Various perspectives on the consequences of Artificial Intelligence for our professional life

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OLA4090- Master thesis in Organisation, Leadership and Work

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June 2018

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2018

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Trykk: Reprosentralen, Universitetet i Oslo

Executive summary

This dissertation explores various perspectives on the consequences of Artificial Intelligence for our professional life.

Artificial Intelligence (AI) has gained significant attention during the last couple of years. According to market reports the global AI tech industry will grow exponentially over the coming years and PwC estimates that based on the current enormous investing into AI, the contribution to the global economy could reach up to USD 15.7 trillion by 2030 (Rao and Verweij, 2017). Never before has the term AI been discussed in so many forums across companies, blogs, unions, media and political circles. The willingness to invest in this technology has never been higher and all indicators show that it will only continue. Whether we are afraid of it or chose to embrace it there is no stopping it.

The heightened momentum of this new technology has raised and continues to raise many questions and predictions. Some of these are of a philosophical character, others related to social or political consequences and many just want to know what this means for us as regular employees of a company.

In this dissertation I attempt to summarize and categorize some of these rather complicated questions and predictions related to the consequences of AI for our professional life. I present the findings in light of four main perspectives. The perspectives include short and long term optimistic and pessimistic consequences of AI related to our professional life such as effects on employment, productivity and personal competence.
While the study primarily focuses on the perspectives on the consequences of AI for our professional life such as employment effects, it was inevitable to add a broader view on the consequences for society as a whole as the subjects are closely related.

Method
I used the scoping study method as it allowed me to both use academic and non-academic literature and at the same time complement the literature review with in-depth interviews with elite informants in the field. The field of study is characterized by exponential growth and it

was difficult to find relevant and up to date information in the academic literature only. It was therefore important to use literature from lesser known but updated sources such as business databases and articles. The in-depth interviews added a complementary dimension to both the academic and non-academic literature to further increase the validity of the study.

Results

Both the literature review and in-depth interviews show a highly fragmented set of predictions ranging from highly optimistic to highly pessimistic future scenarios. In particular the distant future effects of AI on our society were characterized by conflicting scenarios and a high degree of uncertainty. In addition the literature tended to reflect far more dramatic scenarios than those from the in-depth interviews with the elite informants.

While the study shows a wide range of different future scenarios it also revealed areas where the literature and elite informants were in agreement. The need for governmental involvement across a wide array of areas was frequently mentioned. There is agreement that regulation, taxation, legislation and education will be prerequisite for successful large scale deployment of AI into society. There was, however, uncertainty related to how this should be done. It was consistency in the literature and interviews that with such a rapid development of digital technologies, most people will need to accept and include a higher level of digital competence in their everyday work and life. The need for higher digital competence seems to be relevant in all types of work in order to be competitive in the future job market.

Preface

When writing this preface now, I can't believe that I have almost finished my Master thesis. Working full time and writing a Master thesis was not easy, however, I have to admit that my self-discipline has never been better. As I was writing about a subject that really interest me and is also relevant to my field of work it made it easier to spend countless evenings working on this thesis.

First off all, I would like to point out the incredible help I got from my supervisor Lars Klemsdal. Thank you so much for your support during the whole process and for all the constructive and helpful feedback that I got from you.

I would also like to thank the elite informants who participated in the interviews, as without you my Master thesis would never be so interesting. I can't disclose your names, but I would like to thank each and every one of you for taking your time for the interview with me and for being honest and informative.

Oslo, June 2018

Daria Fagerli

Table of contents

1 Introduction and the background for the study

We stand on the verge of a new intense leap in the pace of development. Automatization, digitalization and the appearance of Artificial intelligence is widely discussed everywhere these days.

Digitalization is quite a broad term that affects various, if not all, aspects of life. Digitalization or Digital transformation is the changes caused by the application of digital technology in all aspects of human life (Stolterman and Fors, 2004). Artificial Intelligence is one of the results of digitalization. There are plenty of opinions regarding Artificial Intelligence, regarding our future and the future of employment with Artificial Intelligence in it, both positive and negative. Some researchers support and promote the idea of it, while others warn us about all the negative consequences it may cause.

The constantly growing computing power and data capacity of the machines as well as constantly developing software predetermined the appearance of Artificial Intelligence as we know it today. When it comes to the hardware, some predictions were made already in the 60s. Those predictions refer to Gordon Moore who was the "father" of a so-called Moore's Law. Moore's law, which has held true for over four decades, is a computing rule which predicts that the number of components in integrated circuit chips will double every eighteen months. According to the Moore's Law, this might lead to a much smarter AI and even a so-called "Superintelligence" in the future (Bostrom, 2016). And if that "Superintelligence" is going to be smarter and much more productive than us, then we might be in a danger of losing our jobs to an Artificial Intelligence. So, the question is: will Artificial Intelligence leave us unemployed in the future … or not?

Having in mind the questions raised above, the purpose with this dissertation is to point out and explore different positions in the literature and among elite informants who tries to understand in which areas we can be replaced by an Artificial Intelligence in the future – and in which areas we can't. Subsequently I'm going to make a qualitative research on the field by using the data available from the previous studies-, and by conducting in-depth interviews with current elite informants in the market. The overall purpose is to understand what the existing perspectives are, what we can take away from those perspectives and how we might prepare for the changes in order to be competitive in this world of emerging new

technologies. I believe this work will help with the understanding of what direction to choose, what career to pursue and what to prepare for in our professional life in the future.

1.1 Limitations for this dissertation

The main limitations of this work are time and money needed to conduct a more detailed qualitative research. My chosen research question is a broad topic that can open many other questions and problems that could be discussed, studied and analyzed. As such I have narrowed down the scope of this dissertation and focus primarily on the perspectives on the consequences that AI will have on our professional life. I do not go into details or predict what we need to do specifically in order to avoid potential negative economic or social consequences or gain the positive consequences. Even though many researchers consider this to be a very important topic it was not possible to cover such a large scope in this dissertation.

In addition, I do not go into detail of all concepts and technologies surrounding Artificial Intelligence but limit this to a high-level overview of application areas and technologies.

This dissertation does not cover historical events building up to the current digital transformation that we are seeing in society today. Even though this is important and surely interesting, I am intentionally excluding historical comparison of events happening now with events that had happened in the past.

Finally, I do not cover ethical, moral or philosophical questions related to creation of "thinking machines" or "superintelligence" that can represent an existential threat or moral and ethical questions about the machines themselves. While highly relevant and important, the topic is suggested to be covered in a separate research.

My dissertation therefore limits the scope primarily to the review of existing perspectives on the consequences of AI for our professional life.

1.2 Abbreviations and definitions

In this dissertation I repeatedly use “AI” as abbreviation for “Artificial Intelligence”.

I also repeatedly refer to “Elite Informants” and “Experts”. “Elite Informants” refers to the interviewed people in my qualitative research while “Experts” refer to reference persons in the literature.

1.3 Research question

In order for this research to be narrowed, but at the same time interesting, I have chosen to answer the following research question:

What are the various perspectives on the consequences of Artificial Intelligence for our professional life?

To answer the main research question, I have divided my research into several underlying research questions, which will be covered in this study:

- *What are the various perspectives on the consequences of Artificial Intelligence for our life in general and in particular for our professional life in the literature?*
- *What are the various perspectives on the consequences of Artificial Intelligence for our life in general and in particular for our professional life among the elite informants?*

1.4 Structure of the study

In the following first (1) chapter, I will describe the theoretical framework for this study based on four theoretical perspectives of the future. Chapter two (2) will explain how the information on various perspectives was collected from the literature. I will also present the chosen method of analysis for the empirical part of this dissertation. In order to demonstrate the variability of the viewpoints from the literature, in chapter three (3), I will sort out different contributions within various perspectives and analyze them. The information from the conducted in-depth interviews will be presented and interpreted in chapter four (4). In chapter five (5) I will summarize the most important findings, both from the literature

research and findings from the conducted interviews and use that to provide answers to the research questions as well as recommendations regarding future studies.

1.5 The concept of Artificial Intelligence

In their "manual" for Artificial Intelligence, Russell and Norvig (2014), define AI as a program, that attempts to understand and to build intelligent entities (Russell and Norvig, 2014). But what constitute intelligence? According to Pennachin and Goertzel (2007), intelligence suppose the ability to obtain, think and apply the acquired knowledge, both general and specific, across multiple dimensions (Goertzel and Pennachin, 2007). However, even though these algorithms might be seen as intelligent algorithms, they still lack consciousness. They don't have any internal knowledge about themselves, beside the one that was programmed. They don't have any subjective experiences and can't feel joy or become sad (Immega,2018). Today AI is still in its early year of development and while they are starting to solve more advanced tasks they are still very much limited to their programming.

1.5.1 Current Practical application of AI

Most of us use different search engines on the internet, online translators or digital assistants like Siri without even thinking that these are actually AI algorithms. AI is now applied to many different activities and in various business fields and industries. These are areas such as transportation, medicine, entertainment, home automation, game playing, education and others. Despite many different application areas, in this dissertation I will primarily look at the application of AI in business and professional contexts. Therefore AI algorithms might be divided into three different types, based on the business needs they support: process automation, cognitive insight and engagement with customers and employees (Davenport and Ronanki, 2018).

Process automation

Process automation is supported by the technology called Robotic Process Automation, or RPA. This technology helps to automate processes, especially those which include repetitive

tasks. The program imitates the user's actions in order to obtain a desired result. It can receive, sort and process the acquired data and replace human work in these repetitive, consistent and routine tasks. RPA technology is the most simple type of process automation technologies (Capgemini, 2017). RPA technology is not so expensive as the other technologies and the most easy to implement. At the same time this technology is also the least "smart". RPA technology is used to fill various forms, collect and consolidate data from multiple systems, update the data and to execute manual tasks associated with a high risk of making an error (Davenport and Ronanki, 2018).

Cognitive Insight

Cognitive insights is based on predictive algorithms or predictive analytics and is used in many different fields like marketing, finance, retail, telecom, insurance. Predictive modelling, machine learning and data mining are all techniques from predictive analytics. Predictive models find patterns in data in order to identify opportunities and potential risks. They use information from acquired data to predict trends and patterns of behavior. These algorithms help businesses to analyze customers behavior and preferences; identify credit fraud; provide personalized targeting and personalized content. The difference between this type of algorithms and traditional analytics is that the predictive models are training themselves on a set of data and improve their abilities over time (HBR Insight Center, 2014, pp.3-13).

Cognitive engagement

Most of the cognitive engagement projects use chatbots and machine learning. These technologies help to engage with the customer and provide customer service in a very broad range of issues when a customer needs it. It might also help to reduce the time employees uses on the routine communication with the customers, so that they will have more time for more complicated activities. For the employees these chatbots can also be useful, as they can provide answers to the questions an employee might have, as well as help with employer – employee interaction (Davenport and Ronanki, 2018).

1.6 Theoretical framework for the study

To understand the employment issues we might face in the future, I examined the existing literature on AI and employment issues corresponding to Artificial intelligence.

As elaborated previously, we are already experiencing large changes connected to constantly evolving new technologies and according to the Moore's law, we can expect even bigger changes in the relatively near future. It might therefore be useful to understand how these changes affect our personal and professional life, so that we have the possibility to prepare for them in some way.

Some scholars and practitioners use to divide various job positions into several categories instead of naming each and every job position that might be effected by the digitalization process. That is why, for the simplicity of this study, I have chosen to divide all types of jobs into the following three categories:

- **Low-skilled jobs**

Low-skilled jobs can be manual labor jobs or jobs that require some basic skills. That doesn't mean that these jobs are "no-skilled" jobs. They still require a certain degree of communication skills, language understanding and problem solving ability. Compared with other types of jobs, low-skilled jobs require low level of formal education and are highly routine driven. Physical abilities are required at a higher level than at the other types of jobs. Typical low-skilled jobs are factory jobs, food service jobs, customer service and delivery jobs (Maxwell, 2006).

- **Medium-skilled jobs**

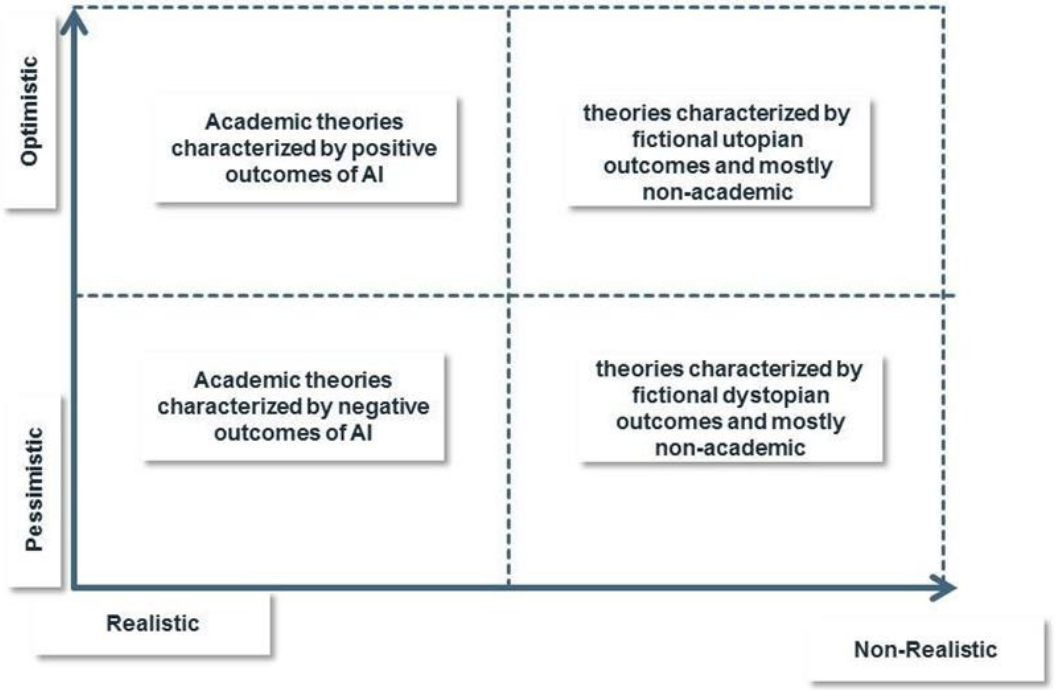
These types of jobs require a special skill with a level of education beyond high school level, but not at a post graduate level. These are jobs such as truck drivers, painters, plumbers, cooks, nurses, retail sales and other similar types (Holzer and Lerman, 2009).

- **Highly-skilled jobs**

This category of jobs covers all the jobs that require not only a specific skill and formal education, but it also requires some years of experience within the field. Typically the workers holds a post graduate degree. An example of such jobs could be doctors, coders, experts in a chosen field of science and others (Holzer and Lerman, 2009).

1.6.1 Four theoretical perspectives

Every good research needs a theoretical framework to provide scientific justification and support for the rest of the dissertation. There are plenty of opinions on this field of study, where both optimistic and pessimistic points of view are presented. These opinions even spread from utopian to dystopian ideas about our future with Artificial Intelligence in it. Somewhere in between utopian and dystopian ideas, there are realistic scenarios of our future. Based on those ideas, for the simplification of my study, I chose to divide all the researched literature into the four theoretical perspectives: realistic optimism, non-realistic optimism (utopian perspective), realistic pessimism and non-realistic pessimism (dystopian perspective). I illustrate these theoretical perspectives in the picture below (Picture 1. The four theoretical perspectives)



Picture 1. The four theoretical perspectives

Realistic optimism and Realistic pessimism are the two theoretical perspectives that base their ideas on the events that are happening in the present, or are likely to happen in the relatively near future. These perspectives are based on the realistic understanding of the world which claims that the world or an object in it exists in reality independently of our perceptions or beliefs. Realists understand events just as they are (Blackburn, 2005). Non-realistic optimism

and non-realistic pessimism perspectives represent scenarios in the distant future and are often characterized by dystopian or utopian ideas about our future. Keeping in mind Moore's law and Kurtzweil's extension of Moore's law in "the law of accelerating return", we are not able to have a realistic picture of what the future will look like in 30 years and the perspectives are therefore considered "non-realistic". As such, literature on utopian and dystopian perspectives that reflects the future in some 30 years are mostly found in science fiction, while academic theory tends to support more realistic and imaginable ideas.

2 Methodology

In this chapter of the dissertation I will elaborate about the methodology that was used in order to answer the research question that was stated in the previous chapter:

What are the various perspectives on the consequences of Artificial Intelligence for our professional life?

The goal of this chapter is to ensure transparency of this study. First, I will briefly describe the chosen method of study and thereafter the process of data collection and data analyzes. I will also explain the limitations and validity of the study.

2.1 Research method

This dissertation involves data collection from both the literature, and through qualitative interviews. The substantive amount of the material is gathered through the literature studies. It was important to include the literature review as the main method of the data collection, as such reviews allow to address much broader questions than is possible for the empirical study alone (Baumeister and Leary, 1997, pp.311-320). At the same time, to properly answer the main question of this dissertation, I have conducted interviews with elite informants within the field of AI, as their opinions might give additional insight into my research question that is missed while reviewing the literature. Interviews were primarily needed due to the fact that technology within the field of AI is developing rapidly and exponentially and with constant recent updates relevant to the question that I am researching. When a new literature in the field of study is written, then it normally takes some time to publish it, distribute it and in some cases, promote it to the broader public. As a result, the information might be not up to date by the time the article or the book appears in the database, library or in the market. In-depth interviews were therefore chosen as a supplementary way of data collection as a source for a more up to date information.

2.1.1 Scoping review

For the purpose of reviewing the literature on the selected field of study, I decided to choose Scoping review or Scoping study method, which has not received a lot of attention in the research methodology literature yet. Researchers are still arguing regarding how to undertake

that type of study, what tools to use, what stages to include in this process of the review and what are the differences between the scoping study method and the systematic literature review (Arksey and O'Malley, 2005, pp.19-32).

This method of the literature review, according to Mays, Roberts and Popay (2001), allows to "map rapidly the key concepts underpinning a research area and the main sources and types of evidence available, and can be undertaken as stand-alone projects in their own right, especially where an area is complex or has not been reviewed comprehensively before" (Mays, Roberts and Popay, 2001).

Scoping review could be used in several cases:

- In cases, where the quality of included studies is not likely to be addressed, as the purpose is to get insight into the broader topics, instead of a very specific research question which requires quality assessed evidences (Dijkers, 2015). With the other words, we might not see the detailed description of the research results, but the study is undertaken in order to examine the variety of the research practice. That kind of practice could be especially useful in cases where it is hard to imagine the approximate scope of the available material on the field of study (Arksey and O'Malley, 2005, pp.19-32).
- Scoping reviews might be used when the researcher want to link together big amount of information on different topics. The conducted scoping review in that case can be a valuable theory building technique (Baumeister and Leary, 1997, pp.311-320).
- The other reason to execute a scope review is a need to determine whether the full systematic review is necessary or not. The full systematic review might require a lot of resources, both in a form of time and cost, that is why it might be a good idea to undertake a scope study first. Scope study might require a lot of resources as well, however less than the full systematic review. In addition to this, a full systematic review might take longer time (Arksey and O'Malley, 2005, pp.19-32).
- Theory evaluation is one more reason for conducting the scoping review. The author focuses on reviewing the literature which is relevant to the feasibility of the existing competing theories (Baumeister and Leary, 1997, pp.311-320).
- Identification of the research gaps in the existing evidence might be one more reason to undertake the scoping study (Levac, Colquhoun and O'Brien, 2010). However, as the quality assessment is not a purpose of the scope study (Arksey and O'Malley,

2005, pp.19-32), it will be hard to identify research gaps where the research itself is of a questionable quality (Dijkers, 2015).

- The results of an undertaken scope study might help practitioners who lack the necessary insight in the researched area to summarize and distribute findings, as they might lack resources to conduct those researches by themselves (Arksey and O'Malley, 2005, pp.19-32).

This dissertation does not aim to present the research findings in detail, but the purpose is to examine the range of the research practice, to explore and discuss different available perspectives and discourse on the consequences of AI for the future of work.

As stated above, the interviews with the elite informants in this field of study is an important part of this work. However, every interviewed person is communicating his/her own thoughts, opinions and experiences and none of the in-depth interviews could be seen as something generalizable and as "the only truth". As the author of this dissertation, I myself lacked the necessary insight in this concrete research area prior to the start of this research, so I couldn't base my findings only on the opinions of the interviewed persons. That is why the review of the literature was chosen as the main empirical material for this dissertation. Scoping literature review appeared as the most appropriate type of review in my case, as it is engaging a rather comprehensive literature review, as well as in-depth interviews with the elite informants in the relevant field of study at the last stage of the review.

As for any other literature review methods, it is essential to discuss the limitations related to it. As stated above, the quality of evidence is not evaluated as important as it is for the full systematic reviews. However, if the quality of the primary studies is not assessed and the study is undertaken to identify the gaps in particular area, then the usefulness of the findings might be questionable (Dijkers, 2015). This concrete scoping review does not have the purpose to identify the gaps in the area of the research, but the purpose is to review the literature which is relevant to the validity of the existing competing theories and to examine the research practice on the examined topic. Because of that I suggest that the stated limitation is not applicable in this case.

