advice/report

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Mismatch ICT labor market in North of the Netherlands

Samenwerking Noord

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Samenwerking Noord

CONTENT

Preface

In front of you is the advice report for Samenwerking Noord. The research that is contained in this advice report has the aim to clarify the ICT labor market for the Northern Netherlands. Based on the many aspects influencing this labor market the advice has been written to further help Samenwerking Noord and its members in this tight market. This advice report has been written by four students from the Rijksuniversiteit Groningen from the Faculty of Economics and Business, namely Sander Everink, Esmee Mei, Leonidas Papadopoulos, and Jewan Kodde. The advice report is the main deliverable for the course of Business Research and Consulting, which we as the four students follow. We want to give special thanks to Wijnand Aalderink and Albina Vitochina from Samenwerking Noord for the close collaboration and all the input they have provided during the project. Also we want to thank our supervisor Gert Haanstra and our second supervisor Daan Tavenier for their helpful insights in this consultancy process.

Summary

Research

Main research question: "*What is the nature of the mismatch between demand and supply of the ICT-labor market in the North of the Netherlands and from what different angles the members of Samenwerking Noord can work together towards solutions?*".

We discovered that the nature(s) of the mismatch can be explained through quality and quantity and is depicted in the following summary and figure 1:

- ❖ Qualitative
  - o Shortage of highly-educated ICT workers.
  - o Not making use of MBO-educated workers.
- ❖ Quantitative
  - o High increase in demand 18.3%.
  - o Relatively low increase in supply 7.3%.
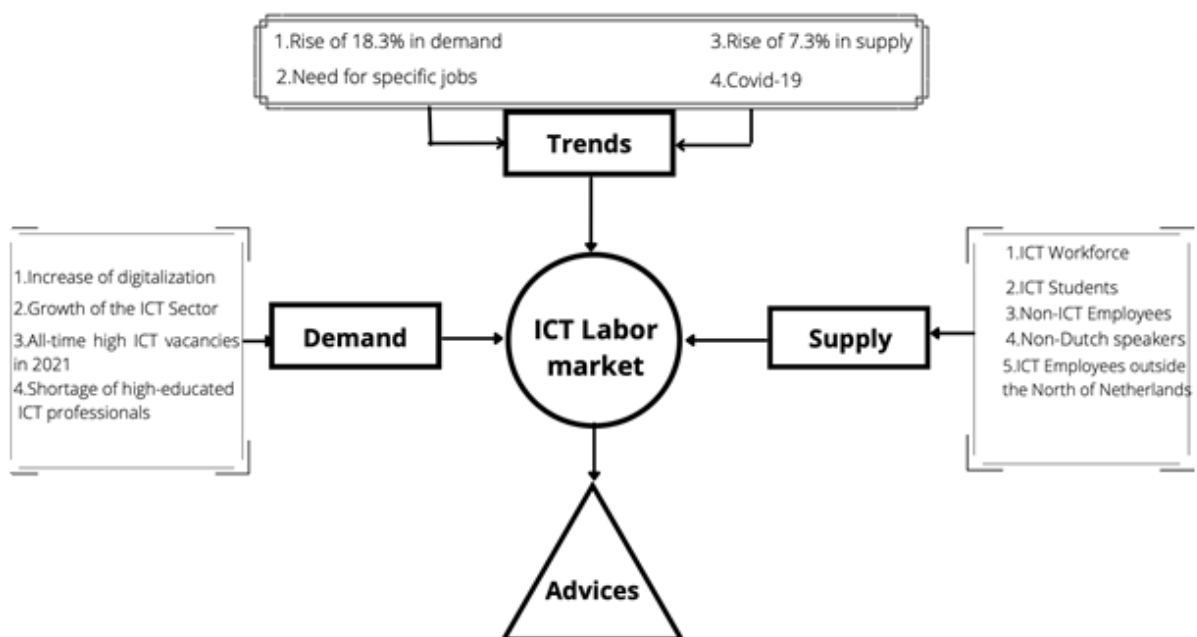
Figure 1 Research results model

Advice

Our advices have been segmented into two categories, namely advice that is direct towards Samenwerking Noord, and what Samenwerking Noord can do to assist in challenging the mismatch, and advice for actions that could be taken for the individual members of Samenwerking Noord. These advices can been seen in the figure 2:
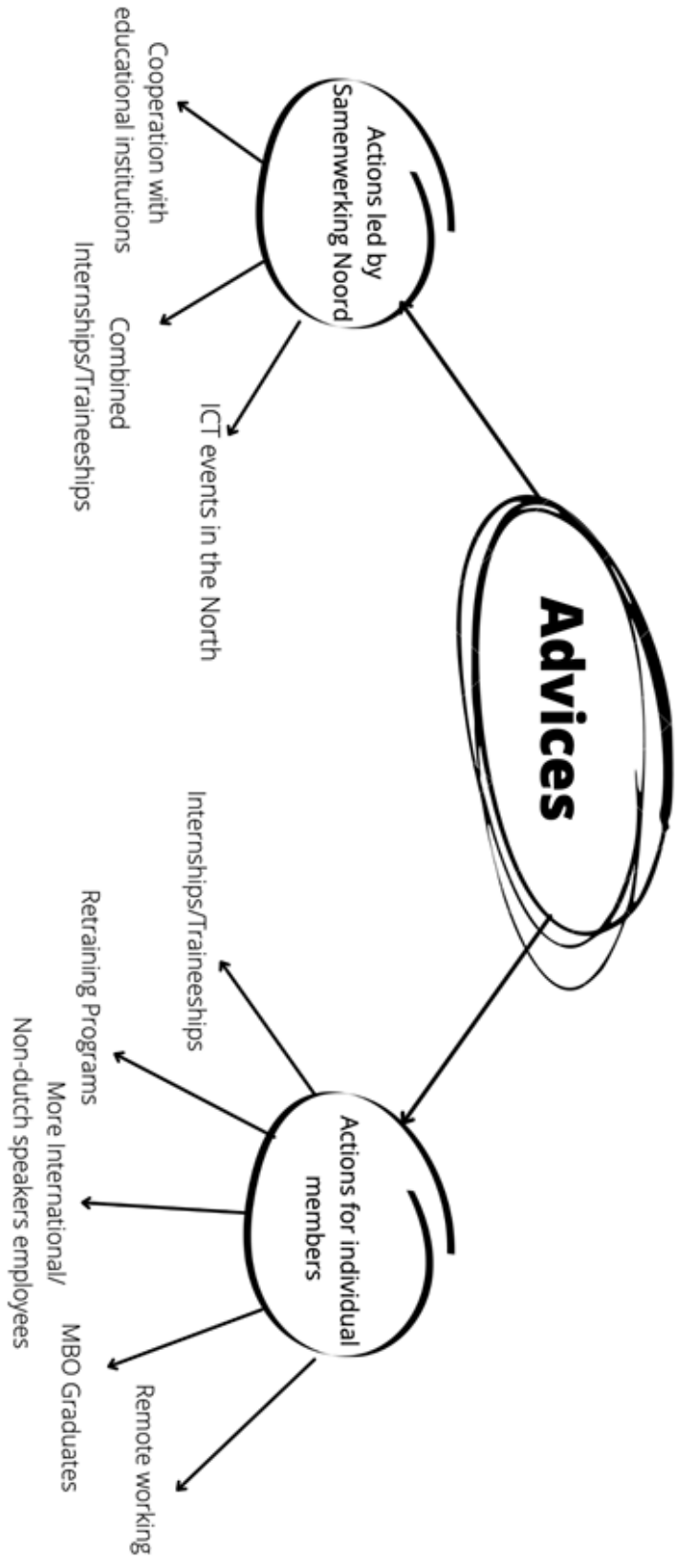
Figure 2 Advices

Summary (Dutch)

Onderzoek

Onderzoeksvraag: *"Wat is de aard van de mismatch tussen vraag en aanbod van de ICT-arbeidsmarkt in Noord-Nederland en vanuit welke verschillende invalshoeken kunnen de leden van Samenwerking Noord samenwerken aan oplossingen?".*

We ontdekten dat de aard(en) van de mismatch te verklaren zijn door kwaliteit en kwantiteit en deze worden weergegeven in de volgende opsomming en figuur 3:

- ❖ Kwalitatief
    - o Tekort aan hoogopgeleide ICT-ers.
    - o Geen gebruik maken van MBO opgeleide werknemers.
- ❖ Kwantitatief
    - o Sterke toename van de vraag 18,3%.
    - o Relatief lage toename van het aanbod 7,3%.
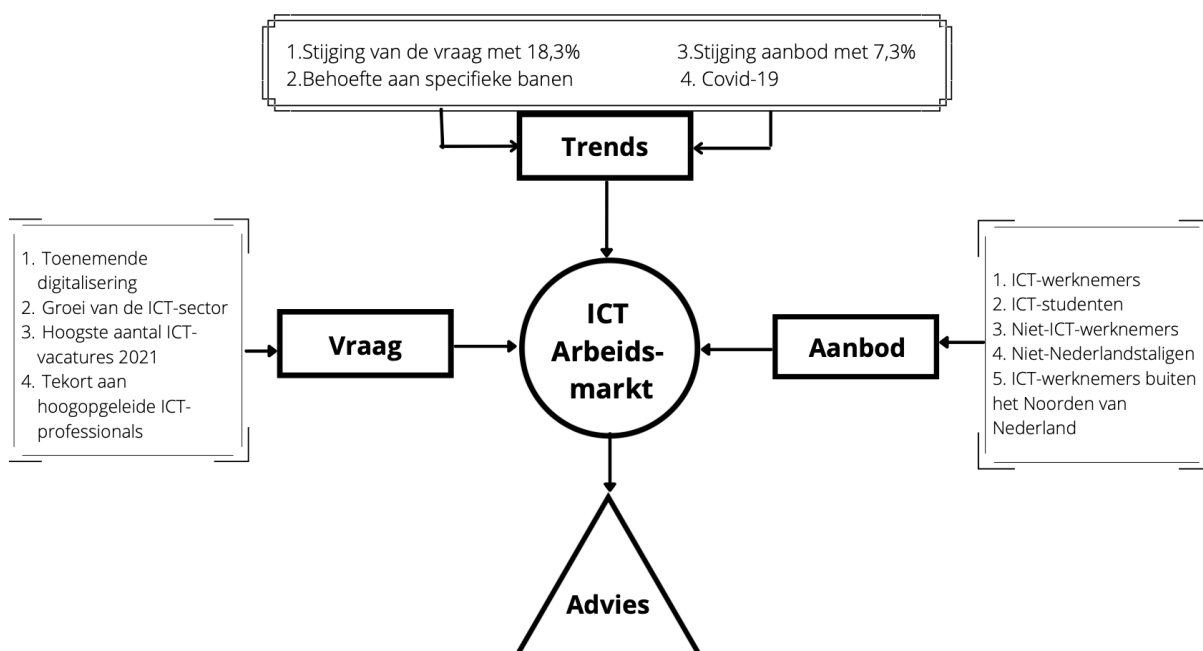
Figure 3 Resultaten onderzoek model

Advies

Onze adviezen zijn gesegmenteerd in twee categorieën, namelijk adviezen die direct naar Samenwerking Noord gericht zijn, en wat Samenwerking Noord kan doen om de mismatch te doorbreken, en adviezen voor acties die door de individuele leden van Samenwerking Noord ondernomen kunnen worden. Deze adviezen zijn terug te zien in het figuur 4:
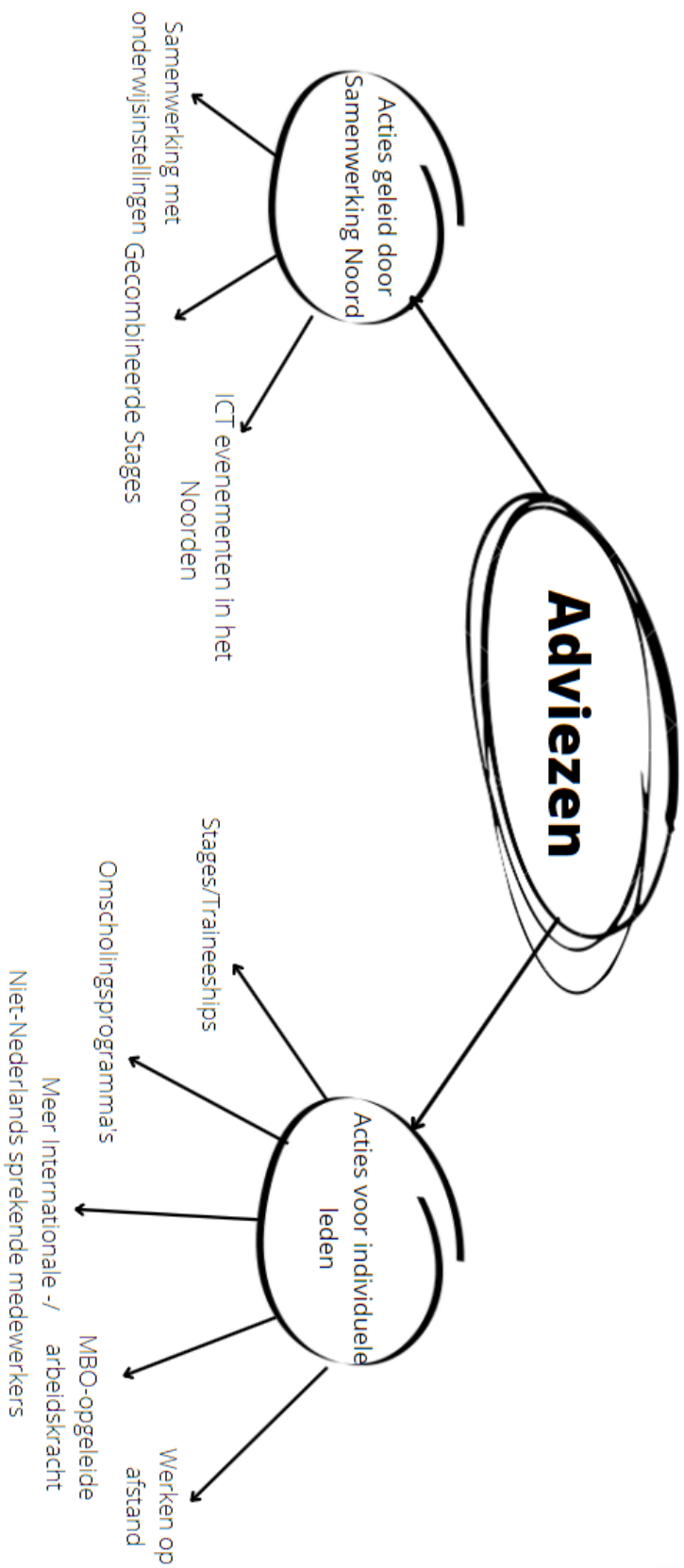
Figure 4 Adviezen

1. Introduction, Goal & Structure

1.1 Introduction

The purpose of this report is to study the ICT labor market in the North of the Netherlands to determine if there is a mismatch between supply and demand, and if so what is the nature of this mismatch. This report has been sponsored by Samenwerking Noord, an organization that connects organizations in the northern part of the Netherlands and shares knowledge in the field of IT. Samenwerking Noord was established ten years ago and has grown from eight to eighty-three members to this day.

