Socio-Economic Research Centre
SERC 社会经济研究中心

Generative Artificial Intelligence: A Powerful New Technology

22 February 2024

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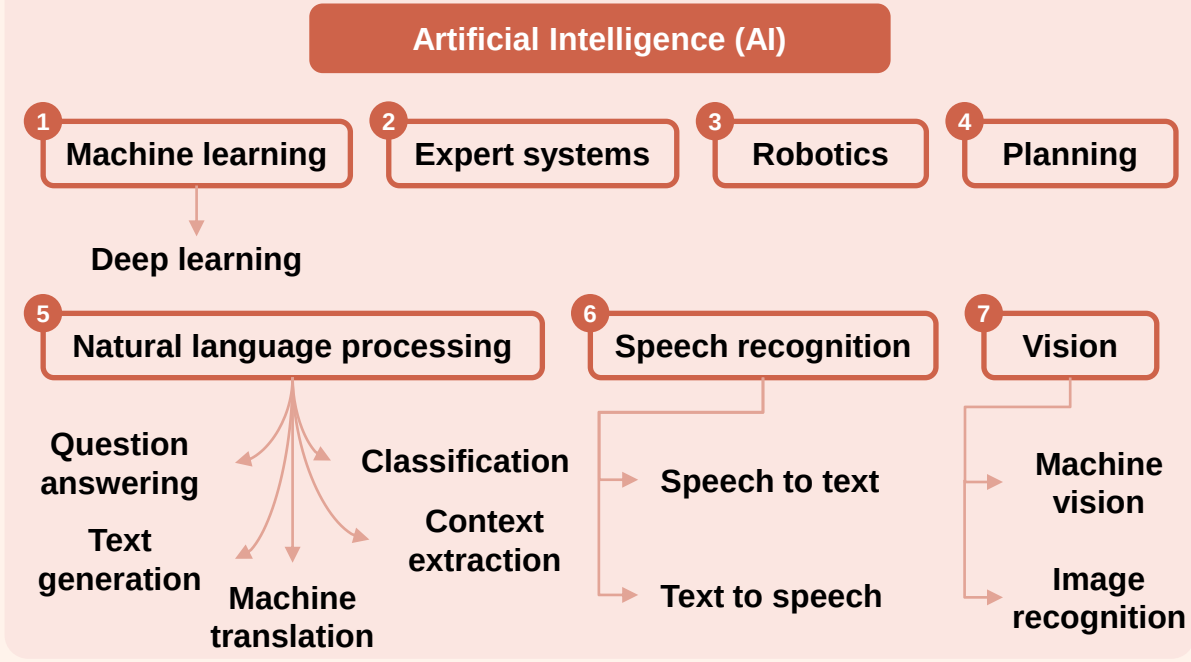
What is Artificial Intelligence (AI)?

Fun fact about Artificial Intelligence (AI)

Artificial Intelligence (AI) refers to a set of technologies that **allow machines to exhibit intelligence**, adapt to new situations, and enhance human creativity and intellectual abilities through collaborative intelligence across a wide spectrum of challenges.

The main subfields of AI include **machine vision, speech recognition, robotics, machine learning, deep learning and natural language processing**.



The history of AI began with a seminar paper in the 1950s titled "Computing Machinery and Intelligence". Later, the proof of concept was demonstrated by the “Logic Theorist”, a computer program, marking the start of the AI journey.

AI applications have rapidly expanded with the rise of smartphones, enabling advancements in our daily activities, such as **image recognition and data analysis**.

Google search engine

Apple Siri

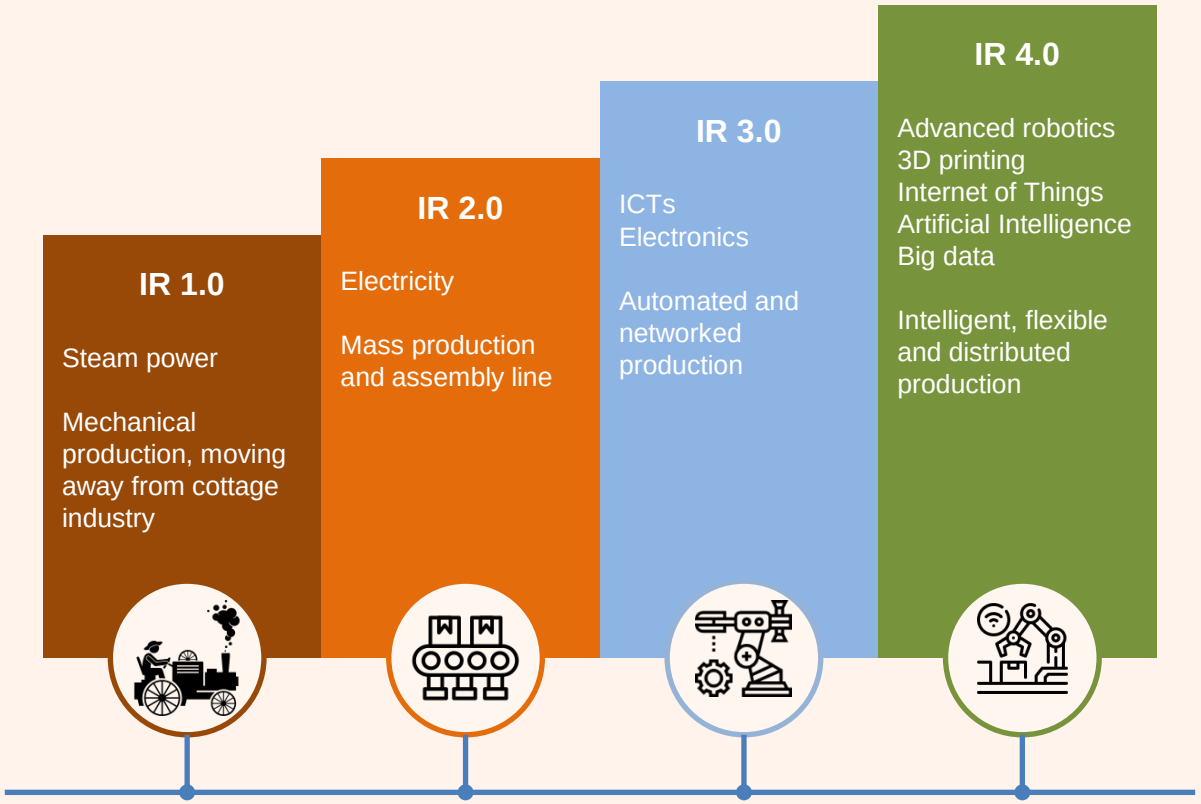
Self-driving car

Image recognition

AI - A catalyst to the Industrial Revolution 4.0 (IR4.0)

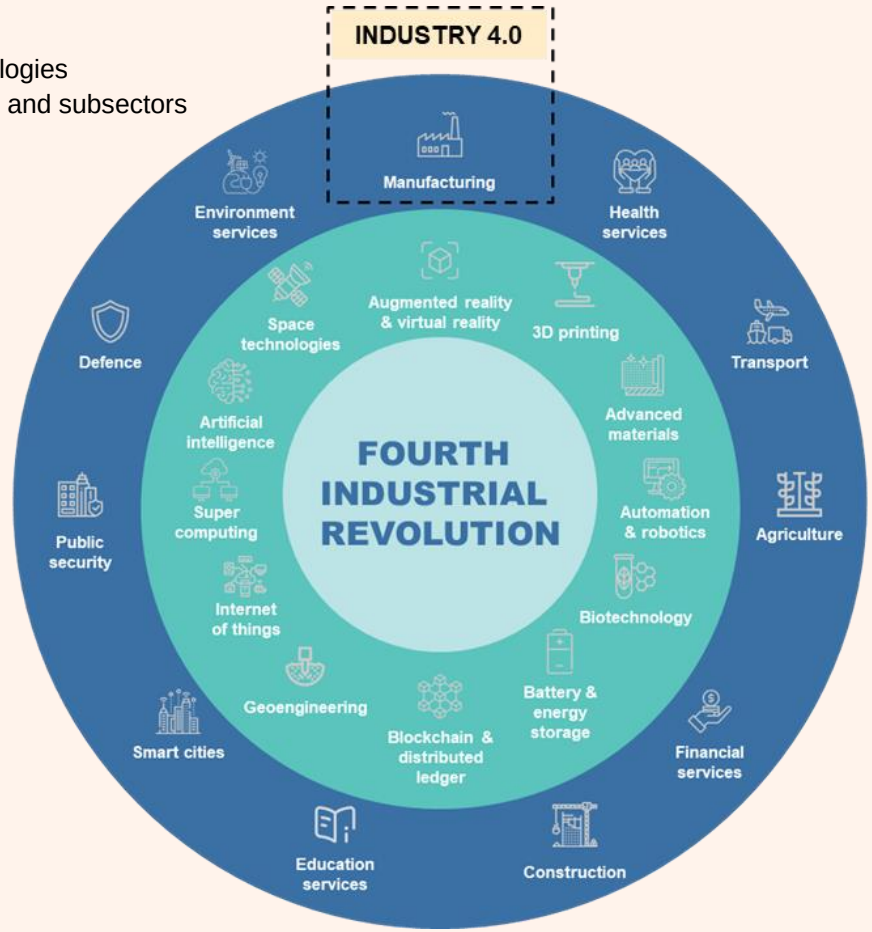
The Fourth Industrial Revolution (IR4.0) is a realisation of the digital transformation of the field, delivering real-time decision-making, enhanced productivity, flexibility and agility.

It was characterised by **a convergence of digital technologies, automation, and artificial intelligence (AI)**.



Source: McKinsey; National Industrial Revolution 4.0 Policy

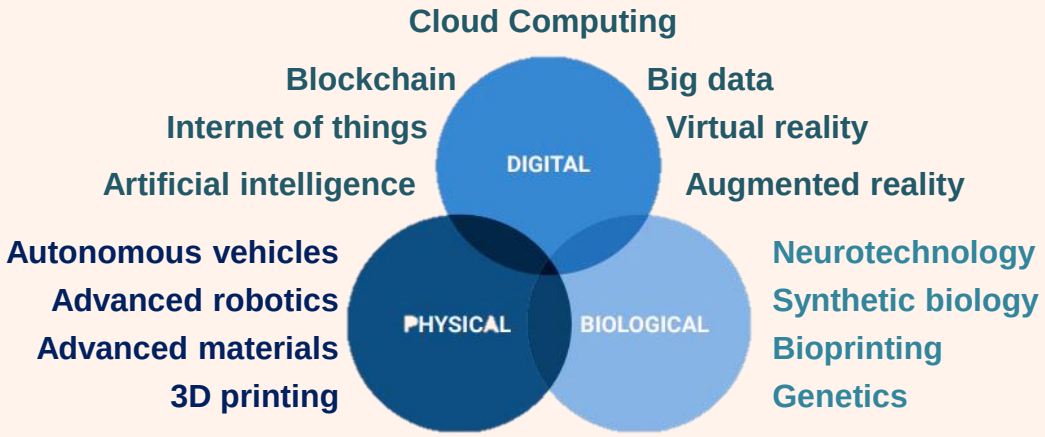
Industry 4.0, a subset of IR4.0, focuses on the manufacturing sector, whereas **IR4.0 encompasses almost every industry and all aspects of human life**.



