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Competence Dynamics in the Age of AI

A qualitative study examining how generative AI alters the relevance and need of competences among high-skilled workers

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Abstract

The rapid pace at which generative AI is becoming incorporated into various professional fields is altering the required competences of high-skilled workers. As this technology is becoming more established, there is a simultaneous evolution of the necessary competences which accentuates the significance of further developing functional, cognitive, and social competences. The aim of this qualitative study is to explore the impact of generative AI on both the relevance and need of these competences among high-skilled workers across different sectors.

A systematic literature review was conducted to create a competence framework for high-skilled workers based on the existing literature. Semi-structured interviews were carried out with high-skilled workers that have experience working with generative AI to clarify the effects of the technology on the competence needs. Several areas emerged where the integration of AI directly or indirectly influenced their role or what the professional perceived to be necessary competences needed for their position. The findings suggest that while generative AI enhances efficiency and productivity for routine and simple tasks, it also necessitates a need for further development of high level social and cognitive competences, such as critical thinking, problem solving, and emotional intelligence. Moreover, the findings also underscore the dynamic symbiosis of functional technical competences and generative AI, highlighting the need for continuous development of these competences. This thesis contributes to the discourse of the interplay between high-skilled workers and generative AI by providing a framework of competences for professionals and organizations trying to navigate this emerging technological development. The results provide insight and implications for the development of the workforce, organizational strategy formulation, and future educational planning, which will be valuable for high-skilled individuals navigating and staying competitive in a future where AI will increasingly influence professional roles and required competences.

Keywords: High-skilled workers, Generative AI, Competences, Competence framework, Large language models (LLM)

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1. Introduction

The introduction chapter introduces the overarching topic of research, including background information of generative AI and defining high-skilled workers. Additionally, the impact on competences and a problematization centered around implications of scarce research in an emerging topic. This chapter also presents the purpose and research question, delimitations, and disposition.

1.1 Background

Innovation and digitalization has historically had immense impacts on businesses by altering common practices and roles within organizations (Rachinger et al., 2019; Warner & Wäger, 2019; Hult et al., 2004). Digitalization and technological innovations change the ways of working, augmenting required competences and redefining preset roles to adapt to a rapidly changing environment (Kohnke, 2017). A technological innovation which has been on the rise during recent years is generative AI (artificial intelligence).

Generative AI refers to a class of artificial intelligence technologies designed to create new content, ranging from text and images to music and code, based on patterns and data it has learned. It uses algorithms to generate outputs that are often indistinguishable from those produced by humans.

The above two sentences were generated via OpenAIs ChatGPT 4 using the prompt “Can you define generative AI in two short sentences?”. ChatGPT is a form of generative AI based on a large language model (LLM) which enables the user to prompt the chatbot, which then generates an answer to the prompt based on the incorporated AI model (OpenAI, n.d.). Upon the launch of ChatGPT, it was the first ever advanced form of generative AI easily accessible to the public, obtaining over 100 million users just two months after launch (Hu, 2023). The launch, and massive success, of ChatGPT is accredited by many to have started an AI-boom (Jackson, 2023; Rudnitsky, 2023; Roose, 2023; Chow & Perrigo, 2023), resulting in an arms race consisting of technology companies producing generative AI models, the development of AI solutions, and the integration of AI into various business aspects. Following the initial praise of generative AI, concerns were raised regarding the impact on the existing workforce. Some argue for a generative AI replacing jobs (Ekström, 2023; Zinkula & Mok, 2024; Cerullo, 2024; Smith, 2024), while some argue for an augmentation of existing roles (Hassani et al., 2020; Ghosh et al., 2023; International Labour Organization, 2023).

Additionally, this technological race is noticeable in areas other than AI development. For traditional businesses, generative AI has revolutionizing possibilities. Generative AI’s potential of enhancing decision-making, streamline workflows, and promote innovation, promises value beyond simple automation of work tasks (Chui et al., 2023). In practice, this is

evident since generative AI is already becoming integrated into numerous functions in various organizations, although more predominantly in sectors with high-skilled workers (Jarvis et al., 2024). High-skilled workers is a categorization of roles among the general workforce and are highly educated with three or more years of post-secondary education, highly trained, or have experience within complex physical or mental tasks (International Labour Organization, 2014). Additionally, high-skilled workers are commonly specialized within specific tasks related to their role, and the term covers a wide variety of jobs within different sectors with different responsibilities (International Labour Organization, 2014). An augmentation of high-skilled roles with the increased usage of generative AI could result in shifts concerning the value and relevance of competences. Generally, previous research on the topic of generative AI has focused on specific roles which require distinct technical skills, such as IT professionals. However, the scientific literature surrounding the impact of generative AI from a broader perspective concerning the overall impact on high-skilled roles is scarce. Therefore, this study focuses on the impact of generative AI concerning the competences of high-skilled workers.

1.2 Problem discussion

There is an increasing amount of studies examining how AI will alter the workforce of companies in a wide variety of sectors, and a particular focus surrounding the impact for positions requiring distinct technical competences. However, research surrounding the impact of generative AI on the composition of competences of high-skilled workers is notably scarce. Additionally, previous literature surrounding the subject of AI typically focuses on AI in its broad sense, often examining impact on labor that effectively replaces the existing workforce, instead of augmenting roles. Therefore, the application and usage of AI in everyday work for high-skilled workers is commonly overlooked. Considering this, there is a need for more research examining how generative AI will alter attractive competences among the workforce. Based on the AI-hype, reports showcasing that 89% of executives deeming generative AI as a top three tech priority in 2024 (Apotheker et al., 2024), and the aforementioned increased organizational implementation, there are indications that generative AI is becoming increasingly integrated into common organizational practice. In this context, generative AI presents a unique opportunity for high-skilled workers who want to capitalize on potential value that can be obtained through the use of generative AI.

Overall, our master thesis holds an interest for a broad audience. There are several possible implications for organizations who want to remain relevant by developing their existing workforce, and hiring individuals who possess attractive competences in an AI-era. From a workforce and societal perspective, developing relevant competences and skills will be an essential component in adapting to industry shifts. By creating an increased understanding, our research will contribute with valuable insights regarding the development of competences as generative AI continues to develop, becoming increasingly integrated into practice.

In this context, our study becomes important from a societal, organizational, and individual perspective if it is found that generative AI majorly impacts the need and relevance of different competences amidst increased organizational integration. Previous research focusing on niche roles and a narrow selection of competences, such as by Nhavkar & Goel (2023), Epstein et al. (2023), and Pavlik (2023), have indicated that generative AI impacts the need and relevance of certain technical competences. Hence, it is reasonable to assume that as generative AI continues to evolve, obtaining increasingly better performance and being able to perform an increased breadth of tasks, the relevance and need of other competences will be affected.

From a societal perspective, this master thesis can contribute to decision makers in the education sphere by showcasing shifts in demanded competences. Rapid technological advancements have historically impacted sought after composition of competences among employers, requiring the education system to adapt. A historical example could be the increased demand of technical skills as business processes became increasingly digitized with the incorporation of computers into businesses. In a similar sense, one can hypothesize about the implications of generative AI, having the potential to result in the same obstruction referencing the AI hype and previous research. An example of this shift already being in motion is that educational institutions are offering programmes and courses related to generative AI (Högskolan i Halmstad, n.d.; GU Executive Education, n.d.)

From an organizational perspective, shifts in competences are at the essence of what an employee has to offer the organization. Our research concerning practical implications can assist in creating a framework of how to develop their existing workforce, and acquire the right competences, to maximize value for the business. As generative AI can still be deemed to be in a very early stage as it was recently introduced to the general public, organization's awareness of impact on competences also aids in hedging against uncertainty. An example of an organization implementing generative AI, which is beyond the sphere of roles requiring traditional technical competences, is the Nordic law firm Vinge (2024), which according to them is set to automate and improve reviewing, analyzing and summarizing documents.

From an individual perspective, potential results from our study can be deemed relevant for similar reasons as to why it is relevant for organizations. By being aware of potential competence shifts, one can develop and increase their value and leverage the possibilities of generative AI, instead of ignoring technological advancements resulting in becoming obsolete. Another consequence of the rapid pace at which generative AI is integrating is the reshaping of desired competence and job security. According to the World Economic Forum (2023), the technological advancements currently being made are expected to reshape 23% of the global job market in the coming 5 years. This development is expedited by the increased application of generative AI, which has influenced the demand for certain competences in several industries. For high-skilled workers, this implies the need to adapt and develop new competences in this evolving landscape.

Overall, embracing the possibilities presented by generative AI can be the difference between thriving with this new technology or becoming obsolete. Despite immense insecurity in how generative AI will progress, it would be ill-advised to neglect the current possibilities presented by this technology for high-skilled workers to generate superior value.

1.3 Purpose and research question

The purpose of this study is to explore how generative AI has affected the use and need of competences among high-skilled workers. As previously stated, there is very little research conducted on the impact of generative AI on high-skilled workers beyond technical competences, nor a clear competence framework which can be broadly applied. Our research intends to provide a deeper understanding of the sphere of generative AI, examining the borderlands of AI and high-skilled workers. With the stated purpose, the research question of this paper is:

- How does generative AI impact the present and future relevance and need of competences among high-skilled workers?

Our literature review provides a theoretical framework which can be broadly applied to examine the relevance and need of competences for high-skilled workers whose everyday job currently, or in the future, implies working with generative AI. This framework is based on prior research conducted within the field of competences and generative AI. The developed framework can be used by high-skilled workers to help navigate their own personal development areas as generative AI potentially becomes more integrated into roles. Hence, the results of this paper is both a theoretical contribution with a competence framework applicable to assessing the implications of generative AI on competences, and an assessment of the current impact on present and future relevance and need of competences among high-skilled workers.

1.4 Delimitations

Given this study's focus on the workforce category of high-skilled workers, the selection of interview subjects has been limited to professionals that fill predefined criteria (specified in section 3.3.2) and also have one or more years of professional work experience. Further, the study is limited to professionals working at organizations located or active in Sweden. Moreover, the study is limited to generative AI tools available in Sweden and does not consider any other tools available elsewhere.

1.5 Disposition

This thesis is divided into six main chapters. In the initial chapter, we present our research topic, problematize the increased interest in generative AI combined with research gaps, present our purpose and research question, and outline our delimitations. In the second chapter, we present a theoretical background on relevant concepts and introduce our framework. In the third chapter, we present our method for our carried out research which both describes our applied strategy, design, process, and analysis, as well as reasoning for why the given decisions were made. In the fourth chapter, we describe the empirical findings extracted from our semi-structured interviews. In the fifth chapter, we analyze and discuss the empirical findings from the perspective of our framework and previous research. In the final chapter, we present our conclusions based on the analysis and provide suggestions for future research. The overarching structure of our thesis is presented below in figure 1.

Figure 1: Disposition

2. Literature review

The literature review chapter discusses the theoretical background covering and developing definitions of the three central concepts of the paper: generative AI, competences, and high-skilled workers. Following this, the literature review includes a theoretical framework, where it covers the developed theoretical framework for examining the implications on competences for high-skilled workers in a setting where generative AI is used. The framework involves the three main competence areas of functional, cognitive, and social competences.

2.1 Theoretical background

2.1.1 Generative AI

As established, generative AI is a broad concept. Consequently, there exists a magnitude of definitions which tries to encapsulate the concept of generative AI at its core. The foundation of generative AI consists of machine learning (Blumberg et al., 2024; Baig et al., 2024; Martineau, 2023; Lim et al., 2023; Nah et al., 2023), forming a baseline of continuous learning and development.

After reviewing various definitions from several different research papers in an attempt to establish consensus regarding the concept of generative AI, four definitions are presented below:

"A technology that (i) leverages deep learning models to (ii) generate human-like content (e.g., images, words) in response to (iii) complex and varied prompts" (Lim et al., 2023).

"A type of AI that can generate human-like text and creative content (e.g., music and images) as well as consolidate data from different sources for analysis" (Nah et al., 2023)

"Contemporary, statistical, deep learning approaches which use vast numbers of parameters and quantities of training data to model a space of knowledge artifacts (e.g., images, texts) and can be used to generate artifacts by sampling from this space" (Sarkar, 2023)

"AI that is designed to create or generate new content, such as text, images, or music, from their trained parameters" (Boscardin et al., 2024)

These definitions highlight the breadth of generative AI, displaying the various areas of use and broad application. Regarding differences, the definitions share a varying degree of complexity referencing the components. For example, Sarkar (2023) chooses to incorporate the underlying component of generative AI in describing the machine learning process, while Boscardin et al. (2024) focuses on the output. Concerning commonalities, all of the presented

definitions incorporate a broad definition of the possible outputs of generative AI, such as text and images. With this in mind, our paper adopts the definition of Lim et al. (2023). We believe that this definition captures the breadth of generative AI, while still encapsulating the relationship between the user and technology, which the other definitions does not outspokenly incorporate.

2.1.2 Competences

2.1.2.1 Introduction to competences

Competences include a range of attributes from knowledge, skills, abilities, and behaviors that are critical for individual and organizational performance. The National Institutes of Health (n.d) defines competences as the composition of abilities and behaviors alongside knowledge that contributes to enhanced performance within a professional setting (NIH, n.d.). These components are developed through various means including formal education, personal experiences, and activities in work-life settings.

According to Le Deist & Winterton (2005), Cognitive competence is the (theoretical) *knowledge* and understanding developed through education, training and ongoing study. It is the foundational element that informs further skill development and application in various settings. Functional competence being the (operational) *skills* developed through frequent practice and experience. They are essential for effective execution of tasks and assignments. Functional and cognitive competence together gives an individual the *ability* to effectively execute and perform both theoretical and physical tasks. Personal and Ethical competences refer to the judgemental and behavioral competences and both fall under *social competence* which are crucial for professional conduct, network and building relationships.

This framework of competences provides a holistic view of the requirements that are associated with superior performance across various professions and outlines what sets highly skilled workers apart from others.

2.1.2.2 Importance of competences

The demand for specific competences is driven by technological advancements and demographic changes, leading vocational education and training (VET) and human resource development (HRD) to shift from a supply-driven to a demand-driven approach. This shift emphasizes the need for competences that align closely with contemporary job requirements, organizational needs, technological advancements and trends (Le Deist & Winterton, 2007).

2.1.2.3 Vagueness and ambiguity

The concept of competences often suffers from a lack of clear definition, which can complicate their application across different settings. This ambiguity, while highlighting the

versatility and widespread relevance of competences , also poses challenges for their practical application in HRD and educational systems (Van der Klink & Boon, 2003).

2.1.2.4 Dimensions

Given the ambiguous nature of competences, Van der Klink & Boon (2003) present five dimensions that serve to provide a deeper understanding and how to apply competences . First the *specificity* ranges from generic competence to context-specific. Further, the *coherency* of competence is addressed and this is due to the fact that, skills, knowledge, attitudes and personal characteristics, while they are not the same as competence all competences include some combination of these elements and for each competence the elements vary in importance. A mix of skills, knowledge, attitudes, and personal attributes. The *durability* aspect of competence is concerned with how well it can maintain its relevance over time. Competence is measured in the performance of some type of *activity*. These can be physical and easily observable or mental activities such as critical thinking or thought process, which are not immediately observable. Lastly, *trainability* which distinguishes between personal talents that might be innate. If a competence is more easily mastered with innate talent then the trainability is low. All these dimensions help in understanding the specific application of competences as a concept and how they play out in various contexts (Van der Klink & Boon, 2003).