The other limitation of the scoping studies might be the fact that it doesn't provide the detailed description of the research findings (Dijkers, 2015). As it has been mentioned above, the aim of this research is to get the better insight in the area of Artificial Intelligence and

potential employment issues associated with it, and not to describe the findings in details. For this reason the mentioned limitation is not relevant for this dissertation.

2.2 Methodological framework for the scoping studies

There is no predefined procedure for conducting scoping reviews. Some researchers tried to conduct scoping studies, and based on their own experience and opinions, we may find several proposed types of framework for such a study. Some are more complex, which make them look more like a systematic review. That may be useful in cases where the quality of evidences is of a high importance. Others might choose to go for the less detailed and ambitious framework for their study. This is done in order to simplify a research if the person would like to minimize the use of time and resources associated with a systematic literature review, but at the same time want to show and document the process in a sufficient detail. Arksey and O'Malley, in "Scoping studies: towards a methodological framework", point out that the purpose of the review and the resources available predetermine the extent of the in-depth coverage of the available literature (Arksey and O'Malley, 2005, pp.19-32).

Based on the fact that I chose to conduct this dissertation alone, the scope of the literature I could study and analyze, as well as time and other resources for this dissertation were limited. At the same time, I wanted my research to have some methodological rigor. For that reason, I chose to use the methodological framework designed by Arksey and O'Malley. In their study, they offer six stages that a researcher might undertake in his review (Arksey and O'Malley, 2005, pp.19-32). I would like to note that the same framework is offered by Richie and Spencer (1994), in their work "Qualitative data analysis for applied policy research" for the qualitative data analysis, although they are recommending it as a part of and in order to facilitate systematic analysis (Ritchie and Spencer, 1994, pp.173-194).

Even though I chose the methodological framework designed by Arksey and O'Malley, I chose to simplify and consolidate the six stages into five stages. As I do not aim to identify gaps in the research area nor to build new theory I have simplified the charting stage and combined it with the "collating, summarizing and reporting the results stage". This research aims to gain insight on the existing competing perspectives.

The five stages of this scoping study review are:

Stage 1. Identifying the research question: during this stage a researcher should identify the most important aspects of the research question, as well as different parameters that he want to include in his work in order to minimize the number of relevant references (Arksey and O'Malley, 2005, pp.19-32).

Stage 2. Identifying relevant studies: This stage identifies which information to include in the study. This includes finding out relevant reviews, evidences and studies on the field. (Arksey and O'Malley, 2005, pp.19-32).

Stage 3. Study selection: this stage deals with the elaboration of a mechanism which is supposed to help with the exclusion or inclusion of studies (Levac, Colquhoun and O'Brien, 2010).

Stage 4. Charting, collating, summarizing and reporting the results: this stage includes sortation of all the acquired literature according to different criteria with the subsequent identification of the dominant areas of the research and analyzes of the results (Arksey and O'Malley, 2005, pp.19-32).

Stage 5. Consultation Exercise: the fifth stage is an optional stage of the framework for scoping studies offered by Arksey and O'Malley (Arksey and O'Malley, 2005, pp.19-32). A consultation exercise stage or an Interview stage have aim to get the in-depth understanding of the studied phenomena (Ritchie, 2003, pp.32-34).

Below I will show how this methodological framework was applied to my research.

2.3 Results of the scoping review

Stage 1: Identifying the research question

In order to identify the research question correctly, the researcher is recommended to maintain a wide approach during the first search. Later on, the research question might be redefined as the familiarity with the available literature and general scope of the field has been obtained. It is therefore recommended to undertake several searches. First one should be a more general and broad, while the following search/s should be limited by some inferred parameters. (Arksey and O'Malley, 2005, pp.19-32).

In order to identify the research question that is of interest and is relevant to my field of study, I have decided to focus on several searching - engines:

1. Google Trends and keyword tool
2. Google Scholars
3. Gartner
4. Google AdWords
5. Other sources (papers from Google Search, articles in the relevant magazines, interviews with experts in the field that could be found on Internet)

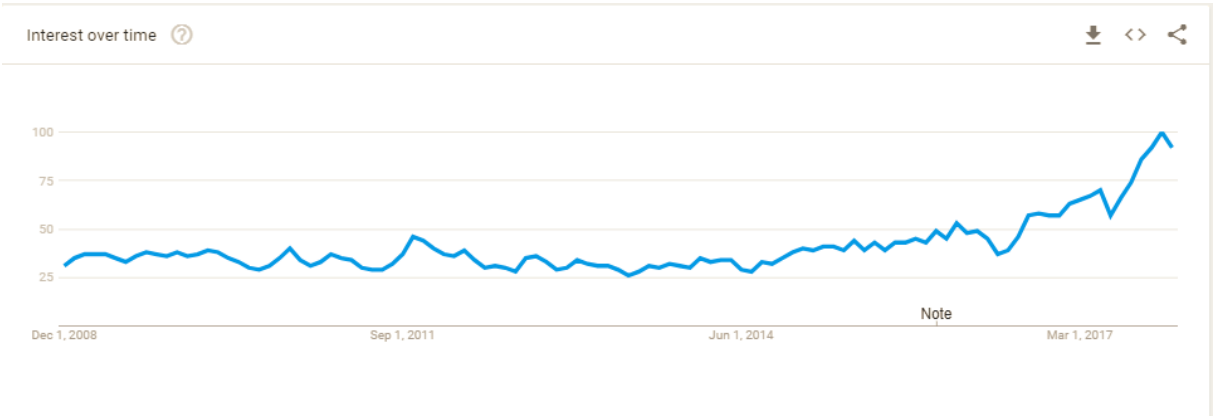
I decided to use those tools to cover different perspectives of available resources. Due to the fact that I'm currently working in an IT company, and I'm generally interested in technology, but at the same time my university degree is in the field of organization, leadership and work, for my dissertation I was checking the fields of study that are connected to both of the above mentioned topics, and that are widely discussed. The research connected to Artificial Intelligence came into my mind rather quick, as It is a very discussed field of study nowadays and many publications are made regarding that topic. As I was looking through the relevant IT magazine "Teknisk Ukeblad", an Article about Artificial Intelligence and employment problems connected to it caught my attention. I had then decided to search for more information connected to that issue and check platforms like Google Trends, Google Scholar database and Gartner database, as well as Google AdWords, in order for to find out regarding the actuality of the problem within different groups of population (academics, practitioners and just interested people not connected to AI).

My research question was "What are the various perspectives on the consequences of Artificial Intelligence for our professional life?".

As stated in the previous chapter, it is difficult to predict the future, that is why I chose to examine the existing perspectives on this future. I was aware that the term "future with AI" includes predictions regarding our personal and professional life. My intension was to limit the scope of this research, so I chose to look at its effect on the professional life. For that reason, the term "in our professional life" was also included in the research question.

First, in order to check to which degree the chosen research question was in demand these days, I decided to check Google Trends platform. Google Trends helps to map what everybody are searching for, to map frequency, development and "top of mind". Google trends helped me to depicts the interest for the term for all groups of people: interested,

practitioners, academics, students, etc. The search parameters that are used were set to "Worldwide search", and from 2008 until todays date, which indicates interest for the last ten years. I searched for the terms "Artificial Intelligence" to map the interest for the term in general. The picture below shows the result (Picture 2).



Picture 2 Interest over time

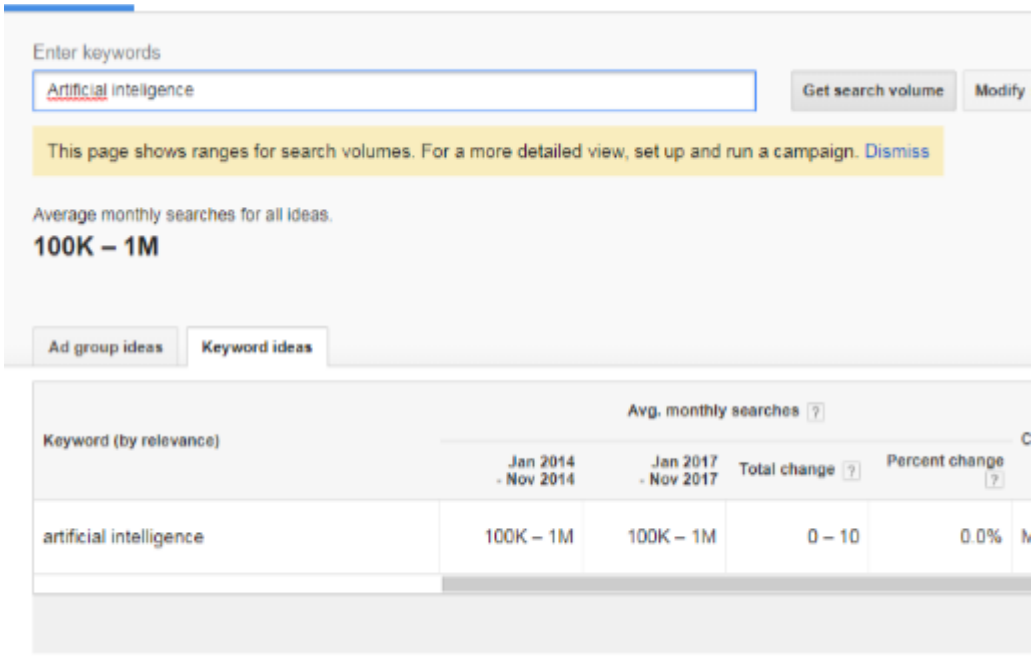
As seen on the *Picture 2 Interest over time*, the interest for the term "Artificial Intelligence" has raised dramatically for the last ten years. It is on "100" in September 2017, which means that it is on the peak popularity for this term.

The searches for other combinations of words like "Artificial Intelligence employment" or "future with Artificial Intelligence" didn't give enough matches in order for to establish a trend.

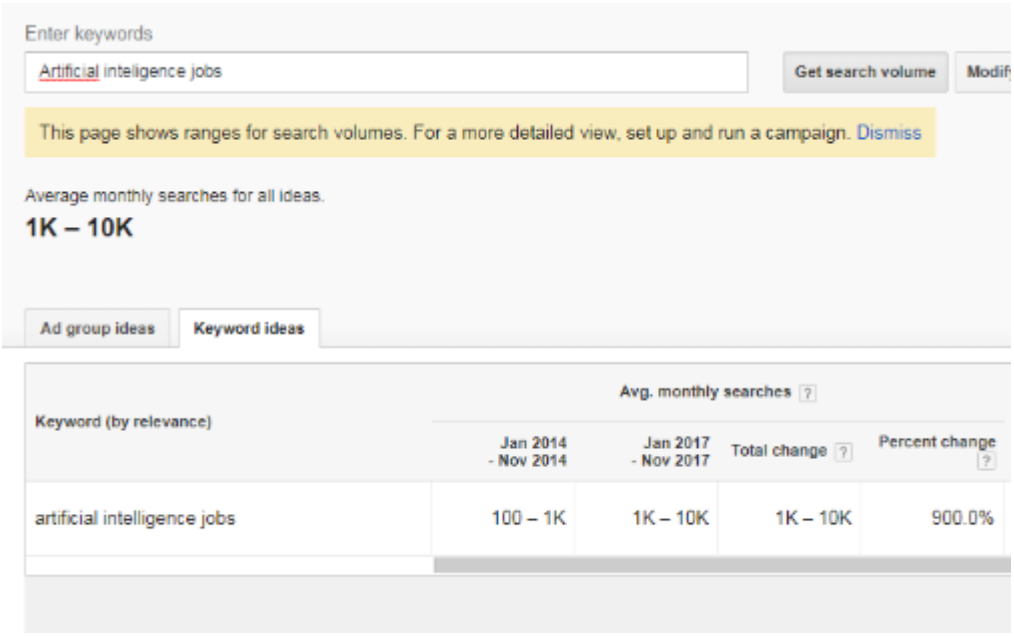
Secondly, I searched in the Gartner database to map the technology business articles and business research which are relevant to Artificial Intelligence and employment issues connected to it. Gartner provides primary research for businesses and practitioners and it therefore provides the important business side of available material on the specified field. As it is a specified database which offers access to the technology business related articles, then the number of final hits within every search combination is not as big as in other, not specified databases. In the case of this research, the combination of key concepts "*Artificial intelligence"* gave 2300 hits and the combination "*Artificial intelligence" + jobs* gave 917 hits. That means that more than one third of all the searches connected to Artificial Intelligence included the issue of employment connected to it, which indicated how important this issue is in the business world these days.

One more database that was used in order to map the main areas of academic research was Google Scholar. It gives insight in the area of interest and area of focus of academics, within the specified field. There are several search criteria that were applied: the search results were sorted by relevance and by the exact phrase; combination could occur anywhere in the article; The search combinations were *"Artificial Intelligence"*, "*Artificial Intelligence" + future* and *"Artificial Intelligence" + "future of employment"*. The first combination gave 2, 374k hits, the second gave 1, 826k results and the third search combination gave 1, 210 results. The results from Google Scholar shows the general interest in Artificial intelligence as a topic and a relatively small amount of academic research which is connected to employment issues with the raise of AI.

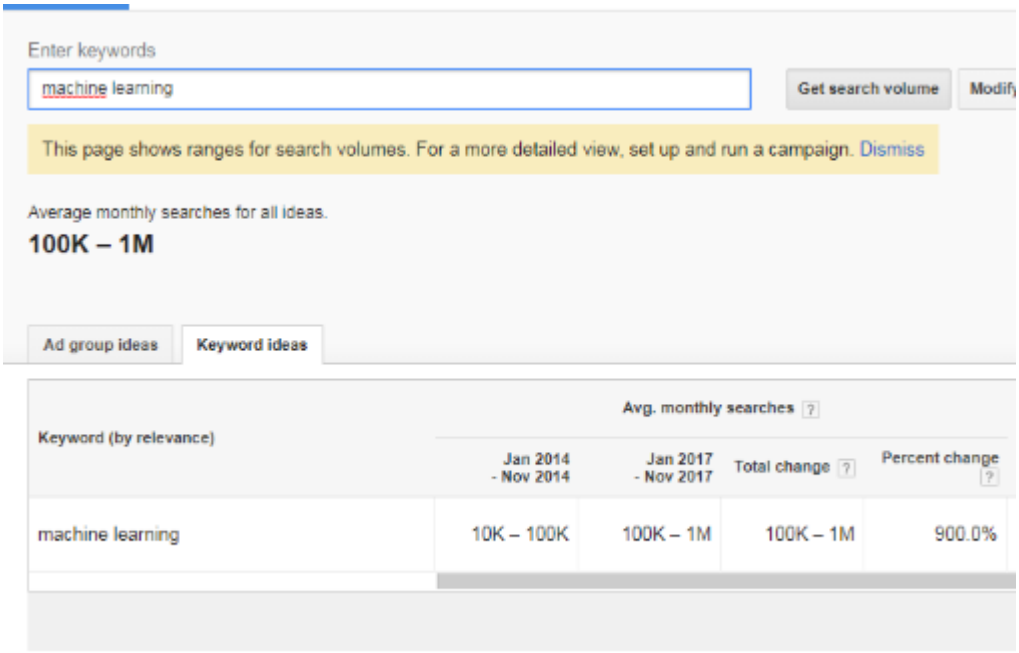
At the same time if the same key combinations would be limed in Google AdWords which shows the searching statistics for Google Search platform, then I could notice the incredible increase in interest for the issues connected to employment and Artificial Intelligence, as Google AdWords helps to find the most searched combination of words and looks at the development over time. The examples of the key words combinations are listed below in the Picture 3, Picture 4 and Picture 5.



Picture 3 Key words "Artificial Intelligence "



Picture 4 Key words "Artificial Intelligence jobs"



Picture 5 Key words "Machine learning"

As seen from the pictures shown above, there is no increase in the number of searches for the term "Artificial Intelligence", however the number of searches for the combinations like "Artificial intelligence jobs", or "Machine learning" has increased incredibly since year 2014.

The described above statistic is the clear indicator for the constantly growing interest in Artificial Intelligence. As the main purpose of the first stage of scoping research is to identify

what the specific questions are which are relevant to explore within the subject (Arksey and O'Mailey, 2005, pp.19-32). The focus for this section was to deal with this undertaking for the field of Artificial Intelligence. It showed that employment issues connected to the appearance of AI is of a high interest among all types of people including those who does not yet have a specific relation to AI (likely due to high mainstream media coverage). As the interest grows, the more practitioners, academics and other interested are getting involved into the research and some of them are developing their own theories on what the future with AI might look like for our life and our professional life as a part of it.

Stage 2: Identifying relevant studies

To identify relevant studies on the field, a researcher may search in electronic databases, libraries (for the key journals or pieces that are not available in an electronic form), throughout reference lists and Internet. A researcher may also get the information from the employees of the relevant organizations (if there is a chance that some important information might be missing). It is also important to identify if the search is going to include any foreign literature or include different country's terminology (Arksey and O'Malley, 2005, pp.19-32).

As indicated by Arksey and O'Malley (2005), scoping studies are not necessarily a "quick" or "cheap" option. In fact, an example scoping study of a relatively narrow area needed three full time employees for six months as well as an information officer to conduct literature searches (Arksey and O'Malley, 2005, pp.19-32). As such, and as AI is a large area of interest with significant amount of research attached to it across the globe, I needed to simplify and narrow down the scope of this scoping study. For that reason, and as the main purpose of this research was to get the better insight in the existing competing theories, without going into the details, I chose to use Google Trends, Google AdWords, Google Scholar- and Gartner databases for to identify the research question and then to get the understanding of the scope of the available literature. As Google platform is in general one of the most used platforms for the search of any information, I thought that it would be the right choice from my side.

After the research question was chosen, I decided to include only studies in English language. That was done because of the time constraints for my research. The year of publication was not limited to ensure enough hits. For Google Scholar, search results were sorted by relevance and the word combinations could occur anywhere in text. For some word combinations I combined exact combinations with random. For Gartner database I searched among premium articles.

Key concepts for the search were chosen, and the first key combination that was applied for the search of the relevant literature was *"Artificial Intelligence" + future,* which gave 1 826k hits in Google Scholar, 2019 hits on Gartner database and 61 400k results on Google Search.

Later on, the key concept was changed and I searched for *"Artificial Intelligence" + employment*, which gave the total of 109k hits in the Google Scholar database, 315 hits in Gartner database and the same searching combination gave me 48,600k hits on Google Search.

I had to make my search even more precise and the new word combination which I used was *"Artificial intelligence" + "future of employment"* for Google Scholar and Google Search, however I had to use combination *"Artificial intelligence" + future of employment* for Gartner database to secure enough hits. This search gave me 1, 210 results on Google Scholar and 161k on Google Search, and therefore helped me to sufficiently reduce the scope of the literature for both of these sources. For Gartner database this combination gave me 279 results. That was the final search combination for that stage of the review.

As the field of AI is subject to rapid and exponential growth with a growing interest, the amount of hits related to the chosen word combinations described above are growing as well month by month.

Stage 3: Study selection

As an elaboration mechanism for the exclusion of irrelevant studies, Arksey and O'Malley (2005) suggest to use an inclusion and exclusion criteria, as systematic research does. A researcher might also choose some other elaboration criteria. For example, whether it is necessary to read the full article / piece of literature, or just an abstract (Arksey and O'Malley, 2005, pp.19-32).

After the final search in the databases was accomplished, I had to somehow make a choice of some articles over the others, as the total amount of papers found was too big to read and summarize the information when making the review alone. Some of the studies seemed to be irrelevant already by the heading, but still the amount of information was too comprehensive to start sorting it on my own.

Since my research question suppose both the positive and the negative outcome, I attempted to narrow down the results by adding words *problems* and *opportunities* to the search combination "*Artificial intelligence" + "future of employment"* on all databases and Google

Search. This did not narrow down the scope to any extent although I could clearly say that the papers were representing positive outcomes, negative outcome while some were representing both.

Since no more precision could be done for the research question, I decided to choose 200 papers and articles that, based on their headlines, seemed to have the best fit with my research question. I handpicked the articles by the relevance of the heading, with 68 papers found in Google Scholar and 132 papers found in either Gartner database or Google Search platform.

200 papers is still a lot of information when there is only one person who is making the review, so I decided to further minimize the search to 40 papers from Google Scholar, and 60 papers from Gartner and Google Search. At the end of the "study selection" phase I had 100 papers chosen on the basis of their headlines. The abstracts of those 100 papers were read where it was possible. In the Gartner database I could only read the abstract or full free articles and was limited to the summary of the premium articles. That was done due to the fact that I lack resources and time to go through all of the articles found through the databases and Google Search platform, however I needed to get the understanding of the total scope and interest in the field.

By reading the abstract of 100 papers[1], a total of 24[2] papers were downloaded from available database and Google Search, read in full and included in this dissertation. In addition 4 books were partially read and included. I also decided to read and include an additional 20[3] non-academic research I picked up from Google Search. Using non-academic articles from lesser known sources on the internet can seem unreasonable or not trustworthy. However, as I am examining a field of study that is rapidly and exponentially growing, this strategy is necessary as it can be the only place where new and updated information can be found. The reason is simple. Most commonly it takes a long time to publish properly conducted academic research or a book. In fact, it can take months or years from the date when an author starts to write a paper until it is published and publicly available. During this time there may be many changes or news in the marked which can mean that available academic research is not necessarily up to date. By Including "non-academic" articles found through Google Search, valuable and up to date information related to this research can be found and used as a supplement to the academic literature. As I noticed later, after going through some of the available articles on

[1] All 100 papers are listed in the ***Attachment 1*** at the end of this dissertation
[2] All 24 final papers are listed in ***Attachment 2*** at the end of this dissertation
[3] All 20 non-academic sources are listed in ***Attachment 3*** at the end of this dissertation

Google search, the statement above is especially true for those who represent realistic perspectives. For all material selected during this stage of the scoping review, I attempted to include articles representing both positive and negative outcomes.

