MASTER THESIS | DANIELA BIRGMANN, 141208

AI IN THE CREATIVE INDUSTRIES

A Comprehensive Study of AI's Influence on Graphic Design, its Effects on the Creative Production Process, Collaborative Dynamics, and Market Trends.

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Abstract

In a world where technology and creativity collide, the ever-evolving landscape of generative AI has emerged as a dynamic force, reshaping the field of the creative industries. Since the end of 2022, generative AI has created a big discussion about the value of designers and artists. Yet, given the short timeframe, research in computational creativity shows big gaps in the changes creative professionals must deal with. Previous literature anticipated heightened productivity and efficiency through human-AI collaboration, shedding light on profound market changes in job roles and skills within the creative industries. The goal of this master's thesis is to investigate alterations in productivity and efficiency in the creative process for graphic designers due to AI. It explores modifications in the creative production process, collaboration with generative AI, and business implications like job displacement, new roles, and skill development. The study collects data using an inductive, qualitative approach based on n=15 semi-structured interviews. The findings reveal that effective collaboration with AI enhances designers' efficiency in the production process, but since resources are directed towards more high-value tasks, the overall productivity of the process remains unchanged. The design market notes a decline in basic design jobs, signalling an evolution in designers' roles, particularly in Art and Creative Direction. New technical roles like operational engineers and creative quality assurance directors are emerging, emphasizing proficiency in navigating and curating AI tools. Designers must acquire management, communication, and technology skills while maintaining mental and creative flexibility to adapt to evolving ideas. This research adds to existing literature by exploring AI's practical impact on graphic designers, emphasizing the enduring human role, opportunities, and limits of AI-related tasks, and suggests new directions for further exploration in academia.

Keywords: Generative AI, Creative Industries, computational creativity, market changes, co-creation

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1. Introduction

In the ever-evolving landscape of technological innovation, Artificial Intelligence (AI) has rapidly emerged as a new force, performing tasks with human-like intelligence and is reshaping industries across the world (Anantrasirichai & Bull, 2021, p. 589). Empowered by high-performance computing power and increased data storage, AI applications help in daily tasks, finance, security, and predictive analysis. Even governments recognize AI's potential as an economic and social progress driver (ibid.). Yet, what truly fascinates, and calls for exploration is the profound impact AI currently has on the creative industries. By the end of 2022, generative AI tools had taken the world by storm (Filkey & Fong, 2023). In just a few months, a revolution in technology and design emerged that promised new ways to create, and empowered individuals to unleash their creativity (ibid). Tools like Midjourney, Stable Diffusion, and Photoshop AI have pushed the boundaries of human's imagination and innovation, causing creative professionals to reflect on their own work and, perhaps more importantly, to consider the future evolution of the creative industries (Filkey & Fong, 2023).

While now anyone with the help of AI-driven tools can easily generate content and create complex and creative art, the revolves around the anticipated transformations in the professional lives of designers and whether their skills remain irreplaceable. Some people fear for their job while others argue that this development is not a replacement for human creativity, but rather a collaboration, where AI serves as a catalyst for creative expression (Pfeiffer Report, 2018, p. 16). Several examples offer insights into how AI is transforming the creative workflow and pushing the boundaries of computational creativity. Smith et al. (2017) showcased the immense worth of AI within the creative process for a trailer production, specifically emphasizing its role in streamlining the editing of a movie trailer. This led to notable savings in terms of time and effort and generated a huge social media impact (Smith et al., 2017, p. 1807). Furthermore, an early attempt to utilize AI for artistic creation happened in 2016 with the introduction of a 3D-printed painting known as "The Next Rembrandt" (Tietgen, 2016). The team digitized Rembrandt's works, focusing on portraits from 1630 to 1640. They analyzed facial features, determining the typical features of a Rembrandt portrait and the outcome is considered an 'original' of the 1669 decreased artists (Tietgen, 2016). Furthermore, in 2018 the first picture entirely generated by AI was sold on an auction for $432,500, exceeding all the expectations (Alleyne, 2018).

These examples prove the deep impact AI already made in the creative sector, but not until recently have professionals in the field fully grasped the changes that will come. In a study in 2018, 21% of the interviewed creative professionals revealed their interest in AI in their work life, and they sensed that it would change the industry, but were not sure how it would alter the way they work (Pfeiffer Report, 2018, p. 14). Pennington & Stanford (2019) explicitly identify graphic design as one of the professions experiencing shifts in qualifications, work roles, and employment dynamics changing with AI (p. 54). Fast forward to the present year of 2023, we find ourselves in an era profoundly influenced by generative AI, where nearly all creatives

in this sector must deal with transformations. Based on a recent study, involving 3,000 global leaders and 21,000 workers across 28 countries revealed that automation will transform traditional work processes, job roles, and organizational structures but also boost productivity and enable new businesses (IBM, 2023). Moreover, human-AI partnerships will enhance value creation and outcomes (ibid.). In graphic design, automation is significantly changing visual communication, by rapidly and affordably creating products that once required extensive human effort and specialized education (Matthews et al., 2023, p. 379). The literature urges a shift away from placing primary emphasis on the aesthetic and technical abilities required for creating visual communication. Instead, it encourages a deeper engagement with human skills such as negotiation, cooperation, and judgment (Pennington & Stanford, 2019, p. 45). Yet, history has shown that with the advent of change, adaptability follows (Acemoglu & Restrepo, 2018, p. 208). After initially resisting, people tend to utilize newfound technologies, ultimately fueling further creativity. Similar to the shift from paintings to photographs, which infused artwork with emotions and expressions beyond replicating reality, the evolution from one medium to another establishes innovation (Filkey & Fong, 2023).

In addition to its evident influence on professionals within the creative sector, the rapid progression of AI technologies is certain to have significant impact in the creative economy (Felten, Raj & Seamans, 2019, p. 33). Traditionally, creative endeavors have been perceived as labor-intensive, potentially constraining an individual's economic potential (Lee, 2022, p. 604). The question is whether it is possible with the assistance of AI tools to accelerate the creative process and generate a greater volume of ideas in a shorter timeframe, facilitating economic growth (ibid). As Acemoglu and Restrepo (2018) point out, AI is leading in a unique set of consequences for the labor market, distinct from previous waves of technological change (p. 207). Also, Lee (2022) underscores the link between AI and creative industries, emphasizing the economic significance of creativity while highlighting the need for a deeper exploration of its broader market and economic impact (Lee, 2022, p. 604). It is noteworthy that for certain businesses, AI represents a fundamental solution to ease the substantial workloads of creatives (Lee, 2022, p. 606). A subscription-based AI writing service proudly advertises its ability to deliver a finished article in under a minute, at a significantly lower cost compared to hiring freelance writers (Lee, 2022, p. 606).

While there is existing literature on creative industries and the influence of AI, the workflow changes, and market transformations are only beginning to attract the attention of researchers. Given the current state of research in this area, the primary objective of this thesis is to explore the emerging area of computational creativity, placing particular emphasis on the job and business aspects of AI implementation in graphic design. The found research gap encompasses areas such as evaluating alterations in the creative production process, uncovering successful human-AI collaboration, and assessing industry shifts, which have received limited

attention in previous studies. To bridge this knowledge gap, the following research questions have been developed:

RQ1: What impact has generative AI on streamlining the creative production process, including productivity and efficiency?

RQ2: How is human-AI collaboration facilitated in the creative process?

RQ3: How does AI influence job roles for graphic designers, including skill changes and job displacement?

1.2 Scope and Limitations

The creative industry, also called, creative economy or cultural industries encompasses a big field and sometimes the terminology gets used in the wrong context. In general, creative industries refers to a range of economic activities that are concerned with the generation and commercialization of creativity, ideas, knowledge, and information (Perrish, n.d.). David Parrish's definition of creative industries is the following: "*The term 'creative industries' describes businesses with creativity at their heart – for example design, music, publishing, architecture, film and video, crafts, visual arts, fashion, TV and radio, advertising, literature, computer games and the performing arts."* On sub-sector of the creative industries is visual graphic design. Since it was identified as the area most influenced by AI, this sector will be the main focus of my thesis (Pennington & Stanford, 2019).

While AI application in create workflows range from content creation, information analysis, content enhancement and postproduction workflows, information extraction and enhancement, and data compression, this thesis focuses mainly on the applications for content creation in the creative production process. Creating original content and new designs is a fundamental activity of designers and artists. By narrowing the research focus on market and business impact, I will delve deep into how AI is reshaping the way creative industries operate, how value is perceived and generated, and how traditional practices are being disrupted and reshaped. This research has the potential to contribute valuable insights to both the academic community and industry practitioners who are interested in understanding the implications of AI in the creative field.

1.3 Thesis Structure

In the introduction, I introduced the research topic, its importance, research questions, and the thesis context. The subsequent literature review examines existing knowledge, identifies research gaps, and areas requiring further investigation. This formed the basis for Chapter 3, where I discuss the theoretical framework used to address research questions, explain AI's role in the creative sector, and introduce common AI tools for graphic designers. In the methodology section, I describe the research methods and approaches employed in my thesis, including the research design, data collection methods, sampling techniques, data analysis procedures, and study limitations. Chapter 5 is dedicated to presenting the findings of my research. I utilized models explained

in section 3 to communicate the results effectively and answer the research questions. In Chapter 6, I discuss the findings, connecting them to existing literature and the theoretical framework for deeper insights. In the conclusion, I summarize the research, explain its broader contributions, and suggest paths for future exploration.

2. Literature Review

Artificial intelligence has gained significant attention as a prominent research area in recent years (Amato et al., 2019, p. 6). While the spotlight was initially on computer science, mathematics, and psychology, it has also revealed numerous other fields ready for exploration (ibid.). This thesis operates on the overarching research field of *computational creativity*, specifically examining the impact of AI on job and business dynamics within the field of graphic design. This focus facilitates an examination of the influence of AI integration in the creative production process, workforce dynamics, and human-AI collaboration strategies within creative sectors such as design. Even though researchers have only recently started exploring the field of computational creativity, it is exceptionally interesting, and Colton & Wiggins (2012) argue that it might be the furthest as AI research goes (p. 21). In the following concept matrix, I summarize relevant literature in terms of creativity, AI, and economy that presents the pertinent concepts for this thesis (see Table 1).

	CONCEPTS						
LITERATURE	AI	Creativity	Computational Creativity	Economy	Creative Industries	Graphic Design	Collaboration
Anantrasirichai & Bull, 2021	x				x		
Mustafa, 2021	x	x			x	x	
Boden, 2004	x	x	x				
Pfeiffer Report, 2018	x	x	x		x		
Sowa et al., 2021	x		x			x	x
Acemoglu & Restrepo, 2018	x			x			
Felten, Raj, & Seamans, 2019	x			x			
Hwang, 2022	x						x
Inie, Falk, & Tanimoto, 2023	x	x	x		x		x
Lee, 2022	x	x	x	x	x		
Matthews, Shannon, & Roxburgh, 2023	x				x	x	
Colton & Waggins, 2012	x	x	x				
Krarimi et al., 2021	x	x			x		x
Strauss, 2023	x			x			

Table 1: Concept Matrix.

2.1 The Arrival of Computational Creativity

The probably most important researcher in the field of computational creativity and the woman behind the first attempt to provide a theoretical framework for the study of creativity in AI is Margaret Boden (2004). She is the first person in my knowledge to acknowledge creativity in computers and argues that computers not only appear to be creative but can also help us to understand human creativity itself (Boden, 2004, p. 16-20). Boden (2004) suggests that computers can be used to create computational models of creativity, which attempt to

simulate the cognitive processes involved in creative thinking (p. 131). By building and testing these models, researchers can gain a better understanding of how creativity works in the human mind (Boden, 2004, p. 16-20). Additionally, computers can help map and navigate in a conceptual space, allowing researchers to visualize the relationships between different ideas, concepts, and creative works (ibid., p. 58). In computational creativity research, the work revolves around computers with intelligent tasks that produce something of cultural value (Colton & Wiggins, 2012, p. 22). Colton & Wiggins (2012) working definition of computational creativity research is: "*The philosophy, science, and engineering of computational systems which, by taking on particular responsibilities, exhibit behaviors that unbiased observers would deem to be creative*" (p. 21). An illustrative example is AARON, a drawing program that possesses the capability to produce thousands of line drawings following a specific style (Boden, 2004, p. 9). Additionally, certain AI programs have the capacity to reshape their conceptual framework by modifying their own rules, resulting in the generation of new, intriguing ideas (ibid.). While most of the early computational creativity was used by contemporary artists, it has made its way into the commercial life of graphic designers (ibid.).

Since creativity is a complex concept and has many interpretations, the meaning of creativity in the context of this paper is described in section 3.2.3. The question whether computers possess true creativity goes beyond scientific exploration and ventures into the field of philosophy, where moral and political considerations come into play (Boden, 2004, p. 21). However, this is not the sole focus of the research field; what holds greater prominence is the exploration of the consequences when computers can mimic human-like creativity and execute tasks as designers do.

2.2 Current State of AI in Graphic Design: Awareness, Impact, and Adoption

In 2018 Adobe commissioned research with the goal to better understand what role technology plays in the work life of creative professionals. Design tools are indispensable for designers' daily tasks, but until recently, technology was primarily used to bring creative visions to life, rather than serving as a source of inspiration (PfeifferReport, 2018, p. 11). The 110 qualitative interviews revealed that creatives see the potential of AI to take off workload and create abilities that were not there before, but there was uncertainty about its direct impact on them (ibid., p. 2). The paper from Mustafa (2023), sheds light on the speculations that design professionals had back in 2018 regarding the impact of AI on the industry (p. 243). Experts asserted that AI technology enhances the work of graphic designers significantly: by automating routine tasks, AI has liberated them to channel their efforts toward the more imaginative and strategic dimensions of their work (Mustafa, 2023, p. 246). These findings align with the results of research conducted in 2023, indicating that machine learning has the potential to assist creative professionals in meeting the rising need for increased productivity, speed, and effective management of the escalating complexities with audiences, tasks, and technologies (Inie, Falk, & Tanimoto, 2023, p. 4). As per research conducted by Accenture, AI is projected to boost productivity

in the creative industry by as much as 40% by the year 2035 (Accenture, 2017). Furthermore, AI can serve now as a source of inspiration for creative professionals, offering a big array of quickly generated output (Inie, Falk, & Tanimoto, 2023, p. 4). This inspires new ideas and allows for exploring a broader range of possibilities in the creative process (ibid.).

Undoubtedly, today's technology landscape sees automation wherever possible, yet it's important to understand that instead of jobs disappearing, they are evolving (Tam, 2019). In a study conducted in 2023, participants were not too worried about AI taking their job soon (Inie, Falk, & Tanimoto, 2023, p.3). Only 3 out of 23 respondents fear for their job, while others are of the opinion that only boring, repetitive tasks will be replaced and hope that AI just becomes another tool (ibid.). Nonetheless, certain concerns have emerged in studies focusing on technology and AI within the creative sectors. Creatives have raised concerns about the potential loss of human touch and that generative AI might bypass crucial aspects of creativity like exploration and happy accidents, which could potentially lead to stagnation of creativity (Inie, Falk, & Tanimoto, 2023, p.3; Mustafa, 2023, p. 248). Another concern is that as technology advances, people might be less inclined to try new and innovative ways to solve creative problems (PfeifferReport, 2018, p. 2). Yet, the most prevalent worry centers around the idea that AI could contribute to standardization of visual outcomes, potentially diminishing the value of human creative skills (ibid.).

But there's another significant shift in the industry: the empowerment of ordinary individuals to unleash their creativity. A consistent theme discussed in the literature is the concern that easily accessible computer programs based on AI technology allows clients to avoid designers (Matthews et al. 2023, p. 371; Karaata, 2018, p. 184). There are AI-powered tools that can quickly fix photos, create logos, design websites, and make marketing materials without needing a professional designer (Karaata, 2018, p. 184). This makes it easy for individuals and small businesses to get design work done quickly and affordably (Matthews et al. 2023, p. 371). Interestingly, the widespread sentiment is that everyone can be a designer now, believing that what can be achieved with simple tools should be considered similarly valuable as creative projects of professionals (PfeifferReport, 2018, p. 22). Moreover, Matthews, et al. (2023) conducted a literature review to investigate how AI will influence the daily tasks of designers, with the aim of understanding the necessary changes in design education. The authors highlight that because of the current evolution, educations are out-of-step with the new creative landscape and warn that graduates are being prepared for economic and cultural conditions that no longer exist (Matthews et al. 2023, p. 379). University-educated designers now compete not only with AI but also with non-creatives employing AI to achieve creative, rapid, and cost-effective outcomes (ibid.). The researchers stress that educators and researchers must ask questions about the future role of humans in this landscape.

2.2.1 Changing Roles of Graphic Designers

The literature review from Matthews et al. (2023) answers some questions regarding how the roles of graphic designers change with the rise of AI and how computers can assist the errors humans produce (p. 371-372). While, humans are often seen as less reliable, prone to mistakes, and slower than machines, automation-based products are presented as a way to bypass expensive designers for last-minute changes, promoting a dismissal for human workers (Matthews et al., 2023, p. 371). This perspective is attractive in a capitalist context where machines don't require payment and can handle heavier workloads in less time (ibid.). Anantrasirichai and Bull's (2021) review anticipates a substantial surge in AI usage, particularly in post-production workflows such as image, video, audio, and text editing (p. 636). They project that AI will play an increasingly common role as a creative tool and collaborative assistant, extending its support from acquisition to production, delivery, and interactivity (Anantrasirichai & Bull, 2021, p. 639). However, some experts suggest a more constructive role for human designers (Ferrari, 2017, p. 2629). They may serve as mediators between clients and computer-generated products, facilitating production, interpreting results, and ensuring quality (ibid.). Others recommend that creatives may shift more towards acting as Art Directors, emphasizing decision-making over content creation (PfeifferReport, 2018, p. 14). Ferrari (2017) emphasizes that the availability of creative tools to everyone doesn't guarantee the quality and usability of what's created (p. 2629). From now on, the designer's role isn't primarily about shaping the product's appearance, but rather about initiating the system and assessing the outcomes (ibid.). Another author emphasizes that in a world with ever-present AI, there will be a greater need for guides, coaches, and teachers who can help individuals harness AI's potential effectively (Slaughter, 2023). Consequently, designers are less focused on crafting the product's visual form and more on ensuring its overall soundness and appropriateness (ibid.). This shift in design emphasizes ‘co-creation’ rather than the conventional ‘human-centeredness’ (Sanders & Stappers, 2008).

Matthews et al., (2023) found that in the year 2023, successful designers are increasingly valued for their interpersonal skills, attention to aesthetics, and contextual understanding—qualities that computers struggle to replicate (p. 372). Job advertisements for graphic designers now seek candidates with competencies in research, communication, collaboration, and skills in business strategy, innovation management, and branding (Matthews et al., 2023, p. 372). Additionally, a recent study advises HR professionals to review roles, eliminate repetitive tasks for AI handling, merge roles, expand roles to include AI tool management, and provide targeted skill development for high-level tasks (Goldstein et al., 2023). Generative AI will allow designers to access a wider range of skills, which were previously only available to big teams, making them more specialized, efficient, and independent (ibid.). Acemoglu & Restrepo (2018) highlight that automation in creative fields changes the nature of jobs rather than eliminate them entirely (p. 207). For example, some tasks may become automated, but new roles related to AI management, data analysis, or creative supervision may emerge (ibid.). There may be a shift in demand for certain skills, but creatives who are proficient in working with AI tools and

understanding their capabilities could be in high demand (Acemoglu & Restrepo, 2018). But next to the skill and job role transformation are also new jobs arising. The emerging career category of 'prompt engineers', is considered one of the hottest tech jobs on the rise in multiple fields (Slaughter, 2023). The job includes crafting text-based instructions, which then are inserted into AI tools (Popli, 2023). These instructions serve the purpose of guiding the AI in generating content like blog posts or sales emails, ensuring they possess the desired tone and factual accuracy (ibid.).

Rather than seeing AI as a replacement for human designers, the industry needs to acknowledge the strengths it can bring and embrace it as a personal assistant, working in collaboration and co-creation to achieve the best possible outcome. This aligns with the research findings of Sowa, Przegalinska, and Ciechanowski (2021), which strongly support the notion that increased productivity in managerial professions arises from human-AI collaboration. The researchers emphasize a close partnership between humans and AI, rather than pursuing complete automation (Sowa, Przegalinska, and Ciechanowski, 2021, p. 141).

2.2.2 Collaboration between AI and Humans

Co-creative systems, a subset of computational creativity, entail real-time collaboration between human users and AI agents for a shared task (Karimi et al., 2020, p. 222). The exploration of human-AI co-creation has gained momentum in various fields, and the effectiveness of such human-AI collaboration in the creative field is demonstrated by Smith et al. (2017). Smith et al. (2017) showcases the world's first collaborative computer-human effort, creating an officially released and highly publicized trailer for the film 'Morgan', launched by 20th Century Fox in September 2016 (p. 1799). They developed an intelligent system that can understand and capture emotional patterns in horror movies, specifically for use in trailers (Smith et al., 2017, p. 1799). The AI-driven creative process applied domain-specific learning to the given film in order to generate a shortlist of scenes fitting for the trailer production (ibid., p. 1801). The ultimate artistic touches, encompassing shot composition, seamless transitions, and overlaying the official Fox soundtrack were contributed by a professional filmmaker (ibid., p. 1804). The AI-generated trailer went viral on social media platforms and disrupted the film industry by proving that AI can significantly amplify creative processes (ibid. p. 1807).