2.1.3 The impact of generative AI in practice

Today, generative AI is implemented in numerous organizational functions. Most notably, generative AI has already reached a broad adoption in IT and cybersecurity (43%), marketing, sales and customer service (37%), product development and R&D (32%), strategy and operations (29%), finance (20%), and supply chain and manufacturing (18%) in USA (Jarvis et al., 2024). Consequently, the implementation of generative AI can be largely accredited by expected efficiency and productivity gains. For example, it is expected that generative AI will be able to improve efficiency and productivity of high-skilled workers by 56% in the future (Jarvis et al., 2024). Despite this, it is worth noting that it is difficult to determine how the use and implementation of generative AI in its current state have affected efficiency and productivity. Although it is reasonable to assume that the same level of gains are yet to be experienced as the adoption and familiarization of the technology, combined with generative AI constantly improving.

Additionally, as generative AI becomes integrated into various roles, the value of different competences can decrease or increase in value depending upon which tasks or what role generative AI has in relation to the role (Notley, 2024). Therefore, it is important to effectively restructure the valuation of competences as generative AI becomes more integrated into various operations (Notley, 2024). Consequently, as a result of a redefinition of valuable competences, there is also a requirement to beforehand have a concrete understanding of the specific competences required within a given organization that are

required to carry out your tasks, although the typical tasks performed changes with generative AI (Notley, 2024).

The redefinition of valuable competences can be accredited towards technology evolving at a pace much more rapid than ever before, directly affecting organizations (Svensson, 2023). Consequently, organizations should prioritize constant learning to reduce the risk of becoming obsolete with their technological integrations into business practices (Svensson, 2023). In a similar sense, it is suggested that instead of generative AI replacing jobs, it will instead make individuals more efficient in their existing roles, or result in people becoming realigned to new roles (Consultancy.uk, 2023). On an individual level, the findings appear to be aligned, as 79% of respondents who are high-skilled workers believe that they need to grow their skill set to safeguard their jobs (Consultancy.uk, 2023). More specifically, 63% want to develop more analytical skills, such as data and information analysis, research, and problem solving skills, 53% want to develop more programming skills, 49% want to develop skills on how to work with generative AI tools, and 10% want to develop new and different skills, but are unsure of which (Consultancy.uk, 2023).

Although, the value of generative AI is not in the product, but in its use. The sheer implementation of generative AI into businesses does not mean that the full potential of generative AI will be extracted (Sears, 2023). Instead, it will be required to restructure business processes, incorporating generative AI, as there otherwise are significant risks of forcing new technology into an outdated process, resulting in an expensive old process, creating a subpar experience of employees and customers (Sears, 2023). In addition, managers receive increasing responsibility in having to learn how they can foster a culture of using generative AI, as well as upskilling employees to become efficient users to extract more value from the technology (Dhar, 2023). In this sense, it is a necessity that managers need to become familiar with generative AI to enable and aid others in their usage (Svensson, 2023; Sears, 2023; Dhar, 2023; Kuklina, 2024). Consequently, the ability to efficiently use generative AI becomes a skill on its own (Kuklina, 2024). In these, and similar, scenarios concerning upskilling or reskilling, generative AI has also been found to be an effective tool with immense personalization that can tailor to specific learning needs (Consultancy.uk, 2023).

Furthermore, it appears that generative AI lowers the barriers to entry by augmenting juniors (Brachio et al., 2023), enabling them to carry out tasks which they otherwise would not be comfortable performing due to no or very limited prior experience. Similarly, the value of generative AI appears to be highly dependent upon context, not only based on role, but also as bottom performers in organizations have a higher percentage increase in performance when using generative AI, compared to the top performers (Candelon et al., 2023). In this sense, generative AI closes the skills gap by democratizing the access to technical skills, increased creativity, and project management competences (Candelon et al., 2023; Brachio et al., 2023)

Despite the immense possibilities of generative AI, it is important to note that the benefits are not universal. Some tasks are better performed by humans, some are performed better by AI,

and some are better with a combination of the two (Notley, 2024; Gupta et al., 2023). Consequently, generative AI becomes an enabler with the possibility of increasing both the breadth of tasks which can be performed by a single individual, and also the level (Notley, 2024; Gupta et al., 2023). This results in a possibility that instead of generative AI becoming an enabler, it can potentially become a co-passenger, or assistant, in daily work related activities (Gupta et al., 2023). At its core, an essential aspect in understanding the potential of generative AI is understanding the differences and similarities of intelligence of the technology, and the human (Notley, 2024; Gupta et al., 2023)

In its current state, generative AI has the ability to perform repetitive and mundane tasks which otherwise would be performed by someone possessing specific technical skills (Notley, 2024; Consultancy.uk, 2023; Kuklina, 2024; Sears, 2023; Ellingrud et al., 2023). In addition, AI is currently even superior to some humans at performing some tasks that otherwise would require technical skills (Kuklina, 2024). For instance, generative AI currently is proficient in processing and analyzing large volumes of complex and varied data, predict future trends, perform scenario analyses (Brachio et al., 2023; Bain & Company, 2024; Gupta et al., 2023), finding information or data needed to effectively perform your job (Sears, 2023; Gupta et al., 2023), generate marketing-related material, and aid workers in their use of different analytical tools (Bain & Company, 2024; Gupta et al., 2023).

A potential shift into a further increased integration of generative AI into business processes can result in a transformation of roles to instead focus on higher-value tasks which require human creativity (Sears, 2023; Notley, 2024; Consultancy.uk, 2023; Ellingrud et al., 2023; Kuklina, 2024; Wong, 2020). Consequently, this shift results in an overall increased demand of competences on a higher level than before coupled with less specialization and more generalization (Sears, 2023; Notley, 2024; Consultancy.uk, 2023; Ellingrud et al., 2023; Kuklina, 2024; Wong, 2020). In this sense, less scenario dependent competences, such as emotional intelligence, critical thinking, leadership, and problem solving will increase in importance, as generative AI is currently not able to emulate these competences in a fulfilling way (Notley, 2024; Wong, 2020; Goel et al., 2023). The competence of problem solving appears to be especially important, as participants in a study of Candelon et al. (2023) showed that the performance of individuals who used generative AI to aid their problem solving was worse compared to those who did not use generative AI.

In addition, social competences which are key human skills have proven difficult for generative AI to understand (Kuklina, 2024; Ellingrud et al., 2023). A result of this is that the value of social competences have already increased, and are expected to continue to increase, as implicit human skills are overall very difficult for generative AI to imitate (Kuklina, 2024; Ellingrud et al., 2023; Candelon et al., 2023; Dhar, 2023). In addition, critical thinking appears to be an additional competence which generative AI in the foreseeable future is not able to emulate in a fulfilling way (Dhar, 2023). Regarding the current usage and implementation of generative AI, valuing the output of generative AI becomes especially important as there is no guarantee that the current LLM:s are able to consistently outperform or match the performance of a human (Kuklina, 2024; Wong, 2020).

Although, Gupta et al. (2023) and Consultancy.uk (2023) believe that when generative AI becomes more advanced and able to add contextual awareness and emulate human-like decision-making, it will result in a further integration into the workflows of enterprises. In this sense, generative AI has the possibility to radically change how business altogether is conducted (Consultancy.uk, 2023; Gupta et al., 2023).

2.2 Theoretical framework

2.2.1 Competence framework for high-skilled workers

To categorize and explore the composition of competences for high-skilled workers in the context of generative AI, this section describes the competences identified via our literature review and later presents a developed framework. In this context, a comprehensive literature review was centric in order to correctly categorize competences to paint a representative picture of the most relevant competences of high-skilled workers. Our framework consists of three competence areas: functional, cognitive, and social. The framework is depicted below in figure 2. The three areas, and the specific competences, of our framework do not capture every competence of every high-skilled worker, although are described as the most centric in literature.

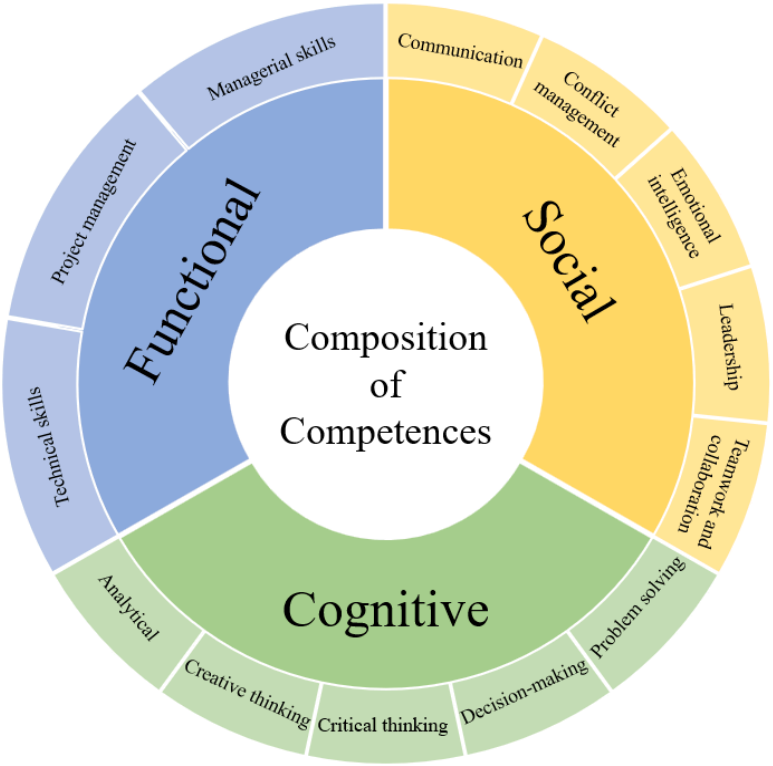

Figure 2: Competence framework

2.2.1.1 Functional competences

Functional competences is a categorization of competences that refers to highly specific skills that can be directly tied to specific tasks (Gallagher et al., 2010). These competences often majorly differ depending upon the role (Giri, 2019), essentially stating that the perceived value of a functional competence is heavily dependent upon the context. In our paper, we have three sub categorizations of functional competences: technical skills, project management, and managerial skills.

Technical skills

Technical skills refers to a specific skill set developed and learned directly associated with a role. The concept of a technical skill set is centered around hard skills, where a high-skilled worker develops intense conceptual understanding and excels at specific tasks. Gallagher et al. (2010) argues that excellent technical skills are a requirement for high-skilled workers to thrive in a dynamic environment. Additionally, literature suggests that immense technical skills are heavily related to wage premiums for high-skilled workers (Rothwell, 2015), relating to an attractive and relevant skill. Consequently, Lyu & Liu (2021) argues that specific technical skills is the most attractive competence that a high-skilled worker can have, as it is the most closely interwoven skill that is relatable to the specific tasks of a role. Hence, one can argue that skills that can be deemed technical are the most important for many high-skilled workers.

Project management

Project management at its core consists of many different sub-categories of skills, which depending upon the role can be directing, sales, planning, managing, and more. Essentially, project management as a competence covers the ability to effectively manage projects. Elsabaa (2001) suggests that a high-skilled worker with sufficient project management competences has the ability to not only boost their own performance, but also of others working on the same project. In a similar sense, project management was found by Giri (2019) to be one of the most important competences for high-skilled project-based work, as the performance of an individual with sufficient project management competences heavily impacts the performance of a project and the outwards perception towards customers. Moreover, the competence of project management is stated by Anantatmula (2010) to be especially valuable in dynamic environments where the circumstances constantly change.

Managerial skills

Managerial skills refers to the ability to the technical skill set of specific activities, such as methods, procedures, and processes that can be related to guide their team, coordinate projects, and achieve set goals. Managerial skills have become more important for traditional high-skilled workers in dynamic environments where any given individual has greater freedom in achieving their deliverables as there are higher demands on managing your own work (Raabe et al., 2007). Organizations with widespread managerial skills have the ability to foster a more competitive environment, improving the market positioning of the organization, by essentially aiding the achievement of objectives, subsequently aiding business success

(Contreras et al., 2023). On the same topic, extensive managerial skills have also been found to increase performance productivity (Gallardo, 2020).

2.2.1.2 Cognitive competences

Cognitive competences involve the mental processes and abilities to process information, generate solutions, and execute tasks efficiently. VanLehn (1996) describes the concept of cognitive competences as broad applicable knowledge that can be used to effectively complete tasks while not directly tied to the technical skill set of said task. In our paper, we have five categorizations of cognitive competences: analytical, creative thinking, critical thinking, decision-making, and problem solving.

Analytical

Being analytical is a collective term referring to the ability of systematically and logically examining data, information, or problems. It is an attractive competence to possess and develop, as analytical thinking is a key competence being applied and used in numerous scenarios of high-skilled work (Ribarsky et al., 2009). Continued, a developed ability of being analytical is also related to increased job performance of high-skilled workers, compared to individuals who do not have a developed analytical ability (Kryscynski et al., 2018). Additionally, Mardiansyah et al. (2019) have similar findings, referring to the competence of being analytical as a crucial component of success for high-skilled workers in the modern economy as many high-skilled roles typically require analyzing data in different contexts.

Creative thinking

Creative thinking refers to the ability to develop ideas and approaches within their given field of work, essentially a collective term that requires a composition of diverse skills to approach a problem. Creative thinking is not only a valuable competence by itself, but also from a larger perspective in its ability to assist the development of other competences and skills. Musayevna (2022) found that the competence of creative thinking enables individuals to develop their ability of innovative thinking, problem solving, and critical thinking abilities, all of which are attractive competences in the knowledge economy. Herliani & Rosidin (2022) build upon the value of creative thinking in the modern economy, stating that creative thinking is an essential competence to appropriately and effectively handle and reason with diverse sources of information. In a similar sense, Palupi et al. (2020) further describe that the competence aids the overall learning process, suggesting that individuals with highly developed creative thinking have the ability to more easily adapt to new challenges.

Critical thinking

The competence of critical thinking encompasses the ability to reflectively and independently make reasoned judgments. Indrašienė et al. (2018) identified that the competence enables high-skilled workers to identify, analyze, justify decisions, make decisions, and present problems in an effective manner. Knap-Stefaniuk & Ambrozová (2021) focuses on the competence and implications for leadership roles, finding that critical thinking is essential as

it aids decision-making and action taking, as fast access to information otherwise leads to decision paralysis or cognitive dissonance. Concerning the rapid access to information and implications for high-skilled workers, Dwyer et al. (2014) argue that critical thinking is an essential competence that aids adaptability and flexibility. Consequently, Dwyer et al. (2014) directly applies the benefits of critical thinking to the sphere of fast access to changeable information, stating that extensive critical thinking abilities promotes decision-making and problem-solving in this context.

Decision-making

Decision-making refers to the ability to reason, analyze, gather information, and more, to thereafter perform a justifiable decision in a scenario with multiple alternatives, achieving the best possible outcome. Bruin et al. (2020) states that the competence of decision-making is a combination of many skills and experiences, such as overall fluid intelligence, motivation, emotional regulation, and experience. Hence, Bruin et al. (2020) also conclude that older adults naturally have a tendency of superior competence of decision-making as there exists significant age-related improvements. Moreover, Deming (2021) argues that decision-making has become a more centric ability for high-skilled workers as information and data availability has increased. As a result of this, Deming (2021) states that the competence of decision-making is practiced earlier in careers as less senior high-skilled workers are presented with decision-making challenges, leading to an increased development. Additionally, Jonassen (2012) explains that decision-making as a competence has the ability to boost overall problem solving skills, as the process of decision-making involves the use and development of similar skills.