In this report, we will first explore the ICT labor market in the North of the Netherlands to gain a deeper understanding. Afterward, we will explore the ICT labor market from three different angles. First through the perspective of the demand, then we will explore the supply side of the ICT labor market, and next, we will look at different trends that play a role in this supply and demand. Moreover, our survey findings will be discussed, along with the answers to our research question, and our final advice on what Samenwerking Noord and its members can do to combat the experienced ICT labor market shortage.

The increasing digitalization of companies resulted in an ever-increasing demand for ICT personnel. The mismatch is so large that, according to research from the UWV, in 2019 already 70% of ICT vacancies were difficult to fill. No signs since then have suggested that this shortage will be lessened and there are new upcoming trends like increased digitization through Covid-19, which can advance the possible mismatch.

The challenges on the ICT labor market have been ever-present in recent years and are currently a hot topic for the majority of the members at Samenwerking Noord. There have been efforts in the past by members of the organization to solve the problem, but it is currently unclear for Samenwerking Noord what the scope of the problem is and what actions have been taken by the members to address these challenges.

In this paper, Information Communication Technology (ICT) will be defined as the use of computers and other digital technologies to help people or organizations manage or use information (Julita, 2011). ICT is mainly focusing on communication technologies like the Internet, wireless networks, cell phones, or other communication instruments.

1.2 Goal of the project

The intake meeting was conducted with W. Aalderink and A.Vitochina, the secretary board member and program manager of Samenwerking Noord. This is an association with eighty-three members that cooperate in terms of IT. Samenwerking Noord would like to contribute to a well-functioning northern ICT labor market. The main question that was presented in the intake meeting was on how Samenwerking Noord can best tackle this northern ICT-labor market in our association. The requested advice report relates to all the insights and data into the relevant perspectives on the topic that are currently available.

There have been difficulties in the past to fill the large number of open ICT vacancies by the members of Samenwerking Noord. The purpose of this research is to identify the main causes of why it is so tricky to fill these ICT vacancies. In order to gain a deeper understanding of the dynamics of the ICT labor market in the North of the Netherlands, we defined the following research question: "*What is the nature of the mismatch between demand and supply of the ICT-labor market in the North of the Netherlands and from what different angles the members of Samenwerking Noord can work together towards solutions?*"

In order to answer this research question, sub-questions were developed:

1. *Who are the main actors that are relevant to the ICT market in the North of the Netherlands?*
2. *What are the trends regarding the development of the ICT-labor market on the supply side, the workforce, in the Netherlands?*
3. *What is the extent of the current mismatch between demand and supply at the members of Samenwerking Noord?*
4. *What are the main issues regarding the supply of the ICT market in the Netherlands?*
5. *Why is there a mismatch between the demand and supply of the ICT labor market?*

With these sub-questions, we will try to explore different perspectives relating to the ICT-labor market in the North of the Netherlands. By understanding what challenges are active on the supply (the available workforce) and demand-side (organizations that are looking for employees) of the ICT-labor market and how this market has been developing over the last decade, we try to gain a deeper understanding of the scope of the hypothesized mismatch.

1.3 Research Method

We have made use of several sources of information to delve deeper into the topic of the ICT labor market. First of all, we started by conducting broad desk research on the topic of the labor market, enriched in scope by workshop classes on the topic of business research and consultancy facilitated by the University of Groningen. During, and after, the desk research, we have conducted interviews with several stakeholders to complement sources of data and to point us in various research avenues. We will elaborate in the interview section below about which professionals the interviews were conducted with. To test if the desk research and interviews apply to real case scenarios, we have developed a survey to be spread among the members of Samenwerking Noord. To finalize the research, we have concluded with a triangulation of all sources of information and compiled this into a conclusion of the scope of the ICT labor market.

Desk research

Online sources have been the main source of our collected data. Through various websites, like for example the UWV or CBS, tons of data have been gathered on the ICT-labor market, the supply side of the labor market, as well as the demand side of the labor market (all references can be found in the reference list).Various trends, such as the impact of Covid on the ICT labor market have also been carefully analyzed.

Interviews

Through contacts of the sponsor, W. Aalderink, four interviews have been conducted to help us initially explore the ICT-labor market and get a grasp of the problem statement, as provided by the sponsor. In the exploration stage, interviews were conducted with member representatives of two different sectors of Samenwerking Noord, a representative of IT services and the sector representative Transport, Energy & Services sectors (Gert-Jan Theuwissen), to identify the scope of the problem and current and past attempts to tackle it. After the exploration stage, we also conducted interviews with some experts in the field of IT (Robin van den Berg) and the labor market (Arjen Edzes), to get more insights on what has caused the problem to arise and what tools can be implemented to solve it. These experts guided us in different directions to find data and provided insights into the nature of the problem and the great impact it will have, on not only northern firms, but the entire country.

Survey

After collecting all the relevant data from the internet, interviews, and other sources, we have opted for a survey among the members of Samenwerking Noord (appendix 1). The goal of this survey is to test the applicability of the information that has been collected through carefully analyzing various sources, to the real-life cases of the members. The survey resulted in a total of 27 respondents of the 83 total members of Samenwerking Noord. The survey will help us verify or dismiss the relevancy of data found.

Information triangulation

In order to make sure that the collected data, insights, and trends are actually relevant for the members of Samenwerking Noord, the process of information triangulation has been used. With information triangulation, we compare multiple data sources with each other in order to verify their validity. Data from the desk research, from the interviews and the surveys, have all come together into a concluding section and resulted in advice.

2. Background Dutch ICT labor market

In the following chapter we will dive briefly into the background of the ICT labor market. By looking at the labor market, the increase in ICT professionals, in which sectors ICT professionals work, and the ICT sector we will be able to better answer our research question. The data and graphs included in this section are from the ICT, Knowledge, and Economics report from the Central Bureau for Statistics (CBS).

2.1 Labor Market in North of the Netherlands

The labor market, also known as the job market, refers to the supply of and demand for the labor, in which employees provide the supply and employers provide the demand. (Kenton, 2021). It is a major component of any economy and is intricately linked to markets for capital, goods, and services.

The working population of the whole Netherlands is 8.401.600. The greatest working population can be found in the Western part of the Netherlands (49,38%), followed by South (21,54%), East (20,10%), and North (8,78%). Specifically, in the northern part of the Netherlands the workforce consists of 737.400, with the biggest in Friesland (269.400), followed by Groningen (264.800), and Drenthe (203.100).

2.2 Increase of ICT professionals[1]

In the following section, we will have a look at the ICT professionals throughout the whole country instead of the Northern region, as these were the only available values. The amount of ICT people has only been increasing over the last decade. In the year 2020, 474.000 ICT'ers were working in various industries in the Netherlands, which is an increase of 74% from 2015 in which there were 273.000 employed ICT workers.
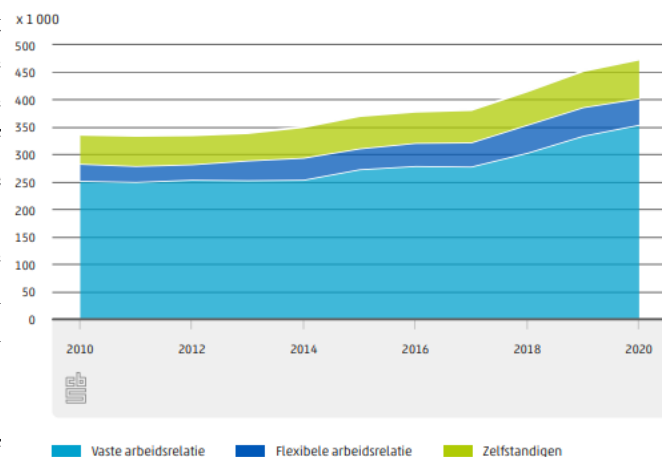
Figure 5 Employed ICT professionals 2010-2020 (CBS, 2021)

In Figure 5 you can see the development of ICT professionals in the Netherlands from the period between 2010 and 2020. Currently, most ICT workers are permanently employed, followed by people with flexible employment, and then freelancers.

Looking at the demographics of ICT workers, 85% are male with most falling within the 25-34 age category (figure 6). Even though the share of women operating ICT jobs is limited, there has been an upward trend in the past years, in 2005, 10% of ICT workers were women, whereas in 2020 this number has reached 15%. Moreover, there has been an increase in younger people with an ICT job. The number of ICT professionals younger than 35 has increased from 32% in 2015 to 36% in 2020 (figure 7).

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[1] https://longreads.cbs.nl/ict-kennis-en-economie-2021/

Similarly, during the same period, the share of ICT workers within the age category of 55 to 75 has increased from 13% to 16% (figure 7). The shares of these age groups increased, whereas the share of 35-55 years old decreased (figure 7). Furthermore, when analyzing the education levels of ICT workers, we can see that 64% of ICT workers have an HBO/WO degree (figure 6). Over the years, the share of ICT workers having an HBO/WO degree has increased, while the percentage of MBO has fallen. This highlights the fact that there has been an increase in demand for higher-educated ICT workers, which will be further discussed in the demand chapter. For more details regarding the characteristics of ICT professionals in the Netherlands, see appendix 2.

	2005	2010	2015	2016	2017	2018	2019	2020	Werkzame beroeps-bevolking[1] 2020
Onderwijsniveau									
Basisonderwijs	1	1	1	1	1	1	1	1	4
Vmbo-b/k, mbo1	3	3	2	2	2	2	2	2	8
Vmbo-g/t, havo-, vwo-onderbouw	4	3	3	3	3	2	2	2	7
Mbo2 en mbo3	6	5	8	8	7	7	6	6	13
Mbo4	21	19	15	14	15	14	14	15	17
Havo, vwo	14	13	11	11	11	10	10	10	9
Hbo-, wo-bachelor	33	36	38	38	38	39	39	40	25
Hbo-, wo-master, doctor	18	20	22	22	24	24	24	24	16
Weet niet of onbekend	1	1	1	1	0	0	1	1	1
Geslacht									
Man	90	90	88	87	86	87	85	85	53
Vrouw	10	10	12	13	14	13	15	15	47

Bron: CBS
[1] Internationale definitie.

Figure 6 Education level and gender ICT professionals (CBS, 2021)

Figure 7 ICT professionals based on age category (CBS, 2021)
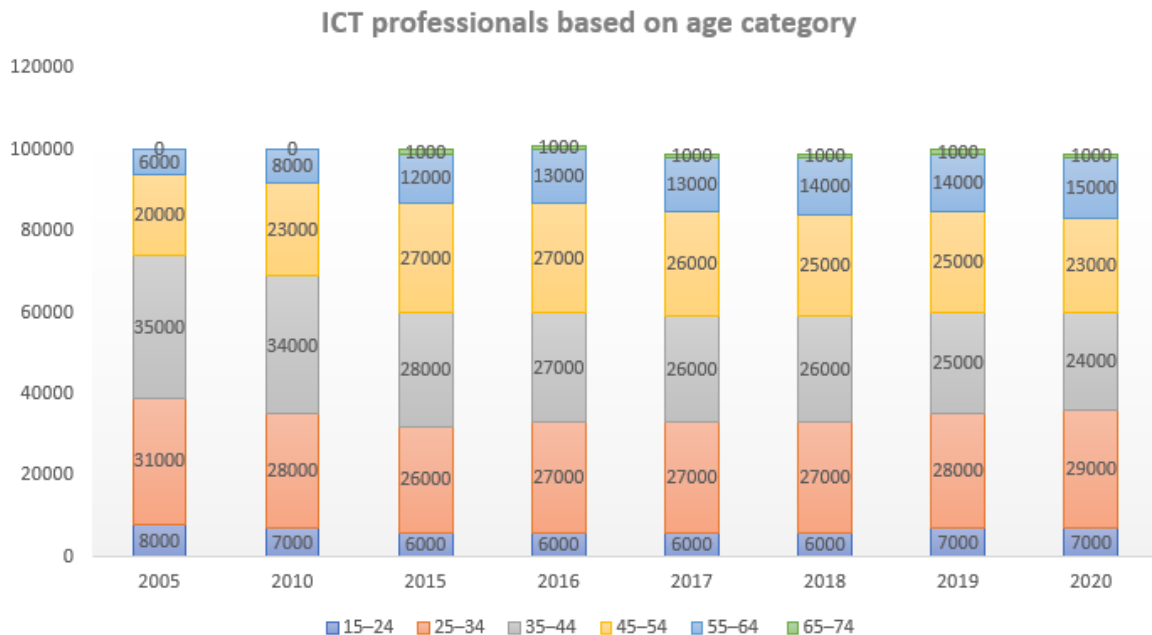
2.3 ICT professionals outside the ICT sector[2]

In 2019, 152.000 ICT professionals were working in the ICT sector, making up 5 percent of the total workforce (appendix 3). This is more than one-third of all ICT workers, of which the vast majority of 86% were performing information service activities. Almost two out of three ICT people work in other sectors e.g., government, trade, and financial institutions. In certain branches, ICT workers are overly represented. Logically the highest ratio can be found in the ICT sector itself, in which circa 48% of all workers have an ICT job. Splitting the ICT sector further into sub-branches, one can see diverging values for the ratio of ICT workers: information services (58,9%), telecommunications (30,4%), and media (18,7%). Energy companies (13,2%), and financial institutions (11,9%) also employ a high ratio of ICT professionals. On the other hand, in branches such as agriculture, forestry, and fishery (0,4%), and hospitality (0,2%), only a small percentage of ICT workers make up the working population.

2.4 ICT sector[3]

The CBS follows the definition for the ICT sector of the Organisation for Economic Cooperation and Development (OECD Economic survey, 2021), in which the ICT sector consists of firms from the ICT services sector, wholesale trade in ICT equipment, and the ICT industry (appendix 4). The ICT services sector includes companies that concern them with electronic information processing and communication support, e.g., telecommunications and the development of software. ICT equipment wholesalers are firms that trade in software, computers, and other electronics. This equipment is mainly supplied to the dealers and other non-end users. ICT industry entails companies that especially design and manufacture information and communication equipment.

2.5 Growth of ICT sector[4]

In the period of 2011-2016 the ICT sector in the Netherlands showed tremendous growth which was higher than the overall economy of the country (Kitkevich & Oosten, 2018). The number of ICT companies also grew between 2011-2017, in which IT and information services sectors grew the quickest. In the last quarter of 2020, the Dutch ICT sector (appendix 4) consisted of circa 82.000 firms (figure 7). At the end of 2020, there were a total of 1.9 million firms across the whole country, of which 4.3% were ICT firms. These values of 2020 follow the trend of a steady increase of ICT firms in the past decade. However, the growth in 2020 of 1,6% is considerably lower than in previous years. From 2010 to 2019, there was an average increase of Dutch ICT firms of 4,3% each year.

Most ICT companies in the Netherlands are operating as ICT service providers (76000), followed by ICT equipment wholesalers (5150), and the ICT industry (960). Over the past decade, there has been a huge surge in ICT service providers in which there was an increase of 58% between 2010 and 2020. This upward trend was also apparent for ICT industry firms, in which there was an increase of 19% during this period. On the other hand, there has been a decrease of 22% of ICT equipment wholesalers.