Another example is the one from Krarimi et al. (2021). Designers often struggle with a persistent challenge called fixation, which hinders their ability to break free from initial ideas and the capacity to envision beyond their initial concepts (Karimi et al., 2020, p. 221). By developing an AI sketching partner, the design process can be enhanced by providing further ideas based on the designer's sketch, avoiding them from getting stuck (ibid, p. 230). So, while technology in AI used to be only outcome-focused and used for executing a vision, it can now serve as a starting point for the creative process (Pfeiffer Report, 2018, p. 12). Computers can generate new ideas and concepts, assisting individuals in doing the same (Boden, 2004, p. 10). Both their failures and

successes can provide valuable insights for enhancing designers' own creative abilities (ibid.). Furthermore, AI has found its significance at the management level (Sowa, Przegalinska, and Ciechanowski, 2021, p. 141). Managers are willing to embrace AI-based tools, but these tools must be fit to their individual needs, given how complex their responsibilities are. Most participants are confident that AI can assist them and are enthusiastic about partnering with AI, indicating a positive attitude change toward this technology (ibid.).

To cluster the landscape together, Hwang (2022) categorized AI co-creative tools into four groups: Editors, Transformers, Blenders, and Generators. Editors simplify content editing, such as background removal in images or videos using tools like Photoshop AI (Hwang, 2022, p.3). Transformers convert content from one form to another, for instance, turning hand-drawn sketches into digital images with tools like Uizard.ai (ibid.). Blenders merge creative elements, often using GAN technology, to generate new ideas. And generators produce creative outputs based on user-provided guidance or constraints (ibid.).
These categories play different roles: Blenders and Generators introduce novelty, while Editors and Transformers work with predefined directions where creatives lead (Hwang, 2022). Hwang (2022) also highlighted how these tools aid the creative process. Generators assist in idea generation, especially during brainstorming. Blenders are valuable when users have initial ideas, helping inspire more or merge existing ones. Transformers mainly assist in the final creative stage, while editors come into play during reviewing or refining nearly finished content (Hwang, 2022, p. 4). Adding to the previous examples, Sanders & Stappers find that incorporating co-creation with AI into design practice will lead to a series of transformations, impacting the design approach, the scope of the designs, the people engaged in the process, and especially the value of design (2008, p. 15).

2.3 Impact on Society: Creativity and AI

As previously discussed, graphic designers are aware of the changes AI brings and starting to adapt to it, dealing with the consequences but also embracing the opportunities (Matthews et al., 2023; PfeifferReport, 2018). On the other side are consumers, clients, and stakeholders that might not be too intertwined in the creative process but still recognize the shift in the industry. With open AI tools, everyone can effortlessly produce art that looks professional, which adds variety to how society expresses itself creatively (Lee, 2022, p. 608). While AI-generated art might not always look very impressive, it could be more budget-friendly and reachable compared to pieces by professional artists or designers (ibid.). Additionally, through techniques like style transfer, AI can generate visuals that used to require extensive time and expertise from skilled professionals (Pfeiffer Report, 2018, p. 20). It becomes increasingly possible for every society member to engage in artistic endeavours, making creative production more accessible (Gingerich, 2022, p. 260). Hence, AI is lowering the entry barrier, which could potentially diminish the value of creative skills and expertise.

These developments are expected to continue evolving in the future, reshaping how creatives express and bring their unique ideas to life (Pfeiffer Report, 2018, p. 20).

Chamberlain et al.'s (2023) study explored people's ability to distinguish between artworks created by humans or computers and how it influenced perceived value. Participants struggled to accurately discern the origin of computer-generated art, relying on visual cues like brushstrokes or lines. Artworks labeled as computer-generated received lower aesthetic ratings. Adding to that, another study found that while consumers appreciate aesthetically pleasing AI work, it lacks the 'wow' factor of truly unique creations (Inie, Falk, & Tanimoto, 2023, p. 4). This highlights the importance of human involvement in generative AI creation (ibid.).
Just like the invention of photography in the 19th century had a significant impact on the value of artworks, the same can be observed now with the implementation of AI in graphic design (Inie, Falk, & Tanimoto, 2023). Photography's ability to capture realistic and highly detailed images posed a challenge to traditional realist paintings (Savedoff, 1993). Painters no longer needed to focus solely on producing lifelike representations, as photography could achieve this with greater precision. This changed the value, as it undermined the uniqueness and aura of the realistic artworks (ibid). Yet, it enabled completely new art segments and led some painters to explore new artistic movements like impressionism and abstraction (ibid.). So just as photography transformed the art world, generative AI is transforming the design world by offering new tools, techniques, and creative possibilities. Still, what remains unclear is how exactly generative AI is changing the perceived economic value of creative work and designs from professional designers.

2.4 Previous research on AI's Impact on Economic and Business Aspects

In past industrial revolutions, automation initially led to job losses but eventually resulted in an increase in jobs due to greater labour demand (Acemoglu & Restrepo, 2018, p. 200). The current era, marked by AI as the fourth industrial revolution, is not expected to be different (Ferrari, 2017). The market dynamics are changing, and this transformation is altering how work is organized and how economic value is associated with qualifications (ibid.). As a result, designers are increasingly valued for their intangible contributions and services, moving beyond simply creating physical products, which is redefining their roles (Matthews et al., 2023, p. 372).

Which effect new technologies and especially AI and automation have on the labour market describe Acemoglu & Restrepo (2018) in their article. When automation becomes more affordable or efficient, it can replace human labour in certain tasks, leading to what's known as the 'displacement effect' (p. 202) This means workers may lose their jobs in the tasks that are automated, potentially reducing overall job demand and wages (Acemoglu & Restrepo, 2018, p. 202). However, it's essential to note that automation doesn't always mean fewer jobs. The so-called 'productivity effect' means that automation can also make some tasks cheaper to

produce, increasing the demand for human labour in non-automated areas (ibid.). For instance, while simple design jobs may be automated, creative jobs that require evaluation and expertise could see an increased demand and higher salaries (ibid.). IBM's recent research shares the standpoint that AI has the power to revolutionize the employee experience and may lead to the emergence of innovative job roles and career opportunities (Goldstein et al., 2023). AI can create new job categories, for example roles like 'trainers', 'explainers' who communicate AI outputs to customers, and 'sustainers' who monitor AI systems' performance and ethical compliance (Acemoglu & Restrepo, 2018, p. 203). Soni et al. (2020) share a similar viewpoint, asserting that there will be a growing requirement for a new labour force specialized in creating, advancing, and commercializing AI in the coming years (p. 24).

Nevertheless, the economic transition due to rapid automation can be challenging and the shift from old jobs to new ones is complex and often slow (Acemoglu & Restrepo, 2018, p. 208). This adjustment period may be difficult, as seen historically during the British industrial revolution: before it led to increased labor demand, productivity and higher wages, a period of stagnant wages, expanding poverty, and harsh living conditions took place (Acemoglu & Restrepo, 2018, p. 208). The adjustment process comes from unavailability of the required skills as new educations are being established, which professionals must undergo to acquire the necessary skills (Soni et al., 2020, p. 25). The economist David Autor also emphasizes the difficulties in reallocating and redesigning work using the tools currently at our disposal, noting that this process often requires a substantial amount of time to navigate (Strauss, 2023). Also, according to a new study from the IBM Institute for Business Value uncovers that 40% of employees will require reskilling due to the integration of AI and automation within the next three years (Goldstein et al., 2023). This percentage could potentially encompass 1.4 billion individuals out of the global workforce (ibid.). IBMs study mentioned 'Time management skills and ability to prioritize', 'ability to work effectively in team environments', and 'the ability to communicate effectively' as the top three most critical skills required of the workforce in 2023 (ibid.). Yet so far there is little concrete information about what skills this new technology will require from graphic designers (Acemoglu & Restrepo, 2018, p. 228).

While Acemoglu and Restrepo (2018) focus on the challenges associated with labour reskilling, a separate study conducted in 2019 addresses the concern of AI displacing human work while exploring the relationship between AI and the labour market (Felten, Raj, & Seamans, 2019). The researchers introduce a new metric, the AI Occupational Impact (AIOI), which connects AI advancements in specific applications like image recognition, translation, and strategic gaming to workplace capabilities and job types (ibid.). This measure is used to analyze the connections between AI and wages, employment, and labor market polarization (ibid.). The AIOI scores suggest that AI is assured to have a more significant impact on cognitive skills, especially those related to problem-solving perception and creativity, while its influence on physical tasks and abilities is

expected to be relatively limited (Felten, Raj, & Seamans, 2019, p. 15-16). Looking at the AI impact score which the highest number of 7.31 for civil engineers and the lowest number of 0.595 for brickmasons, graphic design receives an impact score of 0.710, positioning themselves as a high impact occupation (Felten, Raj, & Seamans, 2019). Their findings on employment and wage growth between 2010 – 2016 reveal that, on average, AI-impacted occupations witness a slight yet positive wage increase, with no significant changes in employment (Felten, Raj, & Seamans, 2019, p. 27). Tiwari (2023) adds that AI has the potential to increase productivity and economic growth by increasing efficiency and reducing costs (p. 4). Notably, the positive wage correlation is more pronounced in occupations demanding higher software skills (Felten, Raj, & Seamans, 2019, p. 27). This is also highlighted in Tiwari's review, concluding that higher levels of education and skills are more likely to adapt to the changing market and take benefit of new employment opportunities (2023, p. 4). In the context of creative industries, this could mean that the impact of AI on wages can vary. Automation of certain tasks may reduce the demand for low-skilled positions, potentially impacting wages for those roles. However, skilled creative professionals who can leverage AI to enhance their work may command higher wages due to their specialized expertise (Felten, Raj, & Seamans, 2019).

In contrast to prior articles suggesting AI will eliminate low-skilled jobs and entry-level positions, economist David Autor is a different opinion and believes AI has the potential to tackle income inequality (Strauss, 2023). Autor believes that AI has the power to reshape the labour market, empowering workers to perform more expert tasks and potentially raising wages for those in lower-skilled roles (ibid). He argues that AI differs from previous technologies because it can adress problems that involve judgment, inference, and flexibility, rather than just rule-based tasks. This enables AI to complement human expertise rather than simply replace it (ibid). Yet, the key question is whether AI acts as a substitute or complement for different industries of workers. In cases where AI complements existing expertise, it can enable individuals to perform more expert work with less education, ultimately benefiting workers. However, in cases where AI purely substitutes for expertise, it may lead to job losses (ibid). While Autor suggests that technology creates new demands for expertise, he also acknowledges the challenges and potential disruptions that AI may bring for some occupations (Strauss, 2023).

2.5 Motivation and Research Questions

In the context of computational creativity, several recent studies have investigated the impact of new technologies in the design sector (Pfeiffer Report, 2018; Mustafa, 2023), the changing role of creatives in the age of AI (Anantrasirichai & Bull, 2021; Matthews et al., 2023) and the change of creativity itself (Lee, 2022). Other research works focus on the effective collaboration between designers and AI tools (Smith et al., 2017; Karimi et al. 2020) or the educational shift in the teaching of design with AI (Matthews et al., 2023,). However, there is very little systematic evidence on the impact of AI on market and business impact, especially in the creative sector. Existing literature provides broad insights and speculations about positive productivity and

efficiency effects but lacks in giving a detailed view of where in the creative process this is achieved. The research by Acemoglu and Restrepo (2018) describe the effects automation has on the labour market and Felten, Raj, and Seamans (2019) started to explore the relationship between AI and the labour market for all occupations. Now, while the creative industries not only play a pivotal role in driving innovation and economic transformation, in alignment with European regional policy goals for intelligent and sustainable growth, they also have considerable influence over societal values and behaviour (Boix-Domènech & Rausell-Köster, 2018, p. 19). Hence, as the industry undergoes a shift in the era of AI, it becomes essential to thoroughly assess AI's influence and the evolving role on the graphic design market.

2.5.1 Research Questions

After conducting the literature review, it became evident that there is a significant research gap when it comes to understanding the production process adaption and market changes with AI implementation for graphic designers. This gap includes areas like productivity and efficiency effects in the creative process, beneficial human-AI collaboration, business, and market changes and evaluating the value of creative work. These aspects have not received attention in existing studies and should be explored further. To bridge this knowledge gap, this thesis aims to investigate the consequences of AI in creative industries, including its impact on job roles, reskilling, collaboration, production processes, and value creation process.

During the review of existing literature, I considered how AI technologies are simplifying creative production processes and transforming the productivity or efficiency of creative work. Previous work highlighted that automation could enhance productivity but has not yet put specific focus on graphic design (Pfeiffer Report; Mustafa, 2023). Therefore, I want to exclusively look at the creative production process, identify where AI can be implemented and take over repetitive tasks, where it is affecting productivity and efficiency to draw a conclusion about the overall process productivity. The inquiry is summarized in the first research question:
RQ1: What impact has generative AI on streamlining the creative production process, including productivity and efficiency?

Additionally, collaboration and co-creation has been discussed in previous literature in various context. Hwang's (2022) case study shows that future AI co-creative research should further explore the possibilities to provide support at various steps of the creative process, since producing creative work requires more than generating and executing ideas. However, how the collaboration between graphic designers and AI in efficient content creation is facilitated is up for exploration. I aim to explore how human-AI e collaboration is enabled, examining the benefits and challenges. This is encapsulated in the second research question:
RQ2: How is human-AI collaboration facilitated in the creative process?

Finally, considering the lack of prior exploration, it is important to investigate the impact of AI on market transformations for graphic designers. As mentioned by Inie, Falk, and Tanimoto (2023), it's vital to understand how generative AI might affect specific roles, explore how AI can assist creative practices, and understand specific skills required by graphic designers today. Existing research has touched on emerging employment prospects and skills, but it has been rather broad and lacks a focus on the creative market (Felten, Raj, & Seamans, 2019; Tiwari, 2023). This inquiry is part of the third research question:
RQ3: How does AI affect job roles for graphic designers, including skill changes and job displacement?

By expanding the research in computational creativity, I contribute valuable insights for creative practitioners, and researchers who are interested in understanding the changes happening in the creative industries and the impact it has for the business of graphic designers.

3. Theory and Concepts

In this section, the theoretical foundations supporting the investigation of AI implementation into creative industries are explained. Initially, I elucidate an established framework for describing the design process, followed by an exploration of a framework for comprehending market changes driven by automation. Subsequently, I take a closer look at the functionalities behind AI and generative AI. Lastly, I offer a definition of creativity and computational creativity for this thesis before the value of creativity is explained.

3.1 Framework for the Creative Process

To investigate how productivity and efficiency with AI changes, it is important to understand the creative process. The first research question evolves around the question of how AI implementation changes the overall design process, and which parts may or may not become more efficient or productive. The UK design council has developed a framework called ‘Double Diamond Model’ (DDM) that represents a standardized, strategic approach to design and acknowledge the value of design management (Design Council, 2004). The DDM offers a straightforward way to outline the stages involved in any design and innovation project, regardless of the specific methods or tools employed (see Image 1). The clear and comprehensive description of the design process makes it accessible to both designers and non-designers.

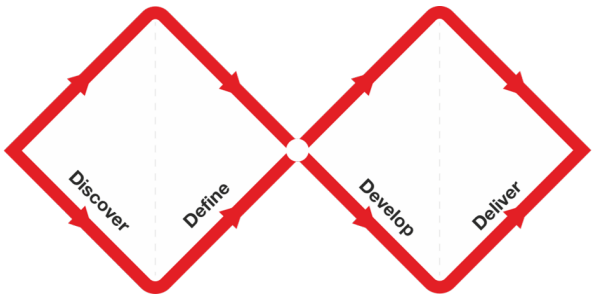

Image 1: The Double Diamond by the Design Council (Design Council, 2004).

Since it was launched in 2004, it has gained worldwide recognition, is widely referenced on the web, and expanded in multiple ways for different design fields (Design Council, 2004; Dusch, 2022; Boicheva, 2022). Notably, the UX/UI design field has extensively embraced this framework due to its strong emphasis on human-centeredness and the idea of comprehending the problem before starting the design process (Boicheva, 2022). However, fields like graphic design can also highly benefit from using this framework for a project. Given that the model above is quite simplistic and does not encompass every facet of the complex design process undertaken by graphic designers, I have incorporated insights from other sources to provide a more comprehensive representation of the graphic design process (see Image 2).

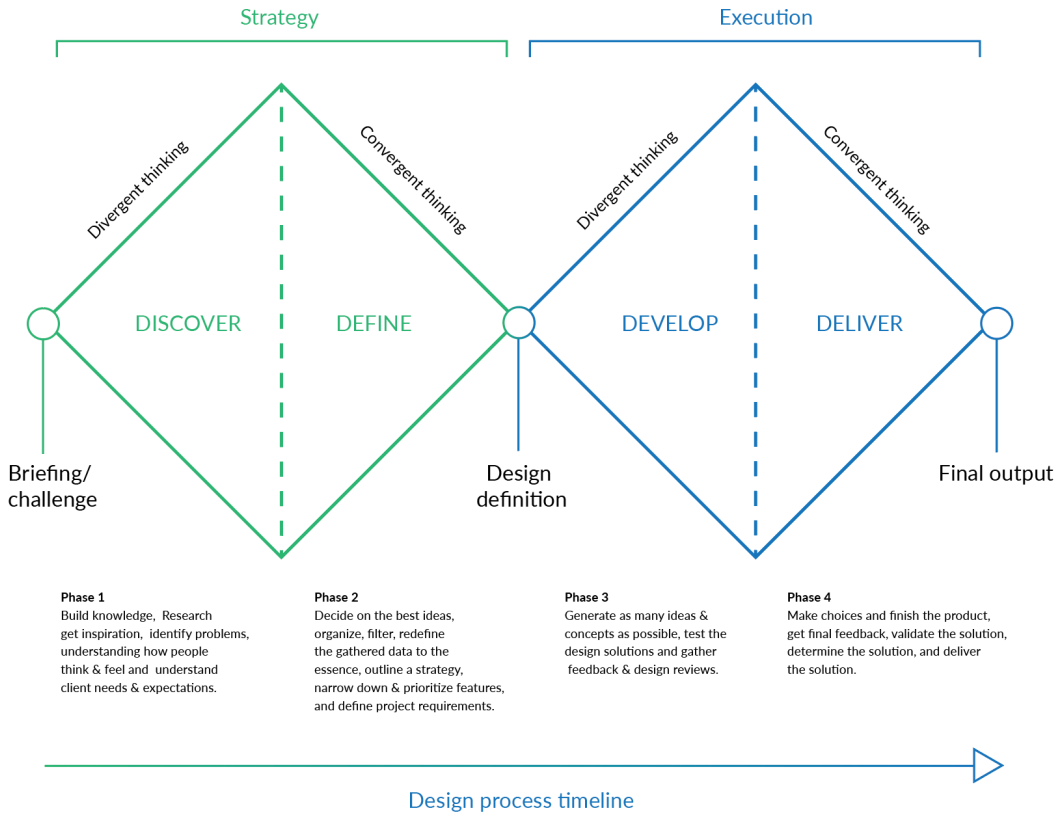

Image 2: Own representation of the Double Diamond Design process after the Design Council, 2004; Boicheva, 2022; Dusch, 2022; Douglas, 2021.

Every design process begins by identifying a problem or understanding the client's needs (Boicheva, 2022). Designers, prior to proposing a solution, must gain a deep understanding of the issue they intend to solve and establish their goals (ibid). The design process is then divided in four steps which each serves a specific purpose: *Discover, Define, Develop and Deliver*.

The first diamond in the model represents the strategic part of the process (Dusch, 2022). The purpose of the *Discover* phase in the DDM is to promote a deep understanding of the problem rather than making assumptions about it (Design Council, 2004). During this stage, the aim is to take the existing issue and approach it expansively to gain a comprehensive understanding. It primarily serves as a research stage, to get inspirations, gather all essential data and understand the target group and clients' requirements (Boicheva, 2022). Here it is important to have a divergent thinking and adopt a wide-range exploration to get as many insights, viewpoints, and inspirations as possible (Douglas, 2021). In the *Define* phase, active decisions are necessary to reframe the challenge based on insights obtained during the discovery phase (Design Council, 2004). The primary objective of this phase is to precisely define the core problem that needs to be addressed and decide on main ideas that are being explored, while eliminating any irrelevant data that could divert attention away from the primary issue (Boicheva, 2022).

The 'Execution' stage involves hands-on design work, but instead of immediately settling on a single solution, the *Develop* phase encourages the exploration of multiple ideas before making a final decision (Dusch, 2022; Douglas, 2021). The aim of the *Develop* phase is to refine the problem statement and once again engage in divergent thinking (Boicheva, 2022). During this creative process, concrete ideas are generated to deepen the understanding of the product and formulate innovative approaches to solve it (ibid). The final *Delivery* phase entails the practical testing of various solutions on a small scale, eliminating those that prove unviable while refining and enhancing the ones that show promise (Design Council, 2004). Here it is important for the designer to validate and determine the solution and make concrete decisions to select an outcome that fulfils the quality standards and aligns with the client's requirements (Boicheva, 2022).

It's important to note that the DDM serves as a standardized framework for illustrating the design process. However, not every project or designer necessarily follows this precise model. Nonetheless, for the purpose of this thesis, it offers a valuable framework for examining potential modifications when integrating AI into the design process.

3.2 Framework for Industry Changes

As previously mentioned in section 2.4, Acemoglu & Restrepo (2018) explained a framework to examine automation and its impact on work, jobs, and skills. Based on their text, I created a framework that visualizes the effects AI integration has on the labour market (see Image 3).