Problem solving

The competence of problem solving involves the ability to identify, analyze, and resolve issues effectively. The process of problem solving combines analyzing, creative thinking, decision-making, implementation, problem identification, and more, making it a broadly applicable competence. Nokes et al. (2010) states that a high level of problem solving is crucial in formal high-skilled settings, as the broad application of the competence entails a frequent usage, hence resulting in an increased need and haste development. Choudhar et al. (2022) agrees with the notion of Nokes et al. (2010) concerning the importance of problem solving and describes the complex interplay of skills which constitutes the competence, stating that an effective problem solver often has well developed competences as a result of its broad application.

2.2.1.3 Social competences

Social competences refers to a range of interpersonal skills and abilities. Rose-Krasnor (1997) defines social competences as an overall effectiveness in social interactions with transactional, context-dependent, and goal-specific characteristics. In our paper, we have five categorizations of social competences: communication, conflict management, emotional intelligence, leadership, and teamwork and collaboration.

Communication

Communication refers to the ability to clearly and effectively exchange information and ideas. In a professional context, Galli (2020) argues that having a well developed ability of communicating is essential for high-skilled workers overall, although especially within project based work, as communicating needs, goals, desires, and establishing trust is essential for project success. In this context, Galli (2004) also states that your competence of communication essentially determines your ability to rightfully communicate your composition of competences to others. Rao & Nattala (2018) argue that communication as a competence also significantly aids the career development of high-skilled workers, as communication is essential for securing and sustaining jobs, and receiving promotions. Continued, Colley (2007) argues that communication as a competence can be applied in a broad variety of areas, such as listening, questioning, reflecting, explaining, and persuading, indicating a spillover effect towards other competences.

Conflict management

The competence of conflict management involves identifying, addressing and resolving disagreements or disputes effectively. The application of the competence can vary depending upon the seniority of the role, where Thakore (2013) states that it is especially important for managers with team responsibilities to effectively tackle internal challenges and disputes. In addition, Thakore (2013) also states that effective conflict management essentially results in an improved quality output as issues can be tackled more efficiently. Moreover, Adham (2023) describes that conflict management is of more importance now than ever due to the globalization of organizations, referencing the understanding of cultural differences, and that effective conflict management is an interplay of emotional awareness, fostering a competitive atmosphere, providing constructive feedback, effective communication, leadership, trust-building, managerial strategies, and empathy. Furthermore, Lang (2009) states that high-skilled workers overall, no matter the juniority or seniority, have a need of effective conflict management to foster in team environments.

Emotional intelligence

Emotional intelligence refers to the ability to perceive, understand, manage, and use emotions effectively. Despite being a social competence, Rezvani et al. (2016) claims emotional intelligence to have a strong relationship with overall performance as emotional intelligence is positively correlated with project success. Continued, Arora (2017) goes beyond its predictability of performance, stating that emotional intelligence is twice as important as being analytical or possessing a specific technical skill when it comes to advancements in a professional career. From another perspective, Korniienko & Barchi (2023) argues that emotional intelligence is an important competence to possess as it enables high-skilled workers to manage interactions and emotions effectively, combined with a superior understanding of workplace missions.

Leadership

The competence of leadership involves guiding, influencing, and directing the behavior of others to achieve a common goal. To have a well developed leadership is described as crucial by Schoemaker et al. (2013) in the modern economy as it allows high-skilled workers to think strategically and navigate unknown or changing environments. Hence, Schoemaker et al. (2013) also believe leadership to be a valuable competence for businesses in highly dynamic business environments where either external or internal circumstances rapidly change. Furthermore, Mumford et al. (2007) mean that leadership is a requirement throughout all levels of seniority in organizations as leadership skills not only necessarily involve leading others, but leading yourself. Mumford et al. (2007) also concludes that the strategic aspect of leadership is commonly only visible at the highest level of an organization.

Teamwork and collaboration

Teamwork and collaboration as a competence refers to the ability to interact, effectively work, and build relationships with others to achieve common objectives. Cortez et al. (2009) states the importance of teamwork, as it effectively increases overall performance of a group, making it an essential for high-skilled workers in teams. Davis & Marshall (2014) have made similar findings, acknowledging that the competence is especially important for high-skilled workers to produce the best outcomes, specifically for practices involving value-adding services and human interaction. Additionally, Ellis et al. (2005) state that effective teamwork and collaboration within a team has the direct ability to significantly increase the quality of other competences, such as problem solving.

3. Methodology

The methodology chapter presents the chosen research strategy and design. Additionally, it also covers the research process consisting of the primary and secondary data collection, reflecting and motivating upon the steps taken. Moreover, it also covers the method of data collection, finally discussing the overall research quality.

3.1 Research strategy

We apply a qualitative research strategy approach to assist in analyzing and answering the research question. The reasoning behind applying a qualitative research strategy is primarily based on methodology readings of Bryman & Bell (2011), as well as previous readings of Patel & Davidson (2019), and joint discussions. By opting for a qualitative research strategy, we are able to gain superior depth from each point of data collection compared to a quantitative approach. Additionally, the research we are conducting can be deemed to be in the beginnings of real world application of modern generative AI. Hence, a potential risk of applying a quantitative research strategy would be that it would not be able to generate the same value as qualitative data, as the explorative nature of our study requires knowledge and reflections arising from the respondents (Bryman & Bell, 2011). This further allows us as researchers to compile many points of data, generating insights.

Moreover, a qualitative approach allows greater flexibility in the research design (Bryman & Bell, 2011), which is positive in the dynamic and constantly changing field of which our research is being conducted. Although, one of the primary issues of adopting a qualitative approach is that there can be issues in analyzing interviews as the opinions and answers expressed are subjective by nature. Additionally, as our interview subjects have various roles, the findings from each interview might not be representative across the different roles covered by our interview subject. In this case, isolating based on roles could prove to be more righteous based on the different aspects which makes each role unique. To combat this, and strengthen the validity and reliability of our research, we made sure that all interview subjects had commonalities in their specific roles concerning typical tasks and dynamics. Therefore, general conclusions can be drawn by using a qualitative research strategy.

We have also applied the concept of problem driven research, described by Bryman & Bell (2011), as literature is scarce surrounding the implications of generative AI in the context of its effect on competence for high-skilled workers. A result of this is that there does not currently exist a framework which can be directly applied to our research. Additionally, our study applies general theories surrounding implications of technological development in the context of industry applications and frameworks describing and evaluating competences. Our motivation for applying broad and general theories is coherent with the context of aforementioned speculations surrounding generative AI and broader societal impacts.

Furthermore, our study applies inductive reasoning. We have conducted interviews with 14 respondents with various roles across different companies and sectors. Based on these points of data collection, we are going to analyze the empirical findings and generate patterns and identify themes to answer our research question. Our findings and analysis thereafter leads to a generalization of generative AI:s impact on competences of high-skilled workers, aiding future research.

3.2 Research design

When deciding upon our design, we closely evaluated our alternatives and eventually came to the conclusion that a paper matching the characteristics of a case study design is the best fit for our paper. Our initial consideration was finding a link between our adapted strategy, and considering our qualitative approach, a case study best describes our initial discussions regarding what we want to research. In this context, our aforementioned approach of conducting interviews with professionals representing different organizations, which will be described more profoundly in the upcoming section, aligns with a case study design. As we want to extract specific knowledge, experience, and findings of professionals, it further reinforces our reasoning of adapting a case study design. Additionally, other research designs could be applied, such as a comparative design, examining the same phenomenon. Although, the potential research question(s) from such a paper would most likely differ, as it would focus on similarities and differences. In our case, we apply a similar thought process, although further considering the explorative nature of our research. Hence, a comparative study would require delving deeper and examining two or more different entities and their usage of generative AI. In this case, we jointly came to the conclusion that research and trade implementation needs to have adapted to a greater degree than the current performed reconnaissance suggests.

Moreover, through adopting a case study design, our intention of gathering data where the value has high density aligns with our applied research strategy. Additionally, within the context of generative AI and implications for competences, the specific phenomenon that will be examined naturally becomes how revolutionary technology impacts the composition of competences among high-skilled workers.

3.3 Research process

The research process of our paper is presented below in figure 3. This figure illustrates our process of conducting our research, which initially started early autumn 2023 after determining that we were going to write our thesis together. However, the overwhelming majority of work on this paper was conducted from January to May 2024. Due to our research subject being on the rise, our process heavily relied on an iterative process, referencing both many central papers being published and generative AI becoming integrated to interview subjects' workplaces during our research process. Although, the general implications and insights did not appear to heavily vary during the research process, hence arguing for a firm research process.

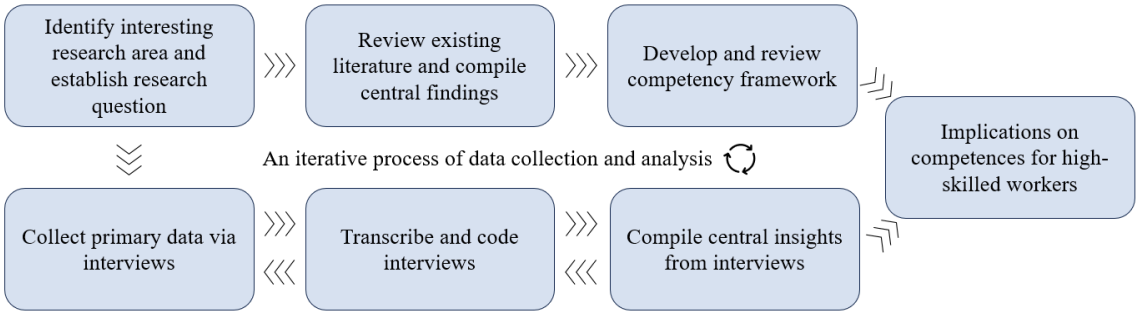

Figure 3: Research process

3.3.1 Primary data

Linking our research strategy and design towards our method of data collection, we conduct semi-structured interviews.

Moreover, regarding the applied method of sampling, we use snowball sampling. We initially reached out to individuals within our vicinity who aligned within the scope of our research area, and thereafter asked if they could refer us to other interview subjects who possibly could be interested in participating in our study. Thereafter, if the referred interview subject participated, we repeated the process.

Bryman & Bell (2011) argues that one of the primary issues with this sampling method is that it is not random, hence not guaranteeable representative of the population which the sample is supposed to represent. Despite this, we consider snowball sampling to be the most beneficial sampling method regarding the circumstances of which the study was conducted. We reached out to our professional network, consisting of high-skilled workers with diverse roles, organizations, and industries. This enabled us to generate a greater number of interviews and breadth, while still being directly applicable to our examined population, compared to alternative approaches to sampling.

3.3.2 Selection of respondents

Combined with snowball sampling, we also used selection criteria in order to obtain a coherency in the context of which the study is being conducted, as well as beforehand be able to determine that the respondents would be able to reflect on the impact of generative AI on their role. Hence, the participating respondents of this study were required to fulfill the following three criteria: 1) one or more years of professional work experience, 2) have a role which can be categorized as high-skilled, and 3) familiarity with generative AI.

Regarding the first criteria, we believe that sufficient work experience is required for the respondent to reflect upon the impact of generative AI on their role or assess broader industry impact. Concerning the second criteria, as our study aims to draw specific and relevant conclusions related to a scope, we assessed that a coherency was in need to be established among our respondents.

Lastly, concerning the final criteria, we reasoned that a necessity for sufficient insights to be provided by the respondents, a broad selection criteria of familiarity of generative AI was required. The reasoning for adopting the criteria of simply familiarity of generative AI, compared to having a license or outspoken policy either encouraging or discouraging the use of generative AI in the workspace, was to broaden the scope. We reason that an employee at a workplace that directly supplies their workers with licenses for generative AI would possibly offer different insight compared to workplaces which do not supply licenses. By broadening the scope outside of workplaces who provide licenses, we are able to conduct a more nuanced analysis, providing more representative conclusions to our purpose and research question. The list of respondents are depicted below in table 1.

Respondent	Professional title	Industry	Date	Duration	Interview setting
R1	Analyst	Consulting	2024-03-12	56 Min	Online, Zoom
R2	Marketer	Vehicle safety	2024-03-24	36 Min	In person
R3	Project manager	Consulting	2024-04-04	39 Min	Online, Teams
R4	Analyst	Consulting	2024-04-04	25 Min	In person
R5	Project manager	Consulting	2024-04-04	32 Min	In person
R6	Analyst	Consulting	2024-04-04	26 Min	In person
R7	Audit associate	Consulting	2024-04-12	29 Min	Online, Zoom
R8	IT coordinator & programmer	Education	2024-04-18	82 Min	Online, Zoom
R9	CEO	Marketing agency	2024-04-23	68 Min	Online, Zoom

R10	Marketer	Fashion	2024-04-23	29 Min	Online, Zoom
R11	Tax lawyer	Consulting	2024-04-23	47 Min	Online, Zoom
R12	Accountant	Industrials	2024-04-23	26 Min	Online, Zoom
R13	Data scientist	Medical technology	2024-04-25	31 Min	Online, Zoom
R14	Investment analyst	Venture capital	2024-04-25	33 Min	Online, Zoom

Table 1: Respondents

3.3.3 Interview guide

Our semi-structured interviews are our primary source of data that is analyzed in this paper. We ensured the relevance of the data collection by closely aligning the interview guide with our research question. We constructed an initial interview guide with assistance from ChatGPT-4. Our prompt consisted of our purpose and research question section followed by "Please assist us in generating an interview guide". After receiving the output, we heavily revised the interview guide to ensure its relevance to our specific research. In addition, we conducted two separate pilot interviews with respondents which we were closely tied to. The reasoning behind this was to gain the perspective of respondents who might not have the same academic knowledge of generative AI and competences. After the first pilot interview guide, we revised the interview guide, repeating this process after the second pilot interview. A conclusion of the feedback was to exemplify more and use less academic terms to ensure the respondents understanding, easing their ability to provide a more relevant, and at the same time elaborate, answer. In general, the interviews were a combination of open and specific questions, where we ensured the respondents understanding of each question by following up with if they would like an example.

The English interview guide can be found in Appendix A, and the Swedish interview guide can be found in Appendix B. As our research is focused on the borderlands of generative AI, high-skilled workers, and competences, the main goal of the interviews naturally came to gather insights from specific experiences and knowledge from the interview subjects. Hence, the majority of the interviews consisted of gathering subjective insights.

3.3.4 Interview format

The respondents of our paper were initially contacted via a text message, email, or in person, depending on our prior relationship with them. For those who we were acquainted with from before, the primary method of reaching out was either text message or via a natural encounter in person. The majority of respondents who we were not acquainted with from before were contacted via email.

The interviews were conducted in one of three ways: in person, via Zoom, or via Microsoft Teams. The interview setting depended upon the availability of the respondent, and/or their preferred method. In the end, the conducted interviews became a relatively even mix between being in person and digitally. The primary advantage of conducting interviews digitally was to allow for immense flexibility, proving to be highly valuable for respondents who underwent stressful periods at work who did not have a lot of time to set aside. Additionally, another advantage of online interviews was that distance did not become an obstacle, enabling us to have interviews with individuals who are distantly located relatively to us. The downsides of the online interviews were that some personal cues, nonverbal signs, and body language cues could go unnoticed (Bryman & Bell, 2011).

