applies mainly	116	47.2	47.2	76.4
	applies entirely	58	23.6	23.6	100.0
	Total	246	100.0	100.0	

I have the opportunity to learn via the Internet during working hours

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	166	67.5	68.0	68.0
	applies seldomly	44	17.9	18.0	86.1
	applies partly	22	8.9	9.0	95.1
	applies mainly	10	4.1	4.1	99.2
	applies entirely	2	.8	.8	100.0
	Total	244	99.2	100.0	
Missing	System	2	.8		
Total		246	100.0		

In my function it is important to continue to learn all the time

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	1	.4	.4	.4
	applies seldomly	4	1.6	1.6	2.0
	applies partly	38	15.4	15.6	17.6
	applies mainly	97	39.4	39.8	57.4
	applies entirely	104	42.3	42.6	100.0
	Total	244	99.2	100.0	
Missing	System	2	.8		
Total		246	100.0		

I obtain ideas from the work of others that I find on the Internet to improve my own work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	74	30.1	30.5	30.5
	applies seldomly	69	28.0	28.4	58.8
	applies partly	68	27.6	28.0	86.8
	applies mainly	24	9.8	9.9	96.7
	applies entirely	8	3.3	3.3	100.0
	Total	243	98.8	100.0	
Missing	System	3	1.2		
Total		246	100.0		

I participate in keeping the information on the Intranet of the NLDO up to date

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	125	50.8	51.2	51.2
	applies seldomly	57	23.2	23.4	74.6
	applies partly	30	12.2	12.3	86.9
	applies mainly	24	9.8	9.8	96.7
	applies entirely	8	3.3	3.3	100.0
	Total	244	99.2	100.0	
Missing	System	2	.8		
Total		246	100.0		

obtain ideas from the work of others that I find on the Intranet of the NLDO to improve my own work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	69	28.0	28.3	28.3
	applies seldomly	70	28.5	28.7	57.0
	applies partly	74	30.1	30.3	87.3
	applies mainly	26	10.6	10.7	98.0
	applies entirely	5	2.0	2.0	100.0
	Total	244	99.2	100.0	
Missing	System	2	.8		
Total		246	100.0		

It is important to store the knowledge of my section electronically

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	14	5.7	5.7	5.7
	applies seldomly	22	8.9	9.0	14.7
	applies partly	47	19.1	19.2	33.9
	applies mainly	92	37.4	37.6	71.4
	applies entirely	70	28.5	28.6	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

I have the opportunity to learn via the Intranet of the NLDO during working hours

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	126	51.2	51.9	51.9
	applies seldomly	69	28.0	28.4	80.2
	applies partly	26	10.6	10.7	90.9
	applies mainly	19	7.7	7.8	98.8
	applies entirely	3	1.2	1.2	100.0
	Total	243	98.8	100.0	
Missing	System	3	1.2		
Total		246	100.0		

It would be useful if the Intranet of the NLDO could be used to study or take courses directly related to my work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	35	14.2	14.3	14.3
	applies seldomly	48	19.5	19.6	33.9
	applies partly	55	22.4	22.4	56.3
	applies mainly	71	28.9	29.0	85.3
	applies entirely	36	14.6	14.7	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

I share my work-related knowledge with others using electronically using a share

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	28	11.4	11.5	11.5
	applies seldomly	43	17.5	17.6	29.1
	applies partly	87	35.4	35.7	64.8
	applies mainly	63	25.6	25.8	90.6
	applies entirely	23	9.3	9.4	100.0
	Total	244	99.2	100.0	
Missing	System	2	.8		
Total		246	100.0		

I spend time to organize electronically the working knowledge of the unit that I am responsible for

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	21	8.5	8.6	8.6
	applies seldomly	60	24.4	24.6	33.2
	applies partly	78	31.7	32.0	65.2
	applies mainly	70	28.5	28.7	93.9
	applies entirely	15	6.1	6.1	100.0
	Total	244	99.2	100.0	
Missing	System	2	.8		
Total		246	100.0		

I think of ways to improve the sharing of information electronically

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	21	8.5	8.6	8.6
	applies seldomly	39	15.9	15.9	24.5
	applies partly	71	28.9	29.0	53.5
	applies mainly	92	37.4	37.6	91.0
	applies entirely	22	8.9	9.0	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

I spend time to improve the sharing of organizational knowledge electronically

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	27	11.0	11.1	11.1
	applies seldomly	64	26.0	26.3	37.4
	applies partly	79	32.1	32.5	70.0
	applies mainly	62	25.2	25.5	95.5
	applies entirely	11	4.5	4.5	100.0
	Total	243	98.8	100.0	
Missing	System	3	1.2		
Total		246	100.0		

I benefit from colleagues who share their experiences/lessons learnt with me

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	10	4.1	4.1	4.1
	applies seldomly	45	18.3	18.3	22.4
	applies partly	97	39.4	39.4	61.8
	applies mainly	79	32.1	32.1	93.9
	applies entirely	15	6.1	6.1	100.0
	Total	246	100.0	100.0	

I share the mistakes that I made and what I learnt from it with my colleagues

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	14	5.7	5.7	5.7
	applies seldomly	25	10.2	10.2	15.9
	applies partly	80	32.5	32.7	48.6
	applies mainly	110	44.7	44.9	93.5
	applies entirely	16	6.5	6.5	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

I play an important role in managing the knowledge of the organization electronically

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	74	30.1	30.1	30.1
	applies seldomly	62	25.2	25.2	55.3
	applies partly	59	24.0	24.0	79.3
	applies mainly	39	15.9	15.9	95.1
	applies entirely	12	4.9	4.9	100.0
	Total	246	100.0	100.0	

I reflect on how information can be managed more effectively

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	25	10.2	10.4	10.4
	applies seldomly	51	20.7	21.3	31.7
	applies partly	74	30.1	30.8	62.5
	applies mainly	73	29.7	30.4	92.9
	applies entirely	17	6.9	7.1	100.0
	Total	240	97.6	100.0	
Missing	System	6	2.4		
Total		246	100.0		

I play an important role in organizing the flow of information in my unit

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	45	18.3	18.4	18.4
	applies seldomly	74	30.1	30.2	48.6
	applies partly	65	26.4	26.5	75.1
	applies mainly	49	19.9	20.0	95.1
	applies entirely	12	4.9	4.9	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