I find it important to mention why I chose to sort the material first on the basis of the headline then further selected through reading abstracts and based on that I finally chose 24 books and articles to read in full. While this method does not cover all contributions to the subject, it enabled me to catch variations in different positions regarding the consequences of AI for the future of our jobs. For this reason, sorting on the basis of headlines and then on the basis of abstract selected the final articles allowed me to cover a broad range of research variations.

Stage 4: Charting, collating, summarizing and reporting the results

According to Arksey and O'Malley (2005), the stage concerned with collating, summarizing and reporting the results, should come after the "Charting" stage, however, as explained in the beginning of this chapter, I suggested it was enough to combine "charting" stage with the next "collating, summarizing and reporting the results" stage (Arksey and O'Malley, 2005, pp.19-32).

Collating and summarizing the results is the stage where the material is organized thematically, as the dominant areas of the research could already be identified. This stage then suggests the development of a framework for collating and summarizing (Arksey and O'Malley, 2005, pp.19-32).

Even though I didn't include the complete "charting" stage which was suggested by Arksey and O'Malley (2005), I had to establish some sorting criteria which could help me to prepare the basis for the further analyses. Going through the 24 papers and 20 articles that were chosen due to the final literature selection, helped to discover the dominant areas of my research, as I could quickly get an insight over the existing expert opinions and choose my reporting strategy. As I noticed the diversity of opinions on this research question, I decided to base my framework for collating and summarizing the results on the competing theories. The studied literature was sorted due to different opinions/ perspectives and the final literature review was organized thematically and around the discovered types of perspectives. I identified only four theoretical perspectives, as those seemed to cover all the main "variations" of all the existing thoughts and opinions. However it might be possible to identify more perspectives that are going to lie in between utopian and dystopian perspectives.

The next step after "Charting" was to list basic characteristics of the relevant studies which are appropriate for the discussed theories. As pointed out by Arksey and O'Malley (2005), after that it should be easier to report the findings and if applicable, make comparisons across the researched theories (Arksey and O'Malley, 2005, pp.19-32).

Those 24 papers and 20 articles that were chosen, includes the information on the above mentioned competing theories, as well as some general information on Artificial Intelligence that is important in order to understand the concept of AI and the purpose of this dissertation.

General information on Artificial intelligence covers topics such as information on the concept of AI, purpose and practical applications of AI, technology and systems and other important questions related to AI. The studied literature helped me to cover these basic questions like what Artificial Intelligence is or what AI can do these days. The role it plays in our life today and in what subfields we can use AI. It also covered the question regarding the features that an intelligent entity should have and to which degree an AI satisfy these features.

The main part of the researched material from the chosen literature pieces aim to support one or the other of the competing theories that were presented in the theoretical chapter of this dissertation.

Realistic optimism and realistic pessimism were represented as the two opposite perspectives which have something in common: they are based on the realistic understanding of the world, and are popular among scholars and practitioners. Realists are thinking mostly about the present or the relatively near future. The researched literature that covered those two perspectives, showed that even though the two perspectives are predicting a totally different future, they both agree that we can do something about our future. Both perspectives see the education, constant learning, as well as greater emphasis on entrepreneurship and research as a way to prepare for those changes that are coming and as a way to have a better future.

The other two perspectives that I covered in my research and that were the result of the final literature selection are utopian and dystopian thoughts about our future. On the contrary to the realistic perspectives, those perspectives are making predictions for the longer periods of time than the realistic ones, and those predictions seem to cover different scenarios of our future: from less to much more dramatic. The studied literature shows the two contrary different future scenarios for the mankind: utopian, where AI helps people to cope with disasters and our future is full of opportunities, and dystopian, where AI might dominate human race and is

the greatest existential threat to mankind as we know it. The most utopian and dystopian assumption is that there is no use in learning and doing something in order to be compatible in the future, as, according to those perspectives, we will either focus on our survival or we will experience an "effortless" success.

Stage 5: Consultation Exercise

As I already noticed, beside the literature review, I chose to execute a qualitative research in the form of an interview with the elite informants in the field. This was done in order to get a better insight in the research question from the perspective of the practitioners in the field of AI, which might be missing if the literature review is the only method used.

Consultation Exercise is a form of a qualitative research. Qualitative research methods are a broad range of approaches and are designed to capture real-life data about people and behavior. Validity and reliability of these methods are, however, by many assumed to be lower because they lack generalizability. The methods rely on subjective opinions of informants as well as subjective interpretation of researchers (De Vaus, 2014, pp.6-8).

There exist plenty of different qualitative methods such as in-depth Interviews, paired interviews, focus groups discussions, participant observation, disclosure and documentary analyzes, and others (Ritchie, 2003, pp.32-34).

Interviews might help to create thick descriptions of human behavior and gain a better understanding of the problem and context. (Geertz, 1973). For the purpose of this dissertation I chose in-depth interviews.

For the interview stage I decided to consult elite informants in the field of AI. In this study elite informants are divided into two categories:

1. People who are working with actual implementation of AI and with technical knowledge of new technologies and digitalization, and;
2. People working with strategic issues related to the implementation of AI and digital new technologies. These elite informants have either broad or relevant technological experience or are in strategic managerial positions with high strategic decision-making power related to AI.

Due to their positions these elite informants are likely to have relevant and interesting viewpoints on philosophical as well as practical questions related to my research.

As Beckmann and Hall mention in their work "Interview research in Political Science" (2013), elite informants can provide a unique insight into the situations and events, because normally we can't observe those events in the same context as they can. As the informants have a specific knowledge relating to a particular subject, and at the same time they can observe events in the context which is not accessible for others, then some information might be impossible to acquire without their participation (Beckmann and Hall, 2013, pp.117-119).

According to the above mentioned definition, I describe "elite informants" as informants, who are in the right position to comment on specific questions related to Artificial Intelligence, and the employment issues connected to Artificial Intelligence across multiple dimensions (business, society, technology, etc.). At the same time the informants might have some specific working experience with AI technologies for the purpose of gaining business benefits for the company they work for.

Equal distribution among the elite informants within the two categories was not important as long as I had at least one informant in each category. The objective with the interviews was to complement the literature review with up to date information and to add information that might be of high importance in order to answer the main research question in this paper.

For the purpose of the interviews I chose five informants, whose knowledge and working experience allowed to place them under the category "elite informants". All of the informants are top managers from various companies and different aspects of business. All of them are somehow involved in the automation and technology. Each of the interviewed persons is one of the best in his/her area of business when it comes to innovation, strategic development, leadership, automation and AI. They have deep insights into aspects related to AI and other technological advances and its implication. Each of the interviewed persons has either extensive experience working with process automation, new technologies or AI as well as the implication of these technologies in their organization. They also have and understanding of implication of AI on other organizations as well as society.

Due to the protection of the informant's personal information I can't disclose their names, companies they work for, or their position in the company. Nevertheless, I will make a short general description of the informants and their working tasks that they perform:

Informant "A": My first informant is working in an international technological consulting company which helps large companies through digital transformation, improvement of their

business and IT strategies, as well as costs optimization. The Informants role is one of the Senior management roles within business development and innovation. The work includes consulting and developing innovative solutions together with clients as well as exploration and testing of new technologies and evaluation of its value in the market. The main contribution of informant "A" to the dissertation is related to innovation and what the impact can be for companies as well as general consequences on society with the introduction of new innovative technologies such as AI.

Informant "B": The second informant I'm going to describe is taking a leading position in the company the informant works for and their main mission is to help the prospective startups to launch and grow. They are especially engaged with startups which are working with new technologies and have potential to become successful international growth businesses. Informant "B" is particularly relevant to answer questions related to the appearance of new types of jobs in the market as well as competences sought by such companies.

Informant "C": The third informant has a leading position in a company which helps large businesses to change their existing business models and practices which are no longer relevant, as well as helping clients with the strategic transformation of their business. The company works in particular with the development and implementation of process automation, as well as technologies within machine learning and artificial intelligence. Informant is working closely with large companies and is in the right position to discuss regarding main needs and motivations of the clients when undergoing digitalization processes and investments in AI.

Informant "D": Informant number four is representing a major Telecom business, and is one of the key driver and project manager regarding automation of the processes in the company the informant works for, as well as responsible for the proper implementation of Chatbots and AI algorithms within this organization. This informant has long experience with change management within the company and therefore is an important person to make conclusions regarding the impact of those technologies on the organization.

Informant "E": Informant number five is a senior manager and part of the management team at a major company within media which is currently undergoing major technological transformation due to disruption in the market and entry of new global players in the Norwegian market. The person can answer related to the need of digital competence, new technologies such as AI in order to be competitive in the present and future.

As explained in the descriptions above, each of the informants is one of the most qualified persons in the sphere of business he/she work in when it comes to AI. They are right and relevant people to discuss regarding new technologies as well as artificial intelligence as well as it's implication and impact on the companies, employees and the future of employment.

Even though I considered these persons highly relevant to cast light on the various perspectives, five people cannot be considered as representative and statistically valid sample of the market or research in general. In addition, I could not necessarily beforehand select people who represent an equal distribution among the perspectives as it was not possible to determine in which perspective they would belong before the interview. Even though findings from these interviews can't be generalized, the purpose was to gain better insight into the research question as well as to complement the literature review from the side of elite informants.

When searching for the informants, I decided to search through different channels: personal connections, personal connections of my student counselor and relevant conferences and events. This searching method secured the needed variety of backgrounds and relevance for my dissertation and research question.

As the purpose of the consultation exercise stage was to reveal unique personal experiences and opinions of elite informants in the field, it was important to construct questions in a way that would let the informants answer the questions as detailed and open as they preferred. For this reason, the interview questions had to be neutral and open so that they would help to uncover more details and opinions of the interviewees. The majority of the questions were therefore open-ended questions (Beckmann and Hall, 2013, pp.196-208). However, even though the questions were made open-ended, the interview questionnaire had to have a structure so that I could map differences among the participants. When the interviews are made structured with the same questions it allows for comparison of the responses from different interviewees. Therefore, interview questions were made open-ended and structured. The second reason is that normally elite informants are very busy and they might suddenly have to disrupt the interview. If the interview is made structured, then the chance that the most important issues have been answered is higher (Beckmann and Hall, 2013, pp.204-206). The interview guide is presented in the end of this dissertation.[4]

[4] The interview guide is presented at the end of this dissertation in ***Attachment 4A*** and ***Attachment 4B***

All interviews were one on one and conducted at the informant's location. The interview guide was written In English and later carefully translated into the Norwegian language, as all of the interviewees are speaking Norwegian and therefore it was easier for them to discuss such a complicated subject in this language. In this way I secured longer conversations and more detailed answers.

As I had to observe, ask questions and at the same time concentrate on the answers in order to ask clarifying questions when necessary, I had to record the conversation. Recording the conversation gave me the opportunity to listen and analyze all the answers several times, before I made any conclusions on the acquired information.

After the interviewing process was finished, I analyzed all the acquired information with the help of a case display method. Firstly, all the questions were sorted by themes in an Excel file. Secondly, I listened to the recordings of the interviews and wrote down important opinions and interesting quotes under the relevant theme. This method of sorting the data helped me to notice similarities and differences among the opinions of the informants, as well as helped me with sorting the data from the interviews (Eisenhardt, 1989, pp.532-550).

The conducted qualitative research was made in accordance with the Norwegian legislation, and the project was submitted to the Norwegian Centre for Research Data (NSD, Norsk senter for forskningsdata) and subsequently approved. The interviewees received the information about the project, with the detailed description of the study. The participation was voluntary and informants were made aware of this. All data was encrypted and securely stored on the stationary computer. After the data was analyzed, it was immediately deleted. The Consent for the participation in the study[5], as well as the approval from the Norwegian Centre for Research Data is attached at the end of this dissertation.[6]

[5] The Consent for participation in the study can be found in ***Attachment 5*** at the end of this dissertation
[6] Approval from the Norwegian Centre for Research Data (NSD) is attached in ***Attachment 6*** in the end of this dissertation

3 Analysis of the existing theoretical perspectives

3.1 Realistic optimism

In general, realism is a view which acknowledges that the objects around us exist in reality independently of our activity (Bhaskar,2009, p.4). Realistic approach is popular among scholars and researchers, as realistic points of view are taking place in the present and relatively near future and can be validated with qualitative or quantitative analyzes.

Realistic approach to Artificial Intelligence addresses specific problems we might face in specific contexts and concentrating on the relatively near future challenges (Tredinnick,2017, pp.37-41). Realistic optimism assumes positive future outcomes with AI as a part of it. While supporters of this perspective are optimistic about the future they do recognize the challenges ahead of us and urge us to prepare for them.

One of the suggestions realistic optimism makes is that all occupations will be affected by the technological progress and digitalization already in the near future. Even though these technological innovations are programmed to perform limited number of tasks, AI are able to do these tasks faster and more accurately than humans. Low skilled occupations are expected to be affected first. This is because many of these tasks consist of repetitive and less advanced tasks than medium and high skilled occupations which require a higher level of education or long experience. Realistic optimism acknowledges that in a relatively near future, technological progress might also automate medium-skilled jobs (Pajarinen, Rouvinen and Ekeland, 2015, pp.5-15). Nevertheless, these scenarios don't frighten supporters of this perspective, as we will be able to concentrate on the activities we do best and enjoy doing or conduct more complicated tasks. These activities normally include decision making, social interaction and interpersonal skills, as well as creative tasks (Kolbjørnsrud, Amico and Thomas, 2015, pp.4-8). Realistic optimism suggests therefore that already in the near future humans will work together with AI and benefit from this "cooperation" as AI will ease our workload. From the realistic optimism perspective, working together with an AI is a possibility to benefit from the technological progress and at the same time keep jobs.

Already today there exist many interesting AI based projects in different fields of business which potentially might develop into a great example of human cooperation with AI. Already today, in some hospitals of the world, we can find robots who perform surgeries and

anesthesiology. The abilities of robotic "doctors" will only improve. The only purpose of such a medical robot is to imitate a doctor's behavior, while at the same time make it much more precise and reliable. In cooperation with a human doctor the quality of the provided medical services will improve significantly (Hemmerling et al., 2011, pp.5-7). One might think that this task is too ambitious for the near future, however realistic optimism believes this is possible already today and will only improve in the years to come. With the help of AI we might within a few years be able to fight various forms of deadly diseases. AI algorithm will be able to detect suspicious changes on an X-ray and warn a doctor in case something is wrong with the patient. In fact, a prototype of this technology is already available in China. Realistic optimism stresses that doctors are not going to be replaced by these technologies, at least not in the near future. Applied AI algorithms will only help doctors by executing and improving the work which requires high accuracy, attention and effectiveness. Radiologists will then get significant help from an AI in the diagnostics of a patient (Marr, 2017).

Another near future scenario which comes from realistic optimism shows us how we could actually use AI in the field of education in order to make our years in school or university more meaningful and exciting. Realistic optimism stresses that by employing AI into our educational systems, we will give our children or ourselves the possibility to study at an individual speed with personalized lessons. This will enable teachers to be more effective as they will not need to spend time repeating lessons to those who do not need it. The teacher will be keeping her job since she will be mentoring the students while they learn with the help of AI algorithms. The teachers work will thus become easier and more exciting. (Schmidt, 2017). Artificial Intelligence algorithms will also be employed in subsequently more and more e-learning platforms. The AI techniques employed in these platforms allow to detect specific needs of a person and combine these needs with the required expertise (Almohammadi et al., 2017, pp. 47 – 64).

Realistic optimism believes that evolving new technologies will increase remote offices and connect workers from all parts of the world even more. (Buchanan, Hatch and Kelley, 2016, pp.1-9). This will open a lot of possibilities for many people who live in remote areas. This will in time also bring developed and undeveloped countries closer together.

Realistic optimism supporters believe that everything is depending on us and we can prepare for coming changes in order to be competitive in the future. It is argued that despite all the

challenges, unemployment will not increase. However, realistic optimism proposes some actions that might be taken in order to be even more attractive in the future job market:

- *Digital competence*

The confidence with doing the work, finding information, providing services and purchasing gods with the help of a digital technology is going to be essential. Eventually all areas of work will be effected by digitization. People without digital competence will have less attractiveness in the job market (Australian information industry association, 2017, pp.31-40).

- *Creative thinking*

The ability to think "outside of the box" will be more important than ever as we need new ways to use technology. People that have developed their creative thinking and problem solving skills will be an attractive resource in the future job market (Rainie and Anderson, 2017, pp.13-15).

- *Cross-Cultural Competency*

Because of the globalization, more and more companies are looking to diversifying their work force. The most effective groups have different skill sets and are able to come with creative decisions and solutions. Cross-cultural competence is increasingly becoming a necessary skill which embraces several abilities: ability to understand the language, adaptability and ability to respond to different contexts (Davies, Fidler and Gorbis, 2011, pp.9-10).

- *Competence across multiple disciplines*

Problems are getting more and more complex and to find the solution a person should have deep knowledge in one discipline, but also be able to have a wider perspective across other disciplines. Understanding the way these disciplines affect each other will be important (Australian information industry association, 2017, pp.31-40).

- *New media literacy*

Our social lives are already dominated by user-generated media like blogs, social networks and different video podcasts. These new communication tools are going to be even more important in the coming years as well in the working environment. Traditional presentations are going to be used less and new media literacy will become mandatory in many working environments (Davies, Fidler and Gorbis, 2011, pp.9-10).

- *Technical proficiency*

Understanding AI and computing is going to be essential in the future due to the evolving changes. Education in the field of technology, mathematics, science and engineering will therefore be one of the most secure professional choices a person might make (Australian information industry association, 2017, pp.31-40).

3.2 Realistic pessimism

Realistic pessimism is another perspective that takes place in the present and near future and reflects the opinions regarding the negative consequences of AI. This perspective acknowledges possible pessimistic scenarios and encourages us to act responsibly when engaging and developing AI to avoid negative effects.

Realistic pessimism believes that the demand for certain jobs will inevitably decrease due to AI and unemployment rates will increase in several types of work (Shewan, 2017). Even some of those who can be described as highly-skilled professionals are in risk to be replaced already in the relatively near future. According to realistic pessimism, some of the more complicated tasks could be done significantly cheaper and faster by an AI (Solon, 2016). More than that, even if people will keep their medium - skilled jobs, they will be paid less as their work might easily be automated (Mannino et al., 2015, pp.1-16).

Supporters of realistic pessimism acknowledges, however, that humans have abilities that makes us unique. These are physical and cognitive abilities. Cognitive abilities are the ones that differentiate us from the machines, and we are still far superior in these abilities. However, as the computing power grow and technology constantly develops, then it's not long until AI will outperform us in these fields as well (Harari, 2016, pp.357-370). Realistic pessimism argues that so-called "deep learning" which is a branch of AI is already in use and could potentially take many jobs around the world in the near future (Kucheriavy, 2018). "Deep learning" is copying the way the human brain works, and in order to work properly the system have to be trained. After sufficient training it will be able to recognize patterns and propose relevant actions with an amazing accuracy. In other words, these types of algorithms are becoming cognitive (Singh, 2017). Due to our natural physical limitations we will never be able to perform some of the tasks as fast and precise as these algorithms and therefore we are at risk to be outperformed by them already in the near future (Kucheriavy, 2018).

Realistic pessimism suggests looking at AI from the perspective of an employer or a company owner. We would then see a lot of advantages compared to using human labor: AI doesn't eat, it doesn't sleep and it doesn't need to rest. Beside that no remuneration for its work is needed (Brynjolfsson and McAfee, 2014, pp.30-34). A company might have just a couple of human employees and still be able to maintain a very high productivity with the use of AI. Even though supporters of this perspective admit that it is still expensive to invest in AI, the technology is continuously getting better and eventually it will become more affordable and available to most companies. If no necessary regulations on a political level are inferred, there is a high likelihood that many jobs will be absorbed by AI technology (Brynjolfsson and McAfee, 2014, pp.224-228).

Despite all the negative predictions, this perspective suggests some actions that should be taken both by the government and at the personal level in order to prevent massive unemployment and a higher difference between the rich and the poor:

- *At the political level*

At the political level realistic pessimism suggests to infer special regulations in a form of tax incentives as well as strengthen social safety policy. Taxation of the businesses that uses AI algorithms instead of human labor might help to slow down the spread of automation as well as compensating for loss of income tax (Mannino et al., 2015, p.6). If high unemployment occur there might be a need for new transition policies in form of additional wage insurance programs (Kletzer, 2018). Another suggestion made by supporters of this perspective is to start developing re-education policies. Education systems must ensure that the workforce of the future is diverse and educate humans to work together with AI (Dignum, 2017, pp.1-8).

