media numeric

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MEDIANUMERIC

DATA-DRIVEN WORK IN THE CREATIVE & MEDIA INDUSTRIES

HOW ARE THE CHALLENGES AND
OPPORTUNITIES OF DATA-DRIVEN WORK
TRANSFORMING NON-JOURNALISTIC MEDIA
PRODUCTION AND CREATIVE
INDUSTRY PRACTICES?

CENTRUM CYFROWE   Storytek_   SWPS University   SOUND& VISION   AFP   ina   inh   EU SCREEN

Colophon

About this report

The Power Of Storytelling is published by MediaNumeric, an initiative of the Netherlands Institute for Sound & Vision, InHolland University, L'Institut National de l'Audiovisuel, Agence France-Presse, SWPS University, Storytek, EUScreen and Centrum Cyfowe.

The *Netherlands Institute for Sound & Vision* is the institute for media culture; an inspiring, creative and accessible place for private individuals and professionals, focusing on current developments concerning people, media and society from a media-historical perspective.

InHolland University is a large university of applied sciences located in eight main cities in the Netherlands, offering practice-oriented education and research opportunities. They educate independent, critical professionals to make a meaningful contribution to the inclusive world of tomorrow, with a focus on fostering a sustainable living environment and a resilient society.

L'Institut National de l'Audiovisuel is a repository of all French radio and television audiovisual archives. Since 1974, Ina has been responsible for preserving, promoting and transmitting France's audiovisual heritage. Ina is also an international training and research centre for digital media and content.

Agence France-Presse (AFP) is one of the world's three major news agencies. Its mission is to provide rapid, comprehensive, impartial and verified coverage of the news and issues that shape people's daily lives.

SWPS University is a private non-profit university in Poland established in 1996, exploring the human mind and applying this expertise to address practical challenges in society, focusing on new technologies and dynamic social change.

Storytek Innovation & Venture Studio is a creative meditech and storytelling accelerator in Northern Europe, offering innovative business models and format options, as well as concrete needs for professional organisations in the European media ecosystem.

EUscreen is a network of European broadcasters and audiovisual archives, media scholars, and technical experts, facilitating access to and engagement with archival audiovisual content through their independent online portal.

Centrum Cyfrowe is a Polish think-and-do-tank supporting openness and engagement in the digital world by changing the way people learn, participate in culture, use the internet and exercise their rights as internet users.

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1. Executive Summary

This report describes the results of the research carried out during the third year of the MediaNumeric project by the consortium partner InHolland University. and describes the results achieved.

The structure of the report adheres to the iterative principle of the study, allowing us to grasp the shape of the whole picture in a complex, ever-changing landscape that is rich with raw data and pre-printed research. By approaching the central research question: "How are the challenges and opportunities of data-driven work transforming non-journalistic media production and creative industry practices?" from various perspectives, we aimed to capture the multifaceted nature of the subject. While this approach may have limitations in terms of cutting into intricate details and depth, it offers a more practical and applicable presentation for our target audience. By providing a systematic overview, we help our readers to navigate the complexities of the subject matter and make informed decisions in their professional endeavours.

C*hapter 2* – Introduction – lays the groundwork for the report by establishing the context, defining key terms, identifying the target group, formulating the research question and objectives, and outlining the research methodology. These components set the stage for the subsequent chapters, enabling a comprehensive examination of the impact of data-driven processes on the creative industries.

Chapter 3 – Trends and Issues in 2023: Impact on stakeholders – offers a holistic perspective on the trends and issues associated with data-driven processes in 2023 through the viewpoints of various stakeholders within the creative industry. It takes into account the distinct challenges, opportunities, and adaptations required by content creators and artists, media and entertainment companies, advertisers and marketers, technology providers, consumers and the audience, as well as policymakers and regulators. By presenting a broad-ranging analysis that intertwines the perspectives of these different stakeholders, the chapter offers the material in an easily digestible format for our target audience.

Chapter 4 – Data-driven Practices in Creative Industries – explores the advancements of data-driven work in the creative industry through the curated selection of showcases. Building upon the previous chapter's examination of the impact on stakeholders, this chapter digs into the subject from a different angle: the lens of various industry sectors. Through a range of showcases, including unique fusions of traditional opera and AI, AI-aided comedy, AI-assisted music creation, voice resurrection technologies, collaborations between human musicians and AI, AI-generated podcasts and videos, de-ageing technologies in film, and the intersection of AI and advertising, the chapter highlights the innovative and captivating experiences that arise from data-driven practice.

By exploring these advancements from different industry perspectives, the chapter offers an all-around overview of the transformative power of data-driven work in the creative industries.

Chapter 5 examines the opportunities and threats arising from data-driven practices in the creative industry. It highlights the potential benefits for creative professionals, including enhanced creativity, AI augmentation, efficiency and productivity gains, and new forms of monetisation. However, it also addresses key threats such as copyright challenges, threats to music streaming platforms' business models, reproduction of social hierarchies and aesthetic biases, the production of deepfakes, and the potential for AI to replace human artists. By understanding and navigating these opportunities and threats, creative professionals and industry stakeholders can make informed decisions and shape the future of the creative industry in a responsible and sustainable manner.

Chapter 6 serves as the conclusion of the report, summarising the key findings and insights presented throughout the previous chapters.

2. Introduction

"The future of entertainment will be the future of everything."
– John Rogers, screenwriter (in Ashby, 2023).

2.1 Background and Context of the Report

The Detailed Project Description for the MediaNumeric project (2019) states, "This deliverable takes the shape of an open-access publication on the challenges of data-driven work for non-journalistic media production and creative industries practices. It includes a critical interrogation of current practices in the field and uses of stronger (hyper)linking in media storytelling for commercial and public purposes. It includes an exploration of the ways and means of indicating data-driven collections of underlying materials".

In 2023, as this report was being crafted, numerous disruptive events unfolded that necessitated adjustments to our initial research vision. Notably, the expansion of generative AI for both images and texts introduced new prospects while simultaneously raising concerns. The advent of ChatGPT is perceived as a pivotal development in the 'third technological revolution,' positing that "we are on the threshold of an age of substitution of human creativity by artificial creativity" (Dornis, 2022, p. 2).

2.2 Definition of Key Terms

This section of the report focuses on key terms related to the creative industries and their evolving landscape. These key terms will be used to define this report's research question and objectives: 'creative industries', 'data-driven technologies', 'data-driven content creation', and 'generative AI'.

2.2.1 Creative Industries

'Creative industries', 'creative sectors', and 'creative domains' are the terms we encountered while searching for our research subject's definition and boundaries. It appears that different institutions have their own preferences for the term. The EU Commission operates with 'cultural and creative sectors' that are part of the 'creative economy'; UNESCO and the UK Government refer to the 'creative industries' as a subset of the 'creative economy' that is a broader sector of the economy. The academia also does not have a clear preference for terminology. However, the word 'industries' seems to be more popular than 'sector' and usually "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" (Parrish, 2019).

According to the European Commission (n.d.), "Cultural and creative sectors of the economy are comprised of all sectors whose activities are based on cultural values or other artistic individual or collective creative expressions and are defined in the legal basis of the Creative Europe Programme", furthermore:

Those activities include the *development, creation, production, dissemination and preservation* of goods and services which embody cultural, artistic or other creative expressions, as well as related functions such as education or management. The cultural and creative sectors include inter alia architecture, archives, libraries and museums, artistic crafts, audiovisual (including film, television, video games and multimedia), tangible and intangible cultural heritage, design, festivals, music, literature, performing arts, publishing, radio and visual arts (European Union, 2013).

Cultural industries and *creative industries* are related concepts but have some differences. Cultural industries generally refer to those industries that produce and distribute cultural products and services, such as film, music, literature, and art. On the other hand, creative industries refer to industries that are based on creativity and intellectual property and could include industries such as advertising, design, software, and fashion.

The cultural industries can be seen as a subset of creative industries. For example, cultural industries usually emphasise the creation and distribution of cultural products and services, whereas creative industries may have a broader focus on generating and exploiting intellectual property. Additionally, cultural industries can have a significant impact on national or regional identity and can be viewed as part of a country's cultural heritage, while creative industries tend to be more market-driven and focused on generating economic value.

The interrelations between creative and cultural industries have been schematically explained by Page and Cannell (2010) in the figure below, where the authors utilised the seminal works of Hesmondhalgh (2007), and Anhier and Isar (2008):
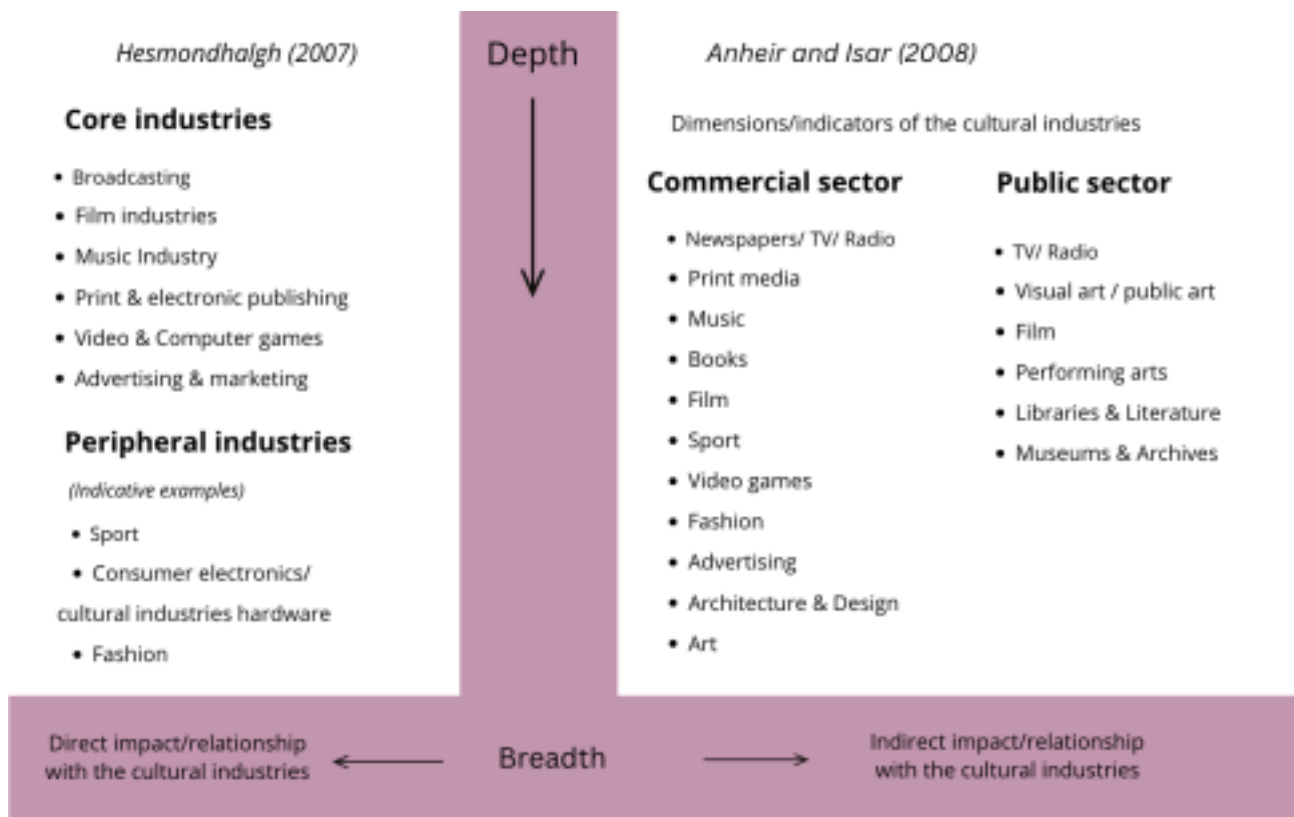
Figure 1. Classifying the cultural industries – their scale and scope. Source: Page and Cannell, 2010, p. 354.

UNESCO Model of Creative Industries

In our research, we will employ the model of creative industries as proposed by UNESCO (UNESCO Institute for Statistics, 2009). As depicted in Figure 2, this model was chosen due to its comprehensive nature and alignment with the diverse characteristics of our MediaNumeric consortium partners. Specifically, it encapsulates "cultural and national heritage" represented by the Netherlands Institute for Sound & Vision (NISV) and the Institut national de l'audiovisuel (INA), the facilitative role for 'books and press' played by Centrum Cyfrowe (CC) and Agence France-Presse (AFP), and the similarly facilitative role for all cultural domains undertaken by Storytek (ST). In addition, Inholland University of Applied Sciences (INH), University of Social Sciences and Humanities (SWPS), and INA also contribute to these domains through education and training.
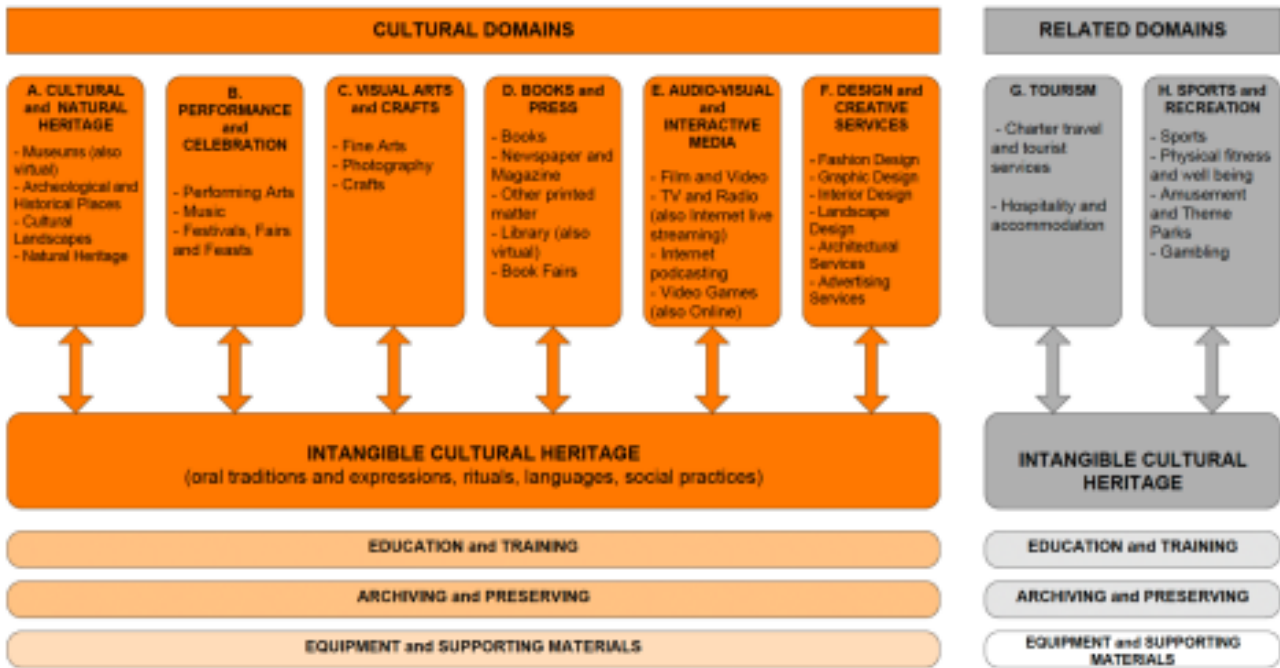
Figure 2. *Framework for cultural statistics domains. Source: UNESCO Institute for Statistics, 2009, p. 24.*

To sum up, a *cultural domain* represents a category within the broader cultural sector that encompasses specific cultural activities, goods, and services. These domains are designed to measure cultural outputs generated by both industrial and non-industrial processes. Cultural domains capture artistic, aesthetic, symbolic, and spiritual values, and they include tangible goods like artworks and intangible services like licensing activities. The definition of cultural domains is hierarchical, with each domain being mutually exclusive, ensuring that each cultural activity or good is classified under a single domain. The domains provide a structured representation of the diverse facets of culture, allowing for a comprehensive understanding of the breadth and structure of the cultural sector.

As we explained earlier, cultural industries belong to the realm of creative industries; therefore, in this report, we will use the last term without special distinguishing between 'cultural' and 'creative'.

2.2.2 What is 'Data-driven'?

Data-driven practice in creative industries involves using data to inform decision-making and improve business operations. This can include collecting and analysing data on consumer behaviour, market trends, and production processes to identify areas for improvement and innovation. Proposed action themes for developing data-driven innovation in creative industries include supporting the sector on a data maturity journey, building clever concentrations of creative development activity, and facilitating connections between

creative industries, investors, and potential investees (Parkinson, Speed, Terras, & Somerville, 2020). Big data and ICT can also play a role in transforming creative industries and generating positive impacts (Morelli & Spagnoli, 2017). However, it is important to consider data diversity and inequality issues in the creative industries

(Living with Data, 2020). Creating a data-driven culture involves taking steps such as defining clear goals, investing in data infrastructure, and fostering a culture of experimentation and learning (Waller, 2021).

To sum up, data-driven practices in creative industries are strategic approaches where data related to consumer behaviour, market trends, and production inform decision-making, spur innovation, and enhance operations. These practices, requiring a commitment to data maturity, infrastructure, and a culture of experimentation, must also address data diversity and inequality issues.

2.2.3 Data-driven content creation

Data-driven storytelling as a part of a broader phenomenon – data-driven content creation – builds a compelling narrative based on complex data and analytics that help tell a story and influence and inform a particular audience (Data Storytelling: How to Tell a Story With Data, 2021). It is effectively communicating insights from a dataset using narratives and visualisations. Data storytelling is similar to human storytelling but provides the added benefits of deeper insights and supporting evidence.

The three key components of data storytelling are *narrative*, *visuals*, and *data*. A well-rounded data story combines these three elements to communicate insights effectively. A thorough analysis of accurate, complete data serves as the foundation of a data story. Analysing data using descriptive, diagnostic, predictive, and prescriptive analysis can enable one to understand its full picture. Charts, graphs, and diagrams provide an important visual aid that helps tell a story. These representations of data can also offer information that might highlight secondary narratives or conversations that, although not crucial to the main story, can provide additional context (Data-Driven Storytelling | Stanford Online, 2022).

Data storytelling can help turn data insights into action. Effective communication is crucial for leveraging data insights, and both hard and soft skills are necessary for this purpose. Data-driven storytelling is a structured approach for communicating data insights through data visualisations, infographics, dashboards, and other visual elements. It is the ability to turn raw data into easy-to-read and easy-to-understand plain stories that help turn insights into action. Data-driven storytelling can influence action both within and outside of an organisation.

Storytelling with data in journalistic practices is a popular subject of academic research (Ausserhofer et al., 2020; Matei & Hunter, 2021; Heravi et al., 2022), and the stock of study

books on the topic is growing. Notable examples include "Foundations of Data and Digital Journalism" by Richards (2023) and "Data Journalism" by Reilley and Sunne (2022). State of the art in data-driven journalism has been central to other deliverables of the MediaNumeric project, such as the "Update on State of the Art Analysis" (T2.2) and the "State of the Art of the Data-driven Journalism Update" (D 2.4). Consequently, our research into the state of the art of data-driven work in the creative and media industries **will exclude related practices in journalism**.

2.2.4 Generative AI

Generative AI is a branch of artificial intelligence that focuses on creating new content. It has been used in various fields, from music composition to drug development, and has shown the potential to enhance creativity and productivity.

In 2022-2023, the generative AI field experienced a significant development surge. The advent of deep-learning models for text-to-image conversion and large language models[1] (LLMs) led to various tools capable of generating images and text. These include but are not limited to, Midjourney and Stable Diffusion, primarily used for image generation, and DALL.E, capable of generating images from textual descriptions. In the realm of text generation, models like ChatGPT have made significant strides, demonstrating the rapid advancement and potential of generative AI technologies.
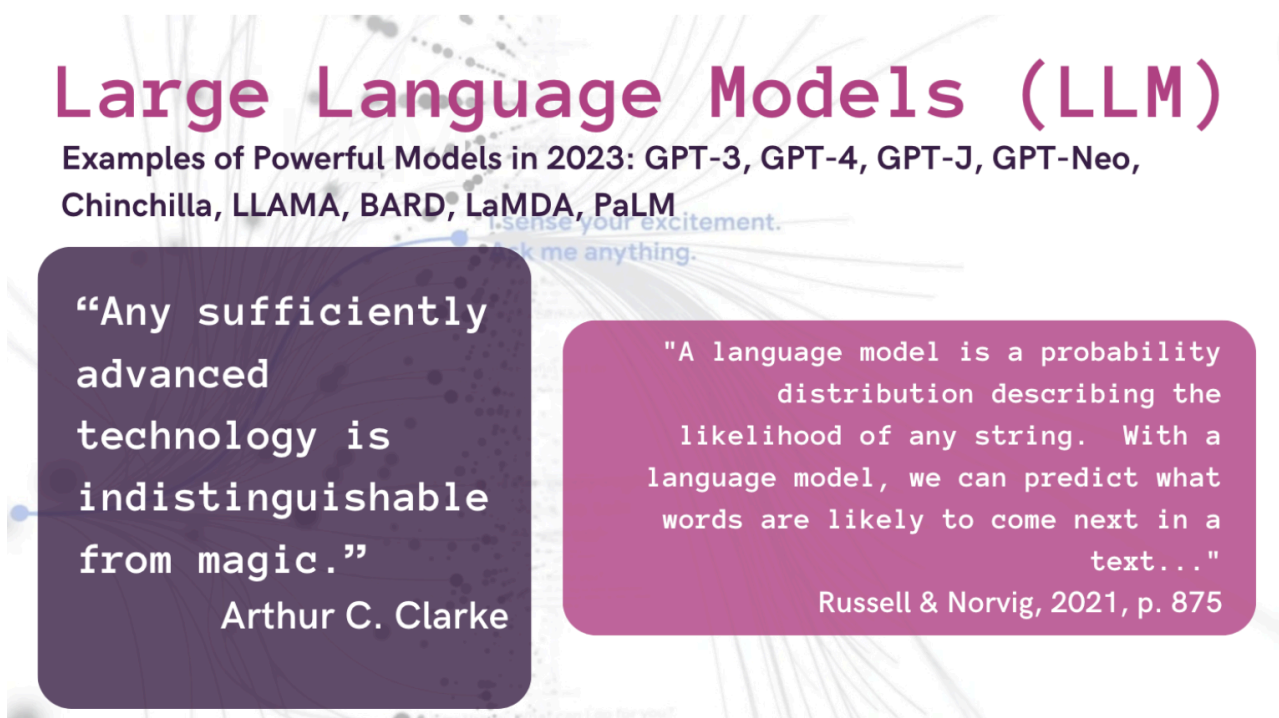
Figure 3. Large language models (LLM)

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[1] To get better understanding how LLM works, see the interactive explanation in New York Times (Bhatia, 2023).

Language models powered by machine learning have become integral to numerous Natural Language Processing (NLP) tasks. They have been employed in various applications, from speech recognition and machine translation to text summarisation.

The experts of AltexSoft (2023) explain on their website what LLM is and how it is used. One of the most prominent uses of language models is *content generation*. They can generate content, including news articles, press releases, blog posts, product descriptions, and creative outputs like poems and guitar tabs. This is achieved by training the models on large volumes of data and terms provided by humans.

Language models have also achieved state-of-the-art results in *Part-of-Speech (POS) tagging*. This process involves labelling each word in a text with its corresponding part of speech, such as a noun, verb, or adjective. By learning from the context and surrounding words in a sentence, these models can accurately predict the POS of a word.

In the realm of *question answering*, language models can understand and respond to queries with or without a given context. They can extract specific phrases, paraphrase answers, or choose from a list of options to provide accurate responses.

Text summarisation is another area where language models excel. They can condense lengthy documents, papers, podcasts, or videos into their most essential parts. This can be achieved by extracting key information from the original text or generating summaries that use entirely new language.

Sentiment analysis tasks also benefit from language models, as they can capture text tone of voice and semantic orientation. In the field of conversational AI, language models form a crucial part of systems that convert speech to text and vice versa, providing relevant text responses to inputs.

Language models have also enhanced *machine translation* by generalising effectively to long contexts. Instead of translating text word by word, they learn the representations of input and output sequences to provide robust results.

Even in *coding*, large-scale language models have shown an impressive ability to generate, edit, and explain code and perform simple programming tasks such as translating instructions into code or checking it for errors.

However, despite their vast potential, LLMs do have **limitations**. They struggle with tasks that require reasoning and general intelligence, such as understanding abstract concepts, making

inferences based on incomplete information, or applying common-sense knowledge. They also lack the ability to understand the world as humans do, and they can't make decisions or take actions in the physical world. These limitations are areas of ongoing research in the field of AI (AltexSoft, 2023).

LLMs have been found to exhibit *societal biases* present in their training data. A study by Nadeem, Bethke, and Reddy (2020) revealed that popular models like BERT, GPT-2, RoBERTa, and XLnet showed strong stereotypical biases. Abid, Farooqi, and Zou (2021) found that GPT-3 demonstrated a persistent bias associating Muslims with violence.

Nevertheless, as a generative tool, AI can play a significant role in human-human collaborations in *music composition*. According to a study by Minhyang Suh et al. (2021), generative AI can influence social dynamics during creativity, acting as a psychological safety net in creative risk-taking, providing a force for group progress, and altering users' collaborative and creative roles.

Generative AI has also found applications in *design practices*. A systematic review by Rowan T. Hughes et al. (2021) discusses how Generative Adversarial Networks (GANs), a type of generative AI, are being incorporated into user pipelines for design practitioners. The study suggests that GANs can enhance creativity, productivity, and design horizons.

Finally, using generative AI in *education* has benefits and ethical implications. A paper by J. Crawford et al. (2023) discusses how generative AI, like ChatGPT, can be used in education. While it can be used to cheat on university exams, it can also be used to support deeper learning and better learning outcomes for students when used ethically.

Disclaimer. In the initial project proposal, our focus was primarily on the data-driven practices of content creation. However, the rapid and unforeseen advancements in AI towards the end of 2022 have significantly reshaped the landscape of the creative industries. Given this development, we have broadened our scope to include AI-driven practices, recognising that AI is not only a natural extension of data-driven technology but is currently the most impactful factor in the field. *Therefore, throughout this report, we will not make a hard distinction between 'data-driven' and 'AI-driven' practices but rather view them as interconnected components of the same transformative process.*

We have chosen not to include a separate section listing data and AI-driven tools applicable for creative means due to the rapidly evolving nature of these tools. The landscape of such tools is in constant flux, with new ones emerging and old ones disappearing regularly. Instead, we will incorporate hyperlinks throughout the report whenever a specific tool is mentioned, allowing readers to explore these tools in a real-time context.

2.3 Defining the target group

Different terms could be used to describe our target group. First, there is the broad term "creative class", which, according to R. Florida (2019), "is the economically predominant class today", represented by people with "high-skill jobs in science, technology, engineering, business, finance, management, law, healthcare, education, and arts, culture, entertainment, and media" (p. 627). Secondly, there are specific words attached to the different occupational groups, such as "designers", "artists", "content creators", "cultural producers", and "entertainers" – to name a few.

Attempting to cater to such a broad audience within a single report is neither realistic nor feasible. A more effective approach would be identifying the various stakeholder positions within the creative industry. Once these are established, we can then concentrate our efforts on those who are the primary targets of the entire MN project.

2.3.1 Main Stakeholders of the Creative Industry

In the creative industry, stakeholders are typically diverse, including entities and individuals involved in producing, distributing, and consuming creative goods and services (Freeman, 1984; Li, 2020).

- From the **production perspective**, stakeholders include *artists and creators*, *producers*, *investors,* and *technical staff*. These entities are involved in the creation of a creative product or service.
- From the **distribution perspective**, stakeholders include *distributors*, *marketers*, and *platforms* that help to bring the creative product or service to the market.
- From the **consumption perspective**, stakeholders include the *audience or consumers*, *critics*, and other entities that use, evaluate, or otherwise interact with the creative product or service.

Chapter 3 of this report will explore how data-driven trends impact the following creative industry stakeholders:
- Content creators and artists
- Media and entertainment companies
- Advertisers and marketers
- Technology providers
- Consumers and audience
- Policymakers and regulators

2.3.2 Target Audience for this Report

While it is true that any stakeholder in the creative industries could find our findings interesting, we have narrowed the audience of this report to the following categories of persons are included in our targeted audience:

- Talent Shaping
- Young Talent
- Advanced Talent

Target group

Talent shaping	Young talent	Advanced talent
Higher Education institutions, Students, Teaching and Management stuff	Early career creative business professional	Experience professionals, employers, policy-makers, industry managers, lifelong learning facilitators
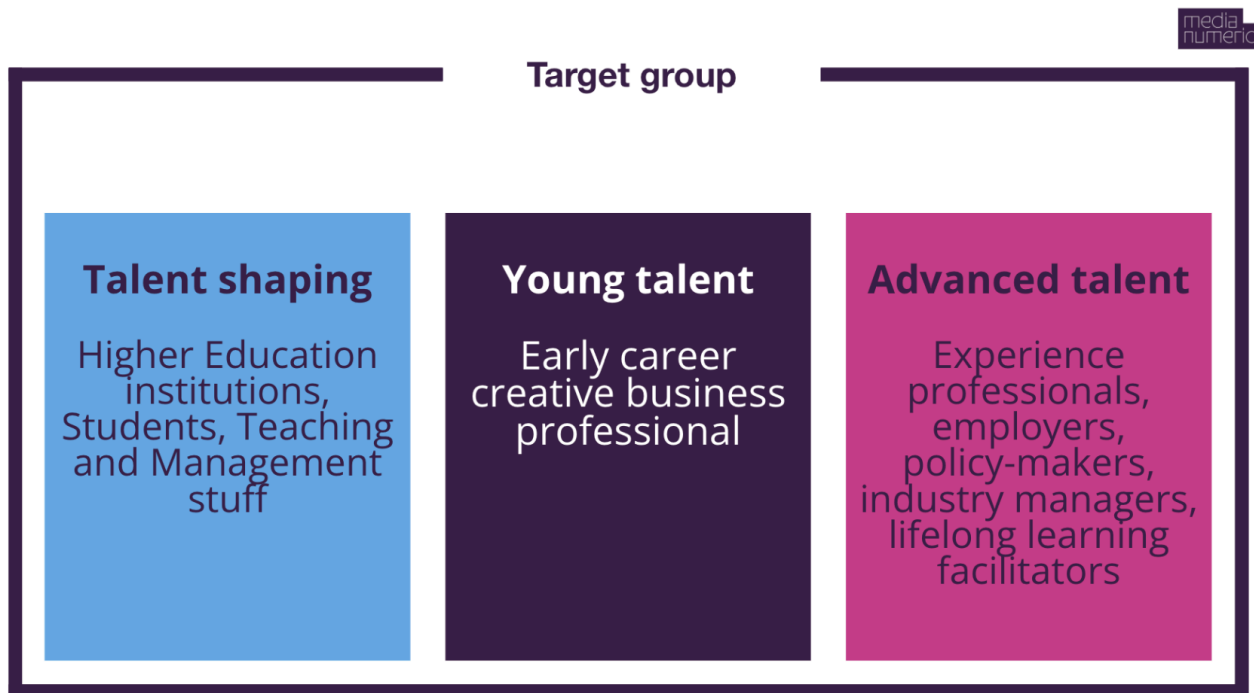
Table 1. The Report's target group.

The following reasons have dictated this focus:

Alignment with project goals: the target group outlined in this report corresponds with the definitions given in the Detailed project description of MediaNumeric (IV.1. Target groups), and it follows the course of consultations with the members of the Stakeholder Board in Paris, 2022.

Influence and impact: This target group significantly influences the creative industries. Higher Education Institutions (HEIs), teachers, and managers shape the skills and knowledge of the future workforce. Early creative business professionals bring fresh ideas and innovation, while experienced professionals, employers, and policymakers have the power to implement changes and set industry standards.

Need for updated Information: The creative industries are rapidly evolving, with new trends

and technologies always emerging. This target group needs to stay informed about these changes to remain competitive and effective in their roles. The report can serve as a valuable resource for them.

Potential for practical application: The insights from the report can be directly applied by this target group in their work, whether developing new curricula, creating innovative business strategies, or shaping industry policies. This makes the report not just informative but also practically useful.

2.4 Research question and objectives

In this section, the research question and the objectives will be formulated.

2.4.1 Central Research Question

Based on the ambitions expressed in the Detailed Project Proposal, the following research question has been formulated:

How are the challenges and opportunities of data-driven work transforming non-journalistic media production and creative industry practices?

This research question must be contextualised within the scope and limitations of our research and the broader MediaNumeric project. While there were significant advancements in data-driven work within the creative industry during 2018-2019, when the project proposal was formulated, two pivotal events dramatically altered the scale of data-driven applications in industrial and everyday practices. These were the COVID-19 pandemic and the release of a multitude of generative AI tools, a period some have referred to as an *AI hype cycle* (Watercutter, 2023; What's New in Artificial Intelligence From the 2023 Gartner Hype CycleTM, 2023)[2]. With the intention of offering a broad overview of the terrain, this report should be viewed as a systematic and methodologically sound, albeit not comprehensive, response to the research question at hand.

2.4.2 Research Objectives

With this report, we aim to achieve the following research objectives:

● To provide a systematic overview of current data-driven practices and the influence of generative AI technologies on non-journalistic content production and creative industries.

● To evaluate the industry responses and adaptations to disruptive technological advancements and events, emphasising stronger (hyper)linking in media storytelling and the emergence of AI as a potential substitute for human creativity.

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[2] According to Gartners Hype Cycle for Revenue and Sales Technologies, Generative AI has reach the top in August of 2023 – earlier than expected (Gartner Places Generative AI on the Peak of Inflated Expectations on T, 2023).

2.5 Methodology of the Research

Considering the rapid data-driven developments across all branches of creative industries, we acknowledge that our research question may seem highly ambitious. However, we have devised an approach that allows us to present an overview of relevant contemporary practices and evaluate them. This will enable us to understand these industries' necessary adjustments and adaptations in response to disruptive events and technological advancements, specifically focusing on 2023.

Disclaimer regarding the use of generative AI in this report: Following recent developments in generative AI, we explored its potential to enhance or, better to say, *augment our research process.* Therefore, we employed the ChatGPT3.5 and ChatGPT4 models to assist us in the following tasks: text summarisation (primarily to assess the relevance of media accounts for in-depth analysis; for the same task with academic papers, we utilised the Ask Your PDF plugin); to refine literature searches through the Scholar Assist and Scholar AI plugins; and to edit our draft pieces of text.