Dealing with organizational knowledge effectively in the NLDO needs to improve

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	43	17.5	17.6	17.6
	applies seldomly	60	24.4	24.5	42.0
	applies partly	42	17.1	17.1	59.2
	applies mainly	59	24.0	24.1	83.3
	applies entirely	41	16.7	16.7	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

It is important for my organization unit to share working knowledge and information with international partners

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	64	26.0	26.1	26.1
	applies seldomly	72	29.3	29.4	55.5
	applies partly	64	26.0	26.1	81.6
	applies mainly	32	13.0	13.1	94.7
	applies entirely	13	5.3	5.3	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

I implement new ways of working with information in the organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	74	30.1	30.3	30.3
	applies seldomly	66	26.8	27.0	57.4
	applies partly	53	21.5	21.7	79.1
	applies mainly	40	16.3	16.4	95.5
	applies entirely	11	4.5	4.5	100.0
	Total	244	99.2	100.0	
Missing	System	2	.8		
Total		246	100.0		

I reflect about the integrity of the information that I am responsible for

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	4	1.6	1.6	1.6
	applies seldomly	10	4.1	4.1	5.7
	applies partly	42	17.1	17.1	22.9
	applies mainly	123	50.0	50.2	73.1
	applies entirely	66	26.8	26.9	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

I allow my subordinates to learn via the Internet during working hours

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	41	16.7	29.7	29.7
	applies seldomly	25	10.2	18.1	47.8
	applies partly	33	13.4	23.9	71.7
	applies mainly	29	11.8	21.0	92.8
	applies entirely	10	4.1	7.2	100.0
	Total	138	56.1	100.0	
Missing	System	108	43.9		
Total		246	100.0		

I encourage my subordinates to share their working knowledge with others electronically

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	7	2.8	5.0	5.0
	applies seldomly	18	7.3	12.9	17.9
	applies partly	32	13.0	22.9	40.7
	applies mainly	61	24.8	43.6	84.3
	applies entirely	22	8.9	15.7	100.0
	Total	140	56.9	100.0	
Missing	System	106	43.1		
Total		246	100.0		

I discuss the advantages of sharing working knowledge electronically with my subordinates

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	15	6.1	10.7	10.7
	applies seldomly	21	8.5	15.0	25.7
	applies partly	39	15.9	27.9	53.6
	applies mainly	47	19.1	33.6	87.1
	applies entirely	18	7.3	12.9	100.0
	Total	140	56.9	100.0	
Missing	System	106	43.1		
Total		246	100.0		

1.9.1.1 The scales related to creating and participating in the learning organization

Case Processing Summary

		N	%
Cases	Valid	230	93.5
	Excluded[a]	16	6.5
	Total	246	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.866	.864	22

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	2.871	1.539	4.235	2.696	2.751	.511	22

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
63.16	149.594	12.231	22

			Statistic	Std. Error
learningorg1	Mean		2.8719	.03544
	95% Confidence Interval for Mean	Lower Bound	2.8021	
		Upper Bound	2.9417	
	5% Trimmed Mean		2.8717	
	Median		2.9091	
	Variance		.309	
	Std. Deviation		.55593	
	Minimum		1.55	
	Maximum		4.64	
	Range		3.09	
	Interquartile Range		.74	
	Skewness		.012	.155
	Kurtosis		-.061	.309

Scale 2

Case Processing Summary

		N	%
Cases	Valid	127	51.6
	Excluded (a)	119	48.4
	Total	246	100.0

a Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.916	.914	25

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	2.934	1.496	4.228	2.732	2.826	.444	25

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
73.35	252.419	15.888	25

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
learningorg1	246	100.0%	0	.0%	246	100.0%

Descriptives

			Statistic	Std. Error
learningorg2	Mean		2.8864	.03622
	95% Confidence Interval for Mean	Lower Bound	2.8151	
		Upper Bound	2.9578	
	5% Trimmed Mean		2.8847	
	Median		2.9091	
	Variance		.323	
	Std. Deviation		.56814	
	Minimum		1.52	
	Maximum		4.68	
	Range		3.16	
	Interquartile Range		.75	
	Skewness		.026	.155
	Kurtosis		-.057	.309

1.9.1.2 Significant differences and correlations related to the scale of creating and participating in a learning organization

T-Test

Group Statistics

	Sex	N	Mean	Std. Deviation	Std. Error Mean
learningorg1	Male	220	2.9103	.54607	.03682
	Female	26	2.5476	.54249	.10639

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
learningorg1	Equal variances assumed	.155	.694	3.205	244	.002	.36270	.11317	.13979	.58561
	Equal variances not assumed			3.222	31.295	.003	.36270	.11258	.13318	.59223

Descriptives

learningorg1

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Policy and governing	20	3,0018	,57007	,12747	2,7350	3,2686	2,14	4,14
Personel, Human resource management	29	2,8040	,50132	,09309	2,6133	2,9947	1,82	3,82
Logistics	35	2,7557	,53531	,09048	2,5718	2,9395	1,77	4,14
Information and communication systems	24	3,2124	,52773	,10772	2,9896	3,4353	2,50	4,64
Planning and control, incl. legal issues	22	3,0124	,45631	,09729	2,8101	3,2147	1,91	3,86
Education and training	36	2,8332	,56538	,09423	2,6419	3,0245	1,55	4,10
Technical and electronic design and maintenance	19	2,8945	,50981	,11696	2,6487	3,1402	2,14	3,75
Military operational	61	2,7595	,59339	,07598	2,6075	2,9115	1,55	3,95
Total	246	2,8719	,55593	,03544	2,8021	2,9417	1,55	4,64

ANOVA

learningorg1

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.995	7	.714	2.401	.022
Within Groups	70.725	238	.297		
Total	75.720	245			