- *At a personal level*

In addition to constant learning and analytical skills, realistic pessimism mentions the importance of developing basic digital skills at a minimum. Digital skills are becoming a requirement in the majority of companies as tools, processes, routines, collaboration and products are being digitized. Digitalization reduces time an employee use to complete tasks and increase productivity. In addition digitalization help people at work stay connected to customers and partners (Hogan et al., 2015).

3.3 Non-realistic optimism (Utopian perspective)

Non-realistic optimism is a perspective which embraces optimistic predictions for the distant future scenarios. There is a belief in either an "effortless success", or in a success that will come easily. This perspective focus only on what we want, and assumes possible difficulties to be temporary (Kling, 1996, pp.40-58). Utopian perspective sees AI as a way to save lives and cope with disasters, and at the same time create more meaningful lives (Harari, 2016, pp.24-53).

Among optimistic distant future predictions, there is a wide variety of scenarios - from those which are close to realistic predictions, to the ones which sound completely utopian. These scenarios predict different consequences for our life and our professional life, however all of them predict a pleasant outcome.

The most "realistic" supporters of the utopian perspective don't believe in the creation of machine intelligence which might be equal to or superior to the human intelligence (Allen, 2011). Ideally their beliefs should be placed somewhere between realistic optimism and utopian beliefs. However, as we are talking about the distant future then such scenarios can't be seen as realistic ones.

Other supporters of utopism believe in the singularity and in the positive outcome of it. They describe singularity as a next step in an evolutionary process. A period which will be indicated by such a rapid technological growth that our lives will change dramatically and we will be able to overcome the limitations of our bodies and brains (Kurzweil, 2005, pp.7-9, 387-389). Utopism supports the idea that once the singularity has been reached, we will perfectly understand the human thinking process and will be able to constantly expand its reach. As a result of this process, the machine intelligence will overcome human intelligence (Kurzweil, 2005, pp.7-9). Utopism suggests that human will be able to even merge our biological bodies and brains with the technology, which will make us closer to achieving immortality (Harari, 2016, pp.49-56).

As already mentioned, the most "realistic" supporters of the Utopian perspective don't believe in singularity and the creation of intelligence that will overcome human intelligence. They believe therefore that in a distant future our professional life will be characterized by the cooperation of humans with AI. Because powers of technology are expanding in an exponential pace, machines will increasingly be able to perform some non-routine tasks and

help humans in our everyday work. They stress that due to the fact that some tasks require a high level of creativity and social or emotional intelligence, machines will not be able to execute these high skilled types of work. For that reason, humans will delegate some tasks to AI in order to reach the maximum potential in everything we do and maximum productivity and in a way work together with AI (Pajarinen, Rouvinen and Ekeland, 2015, pp.6-7).

Utopism which support the idea of singularity, but at the same time are closer to realistic beliefs, expect our professional life to become more meaningful in the distant future. According to this point of view, humans will leave all or most of the repetitive work that focuses on the productivity to AI, while humans will focus only on the tasks that we enjoy and that motivate us intrinsically. This cooperation with AI will make us more productive and will in general totally reshape the way we work (Makridakis, 2017, pp.8-23).

Utopism even acknowledges another future scenario where all occupations are going to be affected by the technological progress to some degree, and many people will lose their jobs. Nevertheless, utopism doesn't see this scenario as a negative one, as it believes that there will be no mass unemployment. The increased productivity will lead to increased demand and a division of labor will transfer to other activities that don't exist today (Int. Federation of Robotics, 2017, pp.3-11). AI might even help us to create those new activities. As stated by Wilson, Daugherty and Morini-Bianzino (2017), some of these activities of the future are already identified by the consulting companies. Examples of these new categories of jobs can be trainers, explainers and sustainers. Trainers will be responsible for training AI to learn different human skills and qualities, like communication and empathy. Explainers will be responsible for explaining the decision-making process of an AI algorithm to non-technical professionals. Sustainers will act as ethics compliance managers (Wilson, Daugherty and Morini-Bianzino, 2017, pp.1-5).

At its most utopian side, utopism considers AI to serve humanity and do all the work for us. Human will merge with technology and will become significantly more productive than ever before. From this point of view, work will exist only in a form of "work for pleasure" and in order to create social relationships. We will work to create. We will no longer need to work for money. The types of work that exist today will be perceived as slavery by our grandchildren (Kimmorley, 2017). The next generation will be characterized by incredible inventions and cures which will be achieved by human cooperation with AI. We will be able to reprogram our biochemistry. Medical treatments will also become personalized, as they

would be created on a DNA level. AI will help us in many other industries as well: military will be able to guarantee our security with the development of smart weapons; business and finance will be able to use intelligent data to make extremely accurate predictions, and so on (Kurzweil, 2005, pp.210-221, pp.279-285).

Because of the diversity of predictions within this perspective, the recommendations on how to be competitive in the future also vary. The most utopian predictions deny the necessity to do anything, as according to them we will never have to work again. The others belief that the positive outcome is the most likely one, however to make this transition easier they give some recommendations:

- *Data protection and security*
  As a significant amount of data will become available, then the need for specialists who are able to protect that data will increase. Our life will be very digitally driven, and therefore knowledge related to data protection and cyber security will become truly important in order to protect us from possible attacks (Hern, 2018).

- *Social and emotional intelligence*
  When the information becomes available and machines are able to analyze all that information, then the ability to connect with each other in a deeper and direct way will become crucial. Our working environment will become truly global and the ability to collaborate effectively with diverse group of people will be a big advantage. (Australian information industry association, 2017, pp.31-40).
- *Computational thinking*
  The ability to understand data based reasoning will be very important in order to understand information (Australian information industry association, 2017, pp.31-40).

3.4 Non-realistic pessimism (Dystopian perspective)

In a broader sense, dystopian perspective supports the idea that the negative outcome is predetermined (Vieira, 2013, pp.14-15). This perspective describes predictions for our distant future and similar to the utopian perspective there is a wide range of possible scenarios. These can range from scenarios similar to realistic pessimism to highly dystopian scenarios where humans become extinct.

Scenarios most similar to realistic pessimism believe in a negative outcome in case nothing is done to prevent it. They do not believe in the creation of an intelligence that will overcome human intelligence (Jankel, 2015). In the more dystopic scenarios within this perspective, AI algorithms might represent a danger to the whole human race. The possible creation of "full artificial Intelligence" that are able to further improve themselves could quickly become superior to humans that are limited by a slow biological evolution. An AI of this form could be able to develop weapons, control financial markets, and at the end dominate us (Dredge, 2015). If such machines will be able to rewrite and upgrade themselves, then in order to be as efficient as possible, they "would act like an obsessive paranoid sociopath" (Omohundro, 2008, pp.30-32). Dystopian perspective points out that beside human extinction, AI might also put us in the other types of existential risks. These risks include scenarios like flawed realization, permanent stagnation and subsequent ruination (Bostrom, 2013, pp.15-31).

Related to our professional life the predictions close to the realistic pessimism perspective believes we will get high unemployment rates and higher level of income inequality. Even though the predictions are pessimistic it suggests that in case necessary policies will be adopted by institutions and governments, there is a chance that this transition will slow down and compensated (McKinsey Global Institute, 2017, pp.4-33).

In the most dystopian scenarios, humans are depicted as "useless" creatures, as algorithms could replace us in almost all occupations. There will be no need for many of the highly intelligent occupations like stock exchange traders, doctors and leaders. Algorithms will be able to make all decisions better than us as they will possess and process information that we will never be able to even understand (Harari, 2016, pp.363 – 376). Besides being replaced, we risk acknowledging that AIs are smarter than us and can make better decisions. Then we risk to give them our freedom to make decisions, drive cars, setting public policies and basically moving freedom and decision making from humans to AI (Makridakis, 2017, pp.9-10). Dystopian perspective stresses that new types of jobs will emerge, however, the chances that the machines are going to be better in those jobs as well are high. That will definitely cause more and more unemployment (Harari, 2016, p.380).

The most dystopian scenarios don't question the ways human kind could continue keeping our jobs, but they put all of its attention on human survival (Gibbs, 2014).

In order to prevent the terrific outcome, dystopian perspective stresses the importance of regulations on the political level around AI which have to be implemented in several areas:

- A science that will help us to understand algorithms which are smarter than human intelligence have to be created before we create Superintelligence (Bostrom, 2016).
- It is necessary to develop a regulation for the science surrounding AI, otherwise human might do something irreversible (Gibbs, 2017).
- The education system will have to change so that it will satisfy the constantly changing market (Rainie and Anderson, 2017, pp.78-87)
- Governments should consider inferring a form for basic income for its citizens that will secure at least the minimum subsistence level (Dignum, 2017).

4 Presentation of the Consultation Exercise findings

In this section I will discuss and explain the findings from the conducted interviews[7] and describe various perspectives on the consequences of AI and automation for our professional life.

In order to answer the main question of this study, it is not enough to just look at how AI and automation processes in general might affect our professional life. Our professional life is just one aspect of our life, and as such everything that is happening in our life in general might affect our professional life. Because of this it is important to look at both questions:

1. What are the perspectives on what the future with AI might look like for us as humans, and;
2. What are the perspectives on the consequences of AI for our professional life as a part of our life in general?

To easier map the eventual diversity or similarity of the elite informant's beliefs, I chose to create a graph, and place each interviewee on the graph, according to his/her position. The graph illustrates realistic/unrealistic on the X-Axis and optimistic/pessimistic on the Y-Axis (Picture 6)

During this process, I faced two difficulties:

Mixing of perspectives among the interviewees

1. During the interviews the opinions of the same person ranged between the different four perspectives when asked about different types of consequences. In questions related to the effects on the society an interviewee might be optimistic, while pessimistic when answering questions regarding the future of employment. This caused difficulties when placing an informant on the graph, as the question of the "consequences of AI for our professional life" can't be answered in full if not combined with the other question – "consequences of AI for our life in general".

[7] The elite informants and their profiles are described in stage five (5): consultation exercise, p.25

Understanding of timeframes among the interviewees

2. The second challenge was that the interviewees could change between optimistic and pessimistic views when asked about near and distant future.

Actions taken to resolve those issues are described below in chapters 4.1 and 4.2 of this dissertation.

4.1 Mixing of perspectives among the interviewees – the first issue

To resolve the first problem, I chose to create three main control categories, representing different aspects of our life according to which I could evaluate the answers of the informants.

4.1.1 Control categories

The first category would clarify the position of an informant regarding the future of the society in general. The second category would clarify regarding the future of our professional life. And the third category to identify if there is anything that we could do in order to prevent the negative circumstances such as governmental regulations.

4.1.2 Valuation of control categories

I created a scale from one (1) to five (5) for each category, where one (1) is the most negative scenario, and five (5) is the most positive scenario. For the third category, one (1) means "depending on regulations, other institutes, etc."; and five (5) means "everything is depending on us".[8]

In order to find out the approximate position of an informant on the scale, I decided to compare answers of each informant with the answers from reference person(s). A reference person is a person to which an individual is compared however not necessary shares the same beliefs (Holton, 2004). Ray Kurzweil was chosen to represent the Realistic optimism perspective for the near future and Utopian perspective for the distant future. Nick Bostrom was on the contrary chosen to represent the Realistic pessimism and Dystopian perspective for the near and distant future respectively. Both Ray Kurzweil and Nick Bostrom are quite

[8] ***Attachment 7*** at the end of the dissertation shows scales for each of the informants

extreme in their forecasts on our future. Below, I provide a short overview over these two person's beliefs. The lowest and the highest possible score for their beliefs - one and five, is given to both Nick Bostrom and Ray Kurzweil respectively.

I would like to note that my initial purpose was not to find true beliefs and positions of the elite informants, but to apply their arguments as manifestation of different perspectives in order to supplement findings in the literature. The position of an informant on the scale described above should therefore be seen as an approximate position, which helped me to reflect either the positive or the negative beliefs of an informant. I also look at the possible change of the beliefs depending on the timeframe we talk about. This study does not include a more advance analyzes of the beliefs.

4.1.3 Reference persons

Reference person for realistic optimism and utopian perspective - Ray Kurzweil:

Ray Kurzweil is a renowned inventor, futurist and technology predictor, as well as a director of engineering at Google (Lev-Ram, 2017). He is also known for his prediction regarding the appearance of Artificial Intelligence and for coining the term "The Singularity" which he describes as a state of technology and science, when artificial intelligence will become much smarter then all human intelligence combined, and the technological development will be so rapid that it will be impossible for human to reach or understand it (Kurzweil, 2005). In 2008 Kurzweil co-founded the "Singularity University" together with Google, where the preliminary mission is to educate and train specialists to resolve problems that humanity might face in the future (Lev-Ram, 2017).

Ray Kurzweil is one of the most known researchers of the modern achievements in the field of Artificial Intelligence. He makes predictions regarding our future with those innovative technologies since 1990s. Most of his predictions are turning into the reality in time or a couple of years later (Baer, 2015). His predictions depict both our near and distant future.

Kurzweil believes that already in the near future humans will be able to be consulted by an AI entity. AI entities will be able to perform many actions for us, do some of the working tasks for us, help us at home, increase and restore our physical abilities. There will be a huge progress in medical field where computers might be able to help people to restore their sight with a help of a digital implant. Education field will benefit as well, as many of the learning

programs will be run through the internet and an AI-based teacher will accompany the student all the way through. Kurzweil stress that even though many jobs will certainly disappear, there will appear many new jobs which are impossible to imagine today. This is because there will be new industries and new concepts which doesn't exist today, and therefore it will be a need for new work positions (London, 2017).

Kurzweil's distant future predictions are very optimistic as well. He believes that we will be able to enter a full emersion virtual reality with the help of computer implants. This will allow humans to have our mind in any place at any moment, as well as work at any company from any place in the world. He predicts that the functionality of our brain will be completely understood and AI's will be many times smarter than a human being. We are going to be able to download any skills and knowledge we wish to obtain, and the process of learning will therefore become instant. Human merge with AI and computer viruses therefore become a main threat. Ray Kurzweil mentions that the Universal basic income is going to be inferred and we will not need to work for our survival anymore. The only reason for working will be our own intrinsic motivation, desire to create something and for our own pleasure (Kurzweil, 2005).

Reference person for realistic pessimism and dystopian perspective – Nick Bostrom:

The other reference person that was chosen to represent pessimistic perspectives is Nick Bostrom, who is a well-known philosopher at the University of Oxford, as well as an author of many publications and books on this field of Artificial Intelligence. Even though Nick believes that technological advances might give us amazing opportunities in the future, he argues a lot on his concerns about potential existential risk to humanity that those technologies might cause. In 2005 Nick founded the "Future of Humanity institute" - a research center at the University of Oxford, where he researches on the humanity issues connected to the these new technologies (Shead, 2016).

Nick Bostrom doesn't make too much predictions regarding our near future, as he focuses mainly on the distant future and questions related to existential risks. Even though he acknowledges the possibilities that Artificial Intelligence might bring us already in the relatively near future, he points out that we don't know how those "advantages" gained with the help of AI might turn out in the long run. He mentions that even if we will cope with

many diseases already in the near future, we all might experience a different effect in a long term. He points out that it's hard to imagine any important area of our life that wouldn't be affected, and our professional life is one of those areas. We are on our path to automate most of the low- and middle- skilled jobs, but even high- skilled jobs are in a high risk of automation. Machine labor will become cheaper and cheaper and in a relatively near future humans will only be competitive in those niches where the human contact or labor is preferred. That means that more and more people are in a high risk of losing their jobs in the near future (Bostrom, 2016).

Our distant future, according to Bostrom, is highly dependent on the regulations that will or will not be inferred: there are some control issues that have to be solved. If those issues are going to be foreseen and regulated, then we might have a chance for a positive outcome. However, if no necessary actions are taken, then this transition might be extremely dangerous, as it might be our last invention. Nick talks a lot regarding existential risks that might arise with the technological breakthrough, as mankind don't know if those risks are manageable. Our professional life might look dramatic as well. According to Bostrom, we might end up having no work, and even if there will be some state subsidies, these will be so small that most of the population is going to be under the poverty line. Even with all those technological advances in medicine, we will not be able to purchase those medicines, as we will barely be able to pay for food and rent (Bostrom, 2016).

4.2 Understanding of timeframes among the interviewees - second issue

To resolve the second issue, in order to find out if opinions of the same person would change depending on what timeframe we talk about, the interviews were analyzed according to two different time perspectives. Firstly, I analyzed the opinions of each interviewee regarding our "near future", and secondly, regarding our "distant future". At the end I presented the graph where it is possible to see how the opinion of the same person changed when asked about different timeframes.

The chosen method of analyzes gave me the possibility to get information on both realistic and unrealistic perspectives, as when looking at our future from the position of near and distant future, each person would describe their thoughts regarding both perspectives.

4.3 Main perspectives

4.3.1 Near future (today's date – approximately three years from now)

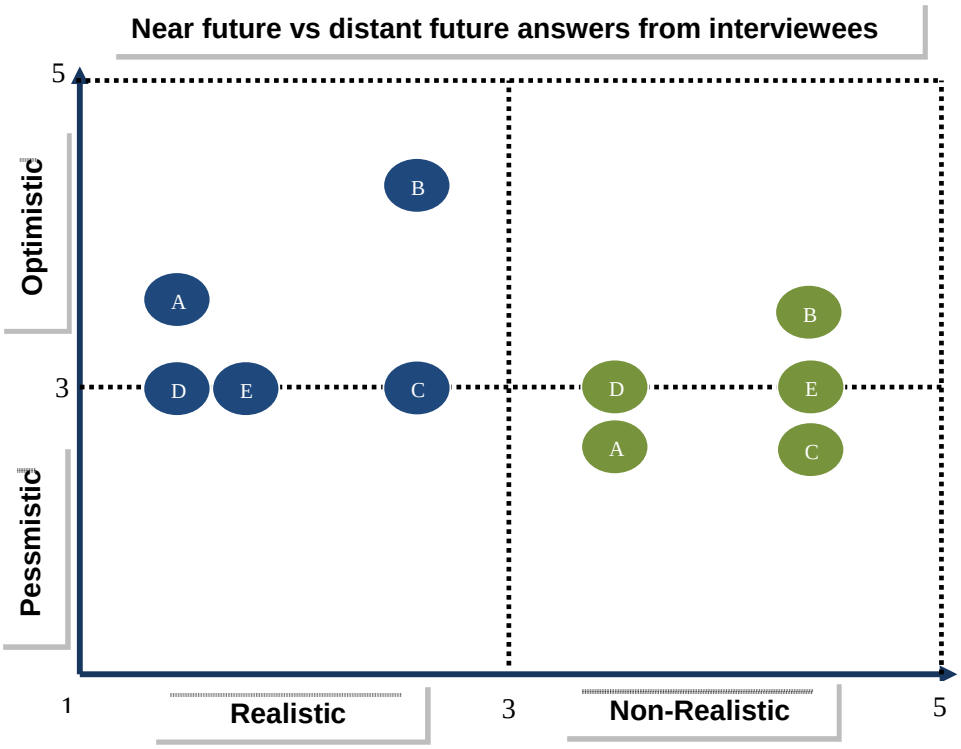
The first analysis I made was of the perspectives that take place in the near future. With the near future I mean the future from the today's date until approximately three years from now.

As mentioned above, each interviewee was analyzed according to their answers on each of the three "control categories". Each person got different amount of points (from one (1) to five (5)) for each control category. The final position of the interviewee on the graph was based on the average score each informant got. [9] The final results with the position of each informant on the graph of the perspectives is presented in **Picture 6** below.

As shown in blue color in **Picture 6**, there is a tendency for optimism among the informants when it comes to the near future. Some elements of pessimism are present but it does not affect all aspects of life. When it comes to the near future, all of the interviewees expect the positive changes and the possibilities that are about to open as much more important than the negative outcomes that changes might cause. However, as we look on the control category regarding the future of work, then we notice that three out of five interviewees agree on the negative consequences of AI and automation for the job market already in the near future.[10]

Below I have combined the relevant opinions of all the interviewed persons for the two realistic perspectives: realistic optimism and realistic pessimism.

[9] Scales for each informant could be found in ***Attachment 7*** at the end of this dissertation
[10] The control category ***'Future of work'*** can be found in ***Attachment 7*** for each informant



Picture 6. Near future vs Distant future (interviewees position)

Interviewees position related to current or near future (now – 3 years)

Interviewees position related to distant future (approximately 20 years in the future)

4.3.1.1 Realistic optimism

The supporters of this perspective among the interviewees see AI as a tool that can within the near future open up a lot of new possibilities and make our life easier. They believe it will provide us with a lot of new services, starting from incredible home entertainment and continuing to better health diagnostics. As informants mention during the interviews:

Informant E: "… that could mean enormous positive consequences for people"

Informant B: "… it can help us in everything we do now to do it even better"

Informant D: "I'm very happy that I'm living right now and that I can experience this change, because this does not happen every generation. And I think that if the people who work with it will accomplish at least 20% of what they intend to accomplish … then it's a revolution!"