To combat the downsides, we asked more followup questions to gain more clarification and depth, combined with reminding the respondent that they are free to speak their mind and ask clarifying questions themselves. Compared to online interviews, the upsides of in person interviews are that it becomes easier to observe the nonverbal signs and body language cues, providing a more personal connection. Although, mixing the interview setting could possibly affect the results, as, for example, some respondents might be more comfortable in a digital setting, or vice versa. However, we have come to the conclusion that the overall direction and/or sentiment would not drastically differ depending upon the setting, as the anonymity ensures their transparency.

All interviews were conducted and led by both of us. An advantage of us both being present during each interview was that follow-up questions could be asked directly by either of us, allowing our different perspectives and understanding to be joined together to allow for deeper insights. Additionally, all interviews were conducted in Swedish as all of the respondents were native Swedish speakers. This also enabled them to provide more insightful and righteous answers, as language barrier did not become any issue. However, some terms and keywords were discussed and defined in English as for some respondents, it proved to be more comfortable.

Additionally, all interviews were recorded, after asking for consent, either via the built in function in Zoom and Teams for the online interviews, and via Google Audio Recorder for the in person interviews. This was an important aspect as we both needed to be mentally present and attentive during the interviews. To not lose track of the overall sentiment and help guide us through the interviews and ensure that every aspect was covered, one of us took minor notes during the interview and marked questions that became answered before us asking them due to the respondent reflecting upon their own answer. By doing this, we also somewhat negated the risk of the interviews becoming too aligned with the sentiment of the respondent, allowing for a more critical and neutral interview.

All of the interviews were initially transcribed via a Python using OpenAI:s Whisper library. After the initially generated transcript, we listened through the interviews while reading the generated transcription, making adjustments where necessary to ensure the correctness of the generated transcript. After the completion of all interviews, initializing the phase where we

began working on section four through six, we translated statements which were used in the report to foster a cohesiveness of the paper.

3.3.5 Secondary data collection

The secondary data of this thesis was collected via a systematic and comprehensive search of literature to examine the current state of research within the scope of generative AI, competences and high-skilled workers. We initiated our research with establishing an initial research question, continued with defining suitable keywords for research purposes, and finally analyzing and structuring the literature to foster readability and accessibility. Collectively, these three steps helped guide us in forming insights regarding the current state of research.

3.3.5.1 Systematic literature reviews

Concerning analyzing the current state of research, we applied the approach of a systematic literature review to foster transparency and replicability. In the initial phase of this process, we used our priorly identified keywords to identify relevant research. These keywords and search strings were generally more directly tied to our research question. After some time, we broadened the scope of keywords as we realized that the topics of both specifically generative AI and more broadly surrounding competences contained notable research gaps. Our identification of the research gaps in terms of our initial narrow research motivated a two-step approach. The secondary phase therefore aimed to be tied to more specific research closely related to different surrounding segments of generative AI and competences. The process of the different research phases and keywords used are presented below in table 2.

The identified literature was thereafter structured with a top-down approach, where a broader examination of relevant concepts are presented, followed by more niche research that is more closely tied to our scope. The literature review is based on peer-reviewed academic papers which were identified via licensed search engines provided by University of Gothenburg. Acknowledging the importance of using search engines with high reliability to ensure the quality and status of the research, we used the following databases: SCOPUS, GU Supersearch and JSTOR. Although, a drawback of exclusively using databases licenses via University of Gothenburg is that there exists a risk where important papers were excluded from our research phase due to not being available from a single database. With this in mind, we still believe that sufficient caution was taken due to the breadth of the three aforementioned databases.

Initial research phase	
Generative AI	Competences
• Generative AI • Generative artificial intelligence • AI generation models • Transformative AI technologies • GPT models • Deep learning AI generation • Generative AI job impact	• Competences • Workplace competences • High-skilled competences • Future skills • Competence development • Skills analysis • Competence framework
Second research phase	
Combining keywords, broadening the search, and connecting to the scope	
• AI impact on employment • AI and job displacement • AI skill demands • High-skilled workers AI • AI and workforce transformation • Upskilling for AI • Reskilling workers AI • Educational needs for AI	• AI literacy • Professional development AI • Adopting AI in work • Technology adaptation at work • AI and organizational change • Digital transformation AI • Technological skills gap

Table 2: Research phases

3.3.5.2 Inclusion and exclusion criteria

Early on in our research, we established inclusion and exclusion criteria for our secondary data collection. The reasoning for establishing criteria for our secondary data were based on initial findings related to prior research. We quickly realized that literature in the sphere of both generative AI and competences are generally too specific to be applied to our research. For example, research of generative AI and AI more broadly contains many publications in the medical and manufacturing sphere. At the same time, research regarding competences and competence development is generally also closely tied to specific industries, whereas many fell out of the scope of our research. With this in mind, we chose to exclude papers where the industry and/or typical job description of the roles covered in specific papers could not be directly applied to the high-skilled workers. Moreover, we also chose to exclude papers which were not written in either English or Swedish. We reasoned that we should strive to obtain a coherency throughout literature, hence relying on the languages we are proficient in.

Additionally, we noticed that there is no widely recognized definition of competences. Therefore, we interpreted papers based on their own application of the term or terms closely related, such as skills or capabilities, and included them if their use fit with our definition of competences. Moreover, the same goes with generative AI, where some researchers writing about generative AI might have just defined it as AI. In these cases, we went the same process

as with competences, analyzing the use and definition of the term and thereafter determining its relevance to our research.

3.3.6 Method of data analysis

To analyze the gathered primary data, we apply the Gioia method (Gioia et al., 2013). In practice, this means a coding method of the transcripts where we initially identify first-order concepts, followed by second-order themes, resulting in aggregated dimensions presented in this thesis. The main benefit of this method is to enable an aggregated perspective from the interviews, hence identifying commonalities and differences across the collected data. In a similar sense, the main benefit is also the main drawback, as it can be criticized for fragmenting the data and neglecting the context of the respondents answers. The coding process also opens up possibilities of subjectivity biases, as we can interpret the data in different ways compared to others. To reduce the acknowledged risks, the coding process followed a grounded theory research approach, becoming an iterative process. It is beneficial to use this approach in a context where there exists complexity and research gaps, which suits the conditions of our paper. This is further strengthened by no widespread standardized codification being applied in research of competences in the sphere of generative AI and high-skilled workers, essentially becoming a very suitable approach.

The coding process was initially conducted in the program Atlas, followed by manual coding by us to ensure the quality and relevance of each code. The process was initialized during the ongoing transcription of each interview. The applied principle of coding was to disintegrate and categorize data to aid in identifying commonalities and differences across interviews, as well as highlighting the most important reflections shared from our respondents. Each influential statement was highlighted and given a first-order code, which resulted in 132 codes. The initial codes were not predetermined prior to the interviews or the coding process, but emerged as a result of its analysis. Hence, by not having predetermined codes, we tried to avoid potential bias which otherwise could arise based on our prior research. After finalizing the transcript of the final interview, the first-order codes were combined into second-order themes. The second-order themes were aggregate versions of closely intertwined themes identified via the first-order codes across all interviews. This was a necessity of our analysis, as the fragmentation of the first-order codes would simply result in a too broad of an analysis.

Finally, categories which emerged from accumulated second-order themes were applied to help structure the data, hence structuring our analysis. This structure was also applied in our structure of the analysis section of this paper. The overall approach and structure of the data analysis is visualized and presented in Appendix C. To conclude, the applied method of our data analysis aided us in structuring the unstructured data of the interviews, essentially fostering a rigorous linkage between the perception of the respondents and our research.

3.4 Quality of research

3.4.1 Credibility

The credibility of the research refers to the trustworthiness and believability of the results and findings Bryman & Bell (2011). That is, how accurately the findings of the author correlates with the answers given by the respondent. In qualitative research this can become an issue since the results of qualitative studies are analyzed and presented based on the interpretation of the researcher. Qualitative research can therefore be scrutinized or face criticism for being too subjective to the opinions and interpretations of the author. This is why the credibility of this study must be addressed to present what measures have been taken to ensure the results are valid and reliable.

To increase the credibility of the results, all respondents were asked during the interviews if the interpreted understanding of their given answers were understood correctly, in order to avoid any misinterpretation of their answers. Additionally, Bryman & Bell (2011) mention triangulation as a method of ensuring the credibility of a study. According to Hales et al. (2010), there are four main types of triangulation: data, method, investigator, and theoretical triangulation. Data triangulation was achieved by using multiple independent interview sources, with different levels of seniority, and from various backgrounds, this provides a more nuanced set of results where areas of agreement and disagreement can be identified. By using thematic analysis the results are also to some extent quantified which further increases the credibility of the study by implementing method triangulation when combining both qualitative and quantitative research. Further, ensuring that both authors participated in the data collection and interpretation of the data by corroborating, verifying these interpretations, and reaching unanimous conclusions, provides a degree of investigator triangulation as opposed to dividing the interviews or executing the research independently.

3.4.2 Transferability

Transferability in a research study, as defined by Bryman & Bell (2011), concerns the extent to which the findings can be applicable in different contexts. For this study, ensuring transferability involves providing a detailed description of the study's context and methodology, allowing others to assess the applicability of the results to other settings (Bryman & Bell, 2011). Although participant names were withheld to maintain anonymity, detailed information about the context and criteria for participant selection was thoroughly outlined. These criteria are potentially representative of a specific demographic, such as experienced and knowledgeable users of AI tools, though they should not be seen as general representation of all professionals. Generalization is an issue typical in qualitative research, as noted by Bryman & Bell (2011). In an effort to enhance the transferability of this study, a theoretical framework was used. This framework aims to pinpoint essential competences for

professionals, with the intent of extending the transferability and application of the study's relevance.

3.4.3 Dependability

In qualitative research, dependability refers to the extent of which the study's findings would still be applicable if conducted again, in other words how trustworthy the findings are and how well they hold from bias (Bryman & Bell, 2011). To ensure dependability, all records of the materials used and steps in the process of the research have been kept and are accessible with the exception of the audio recordings from the interviews. The process of collecting data and literature review as well as the interview guide, coding scheme, and selection criteria for the interview subjects, are all provided in either methodology section or the appendix. Furthermore, all transcripts were reviewed and sent back to the subjects for approval in order to increase the accuracy and trustworthiness of the interpreted findings. All transcripts were approved by the respondents.

3.4.4 Confirmability

To ensure the research's quality, addressing confirmability is vital. These are the measures taken to maintain the objectivity of the research. Bryman & Bell (2011), stress that it is important that no personal values and biases or any theoretical propensity of the researchers affects the research. In order to increase the confirmability of this study, as previously stated, all interview subjects were given the opportunity to approve their recorded responses and interview transcripts to ensure no bias of us misinterpreting the answers. Furthermore, throughout the research period we continuously engaged in peer reviews with thesis supervisors and student peers, a process valuable for receiving critique and feedback to increase confirmability and minimize bias. Bryman & Bell (2011), acknowledge that it is impossible to achieve complete objectivity in qualitative business research. Hence, through these actions, we have taken steps to prevent personal values from manifesting in the research and acted in good faith.

3.4.5 Ethical considerations

In qualitative research, using interviews as the primary source of data collection, ethical considerations must be made in order to secure the rights of the respondents and increase the credibility and validity of the results (Bryman & Bell, 2011). By gaining informed consent from all respondents their integrity and privacy is protected. Furthermore, by providing them with the interview guide and a brief document of introduction to the subject prior to the interviews, the respondents were prepared and informed about the contents of the interview. Moreover, as previously mentioned all respondents were kept anonymous to further protect their privacy, all respondents were instead given individual coded names. Additionally,

another problematic aspect of qualitative interviews is that the results and data are interpreted by the researcher (Bryman & Bell, 2011). The semi-structured format of the interviews allowed us to ask supporting questions in order to clarify and avoid any misunderstanding or biased interpretations of the responses.

4. Empirical findings

The empirical findings chapter showcases the result of the conducted semi-structured interviews. The chapter is divided into three main sections, functional, cognitive, and social, according to the developed competence framework. The data collected from the semi-structured interviews are summarized categorically.

4.1 Functional competences

Technical skills

All of the respondents with coding experience (R1, R3, R4, R5, R6, R8, R9, R13) mentioned that generative AI in its current state is able to perform basic coding tasks, such as resolving coding issues or be used in the initial phases of the coding process to receive a skeleton which they themselves could develop and perfect. Generative AI is also mentioned as an effective replacement of other tools and processes which otherwise would be used if generative AI did not exist.

> *I think that ChatGPT is pretty good at generating code, and it does not necessarily have to be the entire code, but rather something specific that I need help with. And it goes a lot faster to just prompt ChatGPT compared to going searching around the internet and trying to find a solution on Stackoverflow or GitHub. (R6)*

Additionally, all of the aforementioned respondents with coding experience also stated that generative AI in its current state is not able to achieve the same level of code as someone with sufficient coding experience. However, one respondent specifically mentioned the experienced delimitations of generative AI and how it sometimes can hinder efficiency.

> *We have implemented a generative AI that we are encouraged to use, but I don't really feel like it actually helps me in my work. A generic AI that does not have the same level of skills that I have with programming, and that is often wrong, does not really help my efficiency or anything because I need to double check its work. I think that for me to use it, it needs to be more specific, so for me have like perfect knowledge of R or Stata and perfect knowledge of the task and every single line of code that I have written myself. (R1)*

Moreover, several respondents (R1, R4, R7, R8, R12) mentioned that the greatest amount of value of generative AI for high-skilled workers is generally highly task-specific. One respondent specifically mentioned that generative AI in its current state should not be viewed as a tool that will replace the roles of most people, but rather viewed as a tool which can replace tasks that you do not want to do yourself, or where it would be able to achieve a level of quality and efficiency which is impossible for a human to achieve.

I listened to a podcast some time ago where they said something along the lines of "It's not about what jobs AI will replace, but what tasks", and I think that there's a lot to that statement. I mean, do we really want to spend hours with a technical and meticulous and boring task, or would we rather just prompt a chatbot and let it do it in seconds? I would probably prefer the latter. (R8)

Continued, during the interview the decreased usage of a selection of basic technical competences were mentioned by all of the respondents. R7, R8, R9, and R12 specifically mentioned that automating routine tasks with the assistance of generative AI has become a key asset, while R12 described a shift in what competences that are required for them to be a high-performer at their job.

As AI automates routine tasks of my work, such as data entry and basic bookkeeping, there is a growing need for competences related to AI software and data analysis". (R12)

Project management

Concerning project management, respondent R1 mentioned that generative AI can be used as a learning tool that provides examples and instructions for basic tasks which have clear predefined instructions for junior colleagues who do not have prior experience of performing the same tasks as senior colleagues.

I definitely believe that the more junior colleagues I have benefit more from generative AI compared to me as they can use it to come up with examples and sketches of "how things should be", such as outlines for projects timeplans, and receive clear instruction of how you should manage projects. (R1)

On a similar topic, R2 stated that the implementation of generative AI has benefited their project management within their organization, enabling them to carry forward projects which otherwise would not be possible due to resource related restraints. R2 expanded on this by describing that allocating work to generative AI essentially replaces work which otherwise would be performed by other high-skilled workers.

AI has changed how we manage projects. For example, a project we are evaluating if we are going to initiate would originally have very large costs. A solution which was proposed was that some of the generated content instead would be with the use of AI, which would drastically reduce costs. So AI enables us to carry larger scale projects that we otherwise would not consider. (R2)

Additionally, R4 explained that since the implementation of generative AI within their organization, it has restructured the division of work, subsequently resulting in a shift in workflows. R4 described that the implications for junior colleagues is a shift in what the role consists of.

