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.
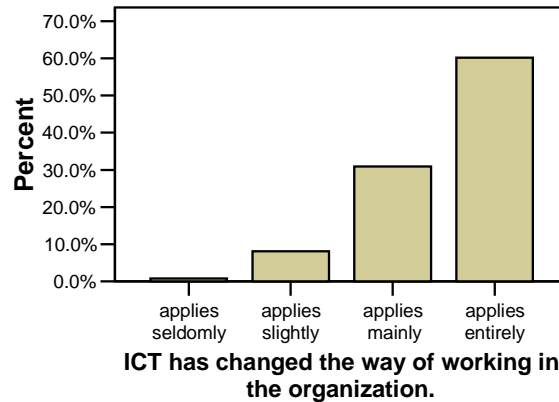
The respondents to the questionnaire indicated that ICT has changed the way of working in the organization. The frequencies of the responses to an explicit statement in this regard: 'ICT has changed the way of working in the organization' are summarized in table 4.1. In this table it is shown that 91.1% 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.

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[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].
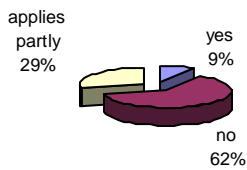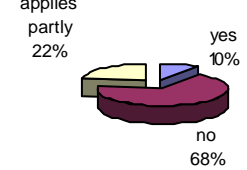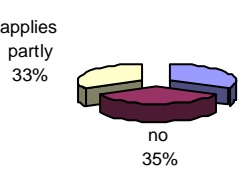
Two respondents wrote on the questionnaire that there is a need to have access to the Intranet of the NLDO including PeopleSoft for employees working at home or when they are placed in foreign countries.
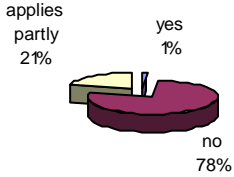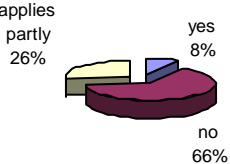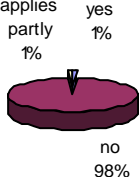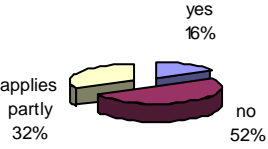
In the next section the research results related to the sub-question: 'What is the influence of ICT regarding info-stress, mobility, productivity and confidence of the officers in the NLDO in their work environment?' are discussed.

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'	applies partly 29% yes 9% no 62%
Statement 17 **The number of e-mails that I receive make my work stressful.** Median: 'does not apply at all' Mode: 'applies seldomly'	applies partly 22% yes 10% no 68%
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'	applies partly 33% yes 32% no 35%

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'	applies partly 21% yes 1% no 78%
Statement 21 **It happens that I receive important information too late because there are ICT problems.** Median and mode: 'applies seldomly'	applies partly 26% yes 8% no 66%
Statement 22 **Using ICT in my work makes me uncertain.** Median and mode: 'does not apply at all'	applies partly 1% yes 1% no 98%
Statement 38 **The amount of information that I have to work through daily makes my work stressful.** Median and mode: 'applies seldomly'	yes 16% applies partly 32% no 52%

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

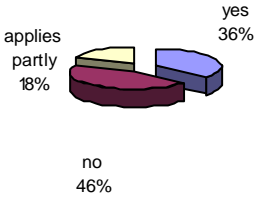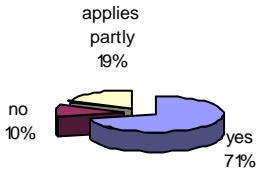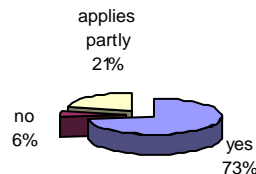Measured with the following two items (explaining 18% of variance)

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'	applies partly 18% yes 36% no 46%
Statement 29	
I do communicate electronically with other professionals about my work. Median and mode: 'applies mainly'.	applies partly 19% no 10% yes 71%
Statement 23	
It is important that I receive information immediately as it becomes available. Median: 'applies mainly' Mode: 'applies entirely'.	applies partly 21% no 6% yes 73%

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].

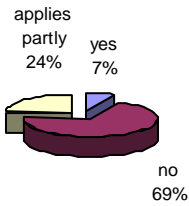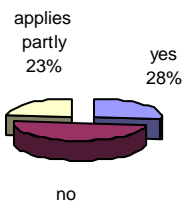A time-registration system with a handheld scanner was mentioned by one officer as an improvement.

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]:
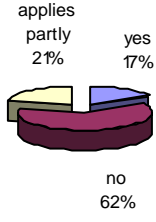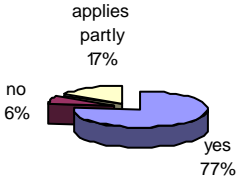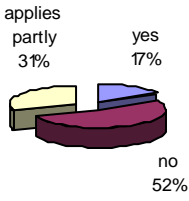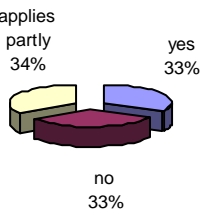*"If someone lives closer to another defence location than where he/she is placed in the organization, is it not possible to work (part-time) in that defence location? Does this require a cultural change and does this need to be stimulated?"*

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'	applies partly 24% / yes 7% / no 69%
Statement 31 **I would like to know how I could find information on the Internet more effectively.** Median: 'applies partly' Mode: 'applies seldomly'	applies partly 23% / yes 28% / no 49%

Statement 32 **I waste time finding relevant information on the Internet.** Median and mode: 'applies seldomly'	applies partly 21% / yes 17% / no 62%
Statement 33 **ICT makes my work more productive.** Median and mode: 'applies mainly'	applies partly 17% / no 6% / yes 77%
Statement 35 **I ask others to help me with ICT.** Median and mode: 'applies seldomly'	applies partly 31% / yes 17% / no 52%
Statement 47 **I waste time finding relevant information on the Intranet of the NLDO.** Median and mode: 'applies partly'	applies partly 34% / yes 33% / no 33%