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[2] https://longreads.cbs.nl/ict-kennis-en-economie-2021/

[3] https://longreads.cbs.nl/ict-kennis-en-economie-2021/

[4] https://longreads.cbs.nl/ict-kennis-en-economie-2021/
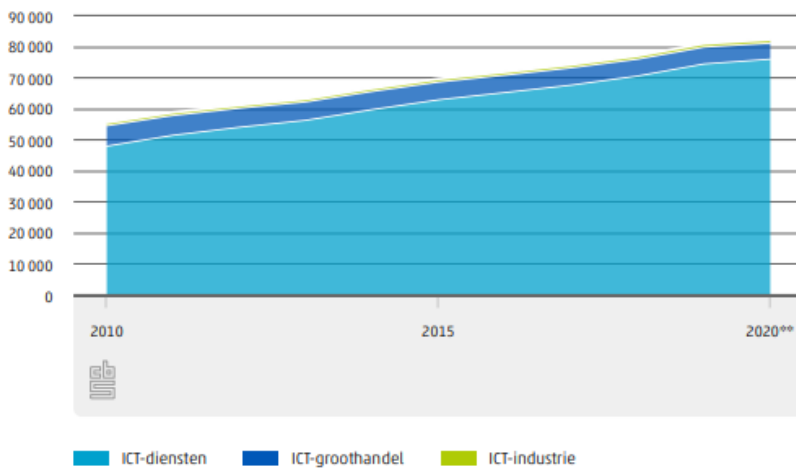
Figure 8 Growth ICT companies 2010- 2020 Q4 (CBS, 2021)

2.6 Key takeaways background Dutch ICT labor market

The number of ICT professionals has only been increasing over the last decade. At the end of 2020, there were 474.000 ICT'ers working in various sectors in the Netherlands. The majority of ICT workers are males and belong to the 25-34 age category. Over the years, the ratio of ICT professionals having an HBO/WO education level has increased as opposed to MBO-educated workers. The highest ratio of ICT workers can be found in the ICT sector, but almost two out of three ICT people work in other sectors e.g., government, trade, and financial institutions. The ICT sector consists of the ICT services sector, the wholesale trade in ICT equipment, and the ICT industry, within each sub-sector there has been an increase in firms in the past decade.

3. Demand in the ICT labor market

In the following chapter we will have a look at the demand for ICT professionals by analyzing the open vacancies data of the Uitvoeringsinstituut Werknemersverzekeringen/Employee Insurance Agency (UWV). By assessing the open vacancies of specific functions we can see how great the demand is in actual values, and by doing so we can better answer the research question: *What is the nature of the mismatch between demand and supply of the ICT-labor market in the North of the Netherlands.* Additionally, literature will be added to provide further insights into the demand side of the ICT labor market. As the demand side consists of organizations looking for ICT employees, the importance of employer branding will also be discussed in this chapter.

3.1 Overview demand ICT labor market North-Netherlands based on open vacancies.

The demand for ICT labor concerns the demand of companies for ICT workers. ICT jobs are not tied to a particular sector. In the year 2020, only 37% of ICT workers were working in the Information and Communication sector, the majority of 63% were working in another sector[5]. Therefore not only ICT companies are having trouble finding ICT professionals, but also banks, governments, and online shops among others. Looking at all the difficulties to fill vacancies across the Netherlands, 9% are ICT occupations. According to the UWV, this ratio is rather high as 5% of all employed people work as ICT professionals[6].

In order to provide a clear picture of the current ICT labor market, we can have a look at the open vacancies, which are the total amount of estimated vacancies that are open at the end of a quarter. In the third quarter of 2021, there were 800 open vacancies within ICT jobs in Friesland, Groningen, and Drenthe[7]. In the following figure 9, you can see how the ICT open vacancies have evolved in the northern region. Comparing this to the whole of the Netherlands with open vacancies of 24.300 (figure 10), this is only a fraction of the total.
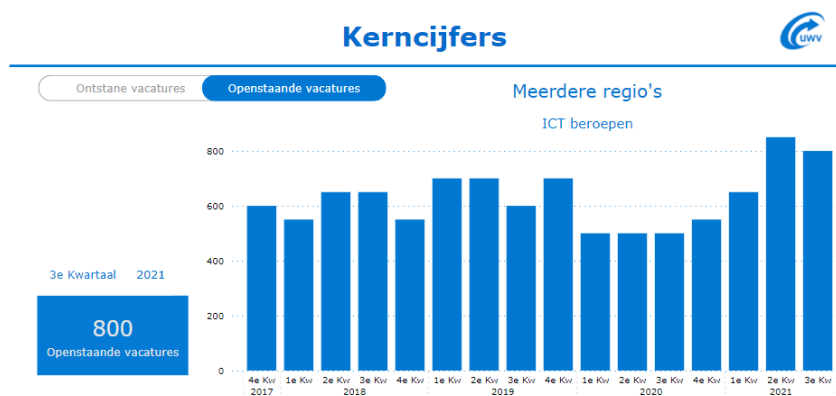
Figure 9 ICT open vacancies Friesland, Groningen and Drenthe (UWV, 2021)

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[5] https://www.werk.nl/arbeidsmarktinformatie/sector/ict
[6] https://www.werk.nl/imagesdxa/moeilijk_vervulbare_vacatures_april2021_tcm95-427706.pdf
[7] https://www.werk.nl/arbeidsmarktinformatie/dashboards/vacaturemarkt
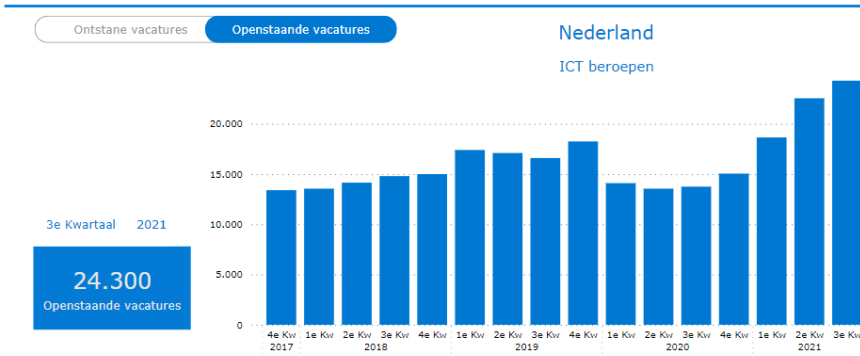
Figure 10 ICT open vacancies Netherlands (UWV, 2021)

3.2 Demand for specific functions in ICT labor market North Netherlands[8]

In order to provide an indication of what kind of functions there is a bigger demand for, we will have a look at the online vacancies dashboard of the UWV. Below you will find an overview of open vacancies from January till November of 2021 in the North of the Netherlands. The ICT jobs are divided into four different job categories, which are software- and application developers, database-and network specialists, user support ICT, and radio- and television technicians. The greatest demand from January-November 2021 in the North of the Netherlands is within the software- and application developers group, followed by the database-and network specialists, user support ICT, and radio- and television technicians(figure 9). Making a comparison with the whole Dutch labor market (figure 10), we can see that there is a similar trend of demand happening throughout the whole country.
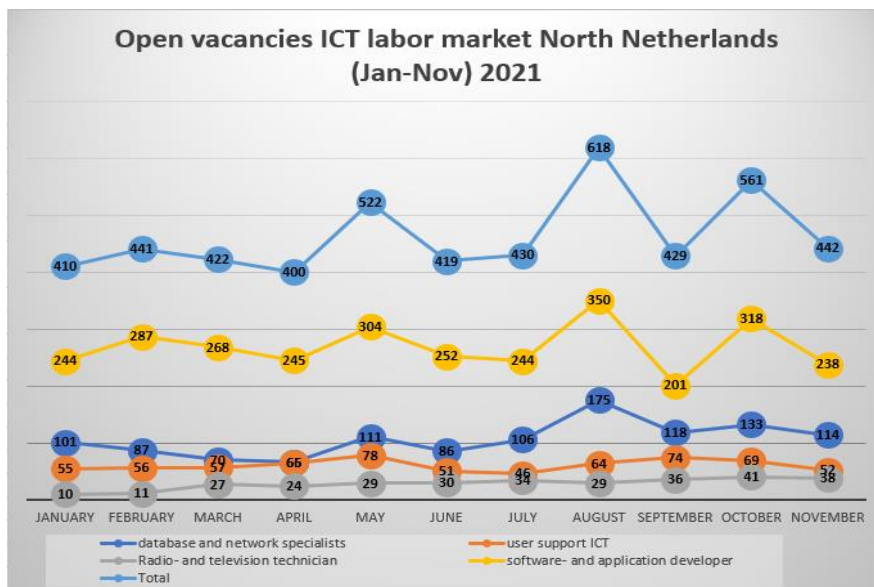
Figure 11 open vacancies ICT labor market northern part of the Netherlands (UWV, 2021)

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[8] https://www.werk.nl/arbeidsmarktinformatie/dashboards/online-vacatures
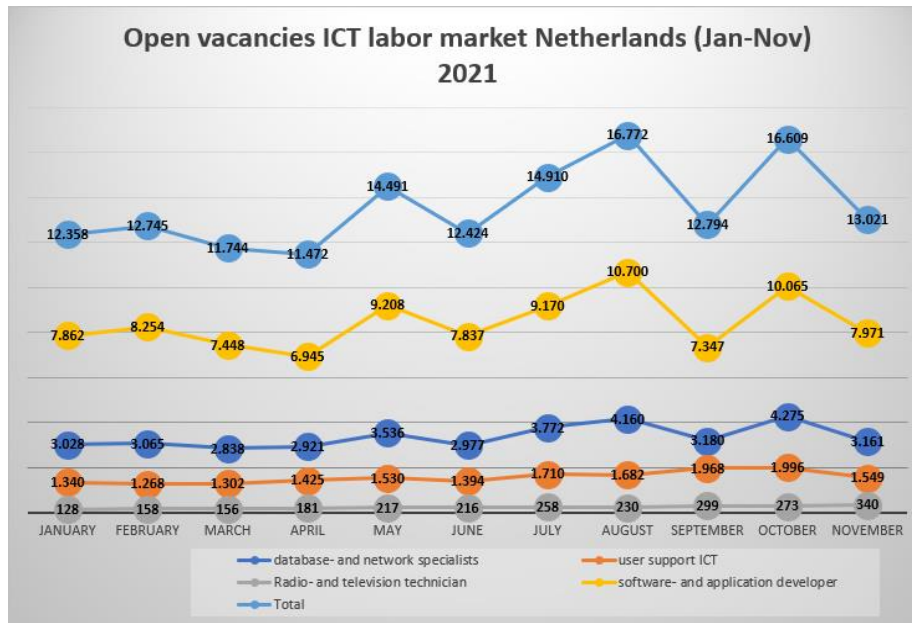
Figure 12 open vacancies ICT labor market Netherlands (UWV, 2021)

When assessing the top ten open vacancies for the North of the Netherlands in the second half of 2022, one can clearly see that the greatest demand at the moment is for software-and application developers (figure 13).

ICT top ten vacancies North Netherlands Q3 & Q4		
Software- en applicatieontwikkelaars	Systeemontwikkelaar ICT	317
Databank- en netwerkspecialisten	Functioneel beheerder	272
Gebruiksondersteuning ICT	Servicedeskmedewerker ICT	248
Software- en applicatieontwikkelaars	Tester ICT	233
Radio- en televisietechnici	Audiovisueel technisch assistent	204
Software- en applicatieontwikkelaars	Webdeveloper (middelbaar)	155
Software- en applicatieontwikkelaars	Adviseur ICT	115
Databank- en netwerkspecialisten	Specialist technische infrastructuur ICT	67
Software- en applicatieontwikkelaars	Programmeur scripttalen (hoger)	63
Software- en applicatieontwikkelaars	Software ontwikkelaar	60

Figure 13 top ten open vacancies North of the Netherlands Q3 & Q4 (UWV, 2021)

3.3 Need for higher-educated ICT workers with up-to-date knowledge[9]

The demand for ICT knowledge is rising and changing rapidly due to the ever-changing developments in programming languages, data, security, cloud, and the Internet of Things. But knowledge itself is not enough anymore, the demand for soft skills is also changing as ICT professionals nowadays are required to work in more multidisciplinary teams. Thus, these workers also need to have a good understanding

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[9] https://www.uwv.nl/overuwv/Images/moeilijk-vervulbare-vacatures-2019.pdf

of the business processes as well to have good communication skills. The hard-to-fill vacancies are mainly positions for HBO and WO level students with up-to-date knowledge[10]:

❖ Especially programmers of specific languages, e.g., Java or PHP, are difficult to find. Additionally, developers of .NET, SharePoint, or cloud applications are also highly in demand due to the rapid digitalization of businesses.

❖ Moreover, the significance of cyber security has become more apparent as more information is stored digitally. As the developments are moving rapidly it is hard to find people with the right knowledge.

❖ Also, organizations have become even more data-driven in their business processes and contacts with customers, in which data needs to be collected and converted, resulting in a need for data warehouse developers, data scientists, and users, and Business Intelligence specialists. When the need for analytical skills is demanded of workers, employers most of the time set a requirement for the education level to be at least HBO.

❖ Additionally, professional administrators within the domains of functions and applications are also difficult to find, as there is a lack of workers with up-to-date knowledge. Regarding system administration, there is a shortage of personnel specialized in cloud and databases.

❖ Furthermore, the labor market for professions related to the design and management of ICT infrastructure and test developers is also challenging to find.

The shortage of higher-educated ICT personnel is not expected to be filled in the near future. The Research Centre for Education and the labor market (ROA), is expecting that there will be a great supply issue of software and application developers, and database and network specialists. Also, the shortage of ICT teachers on all education levels will remain. Within the ICT labor market, there is a mismatch between the knowledge and experience of the demand and supply. There is a need for ICT professionals to be up-to-date with the latest development/ knowledge, which can be proven by certificates and experience. Additionally, there is an incongruity among educated workers as many ICT professionals have only enjoyed an MBO-level education, while the demand is still slim.

The demand for higher-educated ICT professionals can also be seen when looking at the promising professions of 2021 report by the UWV. The overview is determined by assessing the ratio of the number of vacancies and job seekers and highlights in which professions there are high job opportunities. Of the fourteen promising professions within the ICT domain, only one is on MBO level, whereas the others are HBO/WO education level (figure 14).

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[10] https://www.werk.nl/arbeidsmarktinformatie/sector/ict/veel-vraag-naar-hoogopgeleide-ict-ers-met-specifieke-kennis

Figure 14 promising professions 2021 (UWV, 2021)

3.4 General vacancies

The trends discussed above are also supported by literature research and research institutes. Researchers also found that the ICT labor market in the Netherlands is experiencing extreme shortages, as the number of online published vacancies is increasing with great intensity, especially in positions of junior or medium ICT professionals (Hollander et al., 2019). While there is an increase in recent years of ICT professionals, the demand is even higher due to digitalization and the evolution of technology (Interview with Robin van den Berg). That resulted in a scarcity of ICT professionals and an increase of vacancies in all provinces, and so in Groningen. Hence, besides the fact that the number of active seekers increased in Groningen in 2018, compared to 2017, the online vacancies increased significantly more (Hollander et al., 2019).

ICT is striking and the final year's students and starters with up to 2 years of work experience, who are the target group for most of the companies (Prufer, Uijl, Kumar, 2021) is remarkably small for the ICT vacancies to be filled. The Netherlands tries to invest to attract young people to ICT, and this investment seems to be cautiously bearing fruit. However, these increases are not at all in proportion to the number of outstanding vacancies. Young people are also very valuable for the labor market policy in the northern part of the Netherlands. In Groningen, the group of young people, ages from 15-27, has a relatively high proportion compared to the group of the rest of the Netherlands, while the province of Groningen has a low proportion of elderly people. In the supply chapter, we will discuss the supply of the ICT labor market in more detail.

