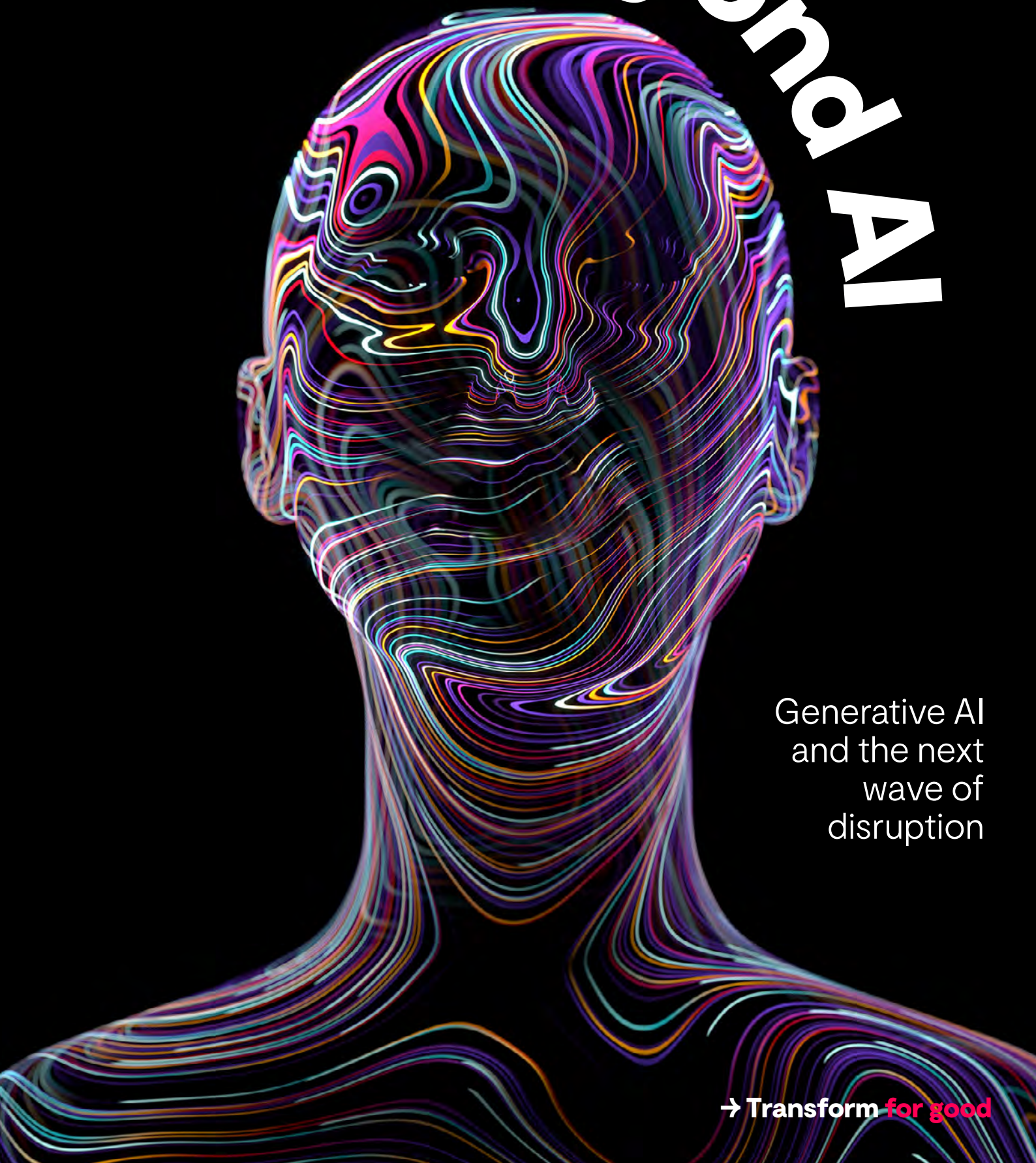
GHD Digital

Beyond AI



Generative AI and the next wave of disruption

→ Transform for good

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Foreword

Welcome to the age of artificial intelligence (AI), a momentous period in human history where AI is revolutionising the way we live, work, and interact with the world.

Over the next three to five years, advancements in AI will create a monumental shift across industries. We are already on the cutting edge of this transformative wave, enabled by the convergence of significant computational power, accessibility to vast datasets, and notable progress in natural language processing (NLP).

In this transformative landscape, one recent advancement stands out for its promise and potential: generative AI. Representing a significant breakthrough in the field of AI, generative AI enables machines to create new content, ranging from text and images to music and entire virtual worlds.

The tangible impact of generative AI is exemplified by the recent release of OpenAI's ChatGPT, which captivated the attention of 100 million users in just two months and revealed countless creative possibilities. Following the release of ChatGPT and competing platforms, including Bard and Bing, there has been a surge in investments from venture capitalists and major technology companies, amounting to billions of dollars.

Amid the technology industry's exciting advancements in generative AI tools and platforms, CEOs and Boards are grappling with essential questions. Some wonder whether this is merely the latest technology hype or a force that can revolutionise their businesses and industries. Their concerns stretch beyond understanding the potential of AI technologies; they need to protect their organisations from the risks and uncertainties of these new tools.

In an environment where regulators and lawmakers are struggling to keep pace, significant ambiguity surrounds the optimal course of action for corporate and government leaders seeking to harness the full potential of AI while effectively managing associated risks. 'Beyond AI' aims to demystify generative AI, identify areas for value creation, and deepen the understanding of the risks involved in adopting these groundbreaking technologies.

This report is the first in a series of insights that delve into the opportunities, applications, and considerations organisations across various sectors should address as we venture into this rapidly evolving landscape. We hope this provides you with a deeper level of understanding of its potential and sparks ideas and discussions within your own organisation.

Kumar Parakala
President GHD Digital

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Executive summary

Generative AI is an emerging field within artificial intelligence (AI) that can potentially transform multiple industries and disciplines. Using advanced algorithms that learn patterns from input data, generative AI can generate entirely new and original content, including text, visuals, audio, and complex designs. This ability to create, extrapolate, and innovate accelerates productivity and enables unprecedented scalability.

Generative AI presents an opportunity for organisations to develop superior products and enhance customer service offerings. Its potential applications span all sectors, offering innovative solutions and transforming traditional approaches. As businesses and society embrace generative AI tools, the impact on economic growth and productivity is set to be profound. By 2030, AI is projected to significantly enhance the productivity of knowledge workers through the automation of routine tasks, real-time data analysis, personalised assistance, improved collaboration, customised learning experiences, enhanced decision-making processes, and reduced human errors.

The potential of generative AI extends beyond productivity gains, as it can also play a crucial role in helping companies and governments achieve sustainability and climate change objectives. AI models are already being used to support sustainable design, climate modeling, pollution control, and waste management solutions. Generative AI promises to promote sustainability across various sectors and address environmental challenges.

Despite its vast potential, generative AI introduces ethical and legal challenges. The report identifies and addresses concerns related to job displacements, privacy, bias, misinformation, and hallucinations. Generating realistic deepfakes, fraudulent images, audio, and video, raises concerns about misinformation, privacy, and security. Copyright and ownership of AI-generated content also push the boundaries of intellectual property law. Ensuring the ethical and responsible use of generative AI is crucial, requiring collaboration between governments, regulators, and business leaders to develop robust governance frameworks and ethical guidelines.

GHD Digital estimates that advancements in generative AI have the potential to revolutionise the global economy, potentially **driving a five to six percent increase in global GDP over the next ten years** (see the footnote).

This growth will primarily emanate from the automation of routine tasks, workforce augmentation, productivity improvements, the emergence of new industries through innovative products and services, and increased consumers and business spending due to AI adoption and personalised offerings.

The report provides a roadmap for effectively leveraging generative AI. To capitalise on this transformative technology, businesses must adopt a proactive and informed approach. Understanding limitations and potential biases, implementing safeguards, and balancing benefits with responsible development and deployment are essential to harness generative AI's vast potential while mitigating risks and unintended consequences.

Organisations aiming to leverage generative AI capabilities should invest in skilled talent, identify high-impact use cases, foster an experimentation mindset, and ensure data readiness. Responsible AI usage is paramount as this rapidly evolving field progresses. Active involvement from all stakeholders is crucial.

Based on executive interviews and quantitative analysis, this report explores generative AI's cutting-edge technology and potential applications across various industries. Its goal is to spark discussions about the transformative impact of generative AI, its ethical implications, and how businesses can leverage this technology to drive innovation.

Note: The estimates are based on the projected baseline GDP growth rate for the next ten years, derived from existing economic forecasts of the World Bank and IMF, and key factors such as population growth, labour productivity, technological advancements, and government policies. The estimates also assume that generative AI could result in a 25% reduction in labour costs, a 20% increase in productivity, and a 15% reduction in time-to-market for new products.

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Generative AI explained

Generative AI refers to a branch of AI that focuses on generating new, original content. It involves training models to learn patterns and structures from a given dataset and then using that knowledge to create new content that resembles the training data. Some of the most common uses of generative AI include creating images, writing text, and composing music, but the applications are vast and growing.

Generative AI stands out as a powerful tool, offering many benefits for businesses. This ground-breaking technology enhances operational efficiency by automating routine tasks and allowing companies to allocate resources strategically toward high-value initiatives. Importantly, generative AI complements human capabilities rather than replacing them, opening new avenues for innovation and providing teams more time for strategic problem-solving.

The story of generative AI began with the evolution of machine learning (ML), a branch of AI that gives systems the ability to understand patterns in data and learn from experience. The emergence of generative adversarial networks (GANs) in 2014 led to the ability to create realistic human faces, high-quality synthetic voices and original artwork. Most recently, generative pre-trained transformers (the GPT in ChatGPT) are now pushing the boundaries further by generating human-like text, showcasing the potential of this technology.

Comparisons of AI with humans and human capabilities have historically focused on three key parameters: (i) language - AI's ability to communicate, (ii) sentience - AI's ability to experience feelings and emotions, and (iii) navigation - AI's (or AI-based robots') ability to navigate and move in the physical world. With generative AI, evolution has reached a critical inflection point where machines can communicate coherently with human beings, understand their preferences, biases, strengths, and limitations, and develop empathetic relationships with humans. While this has many benefits for humankind, it also gives AI an unprecedented ability to influence humans socially, professionally and culturally.

In an era of information overload, generative AI can sift through vast amounts of data, find information relevant to a topic, summarise themes, put forward ideas for consideration, fill in gaps, and provide recommendations, freeing humans to focus on tasks requiring more decision-making skills. Whether it's a writer using AI to brainstorm ideas, a researcher leveraging AI to scan through documents and summarise findings, or a designer using AI to generate initial designs or prototypes, the technology acts in partnership with people as a powerful assistant, enhancing human creativity and productivity.

Generative AI disrupts the notion that machines only replace dirty, dull, and dangerous tasks. Instead, it introduces a paradigm shift by expanding its potential to high-end labour, including creative endeavours and complex technical work. Here, AI capabilities can augment and challenge human expertise. In this collaborative interaction, humans set the goals and provide context and oversight, while AI contributes scale, speed and novel insights, unlocking the power of generative AI.

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Generative AI isn't just a tool for replication, but a catalyst for new kinds of innovation, empowering industries to redefine their boundaries. By leveraging the power of algorithms and deep learning, it revolutionises the creative landscape, sparking a new era of limitless imagination.”

» Aijaz Hussain Shaik, Global Head of Thought Leadership and Research, GHD.

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Exploring the disruptive technology that's transforming multiple industries

Rarely do technologies see such rapid and widespread adoption as observed with OpenAI's ChatGPT, one of the most popular generative AI models since late 2022. In just two months, ChatGPT attracted an estimated base of 100 million users, surpassing the timeframes it took Netflix (ten years), Google Translate (6.5 years), Instagram (approximately 2.5 years), and TikTok (around nine months) to reach the same milestone[1].