Note: The list of IR4.0 technologies is non-exhaustive.

AI, driven by vast amount of data and sophisticated computational algorithms, has emerged as the bedrock of IR4.0, driving unprecedented efficiency gains, error reduction, and cost optimisation across various sectors.

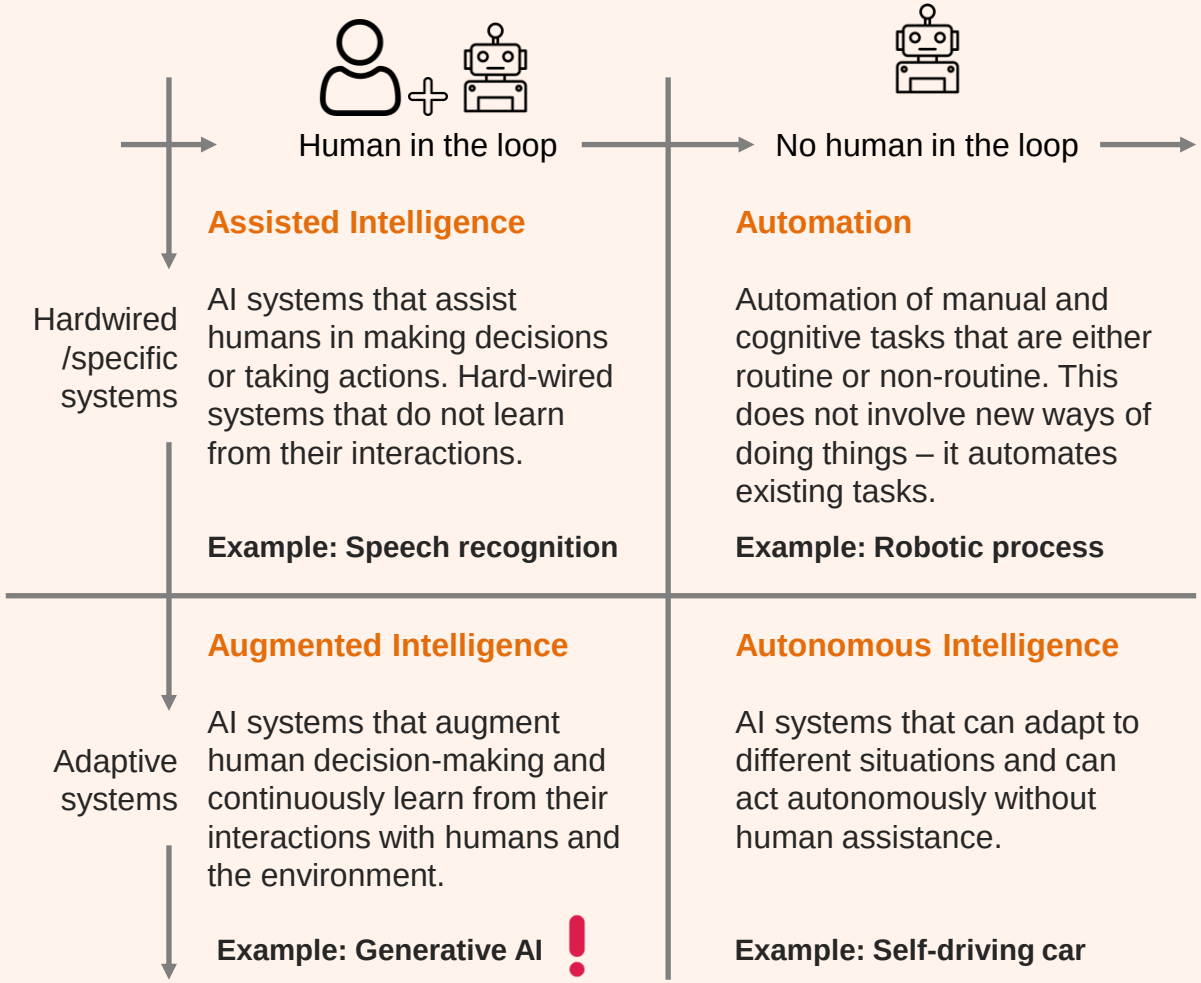
Convergence of digital, physical and biological domains in the IR4.0



The digital economy is defined as economic and social activities that involve the production and use of digital technologies by individuals, businesses, and government. **The IR4.0 entails the intensification of digital advancement across digital, physical, and biological domains.**

Source: PwC

Most importantly, AI is not synonymous with all forms of automation. Its ability to adapt to different situations and learn from vast amount of data differentiates it from traditional automation methods.



AI - The good, the bad and the fear of technological unemployment

Good

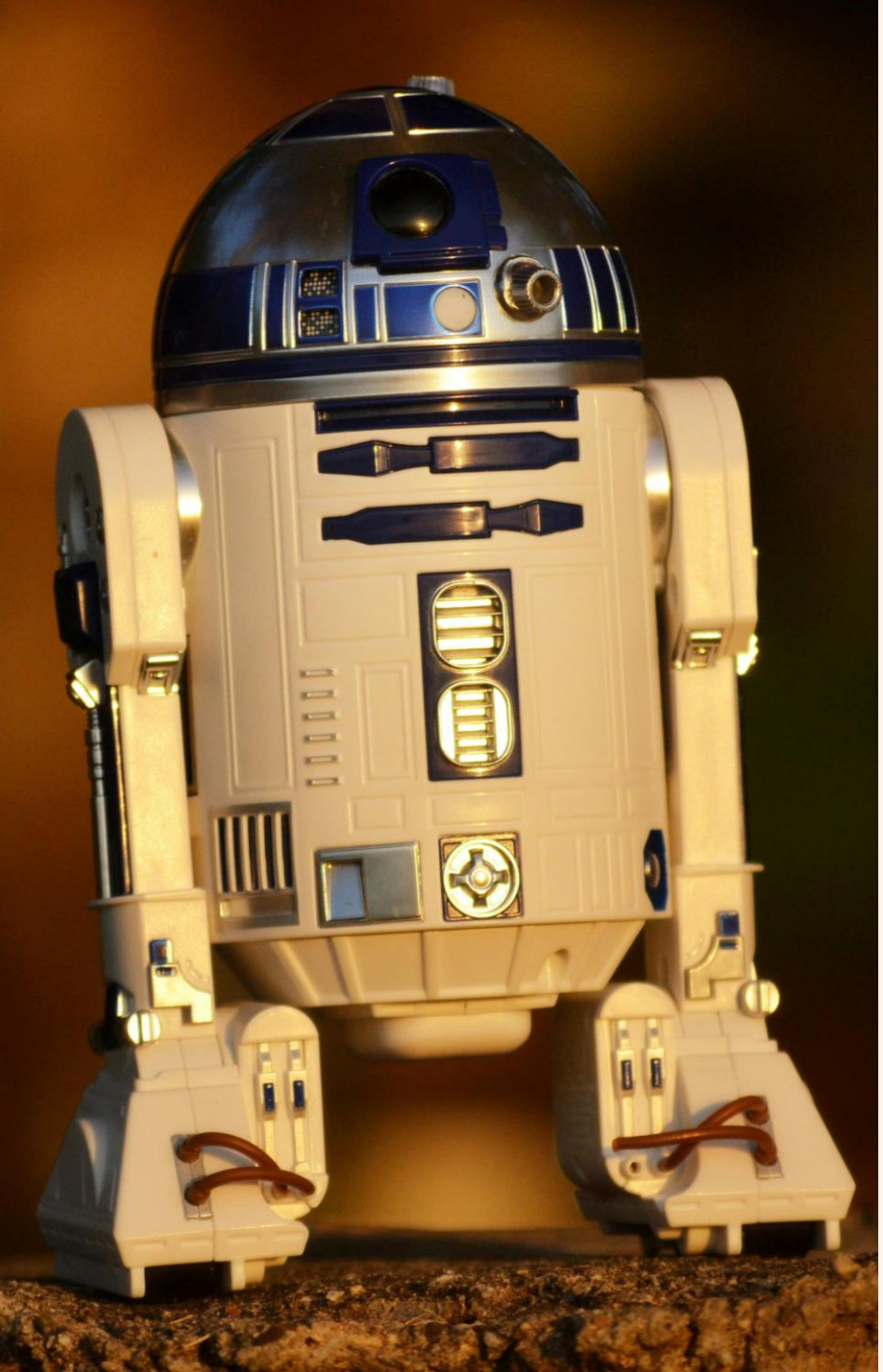
- PricewaterhouseCoopers (PwC): **AI will contribute up to US$15.7 trillion to the global economy by 2030**, including US$6.6 trillion from an increase in productivity and US$9.1 trillion from consumption-side effects.
- The McKinsey Global Institute: **Around 70% of companies would have embrace at least one AI technology by 2030** while less than half of large companies may fully utilise the entire range of AI technologies.

Bad

- While these research findings highlighted that AI generates considerable potential for economic growth, **it is acknowledged that AI may also exert intensified competitive pressure on businesses.**
- **Hence, this requires businesses to adapt, innovate, and find ways to effectively incorporate AI technologies to stay competitive** in the evolving technology-driven business landscape.
- According to both Schumpeterian and disruptive theory, **the adoption of technology is typically driven by competition and may build a first-mover market advantage** if the performance of the technology is strong enough to compensate for all the uncertainties surrounding its introduction.

Fear of technological unemployment

- The Future of Jobs report published by the World Economic Forum: **More than 75% of companies are actively contemplating the implementation of generative AI technologies within the next five years.** On average, about 44% of an individual's skills across all occupations will need to be modified, with AI and big data being the skills most frequently cited as experiencing growing demand by companies.
- Goldman Sachs: **Generative AI could replace up to one-fourth of all work** although these advancements could also contribute to a potential 7% increase in the annual value of global goods and services produced.
- **The impact of AI on job displacement varies across different sectors.** Automation could potentially affect 46% of administrative tasks and 44% of tasks in legal professions, whereas the impact is relatively lower in construction (6%) and maintenance (4%). For instance, the journalism industry may face heightened competition as AI enables individuals with average writing skills to generate essays and articles.
- International Monetary Fund (IMF): **In advanced economies, about 60% of jobs may be affected by AI, while 40% in emerging markets and 26% in low-income countries, respectively.** It may also exacerbate pre-existing inequalities due to the divergence of individual capabilities in AI adoption.



Take a step back: Where are we now?