3.5 Employer Branding

In order for firms to fill their open vacancies, it is necessary for ICT professionals to be aware of your firm and that is where employer branding comes into play. The coronavirus has brought the demand for ICT personnel to an even higher level as many people are still working from home. Firms offering remote service have become busier, as the demand for Cloud professionals and security specialists to make working from home as easy and safe as possible.

Research conducted by Randstad (2020) about the importance of employer branding, influenced by covid-19 times. The research has portrayed the importance of employer branding and more importantly, the connection between the company and its employees. Some of the most results of this research are for the whole Netherlands:

❖ Almost half (47%) of the employees feel more loyal to the company, in contrast to 9% feeling less loyal towards the company.
❖ Almost a third of the employees experience a change in work, especially relating to time off, unemployment, and working hours.
  ➢ 19% Of this 1/3rd are aiming to change jobs in the upcoming half year.
  ➢ 4 Out of 5 employees aren't afraid of dismissal as a result of Covid-19.
❖ The fear for unemployment is higher under the young working force (13%), in comparison to the workforce average (8%).

Employer branding isn't just focusing on attracting new employees, by having a good reputation as a company, but also contributes to a stable working force. Employee retainment is stimulated by this employer branding. The importance of employer branding in employee retainment can be stressed by the fact that employee dissatisfaction is the most important reason men (25%) and women (18%) switch jobs. A better employer branding than that of your competitors will give you an advantage over these competitors in this already tight labor market.

3.6 Key takeaways demand

The demand for ICT workers measured by open vacancies has been the greatest in 2021, compared to previous years, throughout the whole country as well as the northern part of the Netherlands. The demand for ICT workers in the North is only a fraction of the demand in comparison to the whole country, in which the greatest demand is for the software- and application developers group, followed by the database-and network specialists, user support ICT, and radio- and television technicians. There is an incongruity between the demand and supply as there is a need for higher-educated ICT workers (HBO/WO) with up-to-date knowledge and soft skills, whereas the supply mainly consists of ICT professionals with an MBO-level education. As the supply of ICT workers is quite slim, it is even more important for firms to engage in the retainment of personnel, by for example employer branding, in order to attract and retain the limited number of ICT workers.
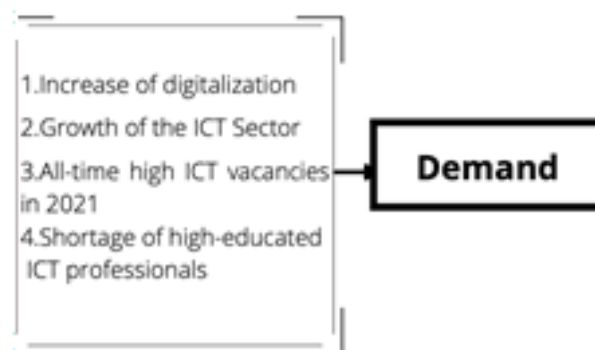
Figure 15 Key takeaways demand

4. Supply

In this section, the supply of IT labor will be discussed. Based on the IT labor market monitor 2019 and the interview with Robin van den Berg, director of the IT Academy Noord-Nederland, we came up with four different streams of ICT labor supply (figure 16). These categories are ICT students (at all levels: MBO, HBO, and WO), ICT employees from elsewhere in the Netherlands, Non-ICT employees that can make the switch to ICT, and Non-native Dutch ICT personnel. The categories are generic and are not mutually exclusive. For example, someone can come work in ICT somewhere else in the Netherlands and be Non-native Dutch.
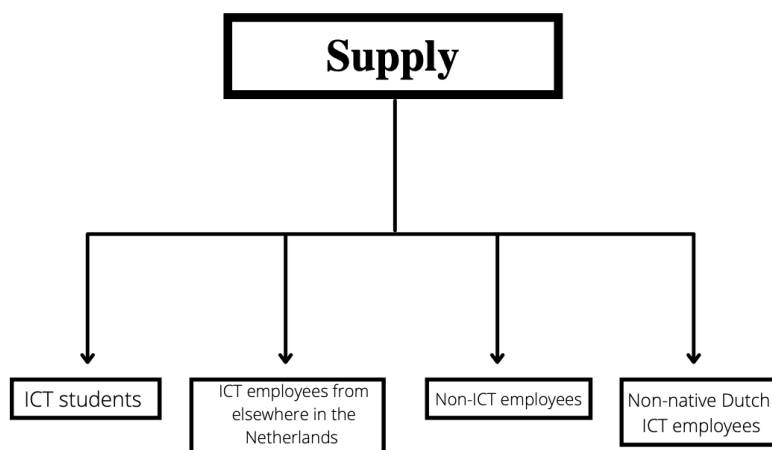
Figure 16 Four different streams of ICT labor supply

4.1 ICT-students

The amount of students finishing their ICT education is steadily increasing over the years. Not only because there are more students in comparison over time, but also the relative amount of ICT graduates compared to all students is growing (figure 17) (bron: Duo, 2021 https://pr-edict.nl/ict-onderwijs). The graph shows the number of ICT graduates per year in the whole of the Netherlands. Interesting in this graph is that although not increasing over time, the largest group of graduates are students who have an MBO degree.
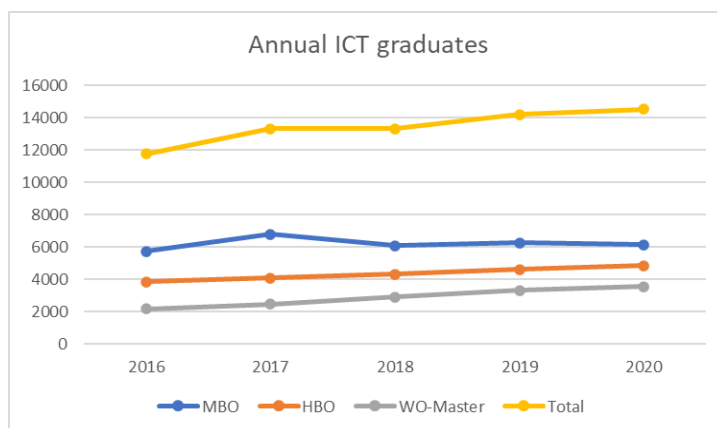
*Figure 17 Annual ICT graduates 2016-2020 (*DUO„ *2021)*

Nevertheless, if this is compared to the demanded education level in ICT vacancies, a mismatch is clearly visible.

When assessing figure 14, the demanded education level in vacancies is displayed. Below in figure 19, the data of the graph (figure 17) and the chart (figure 18) are compared. Showing the difference per education level in demanded education level in vacancies, in the whole of the Netherlands, and the amount of graduates is displayed. It is important to note that the percentage is the number of vacancies

that can be directly filled with fresh graduates and that in the market there are also other possibilities to fill vacancies.
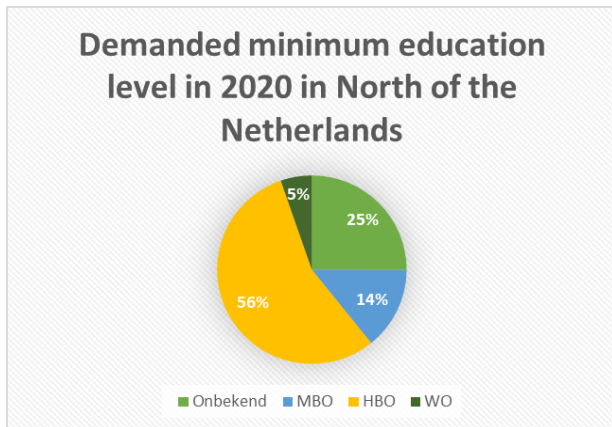
Figure 18 Demanded education 2020 North-NL (https://pr-edict.nl/ict-onderwijs, 2020)

What can be concluded is that the demand for HBO students is much higher than the number of fresh graduates compared to the WO and MBO.

Match vacancies and graduates	Unknown	MBO	HBO	WO
Demanded education level in vacancies	20719	10970	44096	6764
Graduated in 2020		6123	4852	3552
Percentual difference		56%	11%	53%

Figure 19 comparison Demanded education level and vacancies with graduation levels Netherlands (https://pr-edict.nl/ict-onderwijs, 2020)

Last remark about the number of graduates. The spread of the WO and HBO levels IT students over the Netherlands in 2021 (IT-arbeidsmarktonderzoek 2021, YER) is displayed in appendix 5. Important here is that this does not include the communication studies that have been included in the ICT graduates of figure 17, however it does give a generic overview of where potential employees are currently studying. In appendix 6 an overview is given of all the MBO ICT study locations in the North of the Netherlands and the Noordoostpolder[11].

There are also differences in choices between the graduate students from academic universities and universities of applied sciences in the northern part of the Netherlands. These differences are mainly examined between RUG and the Hanze university of applied sciences in Groningen, since they were the only data available and accessible. Based on the report of Hanze University (Fisher, Wever, Aslem, 2021) regarding graduates' students and their decisions, it was found that HBO students choose significantly more often to stay in Groningen or the North of the Netherlands after their studies. On the other hand, WO students want to move to other regions significantly more often. They declared that the most important reason for leaving Groningen is the work, followed by a greater distance by partner and

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[11] https://www.kiesmbo.nl/opleidingen/media-vormgeving-en-ict/ict?location=52.
9896019,6.294439&locationLabel=Ooststellingwerf&distance=50

living environment. Furthermore, while 84% of the ICT HBO students in 2020 declared that they will still live in the North, W.O students want to move to Randstad more often.

The reason is that they believe that there are more jobs and career opportunities in those cities, while the possibility for them to return to the North of the country, e.g., Groningen is low. During the interview with the director of the IT Academy, Robin van den Berg, stated that students from RUG university are not aware of the companies and the potentials that these companies in the North have. In Hanze university, the cooperation with IT companies in Groningen is part of the program, thus the awareness is high for those students. But the problem is that while between 100-125 students graduate per year from Hanze university, there are as many as 1.000 vacancies in the North of the Netherlands (Hollander et al., 2019), while the majority of junior IT talent from universities of applied sciences graduates in the southern or western part of the Netherlands (Report of intelligence group).

A. Edzes, an expert in the Dutch labor market, suggests that the educational level plays an important role in deciding to stay or leave the North and Groningen. He explains that the lower educated someone is the lower the distance he will travel for a job. Also in bigger cities, there are relatively more jobs that demand higher educated people. Higher educated people are more open-minded to leave the region. Family, partner, and living environment are the main reason for the possible return to Groningen. Finally, for both HBO and WO students, they estimate a greater chance to find the right level of job in Randstad.

Interesting was the finding that 1 out of 3 graduates' students from an IT department, does not start working in IT, but instead switches to another field, e.g., education, media or telecommunication. The reason behind that, based on the interview with Arjen Edzes, could be that people who were trained and educated on a specific task or sector, realize that there are fewer opportunities in that sector or the working conditions-benefits are not satisfactory.

4.2 ICT employees from elsewhere in the Netherlands

In this research, we focus on two options of attracting employees from elsewhere in the Netherlands to start working in the North of the Netherlands. These are people who do not move to the North of the Netherlands and people who do. Both come with their own difficulties for employers. The first option of not moving is that the northern part Netherlands have to make favorable working conditions that compete with the region the person is already working in, this asks a lot of individual companies. The difficulty for the second option is that the region "North Netherlands" has to attract people to move here. Resulting in a more broad approach with many different stakeholders.

ICT Employees who do not live in the region

In this age of ICT services, the obstacle of distance is further losing its importance (Muhammad et al., 2007). One advantage of ICT services is what is called "reference location". For example, telecommuters may have the opportunity to live further away from where the offices are located, because due to hybrid and virtual space, they do not have to attend to the company so often. Moreover, because of the opportunity of telecommuting, new areas-regions may attract people to live there, while working in different locations. For the latters, the low-density residential environments become a choice, in order

to avoid the tremendous costs and other perceived drawbacks of urban living, while also the number of telecommuters in the Netherlands is increasing continuously (Muhammad et al., 2008).

Interesting is the finding that the value of the distance-decay parameter strongly depends on the degree of the area. Besides the fact that new ICT services applications allow employees to embrace a different geographical approach, the employees still prefer being located in urban regions (Muhammad, 2007). Research confirmed that younger ages and the medium and higher income level groups are overrepresented in the urban-type environment (Muhammad, Ottens, Ettema, de Jong, 2007). At the same time, middle-aged and old age people prefer to reside in more peripheral cities.

The opportunity to work at home is at the top of the list for IT employees (Prufer, Uijl, Kumar, 2021). Moreover, ICT services also make people aware of attractive new destinations and motivate them to travel and live in different regions, without the concern of the distance from work. In fact, it was found that the distance of the area concerned influences the average trip length and also the value of the distance-decay parameter. The larger the area, the greater is the value of the distance-decay parameter needed to maintain the modeled average trip length at the same level (Muhammad, Ottens, de Jong,2008). For Groningen, this distance-decay is smaller compared to the region of Randstad.

Attracting potential ICT employees to move to the region
In an earlier chapter the demand for ICT employees has been discussed. Due to the high level of competition between employers, it can be difficult to convince people to move away from where they live now to work and live in the North of the Netherlands. A strategy to attract these new employees and also increase other economic prosperity towards the North of the Netherlands can be via region branding. Branding is the creation of an image and the desired association to realize the value and gain a competitive advantage (Wentink, 2006) in this case for a specific region. A well-known example of this in the Netherlands is the campaign "Zuid-Limburg, Je zal er maar wonen." This campaign launched in 2008 had the goal to attract new residents towards Zuid-Limburg in order to counter the shrinking population. The campaign is led by Stichting Regiobranding and funded by the province, municipalities, and multiple companies[12]. Stichting Regiobranding later changed into Limburg Economic Development (LED).

The campaign increased the self-esteem of the local population, which is a good general promotor and there were at the time more people moving towards the region than there were leaving according to local officials. Although it is not completely clear how much of this effect was caused by the campaign. However, not everyone agrees with these earlier mentioned results. Research by Krabbendam consultancy[13] pointed out that in the time span of the campaign 2008 till 2014 there was a decrease in the number of residents in the region and the number of jobs. It must be stated that this was during an economic crisis, but the results are worse compared to the entity country. Also important is the note that the region Zuid-Limburg is relatively small and if such a campaign would be implemented for the region

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[12] https://www.trouw.nl/nieuws/zuid-limburg-zij-wonen-er~bb0f2d4c/
[13] https://krabbendamconsulting.nl/regiobranding-zuid-limburg-de-ontbrekende-data-bij-miljoenencampagnes/

North of the Netherlands problems can occur. One of these is competition within the region and conflicting goals within the project.

Concluding, the stories about the effect of region branding are mixed. There are successes like in Ontario Canada (Cleave & Arku, 2014) and there is a pilot in the region Twente. The most important lesson from these examples is that the brand needs to extend beyond a logo and must explain all the advantages and exploit local values. In the context of Samenwerking Noord, most of these projects are led by local governments and this seems sensible. The campaigns come with high costs and potential benefits are not only for companies but also for these governments. Samenwerking Noord could, if it desires, incentivize the local governments. However, due to the size of the region and its many different stakeholders setting up such a campaign may be difficult.