While neural networks have been around as an AI technique for some time, generative AI has made significant strides due to four key factors. First, introducing the transformer (the "T" in GPT) neural network model has enabled the capture of a wider context, thereby improving the performance of NLP tasks. Second, graphics processing unit (GPU) computing technology continues to speed up the rate at which models can be trained. Third, the intelligent integration of human input to reinforce positive outcomes has led to more accurate and human-like responses. And fourth, its prompt-based user interface is so simple that it is accessible to kids, grandparents, and everyone in between.

The generative AI market is on the cusp of significant growth in the coming years (Figure 1). At the heart of this growth is its unique ability to automate creative tasks, spawning new possibilities across diverse sectors. An analysis by OpenAI revealed that approximately 80 percent of the American workforce is engaged in an occupation where AI could perform or assist with at least 10 percent of their tasks[2]. For example, in design and manufacturing, generative AI's potential for automated design could speed up prototyping and production. Furthermore, rapid advancements in computational power, deep learning algorithms, and an ever-increasing amount of data will continue to refine and enhance AI's generative capabilities. With sustained investment in research and mounting adoption across sectors, the generative AI market presents immense growth potential.

Whilst generative AI has been an overnight success, it has required a very significant investment to reach this point. To date, Microsoft has invested USD10 billion in OpenAI[3]. Now that it has arrived, it is emerging as a game-changing technology, sparking intense venture capital (VC) activity.

Although generative AI currently has wide-ranging applications (Figure 2), multimodal generative AI, which can process and generate data from multiple sources spanning text, images and audio, is coming next. Expected to grow rapidly, it has the potential to impact many aspects of our lives. This technology has the potential to aid in creating realistic simulations of environments, which can be used to study the effects of climate change, pollution and other environmental factors.

VC firms invested about

USD2B

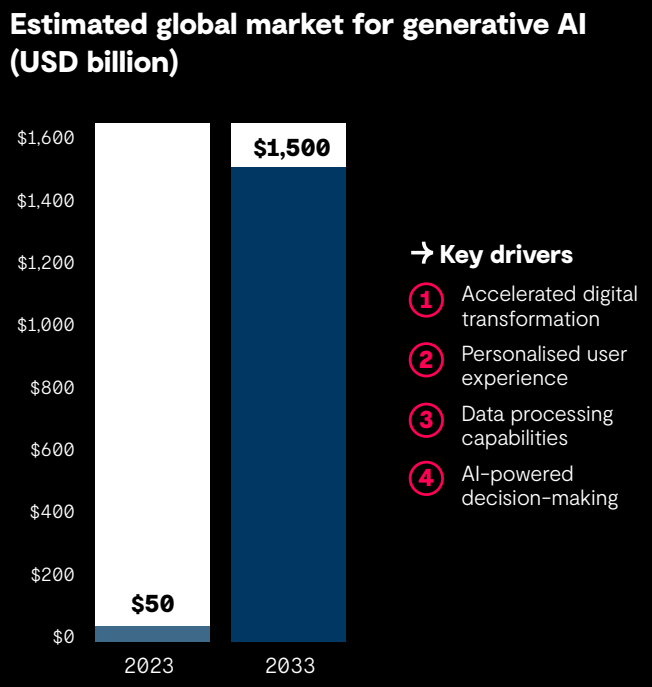
in generative AI in 2022[4], followed by over USD 1.6 billion in Q1 2023 alone[5].

In just 2 months ChatGPT attracted an estimated base of

100M

users

Figure 1: Generative AI market to grow 30x in ten years



Source: GHD Digital analysis based on World Economic Forum, OpenAI, and DeepMind data.

"Generative models allow machines to learn from data and then create new, original content, and they have the potential to revolutionise industries."

» Yann Le Cun, Vice President & Chief AI Scientist, Meta.

“Organisations focused on critical issues such as climate change, water scarcity and sustainability play a pivotal role in understanding and mitigating their impact on communities. Engineers and data analytics specialists must harness their technical expertise and embrace the immense potential of generative AI to tackle these issues with unwavering determination.”

» Dr. Nipa Basu, Global Practice Director, Digital Intelligence, GHD Digital.

Figure 2: The generative AI capability landscape

Text	Code	Image	Speech	Video	Other
General writing	Code generation	Design	Voice synthesis	Video generation	3D models / scenes
Note taking	Code documentation	Media / advertising	Translation	Video editing	Audio
Chat	Code optimisation	Image generation		Transcription	Music
Email	Debugging support			Annotation / analysis	Gaming
Translation					
Content					

Source: GHD Digital analysis

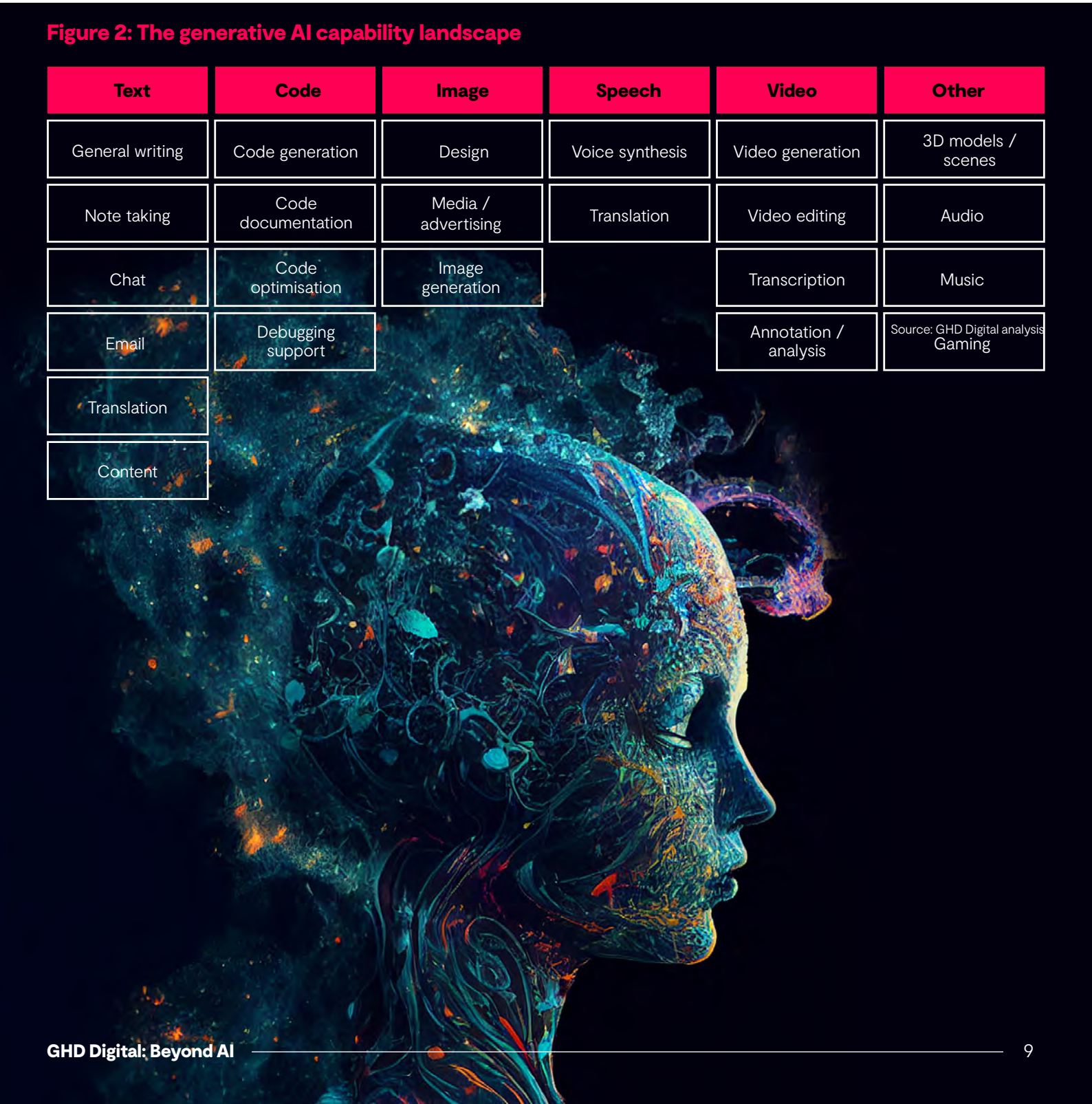


Figure 3: The expected evolution of generative AI through 2030

2032 E*

- Better written final drafts compared to professional writers
- Better final text to product code compared to full time softwares developers
- Better final designs compared to professional artist and designers
- AI generated video games and movies

2027 E*

- Better written final drafts compared to average humans
- Draft text to product code
- Product design and architecture final drafts
- Second draft 3D video files

2025 E*

- Full reports
- Code generated in multiple languages across verticals
- Product design and architecture mock ups
- First draft 3D video files

Today (2023)

- Second drafts
- Long form content
- Longer code generation with better accuracy
- Art
- Logos
- Basic attempt at 3D/video models

2020

- First written drafts
- Basic copywriting
- Multi line code generation

Pre 2020

- Basic Q&A
- Translation
- Spam detection
- Single line autocomplete code

Source: GHD Digital analysis. Note: *E denotes estimates.

In the span of the next decade, generative AI is projected to evolve into an even more advanced tool, capable of autonomously creating highly complex and personalised content across various domains (Figure 3). GHD Digital estimates that by 2030, AI will likely enhance the productivity of knowledge workers by a factor of four to five[6]. This improvement will likely be driven by the automation of routine tasks, the enablement of real-time data analysis, the provision of personalised assistance, improved collaboration, customised learning experiences, enhanced decision-making processes and the reduction of human errors.

AI techniques and generative AI hold potential benefits for every industry. According to the World Economic Forum's Future of Jobs report published in May 2023, which surveyed 803 companies worldwide, over 75 percent of companies expressed their intention to adopt AI technology within the next five years[7]. For instance, Bain & Company has formed a global services alliance with OpenAI, the company responsible for AI systems such as ChatGPT, to bring OpenAI's innovative capabilities to Bain's clients worldwide. The Coca-Cola Company has become the first organisation to collaborate with this new alliance, highlighting its interest in leveraging AI technologies to drive innovation and enhance business operations[8]. Microsoft now offers the OpenAI Large Language models within its Azure store, enabling organisations to license the technology and include it in proprietary products within their private tenancies in the cloud.

Data-intensive sectors, such as banking, or those using data-driven products, like the technology sector, will be quicker to adopt generative AI than those heavily reliant on judgement, such as healthcare. While organisations across various industry sectors find themselves confronted with an overwhelming surge of data that is doubling every year globally, access to high-quality data remains the crucial factor in successfully harnessing the power of AI. Below, we highlight some key applications of generative AI in sustainability and business (Figure 4).

“Many organisations may need a variety of foundation models, or at least many customised variants of a core model, to accommodate the variety of AI use cases likely to develop in coming years accross their teams and operations .”

» Michael Endler, AI Editor, Google Cloud.

Generative AI for sustainability

Sustainable design

By learning from a dataset of efficient and sustainable designs, generative AI can produce novel design ideas that optimally balance aesthetic appeal, functionality and environmental impact. Generative AI can help create designs that integrate seamlessly with the environment, with features such as passive cooling or solar gain optimisation. In product design, it could propose designs that use fewer materials or ones that are easier to recycle. In the realm of urban planning, it can ideate city layouts optimised for green spaces, efficient transportation and reduced carbon footprints. Unlike conventional AI methods, generative AI is not limited to analysing existing design trends or data. Instead, it creates entirely new design possibilities based on learned patterns, unlocking a new level of innovation in sustainable design.

Climate modelling

Traditional AI systems can analyse historical and current climate data but lacks the ability to generate new scenarios. In contrast, generative AI, through its ability to produce new data patterns based on learned information, can create a myriad of potential climate scenarios that account for various factors like greenhouse gas emissions, deforestation rates or ocean warming. This enables climate scientists to explore an array of possibilities, from best-case to worst-case scenarios and everything in between. By providing these high-resolution, dynamic climate models, generative AI could help anticipate climate change impacts more effectively, inform policymaking and inspire innovative mitigation strategies.