Multiple Comparisons

Dependent Variable: learningorg1

LSD

(I) Main_function	(J) Main_function	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Policy and governing	Personel, Human resource management	,19779	,15845	,213	-,1143	,5099
	Logistics	,24614	,15280	,109	-,0549	,5472
	Information and communication systems	-,21063	,16505	,203	-,5358	,1145
	Planning and control, incl. legal issues	-,01060	,16842	,950	-,3424	,3212
	Education and training	,16856	,15203	,269	-,1309	,4681
	Technical and electronic design and maintenance	,10734	,17464	,539	-,2367	,4514
	Military operational	,24228	,14046	,086	-,0344	,5190
Personel, Human resource management	Policy and governing	-,19779	,15845	,213	-,5099	,1143
	Logistics	,04834	,13688	,724	-,2213	,3180
	Information and communication systems	-,40842*	,15043	,007	-,7048	-,1121
	Planning and control, incl. legal issues	-,20840	,15412	,178	-,5120	,0952
	Education and training	-,02924	,13602	,830	-,2972	,2387
	Technical and electronic design and maintenance	-,09045	,16089	,575	-,4074	,2265
	Military operational	,04448	,12296	,718	-,1977	,2867
Logistics	Policy and governing	-,24614	,15280	,109	-,5472	,0549
	Personel, Human resource management	-,04834	,13688	,724	-,3180	,2213
	Information and communication systems	-,45676*	,14447	,002	-,7414	-,1722
	Planning and control, incl. legal issues	-,25674	,14832	,085	-,5489	,0354
	Education and training	-,07758	,12940	,549	-,3325	,1773
	Technical and electronic design and maintenance	-,13879	,15534	,373	-,4448	,1672
	Military operational	-,00386	,11559	,973	-,2316	,2239
Information and communication systems	Policy and governing	,21063	,16505	,203	-,1145	,5358
	Personel, Human resource management	,40842*	,15043	,007	,1121	,7048
	Logistics	,45676*	,14447	,002	,1722	,7414
	Planning and control, incl. legal issues	,20002	,16090	,215	-,1169	,5170
	Education and training	,37918*	,14365	,009	,0962	,6622
	Technical and electronic design and maintenance	,31797	,16740	,059	-,0118	,6477
	Military operational	,45290*	,13135	,001	,1941	,7117
Planning and control, incl. legal issues	Policy and governing	,01060	,16842	,950	-,3212	,3424
	Personel, Human resource management	,20840	,15412	,178	-,0952	,5120
	Logistics	,25674	,14832	,085	-,0354	,5489
	Information and communication systems	-,20002	,16090	,215	-,5170	,1169
	Education and training	,17916	,14752	,226	-,1115	,4698
	Technical and electronic design and maintenance	,11794	,17073	,490	-,2184	,4543
	Military operational	,25288	,13557	,063	-,0142	,5199
Education and training	Policy and governing	-,16856	,15203	,269	-,4681	,1309
	Personel, Human resource management	,02924	,13602	,830	-,2387	,2972
	Logistics	,07758	,12940	,549	-,1773	,3325
	Information and communication systems	-,37918*	,14365	,009	-,6622	-,0962
	Planning and control, incl. legal issues	-,17916	,14752	,226	-,4698	,1115
	Technical and electronic design and maintenance	-,06121	,15458	,692	-,3657	,2433
	Military operational	,07372	,11457	,521	-,1520	,2994
Technical and electronic design and maintenance	Policy and governing	-,10734	,17464	,539	-,4514	,2367
	Personel, Human resource management	,09045	,16089	,575	-,2265	,4074
	Logistics	,13879	,15534	,373	-,1672	,4448
	Information and communication systems	-,31797	,16740	,059	-,6477	,0118
	Planning and control, incl. legal issues	-,11794	,17073	,490	-,4543	,2184
	Education and training	,06121	,15458	,692	-,2433	,3657
	Military operational	,13494	,14322	,347	-,1472	,4171
Military operational	Policy and governing	-,24228	,14046	,086	-,5190	,0344
	Personel, Human resource management	-,04448	,12296	,718	-,2867	,1977
	Logistics	,00386	,11559	,973	-,2239	,2316
	Information and communication systems	-,45290*	,13135	,001	-,7117	-,1941
	Planning and control, incl. legal issues	-,25288	,13557	,063	-,5199	,0142
	Education and training	-,07372	,11457	,521	-,2994	,1520
	Technical and electronic design and maintenance	-,13494	,14322	,347	-,4171	,1472

*. The mean difference is significant at the .05 level.

Group Statistics

	Sex	N	Mean	Std. Deviation	Std. Error Mean
learningorg2	Male	220	2.9285	.55458	.03739
	Female	26	2.5303	.56706	.11121

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
learningorg2	Equal variances assumed	.419	.518	3.454	244	.001	.39821	.11528	.17115	.62528
	Equal variances not assumed			3.394	30.926	.002	.39821	.11733	.15890	.63752

Correlations

			learningorg1	P_hoursPC
Spearman's rho	learningorg1	Correlation Coefficient	1.000	.304**
		Sig. (2-tailed)	.	.000
		N	246	241
	P_hoursPC	Correlation Coefficient	.304**	1.000
		Sig. (2-tailed)	.000	.
		N	241	241

**. Correlation is significant at the 0.01 level (2-tailed).

1.9.1.3 Factor analysis related to creating and participating in the learning organization

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8,885	35,540	35,540	8,885	35,540	35,540	6,426	25,703	25,703
2	1,908	7,631	43,171	1,908	7,631	43,171	2,728	10,910	36,613
3	1,516	6,062	49,233	1,516	6,062	49,233	2,123	8,490	45,103
4	1,446	5,786	55,018	1,446	5,786	55,018	1,873	7,492	52,595
5	1,315	5,259	60,277	1,315	5,259	60,277	1,605	6,421	59,016
6	1,126	4,504	64,781	1,126	4,504	64,781	1,441	5,765	64,781
7	,956	3,825	68,606						
8	,914	3,654	72,260						
9	,881	3,524	75,783						
10	,773	3,093	78,876						
11	,689	2,755	81,631						
12	,559	2,236	83,867						
13	,552	2,208	86,075						
14	,500	2,002	88,076						
15	,489	1,958	90,034						
16	,391	1,562	91,596						
17	,376	1,504	93,100						
18	,332	1,327	94,427						
19	,277	1,110	95,537						
20	,254	1,017	96,555						
21	,242	,970	97,525						
22	,183	,732	98,256						
23	,176	,703	98,959						
24	,152	,609	99,568						
25	,108	,432	100,000						

