Through the looking glass

A glimpse into the future

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Disruption
Demonetisation
Dematerialisation
Democratisation
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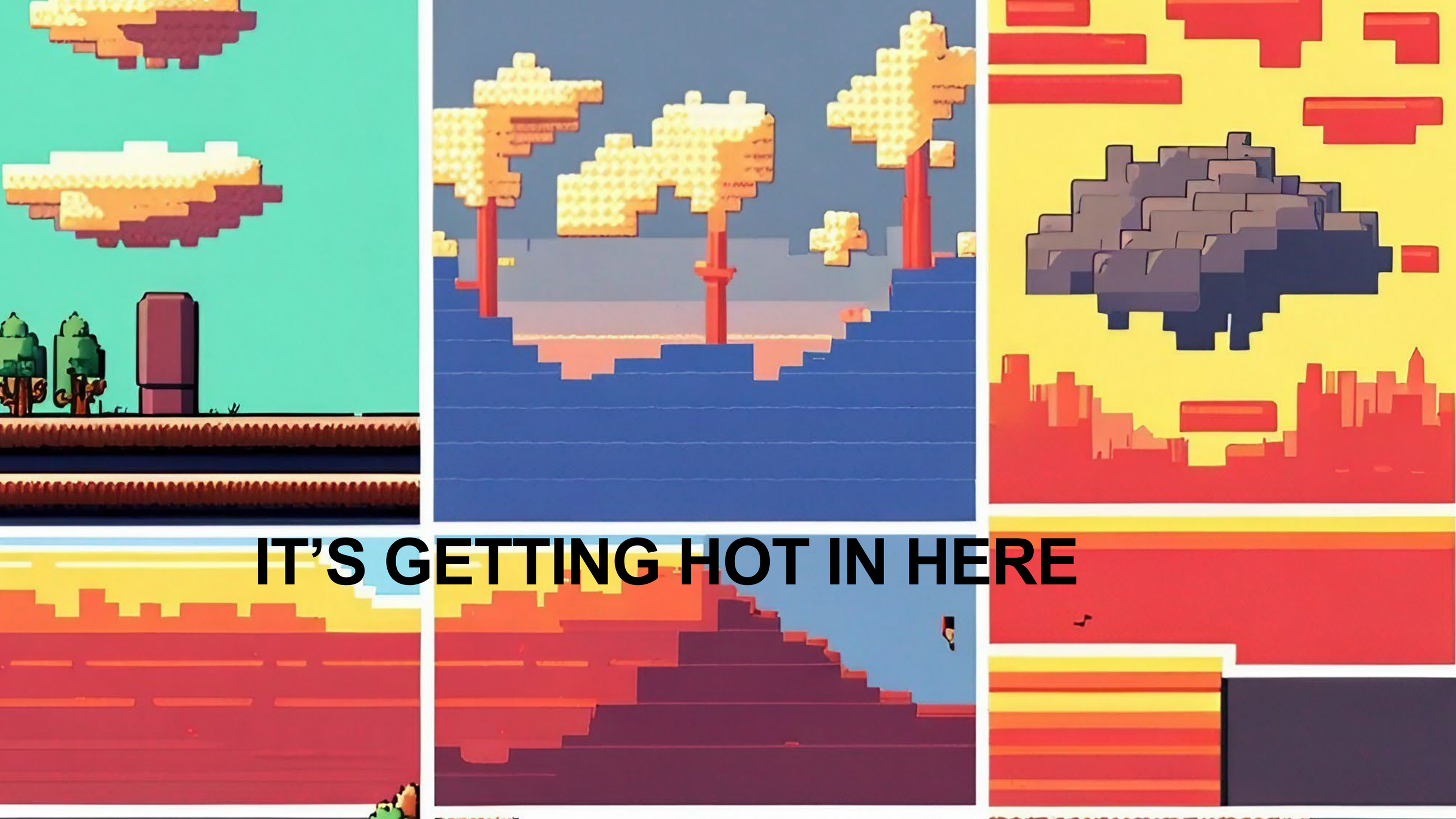
POTENTIAL BLACK SWANS THAT WOULD CAUSE THE GREATEST DISRUPTIVE IMPACT	
Severe Pandemic	No one can predict which pathogen will be the next to start spreading to humans, or when or where such a development will occur. An easily transmissible novel respiratory pathogen that kills or incapacitates more than one percent of its victims is among the most disruptive events possible. Such an outbreak could result in millions of people suffering and dying in every corner of the world in less than six months.
Much More Rapid Climate Change	Dramatic and unforeseen changes already are occurring at a faster rate than expected. Most scientists are not confident of being able to predict such events. Rapid changes in precipitation patterns—such as monsoons in India and the rest of Asia—could sharply disrupt that region's ability to feed its population.
Euro/EU Collapse	An unruly Greek exit from the euro zone could cause eight times the collateral damage as the Lehman Brothers bankruptcy, provoking a broader crisis regarding the EU's future.
A Democratic or Collapsed China	China is slated to pass the threshold of US$15,000 per capita purchasing power parity (PPP) in the next five years or so—a level that is often a trigger for democratization. Chinese "soft" power could be dramatically boosted, setting off a wave of democratic movements. Alternatively, many experts believe a democratic China could also become more nationalistic. An economically collapsed China would trigger political unrest and shock the global economy.
A Reformed Iran	A more liberal regime could come under growing public pressure to end the international sanctions and negotiate an end to Iran's isolation. An Iran that dropped its nuclear weapons aspirations and became focused on economic modernization would bolster the chances for a more stable Middle East.
Nuclear War or WMD/Cyber Attack	Nuclear powers such as Russia and Pakistan and potential aspirants such as Iran and North Korea see nuclear weapons as compensation for other political and security weaknesses, heightening the risk of their use. The chance of nonstate actors conducting a cyber attack—or using WMD—also is increasing.
Solar Geomagnetic Storms	Solar geomagnetic storms could knock out satellites, the electric grid, and many sensitive electronic devices. The recurrence intervals of crippling solar geomagnetic storms, which are less than a century, now pose a substantial threat because of the world's dependence on electricity.
US Disengagement	A collapse or sudden retreat of US power probably would result in an extended period of global anarchy; no leading power would be likely to replace the United States as guarantor of the international order.


IT’S GETTING HOT IN HERE

loods across the world this year cost hundreds of lives and millions of pounds in damages.

Image: Pixabay/QiMono

https://www.weforum.org/agenda/2022/10/floods-are-going-to-get-worse-we-need-to-start-preparing-for-them-now-e426660d42/

What Is Owed to Pakistan, Now One-Third Underwater

Sept. 3, 2022

A flooded residential area in the Dadu district of Sindh Province. Husnain Ali/Agence France-Presse — Getty Images

EPA-EFE/REX/SHUTTERSTOCK

A flooded street on Monday in Nowshera district

TIME

IDEAS • CLIMATE CHANGE

Where We'll End Up Living as the Planet Burns

In the global north, new or expanded cities include Scotland, Ireland, Estonia, and elevated sites with plenty of water, like Carcassonne in France.

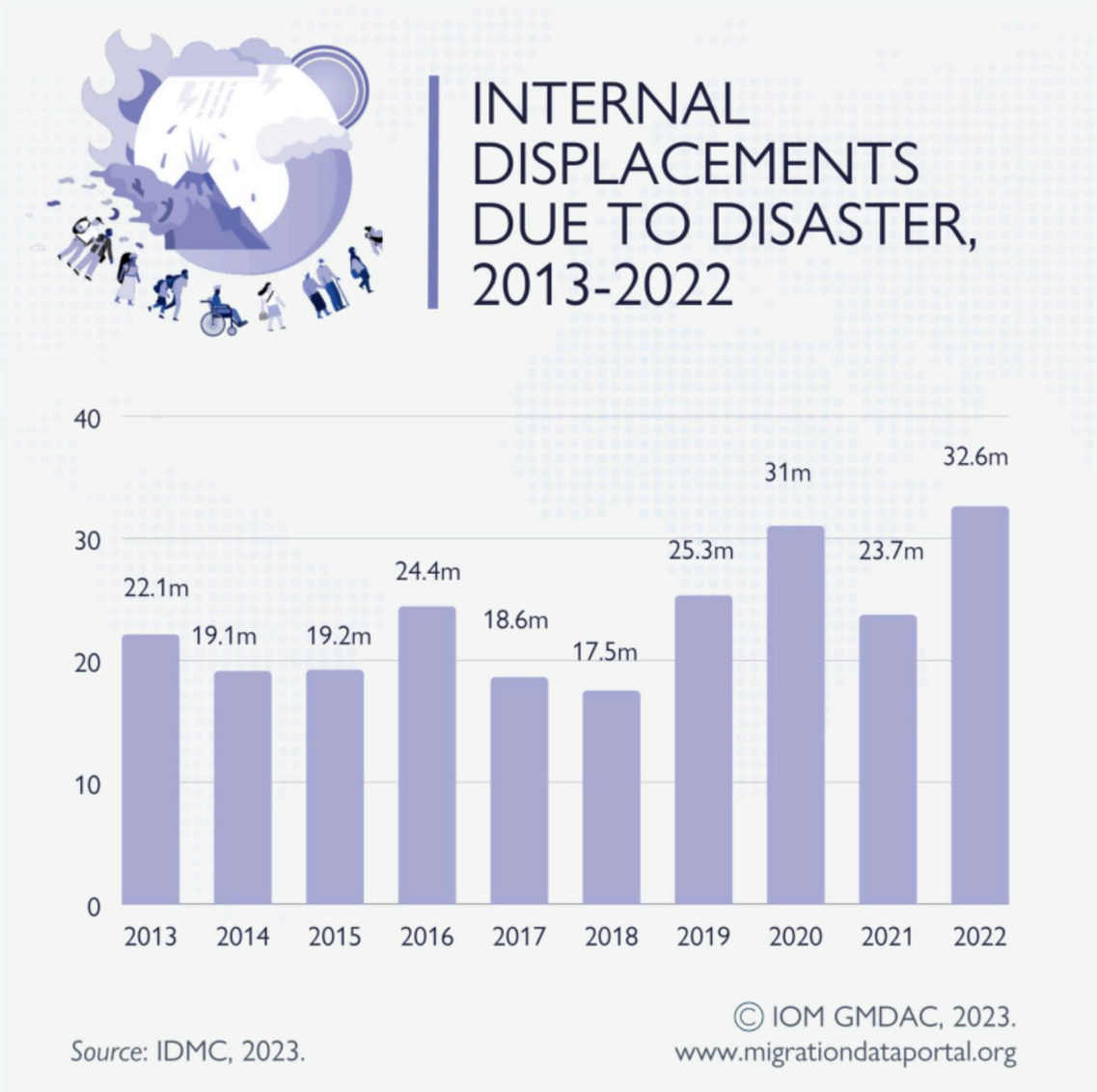
In the global south, there is far less landmass in the high latitudes, but Patagonia, Tasmania and New Zealand, and perhaps the newly icefree parts of the western Antarctic coast, offer potential for cities.

In Antarctica alone, up to 17,000 square kilometres of new, icefree land is projected to appear by the end of the century.

https://time.com/6209432/climate-change-where-we-will-live/

Recent trends

Disasters triggered 32.6 million new internal displacements in 2022, making it the highest figure in a decade as well as 41 per cent higher than the annual average of the past decade (IDMC, 2023).