I would argue that AI has changed how we divide the work within projects. We have started to use AI more and more for routine tasks which project assistants otherwise would perform, essentially freeing up valuable time and subsequently reducing project specific costs. This also means that project assistants now perform different tasks compared to what they did some years ago (R4)

Managerial skills

Regarding the competence of managerial skills, R12 mentioned that the complexity of understanding specific and changing scenarios is not something that generative AI will ever be able to do, as the human aspect will always be difficult to communicate and analyze in a written form.

I don't think that AI will ever be able to have the same managerial skills that I have, like having situational awareness and understanding team dynamics is not something that can be boiled down to zeros and ones. (R12)

Moreover, several respondents (R1, R3, R4, R5, R6, R7, R10, R11) mentioned that an issue with the implementation of generative AI in their organizations is that there has not been an introduction of use cases and in which scenarios generative AI can be beneficial to use. R5 expanded on this concern, acknowledging that using generative AI as a part of your daily work also includes a specific mindset.

I use ChatGPT a bit, but not as much as I know that others outside of our organization does, and I think that it depends on two things. The first is that I don't have a mindset of "Oh, I can use generative AI for this", and the second is that I don't feel like I'm too good at using it. But I think a lot of this is because we've never really been taught how to use it, or when to use it. (R5)

Additionally, R1 specifically mentioned that goals set on managerial levels have started to become related to generative AI, where it is expected from the employees to use it more extensively, although without a clearly defined purpose.

I feel like our implementation of generative AI is just for the sake of it, with an overarching strategy of becoming the leaders of implementation and usage of generative AI, and we don't get much support in how to use it. We just got an email telling us that we now had licenses, but we have never been informed of what tasks or in which cases generative AI can be beneficial to use. (R1)

Similarly, R13 also described a general skepticism towards the trend of implementation of generative within both their organization, but also on a societal level. Moreover, they also believe that an overarching goal of implementing and encouraging the usage of generative AI does not necessarily favor growth, as the risks of blindly trusting AI-models outweigh the possibilities.

For someone who works a lot with AI I have a quite negative attitude towards it. Probably since I have seen the negative side and know how much can go wrong. (...) going headfirst without a use case simply because of AI promising to improve everything is not the best idea. Having a use case or clear purpose will generate more money for effort and is better from a business standpoint. (R13)

4.2 Cognitive competences

Analytical

Concerning the competence of being analytical, all respondents raised concerns regarding the quality and reliability of generative AI:s ability to analyze data in various forms. R4 specifically mentioned that there are significant barriers for them to be able to trust generative AI.

I have tried using ChatGPT for some tasks that I otherwise would have done manually otherwise, like analyzing and compiling large amounts of data. These tasks would have taken me hours to do by myself, but when I can just upload everything and prompt ChatGPT, I can receive an answer in seconds. It doesn't really replace my need to analyze it, as I don't trust ChatGPT and need to double check everything so it still takes some time as well, but it helps. (R4)

In a similar sense, R7 discussed that the generative AI tool that they use within their organization is generally less analytical, as it is trained on industry-specific data. In this context, R7 experiences it as something negative, as they themselves are not able to analyze the output as it is constrained to short, highly specific answers which have a limited ability to be analyzed in itself.

The AI tool we use is very precise and does not give you space for alternatives, which is problematic as in the audit industry we work based on frameworks and principles, which depends on what can be applied to the type of organization and industry. So, the answers we get are always very square, whereas I would prefer them to be more reflective and descriptive (R7)

Additionally, R2 raised concerns regarding the use of generative AI without a sufficient analytical ability yourself. They suggest that without a deep understanding of the circumstances and industry environment, the input data will have a negative effect on the output of generative AI.

You need to have a deeper analytical understanding of the industry environment when generative AI becomes integrated to your role. If you don't know what you are supposed to be asking AI, you'll have a hard time prompting. AI can make you more effective and cut costs, but you still need to have industry knowledge. (R2)

Critical thinking

While several respondents acknowledge the AI's ability to produce material efficiently and provide advanced responses and information, they simultaneously point out that it does not replace the need for expertise and human judgment. Real-world scenarios are more dynamic and the ability to think critically and analytically becomes more important, especially when dealing with uncertainty and resolving areas of conflict. Several respondents also emphasize the need to understand what you are asking the AI to do and also to understand the response it produces in order to validate the response.

> *While ChatGPT provides advanced responses and information, it doesn't replace the need for deep understanding or human judgment, especially in dynamic real-world scenarios. (R3)*

Similarly, some respondents also recognize the limitations of the general purpose nature of these AI tools. When prompted to execute certain tasks that require deep understanding, specific knowledge or input of a more creative nature the AI often fails to deliver on the required level. While still acknowledged for providing valuable assistance, AI does not yet have the capacity to replace the human ability to handle complex scenarios and consider all aspects.

> *Critical thinking remains a key skill because AI can't yet fully understand complex client needs and contexts. (R6)*

Moreover, R9 specifically mentions the limitations of generative AI tools compared to the human mind. They mention that generative AI in its current state is unable to critically reflect upon the input data, essentially having a negative impact on the output. In this sense, R9 argues that one of the main advantages of human intelligence compared to the intelligence of a generative AI is the ability to critically think and reflect upon the approach and a deep understanding of unique circumstances.

> *Despite the advancements in AI, critical thinking remains a crucial competence. There are certain bits where you have to have a human. I can't get my AI systems to have critical thinking. I can't get it to look at things critically. You can set up systems where you give it ten options and based on our circumstances, which of the ten options works best? If you ask it to look at something then it doesn't think critically, it follows your instructions in a very naive way. You can't make the AI say this is the wrong approach, that what you're asking me to do is not the right approach and that's where you need the human to think critically. (R9)*

While agreeing with the efficiency aspect of implementing AI, R14 similarly to other respondents, believes it comes at the cost of understanding the project you are working on. The efficiency gained might come at the cost of misunderstanding crucial pieces of information or not critically analyzing the problem at depth, which consequently might affect

the end result. AI can be used as a complementary support tool but the efficiency must never come at the cost of quality.

> *It's a trade-off. It is easy to find yourself in a role where you become passive in letting the AI take charge like when taking in external consultants. (...) we must never replace our own effort in understanding the case. It can facilitate it, but part of doing the work is building our own understanding of the case, and the more shortcuts you take the less you know and understand about what you are working on. (R14)*

Similarly, R13 continues to develop on the importance of critical thinking and deep understanding of what AI is utilized for. The user needs to have a certain degree of understanding of the subject in order to verify the validity of the output and be able to reason and analyze it in depth. Should problems arise it also becomes a matter of accountability and security making sure that there is enough understanding to determine what the problem is and how to resolve it.

> *You need to be able to prove or determine whether or not what AI produces is correct and works like it is supposed to. I believe it demands a deeper understanding than anything else, so that you don't create something that you don't have any idea of what it does or how. A big part of it is knowing how the systems you build actually work. Because if something breaks and you haven't built it, where do you start looking for the problem? (R13)*

Creative thinking

Regarding the competence of creative thinking, numerous respondents (R2, R3, R5, R8, R9, R10, R13) state that generative AI is a highly valued tool when it comes to idea generation and reflection, as they describe that it is able to provide a different perspective compared to their own. Additionally, R10 expanded on generative AI:s ability to think creatively by describing how they use the tool.

> *I feel that AI is great for me to receive examples and think outside of the box. It can greatly help with idea generation and provides me with perspectives and things to consider which I myself would not think about. (R10)*

Similarly, R13 points at the value in generative AI for the purpose of inspiration, quick feedback and starting the thought process.

> *If you want to know more about something you are working with you can get bullet point lists. And that list of suggestions can be the thing that gets your own thought process going and I find that valuable for both creative tasks but also for problem solving. (R13)*

Decision-making
Moreover, concerning decision-making, respondents R4, R8, R9, and R14 mention that generative AI is generally a sufficient decision-maker. R8 expanded on the topic, stating that generally being sufficient raises other concerns related to when you will be able to trust the decision of an AI-generated answer, compared to the decision of a human.

> *AI definitely is great at decision-making, especially if there is a lot of text. The only concern here, similar to concerns of self-driving cars being able to drive by themselves 98% of the time, what happens to the 2%? Will you be able to, or discover when, you need to "take the wheel"? (R8)*

Problem solving
Continued, numerous respondents (R1, R3, R4, R5, R6, R8, R9, R10, R13, R14) mention that problem solving is a critical competence that although generative AI in its current state is at a sufficient level, it does not fully replace the ability of a human. R13 expanded on this and defines problem formulation to be a key skill in the age of generative AI, as they mean that being able to precisely and efficiently define a said problem is of great value when working with generative AI.

> *I think that problem formulation will become very important and being able to define problems and what we want to accomplish, which is a skill we need to improve. To be able to define the frames of the problem earlier in the project. And that also makes project management, product owners and those types of positions more important. And a lot of testing. It is already important but will become even more so. Especially if the code is not written by a human. Quality assurance and testing. (R13)*

4.3 Social competences

Conflict management
On the topic of conflict management, respondents R1, R3, R4, R10 and R14 mention that generative AI is able to assist in the process of resolving conflicts, as it can be used to generate general approaches. Despite its ability of developing approaches, all of the aforementioned respondents mention the limitations of reading something, and converting it to reality. R10 expanded by describing how they have used generative AI in such situations, but the results have been varied.

> *I've used generative AI multiple times to understand others' perspectives, and although it is effective, it doesn't mean that I'll still understand their point of view. (R10)*

Additionally, R14 mentions skepticism towards the usage of generative AI tools in conflict management scenarios, as the results of using such external tools often have the results as

described by R10. R14 specifically mentions that conflict management is more than a specific competence, as it is also dependent upon the context and the relationship between two or more individuals which is difficult to describe in text.

> *You can use AI as support in conflict resolution, ask it about what questions to ask, and so on… But it won't solve the problem since it is about intrapersonal relationships and how you listen to people's stories and understand their reality. You can't augment that. (R14)*

Leadership

Concerning leadership, some respondents (R10, R11, R12) stated that the ability to lead others is not heavily assisted with the usage of generative AI as it does not replace human interaction or the guidance that a leader provides. R11 expanded and states that generative AI will not ever replace the leadership aspects of their work.

> *Some parts of my work involve leading others, and for those tasks I don't believe that generative AI will ever replace the work that I am doing. (R11)*

Communication & teamwork and collaboration

Several respondents (R2, R3, R5, R7, R8, R10, R11, R13, R14) discussed the implications of an increased use of generative AI and the impacts on everyday social activities which foster knowledge-sharing and social inclusion. Respondent R3 raised concerns regarding the overall mindset of using generative AI for tasks related to collaborations with others, as generative AI has the ability to replace teamwork and collaboration with others.

> *I think that there is an issue with the overall mindset of just prompting compared to asking a colleague something. Now, when someone writes a question in a chat instead of answers where someone would help them they will now more commonly receive an answer from someone who suggests using ChatGPT instead. I don't think it's good, because it refrains people from asking questions which leads to less collaboration with others. (R3)*

On a similar topic, respondent R3 discussed the negative implications on overall social wellbeing as a result of the increased usage of generative AI as a replacement of communicative activities in their work.

> *I feel like I lose a lot of social parts of my work as a result of using ChatGPT. If I previously needed help from a colleague, I would either ask them in person at their desk or ask if they would like to grab a coffee in the kitchen and just brainstorm some ideas. Now I just prompt ChatGPT and receive an AI generated answer. So generative AI has started to become the place I go for brainstorming instead of the kitchen. (R3)*

Additionally, R2 mentioned that generative AI has been an important asset for them, as their organization is currently understaffed in a growing phase. In this scenario, generative AI is a tool which they use for brainstorming combined with a use of generating content at a very high pace.

> *We are currently in a massive growing phase, which means that we are commonly undermanned. In this type of situation, generative AI is an amazing asset that I often use, as it becomes a colleague which can provide rapid answers, although with sometimes subpar quality, to brainstorm ideas with and generate content. (R2)*

R2 continues to discuss that the effects of generative AI is noticeable in some specific work categories, such as translators, where generative AI is starting to replace some positions entirely.

> *I know of a competitor that used to have a team of translators of 15 employees which has now been cut down to just 3. These 15 employees spent 2 years working on an internal generative AI model which eventually became competent enough to replace them entirely. (R2)*

Similarly, R13 suggests that the implementation of AI can also bridge the gaps between different professional fields and make information and knowledge-sharing more accessible. For example to help simplify technically advanced instructions and manuals and tailor these to a targeted audience with a certain level of knowledge. Enabling effective communication and translation to make difficult subjects more understandable.

> *From the social part I believe communication is a typical thing AI can assist with. Writing material, compiling material and simplifying material which I think is very underrated. To explain and present. I believe it will become less important for people to have these competences, or that it will be important in a different way. Us engineers who are able to write very technical and detailed text can now get assistance in making material more accessible and easily understandable for a specifically targeted audience with a certain background and level of knowledge, so improved knowledge-sharing. (R13)*

Moreover, R14 sees a lot of use and application for AI in the preparation stage of venture capital business but mentioned that this is only a small part of the significant work they do. The larger part of what they do is providing expertise and experience from previous ventures and help companies grow and continuously develop. R14 argues that if the investments were purely based on quantitative data AI would certainly be able to replace their job and perform as good or even better. However, R14 stresses that the most important part of their offer is working with people, building relationships and trust and that these aspects are things that AI would have great difficulty replacing.

That's another important aspect. What probably won't be replaced is the biggest part of our job. A lot of the work we do starts after the investment decision has been made. When we take the company into our portfolio we start working with them very actively as owners and take a place as board members. I think it will be very difficult to replace us with AI in this aspect. It's so centered around intrapersonal relations and problems that come with that. (R14)

Emotional intelligence

Other concerns raised were more specifically tied to a desire for authenticity. Multiple respondents commented on the increased amount of AI-generated content in multiple areas of their work, primarily concerning text and images. The general consensus was that something that was easily noticeable to be AI-generated felt disingenuous and insincere, and that they themselves would prefer work performed by a human.

If I have committed towards a delivery for a customer, even when they know that I work with AI, I still don't think they would be very happy with me delivering something that is entirely AI generated. And as you probably have noticed yourselves, you can pick up quite easily if something is generated by AI as humans are very good at pattern recognition. (R9)

Additionally, R4 also mentions the importance of human interaction when an increased amount of content is AI-generated, resulting in an increased desire for human interactions. R4 also mentions that they do not think that AI will ever be fully able to replicate human elements.

I don't think that generative AI will fully replace human interaction and all social contexts, as humans we still want to have human interactions and, I might have to eat my shoes in five years, but I don't think we'll ever reach a point where generative AI is able to fully replace human interaction in a fulfilling way. (R4)

R14 emphasizes that while AI can be valuable in many scenarios it cannot however replace the human element needed for certain situations that require a degree of emotional intelligence. Understanding of human emotions and complex relationships in particular settings highlights the importance of human interaction in these scenarios.

It all boils down to people and relations between people. I believe there is a great deal that AI won't be able to replace us in. AI will not for example be able to mediate between two managers or founders arguing, or be on an elections committee selecting candidates. (R14)

Moreover, R9 also highlights a shift in how the development of generative AI and how one interacts with humans compared to AI. They mention that coupled with a desire for authenticity, an increased craving for your colleagues to be more human has arisen, as

replacing a colleague with a robot does not adequately fulfill a need for human interaction and collaboration.