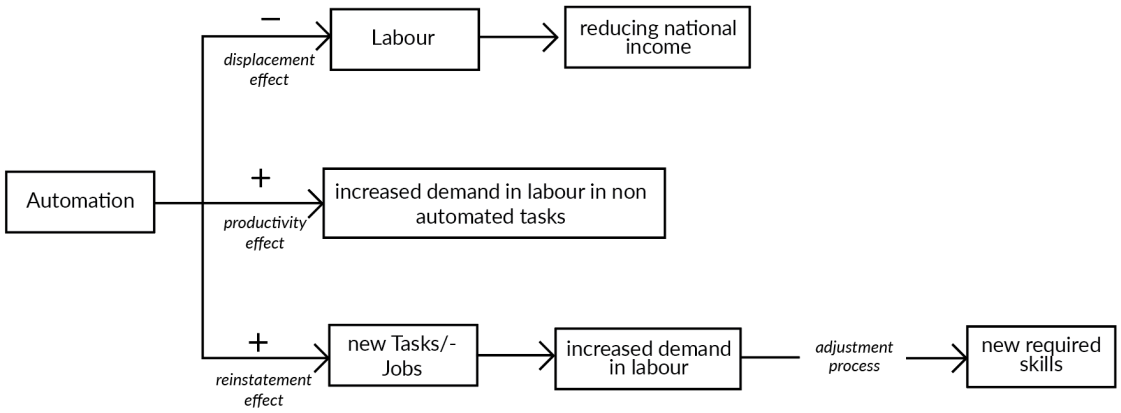

Image 3: Framework describing effects of automation on labor. Own visualization based on Acemoglu & Restrepo, 2018.

Automation, including AI and robotics, takes over tasks that were once done by humans (Acemoglu & Restrepo, 2018, p. 198). This can lead to a significant reduction in the need for human workers, which goes against the common belief in economics that new technologies always create more jobs and boost productivity (ibid). Instead, automation can lead to a decrease in labour demand, lower wages, and fewer job opportunities. This means that the *displacement effect* has a negative effect on labour since some jobs might disappear, which can further affect wages and employment (ibid.). If there would be no economic counterforce, the *displacement effect* would lead to a disconnect between wages and worker productivity, resulting in a decrease in the portion of national income attributed to labour in that sector (ibid., p. 227). However, Acemoglu & Restrepo (2018) identified positive economic forces rebalancing the displacement effect. First, when machines substitute for human labour, they create a *productivity effect*. As the cost of automating tasks goes down, the economy expands and generates increased demand for work in tasks that can't be automated (Acemoglu & Restrepo, 2018, p. 198). This increased demand for labour can occur within the same sectors that are adopting automation or in sectors that are not automated (ibid.). Moreover, and even more important, is the emergence of new tasks where human labour has a competitive advantage and the market creates a *reinstatement effect* (ibid., p. 227). These tasks increase the need for workers, and as historically seen, when automation is used extensively, new jobs, industries, and tasks tend to appear. This is not just something from the past; between 1980 and 2010, the introduction and growth of new job roles accounted for around half of the increase in employment in the United States (ibid., p. 206).

However, new tasks also require new skills. The adjustment process refers to a period characterized by a mismatch between new technology and skills, even though new tasks may have created a demand for labor. This means that the skills needed for these new technologies don't align with those possessed by the workforce, and that period involves workers undergoing new education and training before they can take on new jobs. This mismatch slows down the adaptation of labour demand and diminishes the productivity benefits that come with both automation and the introduction of new tasks.
The framework will help strategically analyze the *displacement, productivity,* and *reinstatement effect* in the creative industries, including new tasks, skill changes and changing job roles.

3.3 Introduction to Artificial Intelligence

What distinguishes us humans from computers is the ability to learn from past experiences and apply life lessons in various situations (Abhishek, 2022). While today's computers cannot even come close to the complex human biological neural network, they have one big advantage: the ability to analyze big amounts of data at a very high speed (ibid.). McCarthy (2007) offers a definition of AI: *"It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable"* (p. 2). In other words, AI refers to a computer's capacity to imitate or enhance human intelligence, including skills like reasoning and learning from past situations and mistakes (Abhishek, 2022). To gain a deeper comprehension of the immense artificial intelligence realm, it's essential to divide it into its subfields (ibid). We can imagine it like an onion with AI as the umbrella term for machine learning and deep learning, while deep learning is another subfield of machine learning (See Image 4).

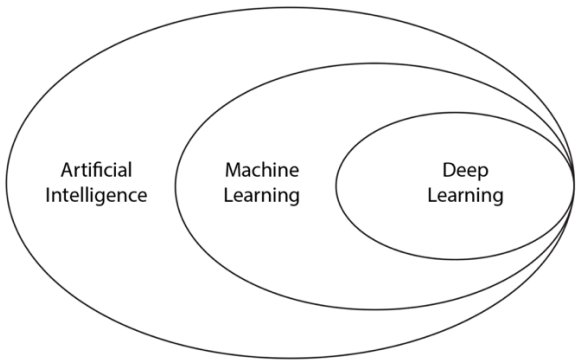

Image 4: Field and subfields of artificial intelligence, own representation.

Generative AI, relevant for the creative industries is based in deep learning. Deep learning, inspired by the human brain networks, is designed to automatically learn and extract features from raw data (Ye et al., 2018, p. 96). It helps computers understand and recognize things like images or speech and learns from experience

and large amounts of data (ibid.). Machines use layers of artificial neurons to find patterns and features in the data and the more data the model consumes, the better it becomes at making accurate predictions or decisions (Anantrasirichai & Bull, 2021, p. 592).

Examining the detailed process of AI output generation (see Image 5), the neural network comprises individual units called neurons, forming the foundation for information processing (Simplilearn, 2019). In image analysis, for instance, the initial layer—the input layer—receives information from individual pixels, transmitting it through channels to successive layers, each with assigned weights. Hidden layers incorporate unique neuron numbers (biases), added to the weighted sum of inputs. This bias is added to the weighted sum of inputs reaching the neuron, which is then applied to a function known as the activation function (ibid.). Each layer's output becomes the input for the subsequent layer, and different layers may serve varied objectives or roles, enabling neural networks to display task-specific behavior. Continuous adjustments to neuron and connection parameters during training result in a well-trained and proficient system (ibid.).

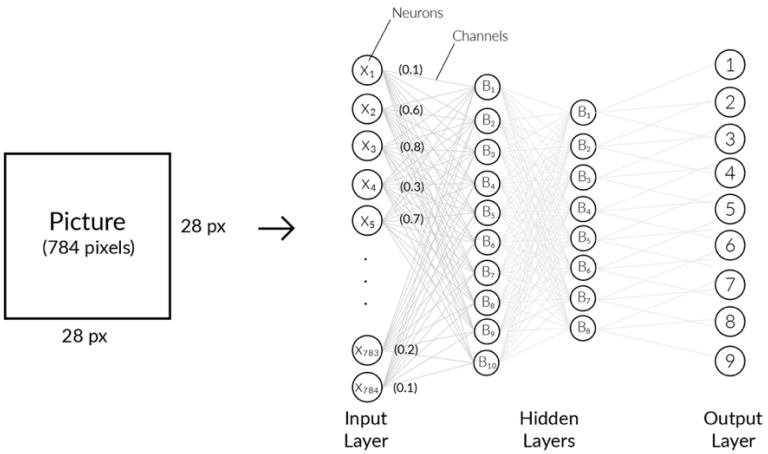

Image 5: Representation of the Deep Learning Model (Simplilearn, 2019).

For processing complex data like images, convolutional neural networks (CNNs) are widely used and are employed for pattern discovery, analysis, and predictions (Anantrasirichai & Bull, 2021, p. 592). CNNs progress from detecting edges in early layers to recognize complex shapes in later layers, enabling both detailed and abstract data knowledge. Approaching creative applications, the introduction of Generative Adversarial Network (GAN) technologies by Goodfellow et al. (2014) has become revolutionary. GANs have transformed AI's capacity to create and manipulate diverse types of content, including images, videos, music, and text. The model consists of two neural networks, the generator, and the discriminator, which are trained together in a competitive manner (Goodfellow et al., 2014, p. 2). In this context the generator can be seen as the artist, creating art while the discriminator acts like an art critic. The generator network creates new data

instances that resemble a given dataset, while the discriminator network tries to distinguish between real data (human) and data produced by the generator. In the so-called adversarial game, the process of creating new images by the generator and judging the outcome by the discriminator proceeds until the generator crafts a convincing sample that not only dupes the discriminator but is also difficult for humans to distinguish (Altexsoft, 2023). This process results in the generator improving its ability to create increasingly convincing data, while the discriminator gets better at identifying fake data (ibid). Currently, GANs find various applications, like art generation, image creation, image completion, and even transforming a text prompt into images (Banji, 2018).

3.4 AI in the Creative Process

AI operates in two main areas for graphic designers: creation and production. Creation involves designers crafting new design content, such image or text generation based on text inputs (Amato et al., 2019, p. 7). Production involves using existing resources to create something new, like modifying an image through techniques such as applying filters or altering content (ibid., p. 12). AI excels in recreating scene-specific image modifications without a reference and automating photo retouching for enhanced quality (ibid., p. 13). Deep learning techniques enable copying artistic styles into existing images, preserving core content, such as altering a photograph to mirror the style of a Rembrandt painting. Additionally, image inpainting automatically restores missing or damaged sections of an image (ibid.).

3.4.1 Generative AI

AI image generators use trained neural networks to create realistic images from textual input, blending styles and concepts (Altexsoft, 2023). Trained on vast image datasets, generators learn diverse image characteristics, enabling them to produce new images resembling the training data. In addition to GANs for realism, other image generators include diffusion models and neural style transfer (ibid.). Diffusion models work with the similar goal like GANs to create an image, by imitating the data they have been trained on (Dhaduk, 2023). Referred to as Denoising Diffusion Probabilistic Models (DDPMs), these models possess a distinct proficiency: the ability to generate high-fidelity synthetic data through an iterative process (ibid). The central concept underlying diffusion models involves introducing noise into a base sample incrementally. Subsequently, these models embark on a denoising process in each step, progressively reconstructing the original data (see image 6). The model employs the reverse diffusion process to create new data (Altexsoft, 2023). Starting from random noise, it takes a guiding text prompt, acting like an instruction manual for the final image. Through iterative reverse diffusion steps, the noise evolves into an image while aligning with the text prompt's content expectations. This process minimizes feature differences, enabling diffusion models to generate realistic images (ibid.).

Image 6: Diffusion models transitioning back and forth between data and noise (Altexsoft, 2023).

Neural Style Transfer (NST) is a deep learning technique that combines the content of an image with the artistic style of another, resulting in the creation of a unique artwork (Altexsoft, 2023). It involves three primary images: the content image (to preserve content), the style image (new artistic style), and the generated image (the variable modified during processing) (see Image 7). NST also operates with CNNs, that have undergone extensive training on vast image datasets (Gopinadhan, 2023). These CNNs consist of layers that evolve from detecting fundamental characteristics like edges and colours to recognize textures and shapes. These layers are employed to manipulate both content and style in the image (ibid).

Image 7: Example of Neural Style Transfer with Picasso painting (Li, 2018, p. 4321).

In simple terms, the process involves two key components: content loss and style loss (Altexsoft, 2023). Content loss quantifies the imbalance between the generated and the original image, focusing on preserving recognizable features (ibid). In contrast, style loss concentrates on patterns and textures, striving to align them between the style image and the generated image. These two types of losses are then integrated into a total loss, providing the flexibility to customize the emphasis on content versus style (ibid.). Optimization plays a vital role in the NST process, as it adjusts the generated image to minimize the total loss (Gopinadhan, 2023). This iterative process effectively blends content and style from different images, resulting in an output that often resembles a work of art (ibid.).

3.4.2 AI Applications for Graphic Design

Today, a huge amount of creative AI tools caters to a wide range of needs. Some are tailored to assist professional designers in simplifying their work processes, while others empower individuals to produce small

to medium design tasks independently. There are AI tools for creating text into realistic or surrealistic images (Midjourney, Adobe Firefly, Stable Diffusion), tools to easily edit pictures (Adobe Sensei), create logos and even a full corporate identity (design.ai, Looka.ai). There are tools that convert rough sketches into refined illustrations (AutoDraw.ai by Google), realistic images (Nvidia Canvas) or even wireframes, mock-ups, and prototypes for web and UX design (Uizard.io; Galileo AI). Moreover, there are deep learning powered software that turn 2D designs into 3D models (alpaca.ai), select colours for a specific project (Khroma.co), turn text prompts into product photography (Flair.ai), create font combinations (Fontjoy.com) or upscale pixelated images into high quality pictures (Nero.com; Letsenhance.ai). Due to the rapid development of new AI tools and other technological advancements, it's possible that not all design tools have been considered. However, I present some of the most relevant tools for graphic designers and non-designers.

Midjourney

Midjourney is an innovative AI tool that transforms text descriptions into images (Pryor, 2023). Founded by David Holz, it stands out for its ability to generate high-quality images with resolutions up to 1024 x 1024 pixels (ibid.). The platform operates seamlessly through the platform Discord, making it user-friendly (Hughes, 2023). Midjourney's strengths lie in its versatility, producing both realistic and abstract images (Pryor, 2023). It encourages creative experimentation, allowing users to fine-tune their creations (ibid.). Furthermore, it can tap into popular culture references, making it a valuable tool for invoking nostalgia and reimagining favourite characters and themes (Hughes, 2023). However, it comes with some downsides (ibid.). Ownership rights for generated images are not exclusive, potentially raising concerns for those seeking full control over their creations. There are concerns over copyright, especially since the founder admitted they didn't receive consent from the creators of the art the model was trained on (ibid.). Additionally, the free trial option has been discontinued due to misuse, potentially limiting accessibility (Pryor, 2023). Below, some examples to demonstrate the artworks generated with Midjourney (Image 8).

Image 8: Examples showcasing pictures and artworks generated with Midjourney AI (@ifonly.ai).

Photoshop AI / Adobe Sensei

Adobe Sensei is an artificial intelligence and machine learning technology developed by Adobe (a leading software company known for its creative applications like Photoshop, Illustrator, and Premiere Pro). Adobe Sensei is integrated into various Adobe products to enhance their functionality and improve user experiences in several ways (Fairley, 2022). Drawing upon a vast repository of content and data, Adobe capitalizes on trillions of elements, ranging from high-resolution images employing a fusion of AI and customer interactions (Karaata, 2018, p. 189). This innovative tool can be used for tasks such as content recognition, automated tasks, personalization, analytics and insights, natural language processing, audio and video enhancement and search and discovery (ibid.). One of Sensei's strengths is the creative assistance, where it aids artists and designers in suggesting design elements, fonts, and colour schemes based on user preferences and project requirements (Fairley, 2022). In Adobe Premiere Pro and Audition, Sensei can automatically adjust audio levels, reduce noise, and enhance video quality (ibid.). Furthermore, Adobe Sensei can recognize the content within images, videos, and documents, making it easier for users to search for and organize their media assets. For example, in Adobe Lightroom, it can automatically tag and categorize photos based on their content, such as recognizing specific objects or scenes (ibid.).

However, contrary to other tools, Adobe's design programs completely depend on the skills and knowledge of the designer (Karaata, 2018, p. 190). Designers that use these programs must have knowledge of design principles. With the integration of artificial intelligence, these programs become easier to use and accelerate the design process but are not really suited for non-designers (ibid.). Recognized for its potential to streamline creative content production, Adobe Sensei has gained a lot of enthusiasm from creative professionals (PfeifferReport, 2018, p. 15).

Another very relevant new AI tool, part of Adobe Sensei, is the new Photoshop version with generative AI that launched in May 2023 (Malleck, 2023). The desktop app has the same features and functionalities as the current Photoshop, but the big difference is that it has AI deeply integrated in the system and claims to be the new 'creative pilot' for designers (ibid.). Generative fill enables users to expand content, whether it's adding more elements, extending vertical pictures into wide horizontals, changing backgrounds, or incorporating generated objects based on a brief description (Adobe, 2023). The added objects even consider shadows, reflections, lighting, and perspective, reducing the need for post-editing (ibid.). Adobe claims that this tool ensures high-quality results with minimal time investment, making it ideal for bringing real or unreal ideas to life (ibid.). Below an example of an edited image using Photoshop AI (see Image 9).

Image 9: Before and after an image was edited with Adobe Photoshop.

While Adobe Sensei seamlessly integrates with Adobe applications such as Photoshop, functioning as a behind-the-scenes technology, Adobe Firefly is another AI tool, which was released in March 2023 (Malleck, 2023). In its beta version, Firefly generates images, textures, and text effects, with plans to expand into 3D and video applications based on text inputs (Coleman, 2023). A few examples of generated images based on text prompts can be seen in Image 10. Unlike other AI models, it doesn't require external platforms like Discord, and it even includes collaboration features that enable multiple artists to work on the same image simultaneously (ibid.). Additionally, Firefly also provides ethical options, such as the ability to opt out of having users' art used for training. Adobe's goal with Firefly is to revolutionize 3D creation, streamline video editing, and enhance the creative process while preserving the artist's role in creative production (ibid.).

Image 10: Examples from Adobe Firefly (Adobe.com, 2023).

Stable Diffusion

Stable Diffusion is an advanced AI tool designed for image processing and enhancement (Gilani, 2023). Its primary purpose is to intelligently refine and stabilize images by diffusing noise and imperfections while

maintaining visual coherence (ibid.). One of its strengths lies in its ability to effectively reduce artifacts and enhance image quality, making it a valuable tool for photographers and graphic designers (see some examples in Image 11). Users can employ Stable Diffusion to achieve smoother and more visually appealing results in various creative projects. However, it's essential to note some limitations, such as potential challenges with extremely complex images and the need for fine-tuning parameters for optimal performance (ibid.). While Stable Diffusion has similarities with Midjourney, they have clear differences (Wankhede, 2023). Midjourney employs a proprietary machine learning model, accessible exclusively through Discord and requiring an internet connection (ibid.). Stable Diffusion provides its source code for free, allowing users to download and run it on their computers. It offers both online and offline usability through various applications, with the option to run it on personal hardware for free or opt for nominal fees for online services (ibid.). While it may appear more complex due to numerous settings, it provides more customization options compared to Midjourney (ibid.).

Image 11: AI generated images with Stable diffusion (Gilani, 2023).

Designs.ai

Away from image generated content, designers can also generate complete brand identities, including logos and advertising campaigns with the help of AI. Designs.ai offer–next to generated brand logos and brand kits–also a video maker, a font combinator, advertisement designer, banner and flyer maker, graphics, and mock-ups (Designs.ai, see Image 12). Their design maker uses AI to analyze the client's design requirements and generated thousands of design suggestions for the user to choose from. Moreover, it is possible to resize the design, so they fit into every social media channel. Their service is available for $17 a month (ibid.).

Image 12: Examples of functionality of Designs.ai

3.4.1 Fails in AI-Generated Art and Design

These previous examples showcase the best works achieved by AI. While these AI tools can create convincing art, they're sometimes far from perfect. The 'failed diffusions' channel on Stable Diffusion's Discord server illustrates that some image generators often produce funny, inaccurate results (Tangermann, 2022). From misplaced body parts to bizarre AI-generated creatures, these fails provide some amusement. Image generative Ai struggles particularly when generating images of hands and feet, and often fails to distinguish between objects (ibid.). To give the reader a comprehensive view of the strengths and weaknesses of AI-generated art are some examples of AI that did not go right (see Images 13 & 14).

Image 13: The pictures for the prompt 'salmon in the river' (Bliabaitė & Ross, 2023).

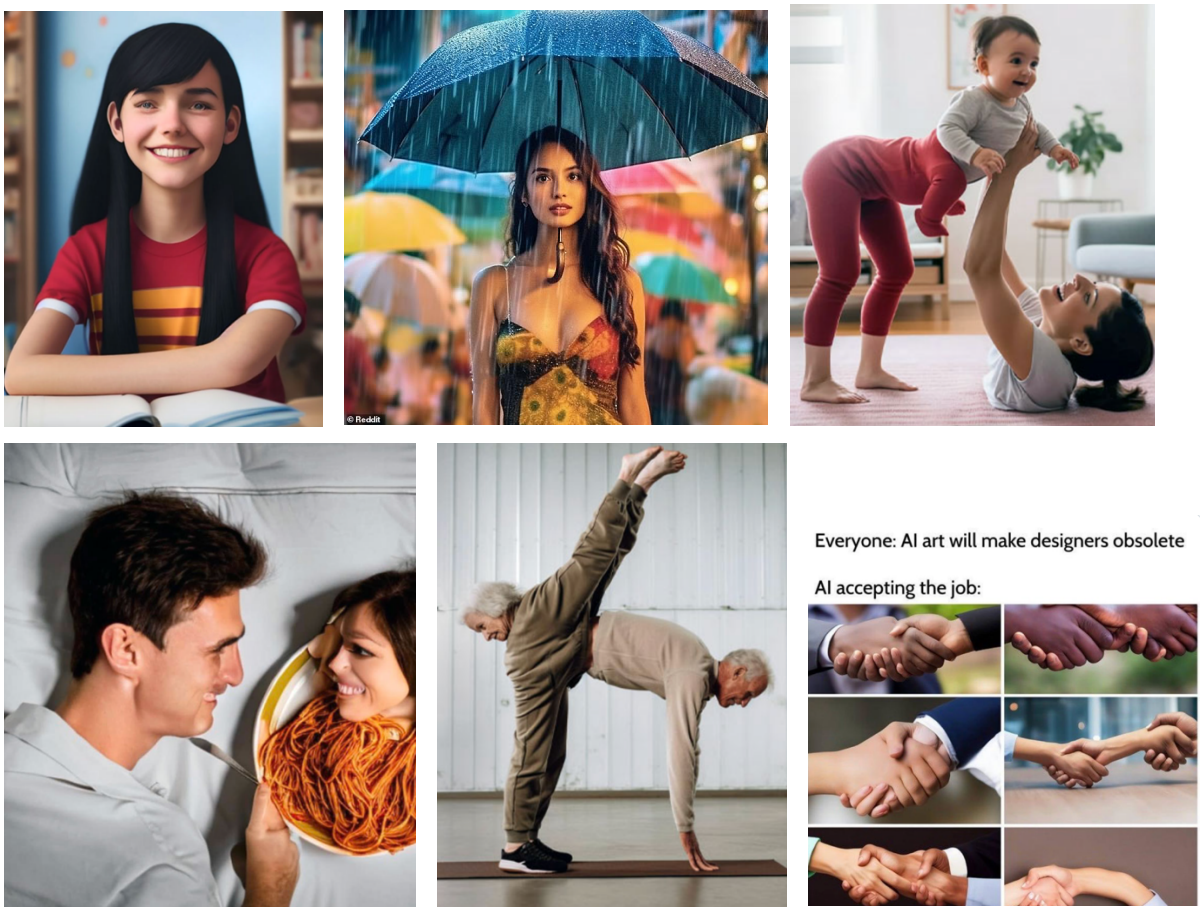

Image 14: Generative AI fails (Bliabaitė & Ross, 2023).