4.3 Non-Dutch speakers

Research of the Global Talent Acquisition Monitor (GTAM) (2018), conducted in 28 European countries, found that there are many foreigners working in the field of ICT, who are willing to consider moving to the Netherlands. In total 180.000 IT employees within Europe would be willing to consider working in the Netherlands[14]. The research also looked into reasons for ICT personnel to be willing to move (appendix 7). It is important for companies to take these reasons into account when actively looking for foreigners to fill their ICT vacancies. When looking at the number of online vacancies posted in other languages than Dutch a large difference between provinces can be seen (figure 20). In figure 20, the percentage of non-Dutch vacancies per province is given and also the average of the whole of the Netherlands and the northern part of the Netherlands[15].

	2017	2018
Average NL	11%	11%
Average NN	7%	6%
Zuid-Holland	21%	21%
Noord-Holland	18%	21%
Noord-Brabant	11%	19%
Gelderland	19%	18%
Utrecht	9%	11%
Overijssel	7%	8%
Limburg	9%	8%
Groningen	6%	7%
Flevoland	6%	6%
Friesland	6%	6%
Drenthe	9%	6%
Zeeland	8%	6%

Figure 20 non Dutch vacancies per province (GTAM,2018)

Tapping into this pool of talent could generate many possibilities for the members of Samenwerking Noord. In the graph in appendix 7, different factors are shown that can help in motivating foreign IT-professionals to come to the Netherlands. Important here is that it is much simpler to contract EU citizens compared to non-EU citizens due to European legislation[16]. The UWV[17] points out that 'statushouders', immigrants that are allowed to stay in the Netherlands, can also be part of the solution to the ICT-employee shortage, but there is no further data on this.

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[14] https://www.intermediair.nl/archief/development/nederland-in-trek-bij-hoogopgeleide
-europese-it-ers?referrer=https%3A%2F%2Fwww.google.com%2F

[15] IT-Labour-Market Rapport Juni 2019

[16] https://www.rijksoverheid.nl/onderwerpen/buitenlandse-werknemers/vraag-en-antwoord/mag-ik-
personeel-uit-het-buitenland-in-dienst-nemen

[17] UWV Factsheet arbeidsmarkt ICT 2019

4.4 Non - ICT employees

PwC (2021)[18] made an assessment that in the Netherlands around 1.6 million jobs will become obsolete in the medium to long term, mostly due to automation. This process will occur between 2021 and 2024, resulting in around 400.000 jobs per year. In some regions in the Netherlands, there are more jobs under pressure, like Rijnmond with 131.000. In figure 21 on the right obsolete jobs of the Northern three provinces in these four years are displayed. In total, this makes for 137.000 potential new employees.

Figure 21 jobs per province under pressure of becoming obsolete (PwC, 2021)

It must be said that not all of these people will probably change their job to become an ICT employee. It is not only important to look for employees of other companies that lose their job, but also within a company (Borghouts-van de Pas, Bosmans, Verschoor, Wilthagen, 2019). Training your staff or helping them with a "Van Werk Naar Werk" (From Job to Job) program can strongly help organizations to keep their human capital within their company.

This internal program is not applicable to every organization and every employee. Another option is letting employees/persons be retrained by external organizations. Within the network of Samenwerking Noord there is the IT academy. In 2020-2021 the IT academy trained 298 persons[19] in different aspects of ICT. Companies need to get ties with external ICT training organizations, because it allows direct access to a new workforce. Van der Berg of IT academy also pointed out that demand from organizations leads to more training spaces in their program and therefore enlarges the amount of new potential ICT employees.

4.5 Key takeaways supply

The biggest mismatch is in the demand and supply of HBO students. Tapping into the pool of MBO ICT students offers more opportunities because the mismatch is smaller there. Attracting ICT employees from elsewhere in the Netherlands is a good possibility, however, it can be difficult. This is due to the fact that potential employees need to be convinced to move to this region and it is a more personalized per employee approach. Another approach could be to do regional branding, as the campaign of "Zuid-Limburg, je zal er maar wonen.", but the effectiveness of such a campaign is unclear. A great source of potential employees is Non-Dutch Europeans. The Global Talent Acquisition Monitor (GTAM) conducted research in 2018 that within Europe (Including Great-Britain at the time) 180.000 ICT employees would consider moving to the Netherlands for a job in ICT. Lastly, there is a pool of people who could in the coming years maybe lose their job due to automation and digitalization. PwC estimates that this group will be around 400.000 jobs per year up until 2024. It is tempting for these potential employees to re-educate themselves from their current work into an ICT career as there are many job opportunities in this field. If this happens, it can create a big relief for the currently very tight ICT labor

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[18] https://www.pwc.nl/nl/actueel-en-publicaties/diensten-en-sectoren/people-and-organisation/van-zombie-naar-engel-baan-door-omscholing-en-afstemming.html
[19] Hanze-21_0597 Infographic IT Academy LR, https://www.itacademy.nl/over-ons

market. Organizations can re-educate their own personnel, attract personnel and train them into ICT or make use of external organizations to do the training. Having direct contact with such training organizations is both beneficial for the training organization as well as the own organization.
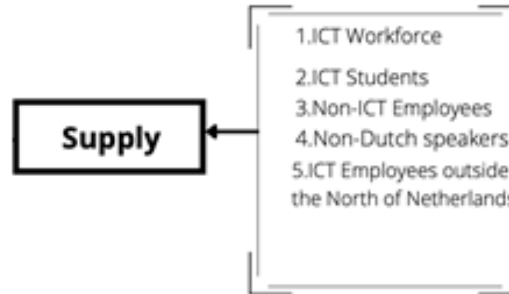

Figure 22 Key takeaways supply

5. Trends in the ICT labor market

Besides the clear supply- and demand side, there are also multiple external factors, namely trends, that can affect both sides. To complement the previous chapters, some of these trends are highlighted.

5.1 Trends in ICT Vacancies

International IT-branch association Comptia (2020) has researched trends within the ICT labor market. Complemented by an article of Computable, some trends have emerged on the demand side of the labor market:

- ❖ In the Netherlands, developers remain the most popular vacancy (26.000 in Q1 of 2020), followed by system analysts, and cybersecurity specialists (13.779 in Q1of 2020).
- ❖ There has been an increasing demand in IT-starters, 40% of the vacancies have been looking for employees with zero to two years of experience, followed up by 10% of the vacancies looking for employees with between three and ten years of experience.

5.2 Job opportunities in ICT

Based on a report by the UWV labor market study (2021), the ICT workforce has been affected by Covid-19. The report shows fluctuations in the development of the ICT-related workforce, normalized through the period that Covid-19 has impacted the economy (figure 23). The biggest impact of the situation has been the decrease in assignments

Figure 23 Impact covid-19 ICT workforce (UWV/CBS, 2021)
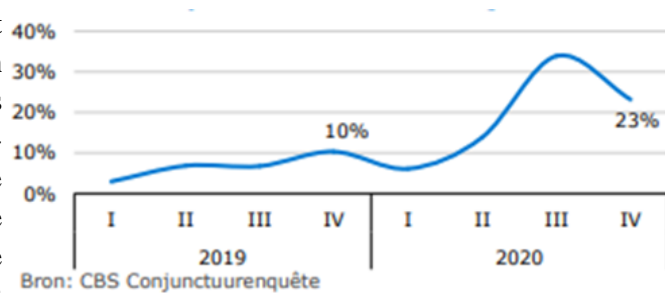
and orders, which resulted in a steep decrease in revenue (UWV;CBS, 2021). The reason for this decrease is the financial uncertainty companies experience in an already poor market. The combination of these factors results in companies having less financial resources to purchase ICT-related services, thus resulting in a decline in revenue.

5.3 Skyrocketing need for supply

One of the big factors for the supply versus demand problems on the ICT-labor market in the North of the Netherlands (as well as the entirety of the Netherlands) has been the rate at which demand has increased. Research by Amsterdam Standard (2019) has found that the average increase of IT graduates has been 7,3% per year, while in the same period of time, the increase in vacancies has been 18,3% per year. This phenomenon contributes to a tightening ICT-labor market and indicates that the increase of graduates can't compensate for the growth in demand.

5.4 Key Takeaways

The key takeaways from the trends that have been uncovered, is that there is a steep rising need in specific functions, like developers, because of the development of organizations in a digitalizing society. Covid-19 affected society in its entirety and according to the UWV (2021) diminished the amount of assignments ICT services had to fulfill but an expected rise in these assignments is expected because of the adaptation of society in regards to Covid-19. Finally, the discrepancy between the rise in demand (18,3%) and supply (7,3%) continues to grow the gap between demand and supply.

Figure 24 Trends in the ICT Labor Market

6. Results, Discussion, Advice

In the following chapter, we will provide a summary of our report by providing concrete answers to our research questions. Alongside we will be discussing the results from our survey that was performed among the members of Samenwerking Noord. Based on these two components we will be providing possible courses of action that Samenwerking Noord and its members can take to tackle the mismatch between demand and supply of the ICT labor market.

6.1 Results from the survey

The survey (appendix 1) we sent out among the members of Samenwerking Noord yielded 27 respondents out of 80, which was a response rate of 33%. These respondents represent various sectors as presented in figure 25. The results have been incorporated in answering the research question, sub-questions, and the different advice we've produced. A list of all possible proposed solutions, as proposed by the members of Samenwerking Noord in the survey, can be found below in figure 26. The solutions have been divided into 3 groups, educational initiatives, collaboration with members, and internal firm actions.

Tot welke sector behoort uw organisatie bij Samenwerking Noord?
27 responses
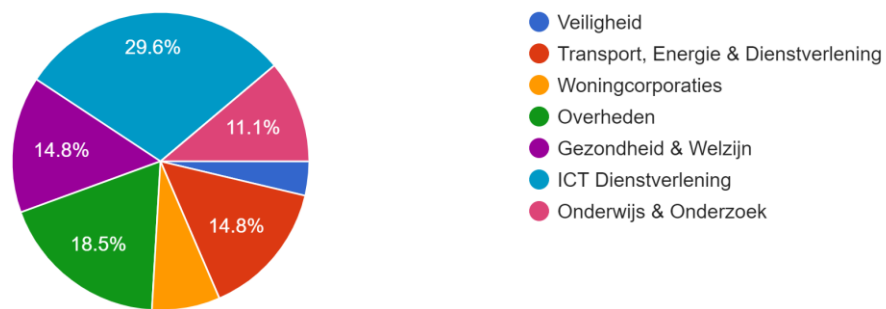
Figure 25 Survey question: To which sector does your organization belong at Samenwerking Noord?

Educational initiatives	Collaboration with members	Internal firm actions
Offer education options	Bundle groups with common goal	Traineeships
Better step-up for MBO	Growth opportunities (among partners)	Function rotation
Cooperation with Universities and HBO	Researching cooperation opportunities	Employer branding
More study projects	Outsource some components and cooperate on some parts.	Look outside the North of the Netherlands.

Create awareness of the possibilities in middle schools (middelbaar onderwijs)	Share specialists among partners.	Ask solicitors about what they like and dislike about a vacancy
Strengthen cooperation among schools.	Too many local platforms (provincial), integral in the North of Netherlands would be an opportunity.	Traineeships
Common initiative towards education.	Willingness to invest in a solid ICT infrastructure	Sharing of functions of employees
Self-educating young professionals	Exchange of employees	Dare to look more broad, remote hiring.

Figure 26 Survey question: Proposed solutions by the members of Samenwerking Noord.

6.2 Results and research questions

In the following part, the first part of our main research question will be answered by discussing the sub-research questions and then answering the main question. Main research question: ***What is the nature of the mismatch between demand and supply of the ICT-labor market in the North of the Netherlands and from what different angles the members of Samenwerking Noord can work together towards solutions?"***

Sub Questions

1. Who are the main actors that are relevant to the ICT market in the North of the Netherlands?
The main actors in the ICT labor market are the employees, the firms, and educational institutions. First of all, employees are a very significant factor in this matter as they are the ones who perform the ICT activities. Even though there are various types of ICT employees that firms in the North can hire (ICT-students, ICT-employees outside North-Netherlands, retraining Non-ICT employees, Non-native Dutch ICT personnel), the supply cannot keep up with the increasing demand. Due to the digitization of society, the demand for ICT personnel has increased tremendously among firms. ICT workers are not only employed in the ICT sector as almost two out of three ICT people work in other sectors, e.g., government and financial institutions. Educational institutions play a great role as well, as they supply the greatest part of the ICT personnel for which there is great demand. The main education level that firms require from their personnel is HBO-level, while the greatest supply of ICT professionals has only enjoyed MBO level education.

This has been discussed in the education paragraph, which showed that over half of the demanded education level is HBO graduates and only 14% is MBO. Regardless, around 36% of ICT graduates are from the MBO. Within the responses of Samenwerking Noord we see this trend even stronger. Where in only 7.4% of the vacancies MBO entry level is required. The results from the survey are displayed in figure 27.

Op welk opleidingsniveau werft uw organisatie voor de meeste ICT vacatures ?
27 responses
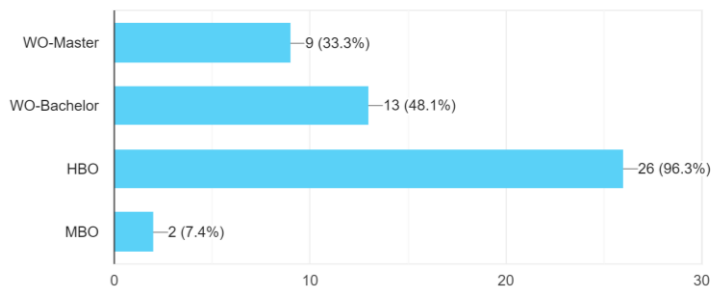
Figure 27 Survey results on requested education level ICT workers.

2. *What are the trends regarding the development of the ICT-labor market on the supply side in the Netherlands?*

The issue regarding the trends relating to the development of the ICT-labor market on the supply side seems to be the absence of growth in comparison to the steep growth on the demand side. The demand side has increased by 18,3% in comparison to "only" 7,3% on the supply side. If this discrepancy in demand- and supply growth goes on for more years, the chasm between the two will only grow.

Within Samenwerking Noord the demand for ICT employees has increased for all members (figure 28). As far as the information of the survey is able to show.

Bij mijn organisatie is de vraag naar ICT-medewerkers toegenomen in de afgelopen 4 jaar?
27 responses

Figure 28 Survey results on growth demand ICT functions

This increase in demand is mostly due to three reasons, as discussed in chapter 3:
- General increase in ICT functions within the organization
- The need for workers skilled in new ICT functionalities
- New ICT questions raised by the organization or its customers.

Interestingly, there is not a clear correlation between the increased demand and the growth of the organization itself or that the need for ICT staff is created by employees leaving the organization. A more in-depth overview of the reasons for increased demand for ICT employees is displayed in appendix 8.

3. *What are the main issues regarding the supply of the ICT market in the Netherlands?*

The main issues regarding the supply of the ICT labor market are twofold. On the one hand, the quantity of the supply of the ICT labor market is insufficient to keep up with the tremendous demand. At the end of the third quarter, there are 24300 open ICT vacancies in the Netherlands. On the other hand, the supply does not match with demand based on the quality of workers, i.e. education level and capabilities of supply and demand are incongruent. The ever-changing developments in programming languages, data, security, cloud, and the Internet of Things require personnel to have up-to-date ICT knowledge.

In addition, the greatest supply of ICT students is from MBO, whereas the greatest demand is for HBO-level professionals.