Already these days we can see the first results of the implementation of AI in different products, services and within companies. All of the informants agreed on the fact that every activity, every business and every area can benefit from tools such as AI. As one of the interviewees stated:

Informant B: "I think it is difficult to find the area which is important for us and that can't be better with the help of AI ... And now we have only seen the start of it"

As all businesses benefit from more automated solutions, then AI is becoming more and more popular among different businesses, both startups and established large enterprises alike. All of the informants, even though representing different areas of business, emphasized the focus on Artificial Intelligence and other new technologies among the companies:

Informant A: "Right now there are not many companies who have implemented very good AI solutions. There are many of those who talk about it and wish to test"

Informant B: "A lot of companies are focusing on it. Almost too many. Even when they might not need it…"

Informant C: "Now there is a lot of "Proof of concept": Take a product, test out, get a feedback, learn from it ..."

The informants notice that even though new technologies and AI as such is in a high demand these days, the current AI solutions are still not perfect and expensive to implement. It also requires a lot of knowledge about the organization where it is about to be implemented such as detailed and mapped knowledge of the internal processes. Many organizations do not have many people who have the necessary competence:

Informant B: "There are still a very few people who have the relevant kind of background and who have the relevant kind of competence ... in relation to how many areas AI can be implemented"

Informant D: "I really feel that ... I really never experienced a tool where everything is possible. So it's always oversold"

Informant C: «There are many new types of vendors who promise a lot… and at the end the customer is very disappointed because they spend maybe one year to develop a chatbot that should answer and respond to things in the customer front .. but those who have sold the technology, they have sold a technology that is not good enough …"

These factors might slow down the implementation speed within the companies and as a result people might not lose their jobs as soon as predicted by the supporters of the pessimistic perspectives. That might give a chance to prepare better for the change.

At the same time realistic optimism realizes that when it comes to the areas that grow exponentially it is clear that the technology might develop really fast and sudden. This will eventually mean that the technology will become significantly cheaper and affordable for everyone, bigger and smaller businesses alike:

Informant A: "It is here we can really see how exponential it is: many talk about it and nothing really happens… and then suddenly it gets cheaper … and then it is an extreme testing period .. and then suddenly it comes in .. and a lot of people will find it incredibly useful…that develops extremely quickly … and then it will be everywhere"

Realistic optimism predicts that some jobs will definitely disappear already in the near future. This is especially relevant for all the positions with a lot of routine and repetitive tasks, with a lot of manual work. However, AI will also be able to help with the execution of more complicated tasks, like diagnostics of people with illnesses, juridical help in conflicts, and even some work that managers and directors does. As elite informants noted:

Informant A: "… those who face the biggest challenges now are actually middle level managers and directors, ... yes, they can do a job, but I do not need a director anymore because that department does not exist"

Informant D: "... customer service, sales - all business processes between a company and customer, which involves manual work …"

The distinctive feature of realistic optimism is that even if it acknowledges the fact that some positions and work titles are going to disappear already in the near future, it believes that a lot

is depending on us, and on our desire to force that technological explosion. According to that perspective we can't stop this development totally, as one noted:

Informant A: "I don't think that it will happen next year, and I don't think we can stop it either.."

However realistic optimism believes that not everything is depending on the external forces only. We still have a chance to decide how fast we want those new technologies to be implemented and to which degree we want them to be present in our life. At least for the near future. Sometimes people are not ready for the change as fast as the companies might suggest and therefore the companies will have to slow down the automation process. Informants supporting that idea comment:

Informant D: "...so then it's just a matter of how hard you wish to pull the screw, because in some places we might want to have human contact .."

Informant D: "..sometimes offering automated solutions goes faster than the market manages to pick it up. Because it's about changing some habits .. "

Realistic optimism believes that there is no use to be afraid of the changes that are about to come. According to this perspective, there are jobs that are going to be gone, but we might get much more interesting and meaningful lives as there will be other, much more interesting and creative tasks:

Informant C: "...In United States they have been doing this for a while now.."

As one of the interviewees explains:

Informant B: "...for example, when Los Angeles introduced those chatbots for the communication with the residents, everyone got very scared and worried that their job would be gone...but the reality was that they got other, much more interesting tasks"

Realistic optimism points out that even though some positions are going to disappear, companies are already developing and will develop plans for the retraining of the employees, so that it would be possible for those who loses their existing position to get another position within the same company:

Informant D: "Yes, we have a plan to prevent people from losing their jobs ... we are in change .. We kept the positions but the tasks within the role have changed a lot. A person will be given some time to attempt to work in the new role, and the employer is obliged to guide, help the employee succeed in a new role. And I think it's part of being an employee today"

Informant A: "I think that we must think differently about the organization. we must be able to create a culture in which people feel appreciated regardless on their position in the company ... we must think what roles do we need in the future, who will lose their jobs soon and who of those could take other roles which already exist or will appear within the organization?"

Supporters of this perspective believe that new tasks and jobs will appear not only within the company a person is working in, or within other business entities, but also on the outside, in the society. We are going to be able to resolve problems that normally wouldn't be prioritized as the today's society does not have enough resources to prioritize it. With the raise of new technologies and AI in a particular, this is going to be possible:

Informant A: "There are a lot of problems that are not resolved today because the society do not have the capacity and can't afford it. For example, to take care of the nature around us, take away all the garbage, etc. There are a lot of puzzles we have not resolved. We must think what we would accomplish if we could have unlimited people available .. what problems do we want to resolve? And then to start fill in people in those tasks .. because some of the tasks do not require long education, but those are the problems we do not solve because they are not important enough for us to afford to let people do it"

In order to be competitive in the future, realistic optimism talks about the importance of gaining the relevant knowledge and taking into the consideration a start-up company as a potential new employer. As one of the elite informants noted:

Informant B: "What characterizes new companies is that they try naturally in the new aspects of business and many of them are kind of "technology front" enterprises or they offer solutions that are not yet developed. We see a lot of companies that are "passing by" established and larger enterprises, as they are more flexible… so we need new companies that can take over and create new jobs…new jobs that are going to replace those which disappear"

When talking about the relevant knowledge, all informants agree on the importance of gaining some digital knowledge regardless of what the person choses to study or work with:

Informant A: "… study what you want, but you have to have something digital. I think we need people in science, we need people within social sciences and politics and health, and within all sorts of things, so I do not think all those jobs will disappear, but I think that having no digital competence is not vise"

Informant C: "… study what you want.. but combine with technology ..... I think that's the key"

4.3.1.2 Realistic pessimism

Before I start with the presentation of the main ideas in support of the realistic pessimism perspective, I would like to note that none of the informants were pessimistic about the near future of the society in general with AI in it. That might be explained with the first assumption that all of the informants are enthusiastically involved in the innovation happening around AI and related technologies. The second reason might be the fact that even if some of the interviewees are believing in the creation of Superintelligence, there is no Superintelligence just yet, and therefore no possibility to be realistic regarding the negative circumstances in just a couple of years, which might be caused by something that does not yet exist.

Beside the positivity regarding the general contribution of AI and automation to our lives in the near future, not everyone was as positive to its impact on our professional life. Three out of five interviewees explained their pessimistic expectations.

Realistic pessimism agrees with the realistic optimism on the fact that these new technologies are quite expensive to implement, and that today there is a lack of knowledge on the subject

and lack of qualified employees who might execute such an implementation. Nevertheless, realistic optimism emphasizes how profitable this investment is to compare with constant investments in employees. Besides, the algorithms are getting cheaper and cheaper and rapidly becoming more and more advanced, so the cost problem is not going to be there for a long time. Supporters also admit that the productivity of the machines and algorithms is way better than the productivity of a human being, and therefore already in the near future we will not have a chance to compete with an AI when it comes to productivity and cost:

Informant D: " It is clear that some investments need to be done, but when you look at the cost reduction you get when reducing the number of employees, then investing in that type of technology is indeed ... this business case is indeed amazing "

Informant C: "I think they're going to cut the number of employees as fast as they can. We see that it is already happening now ... I mean most of our customers who are using this technology .. they use it to reduce costs"

Informants who support this perspective mention that even if we suppose that it isn't the case and that companies will try to save most of the positions or redirect the employees to other functions within the company, it is still not given that the companies will actually succeed with their kind intentions. The reason is that there is still not enough knowledge of the processes and not enough experience with the implementation of these technologies within the companies. As explained by one of the informants:

Informant D: "You must have the right people to do that right .. there are just a few people who have that kind of background and who have that kind of competence .. For a top management, it's easy to say " ok, if we do so then we will save ten million…do it!".. but what you've actually said "yes" to is that many people will not be able to do their job anymore… so the ability to turn it around and implement these technologies, without people losing their jobs, is an important personal quality that not everyone have"

So the question that realistic pessimism raises is: can we do that transformation without making a lot of people losing their jobs?

Realistic pessimism highlights that the transformation which is happening nowadays is unique, and that it is very hard to prepare for it since it is happening everywhere, in all areas

of business at the same time. Everyone is understanding the importance on focusing on these new technologies and they will sooner or later implement these technologies. Besides, we don't really have the same experience from the past and therefore realistic pessimism stresses that this time it is going to be something different and not easy for many of us:

Informant D: "... it happens in all industries and it happens at the same time. So I think it will change in general the way we work… I think thousands of jobs will disappear in Norway. That's because It happens everywhere. I know what we are doing, what the other companies are doing…. Many jobs will be gone in "1 second"

Informant E: Everybody are focusing on this now and everyone are afraid to "miss the train" and lose out on the potential benefits or fall behind competition. It is not necessarily good for all the employees

Interviewees mention that these technologies are not being implemented only so that the customer would have better products, services and experience. They admit that the customer is of course always in focus, however this time it's different. A very important reason for implementation of these new technologies is the globalization and constantly growing competition with international companies. In a way automation of different processes is required in order to reduce costs and therefore be competitive. The customers are also requiring these changes: customers use services and products which international companies offer them, and later they compare those products and services with the offer back home. These offered products and services have to be at least as good as the ones international competitor have to offer. All those factors are triggering automation:

Informant D: "Because of the global impact company's margins become lower and lower …because no matter how cheap we can do it, another international company might do it cheaper. And then we see that the automation, in a way, have to be applied"

Informant D: "AI and robotics – those technologies are not new .. What's new is that it came to this part of the world"

Informant E: "You can't really ignore it when competitors and partners alike are using it and customers expect better, faster and cheaper services and products. It has become a "must have" technology"

According to the elite informants who supports realistic pessimism perspective, in a relatively short time we are going to experience difficulties in finding jobs in several spheres of business. First are those that are easiest to automate, and in a while in all other areas of business:

Informant E: ".. all professions will be affected to some degree but initially we will see reduction of repetitive and simple tasks conducted for example in customer service. Millions of people world wide work in customer service, many in developing countries. Millions of jobs can therefore in a relative short time frame be automated"

Informant C: "I think that if we talk about the next two years, I think there are three types of technologies that will be absolutely crucial. The first one is RPA technology (Robot process automation). The second one is to start using prediction models - to make algorithms based on input from the customers ... And the third type of technology is then chatbots … quite a large part of jobs which can be replaced by one of those technologies can be replaced within the next two years "

Even though realistic pessimism is making negative predictions and warn us regarding our professional future, it still admits that we are going to be able to get a job and be employed if we will stay flexible regarding the tasks that we would have to execute. If we are able to constantly learn new things and be the best at it, and if we gain some digital competence:

Informant D: "If a graduate is going to look for a job now, I do not think he can find a place that is not going to change during the first two years of work. No matter what is he working with "

Informant E: Be involved and engaged in all new things and possible things in your area of expertise. Understand new technologies and digitalization even if you don't like it ... at least to a certain degree

Informant D: " When you start working somewhere now, you must have two qualities: be the best at what you do, because it will always be the best one to be chosen first. And you must be prepared that whatever you are going to be asked to do the first days, it is not going to be what you will end up doing. Do you have those two qualities, then it's not given that you will succeed in the job market, but you will at least have a chance for that".

4.3.2 Distant future (approximately twenty years from now and more)

The second time period according to which I decided to analyze the answers of the informants is a distant future, which means a future from approximately twenty years from now. As the future is so distant, we are not able to have a realistic picture of it, and therefore all the perspectives on the distant future lies either in the Utopian or the Dystopian side of the perspective scale.

All of the informant's answers were analyzed in exactly the same way as it was previously done for the near future. I used the same scale and the same reference people to compare to. The results are shown in green color in the **Picture 6** above.

As shown in **Picture 6**, when it comes to the distant future that we can't imagine and predict as good as the near future, the predictions become more pessimistic, and two of the interviewed persons are placed on the dystopian part of the graph. When looking closer at each of the scales, we can notice that predictions regarding the distant future looks more dependent on the actions of other institutes and people, like government, educational institutions, employers and so on. Distant future seems less dependent on the actions of each single person or organization, as any eventually inferred regulation might cause change in the whole system immediately and therefore change opinions of people regarding their future with AI.[11]

The beliefs of all the interviewees regarding our distant future with AI in it are shown and explained in the light of Utopian and Dystopian perspectives below.

4.3.2.1 Utopian Perspective

Non-realistic optimism or utopian perspective is the most positive perspective of our future. This perspective describes believes on our distant future, and supporters of non-realistic optimism see new technologies and AI as a way to have a better and much more meaningful life.

This perspective was described in details in the chapter three (3) of this dissertation, where I showed how that perspective is highlighted in the literature. Now I would like to present the findings from the consultation exercise stage and explain this perspective from the side of elite informants in the field.

[11] Scales for each informant could be found in ***Attachment 7*** at the end of this dissertation

As implies from the name “non-realistic optimism”, all the supporters showed true beliefs in a bright future that is awaiting us with the technological progress and development of even more powerful AI solutions. As one of the informants stresses:

Informant B: "There are no areas that can’t become better with an AI…and now we have just seen a start of it"

Informant B: “It is potentially a fantastic tool, which can be applied to almost every area…. AI give us the possibility to learn things that we otherwise wouldn’t be able to learn… The best thing is that when you learn it once, you will learn all the world's machines right away!”

Informant E: “Throughout the last two centuries we have seen new technologies change our lives, business and even societies as a whole. AI in future will most likely do this as well. Probably we will see a paradigm shift for business, life and society”

Utopian perspective admits that some of the jobs might disappear, nevertheless, unlike pessimistic perspectives, it believes that most of the people will be able to get another job which will appear with the appearance of new technologies. Utopism argues that there will be a lot of new types of jobs and AI will take the boring, repetitive, routine tasks, while leaving humans with much more creative, meaningful, and pleasurable tasks to resolve. Non-realistic optimism believes that even when AI will be able to perform more complicated tasks that are the prerogative of a human per today’s date, people will still benefit from an AI. People will have access to very large amounts of data, which was previously not available, and because of that we are going to have much better basis for any decisions we make and in general much more possibilities will open up in front of us. Several interviewees emphasized this during the interviews:

Informant B: “I don’t think AI will replace us ... I think it's going to do the tasks that we do today, but much better and faster and smarter …. I don’t mean it would be able to actually do all we do now, but it could help us with everything we do now to do it even better. "

Informant B: "It's not always about reducing the workforce, but it's also about giving those who have the boring, repetitive jobs, where they sit at a call center and answer the same question hundred times per day, a more meaningful life "

AI might even be used in order to compliment us in some low-skilled jobs: instead of replacing us, AI might "cooperate" with us and provide a really personal service to a customer:

Informant D: "… customer service, for example. The skills you might need to work in the future customer center are different from what you need today. Today you don't talk to the customer while you are searching for the information, and the customer doesn't see most of what you do. But if we suppose that everything you do happens automatically ... then a person working in a call center must have a different type of profile ... instead of having twenty years old unskilled employee, we might need lawyers, psychologists, etc ... the type of people who have higher education. They will not handle big volume, but they will be an incredibly important contact point for the customer. The machine will collect and analyze all the information, and a customer service employee will talk to a customer"

Non-realistic optimism also mentions that even if AI will not become that amazing tool and will not be able to work "together with human being", AI will still never be able to replace us. The fact that we are irrational and irrationality is hard to program, the fact that we need to communicate with other people in order to feel us worthy, the fact that we don't want to see machines instead of people everywhere… all that have to be taken into the consideration when we make predictions. As mentioned by several informants:

Informant A: "AI will never replaces people: we are irrational ... I do not think we humans are made to be alone. I think we need each other"

Informant D: "AI might probably replace us in many spheres .. but .. apart from one area, and that is human communication. Social contact points – we humans cannot live without it"

Informant E: "I think as long as customers are people there will always be a need for direct human contact. It's not possible to automate everything "

Informant D: "... if a machine comes and takes a blood test then it's ok ... but when that machine comes back and will tell you the results of that blood test .... then it's probably much better if the human being will do that … especially if it's not good news .."

An important comment was made by one of the interviewees who support the utopian idea. According to this interviewee we can't really talk about employment catastrophe until all the problems are resolved. The informant stated that:

Informant B: "If half of the work tasks will be automated, half of the jobs will be gone, then we have 50% unemployment rate. That sounds logically, however it's not how the world has ever been functioning. A much more correct reasoning is that it will happen when there are no more problems to be solved in society. And it lies in human nature that we will never be there. When all the problems in the world are resolved? – Never! Therefore, there will never be any employment catastrophe"

Interviewed persons point out that the necessary and various new regulations covering the field of Artificial intelligence and other new technologies are definitely going to appear in the future, which is another reason to believe that many employers are going to consider more employments instead of investing in a new technology pending the content and impact of the regulations. This is particularly true for smaller businesses:

Informant E: "If the public sector loses significant tax revenues due to AI replacing jobs or if companies become significantly more productive and profitable than for sure governments will change taxation to get a share from it "

Informant B: "I think public data would be sold to the companies. When data is a value in itself, use of public data might be taxed. When a city have access to a lot of infrastructure data, lots of personal data, then at the aggregated level, instead of just opening it up and giving it away, there's an income base that can replace another type of tax loss "

According to non-realistic optimism, there is still plenty of work for us in the future, as there are plenty of problems that need to be resolved. However, it gives some recommendations regarding the skills and knowledge that we will need for the future:

Informant B: "In general, there is just one answer to it: be very good at analyzing yourself in relation to what you are motivated by, what you like, interests you have ...understand your inner motivation … because when things develop fast, it's not like you can take a course and study every three years .. A person who will want to succeed will have to read the articles almost daily, he must be part of the discussion, he must have the inner motivation … to follow … and you only follow aspects and things you like"

Informant E: "Be up to date with what is happening in your area of expertise. If you lean on old methods and not willing to constantly seek and think new ways of doing something then you can quickly become irrelevant "

4.3.2.2 Dystopian perspective

The supporters of this perspective warn us regarding the possible negative consequences of the technological development and AI that we might experience in the future if no necessary actions are taken. The creation of Superintelligence might place us in the situation where we are no longer in control over the circumstances.

The interviewed informants urged the importance of special regulations in the field of AI that would limit application areas of AI as well as state which persons might and might not use it. Interesting fact is that no one from the interviewed persons was afraid of a Superintelligence that might take over and enslave us, or take all our jobs. The dystopian believes of the interviewees come from the presupposition that when Superintelligence is going to be created and no necessary regulations are made, Artificial intelligence might become as dangerous as an atomic weapon, as we will never know who might use it and how. Informants stress:

Informant A: "I do not have very much faith in humanity…some regulations have to be introduced"

Informant B: "AI is an extremely powerful tool for those who have resources and want to influence decisions. The possibility to manipulate, if someone have resources, is huge ... And those who have the resources to a large extent are big companies, big nations, and it could in a way become a democratic challenge"

Informant C: "I think this technology lacks moral. It's a huge problem because I think we can't leave businesses or people responsible for the circumstances. Here it's extremely important that the government goes inn and create new laws and regulations to prevent this from having negative consequences ... otherwise it could be used by terrorists, smugglers, etc… when you use so much resources on the nuclear weapon and then you see that there is a new technology that is much cheaper and much more efficient….it becomes tempting to use it, isn't it?"

One of the elite informants mentioned that even though a lot of jobs are going to disappear, we have to stay focused on the more important things:

Informant C: "…what is going to happen is that…there will be a lot of regulations in relation to our jobs .. i think that's a completely wrong focus .. What is happening with the jobs is just

nature. And that's going to happen. But now we've got to focus on the much more negative moral aspects of the technology because it's really dangerous. "

In general, all of the informants stay positive regarding the possibilities that AI and other new technologies might bring to our life. They emphasize that they are very excited about the possibilities which might open in front of us. According to them, if we are going to be allowed to use all of these data that might become available, then in the long perspective we will be able to solve incredibly difficult tasks, deal with deadly diseases, artificially grow and replace organs that are not functioning correctly.

However, on the contrary to utopism, non-realistic pessimism doesn't believe in the endless appearance of new problems and tasks. It therefore stresses the necessity for immediate actions in the form of different regulations, which might limit areas of business from applying AI solutions. If those actions are not going to be taken, then a lot of people will lose their jobs and those jobs will never be created again. Informants stated:

Informant C: "...but I think that there will not be as many tasks in 10 years in the world as it is today .. It will not be ... I think that the number of tasks and jobs will disappear at a much greater speed than the new ones will appear ... It is impossible to change and create new jobs as soon as it will disappear. It's not possible"

Informant C: ".. The society will not manage to find tasks quickly enough and people will not manage to reeducate so quickly... and there will be many old people .. this change…I think it's going to be quite painful for many people and businesses "

Supporters of the non-realistic pessimism perspective admit that not all the jobs are going to disappear. There will appear new jobs, and those jobs are going to be much more interesting and creative, nevertheless there will be a huge rate of unemployment because the new jobs that will appear will appear in a relatively small amount to compare with those which will disappear.