The examples show that AI can replicate visual patterns but lacks at understanding some underlying biological structures (Chayka, 2023). AI's struggle with realistic depictions, especially of fingers and smaller features, has led to widespread limitations and humorous acknowledgments (ibid.). Incomplete or flawed datasets result in imperfect creations, as AI relies on statistical patterns and struggles with nuanced details such as the precise number and proportions of fingers on a hand (ibid.).

3.5 Understanding Creativity

Creativity is defined in the Cambridge Dictionary as *"the ability to produce original and unusual ideas, or to make something new or imaginative"*. Boden (2004), a pioneer in AI and creative industries, sees human creativity as the "*ability to come up with ideas or artefacts that are new, surprising and valuable*" (p. 1). Tasks that involve creativity typically demand an element of original touch, a wealth of experience, and an appreciation of the target audience (Anantrasirichai & Bull, 2021, p. 601). Creativity is a process strongly tied to the life of an individual creating the output and is acknowledged when present or absent. Where it comes from or how it manifests is greatly unknown (Pfeiffer Report, 2018). Creativity is a very broad term and can be used in any context and any profession. In fact, everyone is creative to some degree as it is part of human

intelligence, involving processes like conceptual thinking, perception, memory, and introspective self-evaluation (Boden, 2004, p.1). For example, any problem that does not have a pre-established solution requires individuals to use situational creativity (Pfeiffer Report, 2018). For the purpose of this thesis, creativity is defined as inspirational and executional creativity.

Inspirational creativity is driven by the desire to realize a vision and create something new in an unexpected way (Pfeiffer Report, 2018, p. 4). Creativity emerges from novel connections between familiar concepts, involving innovative combinations, deeper exploration, or reshaping of existing ideas (Lee, 2022, p. 605). Design professionals are aware that in order to create something, creativity is not only required at the start of the project but every step of the way. Therefore, are inspirational and executional creativity the core value and skills for designers (Pfeiffer Report, 2018, p. 4). In essence, creativity is highly influenced by the interaction's creatives have with the world, trends and the clients, as well as their skillset and confidence to bring a creative project to life (ibid.).

3.5.1 Computational Creativity

Now that we have a clearer grasp of creativity within the context of this thesis, let's delve deeper into the specific role that AI currently plays in fostering creativity. As shortly touched upon in section 2.1, the definition of computational creativity is: "*The philosophy, science, and engineering of computational systems which, by taking on particular responsibilities, exhibit behaviours that unbiased observers would deem to be creative"* (Colton & Wiggins, 2012, p. 21). So now the existence of generative AI prompts us to reconsider and challenge our conventional notions of creativity and creative concepts (Inie, Falk, & Tanimoto, 2023). In today's world, AI applications are created using algorithms and by imitating user actions through machine learning. This means that AI works without the need for a conventional design process and without requiring any form of creative drive or inspiration to stimulate creativity (ibid.). Although AI lacks the inherent creativity necessary for generating entirely new designs, it excels in performing tasks similar to those carried out by graphic designers (Karaata, 2018, p. 187). For instance, AI takes a design layout prepared by a graphic designer and positions it on other pages systematically. In this role, the emphasis is less on creativity and more on proficiency in using software and efficiently placing elements quickly and accurately, depending on the urgency of the task. In this respect, AI is well-suited for the job, outperforming humans due to its reduced likelihood of making errors (ibid.). However, for the start of a creative process, some argue that it almost always involves combining ideas, often in abstract yet coherent ways, from different domains or multiple experiences, driven by curiosity and experimentation (Anantrasirichai & Bull, 2021, p. 639).

While some argue that computers only reproduce what is already out there, Boden (2004) believes that computers can be creative to some degree (p. 17). Computational ideas can help us to understand how human creativity is possible (Boden, 2004, p. 17). It can be argued that humans also carry around a repertoire of input

to draw on and to come up with ideas, which are always rooted in some pre-existing things (ibid). Computers can therefore not only help us to understand where creativity is coming from, but also enhance creativity. AI currently contributes to the creative process by adding to our perspective, multiplying our options, or functioning as a teammate to source out boring and repetitive tasks (Kennedy, 2023). However, according to Kennedy (2023), AI should not automatically be credited for enhancement, since it implies a qualitative improvement, while AI often introduces changes without necessarily improving outcomes. The focus should remain on ensuring that AI positively contributes to human progress, rather than inadvertently detracting from it (Kennedy, 2023).

3.5.2 Value of Creative Work

Value can have different meanings, and in various contexts, it can be interpreted in distinct ways. In this particular context, I examine two primary facets of value: economic value and aesthetic value. It is crucial to recognize that in creative industries these two dimensions of value are mostly but not always interconnected, since talent or skill for a task is valued differently by people (Entwistle, 2002, p. 319). In creative industries like graphic design, value stems from individual creativity, skill, and talent, holding the potential to generate wealth and employment opportunities through the creation and utilization of intellectual property (Lee, 2022, p. 602). Economic value primarily relates to the financial aspects of an object, service, or process and encompasses the measurable benefits that result from a particular outcome (Velthuis, 2003, p. 185). This includes factors such as cost-effectiveness, return on investment, and profitability and is often based on economic measures like supply and demand (Banton, 2023). For this thesis, when the term ‘value’ is mentioned, it primarily refers to economic value or the financial advantages associated with a product or design process. This encompasses aspects like cost reduction, cost increase, productivity improvements, revenue generation, or efficiency gains (ibid.).

Yet, while economic value can be quantified and analyzed, aesthetic value is a different dimension altogether. It pertains to the perceived beauty, attractiveness, or artistic merit of a product or design. Aesthetic value is highly subjective, varying significantly from person to person (Entwistle, 2002, p. 319). This subjectivity makes it challenging to measure and analyze in the same way as economic value (ibid.).

4. Methodology

In this part, the flow and logic behind the systematic processes that follow the research will be explained and references to the approaches, procedures, data collection methods and analysis procedures are made. Based on Saudners, Lewis & Thornhill’s (2018, p. 130) research onion, the interpretivist research philosophy the inductive research logic and a cross-sectional qualitative mono-method research method is utilized.

4.1 Research Design

In the first part of this methodology section, I describe research paradigm or research philosophy, the research logic and strategy which explains the choices that were made before conducting the research.

4.1.1 Research Paradigm

This research is guided by a specific goal: to explore the influence AI currently has on the creative industries, in particular generative AI on graphic designers with a focus on the design process and the industry changes. In other words, I aim to get the subjective meaning of creative professionals in that market, which are impacted by the current technological wave. Based on this, the interpretivist philosophy is the most suitable for this thesis as the research paradigm emphasizes the importance of understanding and interpreting the subjective experiences and perspectives of designers in their natural context (Kivunja & Kuyini, 2017, p. 33). To get in-depth insights on how design professionals deal with and adapt to AI integration and market changes, a qualitative research model is utilized. In interpretivism, the researcher is inseparable from the subjects' reality, and multiple individuals offer different perspectives on the same issue in a world of diverse realities (Rehman & Alharthi, 2016, p. 55). Within the interpretivist paradigm, the ontology adopts a relativist perspective. This implies that the topic under investigation has multiple realities. These realities can be explored, ascribed meaning, or reconstructed through the human interactions that take place between me and the research subjects (Kivunja & Kuyini, 2017, p. 33). The epistemology assumes subjectivist, as I will process the data through my own understanding of the interaction with the research subjects and make meaning of the findings based on these interactions (ibid.). Given the unavoidable interaction between myself and the participants, the research will inherently mirror some of my own values (ibid.). However, by providing quotes from the interviews and their meaning in the context, thorough steps are taken to ensure a fair and balanced presentation of my findings in section 5. This approach underscores the balanced nature of the axiology employed in this study.

4.1.2 Research Logic & Research Strategy

The field of computational creativity is currently attracting increasing research attention (Colton & Wiggins, 2012). With the widespread emergence of generative AI as a significant topic, there remains a relatively unexplored area in existing literature that can offer insights into the evolving landscape of the creative industries (Filkey & Fong, 2023). While there is research on related topics, a noticeable directly addressing the specific nuances AI has on the graphic design job and market was found. So, rather than starting with preconceived theories or hypotheses, my research is guided by an open-minded exploration of the topic, allowing insights to emerge naturally from the collected data. To explore this phenomenon, the inductive research logic, often described as a ‘bottom-up’ approach is used (Woo et al., 2017, p. 255). As predefined by the interpretivist research philosophy, I try to discover patterns in the data which are collected under broad themes to understand this new AI phenomenon and generate a theory (Rehman & Alharthi, 2016, p. 56).

This aligns also with the research strategy that is applied, namely cross-sectional, semi-structured interviews. I was keenly interested in capturing the perspectives, experiences, and voices of the participants in my study. Their insights, typically deeply embedded in their unique contexts, were central to understanding the phenomenon in its authentic form. By using the qualitative research strategy 'Interview' I was able to get a better understanding of the mind of the subjects. In the core, an interview is a purposeful conversation but more organized and planned and with a clear purpose in mind (Luo & Wildemuth, 2009, p. 248). The semi-structured interviews give considerable flexibility to adjust the questions as the interview progresses, reaching further than the preformulated questions predetermine (ibid, p. 249). However, compared to unstructured interviews, the interviewers are more organized and lead the conversation by asking questions relevant to the research objective (ibid.).

4.2 Data Collection

The data sources include primary data in the form of qualitative interviews, which will be later compared and added to secondary sources of existing literature to achieve a comprehensive answer to the research questions. I located secondary data sources by conducting keyword-based searches on platforms such as Google Scholar, the CBS Library, and Consensus. In cases where specific information was unclear or additional context was needed, I conducted standard Google searches. Additionally, I gathered information from other reputable sources, including the Financial Times or IBM.

Following the principles of inductive research, I conducted an initial questionnaire also called 'pilot-study' involving a small group of participants (n=5). This initial questionnaire allowed me to gain a deeper understanding of the research problem, helping to further direct the research. At the beginning of the research, delving too deep into existing literature might have been premature. The initial questionnaire provided a foundational understanding of how AI currently influences designers' work. It was crucial for grasping practical aspects, as well as determining designers' feelings, concerns, and expectations—essential for framing the research context effectively. Additionally, this initial insight allowed me to approach the subsequent literature review with a more informed perspective. Another beneficial factor was that the feedback from the initial questionnaire served as a quality control mechanism for my research instrument. It helped pinpoint any issues related to clarity, redundancy, or length in the interview questions. By addressing these issues early in the research process, I ensured that the collected data would be of higher quality and relevance.

To achieve a representative sample from the population, the following sampling strategy was used: The research focused on the population in Europe but made no restrictions within to include as many viewpoints as possible. The target population for this study was aimed for professional designers and leaders in the creative industries, including Graphic Designers, Art Directors, Creative Directors, and owners of design or advertising

agencies, as they play a significant role in shaping the creative landscape. The level of the sampling happened at the individual level at the interview stage. Age was considered irrelevant in the selection process, as the focus is on professional expertise rather than age-related factors. Therefore, I aimed for participants who have a minimum of 5 years professional experience in the creative industries. This criterion ensures that participants possess substantial expertise within their field to be able to talk about potential industry changes. While experience with AI was not a strict requirement, it was desirable, as it may contribute to richer insights into the impact of AI on creative work. Moreover, to ensure balance and equality in the sample, efforts were made to include an equal number of participants of different genders.

For the sampling method, the non-probability convenience sampling method was employed to select participants for the study. This method involved a network-based approach, reaching out to individuals known to me, including friends, co-workers, acquaintances, and those recommended by trusted contacts. This process also involved connecting with design professionals on LinkedIn. In the end, the total sample size has amounted to n=15. After the 15 interviews, a saturation was reached, and I concluded that additional interviews would not bring a significantly higher number of insights to the topic or lead to new themes.

Within the final sample, the age ranges between 27 – 55 years, with experiences in the creative industries from 5 years to 25+ years. As aimed for, the target population includes the occupations of Graphic and 3D Designers, VFX and Graphic Designer, Multimedia Designer, Art Director, Creative Director, UI/UX Designer, freelancers, and managing directors of design and advertising agencies. The nationalities of the participant in the study include Denmark, Germany, Austria, Ukraine, and UK. The gender division is not balanced, as there were more male participants (n = 10) than female participants (n=5). The data collection for the initial questionnaire took place in the month of July 2023. For the main research, the data collection period lasted from 15.09.2023 to 13.10.2023 and the interviews were conducted face-to-face in person or over online video calls. The interview length varied from person to person, with the shortest interview of 20 minutes to the longest interview of 90 minutes. All interviews were audio recorded and later transcribed.

4.2.1 Data Collection Instrument: Questionnaire

The pilot study was developed with general questions that arose during the initial contemplation of the topic and revolved around overarching themes of AI adoption, advantages, drawbacks, quality, and ethical considerations. As already mentioned, no literature review was conducted at this point and the questions were built upon interest from my side. The full initial questionnaire can be seen in the attachment.

The literature review uncovered that certain questions from the initial questionnaire were already addressed, particularly concerning the adoption and utilization of generative AI among creative professionals. However,

the literature review also exposed significant gaps in the field regarding alterations in the creative production process due to AI adoption and broader industry shifts resulting from automation. These revelations first guided the formulation of the research questions, which were subsequently divided into four key areas of focus for the primary interview. Therefore, the process of generating the questions resulted from literature, research objectives and insights from the initial questionnaire. The first area for the interview included questions about productivity, efficiency, and creativity with AI and exploring how AI impacts these aspects. The second area aimed to investigate how AI influences the various stages of the creative process. Next, the changes in the industry should be uncovered when talking about possible job displacements or changes in roles within the industry due to AI. The last part concerned the AI-human collaboration and possible new jobs, by asking about the dynamics of working with AI for content creation and identifying new employment opportunities that might be emerging. After finishing the first draft of questions, I sorted them according to the proposed style from Berg (2001): essential questions, extra questions, and probing questions. Essential questions need to be asked because they address the central focus of the research, and extra questions follow essential questions but with different wording. To use the impact of rephrasing, extra questions are used to verify the accuracy of responses (Luo & Wildemuth, 2009, p. 249). A full overview of the interview guide is presented in the attachments.

For the interviews itself, the participants were first asked for permission to audio record the interview. Then, a warm-up phase was included to give the interviewee the opportunity to settle in and feel comfortable before I started with the main body of the interview. Questions from the interview guide were used to steer the conversation, but some questions were left out if the interviewee already mentioned it in their answer. It is interesting to note that some interviews followed quite well the pre-formulated questions, while other interviews rut their own course.

4.2.3 Quality Criteria

Guba and Lincoln (1994) introduced criteria for assessing the trustworthiness of interpretive research, encompassing credibility (internal validity), transferability (external validity), dependability (reliability), and confirmability (objectivity) (Guba & Lincoln, 1994, p.114). Validity, according to Golafshani (2003, p. 599), ensures that the used measurements capture the intended target and produces truthful and relevant results. Internal validity assesses study quality and the accuracy of results representing the group that is being studied (Concic, 2022). In contrast, external validity relates to real-world applicability (ibid.). In qualitative research, credibility therefore refers to the extent to which data and data analysis are believable, trustworthy, or authentic (Kivunja & Kuyini, 2017, p. 34). This was achieved by spending sufficient time in the research field, understanding participants' experiences, and providing the space to share insights more openly, until a point of saturation was reached. This demonstrates a comprehensive exploration of the topic from various angles. Additionally, the transparency of the research context, participant information, data collection process and the

clearly outlined data analysis process allows readers to evaluate the trustworthiness of the study. This also aligns with the criteria of transferability: instead of making broad generalizations, I provide detailed descriptions, so that others can determine the relevance of the findings to their own situations. Even though the interpretivist research paradigm does not allow broad and wide-reaching generalizations, contextual and theoretical generalizations are possible as insights of the research can be generalized to similar contexts or situations (Rehman & Alharthi, 2016, p. 56). As I am analyzing the AI integration in the creative industries with pre-existent theories and concepts (see section 3.l and 3.2), the findings inform and enhance these theories in a broader and theoretical context. Furthermore, the interpretivist approach often aims for illustrative understanding, which means a detailed understanding of the unique aspects of a specific phenomenon (ibid, p. 51). This contributes to a richer understanding of the impact of AI implementation on the job market for graphic designers.

The criterion of dependability, ensures that consistent outcomes are observed under similar conditions, thereby ensuring reliability and consistency (Kivunja & Kuyini, 2017, p. 34). By utilizing the created and expanded models from this thesis in other contexts or for other occupations, similar outcomes can be achieved. The objectivity criterion is vital to ensure that the research findings are free from the researcher's biases and reflect the experiences and perspectives of the participants, not the researcher's characteristics or preferences (ibid.). To minimize my own biases, I used the initial questionnaire to address some of my assumptions and gain a better understanding of the participants. The main questionnaire's development was guided solely by the literature and the field of interest, eliminating personal beliefs. Throughout data collection, I was cautious not to make unfounded assumptions or interpretations that were not supported by the data.
To sum up, as I uphold honesty and diligence in my pursuit of accuracy, ensure that my results resonate across different contexts, and provide detailed descriptions of my study's methods, my thesis aligns with Guba and Lincoln's quality criteria.

4.3 Data Analysis

Following the transcription of each interview, data cleaning was carried out to eliminate unnecessary sections, such as the warm-up phase and unrelated post-interview discussions. This process ensured that only relevant information remained within the interviews before starting the coding phase. Interviews held and transcribed in German were translated into English with the online tool deepl.com. Since the initial questionnaires were shorter, and I needed a quick, concise overview of responses and insights, I opted to code them in an Excel spreadsheet. Given the limited number of participants and the relatively short text length, this approach proved to be the most efficient and practical within the timeframe. The selected codes for the initial questionnaire encompassed the following categories: Current use of AI tools, the role of AI tools, benefits, concerns, ethical

considerations, quality and authenticity, and outlook. An overview of the initial questionnaire, answers, and coding sheet can be viewed in the attachments.

The primary questionnaire data was analyzed using the NVivo software, which is designed for qualitative data analysis. The interview transcripts were imported into NVivo, and I chose the thematic coding method for my coding process. I created a coding framework by identifying top-level themes based on my research questions. These themes formed the foundation for my initial list of broad codes and categories rooted in the research topic. Top-level codes before open coding were: creative process, productivity, efficiency, creative collaboration, job displacement, job roles, new jobs, and skill change. Aligned with the inductive approach, I used open coding, allowing themes and patterns to naturally surface from the collected data, which were subsequently categorized into new codes. Periodically, I conducted code reviews to refine and modify them as my comprehension of the data deepened. At times, this process involved merging or splitting codes or introducing entirely new ones as the analysis progressed. New codes, stemming from open coding were: challenges, opportunities, impact on creativity, cost reduction, quality, time-saving, ethical considerations, AI tools, experience, usage, AI limitations, AI tools for non-creatives, AI assistant, human role, influence on career, creative value, and future outlook.

To further illustrate the coding methodology, consider the following example: After creating top-level codes in NVivo, I began by reading through the first interview transcription, identifying, and assigning relevant sections to the existing codes. In cases where certain themes were important to the topic but not covered by any existing code, I created a new code. I consistently applied this coding process to subsequent transcripts, occasionally merging codes during periodic reviews when identifying patterns.

Once the data was fully coded, I analyzed and interpreted the emerging themes. With the help of NVivo's tools, I was able to get a quick overview of each code’s sections, which made the writing process more efficient and convenient.

4.4 Limitations of the Study

This thesis introduces intriguing findings to the field of computational creativity and the creative industries. Yet, it is important to acknowledge that it does not come without its limitations. A limitation of this study is the relatively small sample size of 15 participants. While this sample size was appropriate for the research scope, time, and objectives, some viewpoints and insights from other design professionals may not be included. Larger sample sizes are often desirable for achieving greater statistical power and representativeness (Noordzij et al., 2011, p. 319). The gender distribution among participants in the study was not equal, as there were more male participants. Therefore, no clear gender-based distinctions can be drawn. Furthermore, convenience

sampling frequently introduces biases that can result in under-representation or over-representation of specific groups within the sample (Etikan et al., 2015, p. 2). These biases in convenience sampling make it difficult for the sample to accurately represent the target population (ibid.). Consequently, the capacity to draw meaningful generalizations from the sample to the broader population is compromised.

Furthermore, the interpretivist research paradigm has its strengths, but it also comes with several limitations. By using this paradigm, I acknowledge that I and the participants bring subjectivity and biases to the study. Even though the best steps are undertaken to avoid and eliminate biases, subjectivity can still affect the interpretation of data and introduce potential bias. And, as I already touched upon, Interpretivist studies often focus on specific contexts and small samples, which can limit the generalizability of findings to broader populations. Which in this case does not pose a significant challenge since the emphasis is on depth rather than breadth. The interpretation variability poses another limitation to the study based on the interpretivist paradigm, as different researchers may interpret the same data differently. This can have consequences on the consistency and reliability of the interpretations. Furthermore, as I am the only person involved in data collection and data analysis, tools like inter-coder reliability or researcher triangulation cannot be used to ensure objectivity.

Improvements could be made in the studies' measurement tools. To further enhance the assessment of productivity and efficiency, conducting a longitudinal study could provide valuable real-time insights into the evolving creative process, without of the subjective opinion of individual interviewees. Additionally, a more comprehensive analysis of job displacement in the market could be achieved by examining current, emerging, and vanishing positions on job portals. Although it may be too soon to discern substantial market changes, the perspectives of professionals within the field could serve as an initial indicator of potential future trends.