> *Previously we wanted humans to be more like robots, and now we want robots to be more like humans. (R9)*

5. Analysis and discussion

The analysis and discussion explores insights from the interviews based on the competence framework and previous literature. The findings are presented in relation to the existing literature and highlights areas of alignment and where the findings diverge from the literature. This section reveals how respondents are impacted by generative AI and how the competences they need are affected. This analysis offers insight into the changing relationship between high-skilled workers and generative AI.

5.1 Functional competences

The majority of respondents state that technical skills are crucial aspects for their current roles as their specific set of technical skills enables them to carry out their tasks efficiently, aligned with previous research (Gallagher et al., 2010; Rothwell, 2015; Jarvis et al., 2024; Lyu & Liu, 2021). Additionally, the majority of the respondents also mention that currently, their use of technical skills has not changed drastically since the implementation of generative AI in their workplace. The main reason appears to be due to an experienced low level of the capabilities of the large language models currently available. In a similar sense, the majority of the respondents also believe that a high level of technical skills, albeit via increased specialization, will always be valuable as few believe generative AI to ever obtain a level of technical competences comparable to the human mind.

On this topic, many respondents acknowledge the main benefit of their usage of generative AI is in performing basic and routine tasks which otherwise would require ground level technical skills, be dull, and time consuming. In this sense, generative AI seems to be able to effectively replace basic technical skills, essentially currently decreasing the value of basic technical skills, and increasing the value of developed technical skills. These findings are in line with previous research (Notley, 2024; Consultancy.uk, 2023; Kuklina, 2024; Sears, 2023; Ellingrud et al., 2023)

However, some respondents also acknowledge that generative AI is currently much more capable than many might be aware of. For instance, two respondents who work very closely with developing solutions based on large language models note that generative AI in its current state is much more capable than most believe. In this sense, they both state that the most capable large language models are able to perform tasks that require a deeper level of technical skills, but are limited by the human knowledge about how to use generative AI.

The discrepancy of the perceived capacity of generative AI between the respondents raises an important question as to what the underlying cause to this divide can be attributed to. It could be that the individual capacity to utilize generative AI, such as prompting skills, affects the value of the output and in turn the attitude towards the capacity of the tool. Another cause could be the motivation to use generative AI, as several respondents have mentioned that

there needs to be a clear use case and not simply a desire from management. Additionally, a majority of the respondents mentioned an overall high-paced work environment with immense time constraints. This could indicate that their perception of generative AI is based on limited testing and use, consequently affecting the perceived capacity of generative AI being able to perform complex technical tasks.

Moreover, concerning the competence of project management, the findings appear to be relatively in line with previous research. The majority of the respondents acknowledge project management to be a valuable competence, as a large share of their work is project based, reinforcing findings of previous research (Elsabaa, 2001; Giri, 2019; Anantatmula, 2010). Furthermore, one respondent noted that they have found junior colleagues to have a great benefit of generative AI, as it enables them to receive examples of project structures prior to them having a chance to familiarize themselves with it via experience. The notion that the junior colleagues generally have a higher perceived value of using generative AI is aligned with previous findings (Candelon et al., 2023; Brachio et al., 2023). Hence, generative AI can be said to reduce the barrier to develop sufficient project management competences.

In a similar way, the stated importance of project management as a competence in a dynamic environment (Anantatmula, 2010) can also be analyzed jointly with the benefit of junior colleagues. As project structures and the relevant set of project management competences change, the perceived benefits of using generative AI among juniors may also be experienced by seniors, as project management altogether is a broad and ever-changing concept. Referencing industry shifts and evolutions caused by constant technological advancements and a dynamic environment, generative AI can be assumed to assist in the development of project management competences throughout all organizational levels.

Additionally, generative AI was also found to be an enabler of carrying forward projects at larger scales than previously possible by having a positive effect on the cost structure. An example which was mentioned was using generative AI to generate content that otherwise would be outsourced and performed by industry professionals. This is aligned with previous research (Bain & Company, 2024; Gupta et al., 2023). Hence, generative AI has the ability to alter the way that the competence of project management is utilized. In this sense, high-skilled workers who use generative AI can creatively reconfigure project structures with the assistance of generative AI. Similarly, it was also found that generative AI essentially changes the composition of competences among project assistants as generative AI replaces numerous basic routine tasks that otherwise would be performed by project assistants. In this case, it is necessary for high-skilled workers with project management responsibilities to sufficiently structure projects to aid the performance and productivity with the additional possibilities of generative AI.

In the case of generative AI:s effect on managerial skills of high-skilled workers, the sentiment seems to vary, heavily dependent upon context. Most notably, a majority of the respondents noted that generative AI in its current form is unable to aid them with tasks that require managerial skills. In this sense, the findings of previous research stating that

managerial skills is a key competence for high-skilled workers remains relevant (Raabe et al., 2007; Contreras et al., 2023; Gallardo, 2020). Based on the responses, it is possible that despite managerial skills being described as a functional competence, it is still important to note its interplay with various social competences. Hence, reflecting upon the respondents' considerations of generative AI and social competences, the effects on composition of competences is difficult to measure.

Instead, the findings indicate that there will be an increased need for managerial skills. This can be especially emphasized in the current rapidly evolving business landscape (Raabe et al., 2007), which can be accredited to numerous technological advancements, including generative AI. This is supported by the insights of numerous respondents concerning the lack of managerial interventions related to the implementation and encouragement of generative AI usage, also highlighted in literature (Svensson, 2023; Sears, 2023; Dhar, 2023; Kuklina, 2024). Hence, it is likely that managerial skills will be a competence which will increase in relevance. Most notably, there appears to be a lack of activities, procedures, and processes that aid the existing workforce in their use of generative AI. It is therefore reasonable to assume that in order to obtain the most amount of value of generative AI usage, managerial skills will increase in relevancy.

5.2 Cognitive competences

Concerning the competence of being analytical, the findings appear to be mostly in line with previous research. All of the respondents mention that being analytical is a primary driver of their performance, aiding career development and carrying out daily activities (Ribarsky et al., 2009; Kryscynski et al., 2018; Mardiansyah et al., 2019).

Additionally, since the introduction of generative AI, a common theme among the respondents appears to be that they use generative AI to perform tasks requiring being analytical. However, there is very limited trust toward that generative AI performs the tasks in a rigorous and correct way. The end result therefore involves performing double the work, with generative AI initially performing the task followed by the task being performed again by themselves to verify the quality. Therefore, the task becomes performed twice, and the value of the competence of being analytical remains essentially the same. However, it is reasonable to assume that the initial task performed by generative AI aids in being analytical, as it can be seen as inspiration and provide additional considerations to the user. In this sense, generative AI can aid in the development of being analytical, instead of replacing analytical tasks.

Although, one respondent mentioned that the generative AI tool that has been implemented in their workspace is trained to be specific and brief in its answers. Despite being useful and having an ability to provide a direct answer, it also has the ability to significantly hinder the understanding of the individual utilizing it by not providing a reflection of the circumstances.

In this sense, the use of generative AI might effectively impede the development of analytical competences, as their use of generative AI might completely substitute other activities that would be performed if generative AI did not exist, which otherwise would have required analytical thinking.

Moreover, a different respondent mentioned that using generative AI results in a greater requirement of developing analytical competences, as you still need a deep understanding of the industry environment in order to properly formulate your prompt, interpret the response, and remain analytical upon considering the implications. Hence, it can be reasoned that the aforementioned impact on analytical skills as a competence in the midst of the AI-boom should not be overlooked. Instead, there are indications that suggest that being analytical will increase in importance, as there is an increased dependency upon applying the competence in an increased number of scenarios.

Regarding the competence of critical thinking, the findings appear to be in line with literature. In particular, numerous respondents raised awareness that despite an increased replacement of routine tasks with generative AI, critical thinking remains a key competence which is used as part of their daily activities that is irreplaceable. In this sense, the findings of previous research appears to be in line with our findings (Indrašienė et al., 2018; Knap-Stefaniuk & Ambrozová, 2021; Dwyer et al., 2014; Notley, 2024; Wong, 2020; Goel et al., 2023), especially in highly dynamic industry environments, further supported by Svensson (2023). Continued, the underlying reasoning behind the remaining need of critical thinking appears to be centered around the complexity of industry environments. For instance, it is reasonable to assume that it is highly difficult to reflect upon all the contextual dependencies for a given scenario, hence not being able to be properly conveyed via neither a prompt, nor the resulting output. In this sense, the deep understanding of real-world scenarios with the aid of sufficient critical thinking appears to be just as, if not more, important alongside the introduction of generative AI.

Further reasoning behind the rigorous use of critical thinking is in line with the previously stated importance of understanding specific scenarios, as one respondent mentioned that generative AI in its current state is not able to critically reflect upon its output. Hence, it can be argued that as generative AI in its current state is sufficient in other areas, there is an increased need of human critical thinking to righteously judge the output. In a similar sense, the importance of critical thinking is also present when prompting generative AI, as the output is heavily dependent upon the input. Therefore, to critically think and reflect upon the contents of your prompt is crucial.

Moreover, numerous respondents also raised concerns regarding generative AI replacing human critical reflection. As established, the thinking of generative AI does not effectively replace the requirement of critical thinking. However, for those who believe that generative AI can replace their own ability to critically think, there is now a risk that their own fundamental ability to critically think becomes obsolete as their dependency on generative AI increases. Additionally, in line with the previous reasoning, as the usage of generative AI

increases, a subsequent increased importance of critical thinking follows as there still exists a requirement to verify the output of generative AI.

Concerning creative thinking, despite generative AI replacing meticulous tasks, creative thinking appears to remain a crucial competence. In particular, it is suggested that the creative process and creative thinking at large is important for high-skilled workers, which is in line with previous research (Musayevna, 2022; Herliani & Rosidin, 2022; Palupi et al., 2020). However, one crucial aspect which was raised is that generative AI has the ability to provide alternative perspectives, which was mentioned as an aspect which helped numerous respondents in their creative thinking. For instance, it was stated that generative AI opened up the possibility for some of the respondents to be subject to other considerations which otherwise would not be present. Moreover, it was also found that a majority of the respondents who have used generative AI as a part of their creative processes used it as an assistant, instead of as a replacement, to gain additional depth in their creative thinking. Hence, the competence of creative thinking can be fostered and increased through the usage of generative AI. Along this, generative AI appears to still be an important competence of high-skilled workers, although with more possibilities of developing said competence as generative AI enables individuals to gain a broader amount of perspectives at a rapid pace.

In addition to this, several respondents also noted that they have used generative AI to initialize their creative process by prompting based on bullet points of their own considerations and/or suggestions. In this sense, generative AI triggers the creative process by effectively adding more layers of reflection within the process by blending AI-generated ideas and considerations with human creativity. Therefore, it is important to consider the middle ground of human versus AI in the final product.

On the topic of decision-making, our findings appear to be relatively in line with previous research. Initially, the majority of the respondents acknowledged decision-making to be an integral segment of their everyday work, as the competence can be applied to a vast majority of scenarios (Bruin et al., 2020; Deming, 2021; Jonassen, 2012). Moreover, some respondents expanded on their use of generative AI in scenarios where the competence of decision-making could be applicable, stating that generative AI is generally a sufficient decision-maker. However, generative AI being *generally* sufficient raised concerns regarding the scenarios where it is difficult to properly translate the scenario into text, which subsequently negatively impacts generative AI:s ability to form well-informed, subjectively correct, decisions. Additionally, as generative AI is neither a perfect nor horrendous decision-maker, it is reasonable to assume that there will be increased importance concerning the competence of decision-making to discover the poor decisions. Therefore, the competence of decision-making appears to remain equally, if not more, important as the impact of poorly substantiated decisions is difficult to measure, also considering that many respondents did not have any experience in using generative AI to support decision-making.

Regarding the competence of problem solving, the findings of our research are heavily aligned with previous research. A vast majority of the respondents stated that problem solving

as a competence is a critical one which they practice throughout a typical workday, which is in line with previous research (Nokes et al., 2010; Choudhar et al., 2022; Notley, 2024; Wong, 2020; Goel et al., 2023). In addition, a general finding was that problem formulation as a sub-skill of problem solving can now be said to be more important, as effective usage of generative AI is heavily dependent on your ability to formulate problems. Hence, it can be argued that setting the scope of problems, and righteously incorporating relevant aspects, can aid the overall performance of generative AI. Additionally, during the interviews it was also introduced that establishing what is to be accomplished within a project has become increasingly important, as the possibilities increase with generative AI becoming more integrated within business processes. Hence, the integration of generative AI has resulted in an increased importance of problem solving as a competence, as formulating problems and setting scopes becomes increasingly important.

5.3 Social competences

Regarding the conflict management competence, the findings of our study are aligned with previous research (Thakore, 2013; Adham, 2023; Lang, 2009). Several respondents mentioned that generative AI can assist in the conflict resolving process, in the sense that it can be used to generate general approaches on how to resolve conflicts. However, numerous respondents also point out that conflict management is not a competence which can be analyzed in a vacuum. This is primarily accredited to conflict management being dependent on context and the relationships between individuals which can be difficult to prompt or augment, which results in a skepticism of relying on AI for managing conflicts. This is aligned with previous research, as Adham's (2023) view that effective conflict management involves a combination of various skills, considerations, and aspects including managerial strategies and emotional awareness.

However, while AI holds great potential in assisting in the approach to managing and resolving conflicts, all of the mentioned respondents also point at the limitations of relying on AI, since the recommendations still need to be executed. Similarly, Lang (2009) underscores the importance of high-skilled workers possessing effective conflict management, regardless of seniority. Although Thakore (2013) asserts that this competence is even more necessary for managers. Therefore, conflict management appears to still be of high importance due to the intrapersonal and contextual nature which cannot be replaced with AI, but can provide approaches that can be useful.

Much in line with the previous research of Schoemaker et al. (2013) and Mumford et al. (2007), the findings suggest that leadership is as, or even more, relevant as before with the introduction of generative AI. Several respondents believed that generative AI does not contribute heavily to the ability to lead others nor affects the need for human interaction and need for good guidance. One could argue that the competence of leadership has become even more important due to AI as opposed to less, reinforced by previous findings (Notley, 2024;

Wong, 2020; Goel et al., 2023). As Schoemaker et al. (2013) highlights that good leadership is valuable in navigating rapidly changing and ambiguous environments, such as the AI-era.

Concerning the competences of communication, teamwork, and collaboration, the findings on the subject and its importance for building relationships, establishing trust and increasing performance are also mostly in line with the previous research (Galli, 2020; Rao & Nattala 2018; Colley 2007; Cortez et al. 2009; Davis & Marshall 2014; Ellis et al. 2005). Collaboration and good communication appears to be an integral and necessary part for the overall performance of the respondents daily activities as it is mentioned by all respondents to be a cornerstone of various activities, with some differences concerning organizational size and industry setting.

However, several of the respondents raised concerns regarding impacts on the willingness to communicate and the consequence of becoming more reliant on generative AI for tasks or problems that previously would require interaction, and sometimes collaboration, with colleagues. Similarly, another implication of this was colleagues now also recommend that one use generative AI instead of providing advice themselves. The respondents overall perception of this development was mostly negative as several of them believe that this will have negative consequences for the ability to effectively collaborate and utilize colleagues' input and expertise. These concerns appear to be in line with previous research (Kuklina, 2024; Ellingrud et al., 2023), also noting that social parts of work are valued more highly independently. Further, the concerns also cover the social aspect and not just the efficiency implications. Some respondents mention the importance of spontaneous conversations and quick feedback when passing a colleagues desk or stopping at the coffee machine not simply for the expertise, but rather the social aspect which builds relationships and workplace connection.