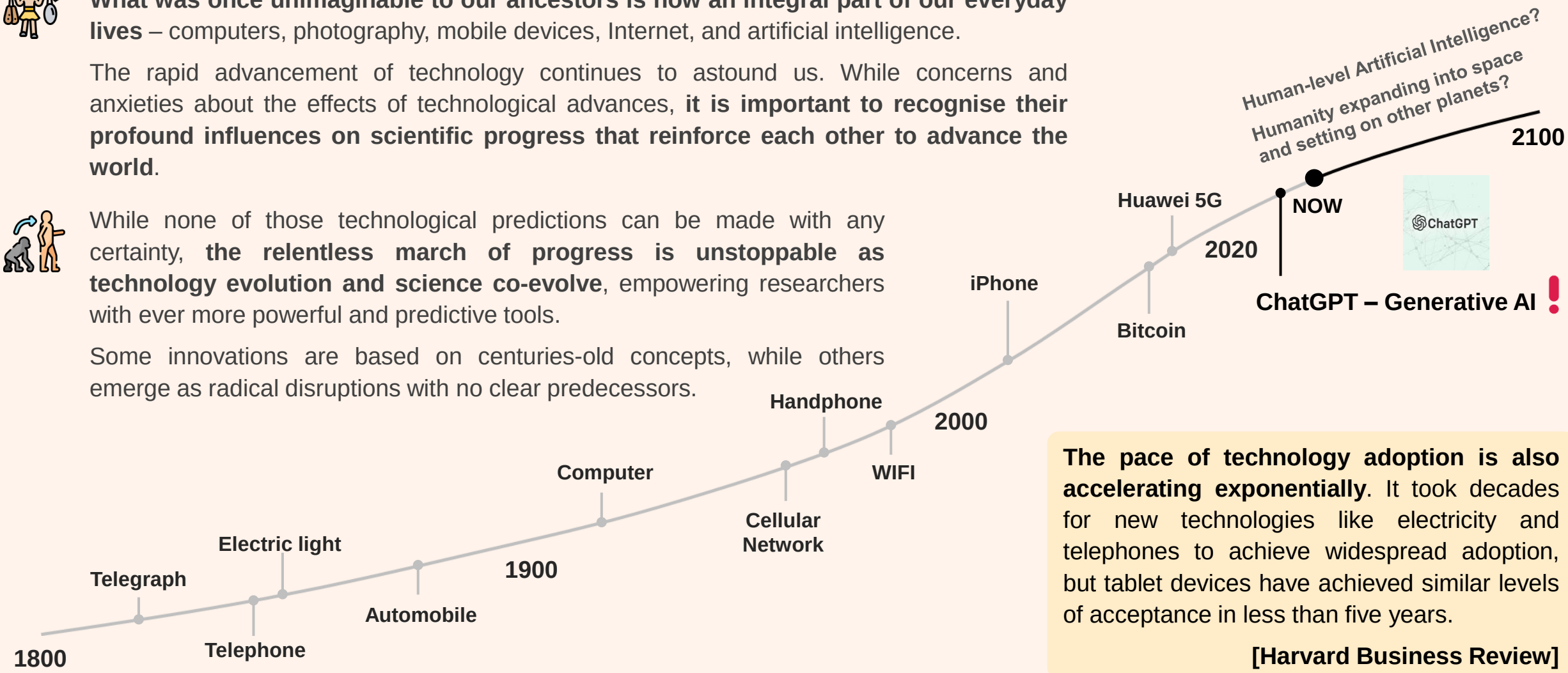
From stone tools to ChatGPT

What was once unimaginable to our ancestors is now an integral part of our everyday lives – computers, photography, mobile devices, Internet, and artificial intelligence.

The rapid advancement of technology continues to astound us. While concerns and anxieties about the effects of technological advances, **it is important to recognise their profound influences on scientific progress that reinforce each other to advance the world**.

While none of those technological predictions can be made with any certainty, **the relentless march of progress is unstoppable as technology evolution and science co-evolve**, empowering researchers with ever more powerful and predictive tools.

Some innovations are based on centuries-old concepts, while others emerge as radical disruptions with no clear predecessors.



The pace of technology adoption is also accelerating exponentially. It took decades for new technologies like electricity and telephones to achieve widespread adoption, but tablet devices have achieved similar levels of acceptance in less than five years.

[Harvard Business Review]

Note: Only include the most significant breakthroughs starting from the year 1800.
Source: Our World in Data; Harvard Business Review; International Monetary Fund (IMF)

About ChatGPT

What is it?

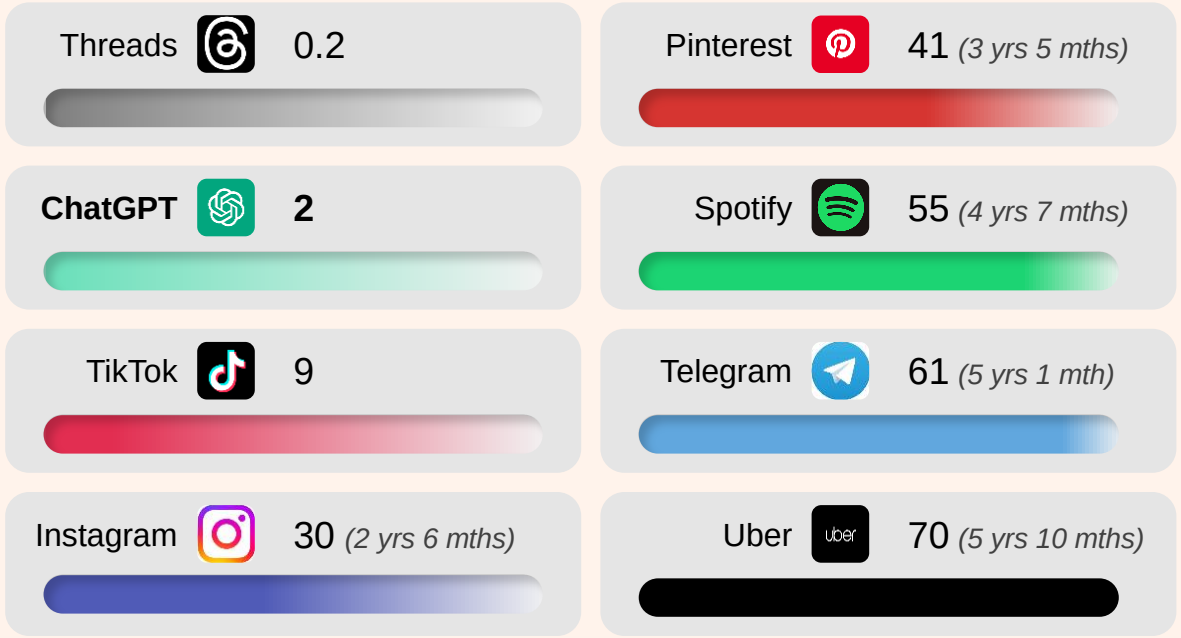
- Developed by OpenAI and powered by a generative pre-trained transformer (GPT) – **a type of large language model (LLM) that leverages the capabilities of natural language processing (NLP)**.
- It is trained on vast amount of unlabelled text data using self-supervised or semi-supervised learning techniques. **This enables the generation of human-like conversations and provision of an immersive and interactive experience**.

What are the impacts?

- Since its release as free software in November 2022, it gained 100 million monthly active users within just two months – **the second fastest-growing consumer application in history**.
- **The advent of ChatGPT has sparked significant development in AI.** Many tech companies have subsequently developed or integrated generative AI into their products and services.

Time to reach 100 million monthly active users (Number of months)

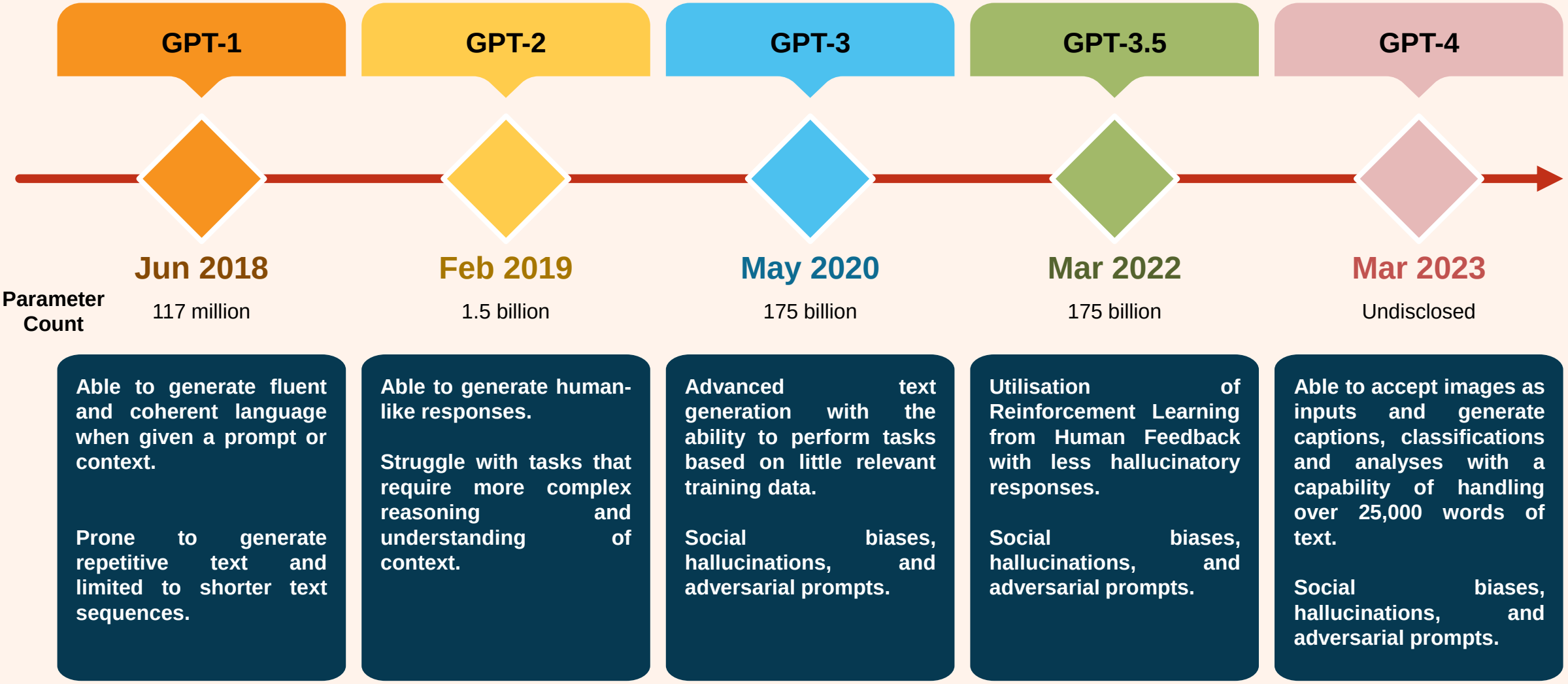
As of 31 Dec 2023



There are other generative AIs in the market:

- **Visual** — Image Generator — Video Generator — Design Generator
- **Audio** — Voice Generator — Music Generator
- **Text Generator**
- **Code Generator**

ChatGPT's journey of its evolution



Note: A parameter is a variable that the model uses to make predictions. The more it has, the stronger capability of AI's performance.