5. Findings

In this section, I am presenting my research findings and answer the research questions. Quotes from the interviews are used to underscore the findings and provide insights into the conversation. To maintain the confidentiality of the participants but still identify the source of the quote, I used participant numbers.

5.1 AI Experience, Usage and Opportunities

The majority of the interviewees possessed good experience with AI and were quite familiar with a variety of AI tools. Nevertheless, it became evident that they were only beginning to delve into the vast potential and possibilities of the constantly evolving AI landscape, given the rapid release of new tools and updates. As participants N7 points out: "*I'm quite familiar with AI and its use in the creative field, but I have limited hands-*

on experience with the various software applications." Among the AI tools, text-based AI's like ChatGPT emerged as the most familiar and was proven to be beneficial across various domains. Other AI tools that have been mentioned, sorted after the number of times mentioned are Midjourney (25), Adobes Photoshop AI (23) and Adobe Firefly, Stable Diffusion (3), Notion (2), Mem.ai (1), Runway (1) and Lightrooms AI tool (1).

In the creative industries, AI primarily finds its role in visualizing ideas, as well as serving as a source of inspiration and a tool for research. Both these themes were mentioned 18 times in all interviews. Other uses for AI are assisting in repetitive tasks, enhancing the editing of pictures and text, aiding in general text composition, communicate a design concept to a client, and notably, frequently contributing to output generation (mentioned 15 times). The main use for participant N2 is: *"[…] exploration of ideas by rendering them visually, enabling me to specify the most promising concepts for further development."* Participant N4 uses AI tools for: *"[…] repetitive iterations, fine-tuning, and manual work that consumes a lot of time, such as typing, clicking through websites, downloading data, and performing tests. These are tasks that neither graphic designers nor their employees typically enjoy."*
While some participants see AI more as an assistant that helps artists reach their creative goals rather than a standalone solution to create an entire product, the findings suggest that it already found its way to final output generation. In some projects, AI is employed as a specific choice to create something that would be challenging for human designers to conceive or execute. Remarkably, these projects often adhere to, if not surpass, the typical timeframes of conventional creative production workflows. To exemplify this, one participant, who serves as an Art Director, shared her experience of a project entirely generated through AI:

> *N3: "For example, we recently created an exhibition for WWF that was entirely developed using AI technologies. This exhibition interprets the world in the style of past artists who have long since passed away. It illustrates how the British landscape could look in 200 years if we don't start treating our environment better. It's fascinating when such creative crossovers succeed. It took a few months for the results to truly reflect what we had in mind. Eventually, we presented the idea, 'Future of Nature', which crystallized into an art exhibition. This exhibition consisted of paintings that depicted a blend of the past and future […]"*

This brings me to the mentioned opportunities for the transformative impact AI holds for creative professionals. AI speeds up the exploration of ideas, facilitates fast visualizations of sketches, with a simple input of an envisioned concept it provides multiple options, and the ability to mimic various styles. It possesses the capacity to think without the influence of external factors or traditional human behaviour, making it invaluable for generating entirely new ideas and concepts that might not have been possible otherwise. Besides, it also allows freelance designers to offer certain services that they didn't really offer before or at least didn't like to do, as N13 explains:

"For me it was extremely hard to write texts. Now I can use AI as a tool, and I can quickly create about 45 SM posts without having to invoice clients right away. This allows me to be flexible to my clients' needs and situations without them feeling financially constrained. So, due to my dyslexia, I often find it difficult to compose texts. In such cases, I find it extremely helpful to use tools like ChatGPT to compensate for my personal weaknesses."

5.2 AI Streamlining the Creative Production Process

To answer the first research question, it is necessary to first look at the creative process and which areas are impacted by AI, where AI can assist, and where participants can't imagine AI implementation. I used the framework (cf. 3.1) to highlight where the interviewees mentioned their use of AI in the creative process. The horizontal orange line represents the design process from idea to final output, with the four stages in the Double Diamond Model (see Image 15).

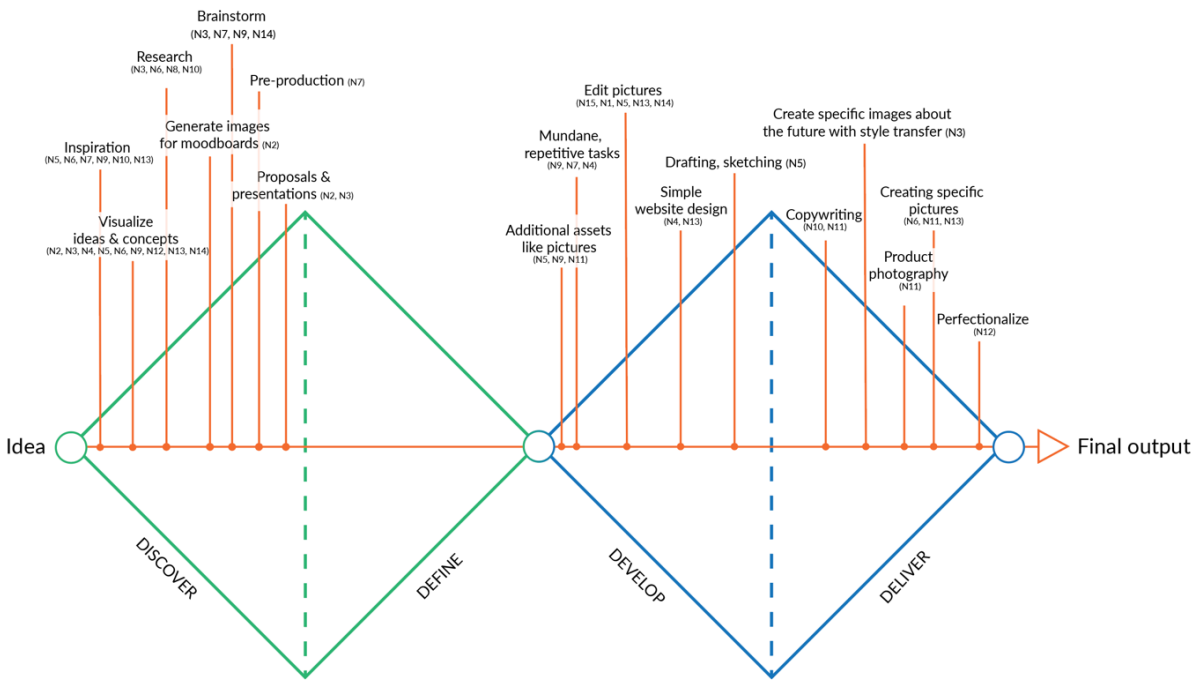

Image 15: Own representation where AI has been used in the creative production process.

As evident in image 15, AI is not capable of handling every aspect of the creative process. The majority of its utility lies in the initial stages of creative work, as highlighted by several participants during the interviews, like N2 points out:

"I haven't had any projects where AI has completely handled the entire creative process. My work primarily concerns creating visual identities, which requires a complex approach and a range of deliverables that AI, in its current stage of development, cannot fully address. However, AI tools do

> *assist me in various aspects. For instance, I utilize Midjourney to bring my ideas and concepts to life visually."*

Or as participant N9 describes: "*For me, it's primarily been useful in the pre-production phase, involving planning […] It seems like we're gradually reaching a point where more actual tasks can be handled by it. But I still believe that its main value lies in pre-production."*

During the development phase, AI handles tasks like image editing and repetitive work, and in the final output, it is used to create unique picture assets or serves as a substitute for product photography. If AI is solely used for output generation, it becomes a deliberate choice to channel its strengths to their fullest advantage, as participant N3 further explains:

> *"For instance, when it comes to visualizing the future of humanity, collaborating with AI systems like a huge help. AI is based on knowledge of how we behave and influence the world, which allows for ideas that would otherwise not be achievable. Imagine telling a human to envision the world in 200 years - that wouldn't be as effective without the comprehensive knowledge embedded in AI. Therefore, I think it makes sense to use AI in our creative processes to bring innovative ideas to life."*

As evident in image 15, the 'define' stage, involving decision-making, strategy organization, prioritization, and project requirement definition, currently lacks AI integration in any creative process. This is mainly because the focus at this stage mainly relies on human involvement, a point I will elaborate on later.

When examining the productivity and efficiency impact of AI implementations, the options are divided. On 18 occasions interviewees mentioned that employing AI in their creative process sped up their process but mainly in the inspiration, research, and idea-finding stage or in text-based and repetitive tasks, as interviewee N2 elaborates:

> "*The advantage is clear: AI speeds up the exploration of ideas by rendering them visually, enabling me to specify the most promising concepts for further development. This functionality also proves valuable in generating images for mood boards, eliminating the need to spend extra time searching for or creating them manually."*

Also, interviewee N8 mentioned:

> *"It's now simpler to quickly gather information, like what life was like in the 1500s, for example. Before, you always had that nagging thought in the back of your head that you needed to invest hours. And if it's something routine or research-related, you can definitely gain a lot from the quick overviews it provides. So, in that sense, you save a bunch of time."*

Especially when it comes to presenting an idea to a client or trying out concepts, AI tools can be time saving, which proves beneficial for everyone involved. Participant N13 explains: *"I can quickly create about 4 – 5*

rough drafts, without the client having to immediately receive a large bill for the hours I invest in it. This makes it possible to make the situation less complicated for everyone involved. So, it's a win-win situation." Interviewee N11 has the same experience and said: *"I can generate that in an hour. For a real photo, I'd need one and a half days. This is a huge advantage for presenting an idea to the client […]."* Also, in basic tasks like Photoshop retouch and editing it proved helpful in eliminating extra hours. Even tasks that before needed an external person can now be handled with the help of AI, as N5 expresses: *"I can do a quick 3D visualization without the need of a 3D artist. Or a concept photo without a photographer, also regardless of the season of the year."* Nevertheless, not everyone had the same experience, particularly when it comes to creating specific designs that AI struggled to comprehend. In such cases, designers often invested a significant amount of time attempting to make it work, only to ultimately complete the task themselves. Participant N6 describes his experience like this: *"You can certainly see how fast you can get things done if all the necessary preparation work is completed in advance. However, the process involves a fair amount of back-and-forth in terms of prompting and waiting."* Other participants see it currently as a waste of time and voice some frustrations while using various AI tools, for example, interviewee N3 highlights: "*I have definitely wasted 30 to 40 minutes in Discord while trying to formulate the right input prompt. Then I wondered if I could have solved the problem myself in the same amount of time.*"

The interviewees also noted that it's challenging to measure productivity in terms of time. This complexity arises from the fact that designers frequently allocate time for unforeseen tasks or find themselves investing additional time in other tasks in the creative process. Although AI can expedite certain aspects of their work, it enables them to dedicate more time to other, more significant, or enjoyable tasks, ultimately preserving the overall timeline of the creative process. This is underscored by the two following statements. Participant N13 said: *"It makes sense that the designer can save time and focus on improving existing designs and shaping them in creative ways rather than painstakingly searching for inspiration or building a base from scratch*." And participant N4 elucidates: "*It doesn't make sense for skilled designers to spend their valuable time on these repetitive and mundane activities. In essence, I see AI as a tool that will transform and augment the design process, making it more efficient and allowing designers to focus on the creative and strategic aspects of their work."*

So, the answer to the productivity question if more output can be achieved in the same amount of time is no, as the focus has shifted towards prioritizing quality. However, thanks to AI tools, some participants experienced heightened efficiency as they could allocate their time more effectively. Interviewee N13 is of the opinion that as a result, the overall quality will improve, as he spends less time on individual tasks and can do more important tasks instead. When it comes to enhancing efficiency, AI is actively pushing boundaries in the field of design. With its speed and precision, AI empowers designers to focus on decision-making in the creative process. This, in turn, contributes to continuous learning in different areas and improvement in the

long run. Participant N2 put it this way: *"It goes beyond just employing AI for graphic generation; it's about using AI as an assistant, capable of enhancing workflow efficiency."* In terms of cost-effectiveness, it became evident that AI tools offer time and financial savings to freelancers and companies. They can in some cases eliminate the need to hire separate concept artists, photographers, or copywriters and save valuable work hours by accelerating various repetitive or mundane tasks. This advantage is not only on the designers-, but also on the client's side, as participant N13 explains: "*When I mentioned my price, [the client] thought it was too high. Then the suggestion came from my side to look at the solution with AI, as this could reduce the cost."*

To elucidate my point and summarize the answer to the first research question, the following graphic illustrates the adapted creative process with AI implementation (see Image 16).

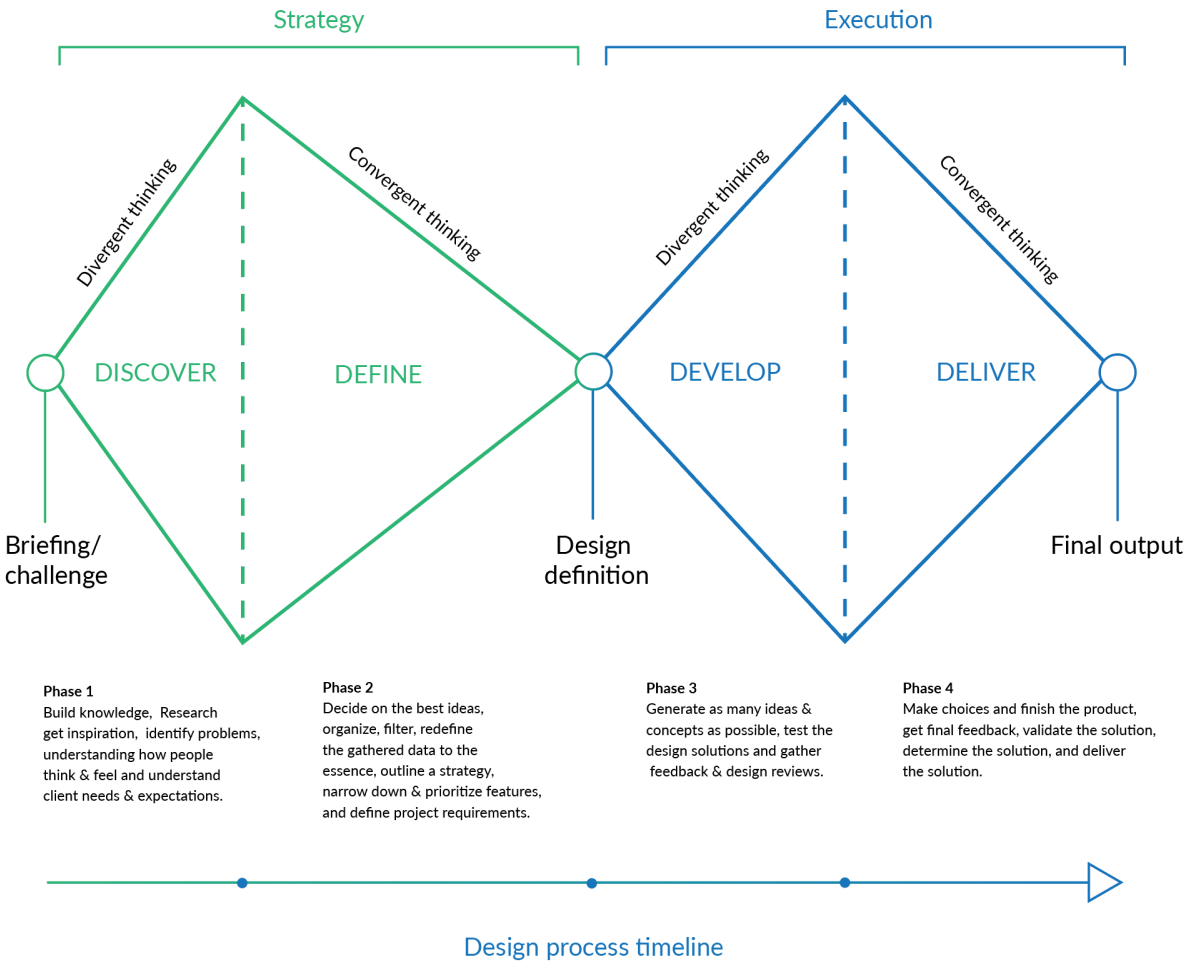

Image 16: Adapted creatives process with AI implementation.

While improving productivity may involve producing more output at the same time, improving efficiency aims to reduce resource waste in achieving a particular outcome (Marovic, 2022). The most significant productivity boost occurs at the initial stage of the design process, where more ideas can be generated in a shorter time. Yet, the overall creative process time remains unchanged. In the development phase, small time-saving instances

were observed, but they did not have a substantial impact on the overall process. When assessing efficiency, it's evident that particularly in the strategic phase of a project, time, and resources that might have been previously spent on research or inspiration are redirected toward decision-making. This empowers creative professionals to invest their valuable time in enhancing quality. Interviewee N3 elaborates: *"Nowadays, there are plenty of options that go far beyond what one can handle alone. The output I present to my clients has become more extensive and diverse as a result."*

While this might sound very promising, we also must look at the limitations of AI tools. Regarding quality, it was mentioned on 11 occasions that the output quality is only the result of the pre-work and, ultimately, the text input. While AI solutions might not always achieve the most exceptional or artistic results, they prove cost-effective and efficiently fulfil their purpose. However, participants acknowledged AI-generated content is recognizable, especially to trained eyes. So, effectively using AI tools requires integrating them appropriately rather than relying on them as standalone solutions.

5.2.1 AI Limitations and Challenges

Throughout the interviews, I have identified three prominent patterns regarding the current limitations of creative AI: 1) Difficulty with complex, customized projects, 2) Dependency on existing materials, and 3) Inability to create diverse human features. AI often struggles to comprehend and effectively handle complex, highly customized projects. These types of tasks demand a deep understanding of client needs and the development of extensive creative solutions through meetings and discussions, as interviewee N10 explains:

> *"They tend to produce generic and uninspired results that may not effectively capture the essence or uniqueness of a brand or business. […] They lack the ability to provide the depth of creativity, nuance, and context that a human designer can offer. They might be convenient for very basic and straightforward needs, but when it comes to representing a brand or creating a distinctive visual identity, they often fall short."*

AI relies on existing materials, hindering its capacity for truly original or innovative work. Unlike experienced human professionals, AI often lacks a learning curve to adapt to the specific style of a project. This means that for every new project, AI essentially starts from scratch. And, another noteworthy observation I came across, as pointed out by interviewee N3, relates to the inability to create diverse human features. This limitation becomes apparent when generating images of people, where an overwhelming number of 'perfect' human representations dominate the generated content. When creating a group of individuals, the lack of diversity is striking, extending beyond skin colour to encompass facial features such as nose shapes, facial hair, and skin texture. This deficiency in diversity presents a significant challenge, since there appears to be an insufficiency of online images that depict the full spectrum of human variations. Participant N3 highlights: *"In advertising*

and movies, an unrealistic beauty standard is often portrayed, which exacerbates this issue. Due to these difficulties, I've given up on creating realistic human figures. Even my boss and the agency's founder have noticed that it doesn't work well when we try to create human figures and have asked us to steer clear of it."

Further frustrations arise when designers have very specific images in their minds that AI struggles to comprehend or replicate. This can lead to the creation of something entirely different or the repurposing of components from other AI-generated designs that are unsuitable for professional work. But interviewee N3 found a positive side to this issue: "*This is a good example of how AI sometimes struggles to create something that doesn't already exist. Sometimes, I even find it rewarding when AI hits its limits because it means the idea is truly new and unique. That gives me confidence in my idea."*

5.3 AI-Human Creative Collaboration

Regarding the second research question, it is intriguing to examine the interaction between AI's contributions and human expertise throughout the creative process, pinpointing the areas in which AI enhances creativity and where human skills continue to excel. All the interviewees agreed that the starting point, the idea, and essentially the creativity itself is and will be for another while in human hands. Although the process of visualizing the idea and creating an outcome can be achieved with a collaboration with various AI tools, as interviewee N2 further elaborates:

> *"Currently, I maintain the opinion that it remains a creative task primarily driven by a human creator. I appreciate the significance of the initial concept and source idea, recognizing that even if the final appearance is shaped through a collaborative process involving AI and a human, it remains a creative effort."*

Interviewee N3 compared this approach to interacting with a young child, who perceives the world in a distinct and unique manner that differs from her own perspective. This aligns also with participant N5s statement:

> *"AI is capable to think without influences from outside or typical human behavior or habits. So, it is good for completely new inputs and concepts you may not have thought about before. It can (and will) be a fertile collaboration indeed, the final decisions and meetings with clients will (always?) stay a task for humans."*

A significant shift occurs as creative professionals learn to delegate certain aspects of the creative process to AI. They move away from the notion of controlling every element and instead focus on identifying where AI can offer valuable support (N6). Furthermore, designers adopt a mindset that is not overly rigid, understanding that creativity doesn't adhere to strict right or wrong categories. In this collaborative approach, any contribution that enhances the quality and effectiveness of an idea is welcomed, emphasizing the importance of not trying to handle every aspect independently (N11).

In collaboration, AI is acting as digital secretary, guiding designers through the digital world and helping them make informed decisions. 10 out of 15 interviewees mentioned that they utilize AI tools as assistants and sources of support in their work. However, to maximize efficiency and coherence, participants noted that AI needs to be trained on internal data, learning the style of different clients, learning from past projects, and understanding their unique style. The question remains what role the human expertise plays in this collaboration. Thinking back on AI's limitation, it becomes evident that humans excel especially in these areas: creative thinking, human interactions & communication, human 'touch' & experience, and curating & managing. To begin, the core of creative thinking and the customized approach is deeply rooted in human inspiration. Machines can follow orders, but the creative part, where decisions are made, is where software falls short. It's the creative individuals who must generate the idea themselves, as interviewee N11 describes:

> *"I can't imagine that idea generation happens anywhere other than in one's own mind. Design is just the result of an idea. At least when it comes to communication design, design is always the second step. First and foremost, there's the idea, and that's always human. So, in every process, you still need someone to design the text that gets entered in the system. That requires a certain amount of creativity."*

So, even though the output is generated with AI assistants, the visionary behind it remains the artist, and creativity remains human. This goes hand in hand with the skill of human interaction, communication, selling ideas, and understanding clients' needs and project requirements. For clients who choose to work with an agency, it's important to have a contact person and to be able to access consulting services. Participant N6 summarizes it this way:

> *"Knowing how to communicate effectively, especially when working with a diverse clientele, is a key skill. Sometimes, you'll encounter clients who are unfamiliar with your particular style, and that's where creativity comes into play. Being able to adapt and navigate various spaces is essential, and AI currently can't match that level of versatility."*

What distinguishes designers from AI is their profound understanding of culture and history, acquired through years of dedicated learning and exploration across various domains, as noted by interviewee N9. They possess the ability to discern which concepts will resonate with their audience and which won't. Interviewee N10 describes it this way:

> *"AI has not changed this preference, as my clients value the authenticity, creativity, and emotional understanding that only humans can provide. While AI has made advancements in various fields, the fundamental human element remains crucial in many professional relationships, and my clients continue to seek that unique perspective and personal communication in our collaboration."*

The essence of developing a brand, interpreting it, and effectively conveying its message underscores the true talent in this field. So finally, arising from AI-human collaboration, is the importance of curating and managing

AI tools, overseeing the entire process, and making informed decisions. It falls upon humans to refine, revise, and ensure that ideas are not only appropriate but also aligned with the desired objective. The process of adapting an idea to specific contexts, and addressing nuanced considerations relies on human judgment, creativity, and a comprehensive understanding of the broader context. Moreover, a crucial element of quality control and assurance relies on human, confirming that an idea is not only feasible but also well-suited for the given task, as noted by interviewee N10:

> "*While AI can initiate the creative process, the role of refining and ensuring the appropriateness of ideas is a task that, for now, remains firmly in the realm of human capabilities. AI complements human creativity and problem-solving but doesn't replace it entirely."*

Furthermore, a considerable number of participants emphasized the significance of craftsmanship—a deep understanding of the craft and the capacity to build coherent, meaningful designs, which will continue to be of immense value. The widespread presence of low-quality mass products stemming from AI-driven tools is predicted to create an appreciation for the skills and talents that creative professionals bring. Interviewee N10 even suggests that non-creatives who experiment with these tools first-hand come to recognize the extensive effort involved in creative work. This realization may lead them to seek guidance from professionals to ensure the quality and utility of their creations. Participant N9 explains: *"I enjoy knowing a person created something, you know? I appreciate the craftsmanship since I know what might go into it, the struggles they've had to get there and the creativity that might not even have been seen before. I hope AI can have a hand in accelerating all that, but don't want it to take over."*

When designers truly understand the palette of their craft, it's not just about craftsmanship; it's also about the intellectual aspect. The fusion of creativity and understanding makes designers very valuable in the process. Still, participant N11 is of the opinion that AI can certainly assist in craftsmanship if designers know very precisely what they want.

5.3.2 AI Impact on Creativity & Creative Value

Ultimately, it can be argued that AI has in some parts influenced the creative process, but the question remains if it also changes creativity and its value itself. In the interviews, it became clear that creativity is human, but AI can even aid creativity by providing new thought patterns, as N3 explains: *"Sometimes I deliberately don't enter the correct input prompt because I want to see how diverse the answers can be. I may have a very specific idea in my mind, but I sometimes deliberately enter a more general input prompt, hoping that something surprising will come out that I never thought of."* It broadens the field of creative possibilities with a simple choice of style, aspect ratio, and other factors. Even failed attempts to achieve a specific outcome can spark new ideas. Lastly, it aids creative professionals in generating something that would have been otherwise too

complex or time intensive. This aligns with N3's example of the art exhibition depicting the British landscape in 200 years or participant N8's case:

> *"For instance, people used a shape resembling Shrek or Super Mario, and the AI generated a Swiss mountain village with the Shrek shape incorporated into the composition and lighting. Achieving something like that manually would be a very specific and challenging task. Now, it seems that people can easily come up with these intriguing ideas and iterate through various versions until they find the one that works, without having to invest an excessive amount of time."*

Subsequently, interviewees have not yet seen changes in the value or demand of their creative work. But, as participant N9 points out, there have been instances where AI has started to replace certain creative tasks, potentially diminishing the value of expertise in fields such as photography, concept art, or copywriting. Contrarily, other participants like N1, N3, N4, and N13 rather see an increase in the value of creativity and human creative work, as participant N1 elaborates: *"I expect that AI-generated content may lead to a proliferation of visually uniform and less professional designs. This could potentially affect the perceived value of creative work by making it seem more accessible but less distinctive."* Or as Interviewee N10 sees it*: "Well, it seems like budget-conscious folks are trying their hand at design, but I don't think high-end clients feel the same way. They're still willing to pay for expertise, knowing that AI-generated work might not meet their standards."*

To sum up, while AI offers powerful capabilities, it's essential to balance its advantages with human expertise, creative direction, and evaluation to achieve the best results. AI's role in the creative process is primarily to accelerate the foundation of a designer's creative vision. This entails taking charge of repetitive and mundane tasks, thereby allowing designers to allocate more time to crucial activities, such as client communication, idea presentation, decision-making, and overseeing the overall process, including adjustments and evaluations. The key lies in curating these tools in a manner that enhances overall efficiency and quality. However, there are instances where it's essential to evaluate whether AI integrations genuinely enhance the final product. As reported by some interviewees, the mere fact that something is AI-produced doesn't necessarily make it more captivating. But when the collaboration is well-structured and balanced, and the designers maintain their quality standards, the path taken to reach the final output becomes inconsequential; what truly matters is the result.

5.4 Market Changes

The third research question revolves around the changing work landscape for graphic designers, and the exploration begins by delving into the concept of job displacement, specifically identifying roles that may lose relevance as AI continues to demonstrate its value in various tasks that designers routinely handle. Yet, as

underscored by interviewee N8: "*AI is like nothing human labour has ever seen before – even compared to the industrial revolution – and we still have no idea to what extent it will go. Industries, but most importantly, workers will have to adapt or be left behind."* To assist designers in this process of adaptation, acquiring insights into these developments becomes essential. To conduct a thorough analysis of these transformations, I apply the framework (cf. 3.2), which is based on the text by Acemoglu and Restrepo (2018). This framework describes the consequences of automation in various industries, including the displacement effect, productivity effect, and reinstatement effect. A concise summary of this framework, with my findings, is presented at the end of this section. It needs to be noted that the insights presented here, particularly in the context of job displacement, are based solely on the perspectives of the interviewees and do not offer a real-time analysis of market demand for jobs.

There were common themes regarding job displacement, with participants identifying job areas which are more likely to feel the impact of AI implementation. Firstly, multiple participants anticipated a reduction in roles associated with repetitive tasks that require basic skills—areas where AI excels over humans. Roles that were mentioned include retouching, video editing, visual effects, 3D visualizations, basic logo design, text specialists, copywriting, and icon design. Participant N4 thinks that: *"For designers who exclusively execute others' ideas, this could be a riskier job since they don't have to develop new ideas themselves*." Interviewee N5 adds: *Especially photographers and 3D artists may get into trouble in some sectors. As well as some text specialists – simple basic stuff can be written by AI for some projects. I think, all the people in the creative industry will have to watch out on all developments with AI not to lose control over it.*"
For new designers striving to establish their unique style and artistic expression, this transition could present particular challenges, as emphasized by N13:

> "*I believe that AI has the potential to replace many aspects of these tasks, and there are also many more junior roles which are already somewhat easily achieved by AI. So, designers who simply create logos quickly, are perhaps not particularly creative, and do not think beyond the logo will be excluded or replaced by the AI*".

Another common belief is that concept artists or concept photography professionals will feel the impact of AI on their job, as they attempt to generate profits by creating numerous variations, they find themselves in a competitive landscape. Interviewee N3 explains: "*Why would you hire someone who draws something for two weeks when you can see on your screen in three seconds whether it works? It's definitely an interesting aspect, and we've already noticed a decline in the use of concept artists."* Interviewee N9 also highlights another interesting aspect*:*

> *"It's not just a matter of honing their skills; it's also about doing it efficiently and staying relevant in a rapidly evolving industry. They must ask and answer the question, "Why should clients choose me*

> *over a $50 per month subscription service or something similar?" It's about leveraging their years of experience and offering something unique and valuable that sets them apart in a competitive marketplace."*

This trend results in processes that previously required an external or additional individual now being replaceable by AI, once again raising the question of the necessity of certain jobs. As elucidated by interviewee N4: "*Typically, this would require hiring a graphic designer, but AI had reached a level of proficiency where it could capture the desired atmosphere and vibe, making it possible to create the initial graphics using AI."* This illustrates how AI can directly handle tasks that traditionally would have been assigned to graphic designers. The same way feels participant N5 and says: *"I can do a quick 3D visualization without the need of a 3D artist. Or a concept photo without a photographer, also regardless of the season of year. Saves time and money. So, branches like those two mentioned may get in serious trouble in some sectors very soon."* From a positive perspective, smaller companies or freelancers can now leverage AI to generate basic tasks, offer more services and reduce costs.

Another intriguing aspect that arises when automation assumes certain tasks, and one that multiple participants have emphasized, is the productivity effect. The effect implies that automation can result in a higher demand for labour in tasks which cannot be automated. This is promising for creative professionals directly involved in the entire creative process, from idea generation to presentation, evaluation, and eventual production, where the scope for AI is limited, primarily confined to the initial ideation phase. It also highlights the value of skills associated with comprehensive thinking, adaptability, and decision-making, reaffirming the importance of roles such as Art Directors and Creative Directors. Participant N6 sees high-end photographers in a good position: "*Good photographers now find themselves with more work, as people seek higher-quality results for significant events or professional purposes. On the other hand, photographers who provide mediocre services might be settling into the middle ground, offering their services for less-demanding clients.*" This means that designers in the middle-class, who used to serve a diverse clientele, now face challenges as clients increasingly become self-reliant. They are creating their own designs or hiring high-end designers when seeking top-quality work. While this shift may impact entry-level or junior artists, who might experience a reduction in work due to the convenience of AI-generated concepts, individuals possessing a profound understanding of their craft and the ability to produce coherent and meaningful designs will continue to be highly valued.

Perhaps the most crucial aspect to consider is that creatives facing the potential obsolescence of their roles can still utilize AI tools to enhance their skills and produce content more efficiently. A common saying is, as N13 rephrased it: *"In the end, it's not the AI taking your job, it's the person who is using the AI."* This is an exciting aspect for the industry because it doesn't mean some professions are necessarily disappearing, but rather

transforming. Companies and individuals will still hire experts to handle the prompts and ensure everything is of high quality. Interviewee N6 expresses: *"Regarding the ongoing debate about whether AI will replace artists, it's unlikely. Instead, designers who leverage AI tools effectively will be the ones who excel."*
In conclusion, while AI has the potential to reduce certain job sectors, it also provides opportunities for individuals to adapt. This can be achieved through effective collaboration with AI or by transitioning to roles less vulnerable to automation.

5.4.1 New Roles & New Jobs

Now that we have established that the design craft will expand, and the profession will change, it is interesting to explore new roles or even possible new jobs that come with the AI change. Participant N4 already sees changes in his job field: *"For instance, the person who previously spent countless hours moving elements around, find their tasks shifting. Instead of tedious manual work, they are tasked with overseeing the AI in creating multiple screens or layouts efficiently."* As mentioned before, creative process coordination in the form of Art Direction becomes much more important. The objective is to comprehend aesthetics and what drives the understanding and evaluation of creative work. Interviewee N13 agrees*: "I think there's going to be a shift in the value of tasks, and so I can well imagine the role of a graphic designer possibly becoming that of an Art Director, directing the big picture."* Interviewee N2 adds: *"Similarly when we transitioned from manual sketching to graphic software, it led to the creation of new jobs and sectors for creativity."* The situation is similar for copywriters, whose primary task used to involve writing newsletters, but now, the newsletters can be written by ChatGPT. These roles already focus more on conducting research, incorporating trends, and delegating mechanical work to AI. In the end, it's about editing to ensure the content aligns with the intended tone and target audience. However, this change is welcome by most participants, since these tasks were not very enjoyable to begin with. The emphasis lays as well on quality, which interviewee N6 elaborates on: *"You can either join the race to the bottom, making more orders and competing with sweatshop-level pricing, or you can take a different path. Opting for the latter, you could choose to focus on quality, doing fewer things exceptionally well and charging a premium for your specialized skills."* Interviewee N2 adds: *"I suppose that human designers will still have two significant roles in the nearest future: creative (as a source of creative ideas and concepts) and a supervision of generated content."*

If the current technological revolution continues at its current pace, we can anticipate the emergence of entirely new job roles. There are already niche roles where designers generate AI-produced content for others, and although it might not be a traditional job, it forms a distinct field with the potential to evolve into roles like prompt engineers. For those already working in automated graphic design, a prompt engineer's tasks may align closely with their current responsibilities, even if their job titles differ. Interviewer N11 envisions the benefits associated with a prompt engineering position: *"If we had someone who is a full-time prompter and deals with*

these issues all day, it might be a great tool to become more efficient and faster." Interviewee N3 highlights why this position has its value: *"I don't think the clients themselves will be writing the prompts. They will still hire experts to handle the prompts and ensure everything looks good."* However, according to participant N13, every designer, to some extent, will assume the role of a prompt engineer. It essentially revolves around comprehending the pattern, which pertains to understanding how to structure information to obtain the desired output. In his view, professional fields like 'prompt coaching' or consultancy might be more appropriate labels for such positions. This position initiates with individuals who possess proficiency in using AI tools for specific tasks but progresses to a more advanced level of technical competence. These emerging experts may not have the capacity to manage every facet of AI, but they excel at navigating specific platforms effectively. Participant N5 also envisions opportunities for individuals beyond the creative industry, as the required skill set is evolving. In the past, a higher degree of expertise was necessary to visualize something effectively, but now, knowledge of prompting can achieve results comparable to those of a skilled concept designer. The interviewee N8 describes this role as follows: *"This role is a bit like operational engineering. We need folks who understand how it works and can work with it. It's similar to being a typist, a task that most people can handle […] but it's about interacting with this process."*

Lastly, creatives might also find themselves into more managing positions, as participant N9 explains:*"We might see roles similar to quality assurance directors who make sure that the output from AI aligns with the brand's established standards. It's like creating specific rules for how the AI generates content, which is vital for keeping a consistent and easily recognizable brand image."* Since a major limitation in generative AI is the lack of understanding of branding and client-specific aesthetics, this presents an intriguing new opportunity for creative professionals. These jobs could be tailored for individuals who find themselves in a position where they act as custodians of the creative process. This approach could become a preference for many companies, especially those placing high value on preserving a unique and consistent brand identity.

5.4.2 New Skills

The majority of participants noted that they haven't witnessed a substantial change in their skill set, apart from acquiring the ability to prompt and communicate effectively with a computer. However, a few interviewees mentioned that this lack of change may be attributed to their limited experience with AI. Some even expressed a sense of urgency to upskill themselves to prevent falling behind in this evolving landscape. Interviewee N2 mentioned:

> *"I have acquired skills in composing prompts, and I am trying to enhance these skills to ensure that the generated content aligns more closely with my creative vision. However, acquiring these skills wasn't demand full or time consuming. Nonetheless, I acknowledge that there might be aspects I have overlooked."*

On the contrary, as noted by some other participants, prompting itself is a skill that can be sharpened and refined over time. As participant N13 explains:

> *"You have to learn a certain writing pattern that is different from conventional writing. If you give the AI wrong information, you will also get questionable results. Therefore, it is necessary to learn how to write with an AI yourself, as it requires a completely different approach. It is different from writing with a normal person because everything must be paraphrased much more."*

Design professionals need to familiarize themselves with diverse prompts, understand text structures, and employ effective techniques. Because success with AI depend on proficiently generating precise requests, using plain language for the AI to interpret intentions accurately. Additionally, what multiple participants mentioned was developing mental and creative flexibility, as well as learning to make decisions faster. Participant N6 describes this approach as follows:

> *"The critical factor here is genuine expertise. While some of us have embraced these AI tools and are actively experimenting with them, the majority lack the real skills required. There's a learning curve involved, and the people who eagerly immerse themselves in this technology will not only pick it up faster but also find it more enjoyable. This positive attitude will ultimately set them apart."*

This ongoing process of decision-making, even prior to the initial production phase, enables designers to rapidly build their repository of ideas. Similarly, the consistent practice of decision-making throughout the creative process fosters continuous learning and improvement over time. In the end, AI serves to broaden a designer's toolbox, to help achieve their creative objectives.

5.4.3 Summary Market Changes

Now that we have discussed the displacement effect, new jobs, new roles, and new skills with AI implementation, I aim to present a comprehensive overview of the market changes using the framework developed by Acemoglu & Restrepo (2018). As illustrated in image 17, a historical perspective reveals that automation in various sectors created common effects. These include the *displacement effect,* which makes certain roles obsolete or less relevant, the *productivity effect*, indicating that fields that cannot be automated experience increased demand for labour, and the *reinstatement effect*, which leads to the creation of entirely new jobs resulting from automation. However, an adjustment process is linked to the necessity to acquire new skills, shift perspectives, or even participate in new educational programs. Further information on this model is available in section 3.2.

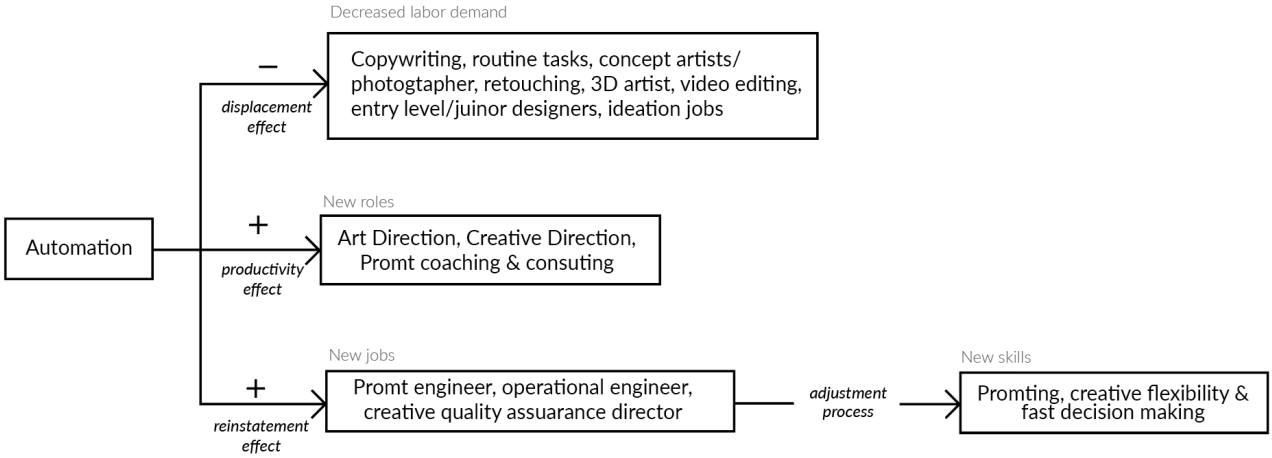

Image 17: Own representation of changes in the creative industries due to AI implementation

When examining the displacement effect, it's important to emphasize that some jobs may be more resilient to the impact of AI implementation than others. Endangered jobs that were mentioned were copywriting, routine tasks, concept artists and concept photographers, picture, and video editors, 3D artists, entry-level and junior designers. Yet, these jobs are not on the verge of disappearing entirely; they might experience a slight decrease in demand. More importantly, they are undergoing transformation, and individuals in these positions have the opportunity to effectively utilize AI tools to their advantage or pivot toward the roles that emerge after the productivity effect. One such field is Art Direction and Creative Direction, which may become increasingly prominent. These roles describe individuals capable of comprehending complex creative tasks, generating innovative ideas, managing the design process, and possessing a deep aesthetic understanding in evaluating the final output.

Already existing jobs like prompt engineers are a clear outcome of AI's influence on the creative sector, but there is also potential for new jobs that align well with the creative industries. As mentioned during the interviews, positions such as operational engineers or creative quality assurance directors may emerge as a result of AI's integration into the creative industries. In contrast to past technological revolutions, the required skill transformation isn't as drastic. The most significant skill evolution lies in the art of crafting effective prompts, which can be developed by actively leveraging new tools and experimenting to determine what creates the best results. Creative flexibility and quick decision-making should already be integral components of a creative professional's skill set, but due to the ever-evolving nature of the craft, these qualities now take on even greater importance. Fortunately, they are attributes that can be nurtured and refined, and educational programs can play a role in facilitating this development. So, the adjustment period went hand in hand with the AI revolution, as we're already seeing new jobs emerging.

6. Discussion

In the dynamic industry of graphic design, a profound transformation is taking place, driven by the current evolution of generative AI. This seismic shift is not only redefining the way creatives create, but it's also fundamentally altering the very essence of the creative process itself. Picture a world where machines are more than mere tools; they're co-conspirators in imagination, partners in design, and guides to unexplored territories of artistry and efficiency. This thesis delves into the current changes in the creative industries, focusing on AIs effects on creative production, collaborative dynamics, and workforce transformations. The insights collected from interviews and applied to established models, provide a broad understanding of the profound changes experienced by graphic designers, encompassing the advantages and challenges in this evolving landscape.