4. Why is there a mismatch between the demand and supply of the ICT labor market?
At the root of the mismatch of the ICT labor market lies the lagging supply of ICT professionals. As discussed above this is in terms of both the quantity and quality of the ICT workers. Over the past years, there has been such a great increase in the demand for ICT personnel that the supply just could not keep up with. As the developments within ICT have become more complicated, the demand for certain knowledge and skills has also become more important. The supply of ICT personnel did not evolve along with the demand for higher-educated ICT workers with more up-to-date knowledge.

5. What is the extent of the current mismatch between demand and supply at the members of Samenwerking Noord?
The mismatch of demand and supply of the ICT labor market is ever apparent at the members of Samenwerking Noord. Almost 70% of the 27 members that participated in the survey experience that the demand and supply for the ICT labor market in the North do not match. Out of all the organizations, no one indicated that the attainment of ICT personnel is easy. Furthermore, almost 90% of the organizations that participated in the survey indicated that the demand for ICT employees has increased over the past years. We will elaborate further on the extent of the mismatch and alternative courses of action that can be taken in the next subchapter.

The increase in ICT employees, given by the members of Samenwerking Noord, was mostly explained by the increase in the amount of ICT functions, the demand for new skills, and rising demand from customers to deliver ICT-related services. The drivers for this increase in demand were related to the digitalization of organizations and the rising needs and wants from customers. One respondent mentioned retirement as another cause for the rising need for ICT employees, which would refer to an outflow of ICT employees.

As a closing remark for this subquestion, the response rate was 33% based on these responses the sub-question has been answered. The responses have been generalized for the whole Samenwerking Noord community.

Main research question
First part of the main research question: What is the nature of the mismatch between demand and supply of the ICT labor market in the North of the Netherlands
The mismatch between the demand and supply of the ICT labor market in the North of the Netherlands is of qualitative as well as quantitative nature. Organizations throughout the whole region, including the members of Samenwerking Noord, are dealing with a shortage of highly-educated ICT workers. Over the last decade, there has been a tremendous increase in the demand for ICT professionals, due to the increasing digitalization of society, in which the supply is not able to keep up. Firms are having difficulty filling their ICT positions, which can be seen by the increasing number of open ICT vacancies. Moreover, there is also a discrepancy between the demand and supply of the quality of ICT workers. Companies are demanding higher-level educated (HBO/WO) personnel with up-to-date knowledge as to keep up with the ever-changing developments that are happening within ICT (e.g., programming

languages, data, security, cloud, and the Internet of Things). Contrastingly the main supply is lacking behind as new ICT personnel predominantly consists of MBO students.

6.3 Advice/ Perspectives

In this section we will be discussing the second half of the main research question: "*...from what different angles the members of Samenwerking Noord can work together towards solutions?"*. Two types of advice will be given. One will be the actions that are led by Samenwerking Noord and the other one are actions members can implement themselves to alleviate the shortage.
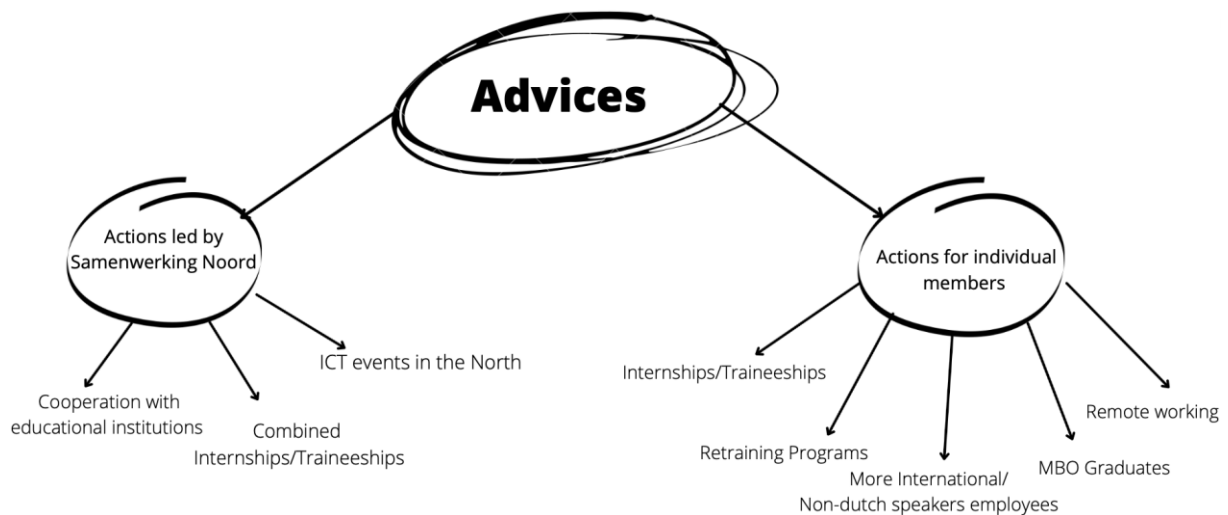
Figure 29 Advices for Samenwerking Noord and its individual members

Actions led by Samenwerking Noord - Focus on the source
Cooperation with RUG and other educational institutions

Many educational institutes are members of Samenwerking Noord. These connections should be more intensively used to connect education and work. Of the Hanzehogeschool 82% of the ICT alumni stayed in the North of the Netherlands[20] in 2020. According to Van den Berg, who is directly connected to the Hanzehogeschool, this is due to the close connection between companies and the ICT studies. The RDW, stated by G.J. Theuwissen of the RDW, does a self driving challenge at the Hanze and also at the Windesheim college. This allows students to get an image of the company during their study and therefore increases the likelihood of staying in the North and as an employee of one of the members of Samenwerking Noord.

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[20] https://www.itacademy.nl/kennisbank/factsheets/waar-werken-cmd-alumni-2020-van-hanzehoge school-groningen

The role of Samenwerking Noord in this is connecting the members from the education sector to the other members. In this Samenwerking Noord can have a supportive role in matching the organizations and share best practices of other collaborations between members. Activities within the educational sector can be very broad, but the involvement of students can be created for instance by:

- Giving lecture talks, in which the company explains where they are working on at an ICT level.
- Giving students a case assignment for one of their courses, based on a real/realistic scenario that has occurred in the collaborating organization.
- Organize company visits for students.
- Promoting/offering internships and traineeships.

In appendix 5 and 6 there is an overview of all the ICT-related studies on WO, HBO, and MBO level in the North of the Netherlands. All educational institutes, except for het Friesland College, are connected to Samenwerking Noord.

ICT events in the North

Working together with educational institutions can also be in a different setting like an ICT event/conference. Setting up a large-scale event with the members of Samenwerking Noord can be a way for the members to promote themselves and their ICT activities. When inviting students from different institutes it enables a large-scale promotion of the organization present. It is a more challenging option, compared to the smaller scale collaboration mentioned earlier, but it can also be a large possibility. Setting up such an event could be a tryout conducted by Samenwerking Noord as an event they organize themselves. Another option is to make use of the experience study association in the ICT have with symposia and conferences. The study association could then help work together with Samenwerking Noord to start an event, or Samenwerking Noord could be a big part of one of the already existing events.

ICT Study associations of the RUG are: S.V. Cover and ASCI. From the Hanzehogeschool it is RealTime and from NL Steden it is Nexus.

Combined Internships or Traineeships

Organizations can start an internship or training program for themselves, however, this can be difficult for smaller organizations. It demands of the organization to give support during the project and an interesting and large enough assignment. For traineeships, it is also normal that the trainee works at different departments over time, in order to learn more about the company. For smaller organizations, this combination of factors can consume many resources, but in the long run, does have a positive impact on employee retention. Every intern or trainee that stays fills a vacancy and is already known with the business and its technical programs.

A solution, mostly for the smaller organizations, could be to combine internships and traineeships with other companies. An intern starts with a smaller project in one organization and when that is finished goes to another member to also start there. For the traineeships, a similar setup can be used. A trainee works at an organization for half a year/year and then switches to another organization. If for instance a half year per organization setup is implemented, a trainee can visit and experience four different companies. Interesting in this is that it is fundamentally different from the current practice in which

trainees are linked to a company and then experience different departments. Therefore doing this could maybe trigger a completely new group of students who are doubting if they want to work in a small or a large company.

The role of Samenwerking Noord is to initiate the combined programs and streamline the process. The smaller members must be willing to start with this and get connected to each other. Streamlining is important, because it is undesirable if there is a lot of time between the switch of organizations. There are multiple approaches of combinations: it could be that there are pre-determined combinations of organizations or that it is free to the student to choose an organization. In the first one, there are also the options for having similar companies, as in sector or type of organization, or very diverse organizations.

There are many possibilities in setups and choices on how to proceed with a combined internship or traineeship. We advise you to look deeper into it and look for an approach that works both for Samenwerking Noord as well as the members.

Actions for individual members - Focus on the source

Internships or Traineeships

Differently from the combined traineeships and internships as discussed before there is also the possibility for organizations to start their own program. During our intake meeting with W.Aalderink, he mentioned that only a few members of the organization offer internships for students, but the majority do not. It could be an effective solution, via the cooperation with the universities (of applied sciences), to start offering internships and traineeships to ICT students or graduated students, with the possibility of recruiting them with the completion of their contract. The member firms could offer internships to students for relevant departments that do not have the required ICT skills and start training them in order to retain them and avoid any possible vacancy.

In the survey, when we asked how members are currently recruiting, most mentioned internal sourcing (26%) or making use of recruiters (26%), or LinkedIn (22%). On the orientation interviews, it was argued from G.J. Theuwissen, a sector-chairman of Transport Energy & Services in Samenwerking Noord, that they have every year a recruitment strategy that involves offering internships to students, and that strategy helped them to not have a massive number of vacancies, but instead, their ICT department to perform better, compared to other members. This way, the organization can also attract more international students, we will elaborate on this in the sub-chapter more international/non-dutch speakers employees. Taking into account what G.J. Theuwissen argued and the results of the survey, where only one respondent mentioned internships as recruiting strategy, we conclude that there are possibilities for members to expand their workforce by actively engaging in internships/traineeships.

Retrain programs for the current ICT employees.

In this period in which technological and digital improvements are rapidly involved within the business industry, it is important for members of Samenwerking Noord to keep up with these evolutions. By implementing retraining programs for the current ICT employees of all the members, the organization and its members will be able to follow the technological trends and at the same time enhance the ICT skills of its employees. Moreover, retraining and informing employees about the technological

evolutions could be a permanent solution to cover the existing vacancies, and avoid a possible increase of them. During the interview with Van den Berg, an expert working at the IT academy, he argued that in the IT academy they train the employees of the future, but it would also be wise for the companies to start train and educate its current employees and engage them with incentives to continue working with the company, since the demand from the competitors is high and each company will try to attract the employee of the other.

Lastly, the report of PwC mentioned in section 4.5 showed that many jobs will be under pressure of becoming obsolete. When within an organization functions will disappear it can be useful to think if there are possibilities in reschooling them towards a more ICT centric function. Using external partners for this retraining would make this process easier. The benefits of such a retraining is that the company keeps its human capital and that workers can stay loyal to their organization.

More international/non-dutch speakers employees

As the director of IT academy claimed during our interview, it is very possible that the demand will increase even more in the future and the companies will have to increase their capacity, something that will lead to a higher demand of ICT professionals. At the end of 2019, nearly 20% of the entrepreneurs in the northern Netherlands reported difficulties in their companies due to labor shortages. Some companies in Noord-Holland have published for 2 consecutive years the most online vacancies in foreign languages, to attract expats to supplement the available talent in the Netherlands that comes from abroad (Hollander et al., 2019). Most of the members of Samenwerking Noord have minimal or almost non international employees in their ICT departments. During the survey among members of Samenwerking Noord, when they were asked if they recruit internationals and non-dutch speakers, and if not, if they would willing to do it, 33.3% of the respondents mentioned that they do not want to broaden their scope. The main reasons were the cost of transforming from a Dutch company into a more international one, and clients' preferences for companies that operate in Dutch.

Currently, within members of Samenwerking Noord there are three main groups that can be distinguished within this field. The two largest groups state either that they are open to non-Dutch speakers in the future or that they are not. The other group states that they currently have Non-Dutch speaking ICT personnel. This is also depicted in the figure (30) below.

Heeft u momenteel personeel in dienst dat geen Nederlands spreekt of heeft uw hiervoor vacatures uitstaan?

27 responses
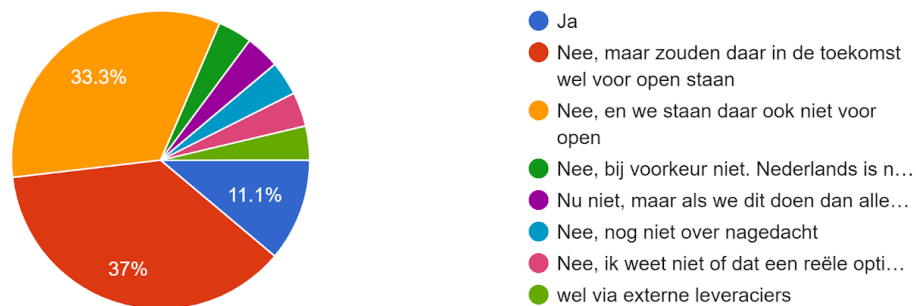
Figure 30 Survey results on openness to Non-Dutch speakers

In this report, research has been presented that showed that there are many European ICT employees who would consider coming to work in the Netherlands. Allowing them to join the workforce could massively improve the options of potential employees to fill ICT vacancies. Next to that, it is very important for the organization to take advantage of the talent and the international students that study in the northern part of the Netherlands, and especially in the province of Groningen where two international universities exist. In order to take advantage of this presence of the internationals, and especially international students in the North, another possible solution could be career days and cooperation with RUG and other universities. What the survey also found is that 37% of the respondents are currently not employing non-Dutch speaking employees, but are willing to explore options for the future. Because of this willingness to explore options, we suggest that this could expand the pool of possible employees by a large amount.

Entry-level positions for MBO graduates

It was found from our desk research that there is a high demand from the companies in the North for HBO ICT graduates, but the number of graduates per year is not sufficient to fulfill these vacancies. Moreover, during the survey we asked respondents about the education level of their ICT vacancies, these levels are portrayed in figure 31. Only 7.4% of the respondents make use of the MBO workforce, while this working force is able to conduct some of the work with for which there is a high demand. Samenwerking Noord's members could start recruiting MBO graduates for entry-level positions, since this group is the largest of ICT graduates in recent years and as the director of the IT Academy argued, they can also work and cover the needs of an organization. The members of the organization could start recruiting MBO graduates and train them in the organization's needs and work on entry-level positions. If vacancies are filled by MBO-educated individuals instead of HBO-educated, the HBO-educated can fill vacancies that demand higher levels of education.

Op welk opleidingsniveau werft uw organisatie voor de meeste ICT vacatures ?
27 responses

WO-Master — 9 (33.3%)
WO-Bachelor — 13 (48.1%)
HBO — 26 (96.3%)
MBO — 2 (7.4%)
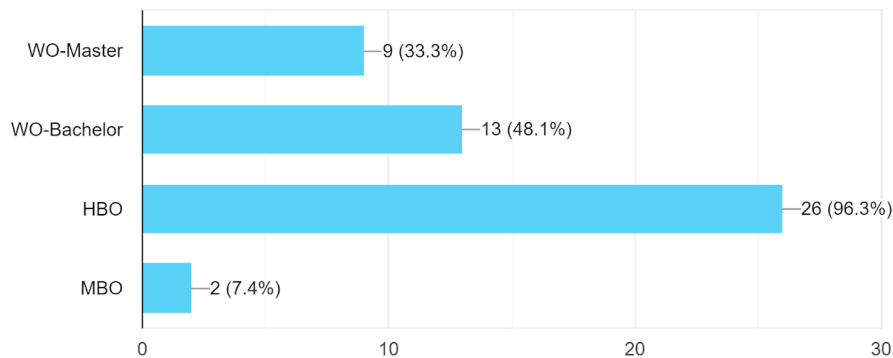
Figure 31. Education level of ICT vacancies

Flexibility on remote working

The last advice option we want to emphasize is on the benefits of allowing employees to work from home. Since the presence of the Covid-19 pandemic, most of the companies did a rapid shift to full-time remote work for many information workers (Yang, Holtz, Jaffe, Suri, Sinha, Weston, Joyce, Shan, Sherman, Heect, Teevan, 2021). Moreover, a recent study from Feelen Christy, et.al., (2021) found that the majority of ICT employees from the beginning of the pandemic were more satisfied when they were working remotely and they felt that their work-related productivity was higher. Furthermore, Hollander and colleagues (2019), found that the most important criteria for ICT employees was the option of working from home, and we suggest that if the members of Samenwerking Noord start offering this possibility to their employees, will not only attract more potential employees, but also will give a good incentive to the current ones to remain in the organization. Finally, by providing this option, the members will be in a better position to attract employees from other regions in the Netherlands, or even from other countries close to the north of the Netherlands, since traveling distance will stop being a barrier.

7. Closing Remarks

The Dutch ICT labor market is experiencing an overall tightness. The demand for ICT employees has increased tremendously in recent years, resulting in an overall shortage of ICT professionals, not only in the northern part of the Netherlands but in the entire country. The technological developments created an urgent need for skilled ICT professionals that can help the organizations and the companies to follow the trends and keep up with competition, while the number of ICT employees cannot cover this demand. The number of ICT professionals is still increasing but not at the pace that the demand does, which led to the mismatch between demand and supply.

As already discussed, the number of vacancies in 2021 has been the greatest compared to previous years for ICT professionals. In the North, besides the fact that after 2018 the number of ICT job seekers increased, the number of vacancies increased with greater intensity, making necessary the presence of new Junior ICT employees to fill those vacancies and resolve this scarcity of ICT professionals. Furthermore, this age group has one of the highest proportions in the province of Groningen, and organizations, thus Samenwerking Noord should take advantage of that source.

This report summarizes the supply of ICT employees in four categories (see Figure 13), which we believe if Samenwerking Noord approaches them, they could turn into solutions to the problem of the high increase in ICT vacancies. While most of the organizations recruit ICT professionals with an HBO degree, this group of employees cannot fill the published vacancies, because there is a shortage in terms of quality and quantity of higher-educated ICT professionals. Moreover, the employees of WO degree are more likely to seek a job career in the western part of the Netherlands. We believe that by shifting the culture of the individual members of Samenwerking Noord, ICT graduates with an MBO degree could partly be a solution to the challenge of filling the vacancies. Furthermore, due to digitalization and the option of working from home, Samenwerking Noord can cover a fair number of vacancies but trying to recruit ICT employees from elsewhere in the Netherlands, or even from outside the Netherlands. Finally, re-training programs are essential for an organization such as Samenwerking Noord, in order to inform and retain its ICT employees, but also the employees of the different members.

While we researched the nature of the mismatch between demand and supply in the ICT labor market in the North of the Netherlands, we concluded that this mismatch is the main reason for the increase in the number of vacancies, not only in the North but also in the rest of the country. The rapid evolution of technological developments, combined with the need to follow the competitors, resulted in a high demand for ICT professionals, creating the highest amount of ICT open vacancies in recent years. Solving this will take a broad and proactive approach.

We hope that Samenwerking Noord will find the tools and the mechanisms to attract the existing young talents in the province of Groningen and engage them with the organization, while it will maintain its current ICT employees and protect them for the competitors. ICT professionals are in scarcity, but we strongly believe that Samenwerking Noord, by taking advantage of the educational institutions and the other network capabilities that are established in the north of the Netherlands, can eliminate the amount of vacancies.

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9. Accountability

Many of the parts have been written and rewritten collectively. For some chapters the main responsibility was divided, these will be mentioned later . The interviews were divide among the group members:

- Leonidas: Robin van der Berg, Arjen Edzes
- Esmee: a representative of IT service, Arjen Edzes
- Sander: a representative of IT services, Gert-Jan Theuwissen
- Jewan: Robin van der Berg, Gert-Jan Theuwissen

The divided chapters/work are:

- Background ICT labor market: Leonidas and Esmee
- Demand: Esmee
- Supply: Jewan and Leonidas
- Trends: Sander
- Literature: Leonidas
- Results: Everyone
- Survey results: Sander and Jewan

Accountability Statement for Business Research & Consulting

To be attached by students registered in the Faculty of Economics and Business at the University of Groningen, to the portfolio of the Business Research & Consulting course.

We hereby declare that we are the authors of the attached documentation/portfolio or the sections thereof for which we are responsible, herein after referred to as this portfolio, and that all materials from reference sources have been properly acknowledged.

We understand what plagiarism is and what penalties may be imposed on students found guilty of plagiarism by the University of Groningen.

Plagiarism & External Assistance

We verify that this paper contains no plagiarized material, and that we received no external assistance from unauthorized outside sources:

- All quotations taken from other works have been referenced to the source from which we obtained them and indicated in this portfolio by the use of quotation marks or indented paragraphs;
- All paraphrases and summaries of material taken from other works have been appropriately framed and/or referenced;
- In our bibliography all works from which we have taken ideas of or consulted have been included and appropriately referenced with the correct formatting (APA 6th Ed.)
- We verify that this is our own body of work and that we did not receive any unfair outside assistance from others (including unauthorized collaboration) in its creation.

We verify that this portfolio (or any part or subsection of it) has not previously been submitted to the FEB or any other faculty or educational institution previously.

We verify that the work that is the responsibility of each member of the group and each member of the group has contributed fairly and equally to the development of this portfolio.

10. Appendices

Introductie: Onderzoek ICT Arbeidsmarkt

Geachte heer / mevrouw,
We vragen u om onderstaande vragenlijst in te vullen. Het invullen van de vragenlijst kost u plm 5-10 minuten.
Met dit onderzoek willen wij bij de ledenorganisaties van Samenwerking Noord inzicht verkrijgen in de ICT arbeidsmarkt. De verkregen resultaten en inzichten gebruiken we in ons advies aan Samenwerking Noord om gezamenlijk te werken aan versterking van de huidige ICT arbeidsmarkt.

Het bestuur en de ledenraad van Samenwerking Noord hebben ons gevraagd om dit onderzoek te verrichten. We gaan strikt vertrouwelijk met uw gegevens om.

Mocht uw organisatie ook werkzaam zijn buiten Noord-Nederland, dan verzoeken wij u om de vragen te beantwoorden vanuit het perspectief van uw Noordelijke vestiging.

Alvast hartelijk bedankt voor uw hulp bij ons onderzoek,

Met vriendelijke groet,

Leonidas Papadopoulos, Jewan Kodde, Sander Everink en Esmee Mei,

Student consultants, Faculteit Economie en Bedrijfskunde, Rijksuniversiteit Groningen

Questions

1. Welke organisatie vertegenwoordigt u?
2. Tot welke sector behoort uw organisatie bij Samenwerking Noord?
    - ❖ Veiligheid
    - ❖ Transport, Energie & Dienstverlening
    - ❖ Woningcorporaties
    - ❖ Overheden
    - ❖ Gezondheid & Welzijn
    - ❖ ICT Dienstverlening
    - ❖ Onderwijs & Onderzoek
3. Hoe groot is uw ICT-afdeling in fulltime-equivalent (FTE)?
4. Er is in het Noorden een disbalans op de ICT arbeidsmarkt (vraag en aanbod matchen niet).
    - ❖ Volledig mee oneens 1 2 3 4 5 Volledig mee eens
5. Het werven van geschikte ICT medewerkers is lastig voor mijn organisatie.
    - ❖ Volledig mee oneens 1 2 3 4 5 Volledig mee eens
6. Het behouden van geschikte ICT medewerkers is lastig voor mijn organisatie.
    - ❖ Volledig mee oneens 1 2 3 4 5 Volledig mee eens

7. Voor mijn organisatie is het een uitdaging om ICT medewerkers te (blijven) trainen zodat zij over de juiste competenties en vaardigheden beschikken.
   - ❖ Volledig mee oneens 1 2 3 4 5 Volledig mee eens

8. Welke manier van werven werkt voor uw organisatie het beste? Noem alstublieft een voorbeeld van een wervingsstrategie die (heel) goed heeft uitgepakt.

9. Bij mijn organisatie is de vraag naar ICT-medewerkers toegenomen in de afgelopen 4 jaar?
   - ❖ Ja, de vraag is toegenomen
   - ❖ Nee, de vraag is gelijk gebleven
   - ❖ Nee, de vraag is afgenomen

10. De vraag naar ICT medewerkers in mijn organisatie is gestegen door:

	Helemaal niet	Misschien	Waarschijnlijk	Zeker
Groei van onze organisatie				
Stijging van het aantal ICT functies				
Meer uitstroom in huidige personeelsbestand				
Nieuwe vaardigheden benodigd				
Nieuwe ICT vragen vanuit de doelgroepen / klanten voor wie wij werken				

11. Welke andere oorzaken zijn er voor de stijging van de vraag naar ICT medewerkers in uw organisatie?

12. Welke ICT-functies heeft uw organisatie de afgelopen vier jaren proberen te vullen?

13. Welke ICT-functies zijn voor uw organisatie momenteel het moeilijkst om in te vullen?

14. Op welk opleidingsniveau werft uw organisatie voor de meeste ICT vacatures ?
   - ❖ WO-Master
   - ❖ WO-Bachelor
   - ❖ HBO
   - ❖ MBO

15. Hoe belangrijk is concrete ICT-werkervaring bij het werven van nieuwe medewerkers voor uw organisatie? Licht uw antwoord toe.

16. Richt uw organisatie zich op het werven van medewerkers van buiten Noord-Nederland?
    - ❖ Ja
    - ❖ Nee, maar wij overwegen wel om personeel buiten Noord-Nederland te werven
    - ❖ Nee, en we zijn ook niet van plan om dit te doen

17. Heeft u momenteel personeel in dienst dat geen Nederlands spreekt of heeft uw hiervoor vacatures uitstaan?
    - ❖ Ja
    - ❖ Nee, maar zouden daar in de toekomst wel voor open staan
    - ❖ Nee, en we staan daar ook niet voor open
    - ❖ Anders…

18. Heeft u tips, contacten of andere informatie die nuttig kan zijn voor andere leden van Samenwerking Noord met betrekking tot de Noordelijke ICT-arbeidsmarkt?

19. Heeft u ideeën hoe de leden van Samenwerking Noord hun krachten kunnen bundelen om de ICT arbeidsmarkt in het Noorden van Nederland te versterken?

20. Als we in de toekomst nog contact met u mogen opnemen voor eventuele vragen, laat dan alstublieft uw naam en e-mailadres achter.

Appendix 2 Background characteristics ICT professionals Netherlands (CBS, 2021)

	2005	2010	2015	2016	2017	2018	2019	2020	Werkzame beroeps-bevolking[1] 2020
x 1 000									
Totaal	315	336	370	378	380	415	452	474	8 951
Positie in werkkring									
Werknemers vast dienstverband, vaste uren	256	252	273	279	278	303	334	354	5 704
Werknemers flexibele arbeidsrelatie	26	31	38	42	44	51	52	48	1 717
Zelfstandigen	34	53	59	57	59	61	66	71	1 530

	% van het totale aantal werkzame ICT'ers								% van werkzame beroeps-bevolking
Beroepsgroep									
Leidinggevenden informatie- en communicatietechnologie	5	6	6	4	5	5	5	5	
Ingenieurs elektrotechniek, elektronica en telecommunicatie	4	4	4	3	4	4	4	3	
ICT-professionals n.e.g.	12	18	3	2	1	1	1	1	
Software- en applicatieontwikkelaars en -analisten	32	31	52	55	56	56	57	58	
Databank- en netwerkspecialisten	32	28	17	17	17	17	16	16	
Informatie- en communicatietechnici n.e.g.	2	2	1	1	0	1	1	0	
Technici informatie- en communicatie-technologie	2	4	9	10	10	10	10	10	
Telecommunicatie-, radio- en televisietechnici	3	3	4	4	4	5	5	4	
Installateurs van elektronische en telecommunicatieapparatuur	7	5	3	3	3	3	2	3	
Positie in werkkring									
Werknemers vast dienstverband, vaste uren	81	75	74	74	73	73	74	75	64
Werknemers flexibele arbeidsrelatie	8	9	10	11	11	12	11	10	19
Zelfstandigen	11	16	16	15	15	15	15	15	17
Arbeidsduur per week									
Minder dan 12 uur	2	2	3	3	2	2	3	3	11
12–19 uur	2	1	1	1	1	1	1	2	7
20–34 uur	13	14	15	14	16	16	17	17	32
35 uur of meer	83	82	80	82	80	80	79	79	50
Leeftijd									
15–24 jaar	8	7	6	6	6	6	7	7	15
25–34 jaar	31	28	26	27	27	27	28	29	21
35–44 jaar	35	34	28	27	26	26	25	24	19
45–54 jaar	20	23	27	27	26	25	25	23	23
55–64 jaar	6	8	12	13	13	14	14	15	19
65–74 jaar	0	0	1	1	1	1	1	1	3

Appendix 2 Background characteristics ICT professionals Netherlands (CBS, 2021) (continued)

	2005	2010	2015	2016	2017	2018	2019	2020	Werkzame beroeps-bevolking[1] 2020
Onderwijsniveau									
Basisonderwijs	1	1	1	1	1	1	1	1	4
Vmbo-b/k, mbo1	3	3	2	2	2	2	2	2	8
Vmbo-g/t, havo-, vwo-onderbouw	4	3	3	3	3	2	2	2	7
Mbo2 en mbo3	6	5	8	8	7	7	6	6	13
Mbo4	21	19	15	14	15	14	14	15	17
Havo, vwo	14	13	11	11	11	10	10	10	9
Hbo-, wo-bachelor	33	36	38	38	38	39	39	40	25
Hbo-, wo-master, doctor	18	20	22	22	24	24	24	24	16
Weet niet of onbekend	1	1	1	1	0	0	1	1	1
Geslacht									
Man	90	90	88	87	86	87	85	85	53
Vrouw	10	10	12	13	14	13	15	15	47

Bron: CBS
[1] Internationale definitie.

Appendix 3 ICT professionals by sector (CBS, 2021)

Bedrijfstak	2015	2016	2017	2018	2019	ICT-ers in totale werkzame beroeps-bevolking[1] 2019
	x 1 000					%
Totaal	370	378	380	415	452	5,0
Bedrijfstak						
Landbouw, bosbouw en visserij	1	1	1	1	1	0,4
Delfstoffenwinning	1	1	0	0	0	.
Industrie	30	30	30	35	38	4,5
Energie	3	4	3	4	5	13,2
Water	1	1	1	1	1	3,9
Bouw	10	9	8	9	8	1,8
Handel	29	30	30	32	33	2,5
Transport	9	9	8	8	12	2,9
Horeca	1	1	1	2	1	0,2
Informatie en communicatie	126	134	131	139	152	48,4
waarvan						
media	9	8	8	9	11	18,7
telecommunicatie	12	11	10	10	10	30,4
informatiedienstverlening	105	115	113	120	131	58,9
Financiële instellingen	30	34	29	29	30	11,9
Verhuur van en handel in onroerend goed	1	1	1	2	3	3,9
Advies en onderzoek	35	29	33	39	44	6,6
Overige zakelijke dienstverlening	12	11	14	12	14	2,8
Overheid	32	30	30	33	38	7,2
Onderwijs	12	12	11	15	14	2,3
Gezondheidszorg	14	14	14	16	18	1,3
Cultuur, sport en recreatie	4	4	5	5	5	2,6
Overige dienstverlening	6	4	5	5	6	3,4
Huishoudens als werkgever van huishoudelijk personeel	0	0	0	0	0	0,0
Extraterritoriale organisaties	0	0	0	0	0	.
Onbekend	15	18	26	28	31	5,3

Bron: CBS
[1] Internationale definitie.

Appendix 4 OECD definition ICT sector (OECD/CBS, 2021)

| SBI 2008	Omschrijving
ICT-industrie	
261	Vervaardiging van elektronische componenten en printplaten
262	Vervaardiging van computers en randapparatuur
263	Vervaardiging van communicatieapparatuur
264	Vervaardiging van consumentenelektronica
268	Vervaardiging van informatiedragers
Groothandel in ICT-apparatuur	
4651	Groothandel in computers, randapparatuur en software
4652	Groothandel in elektronische en telecommunicatieapparatuur en bijbehorende onderdelen
ICT-diensten	
582	Uitgeverijen van software
61	Telecommunicatie
62	Dienstverlenende activiteiten op het gebied van informatietechnologie
631	Gegevensverwerking, webhosting en aanverwante activiteiten; webportalen
951	Reparatie van computers en communicatieapparatuur

Bron: OESO / CBS

MET DE IN- EN UITSTROOMCIJFERS HELDER OP ONS NETVLIES, WENDEN WE ONZE BLIK NU TOT HET AANTAL AFGESTUDEERDE ICT-STUDENTEN PER HBO- EN WO-OPLEIDINGSINSTITUUT IN HET LAND.

AFGESTUDEERDE STUDENTEN PER OPLEIDINGSINSTITUUT HBO-INSTELLINGEN
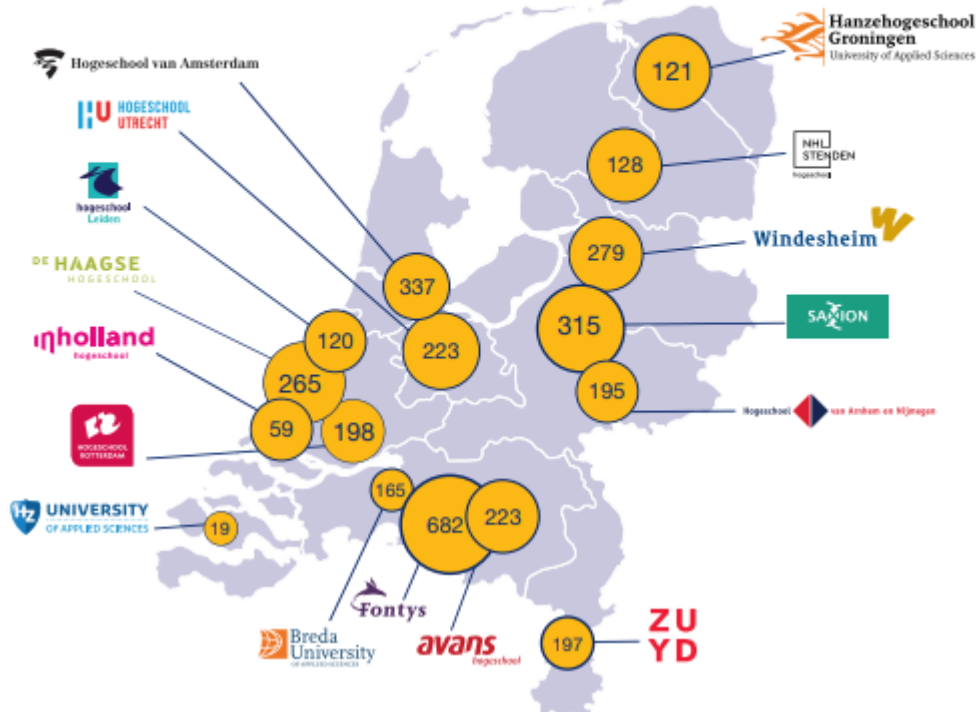
AFGESTUDEERDE STUDENTEN PER OPLEIDINGSINSTITUUT UNIVERSITEITEN
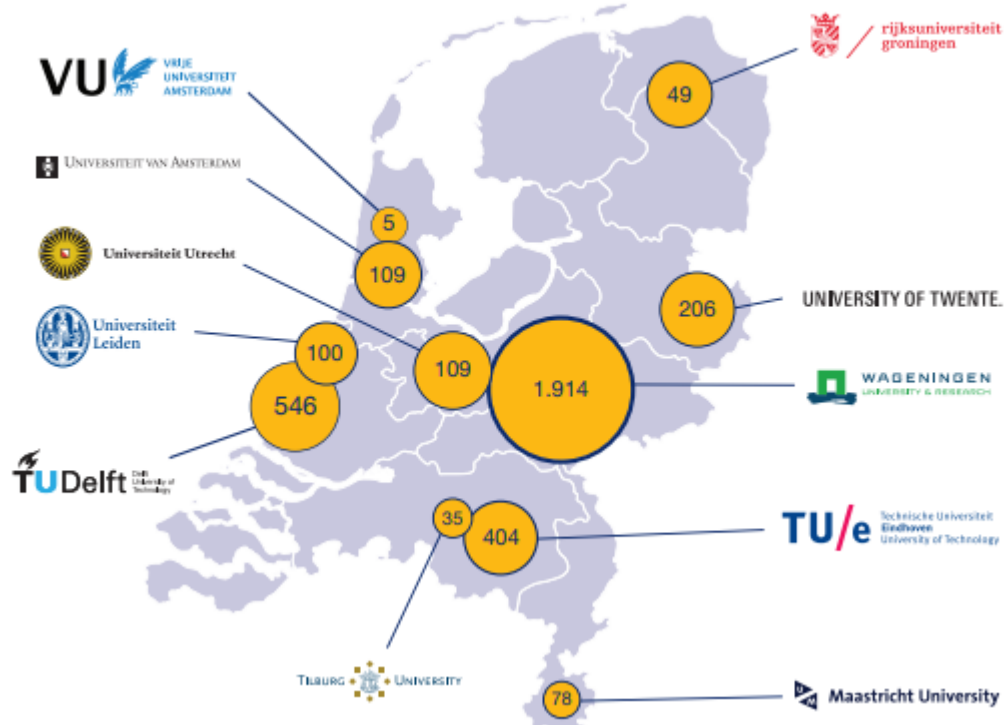
Appendix 6 Overview of MBO ICT studies in North Netherlands (And Noordoostpolder)

	Opleiding	Software developer	Expert IT systems and devices	Allround medewerker IT systems and devices	Medewerker ICT support	Service medewerker
Friesland	Sneek	ROC Friese Poort	ROC Friese Poort	ROC Friese Poort	ROC Friese Poort	ROC Friese Poort
	Leeuwarden	ROC Friese Poort	ROC Friese Poort	ROC Friese Poort	ROC Friese Poort	ROC Friese Poort
	Leeuwarden	Friesland College	Friesland College	Friesland College	Friesland College	
	Drachten	ROC Friese Poort	ROC Friese Poort	ROC Friese Poort	ROC Friese Poort	
	Dokkum					ROC Friese Poort
Groningen	Groningen	Noorderpoort (Kunst & Multimedia)				Noorderpoort (Business & Administratie)
	Groningen					
	Groningen	Alfa-college	Alfa-college	Alfa-college	Alfa-college	
	Groningen	Noorderpoort (Technologie & Ict)	Noorderpoort (Technologie & Ict)	Noorderpoort (Technologie & Ict)		
	Appingedam					Noorderpoort
	Veendam					Noorderpoort
	Winschoten		Noorderpoort	Noorderpoort	Noorderpoort	Noorderpoort
	Stadskanaal					Noorderpoort
Drenthe	Emmen	Drenthe College	Drenthe College	Drenthe College	Drenthe College	Drenthe College
	Assen	Drenthe College	Drenthe College	Drenthe College		
	Hoogeveen	Alfa-college	Alfa-college	Alfa-college		
Noordoostpolder	Emmeloord	ROC Friese Poort	ROC Friese Poort	ROC Friese Poort	ROC Friese Poort	

Appendix 7 Overview reasons for IT employees to move to the Netherlands

Beweegmotieven van IT'ers die in Nederland willen werken
vergeleken met alle Europeanen die over de grens willen
werken

|	
Kennismaken met verschillende culturen	41%
Salarisvoorwaarden/tarief	41%
Mogelijkheid om ervaring op te doen	39%
Een betere levensstandaard verkrijgen	37%
Carrière-/doorgroeimogelijkheden	35%
Werkervaring opdoen	27%
Een nieuwe taal willen leren	26%
Werken voor een internationaal bedrijf	23%
Nieuwe mensen ontmoeten/mijn netwerk uitbouwen	23%
Mijzelf uitdagen	21%

Bron: *Global Talent Acquisition Monitor 2018, Intelligence Group*

Appendix 8 Overview reasons for increased demand of ICT employees within the organisations of Samenwerking Noord.

De vraag naar ICT medewerkers in mijn organisatie is gestegen door:
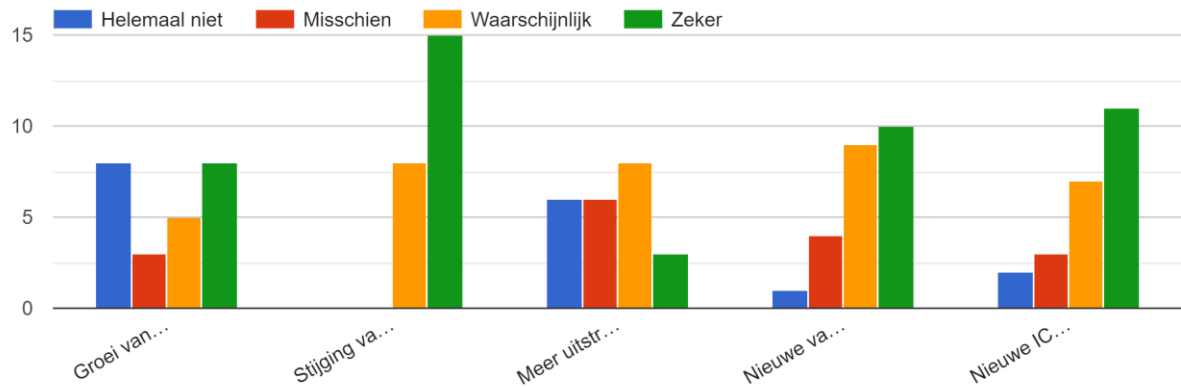
(From left to right per column: growth of the organization, increasing amount of ICT functions, increased amount of staff leaving the organization, new ICT skills are needed and new ICT questions from the organization or its customers.)
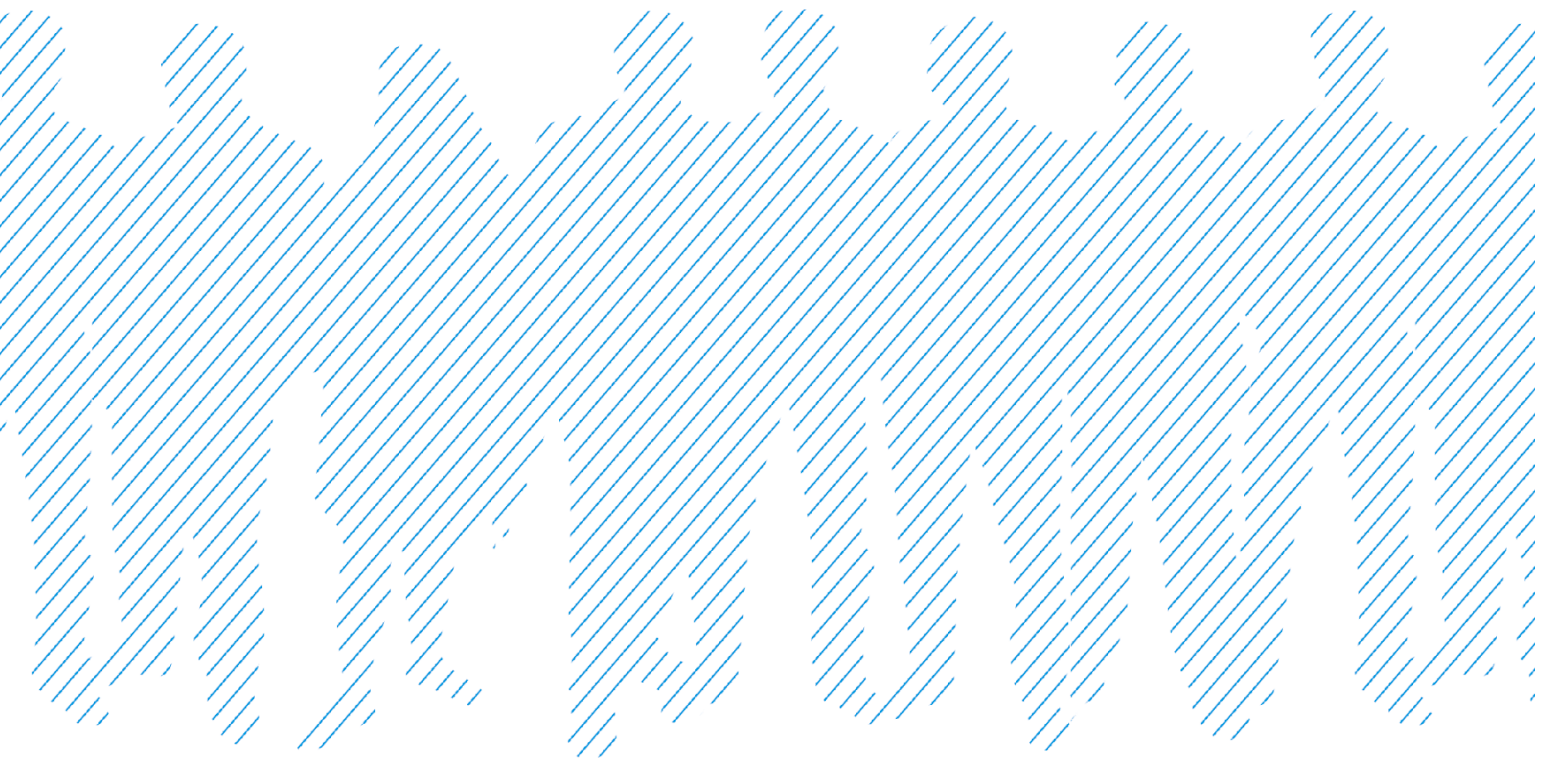
This advice report is the result of your participation in the Student Consultancy project of the Faculty of Economics and Business of the University of Groningen. We want to thank you very much for offering our students the opportunity to do up valuable practical experience during their academic training!

Would you like to join more initiatives that link students to the world of business? Please have a look at our website: **www.rug.nl/feb-for-business** We will gladly cooperate with you again in the future.