ChatGPT: Capabilities of the latest model

The latest version of ChatGPT has showcased its remarkable capabilities by competing with humans in exams. This remarkable progress **demonstrates the tremendous potential of AI to comprehend and respond to complex questions, rivalling human performance in certain contexts.**

	Category	Level	Simulated exams	GPT-4 estimated percentile	GPT-3.5 estimated percentile
	Lawyer	Professional	Uniform Bar Exam (MBE+MEE+MPT)	298 / 400 ~90th	213 / 400 ~10th
	Math	College	SAT Math	700 / 800 ~89th	590 / 800 ~70th
	Biology	Highschool	USABO Semifinal Exam 2020	87 / 150 99th–100th	43 / 150 31st–33rd
	Chemistry	College	AP Chemistry	4/5 71st–88th	2/5 22nd–46th
	Economy	College	AP Macroeconomics	5/5 84th–100th	2/5 33rd–48th
	Physics	College	AP Physics 2	4/5 66th–84th	3/5 30th–66th
	Programming	N/A	Leetcode (level easy)	31 / 41	12 / 41
			Leetcode (level medium)	21 / 80	8 / 80
			Leetcode (level hard)	3 / 45	0 / 45

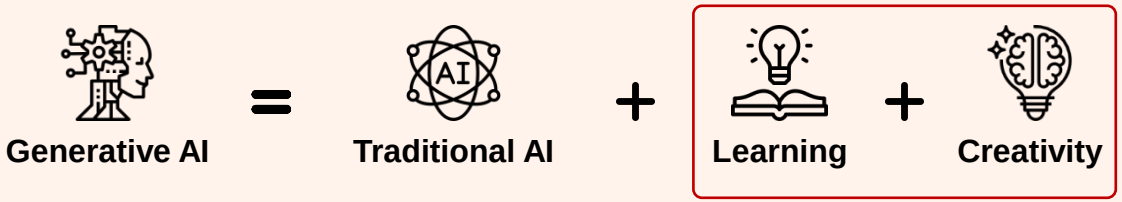
Source: OpenAI

ChatGPT: Breakthrough in Generative Artificial Intelligence

What is Generative AI?

- The successful development of ChatGPT has exemplified the potential of AI in natural language processing – **showing incredible capabilities of adaptability and creation**.
- Generative AI is a breakthrough – **the next generation of text-based machine learning models relies on what's known as self-supervised learning.** This type of training involves feeding a model with a massive amount of data so it becomes able to generate predictions.
- Its rapid growth and integration into various industries, such as search engines and financial assistance, **has highlighted the demand for new AI-powered solutions.**
- In comparison, traditional AI offers quality control and data accuracy for specific tasks based on a set of well-structured models, **while they often struggle to adapting the evolving scenarios, leading to a lack of contextual understanding of tasks.**

To some extent:



> **The launch of ChatGPT has rocketed generative AI on the radar of many people who hadn't been paying much attention – or didn't feel it was relevant to their lives.** This includes workers, who've already been touched by the technology, whether they know it or not.
>
> **-- BBC**
> **17th May 2023**

A comparison: Generative vs. Traditional AI

Generative AI can…

Content Creation and Creative Applications

It can generate new content that resembles the input data by learning patterns and relationships in the training data, whereas traditional AI generally lacks self-supervised learning.

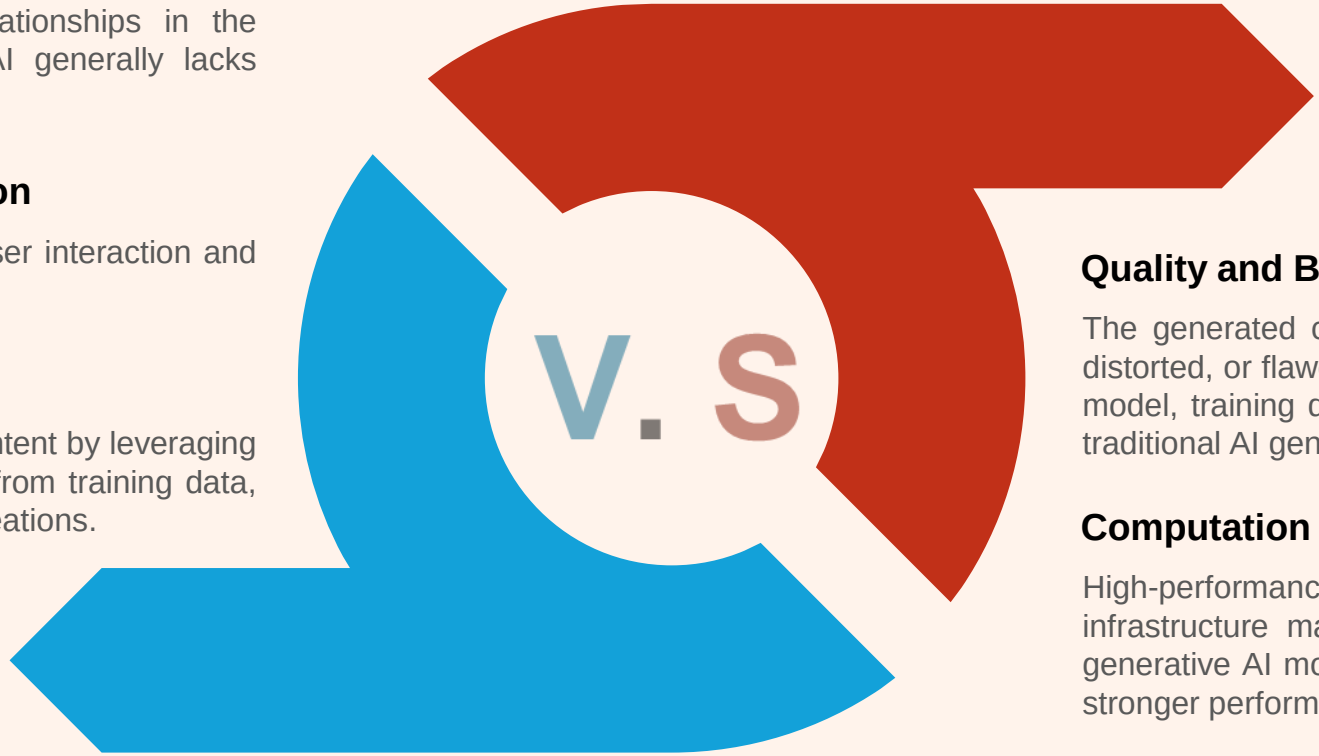
User Interaction and Adaptation

It can adapt and evolve based on user interaction and feedback.

Diverse Outputs

It can generate diverse and novel content by leveraging the patterns and structures learned from training data, allowing for unique and innovative creations.

UP



However, it still has its limitations compared to traditional AI…

DOWN

Quality and Biases

The generated content can sometimes be unrealistic, distorted, or flawed, depending on the complexity of the model, training data, and specific application, whereas traditional AI generally generates structural content.

Computation and Resource Intensity

High-performance hardware and specialised infrastructure may be necessary to train and deploy generative AI models effectively, as more data indicate stronger performance in the output.

Ethical Concerns

Generative AI raises ethical considerations, particularly when it comes to generating deceptive content, deep fakes, or copyright infringement.

A study estimated **an average of 500ml of water for every 20 to 50 conversations with the AI chatbot used** by data centres for electric generation and cooling systems. **These challenges necessitate sustainable development and regulation to ensure the responsible and ethical use of AI**.

The leading Generative AI companies

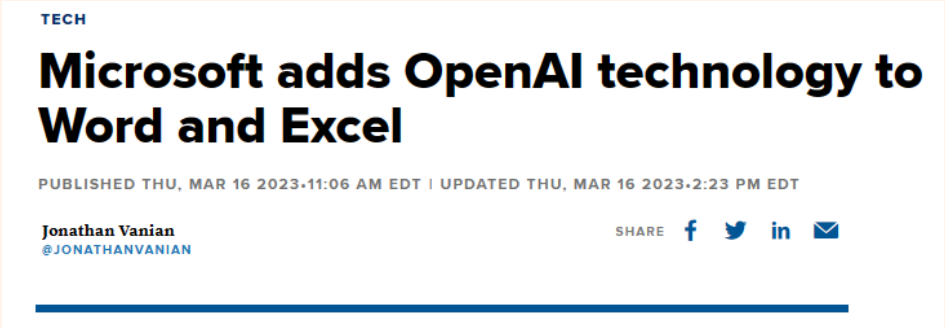
The presence of ChatGPT represents a breakthrough of technology in Generative AI and has significant spillover effects on the industry and ecosystem, although it is just a chatbot.

Design: Adobe Firefly generative AI

Quickly create, add to, remove, or replace images by simply a sentence.

Text: Microsoft Office and Bing (powered by OpenAI)

Serve as a chat tool; write different types of content, from poems to songs to stories to reports; provide information and insights on the website currently open in the browser; and use its image creator to design a logo, drawing artwork, or other image based on text.


TECH

Microsoft adds OpenAI technology to Word and Excel

PUBLISHED THU, MAR 16 2023•11:06 AM EDT | UPDATED THU, MAR 16 2023•2:23 PM EDT

Jonathan Vanian
@JONATHANVANIAN

SHARE

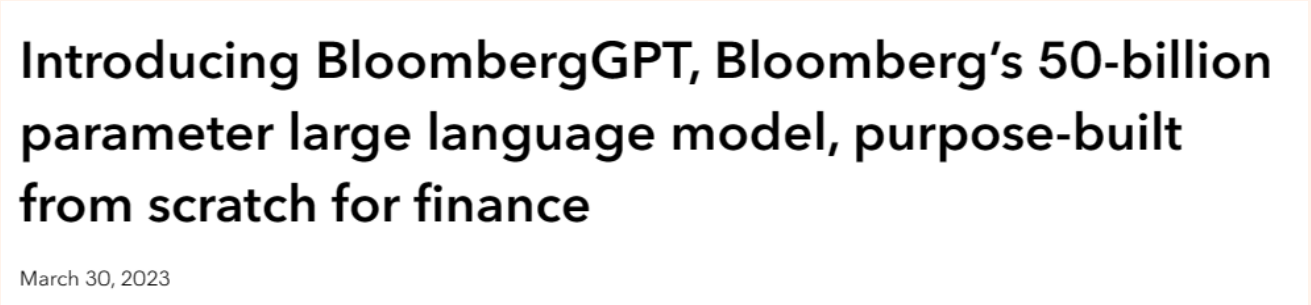
Audio: AIVA

Generate original music compositions in various styles and genres, and customise compositions based on user inputs like mood, tempo, and instruments.

Bloomberg

Analysis: BloombergGPT

Assist Bloomberg in improving existing financial NLP tasks, such as sentiment analysis, named entity recognition, news classification, and question answering, among others.


Introducing BloombergGPT, Bloomberg's 50-billion parameter large language model, purpose-built from scratch for finance

March 30, 2023

Generative AI and its economic impacts

The technology of Generative AI is still in its early stages and has yet to reach its full potential in the economy and businesses. However, based on the research available, it has shown promising results in the workplace by enhancing productivity.

Goldman Sachs: **The breakthrough of generative AI could contribute to a remarkable 7% increase in global GDP**, which amounts to nearly US$7 trillion.

Additionally, such advancements have the capacity **to boost productivity growth by 1.5 percentage points over a ten-year period.**

Boston Consulting Group: **It has the potential to drive about 30% increase in productivity** across the human resource value chain.

The HR administration and shared services (20%-30%) are among the top areas for capacity release, followed by HR strategy and planning, recruiting and resourcing, learning and development.

McKinsey Global Institute: **Generative AI is set to add up to US$4.4 trillion of value to the global economy annually,** with an additional 15%-40% impact on all artificial intelligence.

This estimate would roughly double if generative AI was embedded into software currently used for other tasks.