My research findings, particularly in terms of AI adoption, usage, and potential, are in alignment with existing literature, as they support the idea that AI empowers creatives to concentrate on the more valuable, enjoyable, and strategic aspects of their work (Mustafa, 2023, p. 246; Inie, Falk, & Tanimoto, 2023, p. 4). Furthermore, AI now inspires creative professionals with a wide range of quickly generated output, sparking new ideas and expanding creative possibilities (Inie, Falk, & Tanimoto, 2023, p. 4). However, participants in this study echo concerns voiced by interviewees in other research about the potential loss of human touch and creativity, which could hinder creativity's evolution (Mustafa, 2023, p. 246; Inie, Falk, & Tanimoto, 2023, p. 4). This concern comes from the proliferation of tools designed for non-creative individuals, resulting in an oversaturation of bad produced, ordinary design work that may meet basic requirements but lacks innovation and a deeper purpose. Yet, on the other hand, it can enable individuals without prior training, or a fully developed skill set to enter the world of design and cultivate an appreciation for aesthetics.

In contrast to prior literature, my findings indicate that AI tools, accessible to both designers and non-designers, do not devalue the work and expertise of professional designers (PfeifferReport, 2018, p. 2). Instead, they foster a greater appreciation for designers as people gain insight into the craftsmanship and skill set involved in creating something innovative, creative, and exceptional. While AI enables people to simply create logos, art, pictures, and corporate identities, it also highlights the importance of intricate processes, aesthetics, experience, and profound skill required for quality results. This underscores that quality work involves more than simply inputting a vision into an AI tool. Furthermore, these tools not only enhance the accessibility of design tasks but also play a crucial role in educating a wider audience about the significance of professional work, nurturing an appreciation for aesthetics.

6.1 Changes in the creative production process

Productivity and efficiency are two closely related concepts but have distinct meanings. Productivity measures how much output is generated within a given timeframe and it's about achieving more with the same resources or the same amount of work in less time (Marovic, 2022). Efficiency, on the other hand, focuses on minimizing waste, reducing unnecessary steps, and optimizing processes (ibid.). It's the ability to perform a task with the least number of resources or effort at the same time. That being said, previous research highlighted that AI is enhancing the work of creative professionals, boosting productivity and, making their work faster and efficient (Inie, Falk, & Tanimoto, 2023, p. 4; Accenture, 2017; Sowa, Przegalinska, & Ciechanowski, 2021). For instance, in video production, the utilization of AI in post-production has demonstrated its ability to enhance the production process (Smith et al., 2017, p. 1799). Others anticipate that AI has the potential to contribute to economic growth by improving efficiency (Tiwari, 2023, p. 4). Yet, no concrete data substantiating this claim or providing specific insights into how AI impacts productivity and efficiency in the creative production process for graphic designers was found. By using the design process described in the Double Diamond Model and the insights from the interviews, I can offer concrete insights for productivity and efficiency changes with AI implementation.

For participants in this study, AI plays a central role in visualizing concepts, offering inspiration, and supporting research. It's particularly valuable for automating less creative and repetitive tasks like editing, retouching, and minor content creation, saving time and resources. Generative AI acts as an assistant to help artists achieve their creative goals, especially in cases where human designers may face challenges in conception or execution. As highlighted by Smith et al. (2017), the majority of AI's utility lies in the initial stages of creative work. But graphic designers can also leverage AI assistance in the production and post-production stage. Still, the analysis using the DDM revealed AI's limitation in the second stage of the design process, characterized by decision-making, strategy development, feature prioritization, and project requirement definition. It underscores that while AI can aid specific aspects of the process, it cannot replace the entire creative journey.

While existing work anticipated a big improvement in productivity for creative work (Inie, Falk, & Tanimoto, 2023, p. 4; Accenture, 2017; Sowa, Przegalinska, & Ciechanowski, 2021), my findings indicate that instead of an enhancement in the overall productivity of the creative production process, it's the efficiency that experiences a significant improvement, which contributes to an increased quality. Although productivity may see enhancements in specific areas, such as the idea generation phase, it could potentially extend the duration of other phases as designers reallocate their resources differently. So, even though AI might improve productivity in the ideation phases (Discover & Develop), it's evident that particularly in the strategic phase of a project, time and resources are redirected toward decision-making. With this in mind, I propose an adapted

view on the creative production process using the DDM (cf. 5.2), allowing me to answer the first research question:

RQ1: What impact has generative AI on streamlining the creative production process, including productivity and efficiency?

Generative AI plays a pivotal role in optimizing creative production processes by offering distinct advantages. Firstly, it boosts ideation productivity by rapidly generating and researching ideas, resulting in a greater number of concepts or variations in less time. Also, mechanical and repetitive tasks can be completed faster. However, when examining the overall productivity of the entire process, the impact is not as pronounced. While generative AI accelerates certain phases, it may also necessitate additional time for refinement, selection, or adaptation in other stages of the creative process. As a result, the net effect on overall productivity remains the same. Generative AI truly excels is in enhancing efficiency, particularly during the strategic and decision-making phases of a project. This redirection of effort contributes to an overall quality improvement of the final creative output, making AI a valuable asset for creatives aiming to achieve a balance between productivity and excellence.

During the analyzation of the findings, I found some limitations of the DDM, potentially limiting the transferability to the creative production process in graphic design. The DDM presents a linear, iterative process, but graphic design often involves non-linear and concurrent activities. Designers frequently need to revisit and revise earlier stages as they progress, which the model may not accommodate well. This non-linear nature of graphic design reflects the need for flexibility and adaptation, as designers typically encounter unexpected challenges or opportunities during the creative process. Additionally, the view of the DDM does not include outsourcing within their model which essentially could take on AI. So finally, considering previous literature and my findings, I propose a comprehensive, adapted, and expanded perspective on the impact of AI on the creative production process (see Image 18).

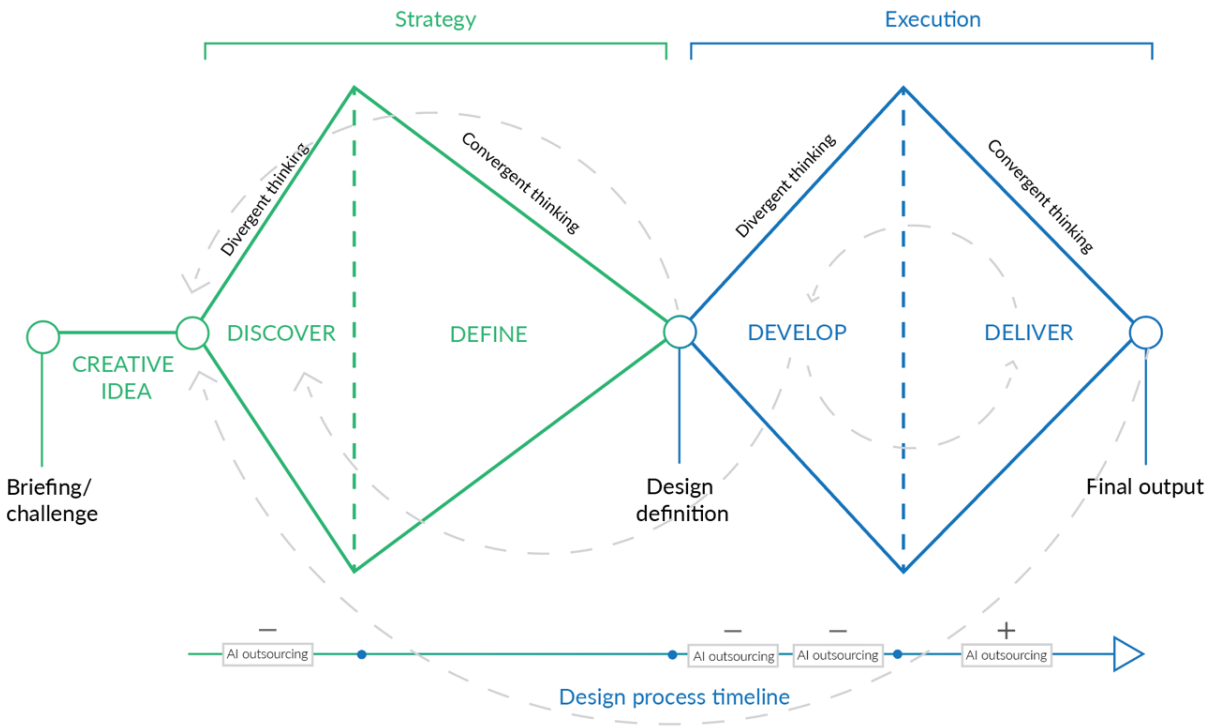

Image 18: Changes of the creative production process with AI, own representation.

In every creative process, the initial idea stems from the creative person guiding the whole process. AI outsourcing can streamline the timeline during the discovery and development phase. However, when AI is used to create the final output, it often extends the process as it takes additional time to align outcomes with the designer's vision. This adjusted model also accounts for iterations, revisions, and client feedback, reflecting the dynamic nature of the creative process.

6.2. Human AI-Collaboration

It's time to view AI as a collaborative tool, a teammate that enhances the capabilities and efficiency of creative professionals. Researchers stress the importance of a close partnership between humans and AI, emphasizing cooperation over full automation (Sowa, Przegalinska, & Ciechanowski, 2021, p. 141; Goldstein et al., 2023). Building upon these insights, Sanders and Stappers (2008) assert that integrating co-creation with AI in design practice leads to a series of transformative effects. These transformations encompass the design approach, the scope of designs, the individuals involved in the process, and, notably, the overall value of design (p. 15). This approach allows AI to complement human expertise rather than simply replacing it (Strauss, 2023).

AI plays a multi-faceted role in the creative process, acting as a digital secretary, that guides designers through the digital landscape, assists in decision-making, and expedites research and repetitive tasks (Anantrasirichai & Bull, 2021, p. 639). This aligns with my findings as AI can be used to assist the process not only in execution

but also as a ‘brainstorm’ partner that thinks without interference from outside or typical human behaviour. In practice, these AI tools are categorized into generators, blenders, transformers, and editors, each assisting in different stages of the creative process (Hwang, 2022). What’s new due to the AI advances is that professionals learn to delegate certain aspects of the creative process to AI, effectively harnessing its strengths.

But let’s not forget the human role in the process, which remains–for now–irreplaceable. Agreeing with existing literature, participants of this study are the opinion that humans are the originators of ideas and still the driving force behind creativity itself. Their involvement includes creative thinking, human interactions, communication, understanding clients' needs, and managing projects. The core of creative thinking and customization is deeply rooted in human inspiration, touch, experience, adaptability, and unique style that designers bring to their work. Ferrari (2017) mentioned that in collaboration, humans act as mediators between clients and AI products, ensuring production quality, interpretation of results, and suitability (p. 2629). My findings add that human designers excel in their understanding of culture, history, and knowledge acquired through years of dedicated learning and exploration. Interpersonal skills, aesthetics, and contextual understanding, are qualities that computers are not yet able to replicate, highlighting the importance of creative professionals. AI elevates design work, making processes more efficient and, at times, faster, and allowing humans to transcend previous skill limitations.

Drawing upon existing knowledge and my own research findings on the areas where AI tools can offer the most significant benefits, I present a research-based recommendation for industry practitioners to ensure a successful collaboration with AI. The insights are used to answer the second research question:

RQ2: How is human-AI collaboration facilitated in the creative process?

Professionals in creative industries should recognize AI as a tool that can enhance the creative process. However, they should not be too quick jumping on AI tools to allow the initial idea and creativity to arise in their own minds, but then building up on that idea with the help of various AI tools like Midjourney, Adobe Firefly or Stable Diffusion. Creating a vast number of ideas to choose from and quickly trying out different concepts can help create a more innovative and diverse ideas. The selection of ideas, appropriateness for the tasks and ensuring brand guidelines is controlled by human hands. AI tools should be used to generate options and ideas, but the final decisions based on creative vision and expertise is made by the creative visionary. In the production phase, designers need to learn to shift from a human-centered approach to a co-creation model, where AI is a collaborative assistant (Sanders & Stappers, 2008). The recommendation is to let AI complement designers’ skills to bring out the best in both human and machine creativity. For example, designers need to recognize their weaknesses and let AI complement them, as we have seen in the example of one participant

who can now offer more services since his dyslexia does no longer pose a challenge for his creative work. In the same way can freelancers produce high quality product photography or 3D renders that before needed an external person. Here the focus should be to recognize the designer's unique style, bring in aesthetics, and contextual knowledge to shape the product and let AI tools assist in repetitive, manual work, like utilizing Photoshop AI, Lightroom AI or ChatGPT.

Still, when it comes to using AI for the final output, leveraging the vast data processing and technical capabilities of AI tools, as demonstrated in the example of generating images depicting the world's future, it becomes crucial to engage in active collaboration with AI as a teammate. Designers need to work closely with the chosen AI tools, go through multiple iterations, and fine-tune the output to align with the creative vision. This process of guiding and curating AI to aid the creative process will be a quality that designers are increasingly valued for in the future (Matthews et al., 2023, p. 372). Yet, it needs to be mentioned that AI implementation should not be forced, as attempting to integrate it without a seamless fit can be time-consuming and hindering the creative process. Designers should be aware of the identified current AI limitations, which are: difficulty with complex, customized projects, dependency on existing materials, and inability to create diverse human features. It's crucial to assess when and where AI can enhance creativity and avoid excessive reliance on specific tools to preserve human touch and unique creativity. Conclusively, the key is to leverage AI's strengths while relying on human creativity and curation skills for optimal results. When graphic designers successfully collaborate with AI, they can enhance their creative work, improve efficiency, and explore new horizons in design.

6.3 Market changes

AI is a revolutionary force with an uncertain potential, requiring both industries and workers to adapt or risk becoming obsolete. Graphic design, according to AIOI scores, is particularly vulnerable to AI's impact, as it heavily influences cognitive skills related to problem-solving, perception, and creativity (Felten, Raj, & Seamans, 2019, p. 15-16). The answer to the third research question sheds some light into current market trends in the creative industries:

RQ3: How does AI influence job roles for graphic designers, including skill changes and job displacement?

Previous research mentioned that the transformation in the market is reshaping work organization and the economic value linked to qualifications (Matthews et al., 2023, p. 372). Agreeing with existing literature, my findings contribute to the sentiment that simple, basic, and repetitive design tasks are seeing a decline in demand. Participants of this study also mentioned that individuals in jobs like concept artists, product photographers, copywriters, and 3D artists must adapt to the changes or reskill. The biggest shift will be

experienced by entry-level employees, which will only intensify over the next years, as a new global study from the IBM Institute for Business Value reveals (Goldstein et al., 2023). While AI products are presented as a way to bypass expensive and time intensive designers, AI is not yet good enough to replace the expertise and aesthetical knowledge of professional designers. These options exist to offer a cost-effective solution for small companies, but these small, less creative tasks will not be missed by designers. Yet, while only a few graphic designers focus on niche products, the productivity effect, promises an increased demand for human labour in non-automated areas (Acemoglu & Restrepo, 2018, p. 202). As previously discussed, the human role in AI collaboration highlights some of the areas that can currently not be automated. Rather than jobs fully disappearing, designers should adapt and assume a new role, highlighting human expertise. Like previous research, I found that there is an increasing demand for Art and Creative Directors who have deep understanding of complex creative projects, comprehend aesthetics, generate innovative ideas, manage the design process, and evaluate the final output (PfeifferReport, 2018, p. 14). The role of designers has shifted from primarily shaping product appearance to initiating systems and assessing outcomes, as noted by Ferrari (2017). Designers, especially freelancers, should prioritize quality over quantity, as AI can handle quick, small tasks, allowing designers to focus on more holistic, value-adding responsibilities.

While participants in this study did not see a change in demand or salary adoption, existing research suggest that creative jobs that require evaluation and expertise could see an increased job demand and higher salaries (Felten, Raj, & Seamans, 2019, p. 27). My findings speculate that the increased efficiency lifts the overall quality of expert work, acknowledging the value of true skill and craftsmanship. Expanding on the economic and business aspect, AI integration can result in cost savings, potentially leading to lower client prices when time and resources are saved (Kennedy, 2023). Conversely, if it enhances product quality or uniqueness, premium pricing may be justified (ibid). So, while automation of certain tasks may reduce the demand for low-skilled positions, skilled creative professionals who can leverage AI to enhance their work are still in high demand (Felten, Raj, & Seamans, 2019). David Autor argues that in cases where AI purely substitutes for expertise, it may lead to job displacement, but in areas where AI complements existing expertise, it can enable individuals to perform more expert work with less education, ultimately benefiting workers (Strauss, 2023). IBM’s study also highlights that AI has the potential to expand employees' opportunities by augmenting their capabilities rather than replacing them (Goldstein et al., 2023). This thesis supports this statement as the previously mentioned human disabilities, lack of expertise or skill can be complemented with AI support, allowing freelancers to provide a wider range of services. In the past, a higher degree of expertise was necessary to visualize something effectively, but now, knowledge of prompting can yield results comparable to those of a skilled concept designer.

In the era of omnipresent AI, there arises a demand for guides to help individuals harness its potential effectively. This shift creates new job opportunities, such as operational engineers and creative quality assurance directors, emphasizing technical expertise in navigating AI platforms. Additionally, the new job model, 'prompt engineer' emerges, focusing on structuring information for desired AI outputs. Other jobs like prompt coaching or consultancy positions may arise, similar to quality assurance directors, ensuring that the AI output aligns with brand standards. This entails creating specific rules for AI content generation to maintain a consistent brand image. It presents an intriguing opportunity for creative professionals who will act as managers of the creative process, catering to companies valuing unique and consistent brand identity. My findings underscore the speculations from Acemoglu & Restrepo (2018), saying that there is a shift in demand for specific skills, and creatives proficient in working with AI tools and understanding their capabilities are in high demand (Acemoglu & Restrepo, 2018). Job postings for graphic designers now look for competencies in research, communication, collaboration, business strategy, innovation management, branding, and service design (Matthews et al., 2023, p. 372). The evolution of AI in design calls for the development of new skills, such as effective prompting, managing skills, and good technological competence. Designers also need to cultivate mental and creative flexibility, speeding up decision-making and staying open to evolving ideas. This study, like others, views re-skilling as an opportunity to maintain a competitive edge and preserve job viability in the market (Goldstein et al., 2023).

6.3.1 Practitioner Recommendations

For professionals in the industry, the recommendation is to actively embrace the benefits of AI, adapt, show active interest, and engage with new tools. Proactive early adopters are better positioned to stay ahead, as it's not a matter of losing jobs to AI but rather leveraging it for one's own advantage. The creative field is evolving rapidly, which might raise creatives concerns about their market value. Yet, a combination of tech proficiency, creative adaptability, and a willingness to collaborate can create a competitive advantage, even in the face of AI. IBM's also urges leaders to adapt current work processes and operating models, rather than automating inefficient ones (Goldstein et al., 2023). Through a strategic reevaluation of workflows and the identification of inefficiencies, the implementation of AI allows employees to focus on more high-value tasks (ibid).

Newcomers in the industry should start with a vision, draw inspiration, and explore different styles to develop a unique voice. Employees should develop skills for creative and responsible AI usage, not necessarily coding but a basic understanding for critical thinking and effective use (Goldstein et al., 2023). Individuals in job entry positions find themselves in an era of evolving tools and technology, making continuous practice essential. Yet, technology aids in skills and career development too. Unlike the years it once took to master a specific skill, even beginners can now convey the impression of competence in less familiar areas. The recommendation for new designers is therefore to embrace new tools, focus on learning, and take incremental steps to enhance

creative skills and develop their own unique style as they progress. While transitioning into a more technical role is possible, understanding the craft and assessing client requirements remain important, though the emphasis may shift away from the purely creative aspects.

6.4 Future Outlook

The future of AI in the creative industry is still unfolding, presenting diverse opportunities and challenges. Multiple participants mentioned their wish for AI to be more integrated and interconnected with other programs, making it less obvious that AI is in use. However, to maximize efficiency and coherence, participants noted that AI needs to be trained on internal data, learning the style of different clients, learning from past projects, and understanding their unique style better. Mem.ai, which was mentioned by an Interviewee, started to make this happen by continuously learning from the users' inputs and outcome goals. This holds the promise of more personalized AI tools integrated into devices like phones and voice-activated assistants, making creative tools more accessible. Some companies, particularly in lawyers' offices, already employ internal AI systems that possess comprehensive knowledge about the company and its operational procedures. As AI capabilities advance, this could also see its utility in the creative sector by learning designers' specific style and being able to handle more complex tasks. AI is transitioning from a general-purpose tool to specialized applications addressing specific tasks. Like the transition from lithography to print or paintings to photography, which introduced more complex and innovative ways to create and experience art, a similar transformation is happening in the creative world. Creatives now have the opportunity to expand their horizons and venture into new territories, breaking boundaries of what was previously known. As designers are just at the beginning of this evolution, the future holds great promise for a world filled with even more creative endeavors. While AI's influence is expanding, the future of its impact on creative roles and industries remains uncertain, requiring continuous monitoring.

7. Conclusion

The goal of this thesis was to investigate the prevailing changes that are happening in the creative industries due to new AI advances. Generative AI made it possible to imagine and create content that was once exclusive to human craftsmanship. In certain aspects, AI even surpasses human expertise in precision, speed, and even creativity. Previous literature has already established that AI significantly enhances graphic designers' work by automating routine tasks, fostering creativity, and providing inspiration, possibly leading to enhanced productivity and efficiency effects (Inie, Falk, & Tanimoto, 2023, p. 4; Mustafa, 2023, p. 246). Yet, going beyond speculation, my thesis offers concrete insights into AI's role in the creative production processes, detailing the impact on productivity and efficiency. I found that AI excels especially in the early stages of the creative process, such as inspiration and research, but also in the production, and post-production stages.

However, tasks like decision-making, strategy development, and project definition remain challenging for AI. While immense time saving was registered in some industries due to AI implementation, I could not find the same being true for designers' creative production process. As demonstrated in the adapted and expanded Double Diamond Model, rather than an enhancement in overall productivity, a notable improvement in efficiency was registered. AI accelerates specific components, enabling creatives to concentrate on high-value tasks, resulting in increased efficiency and improved outcome quality, while the net effect of overall productivity remains the same. Furthermore, previous exploration of human-AI co-creation has shown some compelling examples of how this collaboration can elevate productivity and create better outcomes. By investigating the human-AI collaboration for graphic designers, I found that co-creation with AI has the potential to create more value than either can alone since humans offer capability through empathy and creativity and AI delivers scalability through precision and speed. Yet, while designers should leverage AI strengths, they must actively guide and curate AI outputs to align with their creative vision. It's crucial to recognize AI limitations and avoid excessive reliance to maintain human touch and unique creativity.

Adding to the new way of working, the market dynamics are changing, impacting current roles and jobs of designers. The emergence of jobs like 'prompt engineers' highlights the need for a specialized workforce adept at working with and effectively managing AI. Projections indicate increased job opportunities related to AI, with 40% of employees requiring reskilling within the next three years due to AI (Goldstein et al., 2023). This thesis indicates that some basic, simple design jobs are decreasing but rather than disappearing, designers' roles are evolving. Positions like Art or Creative Direction are taking center stage, involving the management of complex tasks, generation of innovative ideas, and assessment of final outputs. While some designers already assume the role of a prompt engineer, completely new jobs could be operational engineers and prompt coaching. These roles are likely to be more technical, specializing in proficiently navigating specific AI platforms. Additionally, positions in consultancy, or creative quality assurance directors, may arise to ensure that AI output aligns seamlessly with brand standards. In response to this evolution, there's a high demand for designers who are continually acquiring new skills, including managerial proficiency, technological competence, guiding and curating AI, brand awareness, service design, and effective prompting. Equally important is the cultivation of mental and creative flexibility, expediting decision-making, and embracing evolving ideas.

7.2 Contributions to the Field

This research contributes valuable insights to both academia and industry practitioners who are interested in understanding the implications of AI in the creative industry. Previous research in the field of computational creativity has focused on the meaning of creative work developed by computers and revolved around the question if computers can be creative. While the opinions in this regard are still divided and go beyond a mere

scientific exploration, my thesis provides to my knowledge first insights into the practical implications of computational creativity and what it means for graphic designers. Creativity and imagination were long considered exclusive to humans, distinguishing them as unique and superior to other species. The exploration of computational creativity, suggesting that computers can now replicate what designers spend years learning, has sparked significant discussion and apprehension in the industry. The findings of my research can give practitioners some insights and guides on what to expect from the current changes and how to adapt. Currently, the human role is still significant, and AI serves as a tool to enhance creative efficiency. Still, it's crucial for industry professionals to familiarize themselves with AI, develop new skills, to be prepared for ongoing advancements. In academia, it opens up new avenues for exploration in promising directions, offering opportunities to augment, expand, or challenge my research findings.

7.3 Future Research

Future studies in the field of AI in the creative industries can explore various promising directions. The most obvious next step could be to explore AIs impact in other jobs in the creative industries besides graphic design like film and video, crafts, fashion, TV and radio, advertising, literature, or performing arts. Besides that, researchers can investigate how AI is enabling the development of new business models in the creative sector. For example, subscription-based services, personalized content recommendations, and AI-generated products are reshaping how creative content is monetized and delivered to consumers. Additionally, there's potential for research into how AI is disrupting traditional markets while facilitating the emergence of new markets within the creative sectors. This involves analyzing the impact of AI-powered platforms and marketplaces that connect creators with consumers. Moreover, future studies could focus on how businesses in the creative sectors are adapting their strategies to incorporate AI effectively. By examining successful case studies and strategies for integrating AI, researchers can uncover how companies strike a balance between utilizing AI's capabilities and preserving the artistic and creative integrity of their products.

Since the paper length of this thesis was limited, I could not address or analyze the challenges related to intellectual property and copyright in the context of AI-generated content. I am aware, and it was also mentioned by participants of this study that copyright and ethical problems persist with the use of AI generated content. Future papers could discuss issues like ownership, attribution, and licensing when AI is involved in creative production as well as the economic diversity and accessibility of creators and the types of content being produced. Lastly, future studies could investigate consumer attitudes and perceptions toward AI-generated creative content. I found it quite interesting to discover factors that influence acceptance, preferences, and concerns among consumers. Therefore, researching the response and engagement with AI creation will not only support the conceptualization of creativity but will also have significant implications for the future of creative industries.

8. References

Abhishek, K. (2022). Introduction to artificial intelligence. In Redgate. https://www.red-gate.com/simple-talk/development/data-science-development/introduction-to-artificial-intelligence/ [Accessed: 25.08.2023]

Accenture. (2017). Accenture Report: Artificial Intelligence Has Potential to Increase Corporate Profitability in 16 Industries by an Average of 38 Percent by 2035. https://newsroom.accenture.com/news/accenture-report-artificial-intelligence-has-potential-to-increase-corporate-profitability-in-16-industries-by-an-average-of-38-percent-by-2035.htm. [Accessed: 04.09.2023]

Acemoglu, D., & Restrepo, P. (2018). Artificial intelligence, automation, and work. The economics of artificial intelligence: An agenda. *University of Chicago Press*, 197-236.

Adobe. (2023). Dream Bigger with Generative Fill. https://www.adobe.com/products/photoshop/generative-fill.html [Accessed: 08.09.2023]

Alleyne, A. (2018). A sign of things to come? AI-produced artwork sells for $433K, smashing expectations. *In CNN Style*. https://edition.cnn.com/style/article/obvious-ai-art-christies-auction-smart-creativity/index.html [Accessed: 23.08.2023]

Altexsoft. (2023). AI Image Generation Explained: Techniques, Applications, and Limitations. https://www.altexsoft.com/blog/ai-image-generation/#:~:text=AI image generators utilize trained, input provided in natural language. [Accessed: 23.09.2023]

Amato, G., Behrmann, M., Bimbot, F., Caramiaux, B., Falchi, F., Garcia, A., ... & Vincent, E. (2019). AI in the media and creative industries. *New European Media*, 1, 5-33.

Anantrasirichai, N., & Bull, D. (2022). Artificial intelligence in the creative industries: a review. *Artificial intelligence review*, 55, 589–656.

Autor. D.H., Levy. F., Murnane. R.J. (2003). The Skill Content of Recent Technological Change: An Empirical Exploration. *The Quarterly Journal of Economics,* 118(4), 1279–1333.

Baeldung. 2023. Multi-Layer Perceptron vs. Deep Neural Network. https://www.baeldung.com/cs/mlp-vs-dnn [Accessed: 26.08.2023]

Banton, C. (2023). Economic Value: Definition, Examples, Ways to Estimate. *In Investiopedia*. https://www.investopedia.com/terms/e/economic-value.asp [Accessed: 23.09.2023]

Berg, B. L. (2001). Qualitative Research Methods for the Social Sciences. Boston, MA: Allyn and Bacon.

Bliabaitė, E. & Ross, A. (2023). 50 AI Art Fails That Are Both Horrifying and Hilarious. *In BoredPanda.* https://www.boredpanda.com/ai-fails/?utm_source=google&utm_medium=organic&utm_campaign=organic. [Accessed: 06.09.2023]

Boden, M. A. (2004). The Creative Mind: Myths and Mechanisms. London: Routledge.

Boix-Domènech, R., & Rausell-Köster, P. (2018). The economic impact of the creative industry in the European Union. Drones and the creative industry: Innovative strategies for European SMEs, 19-36.

Boicheva, S. (2022). Double Diamond Design Process in a Nutshell. *In HtmlBurger*. https://htmlburger.com/blog/double-diamond-design-process/ [Accessed: 04.10.2023]

Chayka, K. (2023). The Uncanny Failures of A.I.-Generated Hands. *In NewYorker*. https://www.newyorker.com/culture/rabbit-holes/the-uncanny-failures-of-ai-generated-hands [Accessed: 13.09.2023]

Chamberlain, R., Mullin, C., Scheerlinck, B., & Wagemans, J. (2018). Putting the art in artificial: Aesthetic responses to computer-generated art. Psychology of Aesthetics, Creativity, and the Arts, 12(2), 177.

Coleman, K. (2023). Adobe Firefly: everything you need to know about this ethical AI generator. *In CB CreativeBloq*. https://www.creativebloq.com/features/everything-you-need-to-know-about-adobe-firefly. [Accessed: 07.09.2023]

Design Council. (2004). The Double Diamond. https://www.designcouncil.org.uk/our-resources/the-double-diamond/ [Accessed: 04.10.2023]

Dhaduk, H. (2023). How Does Generative AI Work: A Deep Dive into Generative AI Models. *In Simform*. https://www.simform.com/blog/how-does-generative-ai-work/#:~:text=Generative AI uses various techniques, text, audio, and videos. [Accessed: 23.09.2023]

Douglas. (2021). Do You Double Diamond? *In germinate*. https://germinateapps.com/greenhouse/sprout/do-you-double-diamond [Accessed: 04.10.2023]

Dusch, B. (2022). Double Diamond Diagram. In *Codeacadeny.* https://www.codecademy.com/resources/docs/uiux/double-diamond-diagram [Accessed: 04.10.2023]

Entwistle, J. (2002). The aesthetic economy: The production of value in the field of fashion modelling. Journal of Consumer Culture, 2(3), 317-339.

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics*, 5(1), 1-4.

Fairley. R. (2022). What is Adobe Sensei and what does it do? *In Videomaker*. https://www.videomaker.com/how-to/editing/workflow/what-is-adobe-sensei-and-what-does-it-do/ [Accessed: 07.09.2023]

Filkey, A. & Fong, J. (2023). Checkpoint. A historic overview of how generative AI fits into the evolution of creative technologies. Shortfilm. https://aronfilkey.com/work/checkpoint/ [Accessed: 27.08.2023]

Ferrari, G.T. (2017). Design and the Fourth Industrial Revolution. Dangers and opportunities for a mutating discipline. *The Design Journal*, 20(1), 2625-2633.

Felten, E. W., Raj, M., & Seamans, R. (2019). The occupational impact of artificial intelligence: Labor, skills, and polarization. *NYU Stern School of Business.*

Gingerich, J. (2022). Is Spotify Bad for Democracy? Artificial Intelligence, Cultural Democracy, and Law. Yale *JL & Tech.*, 24, 227.

Gilani, K. (2023). What is CFG Scale in Stable Diffusion and What Does It Do? *In Ambcrypto.* https://ambcrypto.com/blog/what-is-cfg-scale-in-stable-diffusion-and-what-does-it-do/ [Accessed: 12.11.2023]

Goodfellow, I., Pouget-Abadie, J., Mirza, M., Xu, B., Warde-Farley, D., Ozair, S., ... & Bengio, Y. (2014). Generative adversarial nets. *Advances in neural information processing systems*, 27.

Gopinadhan. J. (2023). How do you deal with copyright issues when using neural style transfer? *In LinkedIn*. https://www.linkedin.com/advice/0/how-do-you-deal-copyright-issues-when-using-neural?trk=cah1 [Accessed: 23.09.2023]

Goldstein, J., Lobig, B., Fillare, C. Nowak, C. (2023). Augmented work for an automated, AI-driven world. *IBM Institute for Business Value, Research Insights,* 1-28.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. Handbook of qualitative research, 2(163-194), 105.

Hughes. A. (2023). Midjourney: The gothic AI image generator challenging the art industry. *In BBC Science Focus.* https://www.sciencefocus.com/future-technology/midjourney [Accessed: 06.09.2023]

Hwang, A. H. C. (2022). Too late to be creative? AI-empowered tools in creative processes. *In CHI Conference on Human Factors in Computing Systems Extended Abstracts,* pp. 1-9.

IBM. (n.d.). What is artificial intelligence? https://www.ibm.com/topics/artificial-intelligence. [Accessed: 25.08.2023]

Inie, N., Falk, J., & Tanimoto, S. (2023, April). Designing Participatory AI: Creative Professionals' Worries and Expectations about Generative AI. *In Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems*, pp. 1-8.

Karaata, E. (2018). Usage of Artificial Intelligence in Today's Graphic Design. *Online Journal of Art & Design*, 6(4).

Karimi, P., Rezwana, J., Siddiqui, S., Maher, M. L., & Dehbozorgi, N. (2020). Creative sketching partner: an analysis of human-AI co-creativity. *In Proceedings of the 25th International Conference on Intelligent User Interfaces,* 221-230.

Kennedy. E. (2023). Letter: Humanity surpasses AI in creativity and spirituality. In *Financial Times*. https://www.ft.com/content/6028acf5-772d-4853-97a5-3459acbbd5bb. [Accessed: 20.09.2023]

Kivunja, C., & Kuyini, A. B. (2017). Understanding and applying research paradigms in educational contexts. *International Journal of higher education*, 6(5), 26-41.

Li, H. (2018). A literature review of neural style transfer. *Princeton Univeristy*, 4321 – 4329.

Lee, H. K. (2022). Rethinking creativity: creative industries, AI and everyday creativity. Media, Culture & Society, 44(3), 601-612.

Luo, L., & Wildemuth, B. M. (2009). Semistructured interviews. *Applications of social research methods to questions in information and library science*, 232.

Marovic, J. (2022). Productivity vs efficiency: what is the difference and why it matters. In *clockify*. https://clockify.me/blog/managing-tasks/productivity-vs-efficiency/ [Accessed; 25.10.2023]

Malleck, J. [2023). Adobe is adding AI to Photoshop just as Wall Street goes on high alert over fake images. In *Quarz*. https://qz.com/adobe-generative-ai-photoshop-fake-images-1850465719 [Accessed: 08.09.2023]

Matthews, B., Shannon, B., & Roxburgh, M. (2023). Destroy All Humans: The Dematerialisation of the Designer in an Age of Automation and its Impact on Graphic Design—A Literature Review. *International Journal of Art & Design Education*, 42(3), 367-383.

McCarthy, J. (2007). From here to human-level AI. *Artificial Intelligence*, 171(18), 1174-1182.

Mustafa, B. (2023). The Impact of Artificial Intelligence on the Graphic Design Industry. *Resmilitaris*, 13(3), 243-255.

Noordzij, M., Dekker, F. W., Zoccali, C., & Jager, K. J. (2011). Sample size calculations. *Nephron Clinical Practice*, 118(4), c319-c323.

Pennington, A., & Stanford, J. (2019). The future of work for Australian graduates. *In Centre for Future Work*. 2-107.

Pryor, J.J. (2023). What is Midjourney? Everything You Wanted to Know About the AI Art Generator. In *Medium*. https://jjpryor.medium.com/what-is-midjourney-ai-art-generator-c59fcdbd5bea [Accessed: 06.09.2023]

Popli, N. (2023). The AI Job That Pays Up to $335K—and You Don't Need a Computer Engineering Background. *In Time*. https://time.com/6272103/ai-prompt-engineer-job/. [Accessed: 20.09.2023]

Rehman, A. A., & Alharthi, K. (2016). An introduction to research paradigms. International Journal of Educational Investigations, 3(8), 51-59.

Sanders, E. B.-N. & Stappers, P. J. (2008) Co-creation and the new landscapes of design, CoDesign, 4(1), pp. 5–18.

Saunders, M., Lewis, P. H. I. L. I. P., & Thornhill, A. D. R. I. A. N. (2007). Research methods. *Business Students 4th edition Pearson Education Limited*, England, 6(3), 1-268.

Savedoff, B. E. (1993). Looking at art through photographs. *The Journal of Aesthetics and Art Criticism*, 51(3), 455-462.

Simplilearn. (2019). Deep Learning | What is Deep Learning? | Deep Learning Tutorial For Beginners | 2023. [Video] https://www.youtube.com/watch?v=6M5VXKLf4D4. [Accessed: 28.08.2023]

Smith, J. R., Joshi, D., Huet, B., Hsu, W., & Cota, J. (2017, October). Harnessing ai for augmenting creativity: Application to movie trailer creation. In *Proceedings of the 25th ACM international conference on Multimedia*. 1799-1808.

Slaughter, A. M. (2023). The rise of AI forces us to reinterpret our human intelligence. *In Financial Times.* https://www.ft.com/content/dbe9be14-b94e-484e-accb-c135f7527fa4 [Accessed: 20.09.2023]

Sowa, K., Przegalinska, A., & Ciechanowski, L. (2021). Cobots in knowledge work: Human–AI collaboration in managerial professions. *Journal of Business Research*, 125, 135-142.

Soni, N., Sharma, E. K., Singh, N., & Kapoor, A. (2020). Artificial Intelligence in Business: From Research and Innovation to Market Deployment. *Procedia Computer Science*. 167, 2200-2210.

Strauss, D. (2023). David Autor: 'We have a real design choice about how we deploy AI'. *In Financial Times*. https://www.ft.com/content/9c087da3-63d2-4d73-97dc-023025b529aa. [Accessed: 20.09.2023]

Suh, M., Youngblom, E., Terry, M., & Cai, C. J. (2021, May). AI as social glue: uncovering the roles of deep generative AI during social music composition. *In Proceedings of the 2021 CHI conference on human factors in computing systems*, 1-11.

Tam, K. (2019) Can Arti!cial Intelligence Replace (Graphic) Designers? *In Medium*. https://medium.com/invisibledesigns/can-arti!cial- intelligence-replace-graphic-designers- 90b7ad82b212. [Accessed 04.09.2023]

Tangermann, V. (2022). We're cry-laughing at these "spectacular failures" of ai generated art. *In The Byte*. https://futurism.com/the-byte/ai-generated-art-failures [Accessed: 13.09.2023]

Tietgen, M. (2016). 3-D-Drucker erschafft ein neues Rembrandt-Gemälde. *In Welt*. https://www.welt.de/kultur/kunst-und-architektur/article154421365/3-D-Drucker-erschafft-ein-neues-Rembrandt-Gemaelde.html [Accessed: 24.08.2023]

Tiwari, R. (2023). The Impact of AI and Machine Learning on Job Displacement and Employment Opportunities. *International Journal of Engineering Technologies and Management Research*, 7(1), 1-8, doi:10.55041/IJSREM17506

Uizard.io. (n.d.). Rapid, collaborative UX design. https://uizard.io/ [Accessed: 13.09.2023]

Velthuis, O. (2003). Symbolic meanings of prices: Constructing the value of contemporary art in Amsterdam and New York galleries. *Theory and society*, *32*(2), 181-215.

Wankhede, C. (2023). Midjourney vs Stable Diffusion: Which AI image generator should you use? *In AndroidAuthority* https://www.androidauthority.com/midjourney-vs-stable-diffusion-3327349/# [Accessed: 12.11.2023]

Woo, S. E., O'Boyle, E. H., & Spector, P. E. (2017). Best practices in developing, conducting, and evaluating inductive research. Human Resource Management Review, 27(2), 255-264.

Ye, H., Liang, L., Li, G. Y., Kim, J., Lu, L., & Wu, M. (2018). Machine learning for vehicular networks: Recent advances and application examples. *ieee vehicular technology magazine*, 13(2), pp. 94-101.

9. Appendices

9.1 Initial Questionnaire

Name:
Occupation:
Years of experience in the creative industries:
Educational background (art/design-related degree):

1. How familiar are you with the concept of artificial intelligence (AI) in the creative industries (like Midjourney, Adobe Firefly, Photoshop Ai, etc.)?

2. In your opinion, what role does AI currently play in the work of graphic designers and the overall creative process?

3. What concerns, if any, do you have about the integration of AI in the creative industries?

4. How do you perceive the relationship between AI-generated designs and those created by human designers in terms of quality and authenticity, at this moment of time?

5. How do you feel about the idea of collaborating with AI as a creative tool in your design work?

6. Do you think ethical considerations should be taken into account when using AI in the creative process?

7. Are there any specific aspects of AI-generated designs that you find appealing or worrisome?

8. Can you share any personal experiences or encounters with AI-generated designs, and how they made you feel as a designer or consumer?

9.2 Questionnaire

General

1. How familiar are you with the concept of artificial intelligence (AI) in the creative industries (like Midjourney, Adobe Firefly, Photoshop Ai, etc.)? What role does it play in your worklife?

Creative Production Process (productivity & efficiency)

2. Can you walk me through a project you created with the help of AI, the process, possible frustrations, limitation, benefits, outcome. Were you able to produce new/different content than before?

3. Did you notice any changes in productivity, efficiency, creativity, or idea generation? Were there specific creative tasks or processes that became more efficient due to AI, and were there any tasks that could not be automated?

Economic value

4. How do you think the introduction of AI-generated content or tools has affected the perceived value of creative work? (Extra: Thinking of tools that are targeted for non-creatives to create their own design without professional designers)

5. In your opinion, for which skills are clients willing to pay more and for which tasks are they now paying less?

6. Are you able to produce more content in shorter amount of time, ultimately increasing your economic gain?

Job roles & Job displacement

7. With all the new AI tools out there, promising individuals AI generated logos and visual identities fast and cheap, do you think that everyone can be a designer now?
Extra question: What does it mean to be a designer?

8. Which jobs are becoming obsolete or irrelevant with more and more AI integration in creative jobs?

9. Do you think that graphic designers have to take a new role in the future (Extra question: Is it going away from creation and towards evaluation, like art direction)?

10. Have you noticed a change in the client relationship?
Extra question: Do clients want to see more Ai collaboration or actively avoid it?

11. Do you think in the era of generative art & design, new jobs or subfields of creative work are created? Like the art of prompting or designer only using AI to create the clients vision?

Skill changes and reskilling

12. Have you experienced any specific changes in your skillset as a result of AI integration in graphic design? If so, can you elaborate on these changes?
Extra question:Did you acquire new skills to adapt to the use of AI, what was the learning, did it affect your career?

13. Do you think there will be different jobs now in the future? And do you believe that they need further skills or education to work efficiently with ai?

Collaboration with AI (process, output, and value)

14. How do you perceive the division of labour between graphic designers and AI in collaborative work? Extra question: What tasks or aspects of creative work are now typically handled by AI, and which ones require human intervention?

15. Have you noticed any changes in the creative value or quality of projects that involve AI collaboration compared to traditional graphic design projects?