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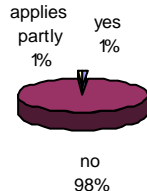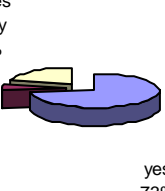47*   I waste time finding relevant information on the intranet of the NLDO.
33   ICT makes my work more productive.
*recoded

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'.	applies partly 1% yes 1% no 98%
Statement 25 **I know enough about ICT networks in order to know what can and cannot be done.** Median: 'applies partly' Mode:'applies mainly'	applies partly 30% yes 44% no 26%
Statement 26 **I am able to use all the software applications that I need in my work effectively.** Median and mode: 'applies mainly'.	applies partly 20% no 7% yes 73%
Statement 27 **I manage my e-mail effectively.** Median and mode: 'applies mainly'.	applies partly 25% no 7% yes 68%

Statement 28 **I organize my information effectively on the computer.** Median and mode: 'applies mainly'.	applies partly 21% no 9% yes 70%
Statement 34 **I have enough insight in ICT in order to participate in decision-making in this regard.** Median: 'applies partly' Mode:'applies mainly'	applies partly 26% no 26% yes 48%
Statement 35 **I ask others to help me with ICT.** Median and mode: 'applies seldomly'	applies partly 31% yes 17% no 52%
Statement 39 **I know where to find information about relevant courses and studies for myself.** Median: 'applies partly' Mode:'applies seldomly'	applies partly 19% yes 37% no 44%
Statement 42 **I can always find work-related information on the Internet just in time when I need it.** Median and mode: 'applies partly''	applies partly 30% yes 33% no 37%

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).
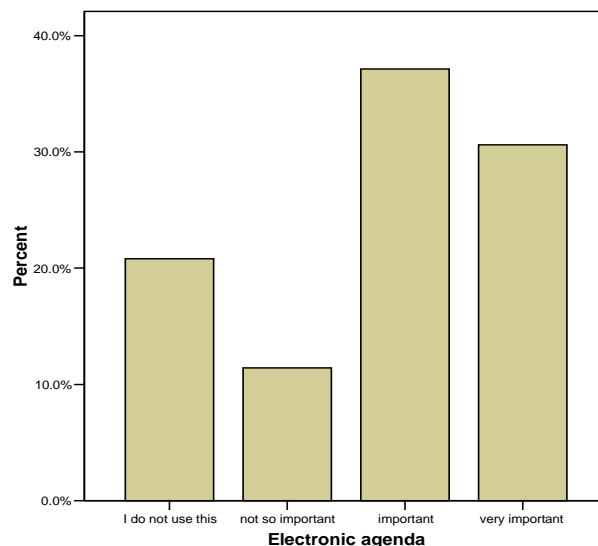
4.2.8.1   Electronic agenda

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'.
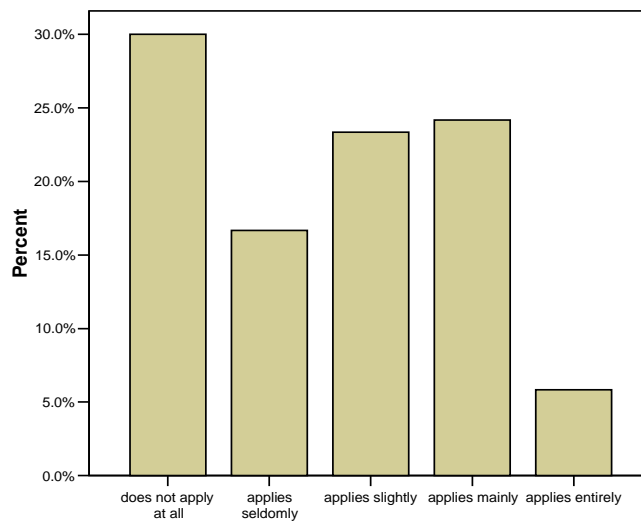
4.2.8.2   Video conferencing

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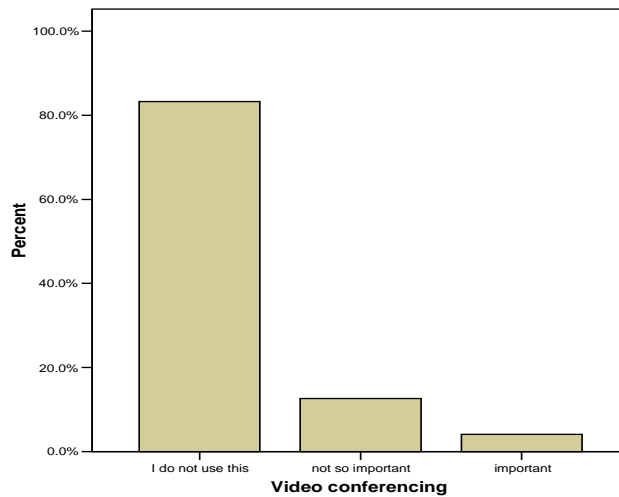
Graph 4.3 The importance of video conferencing in the working situation of the respondents

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'.
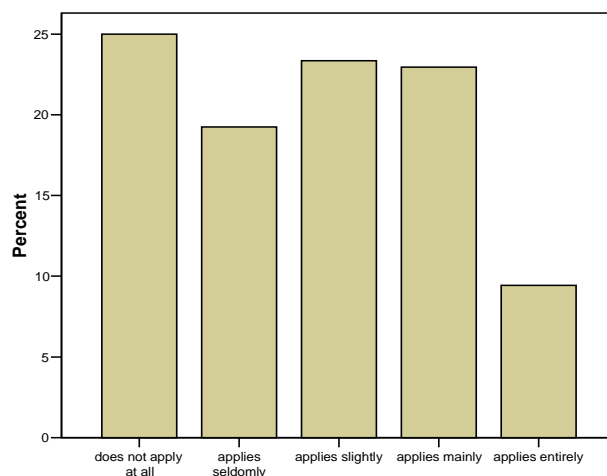
Online (video) conferencing is an acceptable alternative to face-to-face meetings in the NLDO

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'.