About 75% of the value that generative AI use cases could deliver across four areas: **Customer operations, marketing and sales, software engineering, and R&D.**

It will have a significant impact across all industry sectors, with the biggest impact in **banking, high-tech, and life sciences.**

Generative AI-powered chatbots, such as ChatGPT, can **potentially boost productivity by saving 60%-70% of workers' time through work automation.**

Generative AI can substantially enable labour productivity growth of 0.1%-0.6% annually through 2040, but that will require investments to support workers as they shift work activities or change jobs.

How does Generative AI impact on businesses?

There are many possibilities generative AI use cases across businesses that could create an early impact.

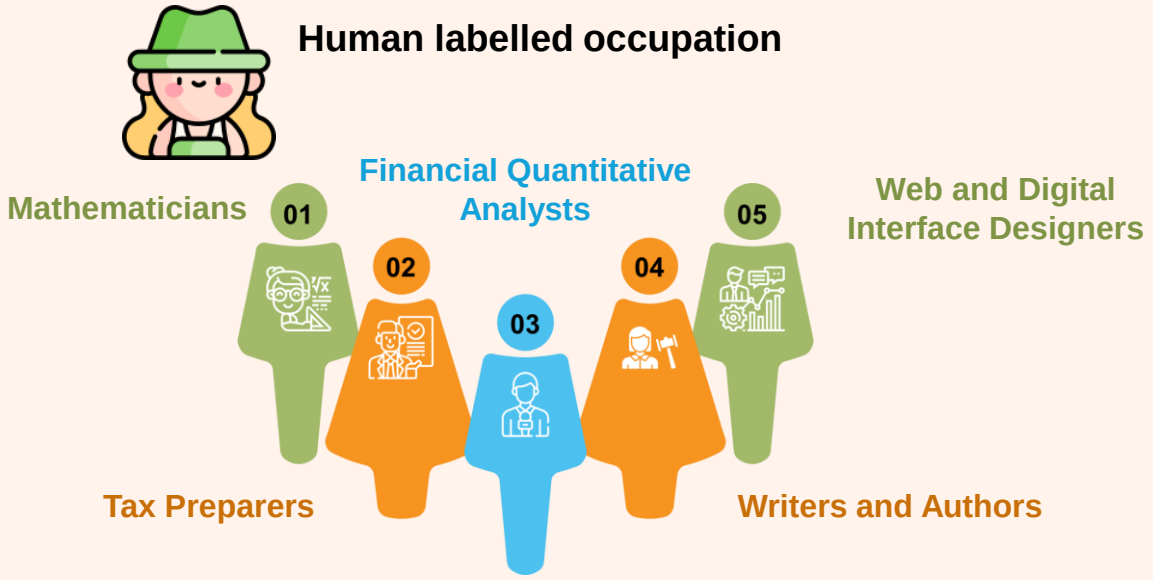
Example use cases (not exhaustive)

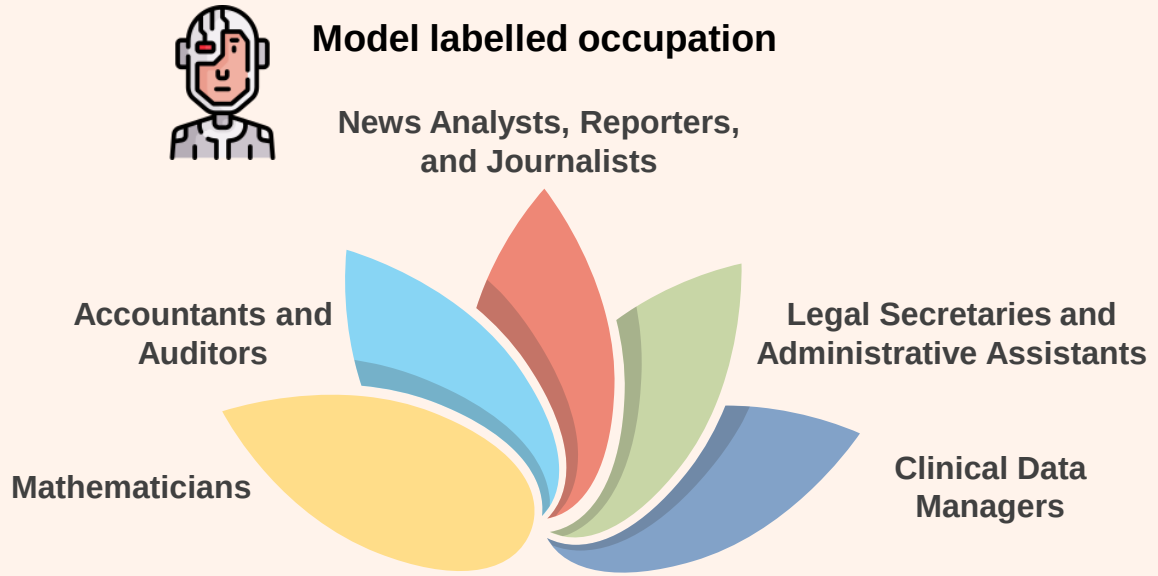
Financial Services	Marketing and Sales	News and Media	IT / Engineering	Risk and Legal
Develop customised investment solutions for mass-market consumers (e.g. robot advice).	Write marketing and sales copy, including text, images, and videos (e.g. to create social media content or technical sales content).	Assist in the post-production editing process, such as rapidly adjusting or enhancing scene details.	Write code and documentation to accelerate and scale developments (e.g. convert simple JavaScript expressions into Python).	Draft and review legal documents, including contracts and patent applications.
Capture complex patterns and relationships in the data, enabling them to make predictive analyses about future trends, asset prices, and economic indicators.	Create or improve sales support chatbots to help potential clients understand, including technical products, understanding and choosing products.	Engage and retain reviewers by creating a more personalised audience experience.	Automatically generate or auto-complete data tables while providing contextual information.	Summarise and highlight changes in large bodies of regulatory documentary.
Fraud detection by generating syntenic examples of fraudulent transactions or activities.	Analyse customer feedback by summarising and extracting important themes from online text and images.	Accelerate content creation by crawling and scraping the web for news stories.	Generate synthetic data to improve the training accuracy of machine learning models with limited unstructured input.	Answer questions from large amounts of legal documents, including public and private company information.

Source: PwC; McKinsey & Company; Montclair State University

Worries about technological unemployment

- Around 80% of the US workforce could experience **at least a 10% impact on their work tasks** with the introduction of large language models (LLMs), while approximately 19% of workers may see at least a 50% impact on their tasks due to LLMs.
- The availability of LLMs have the potential to significantly improve efficiency in the workplace. **Around 15% of all workers' tasks in the US could be completed much faster** while maintaining the same level of quality. When considering the integration of software and tools built on top of LLMs, **this percentage increases to a range of 47% to 56% of all tasks**.





Note: The objective of the study is to investigate the potential implications of large language models (LLMs), such as Generative Pretrained Transformers (GPTs), on the U.S. labour market, by accessing occupations based on their alignment with LLM capabilities, integrating both human expertise and GPT-4 classifications.
Humans labelled 15 occupations as fully exposed, while the language model labelled 86 as fully exposed. Exposure is defined as a measure of whether access to an LLM or LLM-powered system would reduce the time required for a human to perform/complete a specific task by at least 50%.
Source: OpenAI, OpenResearch and University of Pennsylvania (2023).

Generative AI: A double-edged sword

It started to gain more attention:

Italian Data Protection Authority prohibited ChatGPT from processing the data of Italian users due to concerns about data privacy and protection.

Artists and computer programmers, predominantly in the United States, **have initiated legal proceedings against image and code-generating LLMs to address concerns related to copyright and piracy.**

A study conducted by the US Department of Commerce **unveiled the tendency of facial recognition AI to frequently misidentify individuals of colour.**

The utilisation of facial recognition tools by law enforcement agencies could result in wrongful arrests and the disproportionate targeting of marginalised communities due to such biases.

An open letter from the Future of Life Institute, including Elon Musk, advocates for a temporary “halt” in the development of advanced forms of Artificial Intelligence (AI). They contend that **the potential effects of these systems necessitate a meticulous evaluation and justification before further progress can be made**.

Top CEOs and experts in the field of AI also **expressed concerns about the “risk of extinction” posed by AI, urging policymakers to treat it on par with the risks associated with pandemics and nuclear warfare**. In a letter published by the non-profit Center for AI Safety (CAIS), over 350 signatories emphasised this urgent need.

Important!

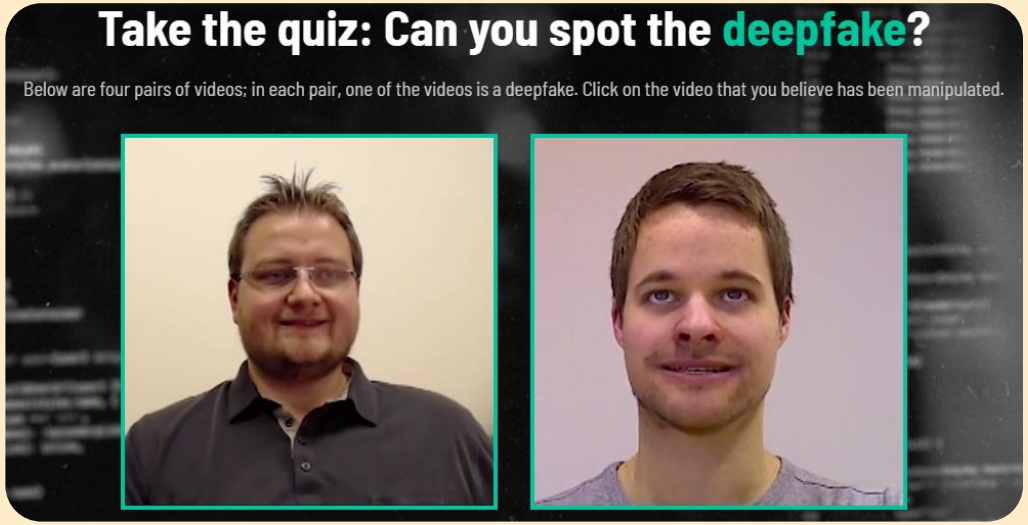
AI development may not always lead to an increase in productivity. A 2016 study by researchers at the University of California revealed that increased time spent on emails corresponded to a perceived decrease in productivity. Similarly, the rapid generation of vast amounts of text by generative AI could potentially lead to challenges such as spam emails and fraudulent activities that are difficult to detect and manage effectively.

Generative AI: More problems than you think

Deepfake technology

Generative AI can easily generate synthetic media that has been digitally manipulated to replace one person's likeness convincingly with that of another.

It has become increasingly sophisticated, making it harder to distinguish between real and manipulated content.




A lawyer used ChatGPT to cite bogus cases. What are the ethics?