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
q29	,231	,754	-,063	,071	-,010	-,038
q40	,102	,051	,864	,187	,008	-,011
q41	,095	,016	-,088	,725	-,085	,262
q43	,232	,214	,077	,623	,365	-,150
q48	,454	-,046	,095	-,031	,566	,049
q49	,106	,292	,071	-,013	,781	,094
q50	,508	,363	-,074	,117	,099	,263
q51	,064	,157	,840	-,131	,122	,040
q52	-,076	-,049	,154	,209	,414	,649
q53	,349	,719	,091	,190	,153	,073
q54	,515	,523	,342	-,035	-,033	-,005
q55	,660	,319	,224	,029	-,048	,201
q56	,656	,264	,278	,012	-,200	,208
q57	,139	,731	,187	,116	,191	,053
q58	,367	,306	,035	,084	-,237	,507
q59	,821	,237	,105	-,015	,046	,002
q64	,684	,177	,072	,181	,032	,201
q65	,802	,155	,022	,045	,222	,099
q67	,792	,104	-,007	,274	,072	,082
q68	,742	,083	-,112	,182	,092	,067
q70	,386	-,014	-,101	-,057	,037	,652
q82	,483	-,073	,444	,289	,193	-,049
q83	,678	,193	,191	,230	,191	-,003
q84	,745	,271	,153	,140	,179	,081
q66recoded	-,221	-,171	-,152	-,695	,067	,021

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

1.9.2 Competence related to competency management

I use my computer to obtain insight in the competencies needed in the organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	70	28.5	28.5	28.5
	applies seldomly	87	35.4	35.4	63.8
	applies partly	60	24.4	24.4	88.2
	applies mainly	25	10.2	10.2	98.4
	applies entirely	4	1.6	1.6	100.0
	Total	246	100.0	100.0	

I use my computer to store relevant information about the potential of my subordinates

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	14	5.7	10.1	10.1
	applies seldomly	23	9.3	16.5	26.6
	applies partly	33	13.4	23.7	50.4
	applies mainly	49	19.9	35.3	85.6
	applies entirely	20	8.1	14.4	100.0
	Total	139	56.5	100.0	
Missing	System	107	43.5		
Total		246	100.0		

I recognize development needs of my subordinates

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	1	.4	.7	.7
	applies seldomly	8	3.3	5.9	6.6
	applies partly	20	8.1	14.7	21.3
	applies mainly	71	28.9	52.2	73.5
	applies entirely	36	14.6	26.5	100.0
	Total	136	55.3	100.0	
Missing	System	110	44.7		
Total		246	100.0		

I facilitate the development needs of my subordinates

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	applies seldomly	5	2.0	3.7	3.7
	applies partly	10	4.1	7.4	11.1
	applies mainly	73	29.7	54.1	65.2
	applies entirely	47	19.1	34.8	100.0
	Total	135	54.9	100.0	
Missing	System	111	45.1		
Total		246	100.0		

1.9.2.1 Scale in relation with competency management with a focus on subordinates

Case Processing Summary

		N	%
Cases	Valid	134	54.5
	Excluded[a]	112	45.5
	Total	246	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.692	.740	3

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.828	3.299	4.194	.896	1.271	.221	3

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
11.49	4.943	2.223	3

Descriptives

			Statistic	Std. Error
competencymang	Mean		3,7929	,06550
	95% Confidence Interval for Mean	Lower Bound	3,6633	
		Upper Bound	3,9224	
	5% Trimmed Mean		3,8267	
	Median		4,0000	
	Variance		,601	
	Std. Deviation		,77503	
	Minimum		1,50	
	Maximum		5,00	
	Range		3,50	
	Interquartile Range		1,00	
	Skewness		-,624	,205
	Kurtosis		,123	,407

1.9.2.2 Significant differences and correlations related to the scale on competency management

T-Test

Group Statistics

	Sex	N	Mean	Std. Deviation	Std. Error Mean
compchange management	Male	220	3,9061	,58516	,03945
	Female	26	3,6314	,51000	,10002

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
compchange management	Equal variances assumed	1,485	,224	2,292	244	,023	,27465	,11985	,03858	,51072
	Equal variances not assumed			2,554	33,292	,015	,27465	,10752	,05598	,49332

Group Statistics

	Rank2	N	Mean	Std. Deviation	Std. Error Mean
compchange management	Subaltern officers	114	3,7946	,60685	,05684
	Head officers	132	3,9482	,55388	,04821

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
compchange management	Equal variances assumed	,210	,647	-2,075	244	,039	-,15364	,07403	-,29946	-,00782
	Equal variances not assumed			-2,062	230,963	,040	-,15364	,07453	-,30048	-,00680

1.9.2.3 Factor analysis related to competency management

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,127	53,183	53,183	2,127	53,183	53,183
2	,929	23,228	76,411			
3	,648	16,198	92,609			
4	,296	7,391	100,000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
q60	,477
q85	,691
q89	,841
q88	,845

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

1.9.3 Competence related to ICT-security awareness

I reflect on the security of information in the NLDO

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	43	17.5	17.5	17.5
	applies seldomly	54	22.0	22.0	39.4
	applies partly	70	28.5	28.5	67.9
	applies mainly	56	22.8	22.8	90.7
	applies entirely	23	9.3	9.3	100.0
	Total	246	100.0	100.0	

I know what the security risks of the Internet are

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	2	.8	.8	.8
	applies seldomly	11	4.5	4.5	5.3
	applies partly	37	15.0	15.1	20.4
	applies mainly	121	49.2	49.4	69.8
	applies entirely	74	30.1	30.2	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

I reflect about the integrity of the information that I am responsible for

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	4	1.6	1.6	1.6
	applies seldomly	10	4.1	4.1	5.7
	applies partly	42	17.1	17.1	22.9
	applies mainly	123	50.0	50.2	73.1
	applies entirely	66	26.8	26.9	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

I encourage ICT-security awareness amongst my subordinates

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	6	2.4	4.3	4.3
	applies seldomly	16	6.5	11.4	15.7
	applies partly	22	8.9	15.7	31.4
	applies mainly	62	25.2	44.3	75.7
	applies entirely	34	13.8	24.3	100.0
	Total	140	56.9	100.0	
Missing	System	106	43.1		
Total		246	100.0		