Further, one respondent discusses the limitations of generative AI in communication and that the greatest part of their work consists of actively working with portfolio companies and understanding their function, goals, and challenges. By doing so they establish trust, which they believe to be one of the most important aspects of their work, and that it is required to be performed by a person. This is aligned with other findings concerning a mistrust in the overall performance of generative AI, and a desire for human authenticity.

However, some respondents also point out the positive implications of using generative AI. One respondent mentions that the current expanding state their organization is in has resulted in them being understaffed. By utilizing generative AI they are able to receive valuable feedback quickly and consistently from an AI colleague. They also mention the advantages in utilizing generative AI for communication purposes and that it can enable knowledge-sharing between professional groups and tailor information to a certain audience making technical information simpler and more accessible. Therefore, it is reasonable to assume that generative AI can contribute to fulfilling a desire for increased communication, teamwork, and collaboration when the possibilities to interact with a colleague are limited. However, the

overall sentiment appears to be that human interaction currently is superior to that with a generative AI.

Regarding emotional intelligence the findings also go in line with previous research (Notley, 2024; Wong, 2020; Goel et al., 2023). Underscoring the importance of being able to understand and show empathy with human emotions, which indicates a willingness to learn but also the ability to manage interactions and understand the mission of a workplace, which several respondents believe generative-AI will never be able to replace due to the notion that these interactions must feel genuine and human (Rezvani et al. 2016; Arora 2017; Korniienko & Barchi 2023).

Several respondents also point out that AI-generated content in text or image is thus far relatively easy to recognize and that the increased amount of this type of content is having the opposite effect. Instead it is increasing the desire for human interaction, or the human element, and also the desire for authenticity. This indicates as mentioned that the competence of human intelligence is as, if not more, important since the introduction of generative AI. Further, this indicates that the need for human interaction is still a strong motivation but even more so that the desire for authenticity is becoming more important to consider.

Additionally, our findings suggest that the increased integration of generative AI in workplaces results in an increased desire to maintain a human connection, despite the replacement of some human interactions. It appears to be centered around AI becoming a shortcut to receive rapid responses, consequently resulting in decreased intrapersonal connections. Hence, the emotional intelligence of a high-skilled worker appears to be even more important than previously established, as a negative consequence of an increased use of generative AI appears to result in less human interaction.

These overarching results suggest that despite the many applications for generative AI in regards to social competences, there is a consensus that the human element of interaction and relationships is currently irreplaceable. This underscores the importance for high-skilled individuals to continue to maintain and enhance these competences when integrating generative AI in the workspace.

6. Conclusions

The final chapter of our thesis presents the conclusions from the analysis and discussion chapter and answers the study's research question. This is followed by theoretical and managerial implications that can be drawn from our research. The final section of the conclusions chapter includes suggestions for future research to contribute to an increased understanding of the borderlands of competences, generative AI, and high-skilled workers

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6.1 Concluding remarks

The purpose of our research is to investigate how generative AI has affected the need and relevance of a selection of competences among high-skilled workers. By exploring this, our research intends to provide a deeper understanding of the sphere of generative AI, examining the borderlands of AI and high-skilled workers. The research question we intend to answer is the following:

- How does generative AI impact the present and future relevance and need of competences among high-skilled workers?

Since the introduction of generative AI in the work setting of high-skilled workers, a new dynamic in the business environment has evolved which has augmented the current relevance of competences and a rising need to develop new skills. The application of generative AI is not limited to niche tasks, but is rather used throughout numerous different activities.

The impact of generative AI on functional competences is apparent, however differing depending upon specific competences. The most significant impact is concerning basic technical skills, where generative AI effectively replaces human work. This results in an increased need and relevance of higher level specialized technical skills. Concerning project management, the benefits of using generative AI appear to mostly be experienced among juniors as they are able to obtain a ground level of project management skills more quickly with the assistance of generative AI. However, there are indications that seniors can leverage generative AI in the future as it alters project structures. Regarding managerial skills, the implications of implementing and encouraging the use of generative AI results in an increased need of activities, procedures, and processes to upskill the workforce on the potential and areas of use of generative AI. Additionally, generative AI shifts the focus towards managerial skills to include ethical, strategic, and interpersonal skills, from traditionally management and administrative activities. Consequently, the relevance and need of managerial skills among high-skilled workers increases.

Moreover, concerning cognitive competences, generative AI is becoming increasingly integrated in a broad variety of organizational functions. Consequently, there is an equal increase in the demand for competences such as creativity, critical thinking, and analytical

skills which are increasing in need and relevance. High-skilled workers must be able to critically analyze and evaluate the output of these tools and utilize them in a way that secures the integration of AI as augmentation of their expertise as opposed to replacing it. Additionally, generative AI has the ability to advance the competences of creative thinking and problem solving by providing additional perspectives. Although, there currently exists a great mistrust towards the output of generative AI tools, resulting in an overall increase in need and relevance of creative- and critical thinking and problem solving. Consequently, this also stands for the competence of decision-making, as generative AI in its current state does not replace the need or relevance of the competence.

Social competences stand out in this framework and offer a unique combination of challenges and opportunities. Generative AI has proven to be a useful supportive tool in matters such as communication, conflict management, and to some extent leadership when being able to provide insights based on data and provide guidance on how to approach social problems in work settings. However, generative AI does not have the ability to provide the human element that is a central part of dealing with such scenarios. This calls on high-skilled workers to utilize this tool that generative AI provides in order to enhance the efficiency while also continuously maintaining and enhancing their intrapersonal skills and team dynamic leadership. Overall, the need and relevance of social competences appear to be on the rise as more content being generated by an AI results in an increased desire for human authenticity and connection.

To conclude, as generative AI continues to advance on the initialized AI-boom, navigating among relevant competences among high-skilled workers will likely continue to shift and evolve in the coming years in parallel with potential technological development and organizational integration. However, presently, specialization and niche competence development appears to fall into obsoletion, as generative AI is expected to raise the bar of a broad range of competences among many high-skilled workers.

6.2 Theoretical implications

This study has two primary theoretical implications. Firstly, the developed competence framework presented in section 2.2.1 (figure 2), which suggests key competences of high-skilled workers. It is important to establish a framework which can be broadly applied for high-skilled workers to align and guide future research to ensure coherency and continue to explore the impact of generative AI on competences. Secondly, the empirical findings have contributed to increased theoretical insights regarding the impact of generative AI on competences among high-skilled workers. We propose that generative AI has impacted the current value and need of competences among high-skilled workers. However, as the field of generative AI continues to develop, we also acknowledge the need to conduct similar research in the future as generative AI becomes more advanced and integrated into organizations.

6.3 Managerial implications

This study has managerial implications on different levels. At an organizational level, our findings propose that high-skilled workers are currently more unfamiliar with generative AI than what has been established. Hence, the increased need of managerial skills in this context suggests that organizations who have implemented, or are considering implementing, generative AI need to perform activities, procedures, and processes to establish and extract value from the technology. Without appropriate prerequisites, follow-up, and constant learning, an implementation of generative AI becomes fruitless as it creates risks of not extracting the full value. In addition, our findings suggest a desire to adapt internal learning systems and processes to continue to develop valuable and relevant competences of high-skilled workers, as an adaptation to changing industry environments is necessary to remain relevant.

At an individual level, the findings of our study suggest that there is an increased requirement to become familiarized with generative AI. Implied by the possibilities highlighted by numerous respondents of this study, a deep understanding of how to practically use generative AI can enable an increased efficiency and productivity for various tasks. In addition, developing relevant competences in the era of AI, either as a high-skilled worker or as a student pursuing a high-skilled role, increases the value of their profile for future employment in a changing landscape.

6.4 Future research

This study has examined several interesting and important factors related to the impact of generative AI in practice and has resulted in identifying a number of potential areas of future research. Firstly, the developed competence framework can be incorporated and further developed in future studies related to generative AI and high-skilled workers, examining the relevance and importance of additional competences which are currently not incorporated. Secondly, future research can also be related to the drivers of implementing generative AI. Based on our literature research and interviews, we have received various insights suggesting that there exists organizational and industrial differences regarding top-down or bottom-up implementation. Thirdly, future studies can delve deeper into the requirements to trust generative AI, and differences among junior and senior employees. During our research process, we gathered various insights from junior and senior high-skilled workers, where skeptics and optimists existed on both levels and differed based on organization and industry. Lastly, future research can explore and compare the usage of generative AI-models trained on specific data compared to generalized models. We believe that this would be especially interesting and beneficial to research in order to gain insights related to the perceived value and usage of generative AI in these two separate contexts, as the investment costs majorly differ.

References

Adham, T. (2023). Conflict Resolution in Team: Analyzing the of Conflicts and Best Skills for Resolution. *Scholars Journal of Engineering and Technology,* 152-163.

Anantatmula, V. (2010). Project Manager Leadership Role in Improving Project Performance. *Engineering Management Journal, 22*, 13-22.

Apotheker, J., Duranton, S., Lukic, V. de Bellefonds, N., Iyer, S., Bouffault, O., & de Laubier., R. (2024). From Potential to Profit with GenAI. *Boston Consulting Group*. https://www.bcg.com/publications/2024/from-potential-to-profit-with-genai

Arora, B. (2017). Importance Of Emotional Intelligence In The Workplace. *International Journal of Engineering and Applied Sciences, 4*.

Baig, A., Yee, L., & Singla, A. (2024). What is generative AI? *McKinsey & Company*. https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-generative-ai

Bain & Company (2024). *Artificial Intelligence*. https://www.bain.com/vector-digital/advanced-analytics/artificialintelligence/?gad_source=1&gclid=Cj0KCQjw6PGxBhCVARIsAIumnWa2U24mntKoaI2e4TxlZ0I0qXOVA0R7QJ1rnXyuOJcUq81Mf9evfWYaAk9GEALw_wcB

Blumberg, S., Chui, M., Yee, L., Javanmardian, K., Singla, A., Smaje, K., & Sukharevsky, A. (2024). What is AI (artificial intelligence)? *McKinsey & Company*. https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-ai#/

Boscardin, K., Gin, B., Golde, P. B., & Hauer, K. E. (2024). ChatGPT and Generative Artificial Intelligence for Medical Education: Potential Impact and Opportunity. *Academic Medicine, 99*(1), 22-27.

Brachio, A., Bianzino, N., & Hinish, S. (2023). How can AI help us accelerate the pace of change the world needs?. *EY*. https://www.ey.com/en_se/sustainability/how-can-ai-help-us-accelerate-the-pace-of-change-the-world-needs

Bruin, W., Parker, A., & Fischhoff, B. (2020). Decision-Making Competence: More Than Intelligence?. *Current Directions in Psychological Science, 29*, 186-192.

Bryman, A., & Bell, E. (2011). *Business Research Methods* (3rd ed.). Oxford University Press.

Candelon, F., Krayer, L., Rajendran, S., & Martínez, D. How People Can Create - and Destroy - Value with Generative AI. *Boston Consulting Group*. https://www.bcg.com/publications/2023/how-people-create-and-destroy-value-with-gen-ai

Cerullo, M. (2024-01-24). How the AI revolution is different: It threatens white-collar workers. *CBS News*. https://www.cbsnews.com/news/what-is-generative-ai-job-exposure/

Choudhar, S., Bi, N., Singh, P., & Talwar, M. (2022). Study on Problem Solving Skills and Its Importance. *World Journal of English Language, 12*(3).

Chui, M., Hall, B., Singla, A., Sukharevsky, A., & Yee, L. (2023). The state of AI in 2023: Generative AI's breakout year. *McKinsey & Company https://www.mckinsey.com/capabilities/quantumblack/our-insights/the-state-of-ai-in-2023-generative-AIs-breakout-year#/*

Colley, N. (2007). The Handbook of Communication Skills. *Social Psychological Review, 9*(1).

Consultancy.uk (2023). *Employees believe they need new skills to compete with AI*. https://www.consultancy.uk/news/36164/employees-believe-they-need-new-skills-to-compete-with-ai

Contreras, D., Padilla, J., & Martínez, C. (2023). Management skills as a factor of business competitiveness. *Región Científica, 2*(2).

Cortez, C., Nussbaum, M., Woywood, G., & Aravena, R. (2009). Learning to collaborate by collaborating: a face-to-face collaborative activity for measuring and learning basics about teamwork. *Journal of Computer Assisted Learning, 25*, 126-142.

Davis, P., & Marshall, D. (2014). Teamwork: An Essential for Leading and Launching Innovation. *Nursing Administration Quarterly, 38*, 221–229.

Deming, D. (2021). The Growing Importance of Decision-Making on the Job. *SSRN Electronic Journal*.

Dhar, J. (2023). People Strategy in the Age of Generative AI. *Boston Consulting Group*. https://www.bcg.com/publications/2023/people-strategy-for-digital-age-of-ai

Dwyer, C., Hogan, M., & Stewart, I. (2014). An integrated critical thinking framework for the 21st century. *Thinking Skills and Creativity*, 12, 43-52.

Ekström, J. (2023-01-28). Därför hotas även ditt jobb av AI. *Aftonbladet*. https://www.aftonbladet.se/minekonomi/a/WRk8KG/darfor-hotas-aven-ditt-jobb-av-ai

Ellingrud, K., Sanghvi, S., Dandona, G., Madgavkar, A., Chui, M., White, O., & Hasebe, P. (2023). Generative AI and the future of work in America. *McKinsey & Company*. https://www.mckinsey.com/mgi/our-research/generative-ai-and-the-future-of-work-in-america

Ellis, A., Bell, B., Ployhart, R., Hollenbeck, J., & Ilgen, D. (2005). An Evaluation of Generic Teamwork Skills Training with Action Teams: Effects on Cognitive and Skill-Based Outcomes. *Personnel Psychology, 58*, 641-672.

Elsabaa, S. (2001). The skills and career path of an effective project manager. *International Journal of Project Management*, 19, 1-7.

Epstein, Z., Hertzmann, A., Herman, L., Mahari, R., Frank, M., Groh, M., Schroeder, H., Smith, A., Akten, M., Fjeld, J., Farid, H., Leach, N., Pentland, A., & Russakovsky, O. (2023). Art and the science of generative AI. *Science, 380*(6650), 1110-1111.

Gallagher, K., Kaiser, K., Simon, J., Beath, C., & Goles, T. (2010). The requisite variety of skills for IT professionals. *Communications of the ACM*, 53, 144-148.

Gallardo, A. (2020). Significance of High Human Skills in the Success of an Organization. *International Symposium on Management*.

Galli, B. (2020). How to Effectively Manage Communication on Project Teams. *IEEE Engineering Management Review, 48*, 21-23.

Ghosh, B., Wilson, H. J., & Castagnino, T. (2023). GenAI Will Change How We Design Jobs. Here's How. *Harvard Business Review.* https://hbr.org/2023/12/genai-will-change-how-we-design-jobs-heres-how

Gioia, D. A., Corley, K. A., & Hamilton, A. (2013). Seeking Qualitative Rigor in Inductive Research. *Organizational Research Methods, 16*(1), 15-31.

Giri, O. (2019). Study on the Role of Project Manager in Improving the Project Performance. *Technical Journal, 1*(1).