By Karen Sloan

May 31, 2023 5:15 AM GMT+8 · Updated a day ago

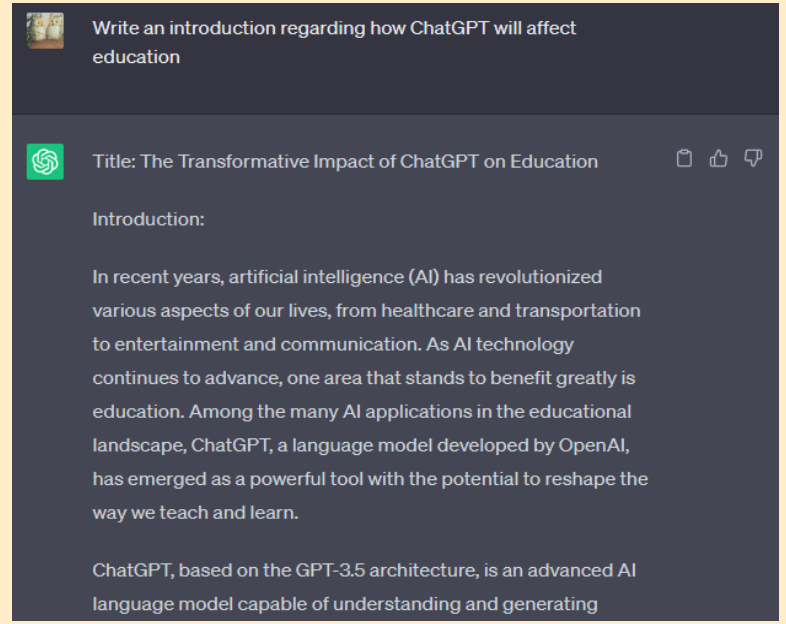
Truthfulness & Accuracy

Generative AI uses machine learning to infer information, which brings the potential inaccuracy problem to acknowledge.

With the rapid advancement of generative AI, there is a notable enhancement in its capabilities, leading to growing concerns regarding the potential for increased fraud activities. As humans may struggle to discern the quality and authenticity of the information in the future, the risks associated with fraudulent behaviour become more prominent.

Misuse in education

The rapid content generation capability of generative AI, often within minutes, raises concerns regarding potential biases, dissemination of incorrect information, and the impact on student's development of critical thinking skills, independent research, analysis, and information evaluation. Additionally, the prevalence of unethical activities such as plagiarism is also a significant concern.

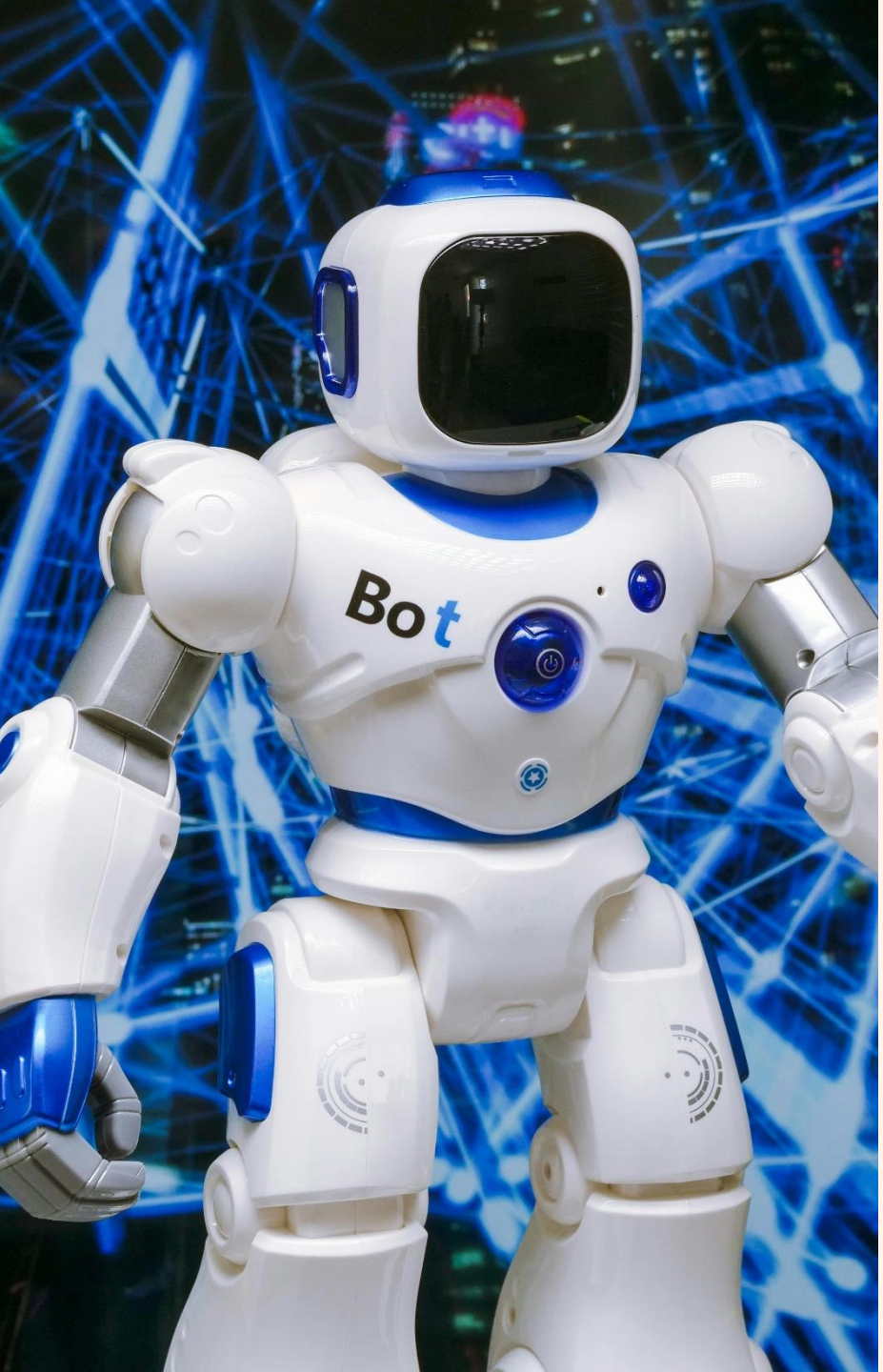

Write an introduction regarding how ChatGPT will affect education

Title: The Transformative Impact of ChatGPT on Education

Introduction:

In recent years, artificial intelligence (AI) has revolutionized various aspects of our lives, from healthcare and transportation to entertainment and communication. As AI technology continues to advance, one area that stands to benefit greatly is education. Among the many AI applications in the educational landscape, ChatGPT, a language model developed by OpenAI, has emerged as a powerful tool with the potential to reshape the way we teach and learn.

ChatGPT, based on the GPT-3.5 architecture, is an advanced AI language model capable of understanding and generating



AI landscape: An overview of global and Malaysia performance

An overview of AI readiness

Government AI Readiness Index 2023

1	United States	6	France	11	Denmark
2	Singapore	7	Republic of Korea	12	Australia
3	United Kingdom	8	Germany	13	Norway
4	Finland	9	Japan	14	Sweden
5	Canada	10	Netherlands	15	Austria

	Global Rank	Regional Rank	Score
North America			
USA	1	1	84.8
Canada	5	2	77.1
Europe			
UK	3	1	78.6
Germany	8	4	75.3
East Asia			
South Korea	7	1	75.6
Japan	9	2	75.1
China	16	3	70.9
ASEAN			
Singapore	2	1	82.0
Malaysia	**23**	**2**	**68.7**
Thailand	37	3	63.0
Indonesia	42	4	61.0
Vietnam	59	5	54.5
Philippines	65	6	52.0

Source: Oxford Insights

Government, technology, data and infrastructure ranking

	Government		Technology sector		Data and infrastructure	
	Global Rank	Score	Global Rank	Score	Global Rank	Score
North America						
USA	4	86.0	1	81.0	2	87.3
Canada	5	85.3	5	64.7	15	81.2
Europe						
UK	11	82.5	2	68.8	7	84.4
Germany	13	80.8	6	63.3	12	81.7
East Asia						
South Korea	3	87.6	21	54.4	6	85.0
Japan	10	82.8	15	56.9	4	85.6
China	22	77.3	10	60.8	29	74.8
ASEAN						
Singapore	1	90.4	4	66.2	1	89.3
Malaysia	**17**	**80.0**	**22**	**54.1**	**37**	**72.0**
Thailand	23	77.2	48	41.3	45	70.6
Indonesia	25	76.2	41	43.5	64	63.4
Vietnam	52	69.0	66	37.8	86	56.6
Philippines	60	65.4	78	34.4	87	56.1

Malaysia vs. Singapore

There is significant potential for improvement in Malaysia compared to Singapore

Malaysia	2019	2020	2021	2022	2023	2019	2020	2021	2022	2023	Singapore
Government		**67.4**	**68.4**	**77.7**	**80.0**		**93.8**	**94.9**	**89.7**	**90.4**	**Government**
Vision		50.0	50.0	100.0	100.0		100.0	100.0	100.0	100.0	Vision
Government and Ethics		64.8	67.0	63.0	72.2		91.6	93.8	84.5	88.3	Government and Ethics
Digital Capacity		84.8	76.8	78.5	78.5		93.8	91.8	91.1	91.1	Digital Capacity
Adaptability		69.9	79.7	69.3	69.3		89.9	94.0	83.2	82.2	Adaptability
Technology Sector		**54.4**	**52.7**	**50.3**	**54.1**		**64.7**	**66.7**	**68.5**	**66.2**	**Technology Sector**
Maturity	**N/A**	30.4	31.5	34.4	34.3	**N/A**	45.0	50.9	54.7	54.8	Maturity
Innovation Capacity		65.1	67.1	53.4	61.5		68.7	72.5	77.7	75.6	Innovation Capacity
Human Capital		67.8	59.4	63.0	66.5		80.4	76.4	73.2	68.2	Human Capital
Data and Infrastructure		**69.2**	**66.3**	**74.2**	**72.0**		**77.6**	**85.8**	**94.2**	**89.3**	**Data and Infrastructure**
Infrastructure		53.4	45.4	79.0	59.0		65.7	78.9	92.3	77.7	Infrastructure
Data Availability		72.0	79.3	74.1	74.2		83.5	87.9	91.1	91.1	Data Availability
Data Representativeness		82.2	74.4	69.3	82.8		83.7	90.6	99.2	99.2	Data Representativeness
Overall Score	**7.1**	**63.7**	**62.5**	**67.4**	**68.7**	**9.2**	**78.7**	**82.5**	**84.1**	**82.0**	**Overall Score**
Global Rank	**22**	**28**	**36**	**29**	**23**	**1**	**6**	**2**	**2**	**2**	**Global Rank**

Note: Government Artificial Intelligence Readiness Index has undergone several changes in its methodology, particularly in 2020 and 2022.
Source: Oxford Insights

Compared to other ASEAN countries' performance in 2023

= *The highest*	Malaysia – 23rd	Thailand – 37th	Indonesia – 42nd	Vietnam – 59th
Government	**80.0**	**77.2**	**76.2**	**69.0**
Vision	100.0	100.0	100.0	100.0
Government and Ethics	72.2	75.5	70.4	62.0
Digital Capacity	78.5	77.2	72.5	66.5
Adaptability	69.3	56.2	62.1	47.7
Technology Sector	**54.1**	**41.3**	**43.5**	**37.8**
Maturity	34.3	27.7	27.9	28.4
Innovation Capacity	61.5	59.2	52.0	46.4
Human Capital	66.5	37.2	50.6	38.7
Data and Infrastructure	**72.0**	**70.6**	**63.4**	**56.6**
Infrastructure	59.0	62.0	51.9	33.7
Data Availability	74.2	77.3	59.4	67.5
Data Representativeness	82.8	72.3	78.8	68.5
Overall Score	**68.7**	**63.0**	**61.0**	**54.5**