Biodiversity and conservation

Through its unique capability to generate new, unseen data from learned patterns, generative AI can create realistic mock-ups of different species or ecosystems under various environmental scenarios. This could provide invaluable insights for conservationists, allowing them to plan and strategise proactively. Furthermore, in the context of threatened species, where data is often scarce, generative AI can produce synthetic data to support population modelling and genetic diversity studies, filling in gaps and adding robustness to existing data. In terms of species identification, generative AI can help create augmented data to train more robust identification models, accounting for variability in appearance, behaviour or habitat.

Pollution control and waste management

Generative AI's unique ability to create novel solutions makes it a potent tool in the battle against pollution and for efficient waste management. For instance, it could design innovative waste sorting and processing systems by creating various conceptual designs and optimising for efficiency, safety and environmental impact. In terms of waste reduction, the technology has the potential to generate new product designs or manufacturing processes aimed at minimising waste production or maximising resource reuse and recycling. Traditional AI systems can optimise existing designs or predict pollution based on current data, but generative AI can create entirely new, optimised designs based on learned patterns.

Generative AI for business

Predictive maintenance and plant operations

Unlike traditional AI, which primarily relies on analysing historical machine data to predict potential failures, generative AI can create new, synthetic machine data based on learned patterns to support simulations of various scenarios of wear and tear and failure modes. This allows for more comprehensive and nuanced predictions, enabling operators to perform precise and timely maintenance. Furthermore, it can generate plant layouts optimised for efficiency, safety and ease of maintenance.

Knowledge management

Generative AI stands as a transformative force in the services and professional services industry, through its capacity to provide new insights or concepts based on the underlying patterns it has learned. This ability is particularly beneficial in fields where the creation of new knowledge is paramount, such as research and development. By synthesising and extrapolating insights from existing knowledge, generative AI could create new ideas, accelerating innovation. It can also help fill in gaps in knowledge by creating plausible, synthetic information where data may be missing or sparse.

Risk management

Traditional AI techniques often rely on historical data to predict future risks. However, they may need help to anticipate novel scenarios that have not been previously observed. Generative AI leverages its unique capability to generate new data based on learned patterns to help simulate a wide range of potential risk scenarios, including those never experienced before. This allows for a more comprehensive risk assessment, capturing a broader spectrum of possibilities and 'unknown unknowns.' This in turn empowers financial decision-makers to unlock new insights, optimise strategies, and maximise ROI.

Stakeholder and community engagement

Generative AI could play a transformative role in stakeholder and community engagement. For instance, it has the potential to create visualisations of potential community development outcomes, giving stakeholders a more tangible understanding of the implications of different decisions. Additionally, generative AI can enhance inclusivity in engagement efforts by producing translations, ensuring all voices are heard and accounted for.

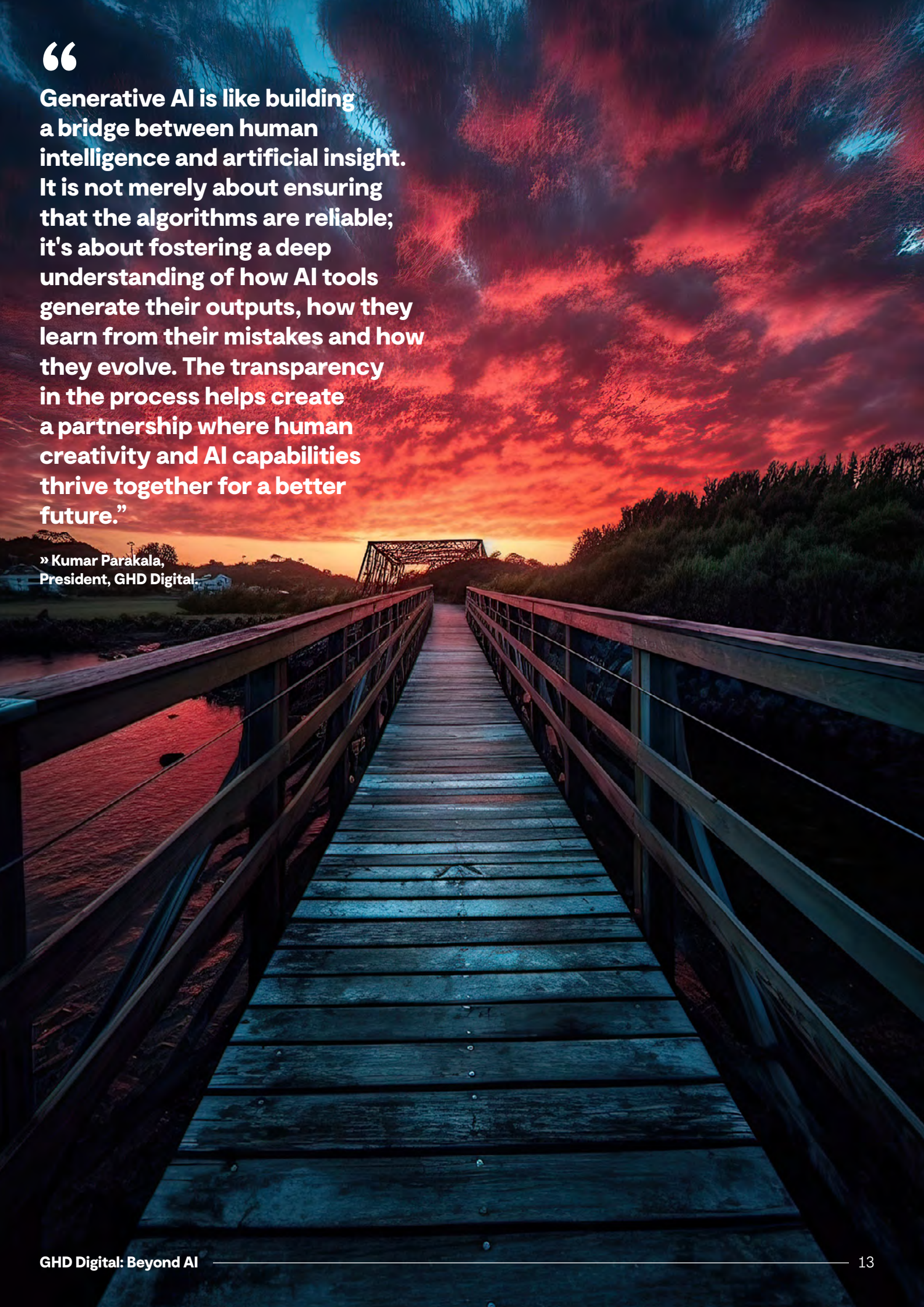
Algorithmic trading

Traditional AI methods in trading primarily involve analysing historical data to forecast future trends. However, these methods may fail to capture the complexity and unpredictability of financial and energy markets. In contrast, generative AI offers the ability to produce new data patterns based on learned information, which enables traders to stress-test strategies and understand potential outcomes. Also, by incorporating generative AI into portfolio construction, portfolio managers can enhance their ability to determine the ideal combination of assets tailored to individual investors. In energy trading, generative AI has the potential to generate data on weather patterns, energy production and consumption to help develop insightful forecasts and dynamic trading strategies. Unlike conventional AI, generative AI's ability to create novel scenarios and strategies based on learned patterns makes it a powerful tool in the ever evolving and complex algorithmic and energy trading world.

Figure 4: Select business use cases of generative AI

Manufacturing and resources	Public sector	Technology
End-to-end automation of factories and plants	Self-serve office	Automated product and hardware design
3D rendering of physical assets	Community engagement; disaster recovery simulation	Automated UI/UX design
Geological assessments for exploration and mining	24/7 virtual assistant support; 24/7 personal tutor	Product testing and feedback
Safety testing and equipment training	Waste reduction and prevention	Tailored AR/VR experience
Knowledge management; automated sales and CX support	Infrastructure mapping and planning	Automated software code generation

Source: GHD Digital analysis.



“Generative AI is like building a bridge between human intelligence and artificial insight. It is not merely about ensuring that the algorithms are reliable; it's about fostering a deep understanding of how AI tools generate their outputs, how they learn from their mistakes and how they evolve. The transparency in the process helps create a partnership where human creativity and AI capabilities thrive together for a better future.”

» Kumar Parakala,
President, GHD Digital.

Revolutionising creativity: how generative AI unleashes boundless artistic potential

Generative AI models are revolutionising creative fields. In visual arts, these models generate artwork by learning from existing pieces, resulting in original creations that push the boundaries of creativity. For instance, DeepArt transforms images into AI-generated paintings by analysing and learning artistic styles. In music composition, generative AI models learn the structure and patterns of different genres to compose melodies, harmonies and even complete compositions. AIVA, an AI virtual artist, uses deep learning to compose emotional soundtrack music, understanding music theory and drawing from a diverse dataset. In content generation, AI models produce written text-based on learned linguistic patterns, potentially transforming industries like journalism and advertising. Bard, a language model chatbot developed by Google AI, can generate text, translate languages, create diverse content and provide informative answers by training on a massive dataset. According to GHD Digital analysis, about 15 percent of all data will be AI-generated in the next three years. Overall, generative AI is expanding the possibilities of creativity across multiple domains.

Source: GHD Digital analysis based on information from DeepArt, AIVA, and Google.

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Generative AI and sustainability

Generative AI holds the potential to promote sustainability across various sectors and address environmental challenges. The technology enables advanced environmental data analysis, facilitating the development of effective strategies for conservation, habitat restoration and biodiversity preservation.

By rendering insights and recommendations on energy consumption patterns, water usage and waste generation, generative AI enables the efficient allocation of resources, reduces waste and promotes more sustainable practices across sectors such as agriculture, manufacturing and urban planning. This paves the way for a greener and more resilient future.

> **“Something that used to take me a year to do, I can now do in days with generative AI .”**
>
> **» Andrew Ng, AI Leader and Adjunct Professor, Stanford University's Computer Science Department.**

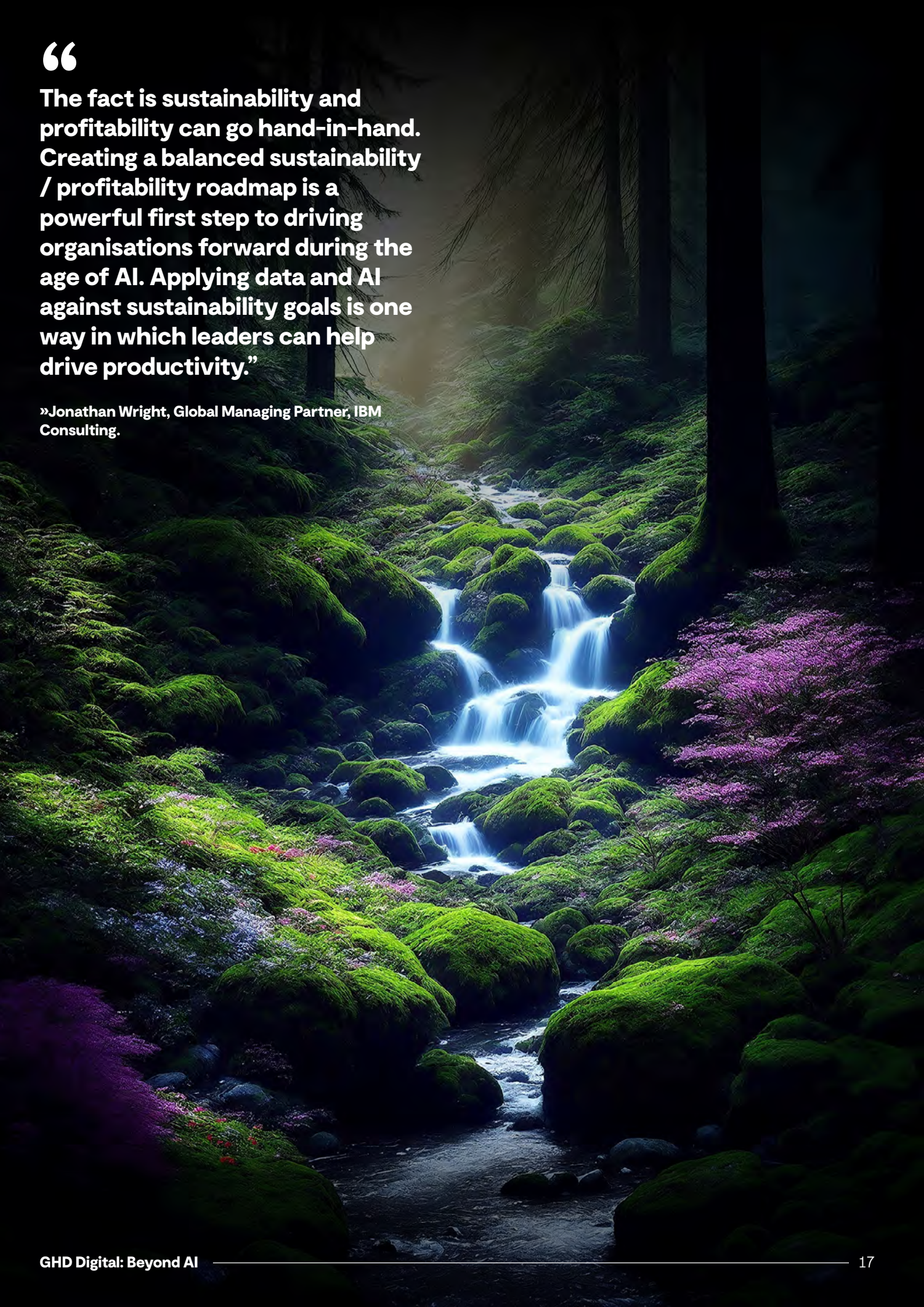
The transformative power of generative AI in design automation and optimisation

Generative AI is revolutionising the engineering landscape, enabling design automation, and transforming the speed, scale, and quality of output. By leveraging its capabilities, engineering companies can accelerate innovation, manage risk in new ways, and handle complex design tasks with greater efficiency. This computational creativity imbues machines with the ability to generate novel, functional, and optimised design solutions based on defined constraints and parameters. From automating routine CAD (computer-aided design) tasks to pioneering in the realm of generative design for advanced structural components or complete systems, the AI's evolutionary algorithms can perform thousands of iterations that account for multi-objective optimisations. This opens a new world of possibilities for businesses, which can benefit from superior design outcomes, faster turnaround times, and substantial cost savings.

Unlocking energy efficiency

The capacity of generative AI to produce new data patterns based on learned information allows the creation of a multitude of potential energy demand and supply scenarios. With the increasing adoption of renewable energy sources and the need to balance supply and demand, generative AI algorithms have the potential to provide valuable insight to optimise energy generation and distribution. Weather data, historical consumption patterns and grid conditions can all be utilised by these algorithms to help optimise energy generation and distribution. This helps in not only improving efficiency but also in reducing carbon emissions.

Generative AI has the potential to fill gaps in weather and energy production data where it is sparse or unreliable. This could help in the optimal placement and operation of renewable energy infrastructure, thereby maximising energy yield and minimising costs. Moreover, generative AI can revolutionise the design of energy-efficient buildings and systems. It can generate a myriad of designs, optimising for factors such as thermal comfort, lighting conditions and energy consumption. The result is a design that integrates seamlessly with their environment and uses passive heating, cooling and lighting strategies, reducing the reliance on energy-intensive mechanical systems.



“The fact is sustainability and profitability can go hand-in-hand. Creating a balanced sustainability / profitability roadmap is a powerful first step to driving organisations forward during the age of AI. Applying data and AI against sustainability goals is one way in which leaders can help drive productivity.”

»Jonathan Wright, Global Managing Partner, IBM Consulting.

Advancing water management

Generative AI has the potential to create data that can be used to simulate various water usage scenarios under different conditions, such as climate change, population growth and policy changes. This is crucial in ensuring adequate supply, managing peak demand and designing equitable water distribution strategies.

Predictive maintenance is one key use case of generative AI in the water industry. By analysing large amounts of data collected from sensors and monitoring systems, generative AI algorithms have the potential to detect patterns or anomalies that indicate potential equipment failure or maintenance needs, and their timeframes. This proactive approach enables water companies to prioritise spend to address issues before they escalate without unnecessary intervention, minimising downtime and reducing operational costs.

In terms of water quality monitoring and control, generative AI could create data that can be used to simulate various scenarios of pollutant dispersion, impacts of industrial activity or climate change on water quality. This can facilitate the development of proactive strategies to maintain water quality standards and respond to potential threats swiftly. This technology also has the potential to fill in data gaps by generating synthetic data where real-world data collection is difficult or expensive, ensuring that models are robust and reliable.

Water infrastructure design and optimisation is another domain where generative AI can play a transformative role. By creating a number of ideas, it can help in the design of water infrastructure – from large-scale irrigation systems to urban water distribution networks – that optimises water use, minimises energy consumption and reduces environmental impact. The ability of generative AI to create novel design possibilities is a distinct advantage over traditional AI, offering the potential for more sustainable and efficient water management systems.

In the context of wastewater treatment, generative AI has the potential to generate innovative strategies for resource recovery and waste minimisation. It has the potential to provide data to help simulate various treatment process configurations and generate optimal designs that maximise resource recovery – such as water for reuse, energy from sludge and nutrient recovery – and minimise waste. By providing data on treatment process performance under different operational conditions, generative AI could help facilitate predictive maintenance and efficient operation of wastewater treatment plants.

Revolutionising enviromental sustainability

Generative AI has the potential to offer ground-breaking solutions to environmental challenges, moving beyond the capabilities of traditional AI methods. For example, climate change modelling. While traditional AI analyses uses historical and current climate data to make predictions, generative AI has the potential to create data for new scenarios based on multiple factors like greenhouse gas emissions, deforestation rates and ocean temperatures. This could support the simulation of potential future climate scenarios, enabling organisations to anticipate a wide range of outcomes.

In the field of biodiversity conservation, generative AI can help with the data to anticipate the impacts of various environmental pressures on ecosystems and species. Generative AI can also create synthetic ecological data where real-world data is sparse, enhancing the robustness of these models and our ability to protect the earth's biodiversity.

Generative AI could revolutionise sustainable design and green technology development. By learning from a dataset of efficient and sustainable designs or technologies, generative AI can propose novel solutions that balance functionality, cost-effectiveness and environmental impact. This could lead to breakthroughs in renewable energy systems, energy-efficient buildings and low-impact manufacturing processes, pushing the boundaries of what we perceive as possible in sustainable design and technology. Generative AI can also be instrumental in managing natural resources more sustainably. It can generate optimised management strategies for resources like water, forests or fisheries, balancing the needs of human use, economic development and ecological integrity.

Transforming transportation mobility

Generative AI's unique ability to create new data patterns based on learned information allows organisations to simulate numerous scenarios and outcomes in transportation planning. For example, it can deliver the data to model potential traffic patterns under different conditions, such as road infrastructure changes, population growth or public transit policy changes. This can inform efficient and effective transportation planning, facilitating the creation of smart cities with minimal traffic congestion and optimal connectivity.

In the case of autonomous vehicles, generative AI could produce a wide array of driving scenarios based on real-world data, enabling comprehensive testing of autonomous vehicle systems without the risk and expense of real-world testing. Generative AI can also help design the algorithms that control these vehicles.

Generative AI could also be a gamechanger in vehicle design. It has the potential to generate a multitude of vehicle designs, optimising for parameters like fuel efficiency, aerodynamics, safety and passenger comfort. Unlike traditional AI that can only optimise existing designs, generative AI could create entirely new, innovative design concepts, pushing the boundaries of what is possible in vehicle design. This in turn could lead to new generations of vehicles that are more efficient, safe and comfortable.

This technology could create numerous strategies for logistics optimisation, considering factors such as fuel cost, delivery time and carbon emissions. It has the potential to generate data on the supply chain, helping businesses develop robust contingency plans. These capabilities can lead to more efficient, sustainable and resilient transportation systems, setting the stage for a future of transportation that is not only smarter but also more sustainable and responsive to changing conditions.

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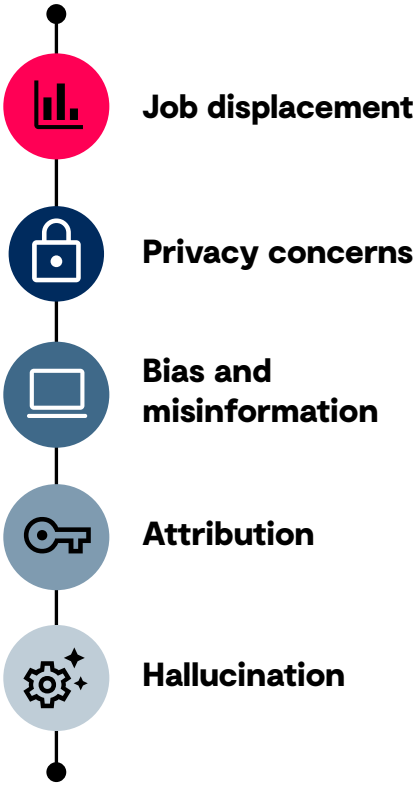
Addressing the critical concerns

While generative AI holds tremendous potential for innovation and progress, it also raises ethical concerns and social implications that warrant careful consideration. Despite its potential, several obstacles must be tackled before this technology can be implemented more broadly (Figure 5). AI is not merely an instrument used to solve any problem at hand, but rather a powerful tool that enhances human capabilities. However, this technology also raises tax, legal, and intellectual property implications, creating a need to establish ethical frameworks, navigate legal complexities, and safeguard against potential challenges. It is imperative for human involvement to assess its accuracy and ensure adherence to established policies.

Leaders of AI companies like Alphabet's DeepMind, OpenAI and Anthropic are cautioning against the potentially existential threats posed by rapidly advancing AI technology, suggesting that mitigating these risks should be a global priority[9]. However, other critics believe that the current state of AI does not warrant such catastrophic concerns. They argue that focusing on these risks distracts from more pressing, immediate issues with generative AI such as algorithmic bias, racism and disinformation[10].

GHD Digital believes that thoughtful action must be taken when considering the integration of this technology, as several significant risks necessitate careful attention and mitigation. These risks encompass concerns regarding biases inherent in the training data, which is often inaccessible due to its proprietary nature, as well as the potential for the model to fabricate or hallucinate information. Furthermore, challenges may arise in rectifying errors within models and uncertainties surrounding liability may emerge when deploying solutions reliant on this technology.

Figure 5: Navigating the pitfalls of generative AI for broad adoption



Source: GHD Digital analysis.

Job displacement

The automation of creative tasks and processes enabled by generative AI has the potential to disrupt the traditional job market and displace human workers. As AI models become increasingly adept at performing tasks that were once exclusively reserved for humans, the demand for certain roles may decrease, leading to job loss and workforce displacement. For example, IBM revealed plans to halt or slow down hiring for back-office functions, such as human resources, as it envisions that around 30 percent of those roles could be replaced by AI and automation over five years, amounting to roughly 7,800 job losses[11].

The World Economic Forum's Future of Jobs Report 2023 indicates a rapid decline in clerical and secretarial positions due to AI, while forecasting significant growth in roles such as AI and ML specialists, data analysts and scientists and digital transformation specialists[12]. The report highlights that over the next five years, the combined impact of AI and other economic forces is expected to lead to a significant structural labour market churn, resulting in about 83 million job losses[13]. On the other hand, the report expects a 40 percent increase in AI and ML specialists by 2027[14]. It is also likely that entirely new job functions will emerge as we learn how to harness the technology for further advantage. According to data collected by Stanford University's Institute for Human-Centered Artificial Intelligence, there were nearly 800,000 AI-related job openings across the United States in 2022[15]. Investing in workforce development and upskilling is crucial, enabling individuals to adapt to the evolving job market and pursue new opportunities in AI-driven industries. While AI continues to advance, humans will always remain the ultimate decision-makers, particularly in tasks that demand a higher degree of emotional intelligence and people-oriented interactions that are beyond the capabilities of machines. Therefore, successfully using this technology hinges on companies prioritising the reskilling of individuals to harness its potential effectively.