**I would like to learn how to participate in online (video) conferencing**

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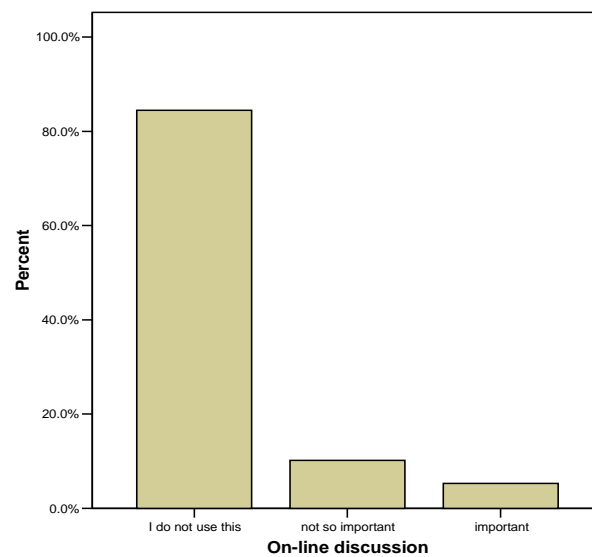
Graph 4.6 The importance of on-line discussion in the working situation of the respondents

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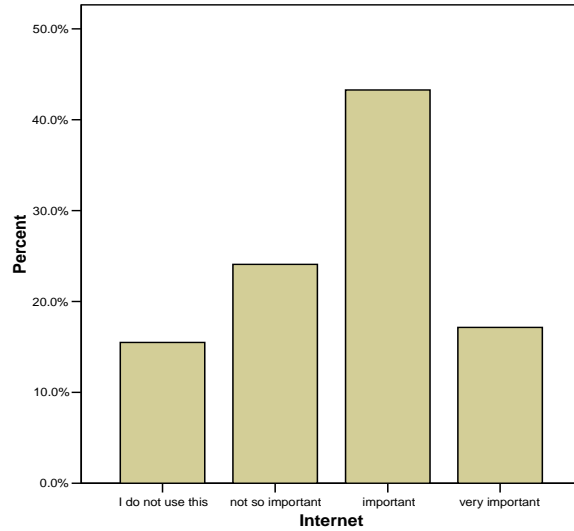
Graph 4.7 The importance of the Internet in the working situation of the respondents

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.
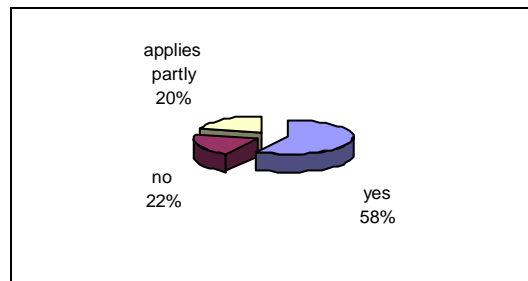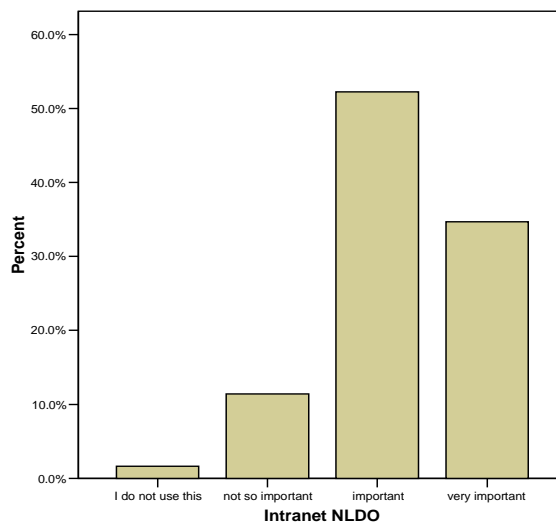

Median and mode: 'applies mainly'

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.
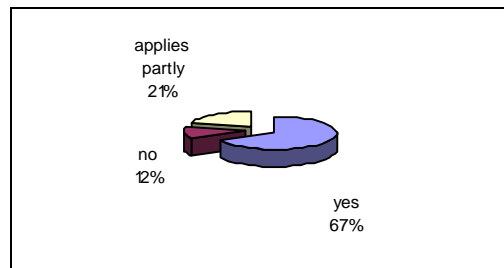
Median and mode: 'applies mainly'

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

156

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.
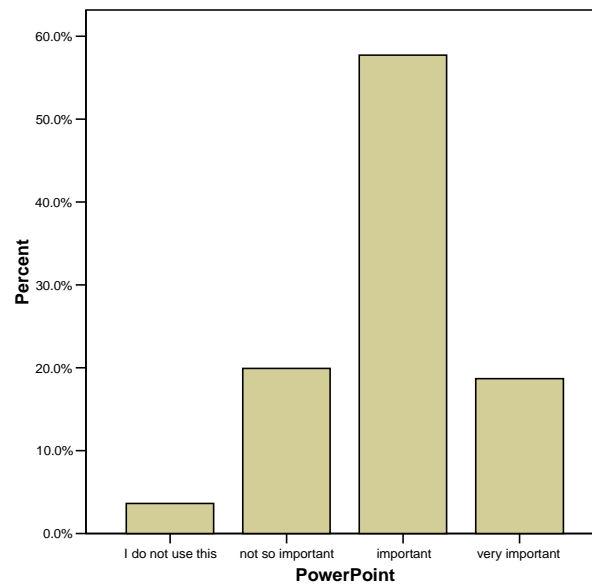
4.2.8.6   MS PowerPoint

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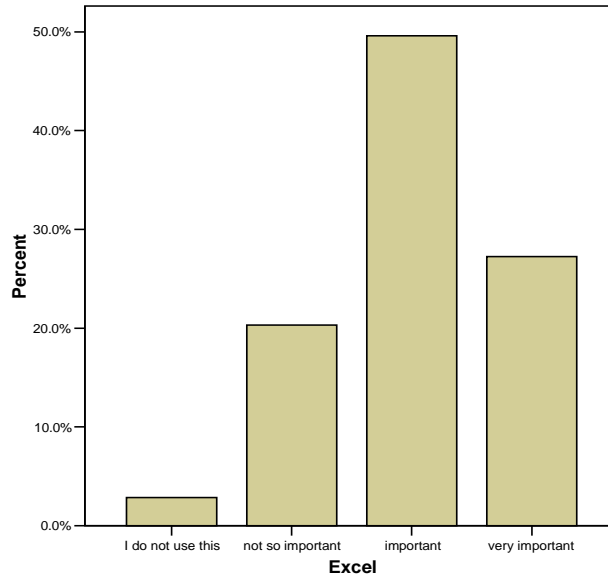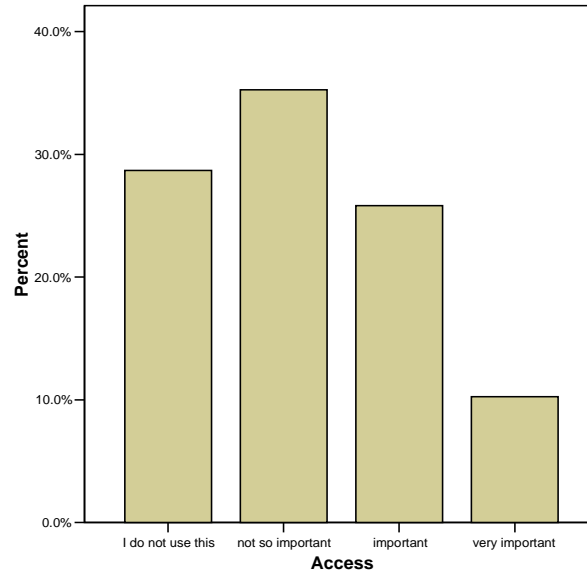
Graph 4.13 The importance of MS Access in the working situation of the respondents

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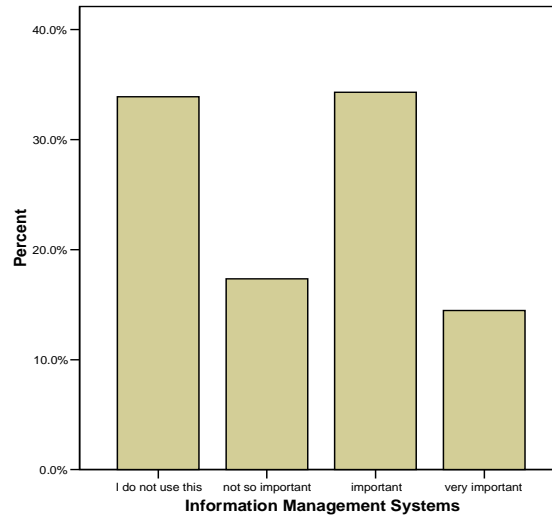
Graph 4.14 The importance of Information Management Systems in the working situation of the respondents

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'.
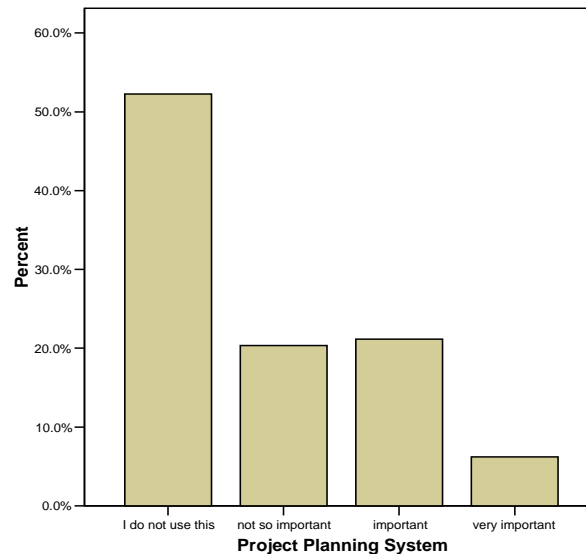

Graph 4.15 The importance of a Project Planning System in the working situation of the respondents

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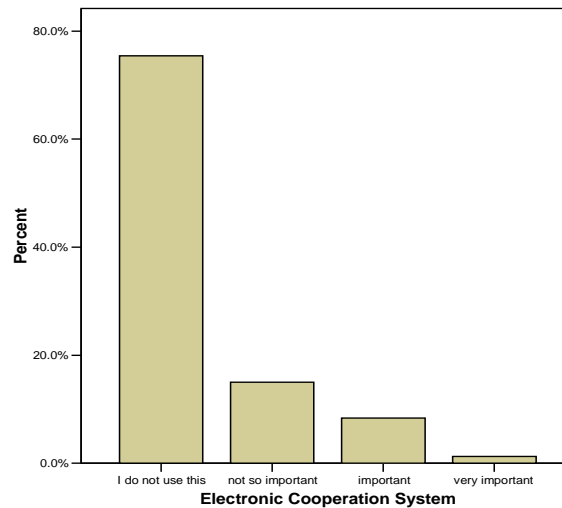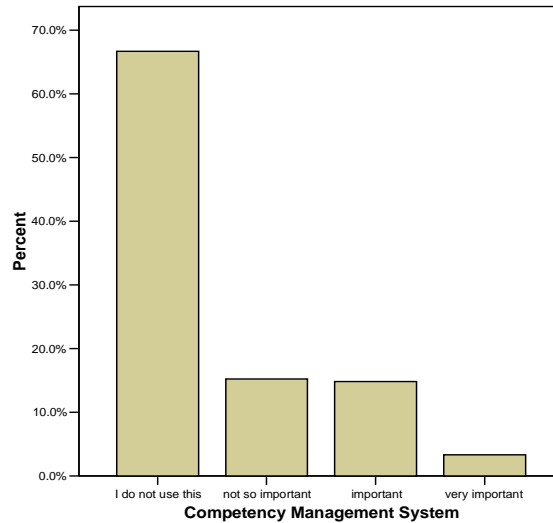
Graph 4.17 The importance of a Competency Management System in the working situation of the respondents

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

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[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'.
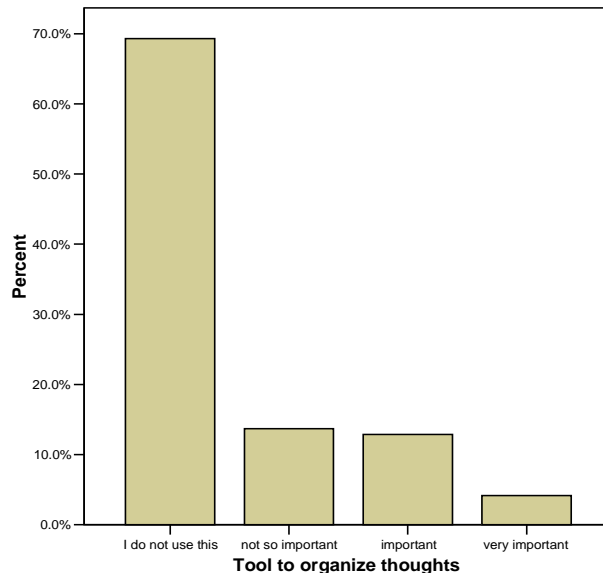
Graph 4.18 The importance of a tool to organize thoughts

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.
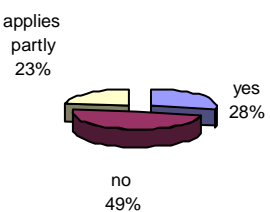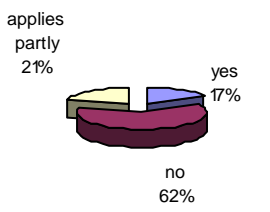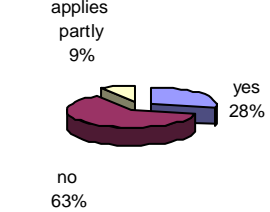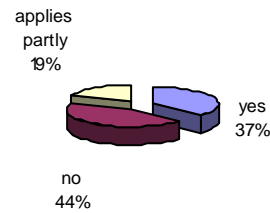
*recoded

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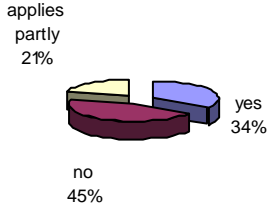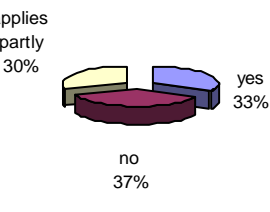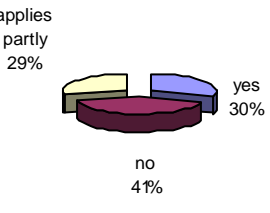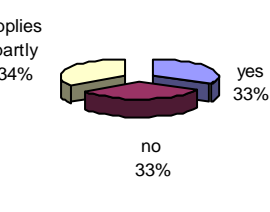
systems. In table 4.11 the frequencies of the responses to individual statements is illustrated.

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'	applies partly 23% yes 28% no 49%
I waste time finding relevant information on the Internet. Median and mode: 'applies seldomly'.	applies partly 21% yes 17% no 62%
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'.	applies partly 9% yes 28% no 63%
I know where to find information on the Internet about relevant courses and studies for myself. Median: 'applies partly' Mode: 'applies seldomly	applies partly 19% yes 37% no 44%

I know where to find information on the Internet about relevant courses and studies for my subordinates. Median: 'applies partly' Mode: 'applies mainly'	applies partly 21% yes 34% no 45%
I can always find work-related information on the Internet just in time when I need it. Median and mode: 'applies partly'	applies partly 30% yes 33% no 37%
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'	applies partly 29% yes 30% no 41%
I waste time finding relevant information on the Intranet of the NLDO. Median and mode: 'applies partly'	applies partly 34% yes 33% no 33%

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.

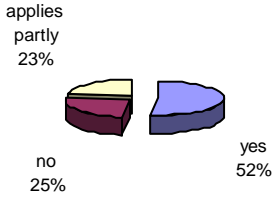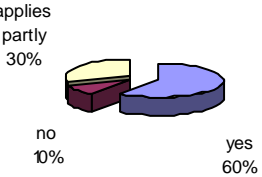Measured with the following three items (explaining 18% variance)

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'	applies partly 23% no 25% yes 52%
Statement 63 **I identify and recognize important information in the information rich environment.** The median and mode: 'applies mainly'	applies partly 30% no 10% yes 60%

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

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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.

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[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

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[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].

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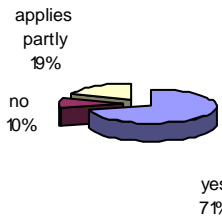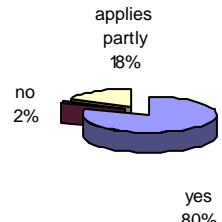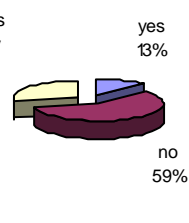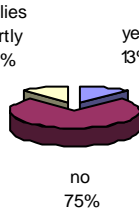
4.2.12.1 Competence in creating and participating in a learning organization, communities of practice and knowledge management

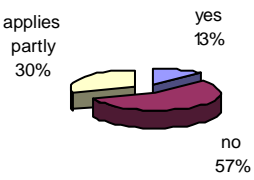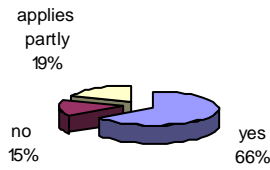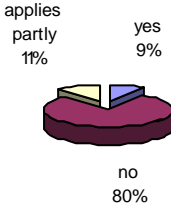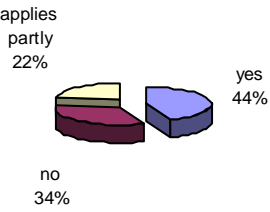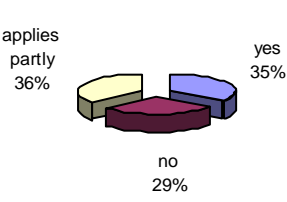The competence in creating and participating in a learning organization, communities of practice and knowledge management were operationalized for the questionnaire by using the following dimensions:

- 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'.
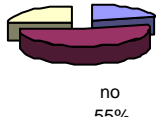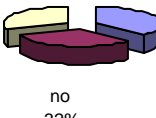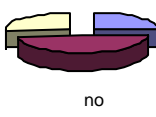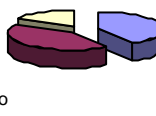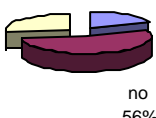
Table 4.13 Response to statements about the learning organization

Statement 29 **I do communicate electronically with other professionals about my work.** Median and mode: 'applies mainly'	applies partly 19% no 10% yes 71%
Statement 40 **I have the opportunity to learn via the Internet during working hours.** Median and mode: 'does not apply at all'	applies partly 9% yes 5% no 86%
Statement 41 **In my function it is important to continue to learn all the time.** Median: 'applies mainly' Mode: 'applies entirely'	applies partly 18% no 2% yes 80%
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'	applies partly 28% yes 13% no 59%
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'	applies partly 12% yes 13% no 75%

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'	applies partly 30% yes 13% no 57%
Statement 50 **It is important to store the knowledge of my section electronically.** Median and mode: 'applies mainly'	applies partly 19% no 15% yes 66%
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'	applies partly 11% yes 9% no 80%
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'	applies partly 22% yes 44% no 34%
Statement 53 **I share my work-related knowledge with others electronically using a share.** Median and mode: 'applies partly'	applies partly 36% yes 35% no 29%

Statement 54 **I spend time to organize electronically the working knowledge of the unit that I am responsible for.** Median and mode: 'applies partly'	applies partly 32% yes 35% no 33%
Statement 55 **I think of ways to improve the sharing of information electronically.** Median: 'applies partly' Mode: 'applies mainly'	applies partly 29% yes 47% no 24%
Statement 56 **I spend time to improve the sharing of organizational knowledge electronically.** Median and mode: 'applies partly'	applies partly 33% yes 30% no 37%
Statement 57 **I benefit from colleagues who share their experiences/lessons learnt with me.** Median and mode: 'applies partly'	applies partly 40% yes 38% no 22%
Statement 58 **I share the mistakes that I made and what I learnt from it with my colleagues.** Median and mode: 'applies mainly'	applies partly 33% yes 51% no 16%

Statement 59 **I play an important role in managing the knowledge of the organization electronically.** Median: 'applies seldomly' Mode: 'does not apply at all'	applies partly 24% yes 21% no 55%
Statement 64 **I reflect on how information can be managed more effectively.** Median and mode: 'applies partly'.	applies partly 31% yes 37% no 32%
Statement 65 **I play an important role in organizing the flow of information in my unit.** Median: 'applies partly' Mode: 'applies seldomly'	applies partly 26% yes 25% no 49%
Statement 66 **Dealing with organizational knowledge effectively in the NLDO needs to improve.** Median: 'applies partly' Mode: 'applies seldomly'	applies partly 17% yes 41% no 42%
Statement 67 **It is important for my organization unit to share working knowledge and information with international partners.** Median and mode: 'applies seldomly'	applies partly 26% yes 18% no 56%

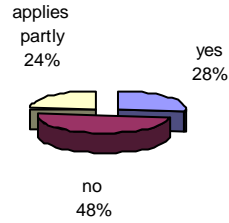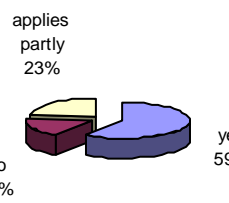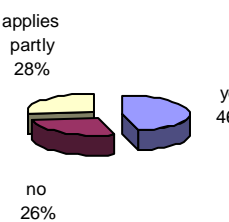|	
Statement 68 **I implement new ways of working with information in the organization.** Median: 'applies seldomly' Mode: 'does not apply at all'	yes 21% applies partly 57% no 22%
Statement 70 **I reflect about the integrity of the information that I am responsible for.** Median and mode: 'applies mainly'	applies partly 17% no 6% yes 77%

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'	applies partly 24% yes 28% no 48%
Statement 83 **I encourage my subordinates to share their working knowledge with others electronically.** Median and mode: 'applies mainly'	applies partly 23% no 18% yes 59%
Statement 84 **I discuss the advantages of sharing working knowledge electronically with my subordinates.** Median: 'applies partly' Mode: 'applies mainly'	applies partly 28% yes 46% no 26%

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.
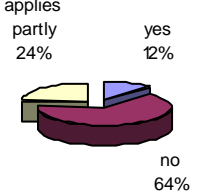
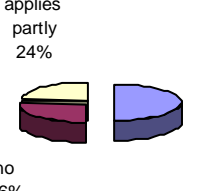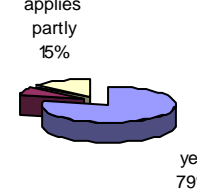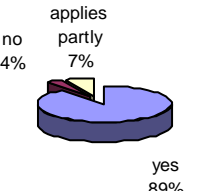No common theme is identified for the sixth component.

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'	applies partly 24%, yes 12%, no 64%
Statement 85 **I use my computer to store relevant information about the potential of my subordinates.** Median: 'applies partly' Mode: 'applies mainly'	applies partly 24%, yes 50%, no 26%
Statement 88 **I recognize development needs of my subordinates.** Median and mode: 'applies mainly'	applies partly 15%, no 6%, yes 79%
Statement 89 **I facilitate the development needs of my subordinates.** Median and mode: 'applies mainly'	no 4%, applies partly 7%, yes 89%

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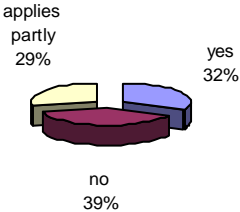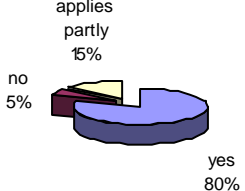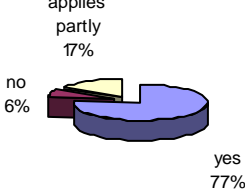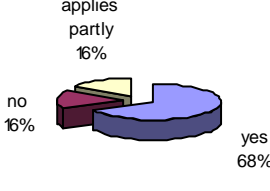
Factor analysis was used to investigate if more than one principal component could be extracted from the variables in this scale based on the correlations the variables have with each other. Only one principal component is found explaining a total of 53% of variance.

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'	applies partly 29% — yes 32% — no 39%
Statement 62 **I know what the security risks of the Internet are.** Median and mode: 'applies mainly'	applies partly 15% — no 5% — yes 80%
Statement 70 **I reflect about the integrity of the information that I am responsible for.** Median and mode: 'applies mainly'.	applies partly 17% — no 6% — yes 77%
Statement 87 **I encourage ICT-security awareness amongst my subordinates.** Median and mode: 'applies mainly'.	applies partly 16% — no 16% — yes 68%

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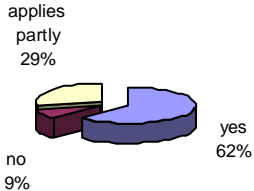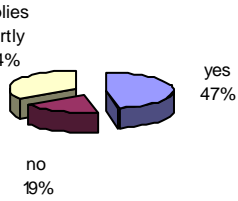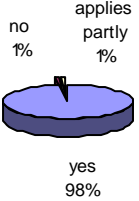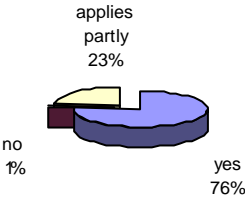
A significant correlation of 0.21 is found between the number of hours per week that respondents work on the PC for private use (at home) and their self-evaluation about competence in ICT-security awareness.

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'	applies partly 29% yes 62% no 9%
Statement 74 **I know how I can accompany changes in the organization effectively.** Median: 'applies partly' Mode: 'applies mainly'	applies partly 34% yes 47% no 19%
Statement 77 **Communication is important during a change in the organization.** Median and mode: 'applies entirely'	no 1% applies partly 1% yes 98%
Statement 92 **I know how I can deal with the resistance my subordinates have against changes in the organization.** Median and mode: 'applies mainly'	applies partly 23% no 1% yes 76%

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.
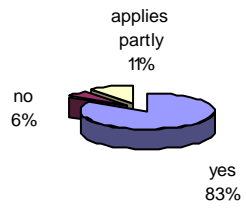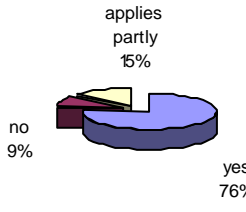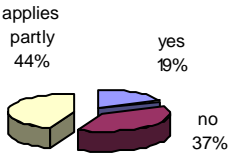
Two significant differences are found
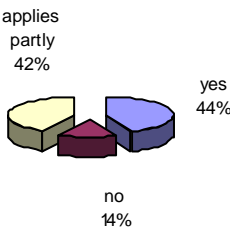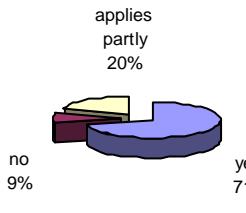
- Male respondents scored 3.9 on this scale with standard deviation 0.6 and female respondents scored 3.6 with standard deviation 0.5. It can be concluded with 95% certainty that those differences apply for the research population as well.
- Head officers score slightly higher on this scale (3.9 with 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'	applies partly 11% / no 6% / yes 83%
Statement 69 **I have enough autonomy to work in the way I find best.** Median and mode: 'applies mainly'	applies partly 15% / no 9% / yes 76%
Statement 73 **Support in developing new ideas is always found in the NLDO.** Median and mode: 'applies partly'	applies partly 44% / yes 19% / no 37%
Statement 79 **I use creative ideas to improve the working method.** Median and mode: 'applies partly'	applies partly 42% / yes 44% / no 14%
Statement 86 **I encourage my subordinates to participate in the thinking process about improving the working processes.** Median and mode: 'applies mainly'	applies partly 20% / no 9% / yes 71%

Statement 90 **I allow my subordinates to work in the way they find best.** Median and mode: 'applies mainly'	applies partly 18% no 1% yes 81%
Statement 91 **I allow my subordinates to make mistakes.** Median and mode: 'applies mainly'	applies partly 23% no 6% yes 71%

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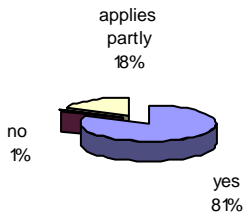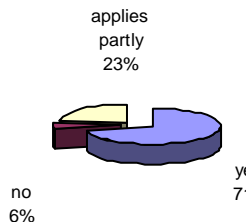 components are found explaining a total of 52% of variance. Varimax-rotation is used to reorganize the information in a more effective way, making it easier to interpret the components (Ten Berge & Siero, 1997).
The subsequent components are identified:

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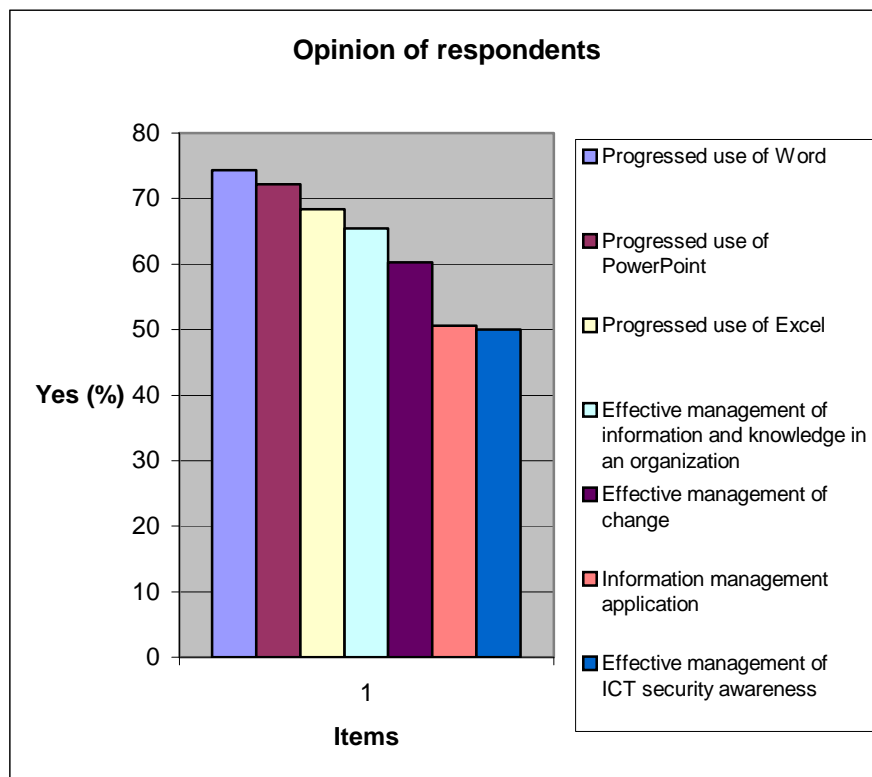
Graph 4.19 Opinion of respondents regarding the items that need to be taught during the initial study (at least 50%)

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.
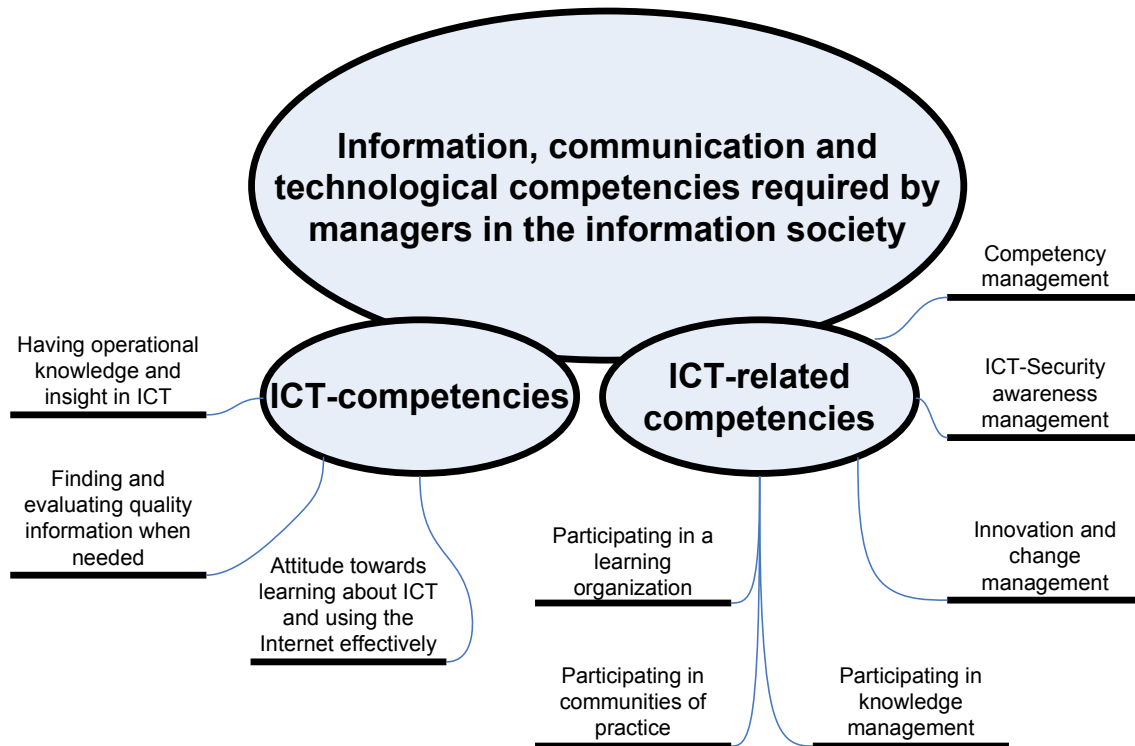
Figure 4.1 Model for information, communication and technological components identified from the responses to the questionnaire

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.