Source: Oxford Insights

Global leaders

The United States (US)

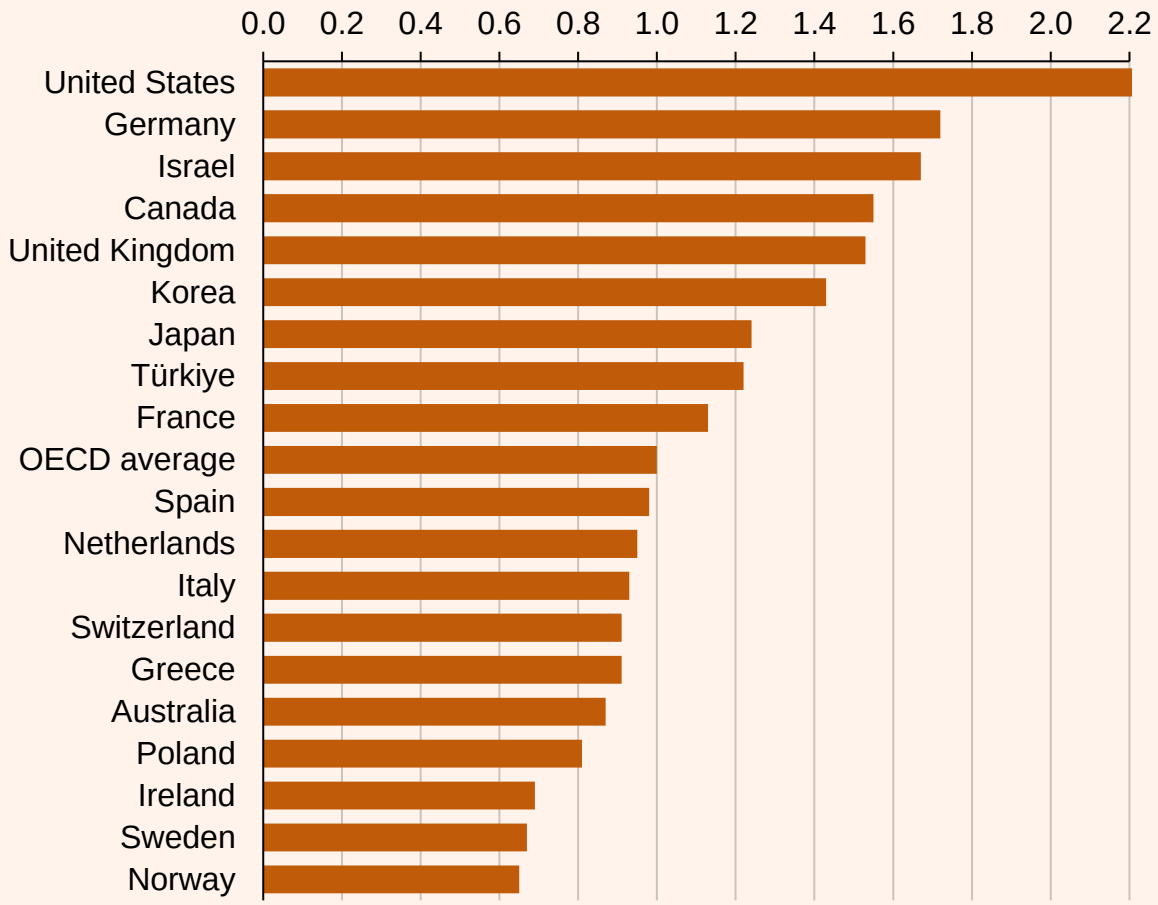
- **The US was ranked first in the Government AI Readiness Index 2023 and has always been one of the top fives over the years**, displaying a robust AI innovation ecosystem across government, academia and industry.
- Several policies and initiatives aimed to support AI development:

  (a) **National Artificial Intelligence Initiative Act of 2020**: Speed up AI research and development (R&D), encourage public-private partnerships, and improve education and workforce development.

  (b) **National Security Commission on Artificial Intelligence**: Advance AI development and associated technologies to address national security and defence needs.
- One of the key pillars is the high investment in R&D to support AI innovation across the private and public sectors.
- OECD AI Policy Observatory: The US recorded a total of US$57.2 billion in venture capital AI investments, **which was the highest among 69 countries in 2022.**

Source: Oxford Insights; OECD AI Policy Observatory

Cross-country AI skills penetration, average (2015-2022)



Note: This chart shows the prevalence of workers with AI skills – as self-reported by LinkedIn members from 2015-2022 – by country and against an OECD benchmark. A country's AI skills penetration of 1.5 means that workers in that country are 1.5x more likely to report AI skills than workers in the benchmark. China is not included in the list.

Leaders in East Asia

China

- **National New Generation AI Plan (2017)**: Aims to become the “primary” centre for AI innovation by 2030.
- Due to relatively poor results in data and infrastructure, concerns arise from indicators such as household internet access and socioeconomic gap, highlighting the need for accessible digital public services and representative data.

China’s profile in 2023:

VC investment in AI (US$ billion)	18.3
AI research publication (% of total)	22.0
AI academic research publication (% of total)	30.1

South Korea

- **National Strategy for AI (2020)**: Aims to contribute 445 trillion Korean won to the economy and ranked third in global digital competitiveness by 2030.
- South Korea has the top-tier digital capacity within the government, with quality data available for training AI models, highlighting the potential for ecosystem development.

South Korea’s profile in 2023:

VC investment in AI (US$ billion)	2.2
AI research publication (% of total)	1.9
AI academic research publication (% of total)	2.8

Japan

- **AI Strategy (2019)**: Specific to the environment and measures conducive to effective future utilisation of AI that offers solutions for global issues.
- Japan is also at the top of the Data Availability dimension, resulting from well-connected populations, comprehensive open data policies, and taking a whole-of-government approach on data governance.

Japan’s profile in 2023:

VC investment in AI (US$ billion)	1.4
AI research publication (% of total)	2.0
AI academic research publication (% of total)	1.8

Source: Malaysia Artificial Intelligence (AI) Roadmap; OECD AI Policy Observatory

Leaders in ASEAN

Singapore

- **National Artificial Intelligence (AI) Strategy (2019)**: Aims to be a leader in several high-value sectors and a global hub for certain AI activities by 2030.
- Its innovative and committed approach to digital government, paired with a business-friendly legislative environment, breeds productivity in public-private partnerships to support innovation.

Indonesia

- **National AI Strategy (2020)**: Economic transformation towards an innovation-based nation with infrastructure and policy support to enhance AI development from 2020 to 2045.
- Thailand and Indonesia introduced ‘digital nomad’ visas as a policy innovation to attract new and skilled tech workers.

Thailand

- **Thailand National AI Strategy and Action Plan (2022)**: Promote AI development and application with an effective ecosystem by 2027.
- While Malaysia ranked second place in ASEAN, Thailand performed well in the data and infrastructure sector, particularly in data availability and infrastructure.

Philippines

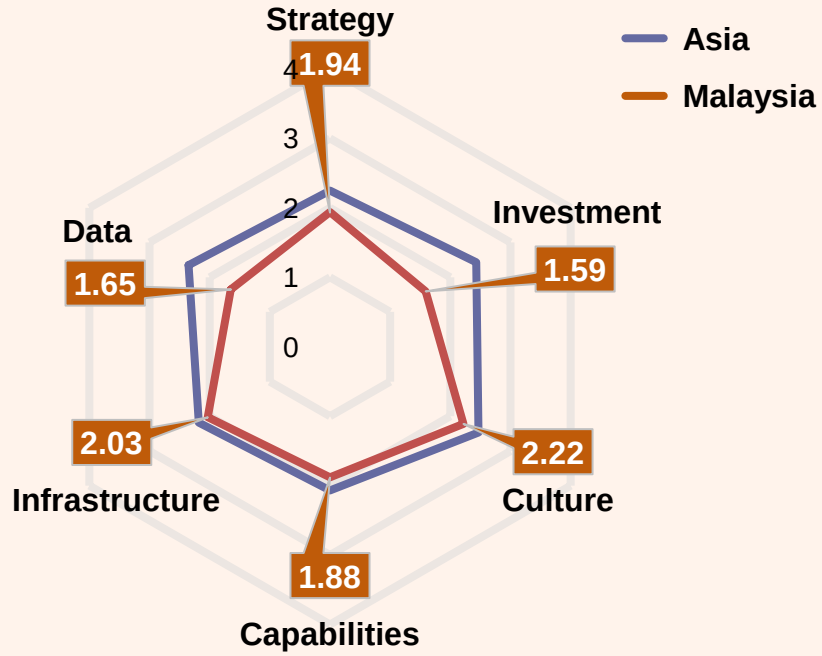
- **Philippines AI Strategy Roadmap (2021)**: Guide the AI technology deployment to enhance the economy.
- Although the Philippines was relatively behind among other nations in ASEAN, it was still in the stage of talent and infrastructure development to enhance AI innovation.

Source: Malaysia Artificial Intelligence (AI) Roadmap; OECD AI Policy Observatory

Malaysia ecosystem

Malaysia: Studies on AI adoption

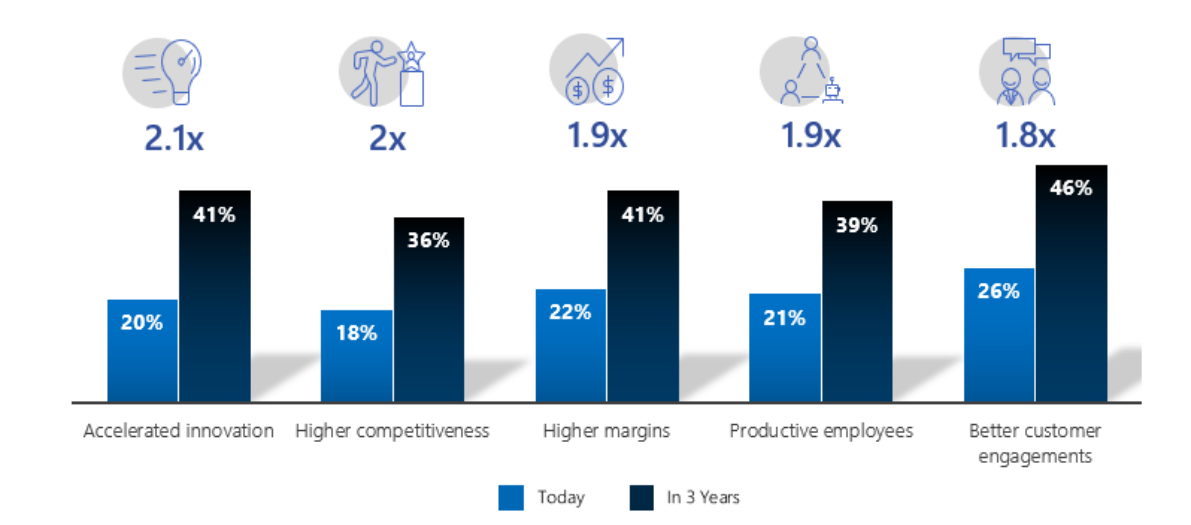
International Data Corporation (IDC) study (2018)



- The organisation's readiness to adopt AI in Malaysia **is behind Asia Pacific in all areas, particularly in Investment and Data.**
- It indicates that **organisations must enhance data governance to leverage the potential of their data and invest in digital platforms**, such as hyper-scale intelligent cloud, rather than expand their traditional IT infrastructure.