Our research process involved several stages and tools. Initially, we conducted an extensive literature review, followed by semi-structured interviews with industry experts, stakeholders, and representatives from Higher Education Institutions (HEIs). This approach yielded 60 insightful interviews, including those conducted for the Updated Needs Analysis Report (2021) and additional discussions held after its publication.

The information gathered from the formal report informed our direction for this new research, specifically, understanding the scope of the creative industry and its stakeholders. However, **we did not include** the interview transcripts in our analysis material for several reasons.

Firstly, the primary objective of the interviews was to determine what and how to teach young professionals about storytelling with data rather than to assess the state of the art. Secondly, when the state of the art in data-driven stories was discussed, most examples were drawn from journalism, which falls outside the scope of this research. Lastly, the interviews were conducted before the widespread introduction of generative AI, which has significantly transformed the landscape.

The subsequent research phase involved additional literature review and **data collection** from legacy media using the *Nexis-Uni-Academic database*. In addition, we reviewed issues of *WIRED*, the *New York Times*, *Forbes*, *Rolling Stone*, *Washington Post* and *Financial Times* – authoritative sources on technology trends, to further our understanding[3]. Additionally, we

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[3] According to the recent analysis of the audience interests (Challenge Validation, n.d.), which reveals key details on the browsing interests of wired.com's visitors, its audience is interested in key categories such as 'News and Media

revised publications gathered through snowball sampling[4]. Our goal was to gather evidence of data-driven work in the creative industries, focusing on the conglomerate of the following domains (refer to Figure 1): *cultural and natural heritage*, *performance and celebration*, *audio-visual* and *interactive media*, and *design and creative services*. We excluded *visual arts and crafts*, *books and press*, as these sectors will be partially covered in the State of the Art of the Data-driven Journalism Update.

The selection procedure began with defining **key search terms** relevant to our research, such as "data-driven" AND "creative industries" / "music" / "festivals" / "museum" / "film" etc., "AI" AND "creative industry"/ "music" / "festivals" / "museum" / "film" etc. We set the timeframe for our data collection from 01.01.2022 to 22.06.2023; language – English, category – "news". The first selection resulted in 211 hits that, after the manual selection, were reduced to 127 texts.

Texts by topic
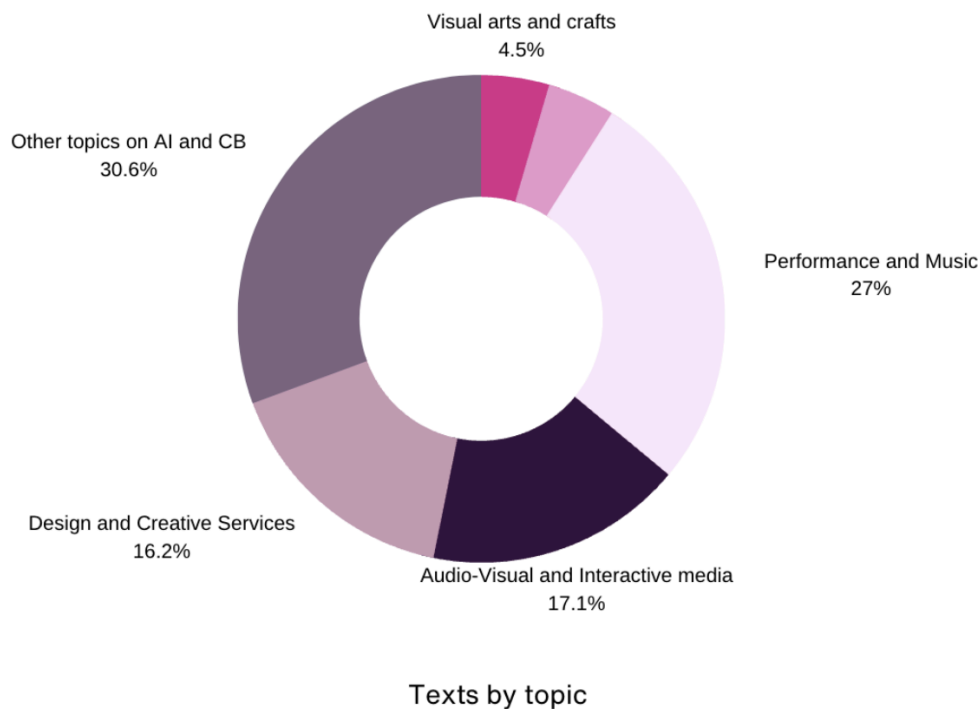
Figure 4. Thematic distribution of selected texts in the corpus

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Publishers', 'Computers and Technology', 'Programming and Development Software', 'Video Games' and 'Fashion'. These categories not only provide valuable insight into the browsing habits of wired.com's visitors but also align remarkably well with the segmentation of the creative industry. This alignment further underscores the relevance and appropriateness of our chosen sources—*Wired*, *The New York Times*, and *Forbes*—for supplementary data collection in our study of data-driven work within the creative industries. The *New York Times* and *Forbes* also emerged as top sources for the same audience when searching the aforementioned topics, leading us to include these international anglophone sources in our additional data collection efforts.

[4] In the context of data collection, the snowball sampling involves starting with a few key texts, then looking at the references cited in those works to find more related sources. This process is repeated, with each new piece of literature potentially leading to more relevant sources, hence the "snowball" effect.

The distribution of texts in our corpus analysis (Fig. 4), which consists of texts from legacy media outlets, provides an interesting insight into the focus of data- and AI-driven practices within various sectors of the creative industries. Most media accounts are dedicated specifically to the music industry in the performance and music sector, which is the most represented in our corpus – 27% of the analysed texts. This suggests that the music industry is a key area of focus within the broader performance and music sector when it comes to the application of data and AI technologies. This could be attributed to the music industry's early adoption of digital technologies, such as streaming platforms, and the vast amount of data these platforms generate. The prominence of the music industry in these discussions underscores its role as a leading sector in the integration and exploration of AI and data-driven practices within the creative industries. The audio-visual and interactive media sectors and design and creative services have substantial representation, with 17.1% and 16.2%, respectively. This suggests a growing interest and application of AI and data-driven practices in these areas, likely due to the increasing importance of digital and interactive media in our daily lives.

Visual arts and crafts, however, are less represented, making up only 4.5% of the texts. This could be due to these arts' traditionally tactile and physical nature, which may be less immediately compatible with data and AI technologies.

The 'other topics on AI and creative business' category is the most represented, accounting for 30.6% of the texts. This category includes texts discussing the creative industry or its sub-part in general, focusing on aspects such as legislation, government response, workplace optimisation, ethical issues, and investments. The prominence of this category suggests a broad and growing interest in the intersection of AI, data, and the creative industries at large. It also underscores the importance of understanding these technologies' wider context and implications beyond their application in specific sectors. The fact that these texts are sourced from legacy media emphasises the mainstream attention and discourse surrounding these topics.
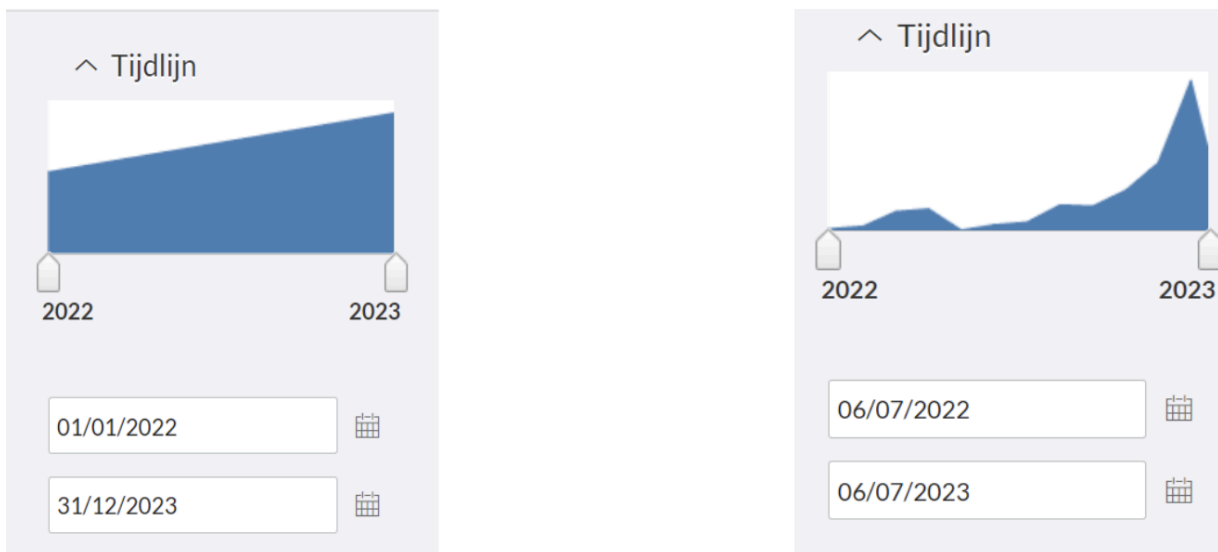
Figure 5. Initial corpus for the research: timeline[5]. Left: selection for the data-driven practices in creative industries. Right: selection for AI-driven work in creative industries.

As Figure 5 shows, the topic of data-driven practices in creative industries attracted steady interest from the legacy media, and it is steadily growing during 2022-2023. It is different for AI-driven exercises in the same sector: the splash of media interest falls at the end of 2022. It hits the maximum in the spring of 2023, aligning with the recent generative AI developments.

Due to the time constraints assigned to this work package, a complete content or discourse analysis of the entire corpus was not feasible. Therefore, we decided to select the most indicative case studies for each chosen creative industry domain, providing a representative snapshot of the current landscape in these areas.

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[5] Due to the default settings of the Inholland's Nexis Uni dashboard, the term 'tijdlijn' appears on the screenshots, which translates to 'timeline'.

3. Trends and Issues in 2023: Impact on Stakeholders

This section aims to provide a systematic overview of the significant developments within creative businesses, both caused and enabled by data-driven technology. Our focus is specifically on content creation practices, which represent a critical aspect of the creative industries. We will present these trends and issues through the lens of different stakeholders, as they are listed in section 2.3.1 of this report, rather than discussing them in isolation. This perspective allows us to provide a more nuanced and practical understanding of our target group.

We will deepen into the effects of data-driven technology on various stakeholders involved in content creation within the creative industry, as identified in the existing literature. To illustrate our findings, we will provide a few examples for each stakeholder type. However, this is just the beginning of our exploration. In the subsequent sections, we will offer a more detailed elaboration on how specific data-driven technologies are being adopted across different industry sectors, supplemented by a range of showcases. This approach will provide a more comprehensive understanding of the real-world implications of these technological advancements on content creation practices.

3.1 Content Creators and Artists

How are data-driven trends impacting content creators and artists?

These individuals are at the forefront of the transformation, finding their creative processes increasingly intertwined with data-driven technologies. For instance, the evolution of generative AI technologies has brought about new possibilities for automation in content creation, leading to continual changes in the roles of writers, designers, artists, and other creative professionals.

Using AI to write articles or social media posts: AI is now used to automate content creation in various fields. GPT-3, a language model developed by OpenAI, can generate human-like text, which can be used to write articles, blog posts, or social media posts (Davenport, 2022).

3.2 Media and Entertainment Companies

How are media and entertainment companies adapting to data-driven trends?

The ongoing disruption requires these organisations to perpetually adapt their business models and operations to integrate data-driven processes. This includes leveraging data for decision-making, incorporating AI in content creation, and adjusting to the constantly shifting content distribution and consumption landscape.

In the context of data-driven transformations in the creative industries, media and entertainment companies have been at the forefront of leveraging these technologies. One prime example is Netflix. Their platform's *recommendation system*, which suggests content based on the user's viewing history and preferences, is powered by complex machine-learning algorithms (SystemDesign, 2023). This data-driven approach significantly enhances user engagement and retention by personalising the viewing experience for each user.

The Amsterdam Dance Event (ADE) *Hackathon* serves as a prominent example of the music industry's efforts to utilise data and technology for innovation and growth. First organised in 2016, this hackathon brings together creative minds from various fields, such as developers, designers, and entrepreneurs, to explore how data and technology can be harnessed to address challenges and unlock new opportunities within the dance and festival scene.

Spearheaded by DGTL, ADE, and the Tech & Dance Collective, the ADE Hackathon encourages participants to develop smart concepts, new apps, and other creative solutions within a 24-hour period. The problems tackled typically encompass areas such as sustainability, copyright, music licensing and compensation, and the historical evolution of dance music.

3.3 Advertisers and Marketers

What is the impact of data-driven trends on advertisers and marketers?

The rise of data-driven processes has sparked a revolution in advertising and marketing, resulting in increasingly targeted and efficient practices.

Generative AI models like GPT-3, BERT, and DALL-E2 have been increasingly used in content creation and marketing strategies. They can produce diverse types of content, such as text and images, including blog posts, program code, poetry, and artwork. These AI models offer businesses numerous opportunities, such as *automated content generation, improving content quality, increasing content variety, and generating personalised content*. Once a generative model is trained, it can be "fine-tuned" for a specific content domain with much less data, enabling its use in specific fields or applications, such as legal content, biomedical content, and more. However, it's crucial

to note that effective use of generative AI still requires human involvement at the beginning and the end of the process.

In the marketing side of the film industry, data-driven technologies have increasingly been adopted to *better understand and appeal to audiences, with the aim of boosting ticket sales*. A key example is 20th Century Fox Film, which transitioned from a traditional entertainment company to a data-driven, audience-first company. The studio applies data insights to inform decisions about movie creation, audience targeting, and experiences delivered. A customer database and tools developed with Google Cloud Technology help inform decisions about film investment, release timing, marketing strategies, and more. This data-driven approach has reportedly led to increased ticket sales and growth for the company (Rieger, 2020).

3.4 Technology Providers

What is the role of technology providers in the data-driven transformation of the creative and media industries?

As providers of the underlying technologies for data-driven processes, technology providers are constantly innovating to meet the ever-changing needs of the creative industries. Industry leaders are leveraging various data-driven technologies and creative sector concepts, including blockchain, artificial intelligence (AI), machine learning (ML), big data, and the Metaverse. The following are some practical examples of these:

Big Data use: Ticketmaster uses big data to analyse ticket sales, artist popularity, and consumer preferences to maximise ticket sales and enhance the concertgoer experience. Eventbrite has been applying data analysis to optimise event planning, ticket sales, and the overall customer experience.

Blockchain: Spotify, in collaboration with the blockchain startup Mediachain, is developing better technology for connecting artists and other rights holders with the tracks hosted on Spotify's service (Perez, 2017). KickCity, EventChain, and Aventus – these blockchain-based event ticketing platforms founded in the era of blockchain optimism, aimed to minimise fraud and maximise efficiency, security, and transparency in the event ticketing process (KickCity.Io, 2018). As of 2023, it appears that EventChain is no longer functioning.

Artificial Intelligence (AI) and Machine Learning (ML): Google provides various AI and ML services for creative industries such as video production. After a successful beta period, Google's Ads Creative Studio is now globally available, introducing a host of features that

enhance collaboration, creativity, and the customisation of display and video ads. The platform enables users to create numerous versions of a single ad, customised for diverse audiences, locations, languages, or contexts, by setting certain ad elements as 'swappable' and applying different versions based on user-defined rules. This ad customisation is currently available for video creatives and will soon be launched for display. The platform facilitates seamless workflow across all campaign's sharing projects across Google Ads, Display and Video 360, and Campaign Manager 360. Ads Creative Studio has helped brands and agencies, such as Men in Green, PepsiCo, and General Motors South America, reduce time and costs, enhance creative effectiveness and efficiency, and promote smoother collaboration between media and creative teams (Moukabaa, 2022).

IBM offers Watson, a powerful AI that can be used in storytelling with data in several ways. It has the ability to process and analyse large amounts of data, extract insights, and present them in a way that is easy to understand, using natural language processing and machine learning algorithms. IBM Watson provides a way to explore and understand patterns and trends in data, and it can also make predictions based on these patterns, aiding in data-driven decision-making.

Adobe offers Sensei, an AI and ML technology that powers features in Adobe's suite of products. Many creative businesses use Adobe products for video production, graphic design, and more (Wiggers, 2023).

Metaverse: The term "metaverse" is used in academia to describe a collective virtual shared space created by the convergence of virtually enhanced physical reality and physically persistent virtual reality. It is essentially a space where users can interact with a computer-generated environment and other users in real-time. This interaction often happens through avatars, which are digital representations of the users.

The metaverse is seen as the next iteration of the internet, evolving from a series of static pages to a fully immersive, 3D virtual space. It merges multiple aspects of technology, including virtual reality (VR), augmented reality (AR), 3D graphics, artificial intelligence (AI), and blockchain, among others. Hickey (2022) explains the term metaverse as mainly a player-owned world built on cryptocurrency-based blockchain technology. Most metaverses require users to purchase in-game items and parcels with cryptocurrency, and these items are almost always nonfungible tokens (NFTs). However, our corpus analysis gives enough examples of broader use of the term – without NFT and cryptocurrency as necessary attributes.

The peak business interest in metaverse spaces was experienced in the second half of 2022, declining but still remaining consistent in 2023. The metaverse significantly impacts technology providers in the creative industry, which plays a crucial role in developing the underlying technologies that power the metaverse. The metaverse now has over 400 million unique average monthly users worldwide (Metaversed, n.d.); according to Learn

platform (2023), more than half (51%) of global users of metaverse virtual worlds are aged 13 or under, and 83.5% of metaverse virtual worlds users are under 18; "only 17% of *boomers* are aware and somewhat familiar with the technology".

"Alongside industries such as entertainment, education, gaming and networking, the metaverse has also provided unique platforms and opportunities for artists and their audiences, whether that be in music, performing arts or digital art forms such as NFTs (non-fungible tokens)" (Learn, 2023).

Examples of the metaverse spaces:

- [Roblox](#) – a popular online platform with 66.1 million daily active users as of May 2023 (Ruby, 2023), allows users to create and play games and build virtual worlds.
- [Second Life](#) is one of the longest-running virtual worlds and an early example of the metaverse concept. "As of 2021, Second Life has reported around 64.7 million active users on its platform. Organisations such as Stanford University, the American Cancer Society, and Adult Swim have also used the platform for enterprise-grade virtual events" (XR Today, 2022).
- [Meta Horizon World VR](#) is developing the infrastructure for the metaverse. In contrast to the leaders, in October 2022, the gaming platform claimed about 200 thousand active users, down from 280 thousand active users in February of the same year (Statista, 2023). According to the Wall Street Journal investigation (Horwitz et al., 2022), there are even fewer than 200,000 monthly users. Some of the virtual worlds have been viewed by fewer than 50 people.

Providers face the task of innovating and adapting their technologies to meet the distinctive requirements of the metaverse. This involves developing immersive content creation tools, ensuring seamless connectivity and interoperability, and offering specialised services tailored to the metaverse, such as virtual commerce platforms and security solutions. This dynamic landscape presents challenges and exciting prospects for technology providers as they shape the future of the creative industry. Coin Desk notes, "While the metaverse has garnered significant attention, achieving widespread adoption may still require time and further development" (Thompson, 2022).

3.5 Consumers and Audience

What are the implications of adopting data-driven technologies for consumers and audiences within the creative industry?

As the primary recipients of creative content, consumers are at the forefront of the ongoing transformations in the quality, variety, and delivery of content, all driven by data-centric innovations. The most significant outcomes of this disruption are the emergence of the do-it-yourself (DIY) sector and the rise of influencers – self-made celebrities.

The rise of the *DIY (Do-It-Yourself)* movement has had a profound impact on creative businesses, leading to a cascade of effects. Firstly, it has brought about direct competition, as individuals can now create and sell their products at lower costs than traditional businesses. Secondly, it has prompted a shift in consumer expectations, with a growing appreciation for handmade, unique, and personalised items. This places pressure on businesses to offer more customised and high-quality products. Additionally, the DIY movement has fostered education and skill sharing, empowering consumers with the ability to acquire new skills and fix or create things themselves. This can disrupt businesses that previously relied on consumers lacking these skills and opting for professional services[6].

Influencers. Furthermore, the DIY movement has given rise to a new industry in the form of influencers, including bloggers and vloggers. Influencers have gained prominence through their online platforms, providing tutorials, tips, and inspiration for various DIY activities. They have built loyal communities and have become influential in shaping consumer choices and purchasing decisions[7].

Fueled by the DIY movement, these data-driven trends have transformed the creative landscape and challenged businesses to adapt. To thrive in this evolving market, businesses are trying to incorporate elements of the DIY ethos into their models, offering more personalised products, embracing sustainability practices, and engaging with consumers directly and authentically. By leveraging these trends and understanding consumers' changing needs and preferences, creative businesses can navigate the data-driven disruptions and stay ahead of the curve.

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[6] As WIRED writes about the AI-aided tools, "It's also a boon to the amateur creator. People might use generators for fun rather than to rival trained musicians, but their work may still crowd the market, says Tatiana Cirisano, a music industry analyst and consultant with MIDiA Research. That poses a challenge, because some music streamers don't differentiate between professionally produced and amateur content the way that video does (think Netflix compared to YouTube or TikTok). "Spotify will become the place where large portions of consumer-created music ends up, mixing in with everything else," Cirisano says" (Hoover, 2023b).

[7] More about social media entertainment and DIY culture in Abidin, 2018; Craig & Cunningham, 2019.

3.6 Policymakers and Regulators

In the context of the creative industries, **policymakers** are individuals or groups, such as elected officials or public servants, who influence or determine policies and practices. They develop, propose, and implement policies that guide the operation of sectors like the creative industries. For instance, a European Union (EU) policymaker might propose a law to protect digital copyright in the music industry, ensuring fair compensation for musicians and music producers (European Parliament, n.d.). Conversely, **regulators** are typically government agencies or bodies that oversee and control certain activities or sectors. They enforce the rules and regulations set out by policymakers. For example, the European Data Protection Board (EDPB) is a regulator in the EU responsible for enforcing data protection laws across the EU (European Data Protection Board, n.d.).

The introduction of generative AI in the creative industries has raised new *ethical, privacy, and copyright issues.* **Ethical concerns** arise from the use of data-driven technologies, such as AI and machine learning algorithms, which can collect and analyse large amounts of personal data for targeted advertising (Simonite, 2023). An example of addressing these concerns can be seen with Google's adoption of AI ethics principles in 2018, aimed at restricting future projects. However, researchers have cautioned that large language models carry increased ethical risks, as they can generate or amplify toxic and hateful speech (Johnson, 2023). Furthermore, these models have a tendency to fabricate information. With startups and tech giants attempting to develop competitors to ChatGPT, there is speculation within the industry about whether the perception of acceptable and ethical deployment of highly capable AI systems for generating realistic text and images has shifted.

Privacy concerns are also prevalent as personal information is collected, analysed, and utilised, often without the user's knowledge or control (Horwitz & Satariano, 2023; Manjoo, 2023; Cox, 2023). Spotify exemplifies the significance of data by monitoring real-time, individual insights that extend beyond basic demographic information and device identifiers. This allows them to gain a deeper understanding of their audience's emotions, mindsets, preferences, and behaviours (Burgess, 2021). Nevertheless, the utilisation of consumer data for personalised recommendations can raise concerns regarding privacy if users are unaware of how their data is being utilised or lack control over its usage. Encrypted messaging applications like Signal and WhatsApp have been considered one of the few remaining havens for privacy (Angwin, 2023). However, governments are increasingly pressuring technology companies to monitor encrypted messages in novel and potentially perilous ways.

Furthermore, the ease of content creation, reproduction, and distribution by AI challenges traditional notions of **copyright and intellectual property rights**, raising questions about the ownership and attribution of creative works (Sisario, 2023; Sorkin,

2023; Simonite, 2023). For instance, user-generated content platforms and social media raise questions about the ownership and attribution of creative works. Notably, in 2023 there have been various legal disputes surrounding the usage of materials to train advanced AI systems. Lawsuits have been initiated by source-code owners against OpenAI and Microsoft's GitHub, as well as visual artists against Stability AI, Midjourney, and DeviantArt (Brittain, 2023). The defendants in these cases have argued that their systems utilise copyrighted works within the bounds of fair use. However, there is an ongoing debate about whether it is equitable for AI to follow the same principles, particularly considering AI's ability to generate copious amounts of valuable content without adhering to the licensing requirements of the source material.

These challenges necessitate policymakers and regulators to constantly adapt existing regulations and introduce new ones to protect the interests of all stakeholders involved. For example, the General Data Protection Regulation (GDPR) in the EU was introduced to provide individuals with greater control over their personal data and establish guidelines for data handling and privacy (European Commission, n.d.). However, as the disruption evolves, it underscores the dynamic nature of the creative industry, where adaptability and readiness to change are key in navigating the future. Policymakers and regulators must continuously adapt to keep pace with evolving data-driven practices (Levy, 2023).

4. Data-driven Practices in Creative Industries

In this chapter, we devote ourselves to the transformative role of data across various sectors of the creative industries. Drawing from a rich corpus of collected data, we present a curated selection of showcases, each illustrating the state of the art in data-driven practices. These examples highlight the impact of data on content creation and industry trends and serve as a testament to the transformative power of data in action.

It's important to note that there will be a more pronounced representation of showcases from the music sector than from the other realms of the creative industry. This is not a reflection of the relative importance or impact of data in these sectors but rather a result of the composition of our corpus and the coverage in legacy media. With its high visibility and rapid technological integration, the music industry has been a fertile ground for data-driven practices, making it a rich source of case studies.

Despite this emphasis on music, the insights gleaned from these showcases are applicable across the creative industries. They provide a comprehensive and insightful view of how data is utilised, shaping the creative industries' current landscape and future potential[8]. Whether in music, film, literature, or visual arts, the influence of data is pervasive and transformative, driving innovation and redefining the boundaries of what's possible in the creative realm.

4.1. Showcases in Performing Arts and Music

This section, dedicated to the music industry, explores cases demonstrating how AI revolutionises content creation. From AI-composed melodies to algorithmically generated lyrics, these technological advancements reshape the landscape of music production. However, it's important to note that integrating AI into the music industry has challenges. Issues such as fake streams (Centre national de la musique, 2021; Hoover, 2023), the danger faced by streaming platforms being overflooded by AI-generated music (Hoover, 2023a; Hiatt, 2023a)[9] and other forms of digital manipulation are emerging as significant concerns. These issues will be elaborated on in Chapter 5.

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[8] In addition to the examples detailed in this section, we gathered instances of data-driven work in other creative sectors such as fashion design, gaming design, fine art, and photography. However, these cases were not included in our detailed descriptions as they fall outside the primary focus of our project.

[9] WIRED reports, "The software covers.ai has a waiting list for new users. But there are also tools that can generate instrumentals from text, give people a starting beat or inspiration, and help them to edit tunes". There is a new model MusicGen, "capable of generating high-quality music samples conditioned on text descriptions or audio prompts" (Musicgen, n.d.). More about this model in: Copet et al., 2023.

4.1.1. Unique fusion of traditional opera, artificial intelligence, and neuroscience

The New York Times (Rose, 2022) reported about the first performance act at Alice Tully Hall for "Song of the Ambassadors," – "a work-in-progress that fuses elements of traditional opera with artificial intelligence and neuroscience, and the photos did appear to show Thake's brain doing something remarkable: generating images of flowers. Bright, colourful, fantastical flowers of no known species or genus, morphing continuously in size, colour and shape, as if botany and fluid dynamics had somehow merged".

The work was created by K Allado-McDowell, who leads the Artists and Machine Intelligence initiative at Google with the A.I. program GPT-3; the composer Derrick Skye, who integrates electronics and non-Western motifs into his work; and the data artist Refik Anadol, who contributed A.I.-generated visualisations.

In the performance, three singers represented "ambassadors" to the sun, space, and life, accompanied by a percussionist, a violinist, and a flute player. Shanta Thake, the artistic director of the performing arts complex, sat silently on one side of the stage with an EEG monitor on her head, feeding brain waves into Anadol's AI algorithm to generate otherworldly patterns, effectively acting as the "brainist."

"I'm using my brain as a prop," she said in an interview.
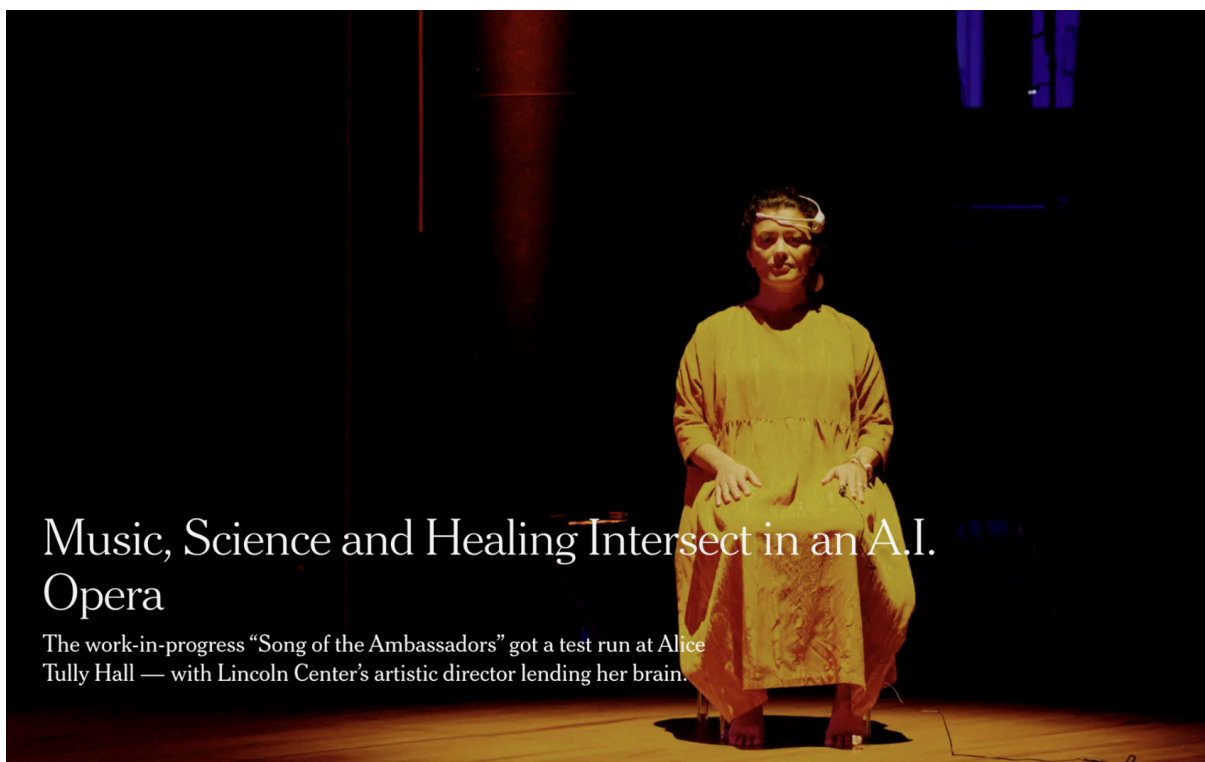

Figure 6. Shanta Thake, Lincoln Center's artistic director, participating in a performance of "Song of the Ambassadors" at Alice Tully Hall. Credit Vincent Tullo for The New York Times.

The performance also involved neuroscientists Ying Choon Wu and Alex Khalil, who monitored the brain waves of two audience volunteers. Wu investigates the effects of works of art on the brain, while Khalil focuses on how music gets people to synchronise their behaviour. Both aim to integrate art and science, aligning with Allado-McDowell's vision of the concert hall as a place where healing could happen.

The performance aimed to test the therapeutic powers of music in a public setting, raising questions about potential policy implications and the role institutions could play if sound and music are recognised as healing. However, the therapeutic effectiveness of such a public performance remains to be seen. The neuroscientists involved with the production have yet to analyse their data, but the project represents a significant step towards understanding the intersection of art, AI, and neuroscience.

4.1.2. AI-aided Comedy

In the vibrant and competitive New York comedy scene, a group known as ComedyBytes is pushing the boundaries of performance art by integrating artificial intelligence into their shows. This "A.I. comedy collective," as they describe themselves, comprises comedians featured on platforms such as HBO, Comedy Central, and "This American Life." They are pioneering a new form of entertainment that blends human creativity with AI-generated content.

ComedyBytes uses a variety of AI tools to shape their performances. One of these tools is ChatGPT, which they use to generate and curate roast jokes. While not all AI-generated jokes are cut, approximately 10 to 20 percent of them end up in the show. They also use Midjourney for generating AI-created images, Wonder Dynamics for integrating AI animations into live-action footage, ElevenLabs for creating AI comedian voices, and D-ID for generating avatar faces of their AI comedians.

The format of a ComedyBytes show is innovative and interactive. It includes humans roasting machines, machines roasting humans, and even a round where a human comedian roasts an AI version of themselves. The prompts fed to the AI tools are part of the preparation process and usually centre around various facts about a comedian. They also train the AI to generate jokes in the style of a specific comedian.

The reaction from audiences has been positive, with attendees appreciating the novelty and creativity of the shows. "We're actually attracting a slightly different audience, and we're expanding the audience that would traditionally come to a New York comedy show. We are seeing some tech folks, some folks in the venture capital world who are working in A.I. or investing in A.I. by day, come to the shows out of curiosity. That's been really cool to see", explained Erin Mikail Staples, a comedian and the group's event producer, in her interview with the New York Times (Fadulu, 2023).

4.1.3. AI-assisted Music Creation

The idea of computers composing music has been around since the inception of the computer itself. Ada Lovelace, a mathematician and writer of the XIX century, theorised that Charles Babbage's Analytical Engine could be used for more than just numbers. She suggested that if the "science of harmony and of musical composition" could be adapted for use with Babbage's machine, it could potentially compose elaborate and scientific pieces of music (Hollings et al., 2018; BBC Music Magazine, 2023).

Fast forward to the present day, and AI's influence on music is becoming increasingly apparent. AI-generated covers of popular songs can be found on platforms like YouTube and TikTok, and software like covers.ai is in high demand. AI tools are also used to generate text instrumentals, provide starting beats or inspiration, and assist in editing tunes.

Despite initial reservations, the music industry has begun to embrace AI. As Martin Clancy, editor of the book "Artificial Intelligence and Music Ecosystem," (2022), points out, "AI is different—different because of its speed, its scale, its ability for personalisation. It really can outcompete with human endeavour and has the ability to produce a huge amount of material."

AI is not only transforming the way music is created but also democratising the process. It's becoming a tool for amateur creators, allowing them to generate music for fun. However, this influx of amateur content poses a challenge for music streaming platforms, which often don't differentiate between professionally produced and amateur content.

4.1.4. Voice Resurrection

In a groundbreaking fusion of music and technology, The Beatles have breathed new life into an old demo tape by John Lennon, thanks to the power of artificial intelligence. The band has managed to create a new recording, set for release later this year, using AI tools to isolate Lennon's voice from the original recording.

Paul McCartney revealed this fascinating process during an interview with BBC Radio 4 on June 13, 2023. He explained, "We were able to take John's voice and get it pure through this AI, so then we could mix the record, as you would normally do" (McCartney, 2023). This innovative use of AI allowed the band to work with Lennon's voice as if it were a fresh recording, providing them with a unique kind of creative freedom.

The idea to use AI in this way was inspired by the work of filmmaker Peter Jackson in his documentary "Get Back," which chronicles the making of The Beatles' "Let It Be" album. Jackson's ability to resurrect archival materials using technology sparked McCartney's realisation that they could do the same with Lennon's old demo.

Jackson's technique involved using AI to separate Lennon's voice from the piano in the original cassette recording. McCartney described the process, saying, "He could separate them with AI. They could, they'd tell the machine, 'That's a voice. This is a guitar. Lose the guitar.' And he did that" (Chappell, 2023).

Despite initial confusion and concern from fans about the use of AI, Ringo Starr reassured in an interview with *Rolling Stone* that the Beatles would "never" fake Lennon's vocals (Hiatt, 2023). The AI was used not to generate Lennon's voice, but to extract and purify it from the original demo, preserving the authenticity of Lennon's performance while enabling a new creation from The Beatles more than four decades after Lennon's death.

4.1.5. Artist voice as an open source: GrimesAI

Figure 7. The headline of the topic by the website Relentlessbits. Source: https://relentlessbeats.com/2023/06/is-grimesai-the-future-of-music/.

Canadian musician Grimes is at the forefront of this AI revolution. As *Forbes* (Pequeño, 2023) and *The New York Times* (Coscarelli, 2023) reported, Grimes has embraced AI to "open-source" her voice, creating a new realm of possibilities for artists and fans.

In a groundbreaking move, Grimes has partnered with a music distributor and her AI platform to allow artists and fans to legally create and distribute songs using an AI-produced version of her voice. As *Forbes* describes, this initiative is "one of the first vetted processes that allow AI-generated songs as many artists remain wary of the technology."

The software behind this, Elf.Tech, produces music using a generative AI music operating system developed by CreateSafe. This system was trained with Grimes' voice, and as Grimes explained to *The New York Times*, "The part that is AI is taking the harmonics and the timbre of the vocal and moving them to be consistent with my voice, as opposed to the person's original voice. It's like a new microphone."

This partnership with Elf.Tech and digital music distribution firm TuneCore has enabled creative works that use Grimes' AI voice to be professionally distributed with vetted royalty splits. Despite Grimes' 50% cut of royalties, the GrimesAI voiceprint "does not claim any ownership of the sound recording or the underlying composition" unless the composition is a Grimes cover song.

Grimes' venture into AI music was inspired by the unauthorised online hit "Heart on My Sleeve," a track credited to AI versions of Drake and the Weeknd. Seeing this as an opportunity rather than a threat, Grimes developed a tool that allows producers and songwriters to make it sound like she is singing their song. The tool, called GrimesAI-1, has been used for more than 15,000 vocal transformations and has helped produce over 300 complete songs submitted for distribution to official streaming services.

Grimes has been impressed by the results and has provided her thoughts on five tracks created with the GrimesAI software. She praised the songs' creativity and the unique ways they utilised her voice. However, she also noted that any lyrics that made her uncomfortable, particularly those with a sexual undertone, were a point of contention for her.

This initiative by Grimes is a significant step in AI-generated music. It not only opens up new possibilities for artists but also raises important questions about the future of music, copyright, and the role of AI in creative processes. As AI continues to evolve and become more integrated into the music industry, artists like Grimes set the stage for a new music creation and distribution era. As Grimes herself put it in her conversation with The New York Times, "What are the boundaries? What is the Overton Window of art? What is allowed?"

4.1.6. Collaboration between human musicians and AI as a performance

In a groundbreaking performance at the Stockholm University of the Arts, a human musician and an AI system collaborated to create a unique piece of music (Oded Ben-Tal, 2022). The AI system, designed by composer and researcher Oded Ben-Tal, listened to musician David Dolan's piano performance, extracting data on pitch, rhythm, and timbre, and then added its own improvised accompaniment. This event marked a significant step in the exploration of how AI and humans might collaborate in the realm of music (Bedingfield, 2023).

Laurie Anderson, a 75-year-old legendary performance artist and musician, laureate of the Visionary Pioneer of Media Art lifetime award (Ars Electronica 2022), is embarking on an ambitious project to transfer her life into Artificial Intelligence. She is writing an opera based on everything she's ever said, written, or published, which is placed into a super-computer in Australia. The opera is written with AI as a collaborator, essentially

making her entire past a collaborator. Anderson revealed her plans during an interview with Euronews Culture (Farrant, 2023) at Ars Electronica 2022 in Linz, Austria, where she performed two spectacular shows.

4.1.7. "Lost Tapes of the 27 Club": AI-generated music for mental health project

In an article by *Rolling Stone* on April 2, 2021 (Grow, 2021), a unique project titled "Lost Tapes of the 27 Club" was highlighted. This initiative, led by an organisation named Over the Bridge, utilised artificial intelligence to generate "new" songs in the style of several iconic musicians who tragically died at the age of 27, including Nirvana's Kurt Cobain, Jimi Hendrix, Amy Winehouse, and The Doors' Jim Morrison.

One of the standout tracks, "Drowned in the Sun," was created in the style of Nirvana, complete with vocals from tribute band frontman Eric Hogan. The song resulted from AI analysing up to 30 songs by Nirvana, focusing on elements such as vocal melodies, chord changes, guitar riffs and solos, drum patterns, and lyrics to generate a fresh composition.

Over the Bridge, based in Toronto, is an organisation dedicated to supporting music industry members grappling with mental illness. The AI system employed for this project was Google's Magenta, a program designed to learn and compose in the style of specific artists by analysing their works. The program scrutinised the artists' songs as MIDI files, examining each artist's note choices, rhythmic quirks, and preferences for harmony. Following the analysis, the computer created new music, from which the most engaging moments were selected.

The lyrics were generated using a generic AI program known as an artificial neural network. The team input the artist's songs started with a few words, and the program predicted the cadence and tone of the poetry to complete it. The compositions were then arranged by an audio house to evoke the musician's style, and tribute artists added the vocals to make the songs sound as realistic as possible.

The project aims to draw attention to the tragedy of musicians' deaths by suicide and the need for mental health support in the music industry. Sean O'Connor, a board member for Over the Bridge, asks, "What if all these musicians we love had mental health support?" This initiative serves as a poignant reminder of the importance of mental health support in the music industry and the potential of AI in music creation.

4.1.8. Musicians clone their voices

Comparable to Grimes, Holly Herndon, a Berlin-based "computer musician," has developed an AI-powered vocal clone named Holly+, reported *WIRED* (Barshad, 2022). This AI tool can

sing in Herndon's voice and be prompted to sing anything. In a TED (2022) talk, Herndon demonstrated Holly+ singing songs in languages she doesn't speak. She also showcased a fellow musician, PHER, singing as himself, then feeding his vocals through a second microphone to Holly+ to sing "as" Herndon, effectively dueting live with Holly+. Herndon has made Holly+ available for anyone to use and collaborate with, and artists are already taking her up on the offer.

Herndon's goal with Holly+ is not to create a dystopian future but to present an opportunity. She recently released Holly+'s cover of Dolly Parton's "Jolene" and a video in which the artist Sam Rolfes portrays Holly+ via motion-capture technology. Herndon sees this as a chance to show how powerful these systems are and how important it is for artists to have sovereignty over their training data.

In 2019, Herndon released PROTO, a collaboration with an AI created by Herndon and her regular group of collaborators, including her partner Mat Dryhurst. They called it Spawn and saw it as an "AI child that we were training with farm-to-table data." Now Spawning is an organisation focused on creating a "consent layer" for training data. It's behind HaveIBeenTrained.com, which lets you search billions of images to see if your data has been used in AI art models.

Herndon hopes Holly+ encourages musicians to learn how to best manoeuvre through the coming future. She sees it as an ambitious creative project and a dream come true to have this "weird disembodied voice" that can perform vocal gymnastics that she would never be able to do. She also finds it mind-blowing that someone can "literally be you" with her blessing.

4.1.9. AI in music reviewing - a case from *Rolling Stone* magazine

In an experimental endeavour, *Rolling Stone* magazine employed Bing's AI chatbot to write a music review for Lil Yachty's album "Let's Start Here". The choice of Bing was strategic, as unlike ChatGPT, Bing has access to the current web, and the album in question featured an AI-generated cover, making it a fitting subject (Dolan, 2023).

The AI was tasked with writing a "Rolling Stone review of Lil Yachty's album Let's Start Here". The result was a draft that needed more depth and specificity while demonstrating a basic understanding of review structure and maintaining an authoritative tone. The review was filled with generalities and clichés, and it missed the opportunity to pointing out the unique aspects of the album, such as its AI-generated cover.

The AI's review was critiqued by a Rolling Stone editor, who commented on the lack of evocative imagery, creative language, and detailed exploration of the music. The review was described as "flat" and "cursory", and it was noted that the AI had included incorrect information, such as the participation of "jazz legend Herbie Hancock", who did not appear

on the album.

The experiment highlighted the current limitations of AI in tasks requiring deep understanding, creativity, and nuanced analysis. While the AI could produce a review quickly (submitted just seven seconds after the assignment), the content lacked the depth, insight, and personal touch a human reviewer would provide.

This case serves as a testament to the current state of AI in content creation. While AI can mimic the structure and tone of human writing, it still needs to improve understanding and convey the nuances of human creativity and emotion. As the Rolling Stone editor said, "We don't want to see technology replace human creativity".

4.2. Showcases in Cultural Heritage

Generative AI and data-driven storytelling are revolutionising the museum experience, redefining how cultural heritage is preserved and presented for future generations. Museums worldwide face the challenge of attracting visitors and staying relevant in the digital age. However, with the emergence of generative AI, museums can now transform their exhibits into dynamic, interactive experiences that captivate audiences. By harnessing the power of generative AI algorithms, museums can bring art and history to life in unprecedented ways, creating immersive and personalised encounters. Moreover, through data-driven storytelling, museums can curate narratives that are deeply engaging and tailored to individual visitors, enhancing their overall experience. These advancements open up endless possibilities, enabling museums to unlock the full potential of AI in delivering captivating and informative museum experiences.

This section will explore three prominent areas within cultural heritage where generative AI and data-driven storytelling have sparked remarkable innovation, as identified by the European Commission in 2022 (Pasikowska-Schnass & Lim, 2023). Firstly, in the domain of archival, cataloguing, and information management, generative AI techniques such as computer vision have been employed to facilitate the cataloguing of artefacts. Natural Language Processing (NLP) algorithms have also played a crucial role in interpreting text-based works, while deep learning methods have been utilised to analyse and restore aged artefacts. Secondly, in visitor experience management, generative AI and data-driven approaches have enabled the tracking of visitor numbers, forecasting attendance, and analysing valuable feedback from visitors. Lastly, in audience engagement activities, generative AI and data-driven storytelling have led to the reimagining and reinterpreting of museum collections, as well as the personalisation of visitor experiences.

4.2.1 Archival, cataloguing, and information management showcases

AI has revolutionised the way museums manage their archives and catalogues. By using

computer vision for cataloguing artefacts, natural language processing (NLP) to interpret text-based work, and deep learning to examine old artefacts, AI has made it easier for museums to manage their collections and provides new ways for visitors to interact with them.

For instance, the European Union funded a project that used Transkribus, an AI-powered platform for text recognition, transcription, and searching of historical documents. This tool was used to identify Lope de Vega as the author of 'La Francesa Laura', a theatre play whose author was unknown. Transkribus can be applied to documents from any place, any time, and in any language, making it a versatile tool for museums and cultural institutions (Pasikowska-Schnass & Lim, 2023).

AI can also be used to enhance the reconstruction of damaged or lost artefacts by analysing historical records, photographs, and other data to create accurate and detailed digital models. This enables museums to recreate and display priceless artefacts and works of art that might have otherwise been lost to history, offering visitors a chance to experience them in stunning detail.

In the field of archaeology, AI has been crucial for the detection of hidden archaeological sites. For example, Leiden University's Leiden Centre of Data Science (LCDS) and the Data Science Research Programme (DSRP) at the Faculty of Archaeology developed a flexible, robust and automatic detection method for archaeological objects (Pasikowska-Schnass & Lim, 2023). This method uses both LiDAR data and R-CNN (region-based convolutional neural network – a technique used in deep learning, one of the sub-sets of AI) to automatically recognise specific historical sites in the region and thus to facilitate and accelerate the process.

4.2.2 Visitor experience management showcases

AI has revolutionised the way museums offer a personalised experience to their visitors, enhancing customer satisfaction and engagement. By analysing visitor behaviour and preferences, AI can help create a custom route map for the audio guide software, enabling visitors to explore the museum in a way that suits them. This personalised approach ensures that visitors are able to make the most of their museum experience by focusing on the exhibits that interest them the most without feeling overwhelmed or rushed (Markus, 2021).

Moreover, AI has been used to bring history to life in a unique way. For instance, a project in New Zealand used AI and animation to tell the history of Tauranga Moana through 18th-century influential Māori chiefs, settlers and Pākehā colonists. The project, called Happy Hikoi, is a ten-part mini-series that is expected to resonate with the younger generation and visitors to the region (Hall, 2023).

In addition, IBM's The Voice of Art project at Pinacoteca de São Paulo used AI to create an interactive exhibit guide where Watson, an ultra-high-performance AI computer, answers museum visitors' questions. The Voice of Art uses natural language processing (NLP), cognitive computing and machine learning (ML) to allow visitors to interact with specific paintings and sculptures in the museum, thereby enabling a personalised visiting experience. Since the start of its use, the Pinacoteca de Sao Paulo Museum has seen a jump in visitor numbers by 200 % (Barth, 2017).

4.2.3 Audience engagement activities showcases

AI has the potential to reimagine or reinterpret the collection and personalise the visitor experience. For example, some Black artists have found evidence of racial bias in AI, both in the large data sets that teach machines how to generate images and in the underlying programs that run the algorithms. In some cases, AI technologies seem to ignore or distort artists' text prompts, affecting how Black people are depicted in images, and in others, they seem to stereotype or censor Black history and culture (Small, 2023).

Information collected through AI-powered tools can also be used to improve exhibit curation and design, helping museums better understand their visitors' interests and preferences. For instance, the Museum of Modern Art is using AI to analyse visitors' comments, while The Broad in Los Angeles is using it to analyse visitors' behaviour, such as ticket and gift shop purchases and website visits (Levere, 2018).

The integration of AI in museums signifies a significant shift in our interaction with cultural institutions, marking a turning point in the way we engage with them. AI has the potential to completely transform the museum experience, enabling the creation of exhibits that are not only informative but also captivating and immersive. By embracing the latest technological advancements, museums can stay up-to-date with our rapidly changing and technologically advanced society. This allows them to meet the evolving expectations of visitors and maintain relevance in the digital age. With AI as a vital component, the future of museums appears promising as it plays a crucial role in preserving and interpreting cultural heritage for future generations.

4.3. Showcases from audio-visual and interactive media

4.3.1. Showcase: AI-generated podcasts

In the world of podcasts, a new genre is emerging: AI-generated podcasts, *WIRED* (Knibbs,

2023) reports. Despite the already saturated market of over 4 million podcasts (Podcast Index) AI startups like ElevenLabs, WondercraftAI, and Podcastle are introducing tools to generate AI voices and content, creating a new wave of AI podcasts.

One of the first AI-generated podcasts to gain traction was "The Joe Rogan AI Experience," a series of simulations featuring the cloned voice of popular podcast host Joe Rogan conversing with AI-generated guests. Despite the creator, known only as Hugo, acknowledging that the podcast is more of a technological showcase than a source of engaging content, the first episode garnered over half a million views on YouTube. However, each subsequent episode has seen a decrease in listenership, suggesting that the novelty may wear off over time.

Other creators of AI-generated podcasts view their work as an experiment or an art project. For instance, Lior Sol, a sound engineer based in Israel, created a podcast called "Myself, I Am and That" using ElevenLabs' tools. He cloned his voice and then cloned that clone, resulting in a highly meta-conversation. Despite the small audience, Sol enjoys the process and sees it as a chance to explore new technology.

AI podcasting startup WondercraftAI has a slightly different perspective. They created "Hacker News Recap," a daily summary of top stories from the Y Combinator-run forum Hacker News, as a proof of concept. The podcast, which is entirely AI-generated, has found a place on Apple Podcasts' tech chart in the US. CEO Dimitris Nikolaou believes that the consistency of AI-generated podcasts could attract a loyal audience.

However, not everyone is convinced about the potential of AI-generated podcasts. Some creators believe that the appeal of podcasts lies in the human connection between the hosts and the listeners, something that AI cannot replicate. Kelsey McKinney, host of the popular podcast "Normal Gossip," sees AI podcasts as part of a larger push to automate and devalue the arts (in Knibbs, 2023).

4.3.2. Showcase: The evolution of AI-generated videos

In the dynamic landscape of AI and video generation, a new wave of AI-generated videos has emerged, capturing the internet's attention with surreal and often impossible scenarios. These videos, created using the first widely available text-to-video AI generators, depict scenarios such as Dwayne "The Rock" Johnson eating rocks or French President Emmanuel Macron sifting through and chewing on garbage.

This new wave of AI-generated videos, such as ModelScope, is reminiscent of the Dall-E images that swept the internet in the summer of 2020, almost indistinguishable from reality within a year. This rapid progression raises questions about the future of AI-generated video and its potential place in Hollywood.

Despite the current limitations of AI-generated videos, such as their lack of coherence from frame to frame, the technology is advancing rapidly. The progression of these generators is advancing "really, really fast," according to Jiasen Lu, a research scientist at the Allen Institute of Artificial Intelligence (Hoover, 2023c).

The potential applications of this technology in the film industry are vast. AI could help cast movies, model scenes before they're shot, and even swap actors in and out of scenes. However, technology is likely to replace human involvement in the film process *only partially*. As Nikola Todorovic, Wonder Dynamics' co-founder, puts it, "What's the point of movies if no human is involved in making them?"

Despite the potential of AI in film, there are ethical concerns to consider. As technology progresses, making compelling deepfakes with just a few lines of text could make it easier. Moreover, the use of unowned imagery could lead to copyright lawsuits.
However, while the future of AI-generated videos is promising, it is also fraught with challenges.

"The success of AI in film will depend on whether it *can* recreate that magic. Attempts so far have been intriguing but ultimately disappointing or harmful—a reminder that just because AI can engineer content doesn't mean it *should*", – concludes an expert from WIRED (Hoover, 2023c).

4.3.3. Showcase: De-aging Harrison Ford with AI in 'Indiana Jones and the Dial of Destiny'

In the film "Indiana Jones and the Dial of Destiny", Industrial Light & Magic (ILM) used a suite of tools, including machine learning, CGI, and other technologies, to de-age Harrison Ford, allowing the 80-year-old actor to appear as his younger self from the early 1980s for about 25 minutes of the film. As Bedingfield (2023a) explains in WIRED, this de-ageing technology represents a significant advancement in the use of AI in Hollywood, raising questions about the industry's future.

The process involved a set of tools ILM calls FaceSwap, which combined data from multiple cameras and facial markers to create a "CG mask" that could be applied to Ford's face in every frame. Machine learning tools were used to analyse years of footage of Ford to ensure the de-aged version resembled his younger self. The scenes were then fine-tuned using VFX tools from Disney Research and other sources.

Figure 8. *De-aged Harrison Ford. Illustration from WIRED, July 7, 2023.*

Despite the impressive results, the de-aged Ford appeared somewhat unreal, with a face that was unusually smooth and glowing, as if it were a moving Stable Diffusion portrait. The film's creators hoped that viewers would feel as if they were watching footage from 40 years ago, but the perfection of the de-aged Ford and the cleanliness of his surroundings betrayed the use of digital trickery.

While not as extensive as the generative AI currently making headlines, the use of AI in this film has sparked debate in Hollywood. The Writers Guild of America is on strike at the time of writing this, to keep AI out of scriptwriting, and the Screen Actors Guild is negotiating with the Alliance of Motion Picture and Television Producers over the use of AI in performances.

Despite these concerns, the potential of ILM's technology is seen as limitless by its creators. They argue that given enough time and resources, anything can be accomplished. This suggests a future in which ageing or deceased actors could be digitally resurrected, and films and TV shows could be enhanced or even entirely created using AI. However, the film also anticipates these criticisms, with a storyline that emphasises the inalterability of the past and the certainty of the future.

4.4. Showcases from Design and Creative Services

4.4.1. Showcase: The intersection of AI and advertising

One area that has seen significant development is using AI in advertising. The New York Times article by Mac Schwerin titled "A.I. and T.V. Ads Were Made for Each Other" (Schwerin, 2023) discusses a striking example of the emerging AI-generated commercials. The column highlights these artificial commercials' uncanny and surreal nature, created using Midjourney and Gen-2. These commercials, often featuring bizarre and impossible scenarios, result from AI interpreting and executing prompts provided by tech enthusiasts. The AI's interpretation of these prompts results in a "freaky visual smorgasbord" that is both fascinating and unsettling.

One such example is "Synthetic Summer," a fake beer commercial produced entirely with generative AI. The commercial begins with a conventional barbecue scene but quickly descends into absurdity, with partygoers laughing aggressively, holding their beers in misshapen fingers, and a fire spreading across the frame. This robot-generated commercial, while bizarre, offers a unique insight into the potential and limitations of AI in advertising.
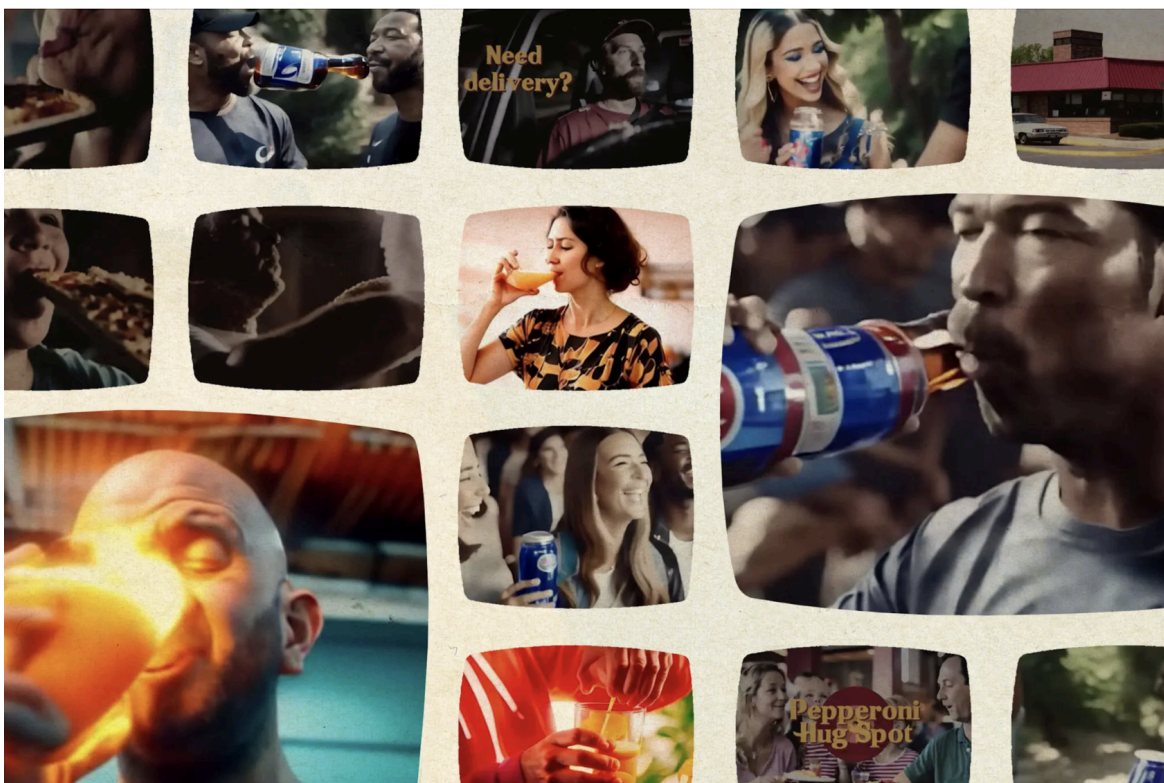

Figure 9. AI-generated ads. Photo illustration by Anthony Gerace in NY Times Magazine, June 27, 2023

Despite the surreal nature of these commercials, they are surprisingly effective at capturing and reflecting the tropes and clichés of traditional advertising. Schwerin (2023) notes that these examples offer a "composite picture of formulas and clichés," including those we are often too immersed in to notice. This supernatural ability to mimic and exaggerate advertising conventions highlights AI's potential as a tool for cultural critique and analysis.

"But beware of the AI hangover. The last technology revolution in ads that promised magical efficiency and exact consumer targeting was automated ad buying across the web. In practice, the ad tech industry, dominated by companies such as Google, has been a distinctly mixed blessing" (Financial Times, June 23, 2023).

Using AI in advertising also raises ethical and practical concerns. The potential for technology to create compelling deepfakes and the risk of copyright infringement are significant issues. Furthermore, the rapid development of AI technology means that the tropes and conventions it learns may quickly become outdated.

5. Data-driven Opportunities and Threats for Creative Industries

Examination of how AI technologies are transforming non-journalistic media production and creative industry practices. Showcases of AI applications in the creative industries.

5.1. Opportunities for Creative Professionals

"The future of entertainment will be the future of everything,"
– John Rogers, screenwriter (in Ashby, 2023).

5.1.1. Enhanced creativity

Enhanced creativity is usually mentioned first whenever a conversation starts about the opportunities provided by data-driven technologies – it will be mentioned in academic papers and the mass-media columns. It has been said that AI technologies can be used as a creative tool or collaborative assistant for creativity in various industries. They can assist in content creation (in each stadium of creation), information analysis, content enhancement, and post-production workflows (Anantrasirichai and Bull, 2022).

Idea Generation: "AI can help develop useful content for social media and determine social media posts with the highest engagement. AI is also good at screening the ideas your audience anticipates and generating topic ideas based on their interests. HubSpot's blog topic generator and Portent's Content Idea Generator are some of the most popular tools" (Darbinyan, 2022).

Text Optimisation: "With the help of AI, optimising content for SEO can also become easier. AI-powered SEO can help create top-ranking content and improve organic traffic by discovering the related keywords or rewriting texts to be keyword-focused" (Darbinyan, 2022).

Content Recommendation: "AI-powered recommendation engines identify new and upcoming creators allowing anyone with a good idea to find an audience for their work. This makes it easier for people to access and consume content depending on their taste while giving new opportunities for creators to succeed" (Darbinyan, 2022).

The white paper presented by the World Economic Forum in 2018 predicted how AI

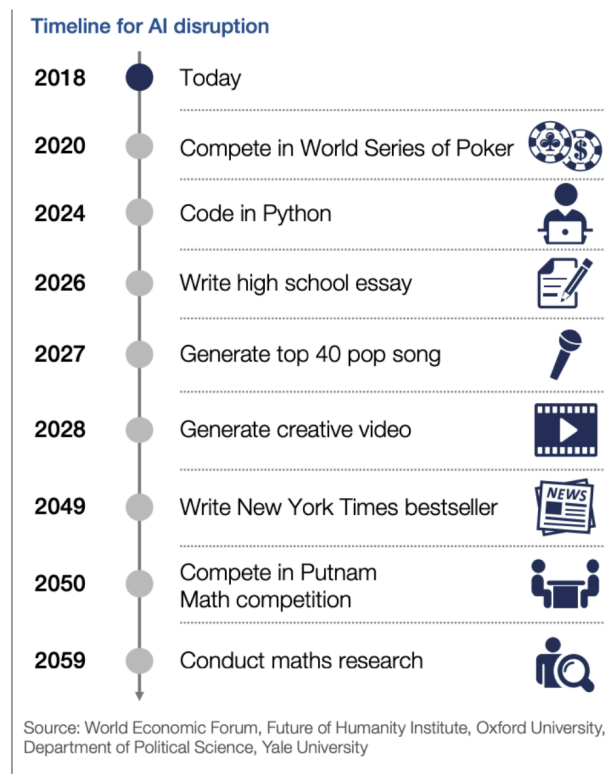disruption in the creative industries will develop in the near future; the picture below shows the timeline:

Timeline for AI disruption

2018	Today
2020	Compete in World Series of Poker
2024	Code in Python
2026	Write high school essay
2027	Generate top 40 pop song
2028	Generate creative video
2049	Write New York Times bestseller
2050	Compete in Putnam Math competition
2059	Conduct maths research

Source: World Economic Forum, Future of Humanity Institute, Oxford University, Department of Political Science, Yale University

Figure 10. Timeline in AI disruption as estimated in 2018. Source: ("Creative Disruption: The Impact of Emerging Technologies on the Creative Economy," 2018)

We can see that just a few years ago, the authors of the World Economic Forum report did not anticipate the events of 2022 and the coming rise of generative AI; otherwise, they should know that "code with Python" and "writing high school essay" would be possible with AI already in 2022, moreover – in 2023 it will becoming a widespread practice. The thing is, nobody can predict how rapidly technology will evolve.

Academia talks about the ongoing development and application of AI in cultural and artistic production as something that "both rehumanise and dehumanise our understanding of creativity":

"The idea of creativity in everyday cultural life aptly rehumanises creativity that has been instrumentalised and dehumanised by the creative industries discourse, seeing it as an essential trait of every human being and being 'grounded in [our] everyday abilities'" (Lee, 2022, p. 608).

5.1.2. AI for Augmentation

The international group of researchers (Hassani et. all., 2020) explore the roles that AI and IA

(*intelligence augmentation*) might play in the future, in terms of technology and the humankind paradigm. The authors argue that AI and IA will likely play significant roles in the future, and there is a need to educate the public about the concept of intelligence augmentation so that the debate shifts from focusing solely on AI to a more balanced focus on both AI and IA.

"As for the future, [the researchers] are of the view that humans will remain in the driving seat for years to come and that AI will have to play the role of assisting IA in humans by providing capabilities to handle structured and unstructured Big Data more efficiently. Whilst AI is a threat to humanity in some respects, humans have always succeeded in adapting to new technology and will continue to adapt to the disruptions brought about by AI" (Hassani et. all., 2020, p. 150-151).

Comparable ideas formulate the Standford University scholars:

"...Given that AI systems and humans have complementary strengths, one might hope that, combined, they can accomplish more than either alone. An AI system might be better at synthesising available data and making decisions in well-characterised parts of a problem, while a human may be better at understanding the implications of the data …, working with difficult-to-fully quantify objectives, and identifying creative actions beyond what the AI may be programmed to consider" (Littman et al., 2021).

5.1.3. Efficiency and productivity

AI can automate repetitive tasks, freeing up time for creatives to focus on their work's more conceptual and innovative aspects. For example, AI can automate the process of editing photos or videos or even writing code.

"The promise of generative AI is that it can boost the productivity of workers in creative industries, if not replace them altogether. Just as machines augmented muscle in the industrial revolution, so AI can augment brainpower in the cognitive revolution. This may be particularly good news for jaded copywriters, computer coders, TV scriptwriters and desperate school children late with their homework. But it may also have a big impact on areas as diverse as the automation of customer services, marketing material, scientific research and digital assistants. One intriguing open question is whether it will reinforce the dominance of existing search engines, such as Google's, or usurp them" (Financial Times, January 3, 2023).

Hye-Kyung Lee (2020), while admitting the production and time benefits of AI aids, pointed out how this can lead to job loss for freelancers:

"...For some businesses, using AI presents a fundamental solution to the labour intensity of artists. This has resulted in a situation where capital replaces labour as the main input into

the production process of original artwork or cultural content. For instance, a subscription-based AI writing service claims that its customers will 'have a finished article in under a minute at a fraction of the cost [needed to hire freelance writers]'".

5.1.4. Creating New Extra Jobs

The widespread concern about job loss resulting from algorithmisation is accompanied by anticipation of the emergence of new occupations facilitated by AI. According to a study conducted by researchers at Stanford University (Littman et al., 2021), it is estimated that by 2030, AI and automation will displace around 800 million jobs. However, during the same period, it is projected that approximately 555–890 million new jobs will be created as a result of this technological disruption. This data is in line with the World Economic Forum analysis:

"It is expected that creative occupations will see an increase in jobs, despite automation, and the change in labour demand is predicted to be as high as 85% in some economies" ("Creative Disruption: The Impact of Emerging Technologies on the Creative Economy," 2018).

5.1.5. Investments in creative business and research

The remarkable progress of generative AI has spurred both governmental and non-governmental investment programs. A prime example is the UK's ambitious plan to boost its creative industries by £50 billion and support an additional million jobs by 2030 (Department for Culture, Media and
Sport, 2023). This plan includes £77m of new funding for advanced screen and performance technology research labs, £50m to support more regional creative clusters, and additional funding for music venues, video game studios, London Fashion Week, and the next generation of British music talent. The plan also aims to build a pipeline of skills and talent through new creative career initiatives.

Another example comes from Hong Kong, where the Visualisation Research Centre is a key deliverable under the two-year art-tech project "Future Cinema Systems: Next-Generation Art Technologies". This project is a collaboration between HKBU, the City University of Hong Kong (CityU), and the École Polytechnique Fédérale de Lausanne (EPFL) in Switzerland. The project has been awarded HK$35.4 million in funding from the Innovation and Technology Support Programme under the Innovation and Technology Commission of the HKSAR Government (Ovietnam, January 20, 2023).

5.1.6. Monetisation

Data-driven technologies offer creatives new avenues to monetise their work, such as identifying profitable markets or enabling the creation and sale of digital art online. Rem Darbinyan from the Forbes Technology Council (2022) highlights two key AI implementations

that can enhance the monetisation of creative work:

AI for influencer-brand matching: With the rise of the creator economy and influencer marketing, brands often struggle to find the right influencers. AI can assist in this process by helping brands identify suitable influencers and predict successful partnerships. Influencer recommendation platforms powered by AI are transforming how brands and content creators connect.

AI for creating virtual influencers: To diversify their influencer marketing strategies and find influencers that resonate with their target audience, some brands are turning to AI to create their own virtual influencers. Examples include Lil Miquela (3M followers on Instagram) and Shudu (241K followers on Instagram). These AI influencers offer brands full control and a unique form of expression, helping them stand out.

5.1.7. Democratisation of creativity

AI tools are becoming more accessible and easier to use, enabling more people to engage in creative activities and express their ideas. This can lead to a more diverse and vibrant creative landscape.

"Generative AI is a good example of a broader trend that is taking powerful technologies out of the hands of experts and putting them in those of everyday users. This democratisation of access may have huge implications and create extraordinary opportunities for many businesses. The increasing popularity of "low code/no code" software platforms, for example, will enable increasing numbers of non-expert users to create their own powerful mobile and web apps. No longer will product managers be so beholden to their tech teams setting their own agenda" (*Financial Times*, January 3, 2023).

The influence of AI on everyday creativity is multifaceted. Lee (2022) provides a summary of the pros and cons surrounding the democratisation of creativity. This perspective is not unique to Lee; similar viewpoints are commonly echoed in other academic and mainstream media outlets.

On the one hand, AI enables ordinary people to create professionally-looking artwork, potentially democratising art and music by making it more affordable and accessible. This has led to an increase in the diversity of creative expressions in society.

On the other hand, there are concerns about the potential lack of cultural diversity in AI-generated expressions. AI's production may be driven by popular tastes, which are further reinforced by AI algorithms used by large platform businesses. This could lead to a homogenisation of cultural expressions.

Moreover, the rise of AI creativity challenges the concept of cultural democracy. It reveals

the inability of the current understanding of cultural democracy to account for the realities of the contemporary creative environment, where advanced technologies are used to assist and even replace human creative labour, offer new types of commercial cultural commodities, and shape cultural tastes.

5.1.8. Learning and skill development

AI plays a significant role in learning and skill development, offering personalised experiences that help individuals enhance their abilities and acquire new ones. A notable example is Code Ninjas, a US-based organisation highlighted by ENP Newswire (May 20, 2022), which teaches children *coding skills* to prepare future creative professionals. The perception that a passion for digital technology only leads to website design and software development is changing. Today, young graduates equipped with coding and STEM (science, technology, engineering, and math) expertise are venturing into dynamic fields like game design and film production within the creative industries. Encouraging children to explore their passion for digital technology from an early age unlocks exciting opportunities and a fulfilling path. Children's interest is sparked by fostering a fun and pressure-free environment for coding education, paving the way for diverse and innovative roles in the digital technology industry. Careers in STEM and coding have expanded beyond conventional desk jobs, encompassing AI, game development, animation design, and film production. Through the removal of unnecessary pressure, children can freely explore coding, unlocking their potential and embarking on a promising future.

"Prompting" or *"prompt engineering"* is a skill that has emerged alongside the launch of generative AI models. Generative AI services, such as ChatGPT and Midjourney, are designed to be user-friendly, but there is much to learn about maximising their potential, particularly for creative applications. As WIRED suggests, spending time with available resources can help users become adept AI operators (Nield, 2023).

White et al. (2023) explained in their [arXiv](#) pre-print paper, "Prompt engineering is the means by which LLMs are programmed via prompts". It "is an increasingly important skill set needed to converse effectively with large language models (LLMs), such as ChatGPT. Prompts are instructions given to an LLM to enforce rules, automate processes, and ensure specific qualities (and quantities) of the generated output. Prompts are also a form of programming that can customise the outputs and interactions with an LLM". The manuscript offers readers a practical "patterns catalogue" for a conversation with ChatGPT.

Platforms like [Medium](#)[10] and [Reddit](#) offer a wealth of information for those looking to improve their prompting skills, as evidenced by the vast array of topics the Medium authors

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[10] Medium is an American online publishing platform developed by Evan Williams and launched in August 2012. It is owned by A Medium Corporation. The platform is an example of social journalism, having a hybrid collection of amateur and professional people and publications, or exclusive blogs or publishers on Medium, and is regularly regarded as a blog host (Wikipedia contributors, 2023).
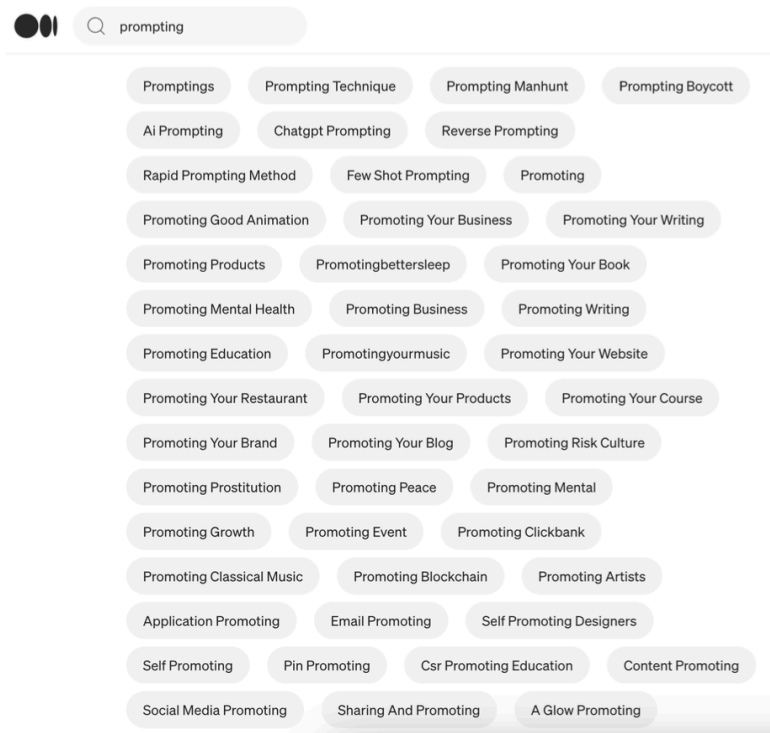
cover:

Figure 11. *Tags covering the term "prompting" on Medium. Screenshot July 2023.*

Online courses like those on udemy.com also provide opportunities to learn and enhance the art of prompt engineering.

Figure 12. *The online Generative AI courses offer – impressions. Screenshot from udemy.com in July 2023.*

While ethical and legal discussions continue, many early adopters of generative AI, like Lance Weiler from Columbia University, emphasise in his interview with the New York Times (Small, 2023a) "a hands-on approach to these tools". As we could observe through our corpus, the main idea of *prompting narrative* is an invitation to try and experiment with a tool as much as possible.

5.1.9. New forms of art and expression

AI opens up new possibilities for artistic expression. For example, artists can collaborate with AI to create new kinds of artwork or use AI to explore new forms of interactive storytelling (see examples in section 4 of this report).

The creative industry is gearing up for a new phase of development where humans and machines collaborate as co-creators. An important example of this is the recent guideline update by the Grammy Awards, which now allows AI-created music to be eligible for awards, but only for human contributors. Rolling Stone covered this significant change in June 2023 (Paul, 2023).

The Recording Academy has set specific parameters for different categories to accommodate this change. For instance, a song with AI-performed vocals could be eligible in a songwriting category if there's substantial human contribution. Conversely, a human-sung song written by AI wouldn't qualify for a composition or songwriting category.

Recording Academy CEO Harvey Mason Jr. emphasised that the aim isn't to replace but to enhance human creativity with technology. This significant change, driven by AI's growing prevalence in the music industry, showcases the creative industry's readiness to embrace the synergy of humans and machines in creation.

5.2. Key Threats and Issues

The modern trends of the 21st century, including the impact of COVID-19, changes in internet regulations, AI development, and shifts in content consumption, are becoming more prominent. Major companies like Disney and Meta (formerly Facebook) are laying off thousands of employees. Movies based on comic books are now considered tax deductions. Automated purchasing systems, or "scalper-bots," have negatively affected how fans engage with live music. Some fans manipulate review scores and ruin brand collaborations, while others influence the stock market through memes and excessively consume streaming content. However, despite all these changes and the vast amount of data available to them, advertisers are still uncertain about the effectiveness of targeted marketing. This situation echoes the sentiment expressed by screenwriter William Goldman: *in the end, no one really*

knows what's going to happen (in Ashby, 2023).

"The unbundling of the American storytelling machine has become the unbundling of the American story. What was once a roaring engine of commerce and a siren of soft power is now as fractured as the audience consuming its products. And it's left the entire country, and the world that consumes its wares, vulnerable", – concludes the WIRED columnist Madeline Ashby (2023), who analyses the disruptive processes in the US entertainment industry and the future of Hollywood.

5.2.1. Copyright

Copyright may need a substantial rethink. In January 2023, Google refrained from releasing its MusicLM model, which turns text into music, because of "the risks associated with music generation, in particular, the potential misappropriation of creative content (Clark, 2023)." However, in the summer of 2023, the model became available to the broad public for experiments.

The complexities of copyright law in relation to music generated by artificial intelligence (AI) have been discussed in academia. In a 2019 paper, the researchers asked readers to imagine a musician holodeck, an endpoint for music AI that has archived all recorded music and can generate or retrieve any possible sound on request. Where do songwriters fit into this future? And before then, can songwriters defend themselves against plagiarism? Should audiences be told if and when AI is used?

Sturm et al. (2019) highlight that while some countries, such as the UK, South Africa, Hong Kong, India, Ireland, and New Zealand, have provisions for computer-generated works, many others, especially in Europe, do not.

"According to the Court of Justice of the European Union (CJEU), a work is considered original when it is the expression of the author's own intellectual creation and his/her free creative choices, the author's personality, or the author's personal touch". The researchers suggest that current copyright laws centred around human authorship and originality may not be equipped to handle AI-generated works.

"Regardless, humans can still have an important involvement in creating music, even if assisted by an AI system, – writes Strum and colleagues, – Originality, as a precondition for copyright-ability, may be concluded whenever there is a significant creative human contribution to the resulting output".

Academics also raise the question of whether AI-generated works should be eligible for copyright protection. It suggests that while significant human contribution to an AI-generated work could warrant copyright protection, works generated with minimal

human intervention challenge current laws. "In any case, humans would be needed, of course, for creating the technology, – the author's argument in the footnotes, – This does not mean that the generated music necessarily reflects the personality of those developers".

The use of copyrighted works in training datasets for AI systems is another point of discussion. It means that while reproductions for automated computational analysis could be allowed under certain conditions, the users must have legal access to the work. "Training state-of-the-art ML models require large amounts of data, i.e., pre-existing music, such as scores, lyrics and/or audio recordings. When the music used to train a system is protected by copyright, permission from the rightsholders is required unless an exception applies. In the EU, a limited number of exceptions exist. Copyright exceptions traditionally concern a qualified purpose, e.g., quotation, parody, teaching, research, and news reporting <...> All in all, it must be retained that copyright is about use and not about access; the exceptions can only be invoked in case users have legal access to the work, or in the above-mentioned example to the digital repository. Furthermore, the European member states still need to implement the directive into national law" (Sturm et al., 2019).

Finally, the paper raises potential liability issues if an AI system accidentally reproduces a copyrighted work. It suggests that the engineer and the user could be held responsible for such infringement: "In generative AI legal Wild West, the courtroom battles are just getting started", – a very demonstrative mass-media headline in CNBC tells (Sheng, 2023)

Non-professional content creator groups have been spared from AI worries and how the ownership of creative work could be protected. This has led to a wave of lawsuits against high-tech companies initiated by writers and artists. Here are some notable examples:

Reuters (Brittain, 2023a) reported about a group of artists who accused Stability AI, Midjourney, and DeviantArt of committing mass copyright infringement by using the artists' work in generative AI systems — a detailed analysis of the case published in the *Art in America* (Mattei, 2023).

The Verge (Vincent, 2023) informed: "Getty Images has filed a case against Stability AI, alleging that the company copied 12 million images to train its AI model 'without permission ... or compensation.'"

The New York Times (Small, 2023): "The comedian Sarah Silverman has joined a class-action lawsuit against OpenAI and another against Meta accusing the companies of copyright infringement, saying they "copied and ingested" her protected work in order to train their artificial intelligence programs, according to court papers".

The Guardian (Creamer, 2023):" Mona Awad and Paul Tremblay allege that their books, which are copyrighted, were 'used to train' ChatGPT because the chatbot generated 'very

accurate summaries' of the works".

Appel, Neelbauer and Schweidel (2023) discuss the issue of AI and copyright in the Harvard Business Review. They argue that "Generative AI, which uses data lakes and question snippets to recover patterns and relationships, is becoming more prevalent in creative industries. However, the legal implications of using generative AI are still unclear, particularly in relation to copyright infringement, ownership of AI-generated works, and unlicensed content in training data. Courts are currently trying to establish how intellectual property laws should be applied to generative AI, and several cases have already been filed. To protect themselves from these risks, companies that use generative AI need to ensure that they are in compliance with the law and take steps to mitigate potential risks, such as ensuring they use training data free from unlicensed content and developing ways to show provenance of generated content".

5.2.2. Threats to the music streaming platforms' business model

Overflood of AI-generated content. There are now more than 100 million songs on Apple Music, Amazon Music, and Spotify, writes Amanda Hoover (2023a) in the "Culture" column of WIRED. Listening to them all would take hundreds of years. Even more, have been uploaded to SoundCloud. AI tools democratise music-making. But there's potential for a flood of AI-generated content to be unleashed onto streaming platforms, competing with real people and their compositions for the attention of your ears.

However, the columnist believes in the unique position of human creation above the artificial one: "AI might become a perfect imitator, but it may not, on its own, create music that resonates with listeners. Our favourite songs capture heartbreak or speak to and shape the current culture; they break new ground during times of political upheaval. AI will have a role in writing, recording, and performing songs. But if people open music streamers and see too many AI-made songs, they may not be able to connect" (Hoover, 2023a).

Will convenient functional sound dominate human-created music? Morgan Meaker (2023) analyses the history of online music platforms and the profound impact of AI and data-driven practices on how we consume and perceive music. A case in point is Spotify, a leading music streaming platform known for its algorithmically curated playlists. These playlists have inadvertently led to a phenomenon Meaker refers to as 'sludge' - a blur of indistinguishable songs that imitate the listener's music taste.

"Twenty years ago, the iTunes Music Store reshaped how we listen, but we have now arrived at another turning point blurring the definition of music" (Meaker, 2023).

The WIRED columnist writes, "My sludge addiction sprang from Spotify's algorithmically curated playlists, which promised to help me focus or find music tailored to my tastes...

These playlists drip-fed me endless pap that dissolved into the background." This 'sludge' is often composed of tracks by artists the listener has never heard of before and, due to the transient nature of the playlists, may never encounter again.

Meaker's backlash against this trend involved resisting Spotify's push for music discovery, seeking out artists on smaller platforms like SoundCloud, and even purchasing vinyl albums. However, the advent of AI-generated music, such as a clip of Ariana Grande's voice singing a Rihanna song, made her realise that this new iteration of 'sludge' is an emerging threat in music streaming.

The author worries about how music consumption will develop, considering the popularity of 'sludge', or "functional" sounds—designed for focus or sleeping. As Oleg Stavitsky, one of the co-founders of [Endel,](#) a slick Berlin-based app that uses AI to generate one endless piece of music that adapts to your surroundings, pointed out in the interview, "functional sound ... can co-exist with human-made compositions". "That sounds harmonious", – resonates with Meaker, – But realistically, how much time for music does a person have? If Stavitsky's functional music becomes popular (already he claims 2 million monthly listeners), it will inevitably eat into time people spend listening to actual music".

5.2.3. Reproduction of social hierarchies and aesthetical biases

An article in The New York Times (Schumann, 2023) highlights the ethical considerations and potential implications of using AI in live performances and composition. The author and his interviewees express their concerns about bias, the reproduction of social hierarchies, and the potential for AI to replace human artists:

Dr. Tallon, a composer and professor of A.I. and the arts at the University of Florida explains: "When I design a tool for my own personal use, I'm looking at data related to my sonic priorities. But public-facing technologies use datasets that focus on, for instance, aesthetic ideals that align more closely with Western classical systems of organising pitches and rhythms."

Besides *aesthetic biases*, AI reproduces *social hierarchies*. A music professor at Brown University, Enongo Lumumba-Kasongo, elaborates on this thought to The New York Times columnist:

There is a very specific racial discourse that I'm very concerned about. I don't think it's a coincidence that hip-hop artistry is forming the testing ground for understanding how A.I. affects artists and their artistry given the centuries-long story of co-optation and theft of Black expressive forms by those in power <...> What I'm most concerned about with A.I. Drake and A.I. Travis Scott is that their music is highly listenable, and calls into question any need for an artist once they've articulated a distinct 'voice.'

5.2.4. Production of deepfakes

In the realm of the creative industry, the emergence of deepfake technology poses significant threats that are increasingly hard to ignore. The threat posed by deepfake technology to the creative industry is not just theoretical but is manifesting in real-world scenarios. To illustrate this, we've chosen two compelling examples: one involves an AI-generated video of a well-known musician, and the other focuses on the disturbing surge of AI-generated true crime videos on the widely-used platform TikTok.

In the bustling world of music, two superstars, *Drake and The Weeknd*, found themselves embroiled in an unexpected controversy that the leading international news outlets coverage[11]. A track titled "Heart on My Sleeve" had surfaced, claiming to feature AI-generated versions of their voices. The track, a novelty for the music industry, went viral, racking up millions of plays across red various platforms like TikTok, Spotify, and YouTube. However, streaming services swiftly removed it, leaving a trail of questions and concerns in its wake.

The track was the brainchild of an anonymous creator who harnessed the power of generative AI technology to create a sound so authentic it could be passed off as real. The music industry watched in trepidation as this grey-area genre exploded in popularity. It was a stark reminder of the disruptive potential of new technologies, reminiscent of the dawn of the synthesiser, the sampler, and the file-sharing service Napster.

The track's success, however brief, sent shockwaves through the music business. Corporations grew increasingly concerned about AI models learning from and diluting their copyrighted material. Universal Music Group, the home of both Drake and The Weeknd, was quick to flag such content, citing intellectual property concerns.

Despite the controversy, artists and their labels remained confident. They believed in the power of fandom, the emotional connection between an artist and their fans, to distinguish the real artist's work from an AI imitation. However, the spectre of royalty-free music generators loomed large, threatening to disrupt the already fragile economy for working musicians.

The music industry found itself at a crossroads as the dust settled on the "Heart on My Sleeve" controversy. The rapid advancement of generative AI across text, images, sound, and video posed a potential threat to creative industries at all levels. Artists, fans, and the systems that govern them were left grappling with the implications of this new technology.

The musician Holly Herndon, who had studied and used AI in her work, summed up the

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[11] More to read in The Washington Post (Ibrahim, 2023), Forbes (Johnson, 2023), Sky News (Russell, 2023).

situation eloquently. "It is now possible to produce infinite media in the style or likeness of someone else, soon with little effort, so we all have to come to terms with what that means," she wrote in an email. Herndon further emphasised that technology is not inherently evil, but its use and regulation must be thoughtfully considered. She warned of the potential for misuses, such as the creation of deepfakes, and the need for artists to be vigilant in protecting their work and identity.

The New York Times (Coscarelli, 2023a) reports that the music industry continues to navigate this new landscape, and the legal and creative questions raised by the "Heart on My Sleeve" controversy remain. The track may have been a novelty, but the issues it brought to light are here to stay. As Herndon pointed out, the music industry needs to adapt to the new reality where AI can mimic any artist's style. The question remains: How will the industry protect artists' rights while embracing the potential of this transformative technology?

Collocutors grapple with why AI-generated music, often called "Fake Drake," seems to have secured a foothold in the music industry. They attribute this trend to the rapid technological advancements that have made it possible to create music that closely mimics the style of popular artists. The potential opportunities that AI offers for music creation are vast, and this, coupled with the novelty of the technology, has led to its continued presence in the industry.

However, the discussion is more than just the rise of AI-generated music. The hosts and Patel also express hope and belief in the enduring value of human-made music. They argue that while AI can mimic the style of artists, it cannot replicate the human connection and emotion that comes with
music created by humans. This unique creativity and emotional resonance make human-made music irreplaceable, despite the advancements in AI technology.

In conclusion, the episode "Why is Fake Drake Here to Stay?" presents a balanced view of the future of music. While acknowledging that AI-generated music is likely here to stay due to its potential benefits and the technological advancements driving it, there is a strong belief that human-made music will continue to be valued for its unique creativity and the human connection it provides. As the music industry navigates this new landscape, the conversation between Goode, Lichfield, and Patel underscores the importance of maintaining a balance between embracing new technology and preserving the human element that lies at the heart of music.

Some of these who use or, better, misuse a deepfake technology play on the public's attraction to *true crime stories*. TikTok accounts post AI-generated clips of murder victims, primarily children, recounting their horrific deaths. These videos, created by accounts like @truestorynow, have amassed thousands of followers and millions of views. The victims in these videos are not real but are AI-generated creations that tell true stories of crime

victims. However, the details are often inaccurate, and the victims' appearances are altered, likely to comply with TikTok's community guidelines banning deepfake depictions of private individuals or young people.

These videos raise significant ethical and legal concerns. "Something like this has real potential to re-victimise people who have been victimised before," says Bleakley, assistant professor in criminal justice at the University of New Haven, in his comment to Rolling Stone (Dikson, 2023). "Imagine being the parent or relative of one of these kids in these AI videos. You go online, and in this strange, high-pitched voice, here's an AI image [based on] your deceased child, going into very gory detail about what happened to them."

AI-generated videos — which are based on images of children who were actually abused — are becoming popular on TikTok. (Any resemblance to a real person is coincidental.) @TOUCHINGSTORY4U/TIKTOK

Figure 13. *Deepfake image of the victim of crime on TikTok. Illustration from the Rolling Stone, May 30, 2023*

The creation of deepfake videos can potentially lead to intricate legal issues. This is evident in the rise of AI true-crime videos, which can be compared to the popularity of deepfake porn. No federal law currently declares the creation of nonconsensual deepfake images and videos as illegal.

As the author from Rolling Stone concludes, "With AI technology rapidly evolving every day, and little to no regulation in place to curb its spread, the question is not whether videos like these will become more popular, but rather, how much worse the marriage of true crime and AI is going to get. One can easily imagine true-crime creators being able to not only re-create the voices of murder "victims," but to re-create the gory details of crimes as well" (Dickson, 2023).

"Deepfake non-consensual contents make it really accessible to fabricate or alter a media by using the face of an individual which in return has the potential to cause psychological harm, national security, market disruption, political instability etc.", noted the authors of the "Ethical & Legal Implications of Deep Fake Technology: A Global Overview" (Shekhar & Ransom, 2023).

Deepfakes, generated using AI technology, pose significant threats to society, including the creation of fake news and interference in elections. The researchers divide these challenges into a few categories by deepfake creator's type:

- *Deepfake hobbyists* see this as a form of tech art or use it for personal benefits such as raising awareness about the technology or getting work in music videos, video games, etc.
- *Political players*, including candidates, hackers, terrorists, and foreign states, can manipulate public opinion and undermine faith in national institutions through deepfakes.
- *Fraudsters* use AI for financial crimes such as stock manipulation and impersonation of bank executives.
- *Entertainment companies* use deepfakes to bring life to game characters or movie scenes. Challenges presented by deepfakes have an ethical and legal nature.
- *Political challenges:* Misinformation and fake news can lead to the viral spread of harmful content. These threaten national security by potentially disrupting election campaigns and sparking unrest.
- *Social challenges:* Non-consensual and revenge porn violate victims' rights, while deepfake technology can facilitate financial fraud and cybercrime and enable defamation of individuals, brands or products.
- *Legal challenges:* revolve around the difficulty of tracing and attributing deepfake content. Once shared online, it becomes nearly impossible to remove such content from the internet, trace its origin, or verify the creator's identity. This makes legal recourse and responsibility assignments difficult.

From a **legal perspective**, deepfakes include the *manipulation of evidence*, which could obstruct justice by altering audio-visual evidence presented in court. The "liar's dividend" phenomenon can legitimise fake information by prolonging its lifespan and causing debates

over its accuracy. Deepfake technology also raises *privacy concerns*, as seen with the Chinese [Zao app](#), which allows users to swap their faces in movies by uploading personal pictures, leading to major privacy concerns. The technology also threatens the right to privacy when it is used to publish non-consensual manipulations of original content. Deepfakes also *challenge political and personal freedom* by creating and spreading fake news, which can influence public debate and potentially incite violence. Lastly, deepfakes can lead to *defamation*, as they can alter or fabricate content to harm or derogate an individual's image. If not regulated properly, this technology can cause harm to individuals across all social strata.

Despite daily improvements in deepfake technology, the regulations governing its use are not evolving at the same pace.

5.2.5. The potential for AI to replace human artists

A significant concern among the creative class, often debated in the media, revolves around whether AI will replace humans. We will not delve into this debate but will present some viewpoints on this matter that have surfaced in the press. From December 2022 to May 2023, we conducted a discourse analysis of how ChatGPT was covered by the media in the Netherlands in the first two months after its launch[12]. One of our research questions was how individuals who earn a living from writing perceive their future in light of the development of generative AI. As depicted in the word cloud (Fig. 14), the predominant sentiment is pessimistic. Writing professionals anticipate being replaced by robots, leading to a halt in their creative output.

A similar scenario is unfolding at the time of writing this report (May – July 2023), with Hollywood screenwriters and actors on strike. One of their concerns is the potential detrimental impact of AI in the near future.

The legendary Netflix "Black Mirror" episode *Joan is Awful* is proclaimed as a symbol of artists' fear of AI: "If you haven't seen it, *Joan Is Awful* is the story of a woman who, at the end of each day, realises with horror that her actions have been folded into a Dropout-style biographical drama, where all her bad traits and regrettable decisions are played out onscreen by Salma Hayek. Except, as the episode goes along, we learn that it isn't Hayek at all; it's an AI-generated likeness of Hayek, commissioned by unethical executives working for a monolithic streaming platform. While it might not be the driving force of the episode, *'AI will eventually replace all actors'* is certainly a theme that runs throughout Joan is Awful" – aldus Stuart Heritage (2023) from *the Guardian*.

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[12] The research was presented at European Media Management Association (emma) in Pamplona, May, 2023 (Berger & Montgomery, 2023).

The potential impacts of AI on filmmaking and scriptwriting represent only two of many other thankful shifts technology has brought to the world of cultural construction and consumption.[13]

Figure 14. A How do content creators in the Netherlands perceive their future in the era of generative AI?

Yet, there are reasons why "Hollywood's future belongs to people—not machines": "Entertainment is something people actually enjoy and engage with even when they don't have to. It's something people enjoy consuming and something people enjoy making. Storytelling relies on empathy. The creator empathises with the audience, and the audience empathises with the characters", – Ashley from WIRED argued.

5.2.6. Micro-targeting and tailor-made content at the expense of shared experiences and diverse storytelling

The influence of advertisers and advancements in ad technology has significantly changed the modern media landscape. In the past, advertisers preferred to partner with unbiased publications to reach a broad audience. However, with the advent of digital media, advertisers began to avoid certain topics, which led to a distortion in news reporting (Ashby,

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[13] More detailed analysis of the predicted impact of generative AI and LLMs on different occupational groups see: Eloundou et al., 2023, in press. Specifically about writers see Bedingfield, 2023b.

2023).

"The content is just a means to an end," says Maggie MacDonald, a platform researcher and advisor to private equity firm Ethical Capital Partners, as *WIRED* quotes (Ashby, 2023). "Because every click, every pageview, every affiliate link, every recommended video that is engaged with, that's a data point. And when you're dealing with the scalability that these digital infrastructures require to make money, they're not actually concerned with the quality of content."

This shift has contributed to the current fragmented media environment. Digital marketing strategies now use audience profiles to create highly targeted ads, which are more valuable across multiple screens. This has led to a situation where everyone in a household could be watching different content, leading to a loss of shared experiences.

"Media executive Euan McLeod recalls growing up when "there was no choice" but to watch what his parents were watching. Now each person in a household might be watching something wildly different, and the shared experience has dissolved. Isolated artists are creating for isolated audiences. Is it any wonder that generative AI seems poised to tailor entertainment to audiences of one?" (In Ashby, 2023)

In this new media landscape, generative AI seems ready to create personalised entertainment for individual viewers. This means that everyone can tailor the narrative to their liking, similar to how you can mix your own drink flavours with a Coca-Cola Freestyle machine. However, this also means that opportunities to hear diverse stories are greatly reduced. This could lead to a world where art and storytelling, which traditionally convey our hopes, fears, and visions for the world, are significantly diminished[14].

In simpler terms, the way we consume media has changed a lot due to advertisers and new technology. Before, everyone used to watch the same thing, but now, everyone can watch something different. This means we're losing shared experiences. Also, with AI, we can now have entertainment made just for us. But this might mean we miss out on hearing different stories and perspectives, which is a big part of what makes art and storytelling important.

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[14] An example of personalised and AI-aided content is featured in the Netflix series "Black Mirror" episode "Joan Is Awful", analysed in the WIRED (see Katwala, 2023).

6. Conclusions

This report systematically analyses data-driven and, most notably, AI-driven practices within the creative industries based on their coverage in contemporary mass media from 2022 to 2023. We sought to answer the central question: *"How are the challenges and opportunities of data-driven work transforming non-journalistic media production and creative industry practices?"*

6.1. Key Findings on Current Data-Driven Practices and Generative AI's Influence

Our investigation revealed that the impact of technological advancements has touched every stakeholder in the creative industry. Content creators and artists have gained a new tool in generative AI, enabling text and image creation and manipulation. Media and entertainment companies use data and technology to adjust their business models, enhance content creation, improve customer relations, and implement marketing strategies like recommendation systems and chatbots. Advertisers and marketers are experimenting with automated content generation, enhancing content quality, diversifying content, and personalising it for audiences. Data-driven technologies are increasingly being adopted to better understand and appeal to audiences to boost ticket sales. Technology providers are harnessing various data-driven high-tech concepts, including blockchain, artificial intelligence (AI), machine learning (ML), big data, and the Metaverse.

Notably, the DIY (do-it-yourself) movement has emerged as a significant phenomenon among consumers and audiences. This movement has given rise to a new industry, including bloggers and vloggers, commonly called 'influencers'. Policymakers and regulators are facing new ethical, privacy, and copyright issues arising from the rapid proliferation of data-driven technology across society.

Despite the widespread adoption of AI technology, particularly the advent of generative AI in late 2022, it proved challenging to find accounts in daily media that reported on the implementation of data- and AI-driven practices. To address this, we extended our research to specialised sources like WIRED and Rolling Stone and collected relevant texts from The New York Times, Forbes, Washington Post and Financial Times, which were missing in the NexisAcademic selection. This allowed us to curate compelling showcases spanning different creative industry sectors.

Performing arts and music presented by unique fusion of traditional opera, artificial intelligence, and neuroscience in the performance called "Song of the Ambassadors"; AI-aided comedy; AI-assisted music creation; collaboration between human musicians and AI

as a performance; artists voice manipulations such as resurrection of the John Lennon voice, GrimesAI – an 'open source' voice that anyone can borrow to record own song, "Lost Tapes of the 27 Club" as an example of AI-generated music for mental health project. The showcases in cultural heritage demonstrate how AI technology enhanced archival, cataloguing, and information management, improved visitor experience management, and stimulated audience engagement activities. Data-driven work in audio and visual media has been shown through the examples of AI-generated podcasts and videos of Hollywood's experiment with de-ageing Harrison Ford with AI in the 'Indiana Jones and the Dial of Destiny' movie. A few showcases depict how AI intersects with advertising in the design and creative services.

6.2. Key Findings on Industry Responses and Adaptations

The potential offered by new data-driven technology in the creative industry is extensive. It enhances creativity, augments professionals, boosts efficiency and productivity, creates new job opportunities, and stimulates investments in creative businesses and research. Data-driven technologies offer monetisation opportunities, including identifying profitable markets and facilitating the creation and sale of digital art online. The democratisation of creativity is a significant achievement, with AI tools becoming more accessible and user-friendly. AI is pivotal in learning and skill development, enabling individuals to upskill autonomously. Additionally, AI has enabled new forms of art and expression, ushering in a phase where humans and machines co-create.

Nevertheless, data-driven practices also introduce threats and concerns. As it exists today, copyright is undergoing a rethink, with ongoing efforts to adapt to evolving practices. Worries about the reproduction of social hierarchies and aesthetic biases, along with the lack of transparency regarding the training data of large language models, are growing. Deepfake technology, powered by AI, poses substantial political, social, and legal threats, including the creation of fake news and election interference. The fear of job displacement due to AI among creative professionals is prevalent (at least in the first month of releasing ChatGPT3).

Moreover, AI technology can pose challenges to enterprises and consumers alike. Business models, particularly in the DIY content and streaming services sectors, face the risk of overload from AI-generated content, potentially diluting the user experience. Micro-targeting and tailored content for individual consumers can lead to declining shared experiences and diverse storytelling (everyone in a household could be watching different content, leading to a loss of shared experiences).

6.3. Final Remarks

In conclusion, the creative industry is amid disruptive processes primarily driven by generative AI. The widespread adoption of AI technology, while often compared to the

arrival of the iPhone and Google, is still in its exploratory phase in 2022-2023. Creative companies and individuals are experimenting with AI's possibilities, with most exploring and experimenting with its features. However, the number of showcases where AI has been structurally incorporated in creative business practices in our data set is limited to advertisement and marketing.

As we navigate this transformative landscape, it's evident that there's much work to be done by society, politics, industry stakeholders, and individuals. To fully embrace AI, we must first seek to understand it, dispelling fear and avoiding both overestimation and underestimation of machine
capabilities. We should actively experiment with AI and create new regulations to ensure its responsible and sustainable integration into our creative endeavours.

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