Goel, S., Kovács-Ondrejkovic, O., Vankudre, R., Bingham, S., & Nitschke, J. (2023). Competence over Credentials: The Rise of Skills-Based Hiring. *Boston Consulting Group*. https://www.bcg.com/publications/2023/rise-of-skills-based-hiring

GU Executive Education (n.d.). *Demystifying AI - Opportunities & Limitations*. https://www.guexed.com/open-enrolment-programmes/demystifying-ai-opportunities-limitations/

Gupta, R., Srinivasan, G., Mittal, N., Nanda, R., Perricos, C., & Nuttal, K. (2023). The implications of Generative AI for businesses. *Deloitte*. https://www2.deloitte.com/us/en/pages/consulting/articles/generative-artificial-intelligence.html

Hales, D., Peersman, G., Rugg, D., & Kiwango, E. (2010). *An Introduction to Triangulation*. UNAIDS

Hassani, H., Silva, E., Unger, S., TajMazinani, M., & Feely, S. (2020). Artificial Intelligence (AI) or Intelligence Augmentation (IA): What Is the Future?. *AI, 1*(2), 143-155.

Herliani, D., & Rosidin, U. (2022). Strengthening Creative Thinking Ability: A Project-Based Physics Assessment Instrument. Impulse: *Journal of Research and Innovation in Physics Education, 2*(2).

Hult, G., Hurley, R., & Knight, G. (2004). Innovativeness: Its antecedents and impact on business performance. *Industrial Marketing Management, 33*, 429-438.

Högskolan i Halmstad (n.d.). *Tillämpad artificiell intelligens (AI)*. https://www.hh.se/utbildning/program/tillampad-artificiell-intelligens-ai.html

Indrašienė, V., Jegeleviciene, V., Merfeldaitė, O., Penkauskienė, D., Pivorienė, J., Railiene, A., Sadauskas, J., & Valaviciene, N. (2018). THE INTERPRETATIONS OF THE CONCEPT OF CRITICAL THINKING. *Social Work*, 16, 266-278.

International Labour Organization (2014). *Skilled Labour*. https://www.ilo.org/media/439421/download

International Labour Organization (2023). *Generative AI likely to augment rather than destroy jobs*. https://www.ilo.org/resource/news/generative-ai-likely-augment-rather-destroy-jobs

Jarvis, D., Mittal, N., Perricos, C., Schmidt, K., & Sniderman, B. (2024). The State of Generative AI in the Enterprise. *Deloitte*. https://www2.deloitte.com/us/en/pages/consulting/articles/state-of-generative-ai-in-enterprise.html

Jonassen, D. (2012). Designing for decision making. *Educational Technology Research and Development, 60*, 341-359

Knap-Stefaniuk, A., & Ambrozová, E. (2021). Critical Thinking – the Basic Competency for Leadership in the 21st century. *Perspektywy Kultury, 33*(2).

Kohnke, O. (2017). It's Not Just About Technology: The People Side of Digitization. In: Oswald, G., & Kleinemeier, M. (Eds.), *Shaping the Digital Enterprise* (pp. 69-91). Springer.

Korniienko, I., & Barchi, B. (2023). THE CONCEPT OF THE SOFT SKILLS AND EMOTIONAL INTELLIGENCE DEVELOPMENT. *Psychology Travelogs*.

Kryscynski, D., Reeves, C., Stice-Lusvardi, R., Ulrich, M., & Russell, G. (2018). Analytical abilities and the performance of HR professionals. *Human Resource Management*, 57, 715-738.

Kuklina, T. (2024). Preparing for the AI-enabled workforce of the future. *KPMG*. https://kpmg.com/ie/en/home/insights/2024/05/ai-tech-powered-human-inspired-art-int-firmwide/workforce-of-the-future-ai-art-int.html

Lang, M. (2009). Conflict Management: A Gap in Business Education Curricula. *Journal of Education for Business, 84*, 240-245.

Lim, W. M., Gunasekara, A., Pallant, J. L., Pallant, J. I., & Pechenkina, E. (2023). Generative AI and the future of education: Ragnarök or reformation? A paradoxical perspective from management educators. *The International Journal of Management Education*, *21*(2).

Lyu, W., & Liu, J. (2021). Soft skills, hard skills: What matters most? Evidence from job postings. *Applied Energy, 300*.

Mardiansyah, E., Saptono, S., & Setiawati, N. (2019). The Enhancement of Senior High School Students' Analytical Thinking Skills in Learning Excretory System Material with Quantum Learning Model. *Journal of Biology Education, 8*(1).

Martineau, K. (2023). What is generative AI? *IBM Research*. https://research.ibm.com/blog/what-is-generative-AI

Mumford, T., Campion, M., & Morgeson, F. (2007). The leadership skills strataplex: Leadership skill requirements across organizational levels. *Leadership Quarterly, 18*, 154-166.

Musayevna, O. (2022). TEACHING CREATIVE THINKING SKILLS AND HABITS IN ENGLISH CLASSROOM. *International Journal Of Literature And Languages, 2*(5), 5-9.

Nah, F., Zheng, R., Cai, J., Siau, K., & Chen, L. (2023). Generative AI and ChatGPT: Applications, challenges, and AI-human collaboration. *Journal of Information Technology Case and Application Research, 25*(3).

Nokes, T., Schunn, C., & Chi, M. (2010). Problem solving and human expertise. *International Encyclopedia of Education*, 3, 265-272.

Nhavkar, V. K. & Goel, S. K. (2023). Impact of Generative AI on IT Professionals. *International Journal for Research in Applied Science and Engineering Technology, 11*(7).

Notley, G. (2024). Generative AI and the Future of Work. *Deloitte*. https://www.deloitte.com/ie/en/services/consulting/research/generative-ai-future-of-work.html

Palupi, B., Subiyantoro, S., Triyanto, T., & Rukayah, R. (2020). Creative-Thinking Skills in Explanatory Writing Skills Viewed from Learning Behaviour: A Mixed Method Case Study. *International Journal of Emerging Technologies in Learning*, *15*(1), 200-212.

Patel, R., & Davidson, B. (2019). *Forskningsmetodikens grunder - Att planera, genomföra och rapportera en undersökning* (5th ed.). Studentlitteratur AB.

Pavlik, J. (2023). Collaborating With ChatGPT: Considering the Implications of Generative Artificial Intelligence for Journalism and Media Education. *Journalism & Mass Communication Educator, 78*(1), 84-93.

Raabe, B., Frese, M., & Beehr, T. (2007). Action regulation theory and career self-management. *Journal of Vocational Behavior*, 70, 297-311.

Rachinger, M., Rauter, R., Müller, C., Vorraber, W., & Schirgi, E. (2019). Digitalization and its influence on business model innovation. *Journal of Manufacturing Technology Management.*

Rao, C., & Nattala, M. (2018). An Introduction to Communication Skills. *International Journal of Research, 5*, 1487-1499.

Rezvani, A., Chang, A., Wiewiora, A., Ashkanasy, N., Jordan, P., & Zolin, R. (2016). Manager emotional intelligence and project success: The mediating role of job satisfaction and trust. *International Journal of Project Management, 34*(7), 1112-1122.

Ribarsky, W., Fisher, B., & Pottenger, W. M. (2009). Science of analytical reasoning. *Information Visualization, 8*, 254–262.

Rose-Krasnor, L. (1997). The Nature of Social Competence: A Theoretical Review. *Social Development, 6,* 111-135.

Rothwell, J. (2015). Defining Skilled Technical Work. Labor: *Human Capital eJournal*.

Sarkar, A. (2023). Exploring Perspectives on the Impact of Artificial Intelligence on the Creativity of Knowledge Work: Beyond Mechanised Plagiarism and Stochastic Parrots. *Microsoft Research*.

Schoemaker, P., Krupp, S., & Howland, S. (2013). Strategic leadership: the essential skills.. *Harvard business review, 91*(1).

Sears, J. (2023). How artificial intelligence can augment a people-centered workforce. *EY*. https://www.ey.com/en_se/workforce/how-artificial-intelligence-can-augment-a-people-centered-workforce

Smith, R. (2024-02-14). AI Is Starting to Threaten White-Collar Jobs. Few Industries Are Immune. *The Wall Street Journal*. https://www.wsj.com/lifestyle/careers/ai-is-starting-to-threaten-white-collar-jobs-few-industries-are-immune-9cdbcb90

Svensson, R. (2023). Future of work. *KPMG*. https://kpmg.com/xx/en/home/insights/2023/11/future-of-work.html

Thakore, D. (2013). Conflict and Conflict Management. *IOSR Journal of Business and Management, 8*(6), 7-16.

VanLehn, K. (1996). Cognitive skill acquisition. *Annual review of psychology*, *47*, 513-539.

Vinge (2024). *Vinge först ut i Norden med AI från Harvey*. https://www.vinge.se/nyheter/vinge-forst-ut-i-norden-med-ai-fran-harvey/

Warner, K., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning, 52*(3), 326-349.

Wong, J. (2020). How to harness AI's power and energize the human enterprise. *EY*. https://www.ey.com/en_se/innovation/how-to-harness-ai-power-and-energize-the-human-enterprise

World Economic Forum (2023). *The Future of Jobs Report 2023*. https://www.weforum.org/publications/the-future-of-jobs-report-2023/

Zinkula, J. & Mok, A. (2024-03-06). ChatGPT may be coming for our jobs. Here are the 10 roles that AI is most likely to replace. *Business Insider*. https://www.businessinsider.com/chatgpt-jobs-at-risk-replacement-artificial-intelligence-ai-labor-trends-2023-02?r=US&IR=T

Appendix

Appendix A: Interview guide (English version)

Introduction of ourselves

- Briefly introduce ourselves and the purpose of our research.
- Explain confidentiality and anonymity, how the data will be used, and the estimated duration of the interview.
- Obtain informed consent.

Warm-up Questions

- Can you describe your current role and main responsibilities?
- How long have you been working in your current field?

Understanding AI Integration

- How have you seen AI tools being integrated into your work or sector?
- Can you provide examples of AI tools that have become essential in your daily tasks?
    - (Has your work been affected or changed since the implementation of AI tools?)

Competence Transformation

- In what ways do you believe AI tools have changed the competences required in your role, organization, and/or field?
    - (Are there specific competences that have become more important since the integration of AI? Why? Can you provide examples?)
    - (Are there competences that have become less relevant or obsolete due to AI integration? Why? Can you provide examples?)

Value and Relevance of Competences

- Has the implementation of AI tools impacted the way your organization develops or prioritizes competences?
- Connected to the competence areas presented in the interview document, do you have any insights related to changes and/or no changes in importance?

Sector and Role-Specific Insights

- How do you think the impact of AI on competences differs across various roles within your sector, such as between junior and senior positions?

Future Competence Requirements

- Looking ahead, what competences do you think will become more critical as AI tools evolve and become more integrated into work processes in 5-10 years or more?
- Are there new competences or skills you foresee needing to develop personally or organizationally in response to the advancement of AI technologies?

Conclusion

- Is there anything else you'd like to add that we haven't covered, especially regarding the impact of AI on competences in your sector?

Closing

- Thank the participant for their time and insights.
- Explain the next steps.
- Provide our contact information for further questions and/or follow-up.

Appendix B: Interview guide (Swedish version)

Introduktion av oss själva

- Kort introducera oss själva och syftet med vår forskning.
- Förklara konfidentialitet och anonymitet, hur datan kommer att användas, samt den uppskattade varaktigheten av intervjun.
- Få informerat samtycke.

Uppvärmningsfrågor

- Kan du beskriva din nuvarande roll och huvudansvar?
- Hur länge har du arbetat inom ditt nuvarande område?

Förståelse för AI-integration

- Hur har du sett AI-verktyg integreras i ditt arbete eller sektor?
- Kan du ge exempel på AI-verktyg som har blivit väsentliga i dina dagliga uppgifter?
    - (Har ditt arbete påverkats eller förändrats sedan implementeringen av AI-verktyg?)

Kompetensutveckling/omvandling

- På vilket sätt tror du att AI-verktyg har förändrat de kompetenser som krävs i din roll, organisation och/eller fält?
    - (Finns det specifika kompetenser som har blivit viktigare sedan integrationen av AI? Varför? Kan du ge exempel?)
    - (Finns det kompetenser som har blivit mindre relevanta eller föråldrade på grund av AI-integration? Varför? Kan du ge exempel?)

Värde och relevans av kompetenser

- Har implementeringen av AI-verktyg påverkat hur din organisation utvecklar eller prioriterar kompetenser?
- Kopplat till de kompetensområden som presenterades i intervjudokumentet, har du några tankar kring förändringar och/eller inga förändringar i dess betydelse?

Sektor- och rollspecifika insikter

- Hur tror du att påverkan av AI på kompetenser skiljer sig åt mellan olika roller inom din sektor, såsom mellan juniora och seniora positioner?

Framtida kompetenskrav

- I framtiden, vilka kompetenser tror du kommer att bli mer kritiska när AI-verktyg utvecklas och blir mer integrerade i arbetsprocesser om 5-10 år eller mer?
- Finns det nya kompetenser eller färdigheter du förutser att du behöver utveckla personligen eller organisatoriskt som svar på framstegen inom AI-teknologi?

Avslutning

- Finns det något annat du skulle vilja tillägga som vi inte har täckt, särskilt när det gäller påverkan av AI på kompetenser i din sektor?

Avslutning

- Tacka deltagaren för deras tid och insikter.
- Förklara nästa steg
- Tillhandahålla vår kontaktinformation för ytterligare frågor och/eller uppföljning.

Appendix C: Interview document (English version)

Master's Thesis about AI

Hi!
Thank you for your interest in our thesis and for your willingness to contribute with your insights. The purpose of this document is to prepare you for the upcoming interview and to help you organize your thoughts.

We aim to investigate how AI has and will impact the competence requirements in companies. A brief description of AI is various algorithms that can be used to generate content. One of many examples of AI is ChatGPT.

In our thesis, we group skills into three different areas. You will find these on the next page. Primarily, we are interested in how AI has or has not affected your use/relevance of different competences, e.g., within these three areas. We are also interested in your thoughts on how it has or has not affected the use of different skills among people in your organization, as well as how it might impact future skill requirements.

Our thesis is based on your and several other interviews. All responses will be anonymous. We will compile all the interviews to create a comprehensive picture.

Thank you very much for helping us in our research. We look forward to seeing you at the interview!
Best regards,

Oscar Höög

Pontus Ljungqvist

UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Appendix D: Interview document (Swedish version)

Masteruppsats om AI

Hej!

Tack för ditt intresse av vår uppsats och att du vill bidra med dina insikter. Syftet med dokumentet är att förbereda dig för kommande intervju och hjälpa dig sortera dina tankar.

Vi vill undersöka hur AI har och kommer att påverka kompetensbehov hos företag. En kort beskrivning av AI är olika algoritmer som kan användas för att generera innehåll. Ett av många exempel på AI är ChatGPT.

I vår uppsats grupperar vi kompetenser inom tre olika områden. Du hittar dessa på nästa sida. I första hand är vi intresserade av hur AI har eller inte har påverkat din användning/relevans av olika kompetenser, t. ex. inom dessa tre områden. Vi är även intresserade av dina tankar kring hur det har eller inte har påverkat användningen av olika kompetenser hos personer i din organisation, samt hur det kan påverka framtida kompetensbehov.

Vår uppsats bygger på din och flera andra intervjuer. Alla svar kommer att vara anonyma. Vi kommer att sammanställa samtliga intervjuer för att kunna skapa en samlad bild.

Stort tack för att du hjälper oss i vår forskning. Vi ses på intervjun!

Med vänliga hälsningar,

Oscar Höög

Pontus Ljungqvist

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