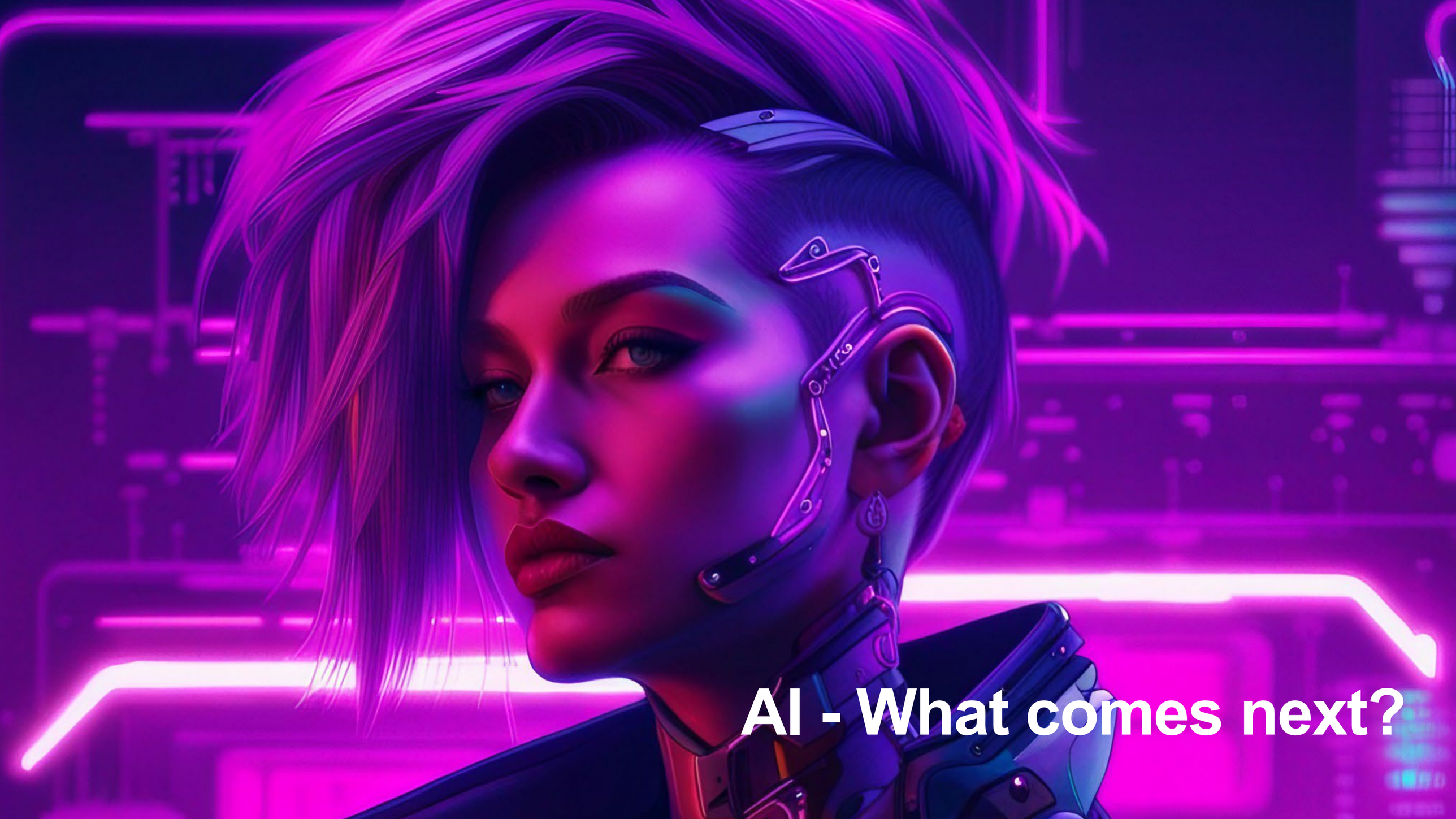


Among the total of 60.9 million new internal displacements registered in 2022, 53% were triggered by disasters (IDMC, 2023).

The top 5 countries with the highest number of new internal displacements due to disasters in 2022 were Pakistan (8.2 million), the Philippines (5.5 million), China (3.6 million), India (2.5 million) and Nigeria (2.4 million) (IDMC, 2023).

98 per cent of the 32.6 million new internal disaster displacements in 2022 were the result of weather-related hazards such as storms, floods and droughts (ibid.).

Floods surpassed storms for the first time since 2016, triggering 6 out of 10 internal displacements due to disasters in 2022, with monsoon flooding in Pakistan causing 25 per cent of internal displacements due to disasters globally that year (ibid.). Somalia experienced its worst drought in 40 years and recorded 1.1 million movements (ibid.). In Tonga, 2 per cent of the population had to relocate following a very rare volcanic eruption (ibid.).


AI - What comes next?

GPT-4 Technical Report

OpenAI*

Abstract

We report the development of GPT-4, a large-scale, multimodal model which can accept image and text inputs and produce text outputs. While less capable than humans in many real-world scenarios, GPT-4 exhibits human-level performance on various professional and academic benchmarks, including passing a simulated bar exam with a score around the top 10% of test takers. GPT-4 is a Transformer-based model pre-trained to predict the next token in a document. The post-training alignment process results in improved performance on measures of factuality and adherence to desired behavior. A core component of this project was developing infrastructure and optimization methods that behave predictably across a wide range of scales. This allowed us to accurately predict some aspects of GPT-4's performance based on models trained with no more than 1/1,000th the compute of GPT-4.

1 Introduction

This technical report presents GPT-4, a large multimodal model capable of processing image and text inputs and producing text outputs. Such models are an important area of study as they have the potential to be used in a wide range of applications, such as dialogue systems, text summarization, and machine translation. As such, they have been the subject of substantial interest and progress in recent years [1–34].

One of the main goals of developing such models is to improve their ability to understand and generate natural language text, particularly in more complex and nuanced scenarios. To test its capabilities in such scenarios, GPT-4 was evaluated on a variety of exams originally designed for humans. In these evaluations it performs quite well and often outscores the vast majority of human test takers. For example, on a simulated bar exam, GPT-4 achieves a score that falls in the top 10% of test takers. This contrasts with GPT-3.5, which scores in the bottom 10%.

On a suite of traditional NLP benchmarks, GPT-4 outperforms both previous large language models and most state-of-the-art systems (which often have benchmark-specific training or hand-engineering). On the MMLU benchmark [35, 36], an English-language suite of multiple-choice questions covering 57 subjects, GPT-4 not only outperforms existing models by a considerable margin in English, but also demonstrates strong performance in other languages. On translated variants of MMLU, GPT-4 surpasses the English-language state-of-the-art in 24 of 26 languages considered. We discuss these model capability results, as well as model safety improvements and results, in more detail in later sections.

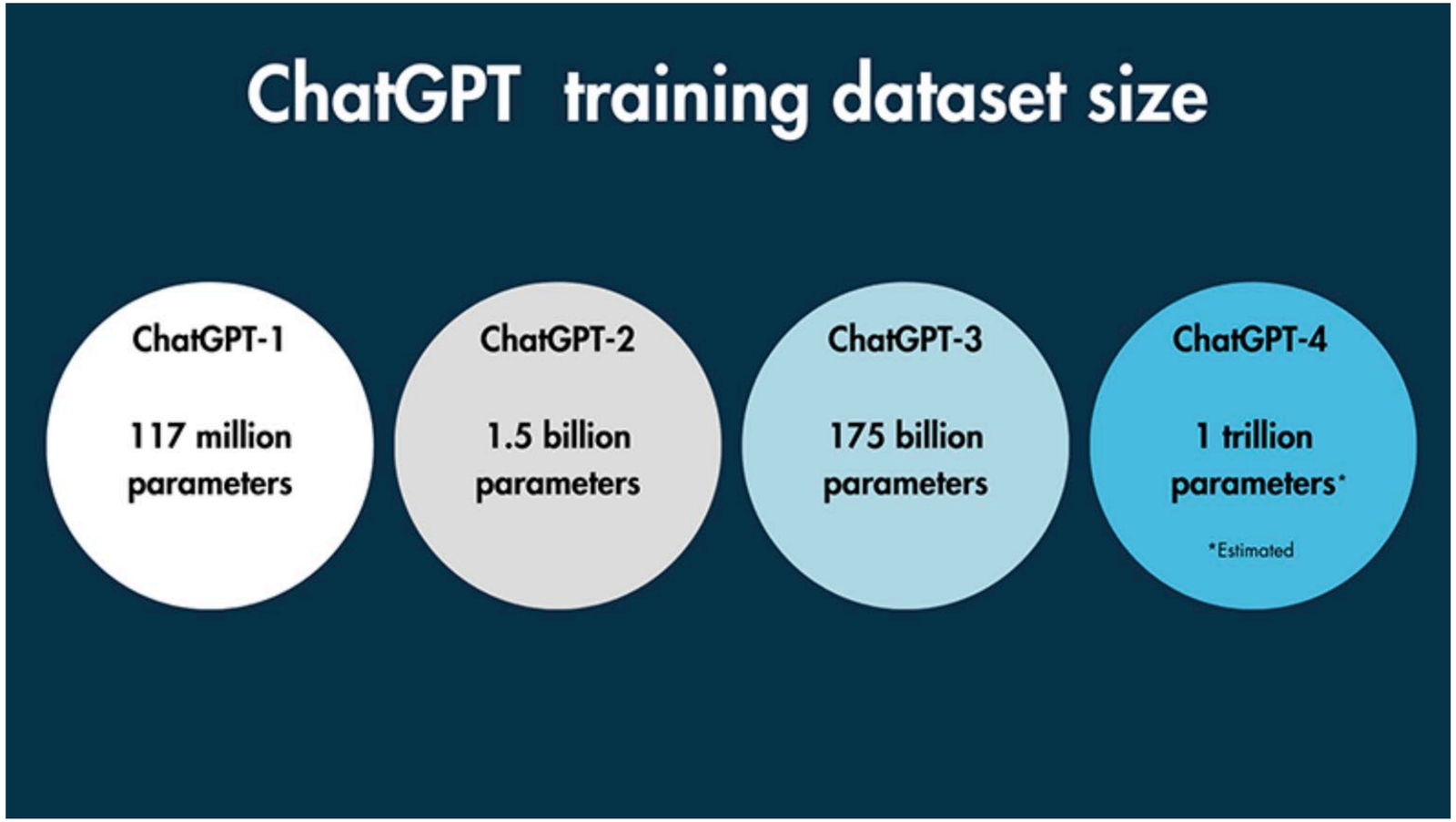
This report also discusses a key challenge of the project, developing deep learning infrastructure and optimization methods that behave predictably across a wide range of scales. This allowed us to make predictions about the expected performance of GPT-4 (based on small runs trained in similar ways) that were tested against the final run to increase confidence in our training.

Despite its capabilities, GPT-4 has similar limitations to earlier GPT models [1, 37, 38]: it is not fully reliable (e.g. can suffer from "hallucinations"), has a limited context window, and does not learn

*Please cite this work as "OpenAI (2023)". Full authorship contribution statements appear at the end of the document. Correspondence regarding this technical report can be sent to `gpt4-report@openai.com`

GPT-4 exhibits human-level performance on various professional and academic benchmarks, including passing a simulated bar exam with a score around the top 10% of test takers. GPT-4 is a Transformerbased model pre-trained to predict the next token in a document. The post-training alignment process results in improved performance on measures of factuality and adherence to desired behavior.

https://cdn.openai.com/papers/gpt-4.pdf



GPT1- 117,000,000

GPT2 - 1,500,000,000

GPT3 - 175,000,000,000

GPT4 - 1,000,000,000,000

https://www.stylefactoryproductions.com/blog/chatgpt-statistics#

ChatGPT is designed to primarily work in English, but it also understands 95 other natural human languages

ChatGPT was primarily focused on Python, but it also understands JavaScript, C++, C#, Java, Ruby, PHP, Go, Swift, TypeScript, SQL, Shell

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2023 will be the last human election

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Apple added $71 billion to its market value after news that it’s been secretly building an ‘Apple GPT’ to rival OpenAI

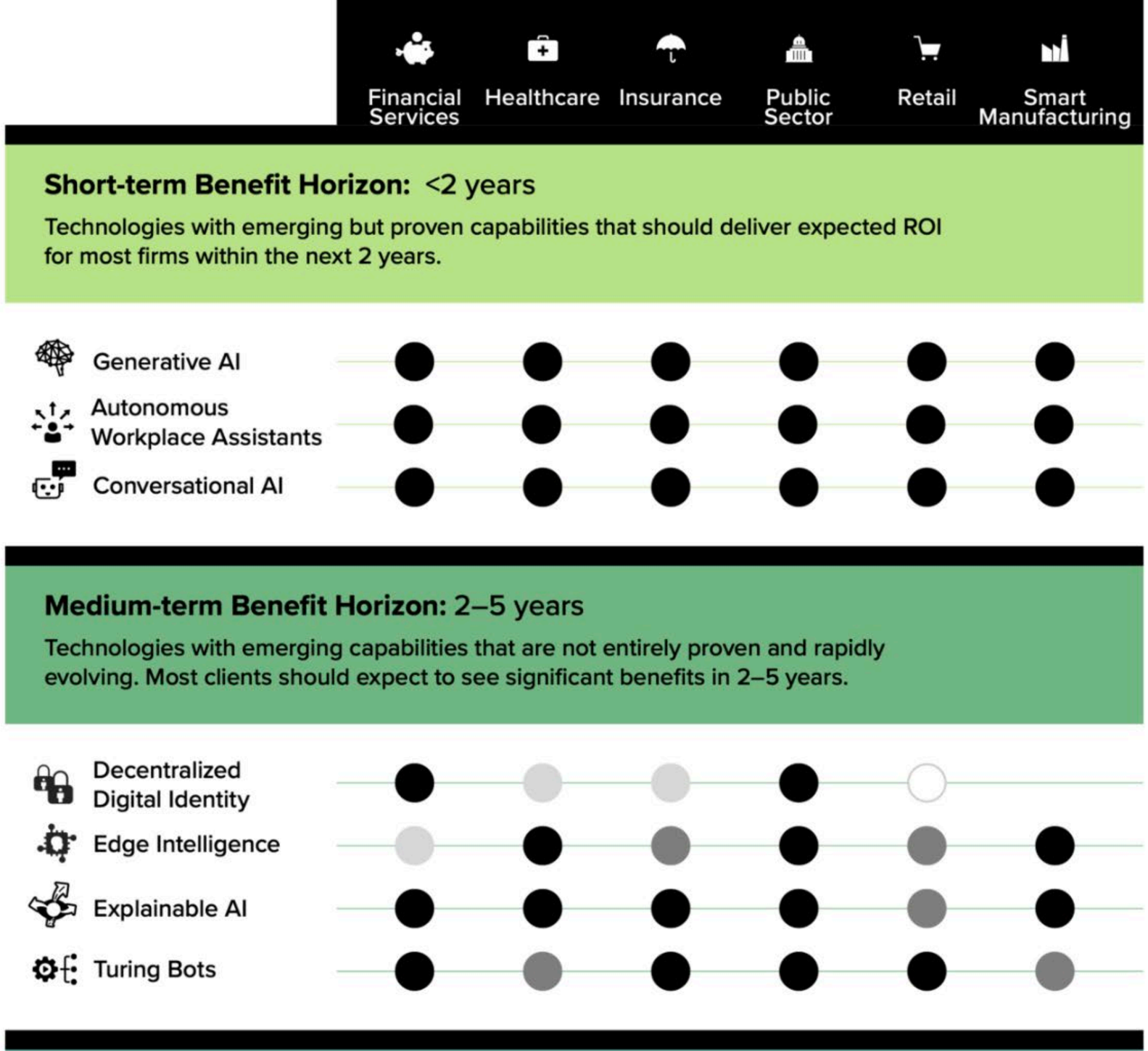
https://finance.yahoo.com/news/apple-added-71-billion-market-121729190.html

The White House recently briefed senators on artificial intelligence in a classified setting as lawmakers consider adopting legislative safeguards on the fast-moving technology.

Senate Democratic Leader Chuck Schumer told senators how the U.S. government is "using and investing in AI to protect our national security and learn what our adversaries are doing in AI.... Our job as legislators is to listen to the experts and learn as much as we can so we can translate these ideas into legislative action."

Schumer, who last month called for "comprehensive legislation" to address AI, pledged to convene the "top minds in artificial intelligence" starting in September to join a "series of AI Insight Forums that will begin laying down a new foundation for AI policy."

https://www.reuters.com/article/usa-ai-congress-idTRNIKBN2YQ1E5



https://www.forrester.com/blogs/generative-ai-dominates-the-top-10-emerging-technologies-of-2023/

Decentralised digital identity

(DDI) is a self-sovereign and user-centric approach to managing digital identities. In traditional systems, individuals' identities are centralised and controlled by governments, or corporations. This centralised approach can lead to issues of privacy, security, and lack of user control over their personal data.

DDI addresses these challenges by leveraging blockchain technology or other decentralised systems to give users more control over their personal information and digital interactions.

The core principles of decentralised digital identity include:
User Ownership: Individuals have ownership and control over their personal data. They can decide what information to share, with whom, and for what purposes.

Interoperability: DDI enables interoperability across various services and platforms. This means that a user's identity can be recognised and accepted across different applications without the need for redundant identity verification processes.

Privacy and Security: DDI solutions prioritixe privacy and security, reducing the risk of data breaches and identity theft. Users can share only the necessary data without revealing their entire identity.

Trust and Consensus: Blockchain technology is often employed in DDI systems to create a consensus mechanism that ensures the integrity of the identity data and prevents fraudulent activities.

Elimination of Central Authorities: Unlike traditional identity systems where centralised authorities verify and manage identities, DDI systems distribute trust among the network participants, removing the need for a central authority.

Portability: With DDI, individuals can carry their digital identity with them across various applications and services, providing a seamless and user-friendly experience.

Edge intelligence

Also known as edge computing or edge AI, refers to the practice of processing data and running applications closer to the source of data generation, rather than relying on centraliSed cloud-based data centre.
The "edge" in edge intelligence refers to the devices and systems located at the periphery of a network, such as Internet of Things (IoT) devices, sensors, smartphones, and other endpoints.

This approach offers several benefits:

Reduced Latency: By processing data locally, edge intelligence reduces the time it takes to receive results or responses, which is particularly crucial for time-sensitive applications like autonomous vehicles or industrial automation.

Bandwidth Optimisation: Edge intelligence can reduce the amount of data that needs to be sent to the cloud, optimising network bandwidth and lowering data transmission costs.

Enhanced Privacy and Security: Some data may be sensitive or confidential and might not be suitable for transmission to the cloud. Edge intelligence allows for data to be processed and analysed locally, ensuring better privacy and security.

Offline Operation: Edge devices can still perform certain tasks even when they are not connected to the internet or cloud, making them more reliable and independent in certain scenarios.

Scalability: Edge intelligence can help distribute the computational load and scale more effectively as the number of edge devices and endpoints increases.

Edge intelligence is becoming increasingly important as the number of connected devices grows, and there is a need for real-time processing and analysis of data at the edge. It complements cloud computing by creating a hybrid computing architecture that leverages the strengths of both cloud-based and edge-based processing, resulting in a more efficient and responsive overall system.

Explainable AI (XAI)

XAI refers to the set of techniques and methods that aim to make artificial intelligence (AI) models and their decision-making processes more transparent and understandable to humans. The interpretability of AI systems has become increasingly important as AI is being integrated into various critical domains, such as healthcare, finance, and autonomous vehicles, where decisions made by AI algorithms can have significant real-world consequences.

The need for explainable AI arises because many modern AI models, particularly those based on deep learning and neural networks, are often treated as "black boxes." These models work by learning complex patterns and representations from vast amounts of data, and while they can achieve impressive performance, understanding how they arrive at their decisions can be challenging for humans.

Explainable AI focuses on several key aspects:

Interpretability: It involves designing AI models in such a way that their internal workings can be easily understood and interpreted by humans. This could involve using simpler, more transparent algorithms or providing insights into the model's decision-making process.

Transparency: XAI aims to make AI systems more transparent by providing users with information about the data, features, and rules that influenced a particular decision or prediction.

Trustworthiness: When AI models are more explainable, users can better understand and trust the decisions made by these models, even in high-stakes scenarios.

Bias and Fairness: Explainable AI can help detect and mitigate biases in AI systems, making them fairer and more accountable.

Regulatory Compliance: In some industries and applications, there are legal or ethical requirements for providing explanations for automated decisions. XAI can help meet those requirements.

Various techniques are used in explainable AI, ranging from simple methods like feature importance analysis and visualization of model internals to more complex techniques that aim to generate human-readable explanations for specific decisions made by AI models.
By enhancing the explainability of AI systems, researchers, developers, and users can gain valuable insights into how these models work, identify potential issues, and ultimately ensure that AI applications are deployed responsibly and effectively in real-world settings.

DEMOGRAPHIC

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LETS TALK ABOUT POPULATION CHANGE

As more countries move from high to low fertility and mortality levels, the global population is undergoing major changes in age distribution.

This shift is unfolding at different times and speeds across countries and regions, producing ageing at intermediate and advanced stages.

The young (aged 0 to 19) and, in most societies, the old (aged 65 or older) consume, on average, more than they produce through their labour.

Most working-age people (aged 20 to 64), by contrast, consume less than they produce through their own labour. Families, markets and governments support this pattern of income and consumption over the life course by mediating the reallocation of economic resources from one age group to another.

One in four of the New Zealand workforce are over 55 years

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Since 1950, global average lifespans have increased by almost 28 years

https://www.unfpa.org/swp2023/too-few

New Zealand contributes .06% of the world's population

And the sixth-largest island country in the world, with a land size of 268,710 km^2

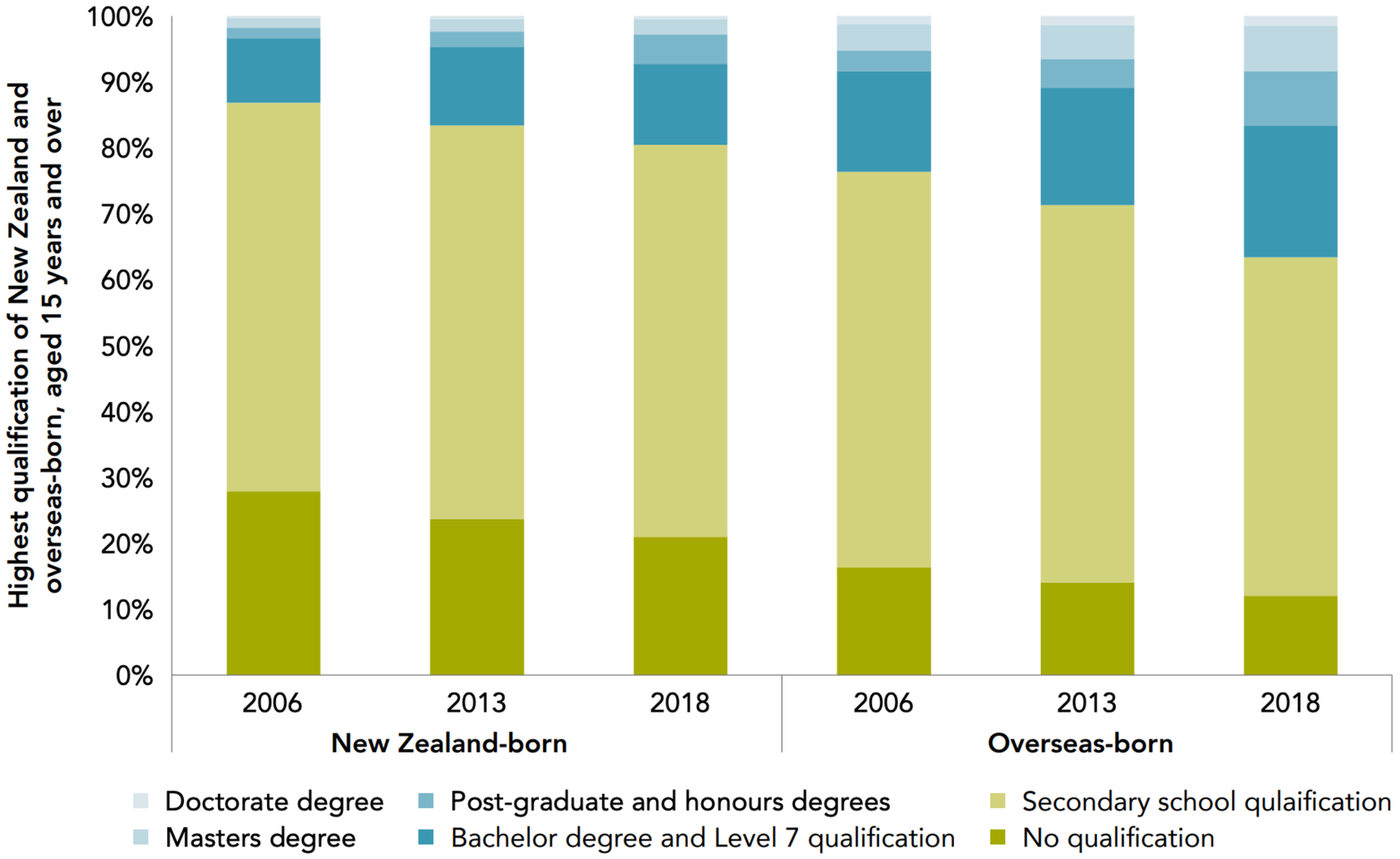
The Netherlands, by comparison is 6 times smaller than New Zealand and has 17,800,000 people (3.5 times the population of NZ)

Over the next few decades, migration is predicted to become the sole driver of population growth in high-income countries (like Aotearoa)

United Nations Population Fund https://www.unfpa.org/swp2023/too-few

Figure 3.9 Migrants have higher qualifications than New Zealand-born adults on average

Highest qualification of New Zealand and overseas-born, aged 15 years and over, 2006, 2013 and 2018



Source: Stats NZ Census.

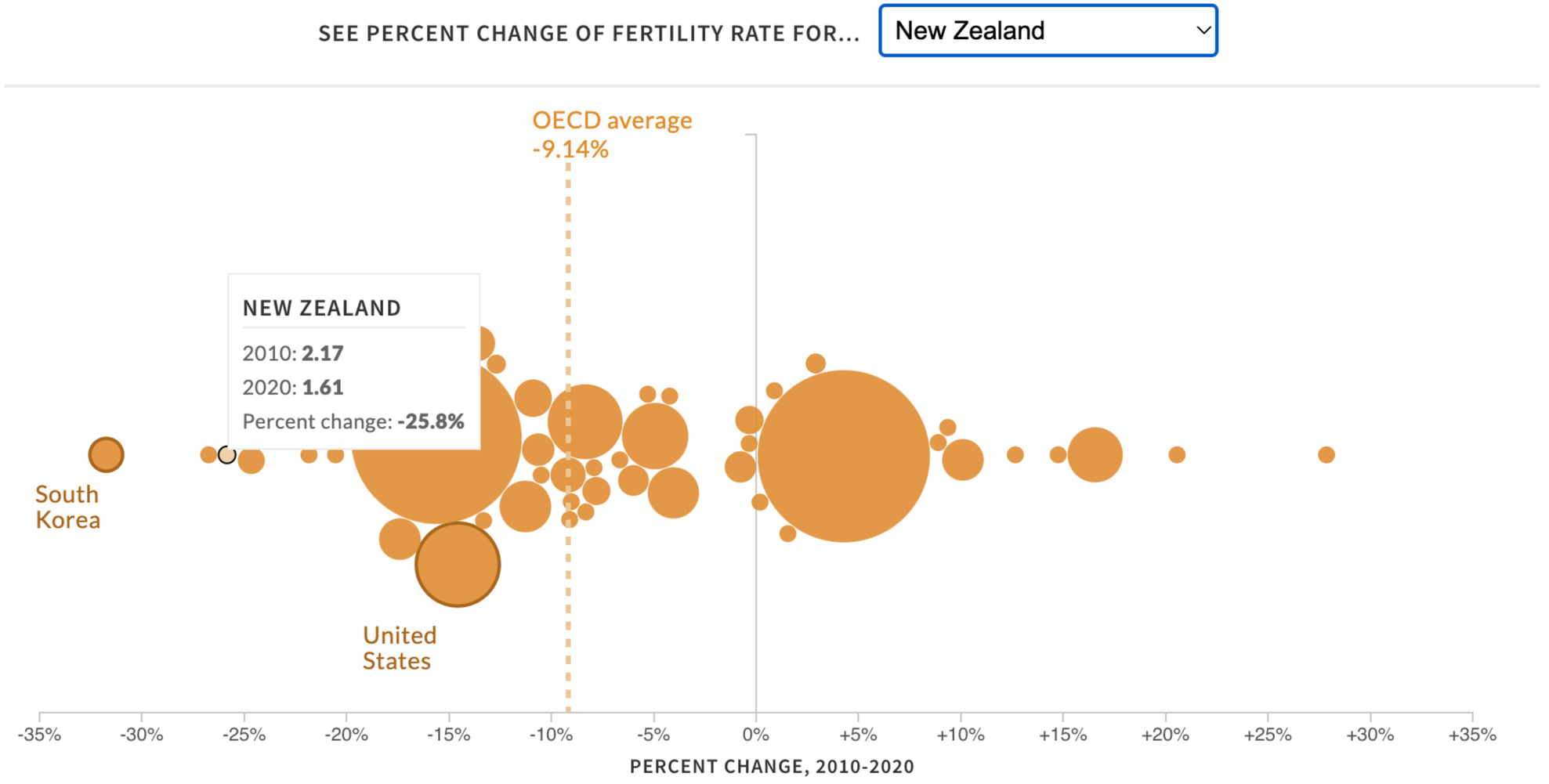
Notes: Based on highest qualification and birthplace (New Zealand-born/overseas-born) published table for the 'Census usually resident population', aged 15 years and over.