Source: Malaysia Artificial Intelligence (AI) Roadmap; Microsoft

- In the survey, most business leaders and workers believed that cultural traits that support AI journeys, namely **risk-taking, proactive innovation, and cross-function partnerships among teams, were not pervasive.**
- **The survey highlighted the importance of leadership commitment towards investment in digital skills, tools and infrastructure** to drive AI-enabled digital transformation.
- **67% of business leaders and 64% of workers perceived an improvement in their existing duties or repetitive tasks.**



Note: AI improves business today and in three years

Malaysian Artificial Intelligence (AI) Roadmap survey (2021)

Key takeaway:

- More than 50% of organisations are still behind in technology applications.
- Top challenges to AI adoption are lack of talents/expertise and funding.
- Budget allocation on AI-related projects is mostly less than 5%.
- Organisation has low overall budget priority for AI.
- Top AI applications are related to analytics and biometric applications.
- The most common AI capability used is intelligent process automation to support operations.
- Substantial gap between government and private organisations in AI development.

AI-related activities and implementation

	None (%)	Initial (%)	Partial (%)	Full (%)
Infrastructure for data storage and sharing	18.8	30.8	27.8	22.6
Data storage in cloud	22.6	30.8	27.1	19.5
Data for inter-department resource sharing (e.g. Cloud sharing)	23.3	29.3	27.8	19.5
Security measures against threat to organisational data	25.6	27.8	24.8	21.8
Policy and mechanism for sharing data with other organisations	36.8	27.1	21.8	14.3

Note: Only selected indicators are shown here.

Source: Malaysia Artificial Intelligence (AI) Roadmap

Examples of AI adoption in Malaysia

PETRONAS: Uses AI to manage platform data - New technology in the oil and gas industry is introduced by moving away from condition-based monitoring and conventional analytics towards predictive maintenance driven by predictive analytics. In the Dulang platform, VROC AI validated the failure root causes 2000 times faster and saved RM 15 million in cost avoidance.

Microsoft (Malaysia) Sdn. Bhd: Supports researchers, nonprofits and organisations globally covering multiple disciplines such as environment, accessibility, human issues, cultural heritage and health through their AI for Good initiatives. Further, ethical AI practices are enforced throughout the organisation via their Responsible AI program.

Seeloz Inc: An AI company based in Silicon Valley, California, but with deep roots in Malaysia, it is an emerging global leader in Supply Chain Automation. Leveraging Artificial Intelligence (AI), Seeloz introduced Supply Chain Automation Suite (SCAS), the world's first Autonomous Requirements Planning (ARP), that redefines supply chain planning across distinct types of supply chains.

Telekom Malaysia Berhad: Signed a Memorandum of Agreement (MoA) with Huawei Technologies (M) Sdn Bhd (Huawei), sealing a collaboration that expands its cloud infrastructure offered through TM ONE.

Huawei: A leading global provider of information and communications technology (ICT) infrastructure and smart devices, employing 197,000 employees in 170 countries and serving over 3 billion people. The company serves over 80% of Malaysians through fixed and mobile telecommunications solutions and is proud to be a part of the nation's digital transformation journey.

Source: Malaysia Artificial Intelligence Roadmap 2021-2025

Where are we now in AI ecosystem?

TECHNOLOGIES WITH A PRESENCE IN MALAYSIA

- Artificial intelligence
- Internet of things
- Advanced materials
- Automation and Robotics
- Drones
- Blockchain
- Cloud computing and Big data analytics (BDA)
- Genetic engineering
- Bioprinting
- Augmented reality
- Sensor technology
- Biotechnology
- Virtual reality
- Battery and Energy storage
- Super computing
- Neurotechnology
- Autonomous vehicles
- Synthetic biology
- 3D printing

TECHNOLOGIES ON THE RISE

- 4D or 5D printing
- Metalenses
- Social robots
- NEW
- Generative artificial intelligence
- DNA data storage
- Private 5th generation (5G) mobile network
- Biodegradable sensors
- Collaborative telepresence
- Health passports
- Ingestible robots
- Smart clothing
- Photonics in space
- Genetic computing
- Geoengineering
- Biomimetic materials
- Carbon-breathing batteries

PRESENT YEAR | **BEYOND 2020**

Source: National Industrial Revolution 4.0 Policy

What does Generative AI mean to Malaysia?

Current policies and impacts of Artificial Intelligence (AI)

- The development of Artificial Intelligence (AI) in Malaysia has been strategically addressed in three key official documents: (i) **National Industrial Revolution 4.0,** (ii) **Malaysia Digital Economy Blueprint, and** (iii) **Malaysia National Artificial Intelligence Roadmap 2021-2025.**
- **AI has considerable potential to increase Gross Domestic Product (GDP) by an additional 1.2% percentage points**, leading to an increment of 30% GDP growth based on the 2018 baseline growth (4.4%) for Malaysia.
- **The Ministry of Science, Technology and Innovation (MOSTI) is still targeting AI-led growth with a 30% increase in GDP at the very least.**
- McKinsey: **Automation by AI can create 1.5 million net new jobs by 2030 in Malaysia (6 million new jobs and 4.5 million job losses), as 50% of work time is spent on repetitive activities.** Workers must have the necessary skills and be committed to continuous learning.
- **Over 50% of organisations were behind in adopting AI technology in 2021, with low budget priority.** The adoption rate is slow, with only 15% - 20% of companies embracing the technology.

However, breakthrough requires new insights

- The presence of Generative AI requires another dimension of studies and regulations as it involves many considerations, such as ethics, privacy, and biases.
- The leader in policy development is the European Union, with the world's first comprehensive AI law to ensure a safe, transparent, traceable, non-discriminatory and environmentally friendly development.
- Since it is a new technology that started in 2022, various research and studies are required to evaluate its potential to fit in Malaysia's context in alignment with national development.
- There may be a requirement to comprehensively review and update the current regulatory framework or roadmap to consider Generative AI.
- With the incoming impact, assisting workers and industries to harness the benefits of this new generation of AI is crucial for maintaining competitiveness and fostering a successful transition.

How does Generative AI shape the industry?

- In May 2023, **Astro AWANI introduced two new AI-powered journalists that deliver fluent Malay-speaking news on TV**. These initiatives are a result of the synergy between generative AI technology and professional journalism practices.
- The integration of AI in journalism exemplifies the potential for collaboration between AI and human professionals in future. **AI can enhance language fluency and content generation**, while human journalists provide critical verification, analysis, and upholding of journalistic integrity.
- It also brought forth a new era of competition and challenges, impacting journalists regardless of their experience. **As AI takes a larger workload, they may find themselves facing a shifting landscape where they may earn less.**
- At the same time, late adoption or reluctance to embrace AI technology may also result in a loss of competitiveness. **Companies may face challenges in keeping up with industry trends, meeting audience expectations, and delivering content efficiently.**

Welcome 'Joon' and 'Monica' to Astro AWANI, as the waves of AI have arrived

Astro Awani
Mei 8, 2023 20:19 MYT

Latest studies on Generative AI

General adoption and application

Key takeaway:

- **About 32% of the Asia/Pacific (AP) organisations committed to investing** in Generative AI technologies.
- **38% of respondents had explored use cases** to implement using Generative AI.
- **Knowledge management is the foremost use case** that leverages access and search across large repositories of information (e.g. images, documents, voice, and other formats), followed by the use case of code generation.
- However, it comes with considerations on the following issues:
  - (a) 66% of AP enterprises identified **data science skills gap as a major hindrance** to becoming data-driven.
  - (b) 62% of AP enterprises cited **the cost of solutions and implementation as a significant challenge** to becoming data-driven.
  - (c) **The need to build robust data governance, security, and compliance capabilities** for business intelligence.

Healthcare

Key takeaway:

- **49.6% of healthcare providers in Asia/Pacific plan to invest** in Generative AI to enhance patient care and boost clinic productivity.
- Top Generative AI use cases for Asia/Pacific healthcare organisations: **Marketing, Knowledge Management, and Conversational applications**.
- Healthcare organisations in the region are cognizant of the need for ethical aspects.
  - (a) 61% of the healthcare organisations in the region are **in the process of adopting data ethics requirements**.
  - (b) **14% adhere to ethical aspects of data already in their organisations**.

Source: IDC Survey Spotlight: What Is the Attitude of Asia/Pacific Enterprises Toward Generative AI Adoption and Application?

Recommendations: Things to consider for embracing Generative AI

It is proposed to:

Review and Establish Regulatory Framework

The Government should create regulations and guidelines tailored explicitly to generative AI, covering areas such as data privacy, ethics, accountability, transparency, and user protection. Collaborating with industry experts, researchers, and stakeholders can help in drafting effective regulations.

Awareness and Knowledge Building

Generative AI, as an integral part of the AI economy, represents a new frontier for businesses, many of which may only be familiar with a few specific products, such as ChatGPT and Microsoft Bing, without fully grasping the breadth of its potential features and applications. It is essential to establish a comprehensive learning ecosystem, including training programs or workshops for professionals, with collaboration with stakeholders.

Promote Research and Development (R&D)

The Government should continue the funding and incentives to support research and development efforts, particularly in generative AI technologies. By fostering an environment conducive to innovation, Malaysia can attract talent and promote the development of safe and reliable generative AI systems.

Testbeds and Sandboxes in Partnership with the Stakeholders

The rapid pace of technological development, coupled with its complexity and associated risks, often poses challenges for policy and regulation. By creating sandboxes and facilitating experiments, institutions and regulators can engage in evidence-based decision-making and adaptive deployment of generative AI technologies, which enable stakeholders to gather insights and assess their impact.

Enhance Educational, Reskilling and Upskilling programs

The global talent competition is expected to intensify as emerging high-tech industries continue to evolve worldwide. Detailed workforce planning is essential for each sector to identify the key manpower skills and capabilities required. By conducting a comprehensive workforce planning, the government and businesses can develop targeted strategies to bridge the skill gap and ensure a steady supply of qualified professionals, as well as streamline existing programs to avoid overlapping.

Special Visa for Foreign Professionals and Graduates

Like Indonesia and Thailand, Malaysia can consider implementing special visas for foreign professionals who specialise in essential industries, such as electrical products and electronics and AI development. A 2-3 years working visa could be automatically given to foreign graduates in Malaysia.

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THANK YOU

Address	:	6th Floor, Wisma Chinese Chamber, 258, Jalan Ampang, 50450 Kuala Lumpur, Malaysia.
Tel	:	603 - 4260 3116 / 3119
Email	:	serc@acccimserc.com
Website	:	https://www.acccimserc.com

For our website:

For our LinkedIn: