



Pien Thérèse Haks

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~ Artificial intelligence... your ultimate co-worker?

Introduction

The graphic sector, once the domain of creative minds proud of their craft, is undergoing a digital transformation thanks to Artificial Intelligence (AI). This emerging technology affects various aspects of the profession, from production processes to creative design. This article explores why and how AI is used in the graphic sector, its impact on traditional professions like offset printing, the shift to online orders, and potential consequences for creative design agencies.

What is AI?

When asked to ChatGPT 4.0, the response is:

AI, or Artificial Intelligence, refers to the capability of machines, especially computer systems, to perform tasks that typically require human intelligence. This includes the ability to learn, reason, solve problems, understand perception, process language, and even be creative. AI systems can be trained to recognize patterns in data, make decisions with a degree of autonomy, and adapt to new situations with the information they collect.

Artificial Intelligence in general

Where does the hype come from? AI already exists for many years. However, especially in the last decade, with faster processors with significant computing power and data linkage through data centers, progress has accelerated. This availability of computing power has led to various new software applications and providers such as ChatGPT and Dall-E. For instance, ChatGPT was launched in November 2022 and gained over a million users within five days. Currently, Dall-E generates over 4 million images per day. AI's arrival has significantly improved productivity and content creation possibilities. Repetitive tasks can easily be automated by AI. Collected data can be processed in all manners, made insightful, allowing for quick market research or scenario setting with reliable results. You no longer need to be a master in Excel to perform complex calculations. This can simply be done in 'human language.'

“If you know what you want to know, you can know everything by asking the right questions.”

Various AI services and technologies have been developed for the domains of text and language, image processing, and machine control. Here are some prominent examples specifically used in these domains:

Text and grammar	Image processing	Machine control
ChatGPT (OpenAI), BERT (Google), Grammarly:	DALL-E (OpenAI), Adobe Photoshop's Sensei, Google Photos:	Tesla Autopilot, Boston Dynamics, ABB Robotics:
Possibilities to edit, summarize, expand, and improve texts.	Generating images from text. Sora: not yet available, but this can generate video from text.	Provides AI-driven solutions for industrial automation, including robots that learn and adapt to new tasks through machine learning.

These AI services and technologies represent just a fraction of what's available, illustrating the breadth and depth of applications in each domain. They are designed to tackle specific challenges like understanding and generating natural language, and recognizing and editing images. Continuous innovation and improvement are making these services more sophisticated, opening up new possibilities across various sectors and industries.

Impact of AI on the Graphic market

Impact on the supply of services, products, and workflow.

The push for cost efficiency and staying competitive is propelling print shops towards AI solutions. This technology simplifies and shortens workflows and repetitive tasks, leading to greater precision and reduced manual labor. Such optimization not only cuts costs but also enables print shops to be available to customers 24/7. Moreover, the rise in online orders for personalized printing and small batches, facilitated by AI without human intervention, shifts customer interaction, allowing them to design and order print work at any time, provided the process is straightforward and accessible.

Many print shops already operate with an optimized and automated workflow, where orders are automatically received and processed. This often means that only **predefined** products can be ordered. The advent of AI enables making this process more flexible and offering customers a different experience in ordering print work, including its design. Customers can specify their needs, and AI further inquires what is required, using terminology that the customer understands.

While traditional automation systems have already offered significant efficiency improvements, the integration of Artificial Intelligence (AI) marks a further evolution. AI technologies can dynamically respond to changing conditions, such as adjusting delivery times based on current traffic information. This enables organizations to elevate their operational efficiency to a new level, resulting in more responsive and adaptive logistics management.

Opportunities	Risks
<ul style="list-style-type: none">• Reach more end customers through a portal• Offer products at a lower cost• Leverage larger providers, outsource work• Assess potential success• Conduct market research• Enable specific customer desires	<ul style="list-style-type: none">• Costly to implement• Loss of customer loyalty• Loss of human interaction• Cybersecurity concerns

Impact on professions in the sector

Professions in the graphic sector are divided into four groups: office functions, prepress/desktop publishing (DTP), design/creative professions, and production.

Office functions

AI significantly impacts roles focused on information processing such as management, staff, sales, marketing, and other support functions. Examples of AI support include routine task automation, data analysis, document management, forecasting and planning, compliance and risk management, and efficiency improvements. AI reduces administrative burdens, saves time and costs, and enhances service delivery.

Opportunities	Risks
<ul style="list-style-type: none">• Routine tasks can be automated• Enables more informed decision-making• Increases error-free work• Enhances efficiency and productivity	<ul style="list-style-type: none">• Privacy risks• Loss of ethical considerations• Lack of human oversight• Dependence on technology• Loss of human knowledge and skills

Prepress/desktop publishing (DTP)

Software for tasks like automatic quoting and press layouts enhances efficiency but is limited by predefined variables. AI introduces dynamism by integrating real-time feedback from the shop floor, such as staff availability, inventory levels, supply pricing and unforeseen circumstances. Thus, AI can proactively suggest adjustments for optimal production planning and cost control.

Opportunities	Risks
<ul style="list-style-type: none">• Optimizing production planning (workflow) and cost control• Automation software for various preparatory processes• Smart ways to detect and correct errors• Generating real-time feedback• Different customer communication methods	<ul style="list-style-type: none">• Planning becomes less 'human', requiring people to constantly perform at their maximum• Loss of quality• People are not yet fully adapted to conceptual thinking• Privacy and data protection concerns• Price prioritized over quality

Design / Creative professions

AI is making its way into creative professions, reducing reliance on design agencies with user-friendly design software. To stay competitive, design agencies must deliver unique, innovative designs that surpass AI capabilities. Expensive stock markets, photographers, and filmmakers watch as AI generates content from simple text prompts without needing a photo or film shoot. Will they embrace AI as a colleague or fight it as a competitor? The era of every creative expression being manually crafted may be over, potentially leading to a renewed appreciation for human creativity and craftsmanship.

Opportunities	Risks
<ul style="list-style-type: none">• Quickly try many different options to achieve the right expression• No need for expensive imagery• Encourages more conceptual thinking by designers	<ul style="list-style-type: none">• Unclear where intellectual property (IP) rights lie• Copyright (EU-legalisation)• Smaller agencies face challenges due to consumers using the technology themselves• Loss of reality• Loss of the human creative aspect

Production

Until now, the term “self-learning machines” has been used, but in reality, a machine could only learn with operator intervention. With AI’s introduction, this begins to change. The software is “intelligent,” capable of recognizing trends through measurements and observations with fast cameras, distinguishing between an incident and a trend. This results in continuous improvements, not dependent on an operator’s personal opinion. Printers and finishers are transitioning from craftsmen to operators, a change that reflects the increased automation and efficiency in the industry, not a devaluation of their role. The application of AI remains primarily in the hands of machine manufacturers, with operators experiencing the convenience and advantages it offers.

AI expands the possibilities of personalized printing and in-line production. It will also provide ergonomic improvements in physically demanding functions.

Opportunities	Risks
<ul style="list-style-type: none">• Machines become self-learning and thus more effectively deployable• Higher quality becomes easier to achieve• Fewer machine malfunctions due to preventive maintenance• AI acts as an assistant for the operator• Smart integrations in the workflow can be achieved with AI• Deployment of collaborative robots (cobots)	<ul style="list-style-type: none">• Dependency on AI knowledge leads to diminishing knowledge of the production process among people• Machines become more susceptible to malfunctions• Dependence on both software and hardware suppliers

Impact on suppliers

The future position of suppliers is discussed in terms of their impact, focusing on both hardware and software providers. Looking ahead, the potential for a combination to occupy a powerful position in the market is examined.

Hardware

We’re observing an increasing automation trend among hardware suppliers, with AI’s introduction leading to the deployment of self-learning machines. This shift allows for a transformation where output becomes input, enhancing tasks like quality control through AI functionalities. Consequently, processes can be executed with greater precision as the digital eye surpasses human capabilities.

Software

AI is making software more accessible, reducing the need for expert knowledge in both design and workflow systems, thereby enabling creative processes through simple human commands.

For consideration

There are some general issues about AI that are not fully clear at the publication date of this paper, however it needs to be considered how Ai will affect these subjects in the future...

AI related to cybersecurity & European Values

It raises concerns about the reuse of data, including personal names, biases, ethical issues, and political preferences. The question arises: if racist information is inputted, does AI also become racist? Securing the massive flow of information to prevent personal or economic harm is crucial. Additionally, if an algorithm causes damage, determining liability becomes complex. Legislation has yet to fully catch up with rapidly evolving technology, prompting significant attention from entities like the EU Commission to regulate these issues.

Copyright and Intellectual Property

An increasing concern with the rise of AI in creative fields is copyright and intellectual property. When AI generates designs, it prompts the question of who owns the final product. Traditionally, copyright is held by the creator, but the situation becomes complex when the creator is an algorithm. If an AI algorithm generates content, determining copyright ownership becomes a challenging issue.

Labor market

There's an anticipated decrease in jobs, particularly in repetitive administrative roles and in streamlining production processes that require less human labor. Concurrently, numerous new positions are emerging in the field of AI engineering. AI will also provide ergonomic improvements in this function, resulting in less absenteeism due to illness.

Environmental Impact

Research from the University of Massachusetts Amherst reveals that developing a single deep-learning algorithm emits about 313 tons of CO₂, equivalent to five times the emissions of an average car over its entire lifespan. The expansion of data centers continues, with Amazon, Google, and Microsoft accounting for 50% of the data center footprint. Globally, 16 new data centers have been added each quarter over the past three years.

Conclusion

AI will continue to transform the graphic sector, driven by efficiency and cost savings. Administrative and creative professions will first experience AI integration, automating tasks. The impact on production will initially be limited, dependent on companies' readiness to upgrade machines, though newer models may incorporate AI functionalities. The most significant changes are currently in content creation, where imagination is the only limit. However, AI serves as a tool, with ethics originating from humans. European regulations are crucial for managing potential excesses.

Asking ChatGPT 4.0 after the conclusion of this document it replies:

The document comprehensively discusses the transformative impact of Artificial Intelligence (AI) on the graphic sector, highlighting its role in enhancing efficiency, creativity, and operational workflows. AI's integration into various domains—from text and language processing to image generation and machine control—underscores its potential to redefine industry standards and practices. While AI offers opportunities for innovation and cost reduction, it also presents challenges related to job displacement, ethical concerns, and dependency on technology. The future of the graphic sector, therefore, hinges on balancing AI's benefits against its risks, fostering a collaborative environment where technology complements human creativity and expertise. As AI continues to evolve, regulatory oversight and ethical considerations will be crucial in ensuring that its deployment benefits all stakeholders, safeguarding against misuse and promoting a sustainable integration into the graphic industry.

“Those who are adept at using AI (i.e., can write good prompts) will stand out. The role of an AI Prompt Engineer could indeed be an interesting idea....”

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