The increasing challenge we will face is ensuring humans have the necessary experience and judgement to provide expert oversight. Professions that are augmented by AI will also need to evolve their approach to skill maintenance. For example, the aviation industry is already grappling with issues arising from pilots handing over much of their flight time to autopilots. They are required to be permanently ready to 'step in' if something goes awry with the autopilot, yet they have fewer and fewer active flying hours to maintain those skills as part of their regular duties[16]. As AI assumes more straightforward tasks, the challenge of achieving and maintaining specialist skills and expert judgement will only intensify.

Privacy concerns

Generative AI models often rely on large volumes of data to learn and generate content, which can raise privacy concerns as these models might inadvertently capture and reproduce sensitive or personal information. Ensuring data privacy and security becomes paramount as generative AI continues to expand its reach. It is important to use language that differentiates between public domain products that retrain from public usage, and proprietary usage that leverages the same underlying models without passing information back to the internet. Whilst ChatGPT is an example of a public domain product, the generative AI model that powers it is also available through the Microsoft Azure Store to be deployed into secure tenancy environments.

Organisations wanting to utilise generative AI must implement the same rigorous data protection measures and adhere to the same ethical guidelines as for all other endeavours when collecting, processing and storing data, to safeguard user privacy.

AI pioneers: unchecked progress poses global risks

Leading experts in the field of AI have expressed concerns about the rapid and unchecked development of generative AI. There are concerns about the misuse of AI by malicious actors, the displacement of jobs and threats to humanity. While they acknowledge the transformative potential of the technology, they are also worried about potential harm to the world. This sentiment is echoed by several leaders in the industry. They point to the speed of AI's evolution as a reason for alarm, predicting that unchecked progress could lead to dangerous outcomes. The fear is not only about the spread of false information but also about the displacement of jobs and the rise of autonomous weaponry. While some dismiss these fears as speculative, there's a strong belief that without global regulation, the race to develop AI could become uncontrollable. Experts suggest that scientists should collaborate on ways to control this technology, stressing the importance of understanding and managing the risks before scaling up AI applications further.

Bias and misinformation

The ability of generative AI models to produce highly realistic content, such as text, images or videos, can be misused to create biased and misinformed content. Since AI models learn from the data they are trained on, they are likely to absorb and replicate biases present in that data (Figure 6). Much of the openly available information in the world on which these models are trained was created with the intention of influencing or presenting a perspective that harbours overt, unconscious or inherent bias. This can perpetuate harmful stereotypes or misleading information, especially when the AI generates content based on this skewed understanding. The risk of AI creating false or misleading information is equally concerning, either through misunderstanding context or by chance.

Addressing this challenge requires transparency, which involves communicating how an AI system was trained, what data was used and the measures taken to ensure the data was comprehensive, balanced and free from bias. It is crucial for organisations to exercise caution to avoid imposing Western values on a global scale while navigating the realm of generative AI, as such actions may inadvertently result in bias and fairness issues stemming from technological influences. It also involves creating systems that explain the outputs they generate and actively test for bias to confirm ethical standards are met and potentially unlawful discrimination is avoided[17]. For example, the BigScience group sponsored by the French government supports the development of an open-source language model, BLOOM, designed to be as transparent as possible[18]. Promoting transparency and actively mitigating bias and errors is critical to ensure the technology is trustworthy, ethical, fair and beneficial.

Attribution

The challenge of attribution arises when the AI model produces plagiarised material, which could be referencing one or many works. Organisations currently lack knowledge regarding potential instances of intellectual property (IP) or copyright infringement within the domain of generative AI, as well as the appropriate measures for effectively managing such occurrences. In such cases, the accountability falls on the human using the output, not the generative AI model itself. To address potential harm, organisations may introduce checks and assessments to ensure proper attribution. Striking a balance between trusting AI-generated attribution and maintaining human oversight poses an ongoing challenge. Establishing clear guidelines for using generative AI can help promote responsible usage and mitigate the risk of plagiarism.

Hallucination

Generative AI chatbots, have been known to produce inaccuracies or "hallucinations," where they generate false or unexpected results not supported by real-world data. According to GHD Digital analysis, about 50 percent of generative AI-generated data is fabricated or inaccurate. These can include invented content, news, or information. This issue was highlighted in two incidents in 2023. First, U.S. law professor Jonathan Turley alleged that ChatGPT falsely accused him of sexual assault, even fabricating a Washington Post article as evidence [19]. Second, lawyer Steven A. Schwartz used ChatGPT for research in a legal case, only to discover that the information provided was entirely made up [20].

To address this issue, rigorous validation techniques and fact-checking algorithms should be integrated into the AI system to cross-verify the information before it's generated. Additionally, iterative fine-tuning of the model, backed by a robust feedback loop involving human reviewers, can significantly improve the AI's output, reducing the occurrence of hallucinations.

Figure 6: System biases introduced during phases of the AI pipeline

Phases of the AI pipeline	System biases	Descriptions and causes of system biases introduced by humans
Data creation	Sampling	Due to the selection of particular types of instances more than others, renders the data set under representative of the real world
	Measurement	Introduced by errors in human measurement or because of intrinsice habits of those capturing data
	Label	Associated with inconsistencies in the data-labeling process due to labelers' different styles and preferences or their belonging to different organisational entities
	Negative set	Introduced as a consequence of not having enough samples representative of the rest of the world
Problem formulation	Framing effect	Based on how the problem is formulated and how information is presented
Data analysis	Sample selection	Introduced by the selection of individuals, groups or data for analysis in such a way that the samples are not representative of the population intended to be analysed
	Confounding	Arises if the algorithm learns the wrong relationships by not considering all the information in the data
	Design-related	Solely introduced or added by the algorithm
Validation and testing	Human evaluation	Due to such phenomena as confirmation bias, peak-end effect, prior beliefs (e.g., culture) and how much information can be recalled (recall bias)
	Sample treatment	Introduced in the process of selectively subjecting some sets of people to a type of treatment
	Validation and test dataset	Introduced from sample selection or label biases in the test and validation datasets or from the selection of inappropriate benchmarks and datasets for testing

Source: Adapted from Srinivasan, R; A. Chander; "Biases in AI Systems," Communications of the ACM, vol. 64, issue 8, August 2021.

> **"The danger of generative AI is that it lacks the ability to understand misinformation, leading to incorrectly equating correlation with causation based on incomplete / inaccurate data or lack of contextual awareness required to understand sensitive dependencies between data sets. The unintended consequence is technology shaping societal views on politics, culture and science."**
>
> **» Tom Golway, Chief Technologist, Hewlett Packard Enterprise.**

Addressing the potential adverse environmental impact of generative AI is imperative

The sophisticated algorithms and computational power required for training and running generative AI models can have a notable environmental impact. The heightened energy demands, especially in large-scale deployments, can strain existing power infrastructure and contribute to carbon emissions. The carbon emissions from training a 2022-era large language model depends on the energy source. With renewable energy, it emits a minimum of 25 metric tons of carbon equivalents[21]. However, if carbon-intensive energy sources like coal and natural gas are used, as was the case for GPT-3, it can result in up to 500 metric tons of carbon emissions, equivalent to over a million miles driven by an average gasoline-powered car[22].

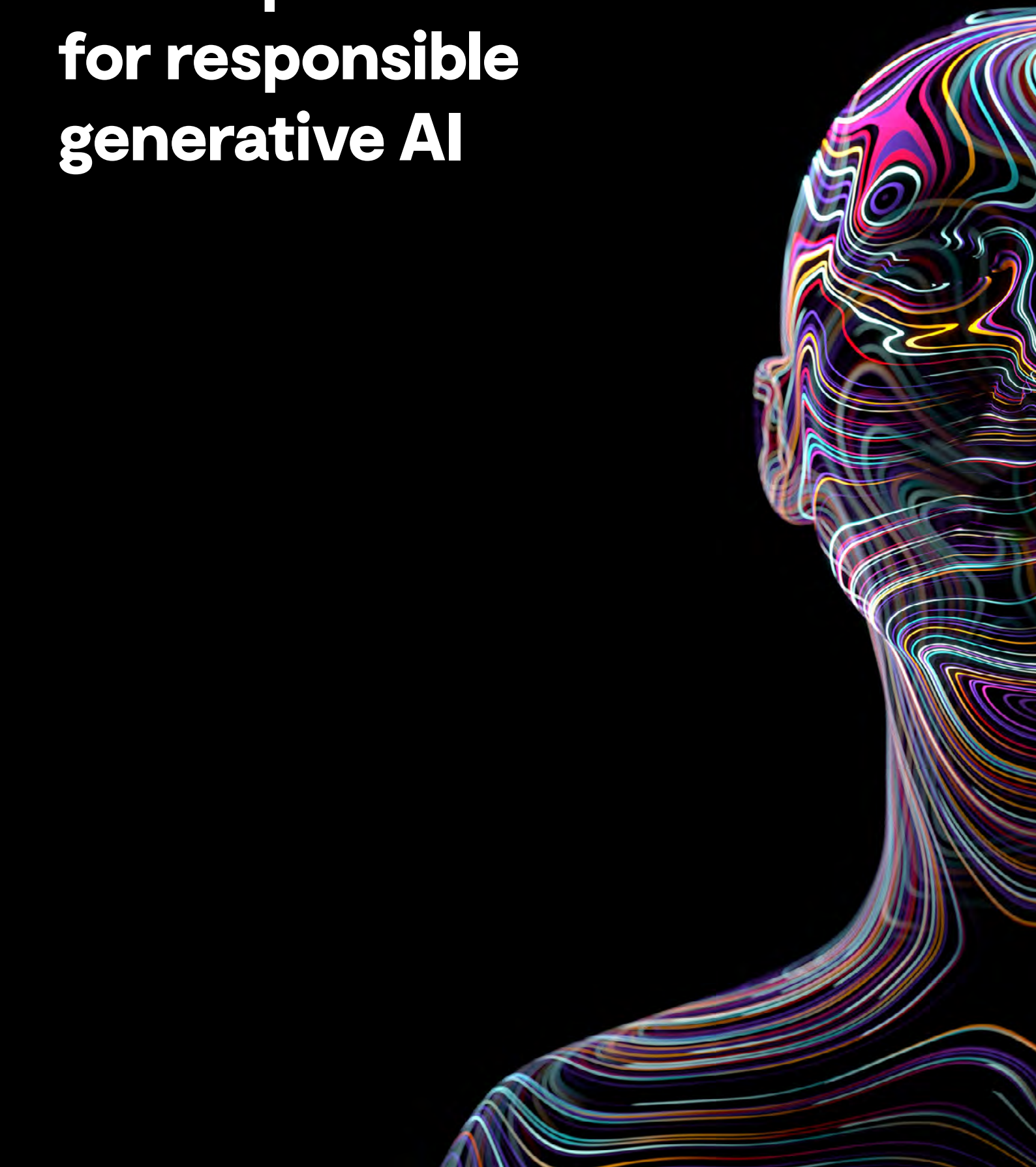
This surge in energy consumption puts additional strain on existing energy infrastructure and may lead to increased carbon emissions, exacerbating environmental concerns. Another related challenge is increased electronic waste. The need for powerful hardware to train and deploy generative AI models can contribute to a surge in electronic waste generation. The deployment of generative AI often requires high-performance computing devices, specialised GPUs and other hardware components. As new and more powerful technologies emerge, older hardware can quickly become obsolete, leading to its disposal and contributing to electronic waste.

Addressing increased energy consumption in generative AI requires focusing on energy-efficient approaches, such as optimising algorithms and model architectures, leveraging specialised AI chips and adopting sustainable practices in data centres. To tackle the challenge of increased electronic waste, promoting hardware longevity and reusability, implementing responsible recycling practices, exploring alternative approaches like cloud-based infrastructure and fostering education and awareness are essential.

> **“We believe AI is a ‘co’ pilot, not ‘auto’ pilot.”**
>
> **» Jared Spataro, Corporate Vice President, Modern Work & Business Applications, Microsoft.**

07

The imperative for responsible generative AI



As generative AI continues to advance and permeate various industries, developing and implementing responsible AI practices that ensure ethical and safe use is crucial. The power of this technology can be misused, leading to deception, disinformation, fraud and even violations of privacy laws. It is critical for executives to recognise that what may be considered appropriate or effective for one society might not necessarily be the same for another. The development of a generative AI engine that accounts for social differences becomes paramount in fostering inclusivity and ensuring ethical deployment of AI technologies. A one-size-fits-all approach is inadequate in addressing the diverse needs and values of different societies. Therefore, it is crucial to shift the focus from solely developing a single tool to cultivating a comprehensive ecosystem that encompasses a range of solutions. By fostering an ecosystem of diverse generative AI tools, organisations can adapt and tailor their approaches to specific social contexts, ultimately fostering greater acceptance, understanding, and positive impact within diverse communities. Embracing this ecosystem mindset will enable executives to navigate the complexities of social differences while harnessing the true potential of generative AI for the benefit of societies worldwide.

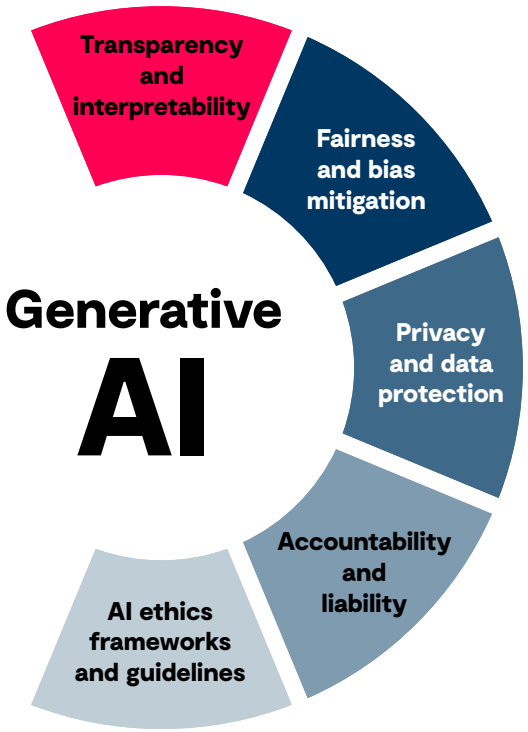
Around the world, guidelines are also emerging to provide appropriate frameworks. ISO/IEC 42001 (the International Organization for Standardization/the International Electrotechnical Commission) is intended to guide organisations in managing their AI and ML systems, addressing key issues such as transparency, explainability of automated decisions, use of data analysis outputs and degrees of system autonomy[23]. UNESCO took a significant step by publishing the first global standard on AI ethics, the "Recommendation on the Ethics of Artificial Intelligence." This framework, adopted by all 193 member states, prioritises protecting human rights and dignity. It provides policymakers with extensive policy action areas, enabling them to apply core values and principles across various domains and ensure ethical AI practices[24].

The five key aspects of responsible AI comprise transparency and interpretability, fairness and bias mitigation, privacy and data protection, accountability and liability and AI ethics frameworks and guidelines. By prioritising these key aspects of responsible AI practices (Figure 7), organisations can ensure the ethical and safe use of generative AI, building trust with users and society to maximise the technology's potential for positive impacts while minimising unintended consequences.

“The potential of AI is truly transformative in the engineering sector. It can revolutionise how we design, plan, and optimise infrastructure, leading to more efficient and sustainable outcomes. However, as we harness this powerful technology, we must do so with a deep understanding of the data, engineering context and potential implications. Organisations must ensure that they are leveraging AI in a way that is innovative, effective, ethical and responsible.”

» Grant Stewart, Practice Director, Digital Intelligence, GHD Digital.

Figure 7: Focus areas to drive the ethical and safe use of generative AI



Source: GHD Digital analysis.

Transparency and interpretability

Software accountability has long been a significant concern for many organisations, but with the advent of AI, this challenge has reached unprecedented proportions due to the sheer complexity and scale of software and data involved. The integration of AI exacerbates the issue, as the inner workings of these systems often remain elusive to organisations. As a result, many organisations find themselves lacking deep knowledge and understanding of what truly transpires within their AI-driven processes. This knowledge gap poses substantial risks, including potential biases, algorithmic errors, and unintended consequences.

Addressing this challenge effectively requires organisations to prioritise gaining comprehensive insights into their AI systems, fostering transparency, and developing robust mechanisms for accountability. Only through diligent efforts to comprehend and govern AI technologies can organisations mitigate risks, foster trust, and unlock the full potential of AI-driven innovation in a responsible and accountable manner.

To foster trust and confidence in generative AI systems, it is essential to prioritise transparency and interpretability. This involves making AI models easier to understand by both technical and non-technical stakeholders. Efforts should be directed toward developing methods that explain how AI models make decisions and generate outputs, allowing users to evaluate the rationale behind AI-generated content or solutions.

Fairness and bias mitigation

Generative AI models can inadvertently propagate or even amplify existing biases present in the data on which they are trained. To ensure fairness, it is crucial to identify and address these biases during the model development process. This involves adopting bias mitigation techniques, such as re-sampling, re-weighting or adversarial training and continuously monitoring AI systems to detect and correct any unintended biases that may emerge.

Privacy and data protection

Responsible AI requires robust privacy and data protection measures to safeguard user information. This includes implementing secure data storage and access controls, anonymising data to prevent the identification of individuals and adhering to relevant data protection regulations and standards. Adherence to new ISO standards will help organisations navigate the complexity of non-standard environments. By prioritising privacy and data protection, organisations can build trust with users and mitigate potential risks associated with the misuse of personal or sensitive data.

Accountability and liability

Establishing clear lines of accountability and liability for developing and deploying generative AI is critical in fostering a responsible AI ecosystem. This involves defining the roles and responsibilities of various stakeholders, including AI developers, users and regulators and developing mechanisms for assigning liability in cases of harm or unintended consequences caused by AI systems.

For example, The OECD AI Policy Observatory supports governments worldwide by analysing the economic and social impacts of AI technologies. It offers real-time information and multidisciplinary policy analysis, engaging stakeholders to identify effective practices. Through country dashboards and the AI Wonk blog, the Observatory facilitates dialogue and knowledge sharing among policymakers and experts[25].

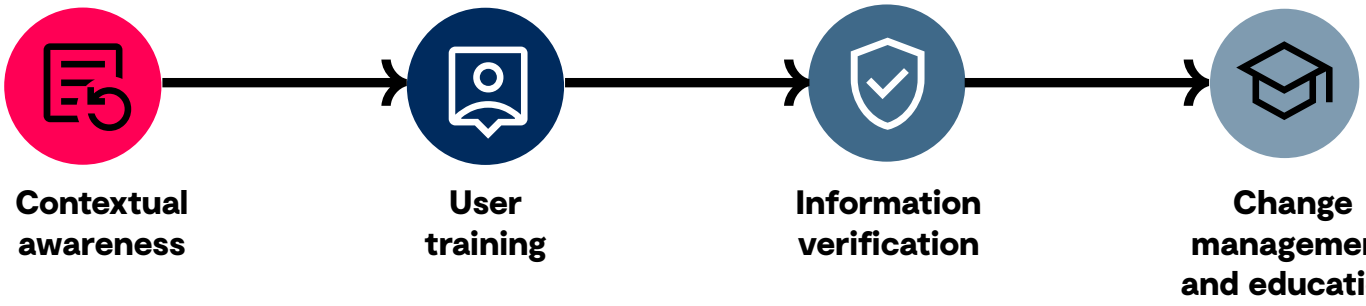
AI ethics frameworks and guidelines

To ensure the ethical use of generative AI, organisations should adopt comprehensive AI ethics frameworks and guidelines that outline principles and best practices. These frameworks should address aspects such as transparency, fairness, privacy, accountability and human oversight, providing a blueprint for organisations to integrate ethical considerations throughout the AI lifecycle. In addition, fostering a culture of ethical AI development requires ongoing education, training and collaboration among stakeholders to promote responsible AI practices across industries.

When deploying generative AI, organisations must pay close attention to four key aspects: contextual awareness, user training, information verification and change management and education (Figure 8).

25. OECD, "How can we ensure that AI benefits society as a whole?".

Figure 8: Aspects that require particular attention when deploying generative AI



Source: GHD Digital analysis.

Contextual awareness

A deep understanding of the context in which generative AI is being used is crucial for successful application. It is not a one-size-fits-all solution and its effectiveness varies based on the problem domain, available data and specific objectives. Users can set accurate parameters and constraints by comprehending the context, leading to more meaningful results.

Information verification

Users should regard themselves as responsible for all generative AI outputs that they use and always assume they need to confirm the veracity of outputs generated. Not all generated content is factual or reliable and cross-verifying AI-produced information with trusted sources is essential. Developing a sense of critical thinking and scepticism towards AI outputs can guard against misinformation.

User training

Mastery of generative AI requires in-depth knowledge and hands-on training. Executives must recognise the importance of learning to ask the right questions, effectively training the AI engine on how to interact, and establishing clear expectations. AI systems are only as effective as the guidance and instructions they receive. By asking the right questions, organisations and individuals can uncover valuable insights and ensure that AI solutions address the key challenges and opportunities at hand. Training the AI engine in appropriate ways enables it to understand and respond accurately, aligning its outputs with the goals and objectives of organisations and individuals. Additionally, setting clear expectations helps manage outcomes and avoid misunderstandings. Therefore, the key role for executives is not only to embrace AI but also to provide the necessary guidance and context to maximise its potential and drive meaningful results.

Change management and education

This is vital to drive the widespread adoption of generative AI among users at scale. Effective change management ensures smooth transitions, addresses resistance and maximises user acceptance. Education empowers individuals with the necessary knowledge and skills to harness generative AI, fostering a culture of innovation and enabling organisations to unlock its full value.

Steering AI's future: the crucial role of boards and risk management

Generative AI plays a pivotal role in our rapidly digitalising world. Organisations with boards that are highly involved in digital and AI strategies are more likely to derive significant value from AI whilst navigating the associated hazards. This is largely because board-level engagement ensures adequate oversight, strategic alignment and the infusion of ethical principles into the design and deployment of AI systems. Such involvement helps cultivate a culture that actively considers and mitigates AI-related risks, such as algorithmic biases, privacy issues and potential misuse, thereby fostering responsible AI practices.

In addition, risk management plays a vital role in the ethical and responsible deployment of generative AI. According to the World Economic Forum's 2023 "Global Risks Report," 54 percent of risk officers reported increased scrutiny of their AI systems for ethical and responsible use. As applications of generative AI become pervasive – such as content creation in fields like finance and healthcare – an integrated risk management framework becomes essential in identifying, assessing and mitigating the risks inherent in these technologies. This is crucial to prevent negative outcomes, such as perpetuating social biases, privacy breaches or the onset of unintended consequences due to opaque decision-making processes.

Companies that employ robust risk management strategies for AI will likely see enhanced trust among their stakeholders. This underscores the importance of proactive risk management in building trust in AI systems. Boards can facilitate this process by promoting transparency and establishing robust governance structures. In an era where AI systems are influential in major decision-making, pursuing ethical and responsible AI is not merely a choice but a necessity. Boards and risk management play a crucial role in this context, shaping the conversation around AI, influencing its development and guaranteeing its beneficial use for society.

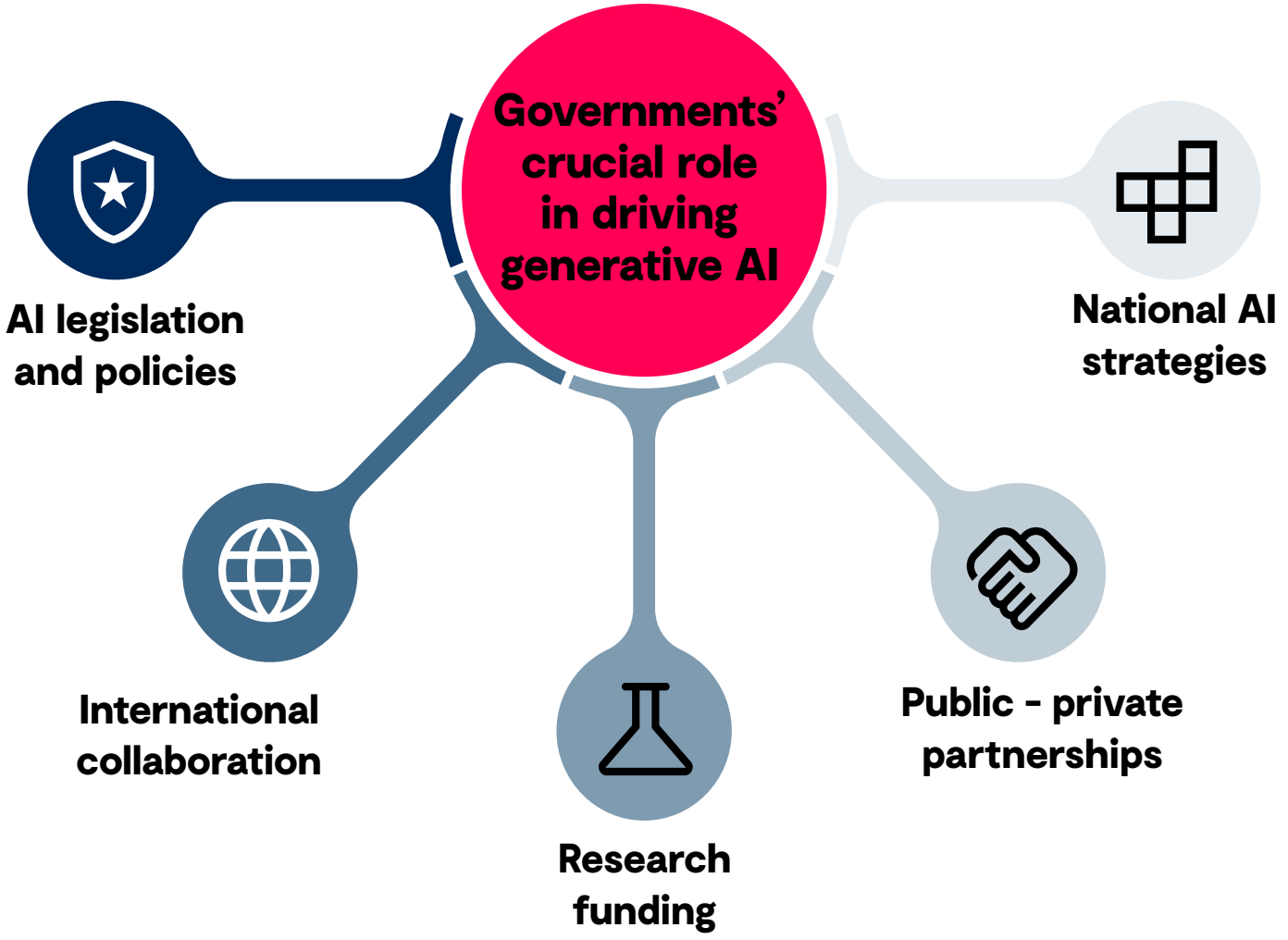
08

The crucial role of government in shaping the future

Governments play a vital role in fostering innovation and the responsible development and deployment of generative AI to ensure the benefits of AI are realised across society. The paramount question arises: Can regulators effectively keep pace with the ever-evolving landscape of generative AI, a field that undergoes weekly transformations, even challenging the experts to remain up to date? A recent analysis of legislative records from 127 countries reveals that the number of laws incorporating AI has increased from one in 2016 to 37 in 2022[26]. Similarly, a review of parliamentary records on AI across 81 countries shows that the mention of AI in global legislative proceedings has experienced a nearly 6.5-fold increase since 2016[27]. The pace, extent, supervision and disclosure requirements of regulatory measures are expected to differ across key markets, as exemplified by legislation with the US AI Bill of Rights, the EU AI Act and regulations from China's Cyberspace Administration. Consequently, vendors and businesses should initiate measures that guarantee data integrity, openness, equity, safety and resilience, which are fundamental to fostering trustworthy AI. By addressing the regulatory landscape, investing in research and development and fostering public-private partnerships, governments can help shape the future of generative AI and maximise its positive impact on society (Figure 9).

The importance of technology interoperability and compliance standards cannot be overstated. Interoperability standards lay the foundation for seamless integration and collaboration across diverse systems, ensuring that various AI technologies can effectively communicate. This enhances efficiency and promotes innovation by fostering an ecosystem where different AI solutions can seamlessly work together. Additionally, compliance standards play a vital role in safeguarding fair competition and nurturing innovation. By establishing clear guidelines and regulations, these standards ensure a level playing field for organisations, preventing monopolistic practices and promoting healthy competition. This protection of competition fosters an environment conducive to innovation, where diverse perspectives and ideas can flourish, ultimately driving advancements in generative AI.

Figure 9: Governments' crucial role in driving generative AI



Source: GHD Digital analysis.

AI legislation and policies

To effectively address the challenges posed by the rapidly evolving generative AI technology, the government must adapt its regulatory frameworks with unprecedented agility, embracing collaborative partnerships with industry pioneers and leveraging cutting-edge expertise to ensure responsible innovation to safeguard the collective future. Governments worldwide must recognise the need for comprehensive AI legislation and policies to ensure the ethical and responsible use of generative AI technologies. These policies should aim to address issues such as transparency, interpretability, fairness, privacy, accountability and liability. Moreover, these policies should provide a legal framework for AI developers, users and regulators to navigate the complex ethical and societal implications of AI. By establishing clear rules and guidelines, governments can promote trust in AI technologies, mitigate risks and ensure that the benefits of generative AI are equitably distributed across society. For instance, the European Commission has published a draft of its AI Act[28]. This legislation includes requirements for generative AI models to mitigate foreseeable risks to health, safety, fundamental rights, the environment, democracy and the rule of law in a reasonable manner.

National AI strategies

Governments should develop national AI strategies to guide their investments and initiatives in AI. These strategies can outline long-term visions and goals for AI adoption and development, focusing on areas such as education and workforce development, infrastructure, research and development, and ethical considerations. For example, the US government is launching initiatives to enhance the research, development and implementation of responsible AI, prioritising individual rights, safety, and societal benefits[29]. This includes a comprehensive strategy featuring the AI Bill of Rights, AI Risk Management Framework and a plan for a National AI Research Resource[30]. Similarly, the AI Action Plan outlined a vision for Australia to become a global leader in the development and adoption of trusted, secure and responsible AI[31]. The plan encompassed various actions by the Australian Government to actualise this vision and ensure that all Australians reap the benefits of an AI-driven economy[32]. By implementing comprehensive national AI strategies, governments can provide a roadmap for growth and ensure that the benefits are leveraged across various sectors and industries.

International collaboration

As AI technologies transcend national boundaries, international collaboration is crucial in developing regulatory landscapes. This involves cooperation among governments, regulatory bodies and international organisations to share knowledge, best practices and expertise, fostering the development of global AI standards and guidelines. International collaboration also facilitates cross-border data sharing, research and innovation, enabling countries to work together to address global challenges and harness the full potential of generative AI.

Public-private partnerships (PPPs)

PPPs are crucial in fostering the responsible development and deployment of generative AI technologies. By working together, governments, industry, academia and civil society can pool resources, expertise and knowledge, accelerating innovation and addressing challenges related to AI development and adoption. These partnerships can also facilitate the sharing of best practices, the development of AI standards and the implementation of responsible AI frameworks and guidelines, ensuring that generative AI technologies are developed and deployed in a manner that benefits society.

Research funding

Recognising the transformative potential of generative AI, governments globally must further invest in AI research and development. This includes funding for academic institutions, research centres and technology startups focused on AI, aiming to accelerate advancements in generative AI and foster innovation. Government research funding can support breakthroughs in areas such as AI algorithms, model interpretability and privacy-preserving techniques, contributing to the development of more robust and responsible AI systems.

Resource guide:

Key regulations and standards that govern the development, deployment and use of AI technologies

The EU AI Act

European law on artificial intelligence

The US AI Bill of Rights

Principles to help guide the design, use and deployment of automated systems to protect the rights of the American public in the age of AI.

The US National Institute of Standards and Technology (NIST) AI Risk Management Framework

A framework to better manage risks to individuals, organisations and society associated with AI.

Australia AI Ethics Principles

Principles designed to ensure AI is safe, secure and reliable.

Cyberspace Administration of China AI Guidelines

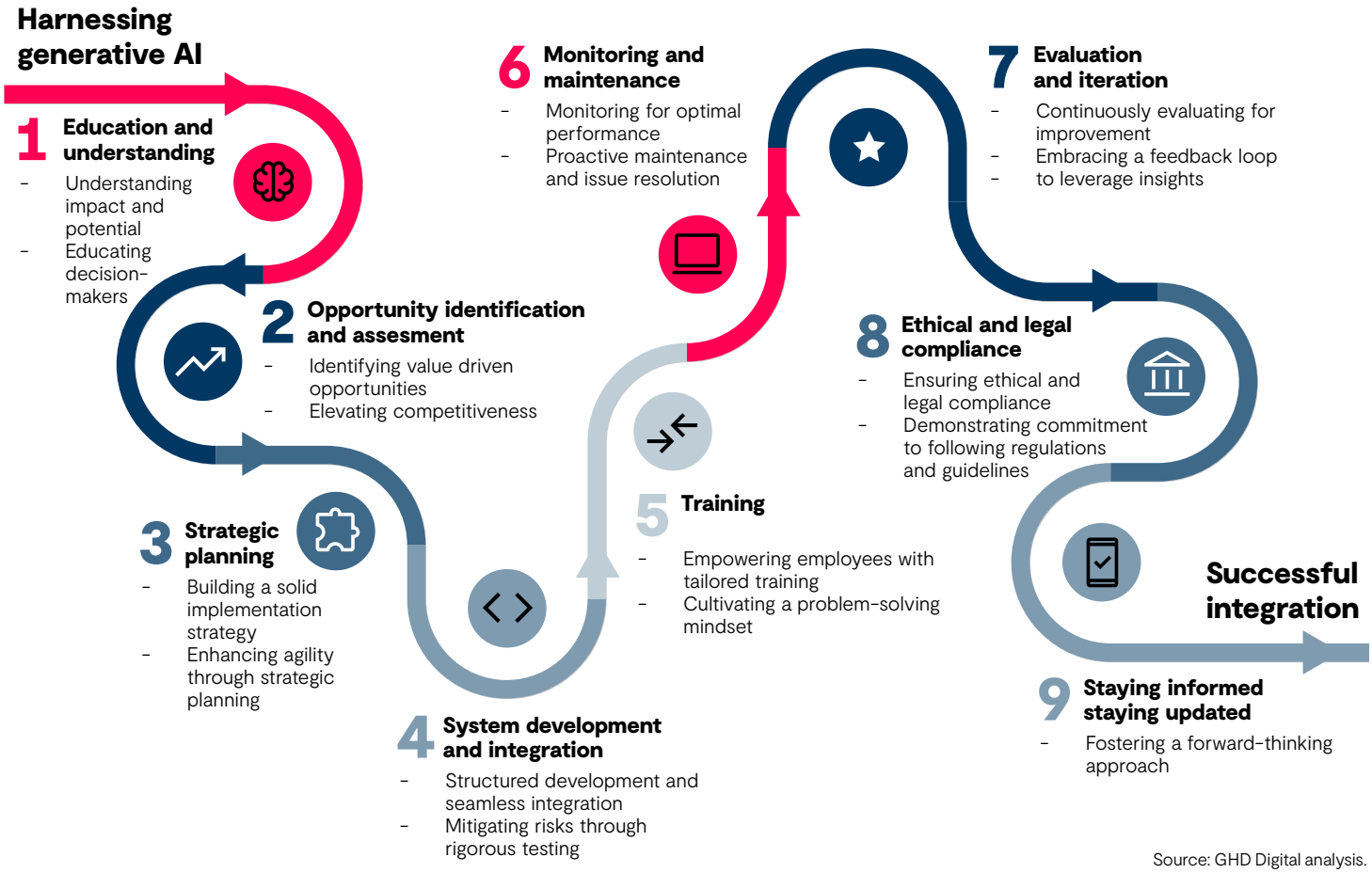
Rules to regulate the generative AI technology.

09

Harnessing generative AI: a roadmap for effectively leveraging generative AI

The successful integration of generative AI within an organisation demands a strategic approach and digital fluency (Figure 10). Organisations should understand the nuances of generative AI and how to leverage its capabilities effectively. Organisations that prioritise education, strategic planning, ethical considerations, and ongoing evaluation will be best positioned to harness the power of generative AI for meaningful innovation, efficiency gains and sustainable growth. The following are the key steps to effectively navigate this technology:

Figure 10: A roadmap to effectively leverage generative AI



Source: GHD Digital analysis.

Education and understanding

Understanding generative AI is not just a matter of grasping technical concepts; it involves acknowledging its profound impact on various aspects of an organisation. By delving deep into the inner workings of generative AI algorithms and models, decision-makers can discern its potential applications and limitations. Recognising that generative AI can be a potent tool for creativity, automation, and personalisation empowers organisations to harness its power effectively. Furthermore, embracing the responsibility of understanding the potential risks and ethical considerations associated with generative AI is paramount. The potential for misuse, inadvertent biases, or unintended consequences necessitates a thoughtful approach. Awareness of the regulatory landscape and ensuring compliance will foster trust and responsible AI practices.

Opportunity identification and assessment

Identifying the areas where generative AI can add the most value is a critical step in the adoption process. Organisations should conduct thorough analyses of their processes, customer interactions, and decision-making to determine where generative AI can make a difference. The identification of strategic goals and alignment with generative AI initiatives can lead to transformative outcomes. It may open doors to automating repetitive tasks, enabling employees to focus on higher-value activities. Additionally, leveraging generative AI to enhance creativity can lead to innovative product designs, marketing campaigns, and artistic creations. Understanding customer needs and expectations is vital in customising experiences through generative AI. By recognising these opportunities, organisations can gain a competitive advantage, elevate customer satisfaction, and drive brand loyalty.

Strategic planning

Formulating a clear and well-defined strategy is the foundation for successfully implementing generative AI. The alignment of these objectives with the organisation's mission and vision ensures a coherent approach. Allocating the necessary resources, including investing in hardware, software, and talent, is essential for a smooth implementation. Considering the costs and potential return on investment is crucial in making informed decisions. Establishing timelines is key to setting realistic expectations and tracking progress effectively. At the same time, defining key performance indicators (KPIs) enables organisations to measure the impact of generative AI on various aspects of their operations accurately. Furthermore, risk mitigation measures should be built into the strategy to address potential challenges and setbacks. By acknowledging and preparing for uncertainties, organisations can be more agile in their response to unexpected situations.

System development and implementation

The process of developing and implementing generative AI systems demands a well-structured and organised approach. Careful selection or development of AI models that align with the organisation's objectives and data availability is essential. Training AI models requires large datasets and careful curation to ensure the accuracy and generalisability of the generated output. Integrating these models into existing systems seamlessly guarantees a smooth workflow and encourages employee adoption. Launching generative AI tools should be accompanied by thorough testing and monitoring to identify any glitches, biases, or unintended outcomes. Specifically, pilot testing in controlled environments can mitigate potential risks before full-scale deployment.

Training

Empowering employees with the knowledge and skills to use and manage generative AI is fundamental to its successful implementation. Tailored training programs should cater to various roles within the organisation, from data scientists and developers to end-users. Training sessions should go beyond technical aspects and include educating users on the potential and limitations of generative AI. This understanding fosters responsible use and encourages creative and innovative applications. Troubleshooting training should be an integral part of the training curriculum, enabling employees to identify and resolve common issues independently. Continuous learning and development will empower staff to embrace generative AI as an asset rather than a threat.

Monitoring and maintenance

Once generative AI systems are operational, continuous monitoring and maintenance are essential to ensure optimal performance. Regularly updating AI models with latest data helps improve their accuracy and relevance over time. Monitoring also involves tracking the impact of generative AI on organisational processes and outcomes. Identifying areas where it excels and areas for improvement ensures a data-driven approach to fine-tuning AI systems. Proactive maintenance can prevent system downtime and disruptions. Organisations must build robust protocols for handling any potential issues promptly and effectively.

Evaluation and iteration

Periodic evaluations of generative AI applications against predefined objectives provide valuable insights into their efficacy. Organisations should be open to reassessing their strategies and making necessary adjustments based on the outcomes. The feedback loop created by continuous evaluation fosters a culture of learning and improvement. AI models can be iteratively refined to align better with evolving organisational needs and industry trends.

Ethical and legal compliance

Ensuring ethical and legal compliance is not just a box-ticking exercise but a cornerstone of responsible AI adoption. Organisations must adopt comprehensive data privacy and security measures to safeguard sensitive information. Addressing potential biases within AI models is critical to ensuring fairness and avoiding discrimination. Additionally, transparent communication about the use of generative AI fosters trust among customers, employees, and stakeholders. Adherence to relevant regulations and guidelines, such as data protection laws and AI ethics frameworks, demonstrates organisational commitment to responsible AI practices.

Staying informed

The field of generative AI is continuously evolving, and staying informed about new advancements is essential to remain competitive. Organisations must actively follow AI research and participate in industry forums to stay updated. Maintaining relationships with AI experts, researchers, and thought leaders will likely provide valuable insights and potential collaborations. Cultivating a culture of curiosity and learning will drive innovation and foster a forward-thinking approach to generative AI.

10

Call to action: capitalising on generative AI

As we stand on the precipice of a new era in AI, it's no exaggeration to say that generative AI holds transformative potential for organisations worldwide. This frontier is teeming with opportunities that, if utilised strategically, can pave the way for ground-breaking growth, productivity and innovation. However, navigating the expansive realm of generative AI is challenging. It requires a judicious approach that melds technological savviness with forward-thinking strategies. Below is a roadmap to aid organisations in effectively capitalising on and executing generative AI capabilities:

1. **Invest in skilled talent:**
To harness the full potential of generative AI, organisations need the right talent. This includes data scientists, AI specialists and ML engineers. However, they must consider the importance of cross-functional teams, including ethicists, legal experts and human-centred designers. These professionals can ensure that the deployment of AI aligns with ethical guidelines, legal norms and customer needs.

2. **Identify high-impact use cases:**
Implementing AI is tempting because it's the latest tech trend. But an effective AI strategy begins by identifying high-impact use cases relevant to an organisation. These use cases should be contextualised within a workflow or function and deliver measurable value considering dimensions such as efficiency, cost reduction, regulatory compliance, revenue generation or customer satisfaction.

3. **Adopt a proof-of-concept approach:**
Before scaling AI solutions across the organisation, begin with smaller proof-of-concept projects to test efficacy and viability. This approach allows one to assess the impact, adjust for unanticipated issues and learn valuable lessons before a larger roll-out.

4. **Ensure data readiness:**
Generative AI models require vast amounts of high-quality data. When moving beyond the capabilities of pre-trained models, establishing effective data governance processes and investing in data infrastructure is crucial. Remember, any AI system is only as good as the data it's trained on, across volume, veracity and velocity.

5. **Prioritise ethical and responsible AI:**
As organisations advance in their AI journey, they should remember that responsible AI usage is vital. They should develop and adhere to an ethical AI framework that continually checks to ensure data privacy, avoid bias and provide transparency and accountability.

6. **Partner with AI solution providers:**
If building in-house AI capabilities seems daunting, organisations should consider partnerships with AI solution providers. These firms offer AI-as-a-Service, providing tailored solutions that can accelerate the AI journey.

“The rise of generative AI signals a pivotal moment in technological history. It's an opportunity to reimagine how we solve problems, deliver value and drive growth. The journey to AI maturity is neither a sprint nor a solo endeavour. It's a marathon that we're all running together. The future is generative and is ours to create.”

» Kumar Parakala, President, GHD Digital.

→ Authors

Kumar Parakala
President, GHD Digital
Kumar.Parakala@ghd.com

Aijaz Hussain Shaik
Global Head of Thought Leadership and Research, GHD
Aijaz.Shaik@ghd.com

→ Artificial Intelligence Centre of Excellence

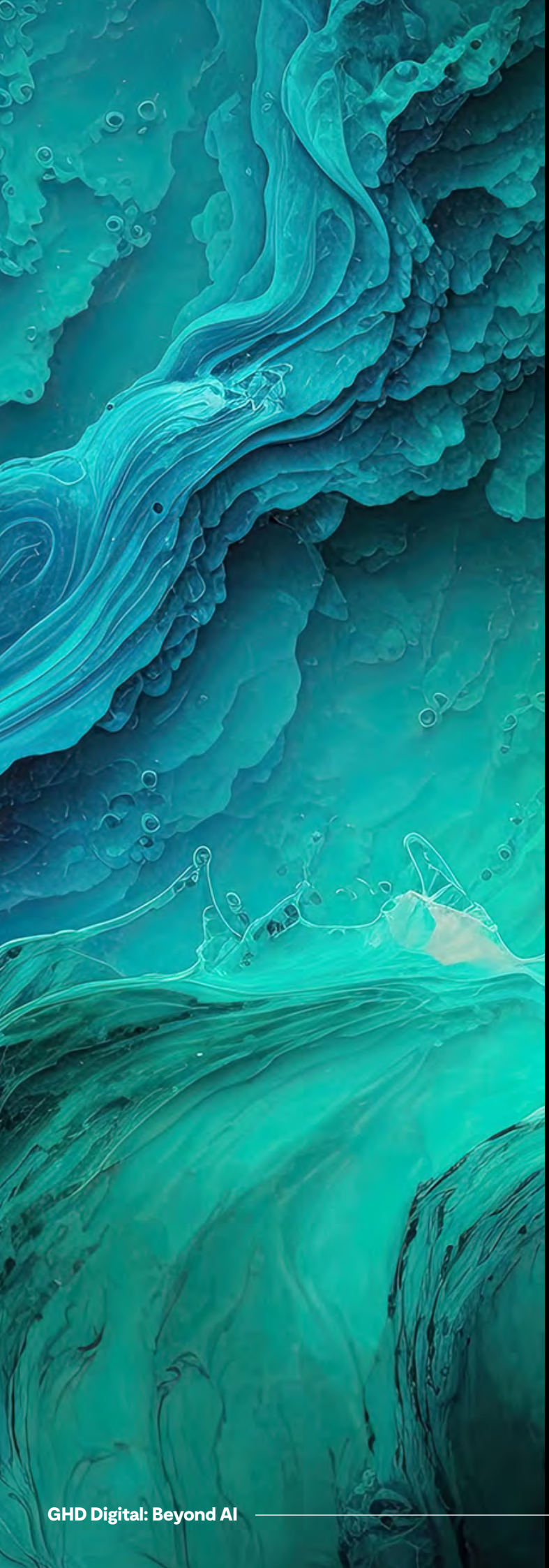
Dr. Nipa Basu
Global Practice Director, Digital Intelligence, GHD Digital
Nipa.Basu@ghd.com

Grant Stewart
Practice Director, Digital Intelligence, Southern Hemisphere, GHD Digital
Grant.Stewart2@ghd.com

→ Acknowledgments

This report would not have been possible without the contributions of the following individuals:

Sonia Adams, Jan Babiak, Natalie Cousens, Sarah Dods, Sylvain Emeric, Ian Fraser, Rob Knott, Simon Light, Paul Murphy, Dilip Raju, Andre Ribeiro, Sukalp Sharma, Jayesh Srivastava, Max Stevens-Guille and Ashley Wright.



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