1.9.3.1 The scale related to ICT-security awareness

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.759	.767	4

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.639	2.870	4.022	1.152	1.402	.279	4

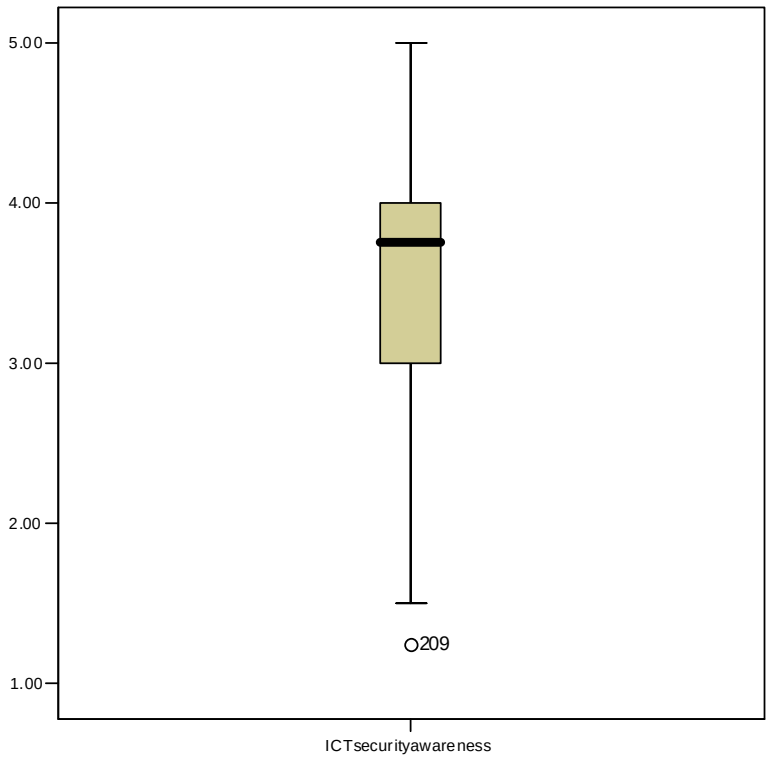
The covariance matrix is calculated and used in the analysis.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
ICTsecurityawareness	246	100.0%	0	.0%	246	100.0%

Descriptives

			Statistic	Std. Error
ICTsecurityawareness	Mean		3.6325	.04829
	95% Confidence Interval for Mean	Lower Bound	3.5373	
		Upper Bound	3.7276	
	5% Trimmed Mean		3.6512	
	Median		3.7500	
	Variance		.574	
	Std. Deviation		.75742	
	Minimum		1.25	
	Maximum		5.00	
	Range		3.75	
	Interquartile Range		1.00	
	Skewness		-.437	.155
	Kurtosis		-.020	.309



1.9.3.2 Significant differences related to the scale ICT-security awareness

T-Test

Group Statistics

	Sex	N	Mean	Std. Deviation	Std. Error Mean
ICTsecurityawareness	Male	220	3.6879	.74031	.04991
	Female	26	3.1635	.75184	.14745

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
ICTsecurityawareness	Equal variances assumed	.254	.615	3.410	244	.001	.52442	.15377	.22152	.82731
	Equal variances not assumed			3.369	31.011	.002	.52442	.15567	.20694	.84190

1.9.3.3 Factor analysis related to ICT-security awareness

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,358	58,952	58,952	2,358	58,952	58,952
2	,631	15,776	74,728			
3	,616	15,402	90,130			
4	,395	9,870	100,000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
q61	,758
q62	,765
q70	,711
q87	,832

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

1.9.4 Competence related to change management

I know how to manage change effectively

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	2	.8	.8	.8
	applies seldomly	20	8.1	8.2	9.1
	applies partly	71	28.9	29.2	38.3
	applies mainly	126	51.2	51.9	90.1
	applies entirely	24	9.8	9.9	100.0
	Total	243	98.8	100.0	
Missing	System	3	1.2		
Total		246	100.0		

I know how I can accompany changes in the organization effectively

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	9	3.7	3.7	3.7
	applies seldomly	38	15.4	15.5	19.2
	applies partly	84	34.1	34.3	53.5
	applies mainly	101	41.1	41.2	94.7
	applies entirely	13	5.3	5.3	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

Communication is important during a change in the organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	1	.4	.4	.4
	applies seldomly	1	.4	.4	.8
	applies partly	3	1.2	1.2	2.0
	applies mainly	53	21.5	21.5	23.6
	applies entirely	188	76.4	76.4	100.0
	Total	246	100.0	100.0	

I know how I can deal with the resistance my subordinates have against changes in the organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	applies seldomly	1	.4	.7	.7
	applies partly	32	13.0	23.5	24.3
	applies mainly	84	34.1	61.8	86.0
	applies entirely	19	7.7	14.0	100.0
	Total	136	55.3	100.0	
Missing	System	110	44.7		
Total		246	100.0		

1.9.4.1 The scales related to change management

The first scale which is not used

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.687	.670	3

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.881	3.292	4.733	1.440	1.438	.571	3

The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
11.64	3.305	1.818	3

Case Processing Summary

		N	%
Cases	Valid	135	54.9
	Excluded[a]	111	45.1
	Total	246	100.0

a. Listwise deletion based on all variables in the procedure.

The second scale which is used:

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.720	.704	4

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.924	3.400	4.741	1.341	1.394	.335	4

The covariance matrix is calculated and used in the analysis.

Scale Statistics

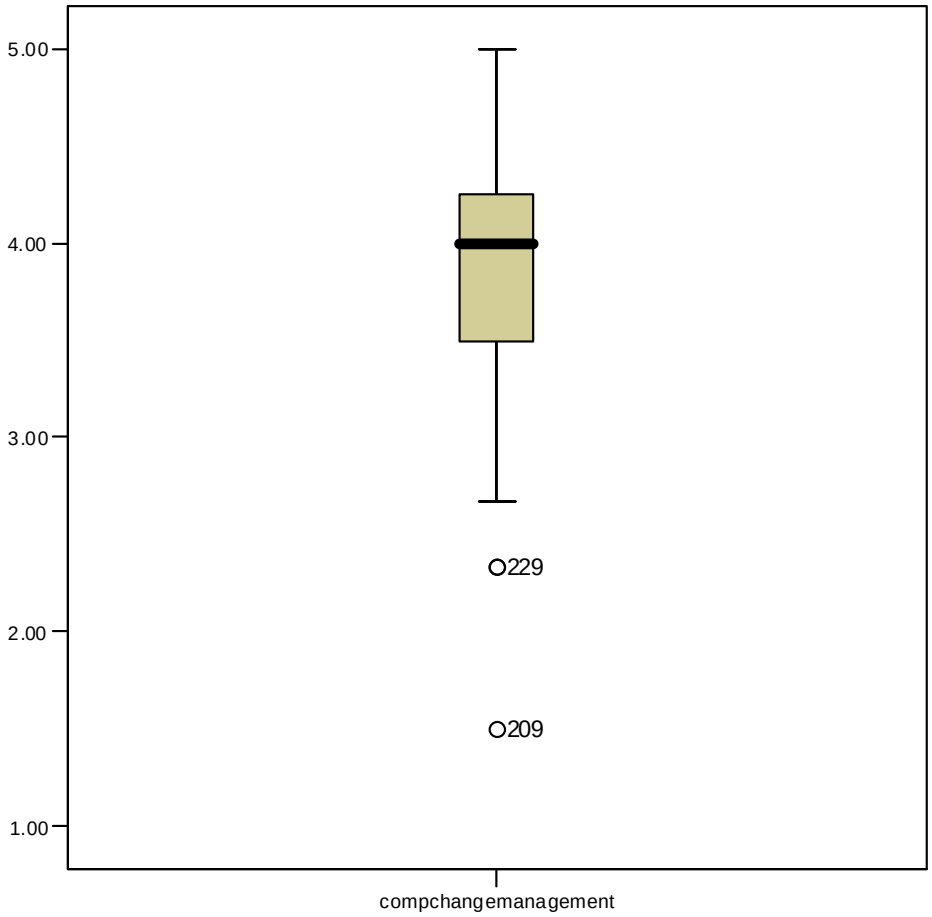
Mean	Variance	Std. Deviation	N of Items
15.70	4.347	2.085	4

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
compchange management	246	100.0%	0	.0%	246	100.0%

Descriptives

			Statistic	Std. Error
compchange management	Mean		3.8770	.03716
	95% Confidence Interval for Mean	Lower Bound	3.8038	
		Upper Bound	3.9502	
	5% Trimmed Mean		3.8897	
	Median		4.0000	
	Variance		.340	
	Std. Deviation		.58290	
	Minimum		1.50	
	Maximum		5.00	
	Range		3.50	
	Interquartile Range		.75	
	Skewness		-.509	.155
	Kurtosis		.597	.309



1.9.4.2 Significant differences related to change management

T-Test

Group Statistics

	Sex	N	Mean	Std. Deviation	Std. Error Mean
compchange management	Male	220	3.9061	.58516	.03945
	Female	26	3.6314	.51000	.10002

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
compchange management	Equal variances assumed	1.485	.224	2.292	244	.023	.27465	.11985	.03858	.51072
	Equal variances not assumed			2.554	33.292	.015	.27465	.10752	.05598	.49332

Group Statistics

	Rank2	N	Mean	Std. Deviation	Std. Error Mean
compchange management	Subaltern officers	114	3,7946	,60685	,05684
	Head officers	132	3,9482	,55388	,04821

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
compchange management	Equal variances assumed	,210	,647	-2,075	244	,039	-,15364	,07403	-,29946	-,00782
	Equal variances not assumed			-2,062	230,963	,040	-,15364	,07453	-,30048	-,00680

1.9.4.3 Factor analysis related to change management

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,183	54,576	54,576	2,183	54,576	54,576
2	,905	22,625	77,202			
3	,593	14,818	92,019			
4	,319	7,981	100,000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
q72	,850
q74	,867
q77	,479
q92	,692

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

1.9.5 Competence related to innovation management

I consider renewal projects as a challenge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	applies seldomly	14	5.7	5.7	5.7
	applies partly	28	11.4	11.4	17.1
	applies mainly	122	49.6	49.8	66.9
	applies entirely	81	32.9	33.1	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

I have enough autonomy to work in the way I find best

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	7	2.8	2.9	2.9
	applies seldomly	16	6.5	6.5	9.4
	applies partly	37	15.0	15.1	24.5
	applies mainly	111	45.1	45.3	69.8
	applies entirely	74	30.1	30.2	100.0
	Total	245	99.6	100.0	
Missing	System	1	.4		
Total		246	100.0		

Support in developing new ideas is always found in the NLDO

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	15	6.1	6.2	6.2
	applies seldomly	76	30.9	31.3	37.4
	applies partly	107	43.5	44.0	81.5
	applies mainly	41	16.7	16.9	98.4
	applies entirely	4	1.6	1.6	100.0
	Total	243	98.8	100.0	
Missing	System	3	1.2		
Total		246	100.0		

I use creative ideas to improve the working method

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	4	1.6	1.6	1.6
	applies seldomly	31	12.6	12.7	14.3
	applies partly	102	41.5	41.8	56.1
	applies mainly	91	37.0	37.3	93.4
	applies entirely	16	6.5	6.6	100.0
	Total	244	99.2	100.0	
Missing	System	2	.8		
Total		246	100.0		

1.9.5.1 The scales related to innovation management

The first scale which is not used

Case Processing Summary

		N	%
Cases	Valid	241	98.0
	Excluded[a]	5	2.0
	Total	246	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.545	.552	4

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.538	2.768	4.104	1.336	1.483	.369	4

The covariance matrix is calculated and used in the analysis.

The second scale which is used

encourage my subordinates to participate in the thinking process about improving the working processes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	2	.8	1.4	1.4
	applies seldomly	10	4.1	7.1	8.6
	applies partly	28	11.4	20.0	28.6
	applies mainly	66	26.8	47.1	75.7
	applies entirely	34	13.8	24.3	100.0
	Total	140	56.9	100.0	
Missing	System	106	43.1		
Total		246	100.0		

I allow my subordinates to work in the way they find best

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	1	.4	.7	.7
	applies seldomly	1	.4	.7	1.5
	applies partly	24	9.8	17.6	19.1
	applies mainly	85	34.6	62.5	81.6
	applies entirely	25	10.2	18.4	100.0
	Total	136	55.3	100.0	
Missing	System	110	44.7		
Total		246	100.0		

I allow my subordinates to make mistakes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	does not apply at all	1	.4	.7	.7
	applies seldomly	7	2.8	5.1	5.9
	applies partly	32	13.0	23.5	29.4
	applies mainly	65	26.4	47.8	77.2
	applies entirely	31	12.6	22.8	100.0
	Total	136	55.3	100.0	
Missing	System	110	44.7		
Total		246	100.0		

Case Processing Summary

		N	%
Cases	Valid	135	54.9
	Excluded[a]	111	45.1
	Total	246	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.637	.641	7

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.711	2.807	4.104	1.296	1.462	.200	7

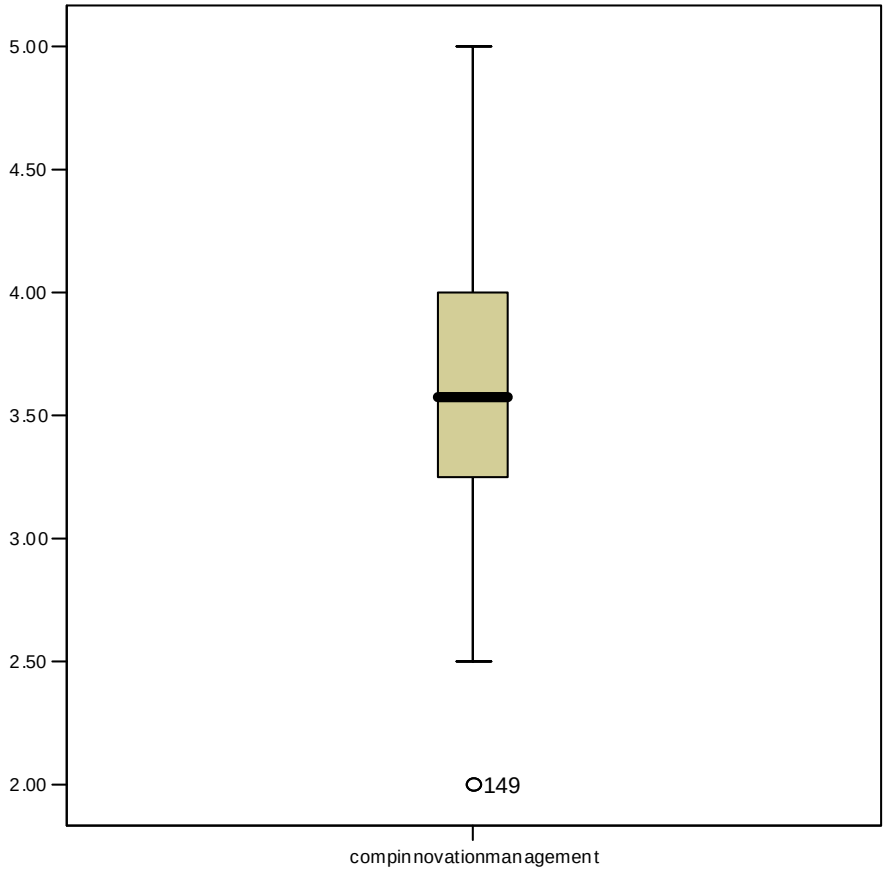
The covariance matrix is calculated and used in the analysis.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
25.98	11.305	3.362	7

Descriptives

			Statistic	Std. Error
compinnovationmanagement	Mean		3.6182	.03315
	95% Confidence Interval for Mean	Lower Bound	3.5529	
		Upper Bound	3.6835	
	5% Trimmed Mean		3.6258	
	Median		3.5714	
	Variance		.270	
	Std. Deviation		.51987	
	Minimum		2.00	
	Maximum		5.00	
	Range		3.00	
	Interquartile Range		.75	
	Skewness		-.287	.155
	Kurtosis		.049	.309



1.9.5.2 Significant correlations related to innovation management

Group Statistics

	Sex	N	Mean	Std. Deviation	Std. Error Mean
compinnovatio nmanagement	Male	220	3.6538	.51459	.03469
	Female	26	3.3173	.47298	.09276

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
compinnovatio nmanagement	Equal variances assumed	.211	.647	3.178	244	.002	.33648	.10586	.12796	.54500
	Equal variances not assumed			3.398	32.411	.002	.33648	.09903	.13485	.53811

1.9.5.3 Factor analysis related to innovation management

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,321	33,161	33,161	2,321	33,161	33,161	2,197	31,389	31,389
2	1,325	18,922	52,083	1,325	18,922	52,083	1,449	20,694	52,083
3	,971	13,874	65,957						
4	,779	11,124	77,081						
5	,668	9,538	86,620						
6	,535	7,647	94,266						
7	,401	5,734	100,000						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component	
	1	2
q69	,503	-,230
q71	,732	-,221
q73	,478	-,206
q79	,730	-,116
q86	,711	-,085
q90	,453	,702
q91	,249	,816

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

1.10 Factor analysis ICT- and ICT-related competencies

1.10.1 ICT-competencies

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4,014	30,877	30,877	4,014	30,877	30,877	2,814	21,648	21,648
2	1,937	14,902	45,778	1,937	14,902	45,778	2,429	18,688	40,336
3	1,336	10,281	56,059	1,336	10,281	56,059	2,044	15,723	56,059
4	,998	7,674	63,733						
5	,894	6,875	70,608						
6	,757	5,822	76,430						
7	,714	5,494	81,924						
8	,588	4,521	86,445						
9	,532	4,092	90,536						
10	,400	3,075	93,611						
11	,327	2,514	96,125						
12	,262	2,019	98,144						
13	,241	1,856	100,000						

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component		
	1	2	3
q25	,620	,225	,237
q26	,650	,032	,207
q27	,842	,082	-,021
q28	,775	,105	,105
q34	,626	,265	,163
q35recoded	,262	,175	,559
q31recoded	,130	,066	,846
q32recoded	,180	-,092	,818
q36	,181	,468	-,298
q39	,018	,709	,243
q42	,133	,805	,074
q37	,143	,817	-,105
q63	,342	,458	,213

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

Component one

Reliability Statistics

Cronbach's Alpha	N of Items
,743	5

Component two

Reliability Statistics

Cronbach's Alpha	N of Items
,700	5

Component three

Reliability Statistics

Cronbach's Alpha	N of Items
,712	3

1.10.2 ICT-related competencies

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11,512	31,978	31,978	11,512	31,978	31,978	5,939	16,497	16,497
2	3,007	8,353	40,331	3,007	8,353	40,331	3,437	9,547	26,044
3	1,970	5,472	45,803	1,970	5,472	45,803	2,979	8,275	34,318
4	1,781	4,947	50,750	1,781	4,947	50,750	2,691	7,475	41,794
5	1,583	4,396	55,146	1,583	4,396	55,146	2,310	6,416	48,210
6	1,359	3,776	58,923	1,359	3,776	58,923	2,252	6,257	54,466
7	1,313	3,647	62,570	1,313	3,647	62,570	2,089	5,803	60,269
8	1,143	3,176	65,745	1,143	3,176	65,745	1,658	4,607	64,876
9	1,096	3,043	68,789	1,096	3,043	68,789	1,409	3,913	68,789
10	,995	2,765	71,554						
11	,925	2,569	74,123						
12	,842	2,340	76,463						
13	,749	2,081	78,544						
14	,697	1,936	80,480						
15	,671	1,864	82,345						
16	,574	1,594	83,939						
17	,556	1,544	85,483						
18	,513	1,424	86,907						
19	,483	1,342	88,249						
20	,452	1,255	89,504						
21	,433	1,204	90,708						
22	,394	1,095	91,802						
23	,351	,975	92,778						
24	,339	,942	93,720						
25	,302	,840	94,559						
26	,283	,785	95,344						
27	,232	,644	95,989						
28	,216	,601	96,590						
29	,205	,571	97,160						
30	,197	,548	97,708						
31	,191	,529	98,238						
32	,173	,480	98,717						
33	,150	,415	99,133						
34	,126	,351	99,483						
35	,109	,303	99,786						
36	,077	,214	100,000						

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component								
	1	2	3	4	5	6	7	8	9
q29	,149	,203	,035	,798	,118	-,007	,019	-,040	-,097
q40	,068	,015	,020	,202	-,079	,018	,729	-,044	,051
q41	,040	,265	,133	-,032	-,025	,123	,027	-,035	,823
q43	,200	,018	,009	,210	,273	-,200	,399	,004	,568
q50	,326	,101	,456	,322	,276	-,039	-,061	-,008	,239
q53	,352	,075	,105	,712	,104	,131	,212	-,085	,086
q54	,362	-,078	,485	,433	,111	,044	,332	-,022	-,132
q55	,566	,183	,464	,165	,053	-,036	,140	-,362	,012
q56	,550	,188	,539	,112	-,050	,075	,163	-,250	-,083
q57	,173	-,080	,222	,678	,016	-,086	,124	-,082	,150
q58	,396	-,008	,324	,295	-,048	,300	-,219	-,090	,284
q59	,733	,076	,326	,275	,011	,043	,139	,057	-,040
q64	,620	,361	,156	,206	,194	-,036	,066	-,046	,047
q65	,752	,137	,207	,223	,244	-,094	,049	-,085	,037
q67	,811	,213	,108	,118	,145	,013	,083	,086	,135
q68	,807	,262	,026	,139	-,013	,059	,018	,164	,120
q70	,224	,405	,214	,091	,493	,232	-,264	,012	-,057
q82	,392	,065	,197	,000	,160	,046	,608	,077	,082
q83	,415	,091	,577	,162	,224	-,135	,347	,089	,117
q84	,468	,235	,507	,246	,277	,050	,332	,010	,038
q60	,656	-,031	,016	,235	,106	,233	,300	,114	-,009
q85	,227	,159	-,060	,195	,196	,495	,320	-,204	,029
q89	,022	,143	,101	-,017	-,025	,847	,017	,041	,024
q88	-,002	-,013	,072	-,041	,220	,853	-,051	-,013	,003
q61	,680	,154	,070	-,168	,448	,115	,032	-,049	,046
q62	,167	,115	,060	,180	,752	,062	,059	,012	,009
q87	,161	,239	,182	,023	,740	,182	,094	,019	,095
q72	,178	,834	-,007	,112	,204	,062	,077	-,055	,028
q74	,169	,720	,294	,064	,076	,105	,086	,150	,086
q77	,017	,323	,524	,024	,044	,151	-,124	-,007	,035
q92	,066	,486	,027	-,127	,226	,312	,330	,188	,003
q71	,185	,728	,107	,141	,138	-,074	-,208	-,009	,242
q79	,350	,642	,313	-,101	,030	,075	,135	,008	,079
q86	,244	,274	,644	,148	,231	,195	,091	,182	,233
q90	-,064	,116	,151	,056	,078	-,011	,082	,855	-,016
q91	,159	,002	-,127	-,205	-,052	-,020	-,060	,702	-,020

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 8 iterations.

Component one

Reliability Statistics

Cronbach's Alpha	N of Items
,899	10

Reliability Statistics

Cronbach's Alpha	N of Items
,933	16

Component two

Reliability Statistics

Cronbach's Alpha	N of Items
,839	5

Reliability Statistics

Cronbach's Alpha	N of Items
,840	8

Component three

Reliability Statistics

Cronbach's Alpha	N of Items
,831	6

Reliability Statistics

Cronbach's Alpha	N of Items
,899	11

Component four

Reliability Statistics

Cronbach's Alpha	N of Items
,697	3

Reliability Statistics

Cronbach's Alpha	N of Items
,752	6

Component five

Reliability Statistics

Cronbach's Alpha	N of Items
,714	3

Reliability Statistics

Cronbach's Alpha	N of Items
,759	4

Component six

Reliability Statistics

Cronbach's Alpha	N of Items
,692	3

Reliability Statistics

Cronbach's Alpha	N of Items
,659	5

Component seven, eight and nine

Reliability Statistics

Cronbach's Alpha	N of Items
,509	2

Reliability Statistics

Cronbach's Alpha	N of Items
,579	2

Reliability Statistics

Cronbach's Alpha	N of Items
,401	2