According to dystopism, as AI technologies are getting more advanced, in a long turn that change is unavoidable. Those technologies are going to be so much better, more precise, much quicker than human at many tasks, that we don't have a chance to compete. When there is a serious competition in the global market, many businesses will not have any chance to exit this route, or they are in a risk of disappearing. As mentioned during the interviews:

Informant B: "The biggest challenge is that .. when we make a decision, look at something, humans might be able to relate to maybe five, six, seven variables .. when we are trained for something for ten thousand hours, we can do it a bit more intuitively and be a little bit better … but we are really far from dealing with one million indicators and doing large data analyzes "

Informant C: "I think that a lot of businesses will be most concerned with reducing the number of employees, because they need to save resources… because they are afraid that their competitors will be using this new technology and have much lower expense rate. So they will not try to find job assignments for people. They would rather try to reduce the number of people .. "

Informant C: "So what happens now is that those technologies are becoming more and more advanced, and within some years they might manage to compete with people… there is no industry that can't be automated"

Dystopian perspective believes that the new labor market will be characterized by much less work, much smaller tasks, and much more free time because of the high unemployment rate:

Informant C: "I think that in 10-15 years people will work with much smaller tasks , much more detailed and creative tasks, because there will be less difficult tasks in general .. "

Despite the fact that in some sources it's possible to see recommendations regarding the creation of the "Universal basic income" to be sure to support those who loses their job, no one from the interviewees thought that it would be reasonable to infer such a regulation. One of the reasons for that was that even though informants admit there will be much less tasks and problems to solve in the society in general, there still will be tasks. Those tasks are not going to disappear completely. The "Universal basic income" is also seen as a demotivating factor by one of the interviewees, as it might make people even more frustrated:

Informant A: " …this will only deny the importance of a human being. I think that many people might need help finding a purpose of living"

While Universal basic income is not seen as one of the favorable solutions for the upcoming employment problem, interviewees see taxation of the businesses who uses AI technologies

as one of the possible ways to reduce the unemployment rate in the future. It was mentioned by several informants:

Informant D: "…we can choose to slow this development politically… if a lot of people will lose their job, there will still be the same amount of old, sick, people who might need places to stay, we will still need kindergartens for our children .. etc. And in one way or another, the government has to finance it. If people don't go to work and don't pay taxes, then we have to get that money from somewhere else"

In likelihood with the supporters of other perspectives, supporters of the dystopian perspective also stresses the importance of personal development, constant reeducation and focus on technology. In addition, they mention the importance of technical education for women in order to prevent the gender inequality in the future labor market:

Informant C: "… I think that we have to get technology related education into all other types of education ... We should make women to a greater degree take a technology related education .... So the community should run technology related education in all subjects .. to give people who loses their job more opportunities ... "

Informant C: "..in the future all the education should be combined with the understanding of algorithms and digitization. Because all positions will be affected to some degree.

Informant E: Digitalization and technology will be part of all types of education in the future in one way or the other.

4.4 Change of the opinions over time and dependency on the time frame

It is interesting to notice how the predictions of each person change depending on what time frame they are asked about. **Picture 6** above shows the development for each of the informants depending on the time frame they are asked about, where the positions related to the near future are shown in blue color, while the positions related to the distant future are shown in green color.

Not only does the predictions change depending on the time frame informants are asked about, but it might also change over time. In general, according to the interviews, the subject around automation and AI seem to be quite dependent on the actions of governments and public institutions. This area is changing rapidly. An interviewed person might get another experience with AI and automation over time. All that might result in that the same person would most probably change his/her opinion on the same question if asked in one year from now and become more optimistic or more pessimistic.

5 Main findings and conclusion

In this chapter of my dissertation I will present the findings from the consultation exercise stage in light of the literature that was analyzed in chapter three (3). As was mentioned in the previous chapters, findings from the consultation exercise stage would complement the literature analyzes.

5.1 Findings from the consultation exercise in light of the literature

The information acquired during the interviews was very interesting and complemented the literature review well. I identified some interesting differences between the presentation of the opinions in the literature and real life.

One of the most noticeable differences is that experts in the literature aimed for a broader public tend to dramatize their predictions compared with elite informants that work directly with the technology. Even the most realistic predictions about our near future seem much more dramatic in the literature. This might be explained with the suggestion that in order to be sold or to trigger interest among a broader audience, an article or a book have to stand out from other publications. These authors might sell their books and articles easier, be more publicly known, get more comments and subsequently more attention from readers and the general public. Some of the authors might even sound a bit science fiction like. On the contrary, elite informants from the interviews were more restrained in their predictions. Even when being optimistic and even utopian about the general impact of Artificial Intelligence and other new technologies on our life, some of the informants were pessimistic and dystopian when it comes to the predictions for our professional life. The majority of the informants were careful when giving the predictions of our distant future. Besides sometimes it was hard for me to understand if the informant was speaking about the near or distant future, and it had to be clarified. If the same question was asked several times but in a different way, then in some cases the informant would suddenly change his/her opinion to the opposite one. When taking into the consideration the fact that all of the informants have a considerable experience working with the new technologies, then it gets clear that the subject of AI is still a “black box” to many of us. At the same time, if I could interview some of the experts from the literature, then there is the possibility that they would also be less precise with their

predictions. I can therefore suggest that in some cases dramatization in the literature is made in order to trigger a higher interest and raise the demand for a publication or an article.

As some statements seems overdramatized in literature, then the interviews with the elite informants gave me a really good insight into the realistic perspectives. Informants are working closely with the new technologies such as AI, and were therefore irreplaceable to discuss regarding the near future perspectives of these technologies. On the contrary, authors in the literature tried not to concentrate too much on the realistic perspectives, as these predictions might become outdated when their publication is out in the market.

The other important point to mention is a relatively vague time frame of the realistic perspectives in the literature. The term "near future" might be understood differently and in some cases might mean to up to three years, while up to ten years in the other cases. While I could clarify this with the informants during the interviews, for the literature no such actions could be performed.

Even though the perspectives differ in the way they see our future life and future professional life, experts from the literature as well as elite informants from the interviews agree on the actions that we have to take in order to be competitive and relevant in the future.

5.2 Main findings

Below, I have summarized all the perspectives on the consequences of AI for our life in general and our professional life in particular, based on the literature and interview analysis.

5.2.1 Near future perspective: Realistic optimism

Realistic optimism perspective was perceived more or less in the same way by the experts from the literature and elite informants from interviews. As noticed above, dramatization of the predictions in the literature could be noticed, however there is shared belief about the events that are happening in our life now and that will happen in the near future.

Realistic optimism believes in amazing opportunities that the new technologies will open up in front of us already in the near future. We still have some challenges ahead which realistic optimism acknowledges, nevertheless when these challenges are resolved, we might have new services, new tools and activities at our disposal, as well as brilliant job possibilities.

When it comes to the job market, realistic optimism realizes that the areas characterized by an exponential growth develop really fast, and that will in turn lead to disappearance of many types of jobs. Nevertheless, this perspective stresses the fact that these new technologies are still very expensive and not affordable to everyone, as well as the solutions are far from being perfect. This fact will definitely slow down the automation process and humans will have more time to prepare for those changes that are about to come. When the changes will come, we might lose our jobs, however we will definitely get new and much more exciting ones. We will be able to perform much more creative and meaningful tasks that will bring us a lot of joy and happiness. All the repetitive and manual tasks are going to be executed by the machines and algorithms.

Realistic optimism mentions that many companies already have the plan for such changes and they will retrain their employees when necessary or give them some other tasks within the same company. Besides, the new technologies will in a way create new jobs, since many people will soon be able to work at any company in the world from any city in the world in a real time.

Supporters of this perspective believe that we are deciding pretty much when it comes to the speed of the transformation, as the customers are humans and we might want humans to execute certain types of jobs when services and products are produced. The other fact is that people, organizations and society might not be ready for the change as fast as it is suggested by the companies, so the automation process would have to slow down.

5.2.2 Near future perspective: Realistic pessimism

Realistic pessimism perspective was depicted in the same way in the literature as it was by the informants from the interview. There was a slight difference in the perception of the general impact of Artificial Intelligence on our life. Interviews showed that elite informants are positive regarding the overall impact of AI, while the pessimistic predictions start mainly with the discussion of our professional life predictions. In literature the pessimistic predictions spread from both the overall impact of AI on our life to our professional life future.

Realistic pessimism believes that the new technologies might really contribute to a better life for us in the future, but we have to be aware of the possible negative consequences that might happen to us.

As the computational power is growing, supporters of this perspective predict sharp decline in all types of jobs: low skilled jobs are going to be gone, middle skilled jobs will be partly gone, and even high- skilled professionals can be partly replaced. Algorithms and machines are getting more and more intelligent and at the same time cheaper and cheaper. This will mean better purchase or investment for the employers and higher rate of unemployment in the population. New types of jobs will of course emerge, however those jobs will be automated as well very fast.

Globalization and tough competition with the international businesses will force companies to invest in the new technologies and reduce costs, which mean reduce the number of employees. Customers are requiring those changes as well. As mentioned by Patrik Lowendahl, a director for digital services in Avanade, in the Finansavisen (2018):

'Despite growth, the company faces increased competition from the abroad. Those developers go well below the Nordic prices, but with the equally good technical knowledge'

(Kveim Sti, 2018, pp.22-23).

Even if there will be an attempt to reeducate an employee or give him some other task, it is still not given that companies will succeed with those intensions. This is because this transformation is happening everywhere at the same time and no one have gone through this before, so there is almost no experience and little knowledge on what actions have to be taken.

5.2.3 Distant future perspective: Utopian perspective

When it comes to the distant future perspectives I noticed that when the interviewees were predicting the distant future it was quite similar to the realistic perspective predictions in the literature.

In general, distant future predictions seem highly dependent on the actions of third parties, like governmental regulations that might be introduced. These actions, if implemented, might change the beliefs of the informants. For this reason, elite informants from the interviews didn't give as utopian or dystopian predictions for our future as was given by the experts in the literature. Because of the described reasons, predictions of the utopists stretch all the way

from a more realistic ones, where experts don't believe in singularity[12] but believe in the positive outcome, to the ones that sound completely utopian.

Utopism believes in a future full of opportunities, where AI and other new technologies help us to prolong our lives, deal with diseases, entertain us and make our lives more meaningful. The most utopian variants of that future include effortless success that will come easily. Utopian perspective believes in the singularity and the possibility to learn and create things that we otherwise would never be able to learn and create.

When it comes to our future in the professional aspect of life, then opinions vary as well. Informants stay more realistic, and predict amazing future where we cooperate with AI technology and get access to large amounts of data that was previously not available. Even though many of the today's jobs will be gone, there will appear a lot of new unresolved tasks and those are going to be much more meaningful tasks that we will be intrinsically motivated to do. All the repetitive and routine tasks will be done for us and we will concentrate on the problems that we really want to solve. Supporters of that perspective believe that there is no end for the problems we will have in front of us, and therefore there is no end for the possible tasks and jobs that humans can execute.

The more extreme supporters of the utopian perspective from the literature believe that we will never have to work again for living, and those types of jobs that we have now will be forever gone. Work will be executed only for our entertainment, and for our joy. AI will never be able to replace us as we are irrational.

Supporters of this perspective understand the importance of necessary regulations in the field of AI, however they are certain that these regulations are definitely going to be inferred in the future.

5.2.4 Distant future perspective: Dystopian perspective

As for the Utopian perspective, supporters of the dystopian perspective among the interviewed informants are much closer to the realistic predictions of our future then experts in the literature.

Interviewed elite informants acknowledge amazing opportunities that these new technologies might open in front of us, however they realize the importance of possible negative

[12] Refer to definition in Chapter four (4) at page 40

consequences of that technological development. They stress the importance of necessary regulations in the field of Artificial Intelligence in order to prevent the negative consequences. If we turn to literature analyzes, then we can see the presence of more dystopian predictions. The most extreme predictions include such predictions as when AI dominates the human race and enslaves us. There are no more jobs, as the human race might be extinct.

At that point here I would like to mention an important difference between the same perspectives in the literature contra interviews with the elite informants. For the elite informants dystopic consequences might come from human nature. They are afraid of the humans who might use these technologies in a wrong way, and in a way pose a new "atomic weapon". Dystopism in literature, on the contrary, sees the threat coming from technology itself. Experts in the literature are afraid of the Superintelligence, which might become so smart that humanity will not be able to control it, and it might destroy us. Both agree on the fact that necessary regulations must be created and implemented, as it might prevent us from the terrific outcome in the future.

Dystopism stresses that if no necessary actions will be taken, then the majority of people will lose their jobs. All the low- and middle- skilled jobs, as well as a high amount of the high skilled jobs are going to be automated, and even when the new types of work will be created, those will be automated pretty soon as well. Supporters of that perspective predict that there will be not so many problems left in the society and in general the competition for the jobs are going to be much tougher then it is today. They mention that with such a competition in a global market, the companies will not have a chance to exit this route.

The most extreme predictions of the dystopian perspective from the literature focuses on the existential risks and not on the employment related issues.

In order to minimize the negative consequences dystopian perspective suggests to infer regulations that will limit the application areas of AI, as well who might use these technologies. It stresses the necessity to create a science that will help to understand intelligence smarter than human beings before we create Superintelligence that might destroy us. Universal basic income is suggested in several literature sources, however informants don't see the necessity to infer such an income.

5.3 Conclusion and recommendations

There exist many different scenarios for our future and our professional life with the constant development of the new technologies. We can't know for sure which one is going to become our next reality in some thirty years or so, however we can definitely prepare for those changes.

Despite all the differences in predictions across different perspectives, across different source of information, there is something in common for all the perspectives: there are visible similarities in the recommendations on actions that are proposed to us. These recommendations can be divided into the two main categories: what can be done from the political side and what can be done from the personal perspective. I am going to summarize those recommendations below. If those actions will be taken, then it might help us to make this transformation easier for us when it comes.

5.3.1 Recommendations from the political perspective

Across all the perspectives there are clear recommendations that politicians much take a far greater role in the digital transformation that is happening. With such large changes coming that can impact almost all aspects of life, business and society there need to be clear plans on how politicians, governments and public institutions will participate. There will be a need for new laws and regulations ensuring that digitalization and transformation of businesses and processes does not harm society in general. New taxation regime covering all these new digital "employees" will need to be implemented to ensure that the public continue to get their share of the financial benefits.

At the same time we see recommendation regarding the educational sector. We must ensure that everyone gets digital competence regardless of education type.

With new regulations there will also be a need for new public organizations that can enforce and control such new regulations.

With such rapid development of technologies and continuously increased investment willingness across all large companies it is critical that politicians get on board to a higher degree as soon as possible

5.3.2 Recommendations from the personal perspective

Even if it was not so important before there is a clear understanding now that everyone regardless of what we are going to study, learn and work with, will have to gain digital knowledge. Digital knowledge is a wide term and it is difficult to define in detail what this actually means. I believe that it boils down to the fact that everybody needs to put extra efforts into "continuous and life-long learning" with special focus on developing technologies, processes and businesses alike. We need to be more open to exploring and testing new technologies within our area of expertise and in life in general. We need to embrace opportunities that the companies we work for opens up for us so that we do not become irrelevant. A good example of such an opportunity given by a company is when Telenor in 2018 implemented the 40 hours life-long learning initiative, advising all their 30.000 employees to spend at least 40 hours a year on learning with special focus on digitalization, data analysis and product development (Knudsen, n.d.)

Actively taking part in the digital transformation and acquiring knowledge of new technologies is crucial and even more so for woman as they tend to be less involved in the technology oriented types of work. This is particularly important to prevent gender inequality in the future.

We will have to be able to constantly learn, develop our creative thinking abilities, and stay flexible regarding the tasks that we might have to perform in the future.

We are suggested to have a greater emphasis on the entrepreneurship and research, and we might consider less familiar companies such as startup companies as a potential employer to a larger degree.

At the end we are suggested to listen to our true motivations, our intrinsic motivations and be good at analyzing ourselves, as this is the only way we could constantly keep learning and reeducating ourselves.

5.4 Further research recommendations

As was mentioned in the beginning of this dissertation, Artificial Intelligence and other new technologies has gained a significant momentum during the last years. Because of the increasing interest, there is going to be a lot of research in the field. As this field of study is

characterized by a high level of uncertainty with many different predictions, there are plenty of areas that could be researched. I suggest several questions within this filed to be particularly interesting for the future research:

- Ethical, moral or philosophical question connected to the creation of Superintelligence.
- Study the perspectives on the regulations on the field of study.
- Consequences of digital transformation for gender equality

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All references used in this dissertation have been included in the bibliography

Word count: 24 901

Attachment 1

Study selection. 100 sources selected during the third stage of study selection

#	Title	Authors	Year of publication	Description	Included/not included in the study
1	*Should Robots Pay Taxes? Tax policy in The Age of Automation*	Abbott, R. and Bogenschneider, B.	2017	The existing tax policies should be changed. Authors argue regarding the importance of a so-called "automation tax".	No
2	*Artificial Intelligence, Automation and Work*	Acemoglu, D. and Restrepo, P.	2018	The objective of this paper is to develop the framework for the study of consequences of automation for employment, wage level, productivity and labor	No
3	*What to Expect From Artificial Intelligence*	Agrawal, A., Gans, J. and Goldfarb, A.	2017	The paper explores the effects of AI on the value of different human skills and whether AI will affect our jobs.	No
4	*A survey of Artificial Intelligence techniques employed for adaptive educational systems within e-learning platforms*	Almohammadi, K., Hagras, H., Aldabbagh, G. and Alghazzawi, D.	2017	A survey looks at different artificial intelligence techniques within e-learning, their advantages and disadvantages.	Yes
5	*Hire the Right Staff to Best Employ Smart Machines*	Andrews, W. and Koehler-Kruener, H.	2015	Paper discusses procedures for hiring talents who can implement and maintain smart machines.	No
6	*"It's going to kill us!" and Other Myths About the Future of Artificial Intelligence*	Atkinson, R.	2016	The paper discusses five negative scenarious of Artificial Intelligence implication and explains why those predictions are wrong	No
7	*Smart Machines Mean Big Impacts: Benefits, Risks and Massive Disruption*	Austin, T.	2013	Intelligent machines will be widely used in many different areas. Paper looks at opportunitis and risks connected to its implementation	No
8	*Top 10 Strategic Technologies — The Rise of Smart Machines*	Austin, T.	2014	Article discusses on collaboration of AI with human	No
9	*Skills for today. Jobs for tomorrow*	Australian information industry associati	2017	New roles will emerge and we will need a new set of skills. This paper discusses how to prepare for the coming changes.	Yes
10	*Why Are There Still So Many Jobs? The History and Future of Workplace Automation*	Autor, D.	2015	Paper looks at historical aspects of automation. It discusses how advances in artificial intelligence might affect positive occupational change in the future	No
11	*Future of Work Scenarios 2035: 'I'd Rather Have a Bot Do It'*	Baker, V. and Austin, T.	2018	Paper advises leaders on how to manage the workforce in a highly positive scenario where AI powers both hardware and software	No
12	*Should we fear artificial intelligence? In-depth Analysis.*	Bentley, P., Brundage, M., Häggström, O. and Metzinger, T.	2018	A set of papers adressed to the politicians and legislators. First, it reveals three myths regarding existiantial threat AI put us in, and then it argues that AI is a necessary tool to build a long-term human presperity	No
13	*Social and Solidarity Economy and the Future of Work*	Borzaga, C., Salvatori, G. and Bodini, R.	2017	This paper discusses the role of Social and Solidarity Economy organizations and its effect on the future of work	No
14	*Global Catastrophic Risks*	Bostrom, N. and Cirkovic, M.	2008	The study discusses different types of possible catastrophic risks that humanity might face in the future and points out how those risks affect each other	No
15	*Existential Risk Prevention as Global Priority*	Bostrom, N.	2013	Paper discusses the notion of existential risk and examines different categories of existential risks. It also discusses the importance of dealing with the larger existential risks	Yes

16	*Superintelligence: Paths, Dangers, Strategies.*	Bostrom, N.	2016	This book talkes about a new form of life - Superintelligence. Machines are able to self improve and will sufficiently become smarter then all human intelligence combined. That might lead to human extinction if no necessary actions are applied	Yes
17	*The ambiguity of intelligent algorithms: job killer or supporting assistant.*	Braun, A., Zweck, A. and Holtmannspötter, D.	2016	This paper looks at varios scenarios of our future working life with AI in it.	No
18	*Workforce of the future: The competing forces shaping 2030*	Brown, J., Gosling, T., Sethi, B., Sheppard, B., Stubbings, C., Sviokla, J., Williams, J. and Zarubina, D.	2018	This report provides information on the research made by PwC and the James Martin Institute for Science and Civilisation, where it is presented 'Four Worlds of Work' for 2030 based on the insights from this research.	No
19	*Economic Possibilities for Our Children: Artificial Intelligence and the Future of Work, Education, and Leisure*	Brundage, M.	2015	This paper describes possible consequences of AI for the demand for human labor and encourages AI communities to eleborate society beneficial directions in order to shape these outcomes	No
20	*Race against the machine*	Brynjolfsson, E. and McAfee, A.	2011	This books describes modern technological advances and compares skill set of the workers with the constantly developing capabilities of the machines. It stresses the importance of keeping up with the change in order to suceed in the future job market.	No
21	*The second machine age*	Brynjolfsson, E. and McAfee, A.	2016	This book discusses advances in technology which will effect all spheres of our life, as well as our working life. It suggests different ways to survive and succeed in this constantly changing environment	Yes
22	*Digital workplace and culture. How digital technologies are changing the workforce and how enterprises can adapt and evolve*	Buchanan, J., Hatch, A. and Kelley, B.	2016	This paper discusses on the importance of constant focus on new technologies and digitalisation for both companies and employees in order to stay competitive and succeed in the new digital work environment	Yes
23	*Robotic Process Automation: Gearing up for greater integration*	Capgemini	2017	This report was conducted by Capgemini. It provides in-depth analyses of a type of AI called RPA. It describes benefits and difficulties when adopting RPA technologies and suggests actions for its successful adoptation.	Yes
24	*The impact of industrial robots on EU employment and wages: A local labour market approach.*	Chiacchio, F., Petropoulos, G. and Pichler, D.	2018	The study examines the impact of automatisation on work and wages in six European Union countries and the displacement effect caused by the robots	No
25	*Four fundamentals of workplace automation*	Chui, M., Manyika, J. and Miremadi, M.	2015	This study stresses that already in the near future most of the jobs will be automated. It shows the importance of redifining job tasks and processes within organisations, as well as concentrate on different type of tasks	No
26	*The AI Now Report: The Social and Economic Implications of Artificial Intelligence Technologies in the Near-Term*	Clare Elish, M., Barocas, S., Plasek, A. and Ferryman, K.	2016	This report raises social questions connected to implementation of Artificial Intelligence. It adresses ethical challenges, political and economic issues that will shape our future	No
27	*Will life be worth living in a world without work? Technological unemployment and the meaning of life*	Danaher, J.	2017	This study examines the social challenges technological unemployment will raise for society	No
28	*Future Work skills 2020*	Davies, A., Fidler, D. and Gorbis, M.	2011	This report depicts IFTF's foundational forecast regarding the ten important skill areas and six key drivers for the workforce of the future	Yes
29	*Robots and humans – complements or substitutes*	DeCanio, S.	2016	Article examines effect on wages with the spread of AI	No
30	*A world survey of artificial brain projects*	De Garis, H., Shuo, C., Goertzel, B. and Ruiting, L.	2010	This article discribes different artificial brain projects: large-scale brain simulations and cognitive behavior simulations	No
31	*Responsible Artificial Intelligence: Designing AI for Human Values*	Dignum, V.	2017	This paper examines a possible impact of AI on different spheres of our life and proposes design principles of AI which might respond to our human values	Yes
32	*Future of Work Scenarios 2035: 'Bots Can't Drive'*	Edwards, D.	2018	This paper describes one of the possible future scenarios where human can't rely on AI and have to control actions of the intelligent machines.	No
33	*A Framework for Applying AI in the Enterprise*	Elliot, B. and Andrews, W.	2017	This paper examines core AI technologies that might be implemented within the enterprises and different AI application areas	No
34	*Reconstructing work: Automation, artificial intelligence, and the essential role of humans*	Evans-Greenwood, P., Lewis, H. and Guszcza, J.	2017	This report explores an optimistic scenario of our future where AI are replacing us, or doing all the work for us, but reconstructing our work	No
35	*New Industries 2030: Virtual Talent Industry*	Fenn, J., Morello, D. and Raskino, M.	2018	This paper describes a scenario where businesses will be able to recruit AI algorithms	No
36	*Could Artificial Intelligence Create an Unemployment Crisis?*	Ford, M.	2013	This article discusses on the possibility of massive unemployment with the increasing implementation of AI systems	No

37	*The future of employment: how susceptible are jobs to computerization?*	Frey, C. and Osborne, M.	2013	Authors estimates the probability of automatisation for large number of different types of jobs. Subsequently they uses those estimates to predict the impact on labor market outcomes	No
38	*Is This Time Different? The Opportunities and Challenges of Artificial Intelligence*	Furman, J.	2016	The paper discusses different possible effects of AI, both posistive and negative. It also provides recommendations regarding possible actions from the governments in order to prevent the negative consequences	No
39	*Ten Years To The Singularity If We Really Really Try: ... and other Essays on AGI and its Implications*	Goertzel, B.	2014	This book combines various essays from Ben Goertzel regarding different issues related to creation of Artificial Inteligence and Artificial General Intelligence	No
40	*Artificial intelligence: opportunities and implications for the future of decision making*	Government Office for Science	2015	This publication explores possible implications of Artificial Intelligence technologies for government and society in Great Britain.	No
41	*How We Will Work in 2028*	Griffin, D. and Coleman, M.	2018	This paper describes six assumptions of our work life by 2028.	No
42	*Communication and Artificial Intelligence: Opportunities and Challenges for the 21st Century*	Gunkel, D	2012	This paper examines how the evolving technological changes affects communication studies	No
43	*Homo deus: A brief history of Tomorrow*	Harari, Y.	2016	This book examines various utopian and dystopian ideas about our future with AI.	Yes
44	*Robotic anesthesia – a vision for the future of anesthesia*	Hemmerling, T., Zaouter, C., Taddei, R., Cyr, S., Morse, J. and Wehbe, M.	2011	This review describes different types of robotic anastesia that exist today and that might appear in the future, its advantages and disadvantages to compare with human doctors	Yes
45	*Will People or Machines Rule Algorithmic Retailing?*	Hetu, R.	2017	This paper discusses the importance of AI algorithms implementation for the retail business of the future	No
46	*Impact of artificial intelligence, robotics and automation technologies on work*	Hislop, D., Coombs, C., Taneva, S. and Barnard, S.	2017	This report summarizes the findings of a previously undertaken review regarding the impact of AI technologies on society and different types of jobs.	No
47	*Competing for Top Talent: Build the Talent Platform*	Hunter, R. and Coleman, M	2016	This paper examines new aproaches to hiring top talents for the organization	No
48	*Future of Work Scenarios 2035: 'Minibot Proliferation'*	Hunter, R. and Waller, G.	2018	This paper describes a future scenario where minibots are heavily used both at work and at home and how this situation should be handled by the leaders within organizations	No
49	*The Evolution of Consciousness*	Immega, G.	2018	This paper explains the notion of consciousness and describes its different types	Yes
50	*Digital Disruption Profile: Computer Vision Sharpens Focus on AI Strategy*	Ingelbrecht, N.	2018	Article look at how computer vision can be employed by businesses and sueed to drive innovation	No
51	*The impact of robots on productivity, employment and jobs*	Int. Federation of Robotics	2017	This report provides International Federation of Robotics's point of view regarding automation and its effect on employment and productivity. This report is based on the opinions of several experts in the field	Yes
52	*The promise of artificial intelligence: Redefining management in the workforce of the future*	Kolbjørnsrud, V., Amico, R. and Thomas, R	2015	This paper stresses that changes caused by the implementation of new technologies will affect all types of jobs. That will create opportunities but will also force leaders to reconsider their own work as well as the work of the employees, reconsider training and hiring processes within the organization	Yes
53	*Partnering with AI: how organizations can win over skeptical managers*	Kolbjørnsrud, V., Amico, R. and Thomas, R	2017	This study shows how the position of a manager within the organization can affect his attitude towards the implementation of AI algorithms. It also provides possible solutions in order to make this transition within the organization smooth	No
54	*Artificial Intelligence and Its Implications for Income Distribution and Unemployment*	Korinek, A. and Stiglitz, J.	2017	This paper analyses how AI can distrupt human labour, if it may lead to a pareto improvement and channels which might lead to ineqality	No
55	*Robocalypse Now? What the 'Fourth industrial revolution' means for retail*	KPMG International	2017	This paper provides information for the retail specialists on how AI technologies might be deployed in the retail business	No
56	*The singularity is near*	Kurzweil, R.	2005	This book describes utopian scenarios of our future where AI is partually or complitely implemented in the society and help us to achieve our higher evolutionary goals	Yes

57	*Predicts 2018: China Leads Asia in Digital Transformation, Driven by Artificial Intelligence*	Liu, P., Tsai, T., Ji, K., Chien, M. and Shen, S.	2017	This paper examines China's innovation startegy and suggests leaders to use China's experience for gaining the competitive advantage	No
58	*Forecast: The Business Value of Artificial Intelligence*	Lovelock, J., Tan, S., Hare, J., Woodward, A. and Priestley, A.	2018	In this paper Gartner forecasts business value of different types of AI	No
59	*Visualizing Opportunities in the Higher Education Ecosystem — Adding Speed and Personalization Through the Digital Dimension*	Lowendahl, J.	2018	Articles examines how digitalization effects speed and personalization in the education ecosystem	No
60	*Automate this: the business leader's guide to robotic and intelligent automation*	Lowes, P., Cannata, F., Chitre, S. and Barkham, J.	2017	This paper examines reasons and basics of the RPA and IA and make some assumptions regarding the future of these technologies	No
61	*Racing with and against the machine: changes in occupational skill composition in an era of rapid technological advance*	MacCrory, F., Westerman, G., Alhammadi, Y. and Brynjolfsson, E.	2014	This paper examines 674 occupations and changes in their skill content in a period from 2006 until 2014 and examines the possible change in skill content in the future	No
62	*The forthcoming Artificial Intelligence (AI) revolution: Its impact on society and firms*	Makridakis, S.	2017	This paper overviews previous predictions regarding technological advances and make overview over existing predictions for the future. It investigates regarding possible consequences of AI for employment and other spheres of our life	Yes
63	*Artificial Intelligence: Opportunities and Risks*	Mannino, A., Althaus, D., Erhardt, J., Gloor, L., Hutter, A. and Metzinger, T.	2015	This policy paper adresses possible risks and opportunities connected to the constant development of Artificial Intelligence and creation of Superintelligence	Yes
64	*Policies to expand digital skills for the machine age*	Martin, J.	2017	This paper examines the distribution of digital skills among population in OECD countries, as well as level of constant re-education among adults. It suggests which policies should be inffered in order to expand digital skills among population	No
65	*The Effects of Artificial Intelligence and Robotics on Business and Employment: Evidence from a survey on Japanese firms*	Masayuki, M.	2016	This paper is using data from previously made survey where over 3000 Japanese firms were interviewed regarding their attitudes towards AI technologies.	No
66	*Jobs lost, jobs gained: Workforce transitions in a time of automation*	McKinsey Global Institute	2017	The MGI report tries to examine which jobs might absolete and which might appear in the next 20 years.It predicts and discusses regarding enormous workforce transitions that we will face in the future.	Yes
67	*Intelligent systems in manufacturing: current developments and future prospect*	Meziane, F., Vadera, S., Kobbacy, K. and Proudlove, N.	2000	This review overviews artificial intelligence algorithms which are used in manufacturing and scenarios for the future development of these algorithms	No
68	*Are Robots Taking Our Jobs, or Making Them*	Miller, B. and Atkinson, R.	2013	This study stresses that higher productivity leads to more jobs and therefore the claims that technology destroing jobs assumed to be a misleading speculation.	No
69	*Leveraging artificial intelligence and robotics for sustainable growth*	Mitra, I., Nandy, P., Bhattacharya, U. and Dutta, D.	2017	This paper discusses the implication of Artificial Intelligence technologies on industries and organizations in India	No
70	*How We Will Work in 2027*	Morello, D. and Coleman, M.	2017	This paper discusses the distant future scenario when human work together with AI	No
71	*The Future of Work Will Demand Changes to Higher Education*	Morgan, G. and Thayer, T.	2018	This paper examines two main trends in the changes to higher education which are connected to the implimentation of AI technologies. Lifelong learning and constant development of new relevant skills will help people being competitive in the future	No
72	*Future progress in artificial intelligence: A Survey of Expert Opinion*	Müller, V. and Bostrom, N.	2014	This study examines the distribution of beliefs regarding the possibility of creation of Superintelligence . A questionaire was sent to experts in the field and findings are summarized and presented	No
73	*Automation and the Labor Force*	Nerhus, L.	2014	This paper examines the historical aspects of automation and discusses various short-term and long-term implications of automation on labor force	No
74	*New technologies: A jobless future or a golden age of job creation?*	Nübler, I.	2016	This research adresses job destruction and job creation issues and stresses the importance of governmental involvment for the better future	No
75	*The Nature of Self-Improving Artificial Intelligence*	Omohundro, S.	2008	This paper presents a framework for answering questions related to the creation of self improving Artificial Intelligent systems, or Superintelligence	Yes
76	*The Risks of Artificial Intelligence to Security and the Future of Work*	Osoba, O. and Welser, W.	2017	This study raises two important question linked to the automation processes that accures. Firstly it looks at risks of Artificial Intelligence which are connected to national and domestic security. Secondly it mentiones issues on the future of work and suggest a framework for examining occupational susceptibility to automation	No

77	*Computerization and the Future of Jobs in Norway*	Pajarinen, M., Rouvinen, P. and Ekeland,	2015	This study aims to understand how vulnerable different jobs in Norway are to digitalization. Authors base their research on the Frey and Osborne's approach	Yes
78	*Technological unemployment: Educating for the fourth industrial revolution*	Peters, M.	2017	This study examines the coming changes connected to the development of technology and stresses the importance of education for the successful employment in the future	No
79	*Future of Work Scenarios 2035: How Will Leaders Manage in a Majority-Bot Workforce World?*	Poitevin, H., Hunter, R., Roth, C., Waller, G., Austin, T., Edwards, D. and Baker, V.	2018	This research offers four scenarios for the future of work with AI and suggests actions in order to successfully manage those human - machine working environments	No
80	*How Artificial Intelligence in Impacting Real Life Every day*	Poola, I.	2017	This study aims to look through different application areas of AI that exists today and give some predictions for the future application areas of AI algorithms.	No
81	*The Future of Jobs and Jobs Training*	Rainie, L. and Anderson, J.	2017	More and more jobs are in a risk to be automated and disappear in the near and distant future. This study focuses on the importance of constant learning and training and examines issues connected to re-education and training	Yes
82	*Artificial Intelligence*	Ranelagh Political Communications	2018	This paper aim to describe general concepts of Artificial Intelligence, it's history and current state. It also looks at current opportunities and challenges connected to AI	No
83	*PwC's Global Artificial Intelligence Study: Sizing the prize*	Rao, A. and Verweij, G.	2017	The research adresses impact and potential of AI technologies and discusses value AI bring to different types of businesses	Yes
84	*From foresight to impact? The 2030 Future of Work scenarios*	Rhisiart, M., Stormer, E. and Daheim, C.	2017	This paper looks at using foresight work to impact policy related to the future of work in the UK	No
85	*How technology is destroying jobs*	Rotman, D.	2013	This study is an analyses of several studies regarding the future of employment with AI. It mentiones that today's jobs are going to disapear faster then the new jobs will appear and stresses the importance of governmental involvment	No
86	*Research Priorities for Robust and Beneficial Artificial Intelligence*	Russell, S., Dewey, D. and Tegmark, M	2015	This report focuses on identification of research directions for the field of AI in order to make it beneficial for society	No
87	*Technological Unemployment, AI, and Workplace Standardization: The Convergence Argument*	Saner, M.	2015	the paper analyzes socio-economic innovations and trends that standardize education, workplace and culture	No
88	*AI, Robotics, and the future of jobs*	Smith, A. and Anderson, J.	2014	Authors of this report argue that new types of jobs will be created and technology will enable us to concentrate on the preferred activities. They stress the importance of self avareness and necessity to control our own destiny as a society	No
89	*The Future: Innovation and Jobs*	Stevens, Y.	2016	This study discusses the positive future scenarios of our work life when AI is broadly implemented. It provides a unique set of solutions which aims to reduce the possible negative impact of automation on society	No
90	*Learn How the Future of Work Is Transforming Employee Experience Globally*	Tay, G. and Aggarwal, A.	2018	By using the examples of five forward organizations, this study aims to show the business value that can be added by the workforce automation	No
91	*Artificial Intelligence and Public Policy*	Thierer, A., Castillo O'Sullivan, A. and Russell, R.	2017	This research raises question regarding regulations in the field of AI and suggests a policy framework for AI algorithms	No
92	*How Digital Transformation Opens New Labor Opportunities for Urban Economy and Industrie 4.0*	Tratz-Ryan, B. and Eichhorn, E.	2018	This paper looks at digitalization and at how it will lead to new business models and labour opportunies	No
93	*Artificial intelligence and professional roles*	Tredinnick, L.	2017	This study discusses how AI technologies will effect and transform our roles that we perform within organizations	Yes
94	*Educating for a Digital Future: The Challenge*	Tucker, M.	2017	This paper focuses on the importance of gaining special skills and knowledge in order to be able to work together with AI in the future. It discusses what type of knowledge might be relevant and what skills we have to focus on	No
95	*Artificial Intelligence as a Positive and Negative Factor in Global Risk*	Yudkowsky, E.	2008	This paper debates to which extent AI is an existential risk or if we will be able to build a friendly AI	No
96	*What happens if robots take the jobs? The impact of emerging technologies on employment and public policy*	West, D.	2015	This paper examines how does new emerging technologies effect public policies, workforce of the future and on various demographic groups	No

97	*The jobs that Artificial Intelligence will create*	Wilson, J., Daugherty, P. and Morini-Bianzino, N.	2017	This report describes three new categories of jobs that will appear in the near future due to the technological advances	Yes
98	*Artificial Intelligence and Robotics and Their Impact on the Workplace*	Wisskirchen, G., Thibault Biacabe, B., Bormann, U., Muntz, A., Niehaus, G., Jiménez Soler, G. and Von Brauchitsch, B.	2017	This paper adresses various questions which might rise when organizations will start with massive automation of their businesses. These questions include economic issues, business issues, unemployment issues and issues connected to change of the educational system	No
99	*How Artificial Intelligence impacts labour and management:Management in the age of Artificial Intelligence Employment, economics and ethics*	Wisskirchen, G.	2018	This study mentiones the future impact of AI on the labor market. It stresses that new job structures will appear, the role of human in the labor relations will change and much of the employment will be outsorced	No
100	*Artificial Intelligence: The Road Ahead in Low and Middle-Income Countries*	World Wide Web Foundation	2017	This study aims to research how AI might effect people in low- and middle-income countries. The results of this study are based on the interviews with the experts in the field as well as extensive literature review	No

Attachment 2

Study selection. 24 final sources selected during the third stage of study selection

#	Title	Authors	Year of publicatio	Description
1	*A survey of Artificial Intelligence techniques employed for adaptive educational systems within e-learning platforms*	Almohammadi, K., Hagras, H., Aldabbagh, G. and Alghazzawi, D.	2017	A survey looks at different artificial intelligence techniques within e-learning, their advantages and disadvantages.
2	*Skills for today. Jobs for tomorrow*	Australian information industry association	2017	New roles will emerge and we will need a new set of skills. This paper discusses how to prepare for the coming changes.
3	*Existential Risk Prevention as Global Priority*	Bostrom, N.	2013	Paper discusses the notion of existential risk and examines different categories of existential risks. It also discusses the importance of dealing with the larger existential risks
4	*Superintelligence: Paths, Dangers, Strategies.*	Bostrom, N.	2016	This book talkes about a new form of life - Superintelligence. Machines are able to self improve and will sufficiently become smarter then all human intelligence combined. That might lead to human extinction if no necessary actions are applied
5	*The second machine age*	Brynjolfsson, E. and McAfee, A.	2016	This book discusses advances in technology which will effect all spheres of our life, as well as our working life. It suggests different ways to survive and succeed in this constantly changing environment
6	*Digital workplace and culture. How digital technologies are changing the workforce and how enterprises can adapt and evolve*	Buchanan, J., Hatch, A. and Kelley, B.	2016	This paper discusses on the importance of constant focus on new technologies and digitalisation for both companies and employees in order to stay competitive and succeed in the new digital work environment
7	*Robotic Process Automation: Gearing up for greater integration*	Capgemini	2017	This report was conducted by Capgemini. It provides in-depth analyses of a type of AI called RPA. It describes benefits and difficulties when adopting RPA technologies and suggests actions for its successful adoptation.
8	*Future Work skills 2020*	Davies, A., Fidler, D. and Gorbis, M.	2011	This report depicts IFTF's foundational forecast regarding the ten important skill areas and six key drivers for the workforce of the future
9	*Responsible Artificial Intelligence: Designing AI for Human Values*	Dignum, V.	2017	This paper examines a possible impact of AI on different spheres of our life and proposes design principles of AI which might respond to our human values
10	*Homo deus: A brief history of Tomorrow*	Harari, Y.	2016	This book examines various utopian and dystopian ideas about our future with AI.
11	*Robotic anesthesia – a vision for the future of anesthesia*	Hemmerling, T., Zaouter, C., Taddei, R., Cyr, S., Morse, J. and Wehbe, M.	2011	This review describes different types of robotic anastesia that exist today and that might appear in the future, its advantages and disadvantages to compare with human doctors
12	*The Evolution of Consciousness*	Immega, G.	2018	This paper explains the notion of consciousness and describes its different types

13	*The impact of robots on productivity, employment and jobs*	Int. Federation of Robotics	2017	This report provides International Federation of Robotics's point of view regarding automation and its effect on employment and productivity. This report is based on the opinions of several experts in the field
14	*The promise of artificial intelligence: Redefining management in the workforce of the future*	Kolbjørnsrud, V., Amico, R. and Thomas, R.	2015	This paper stresses that changes caused by the implementation of new technologies will affect all types of jobs. That will create opportunities but will also force leaders to reconsider their own work as well as the work of the employees, reconsider training and hiring processes within the organization
15	*The singularity is near*	Kurzweil, R.	2005	This book describes utopian scenarios of our future where AI is partually or complitely implemented in the society and help us to achieve our higher evolutionary goals
16	*The forthcoming Artificial Intelligence (AI) revolution: Its impact on society and firms*	Makridakis, S.	2017	This paper overviews previous predictions regarding technological advances and make overview over existing predictions for the future. It investigates regarding possible consequences of AI for employment and other spheres of our life
17	*Artificial Intelligence: Opportunities and Risks*	Mannino, A., Althaus, D., Erhardt, J., Gloor, L., Hutter, A. and Metzinger, T.	2015	This policy paper adresses possible risks and opportunities connected to the constant development of Artificial Intelligence and creation of Superintelligence
18	*Jobs lost, jobs gained: Workforce transitions in a time of automa*	McKinsey Global Institute	2017	The MGI report tries to examine which jobs might absolete and which might appear in the next 20 years.It predicts and discusses regarding enormous workforce transitions that we will face in the future.
19	*The Nature of Self-Improving Artificial Intelligence*	Omohundro, S.	2008	This paper presents a framework for answering questions related to the creation of self improving Artificial Intelligent systems, or Superintelligence
20	*Computerization and the Future of Jobs in Norway*	Pajarinen, M., Rouvinen, P. and Ekeland, A.	2015	This study aims to understand how vulnerable different jobs in Norway are to digitalization. Authors base their research on the Frey and Osborne's approach
21	*The Future of Jobs and Jobs Training*	Rainie, L. and Anderson, J.	2017	More and more jobs are in a risk to be automated and disappear in the near and distant future. This study focuses on the importance of constant learning and training and examines issues connected to re-education and training
22	*PwC's Global Artificial Intelligence Study: Sizing the prize*	Rao, A. and Verweij, G.	2017	The research adresses impact and potential of AI technologies and discusses value AI bring to different types of businesses
23	*Artificial intelligence and professional roles*	Tredinnick, L.	2017	This study discusses how AI technologies will effect and transform our roles that we perform within organizations
24	*The jobs that Artificial Intelligence will create*	Wilson, J., Daugherty, P. and Morini-Bianzino, N.	2017	This report describes three new categories of jobs that will appear in the near future due to the technological advances

Attachment 3

Study selection. 20 non-academic sources selected during the third stage of study selection

#	Title	Authors	Year of publicatio	Description
1	*The Singularity Isn't Near*	Allen, P.	2011	This article argues that the moment when AI algorithms will become as intelligent as human is nowhere near
2	*5 amazing predictions by futurist Ray Kurzweil that came true — and 4 that haven't*	Baer, D.	2015	This article provides a description of several accurate and unaccurate predictions by a well known futurist Ray Kurzweil
3	*Artificial Intelligence for the real world*	Davenport, T. and Ronanki, R	2018	This article depicts several categories of AI which are used by organizations these days, and provides a framework for integration of AI technologies
4	*Artificial intelligence will become strong enough to be a concern, says Bill Gates*	Dredge, S.	2015	This article describes the concerns of several experts in the field of AI regarding the negative consequences of AI
5	*Løser utfordringer på bassengkanten*	Kveim Sti, T.	2018	This article published in "Finansavisen" talkes about a conversation a consulting company Avanade had regarding AI, possibilities it brings and its implementation. This article also describes Avanade's concerns regarding the future employment issues that might arrise in the company when AI is implemented
6	*Elon Musk: artificial intelligence is our biggest existential threat*	Gibbs, S.	2014	In this article Elon Musk stresses AI might be the biggest threat to our civilization and he encourages human to be careful with it
7	*Elon Musk: regulate AI to combat 'existential threat' before it's too late*	Gibbs, S.	2017	Elon Musk depicts AI as a 'fundamental risk to human civilization' and suggests to be proactive with the creation of regulations. Those regulations have to limit application areas as well as who might use it
8	*Growth of AI could boost cybercrime and security threats, report warns*	Hern, A.	2018	This article argues that it's important to be aware of potential misuse of AI technologies within financial sphere, military and others. Therefore it have to be developed a set of regulations to prevent the catastrophic effects of AI
9	*AI vs. Human Intelligence: Why Computers Will Never Create Disruptive Innovations*	Jankel, N.	2015	This article argues that AI algorithms will never become conscious and therefore they will never be able to fully replace human
10	*Yes, robots are going to take our jobs - but this expert thinks the AI age means a better life for people.*	Kimmorley, S.	2017	In this article Ben Goertzel - a well known scientist in the field of AI, arguest that even though AI will definately take many of our jobs, humans will only benefit from that. We will be able to spend more time with friends and relatives and dedicate our lifes to something that is meaningful for us

11	*The question with AI isn't whether we'll lose our jobs - it's how much we'll get paid*	Kletzer, L.	2018	This article point out that even though smart algorithms will replace humans in many jobs, they will only replace us in the fields where they give the greatest productivity advantage. However the article is raising another question: Even though we will keep the job, will we still get the same remuneration?
12	*Artificial Intelligence Will Take Your Job: What You Can Do Today To Protect It Tomorrow*	Kucheriavy, A.	2018	This article discusses the incredible productivity level of AI compared with humans and the opportunities an employer gets when employing AI instead of a human. It also points out what can be done in order to guarantee our future employment
13	*Why Futurist Ray Kurzweil Isn't Worried About Technology Stealing Your Job*	Lev-Ram, M.	2017	This post is a written version of an interview with a futurist Ray Kurzweil, who states that humans shouldn't worry about the development of new technologies and about losing our jobs to AI. He notes that even though the todays jobs will disappear, the appearance of new jobs will emerge
14	*AI won't put you out of work – your future job doesn't exist yet*	London, A.	2017	This article describes predictions of Ray Kurzweil where he talks about the creation of new industries and new job types
15	*How AI And Deep Learning Are Now Used To Diagnose Cancer*	Marr, B.	2017	This article shows us how AI technologies can be implied in order to predict cancer on early stages. AI technologies might potentially open a lot of opportunities for us and help us to predict deadly diseases on early stages and successfully fight them
16	*How AI Impacts Education*	Schmidt, A.	2017	This post gives us an insight into the application areas of AI technologies within the field of education. Successfully implemented AI might help us to personalize the experience of a student. This is done by showing us what areas we should repeat ones again, where we are strong and by providing a unique learning
17	*Nick Boström: Google DeepMind is winning the race to develop human-level artificial intelligence*	Shead, S.	2016	This post shows the opinion of one of the leading voices in AI industry - Nick Bostrom. He talkes about the leading companies in the field of AI who are coming closer to the creation of Artificial Superintelligence
18	*Robots will destroy our jobs – and we're not ready for it*	Shewan, D.	2017	This article argues that even though many of us are not concerned about losing our job to AI, we have to reconsider that. It states that many industries are already effected by new technologies and it will only go further
19	*Deep Learning Will Radically Change the Ways We Interact with Technology*	Singh, A.	2017	In this article we can see examples of Deep learning algorthms applied in various field of science. The post stresses that we will see even more of it in the years to come
20	*World's largest hedge fund to replace managers with artificial intelligence*	Solon, O.	2016	This post describes how one of the world's leading hedge funds attempting to automate three quarters of all management decisions within the next five years

Attachment 4A

Intervjuguide: Andre kategori av elite informanter

Generelt

For det første vil jeg takke deg for at du deltar i intervju i forbindelse med min Masteroppgave. Jeg antar at dette intervjuet vil ta ca. 30 min. Jeg vil spørre deg om dine meninger i forhold til kunstig intelligens(AI), din erfaring med kunstig intelligens samt dine tanker omkring hvordan kunstig intelligens kan påvirke jobbmarkedet i nær og lang fremtid.

Masteroppgaven jeg skriver handler om ulike perspektiver i forhold til konsekvenser av kunstig intelligens og digitalisering for fremtidens arbeidsliv. Jeg trenger det vi kaller «elite informanter» som sitter i en særlig egnet posisjon til å uttale seg om dette, for å avdekke alle aspekter av problemstillingen som ikke omhandles i litteraturen på feltet.

- Før jeg begynner, ønsker jeg å avklare om du har noe imot at jeg tar opp samtalen vår og sletter den etterpå? I dette tilfellet slettes opptakene umiddelbart etter at jeg har analysert informasjonen.
  Jeg vil gjerne be deg om å gi meg ditt skriftlige samtykke der du spesifiserer hvordan du vil at din personlige informasjon (navn, firmanavn, stilling) skal håndteres. Ved anonyme intervjuer vil det ikke være mulig å identifisere deg i forhold til noen av svarene du har angitt.

  Du kan når som helst trekke deg fra intervjuet.

1. Åpne spørsmål for å starte samtalen:

- Kan du fortelle litt om deg selv: hva du jobber med i det selskapet du er ansatt i; Hvilken type stilling har du? (Hva er dine oppgaver?)
- Hvor lenge har du jobbet i den nåværende stilling (evt. generelt med innovasjon / digitalisering / AI).. Har du noen gang jobbet med et AI-relatert prosjekt?

2. Som jeg allerede har fortalt deg, studerer jeg ulike perspektiver i forhold til konsekvenser av AI og digitalisering for fremtidens arbeidsliv. Formålet med dette intervjuet med deg er da å finne ut dine personlige meninger om dette. De fleste spørsmålene jeg stiller er rettet til å avdekke dine meninger om digitalisering, AI, og om det generelle potensialet, muligheter og / eller utfordringer som ligger i den

teknologiske utviklingen. Jeg håper at du kan basere svarene dine på din erfaring og være ærlig om dette.

- Du jobber med ____ og du ser alle de digitale endringene som skjer, og alle de nye teknologiene som oppstår ... Hva tror du fremtiden bringer i forhold til dette?
- Hva er din posisjon i forhold til AI? (evt. hvilke muligheter/utfordringer du ser?)
- Hva tror du er «worst-» og «best case» scenario I forhold til samfunnet?
- Hva tror du er «worst-» og «best case» scenario for (norske) selskaper?
- Siden du jobber med _____ (og du ser hvordan andre selskaper implementerer disse innovasjonene i deres organisasjoner).. Kan du si at mange bedrifter er opptatt av kunstig intelligens i dag og hvorfor? Hvilke muligheter eller utfordringer ser du?
- Hvis selskapene ser muligheter, i så fall hvilke muligheter? Hvis de ser utfordringer, i så fall hvilke utfordringer? (Hva er hovedpoengene med å investere i AI blant norske selskaper? Hva er hovedpoengene mot å investere i en AI?)
- Hva er din posisjon? Tror du det er viktig å fokusere på AI? Hvorfor tror du det er viktig / ikke viktig å fokusere på AI?
- Hva trengs fra et selskap for å begynne å bruke AI (spesialteam, mange ressurser, konsulenter, etc.)?

3. Det andre spørsmålet jeg drøfter i min oppgave er hvordan AI vil påvirke vårt profesjonelle liv og hva vi kan gjøre for å være konkurransedyktige som personer i fremtiden. Derfor vil jeg spørre deg om fremtidens arbeidsliv i forhold til AI

- Hvilke typer oppgaver tror du AI kan gjøre innen de neste par årene og hvilke oppgaver kan de gjøre bedre enn mennesker (allerede nå og i fremtiden)?
- Hvilke oppgaver tror du de aldri kan gjøre?
- Tror du at AI vil øke arbeidsledigheten - hvis ja, hvorfor, hvis nei, hvorfor?
  Hvis ja: Hva synes du bør gjøres for å forhindre massiv arbeidsledighet (fra den offentlige siden /fra bedriftens side /fra ansattes side)?
- Hva tror du mennesker bør lære/studere for å være konkurransedyktige i fremtiden?
  Hvis du vil gi noen et råd angående hva de bør studere/lære seg ... hva ville du anbefalt?

4. Har du noe du ønsker å tilføye angående AI og implikasjoner for arbeidslivet?

Attachment 4B

Intervjuguide: Første kategori av elite informanter

Generelt

For det første vil jeg takke deg for at du deltar i intervju i forbindelse med min Masteroppgave. Jeg antar at dette intervjuet vil ta ca. 30 min. Jeg vil spørre deg om dine meninger i forhold til kunstig intelligens(AI), din erfaring med kunstig intelligens samt dine tanker omkring hvordan kunstig intelligens kan påvirke jobbmarkedet i nær og lang fremtid.

Masteroppgaven jeg skriver handler om ulike perspektiver i forhold til konsekvenser av kunstig intelligens og digitalisering for fremtidens arbeidsliv. Jeg trenger det vi kaller «elite informanter» som sitter i en særlig egnet posisjon til å uttale seg om dette, for å avdekke alle aspekter av problemstillingen som ikke omhandles i litteraturen på feltet.

- Før jeg begynner, ønsker jeg å avklare om du har noe imot at jeg tar opp samtalen vår og sletter den etterpå? I dette tilfellet slettes opptakene umiddelbart etter at jeg har analysert informasjonen.
  Jeg vil gjerne be deg om å gi meg ditt skriftlige samtykke der du spesifiserer hvordan du vil at din personlige informasjon (navn, firmanavn, stilling) skal håndteres. Ved anonyme intervjuer vil det ikke være mulig å identifisere deg i forhold til noen av svarene du har angitt.

  Du kan når som helst trekke deg fra intervjuet.

1. Åpne spørsmål for å starte samtalen:

- Kan du fortelle litt om deg selv: hva du jobber med i det selskapet du er ansatt i?
- Hvor lenge har du jobbet i den nåværende stilling (evt. generelt med innovasjon / digitalisering / AI)?
- Har du noen gang jobbet med et AI-relatert prosjekt? Kan du fortelle litt rundt dine oppgaver og erfaringer i forhold til dette?
- Er det mange AI-relaterte prosjekter dere jobber med som har blitt avbrutt eller utsatt? Kan du si noe om årsaken til dette?
- Er det mange AI relaterte prosjekter som har blitt evaluert?
- Hvorfor synes Dere at det er viktig å fokusere på AI? Hva forventer selskapet å oppnå med å implementere AI?
- De som selger AI- teknologi til dere, hva sier de for å overbevise dere til å investere i dette?

- Er dere en av de første i deres bransje for å jobbe med AI, eller kjenner dere til noen av deres konkurrenter som også jobber med AI relaterte prosjekter? (trenger ikke navn på konkurrenter)
- Hva trengs fra et selskap for å begynne å bruke AI?
- Vi har nå snakket veldig mye om muligheter i forbindelse med AI, men hva kan du si om utfordringer, ser dere noen utfordringer med AI?

2. Vi har nå snakket mye om bedriftens mening om AI, men jeg ønsker også din personlige mening. De fleste spørsmålene jeg stiller er rettet til å avdekke dine meninger om digitalisering, AI, og om det generelle potensialet, muligheter og / eller vanskeligheter som ligger i den teknologiske utviklingen.

- Du jobber med ____, og du ser alle de digitale endringene som skjer, og alle de nye teknologiene som oppstår ... Hva tror du fremtiden bringer i forhold til dette?
- Hva er din posisjon i forhold til AI? (evt. hvilke muligheter/utfordringer ser du?)
- Hva tror du er «worst-» og «best case» scenario I forhold til samfunnet?
- Hva tror du er «worst-» og «best case» scenario I forhold til AI for dere (selskap)?

3. Det andre spørsmålet jeg drøfter i min oppgave er hvordan AI vil påvirke vårt profesjonelle liv og hva vi kan gjøre for å være konkurransedyktige som personer i fremtiden. Derfor vil jeg spørre deg om fremtidens arbeidsliv i forhold til AI

- Hvilke typer oppgaver tror du AI kan gjøre innen de neste par årene og hvilke oppgaver kan de gjøre bedre enn mennesker (allerede nå og i fremtiden)?
- Hvilke oppgaver tror du de aldri kan gjøre?
- Hvordan er tilgangen til arbeidskraft med riktig kompetanse innen AI? (som vet hvordan AI implementeres og brukes riktig)
- Tror du at AI vil øke arbeidsledigheten - hvis ja, hvorfor, hvis nei, hvorfor?
  Hvis ja: Hva synes du bør gjøres for å forhindre massiv arbeidsledighet (fra den offentlige siden /fra bedriftens side /fra ansattes side)?
- Hvordan tenker dere å forhindre at folk mister jobben hos dere nå når AI kan erstatte noen av arbeidstakere? Er det noe diskusjon i selskapet omkring denne problematikken?
- Hva tror du mennesker bør lære/studere for å være konkurransedyktige i fremtiden? Hvis du vil gi noen et råd angående hva de bør studere/lære seg ... hva ville du anbefalt?

4. Har du noe du ønsker å tilføye angående AI og implikasjoner for arbeidslivet?

Attachment 5

Consent for participation in the study

I have received information about the study (see below) and I am willing to participate

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(Signed by participant, date)

Information about the study

BACKGROUND:

The purpose with this dissertation is to point out and explore different positions in the literature and among elite informants who tries to understand in which areas we can be replaced by an AI in the future – and in which areas we can't. The overall purpose is to understand what are the existing perspectives, what can we take away from those perspectives and how we might prepare for the changes in order to be competitive in this world of emerging new technologies.

Literature review plays an important part of this dissertation, as a method used for the collection of necessary information on the subject. However, to properly answer the main question, I am depending on the opinions of elite informants, as they might give some insight into my research question which might be missing in the literature review. For this reason, I chose to conduct in-depth interviews with the two types of elite informants in the field:

- First category: people who are working with actual implementation of AI and with technical knowledge of new technologies and digitalization.
- Second category: people working with strategic issues related to the implementation of AI and digital new technologies. These elite informants have either broad or relevant technological experience or are in strategic managerial positions with high strategic decision-making power related to AI.

You have been invited to participate in this study because your expertise corresponds to one of the above mentioned focus groups and your opinion might be very valuable for the purpose of this dissertation.

The study is performed by the student from the Organization, Leadership and Work Master's program at the University of Oslo.

Date for the end of this project is set to 31.05.2018

ANONYMITY AND PERSONAL INFORMATION:

All personal data will be treated confidentially. Only the person conducting this study (the student) will have access to the provided information. By the end of this project all information will be anonymized and deleted.

The study has been reported to the Norwegian Centre for Research Data (NSD). All processing of personal data in the study must be approved by this agency.

Please provide the desired answer:

- I agree that my personal information may be published after study completion. Personal information might include: Name, Position, Company name (please underline the correct option/s)
- Please don't publish any of my personal information

VOLUNTARY PARTICIPATION:

Participation in this study is voluntary. You can choose to withdraw your consent at any time, and without stating any reason. If you choose to withdraw your consent, all information about you will be deleted.

RESEARCH QUESTION:

What are the various perspectives on the consequences of Artificial Intelligence for our professional life?

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Attachment 6

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Vår dato: 12.04.2018 Vår ref: 60026 / 3 / OASR Deres dato: Deres ref:

Vurdering fra NSD Personvernombudet for forskning § 31

Personvernombudet for forskning viser til meldeskjema mottatt 22.03.2018 for prosjektet:

60026	*What are the various perspectives on what the future with Artificial Intelligence might look like for our professional life: In what types of jobs can AI replace us and where it can't replace us, according to those perspectives?*
Behandlingsansvarlig	*Universitetet i Oslo, ved institusjonens øverste leder*
Daglig ansvarlig	*Lars Klemsdal*
Student	*Daria Fagerli*

Vurdering

Etter gjennomgang av opplysningene i meldeskjemaet og øvrig dokumentasjon finner vi at prosjektet er meldepliktig og at personopplysningene som blir samlet inn i dette prosjektet er regulert av personopplysningsloven § 31. På den neste siden er vår vurdering av prosjektopplegget slik det er meldt til oss. Du kan nå gå i gang med å behandle personopplysninger.

Vilkår for vår anbefaling

Vår anbefaling forutsetter at du gjennomfører prosjektet i tråd med:

- opplysningene gitt i meldeskjemaet og øvrig dokumentasjon
- vår prosjektvurdering, se side 2
- eventuell korrespondanse med oss

Vi forutsetter at du ikke innhenter sensitive personopplysninger.

Meld fra hvis du gjør vesentlige endringer i prosjektet

Dersom prosjektet endrer seg, kan det være nødvendig å sende inn endringsmelding. På våre nettsider finner du svar på hvilke endringer du må melde, samt endringsskjema.

Opplysninger om prosjektet blir lagt ut på våre nettsider og i Meldingsarkivet

Vi har lagt ut opplysninger om prosjektet på nettsidene våre. Alle våre institusjoner har også tilgang til egne prosjekter i Meldingsarkivet.

Dokumentet er elektronisk produsert og godkjent ved NSDs rutiner for elektronisk godkjenning.

Attachment 7: Control scale with informant's answers