https://www.productivity.govt.nz/assets/Inquiries/immigration-settings/Immigration-by-the-numbers.pdf

South Korea has the lowest fertility rate globally at 0.9 children per woman, closely followed by Puerto Rico at 1.0 and Malta, Singapore, and Hong Kong all at 1.1 children per woman.
Even the second most populous country China has a fertility rate of just 1.7

Fertility rates are dropping around the world

Between 2010 and 2020, more than 70% of developed countries saw a decline in their fertility rate, defined as the average number of children born to a woman in her reproductive years.



Notes: Circles are scaled by countries' population sizes in 2020.

In 2021, Aotearoa New Zealand fertility rates by ethnicity

- Pacific women had the highest total fertility rate (2.19 births per woman)
- Māori women had a fertility rate of 2.14 births per woman.
- European or Other women had a total fertility rate of 1.75 births per woman (2023 = 1.61)
- Asian woman had a total fertility rate of 1.40 births per woman.

https://www.stats.govt.nz/information-releases/births-and-deaths-year-ended-june-2021/

Populations that will half by the end of the century

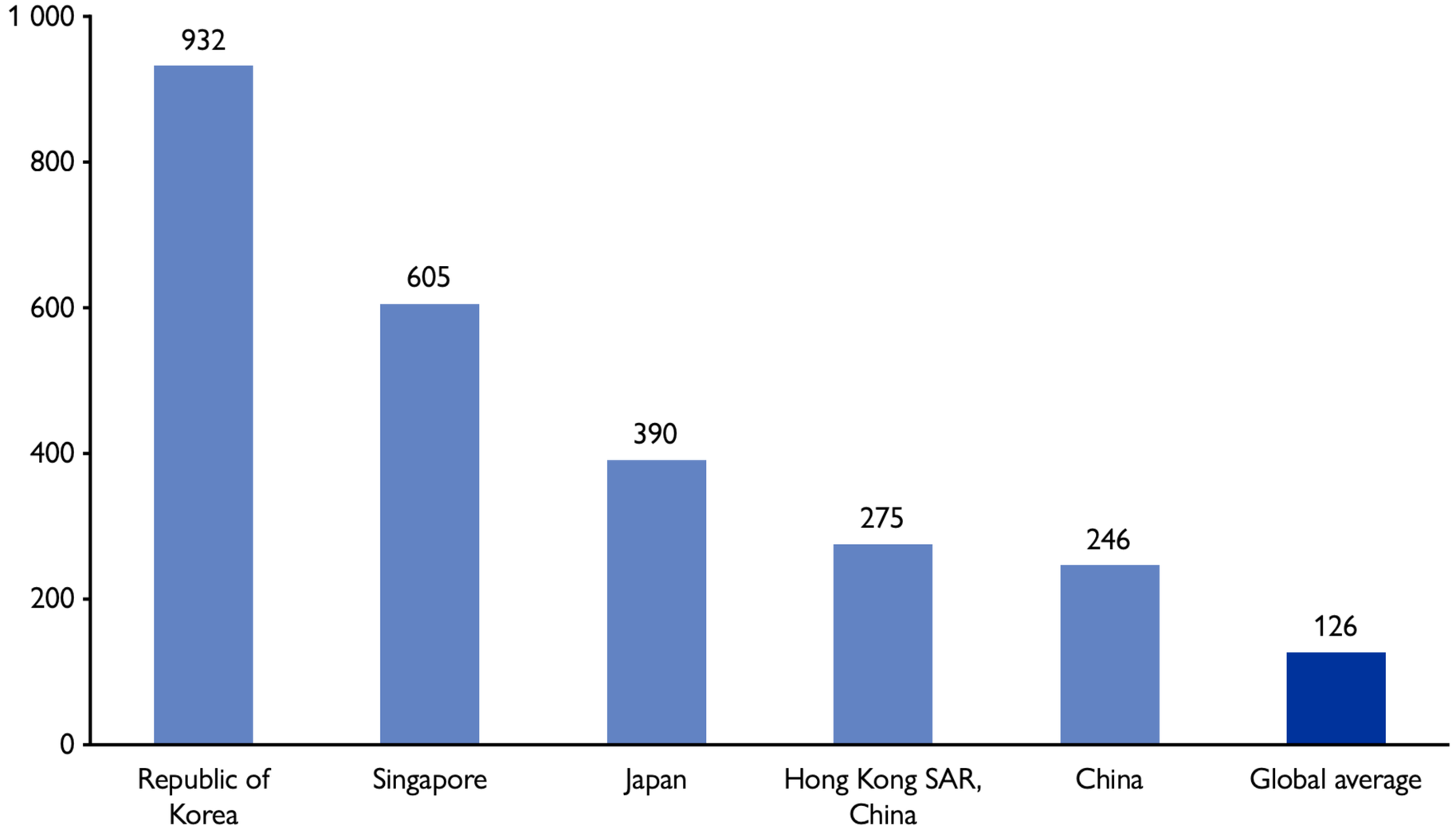
Japan's population is projected to fall from a peak of 128 million in 2017 to less than 53 million by the end of the century.
Italy is expected to see an equally dramatic population crash from 61 million to 28 million over the same timeframe.
They are two of 23 countries - which also include Spain, Portugal, Thailand and South Korea - expected to see their population more than halve.

China, the second most populous nation in the world, peaked 1.413 billion in 2022, and will decrease to an estimated 732 million by 2100

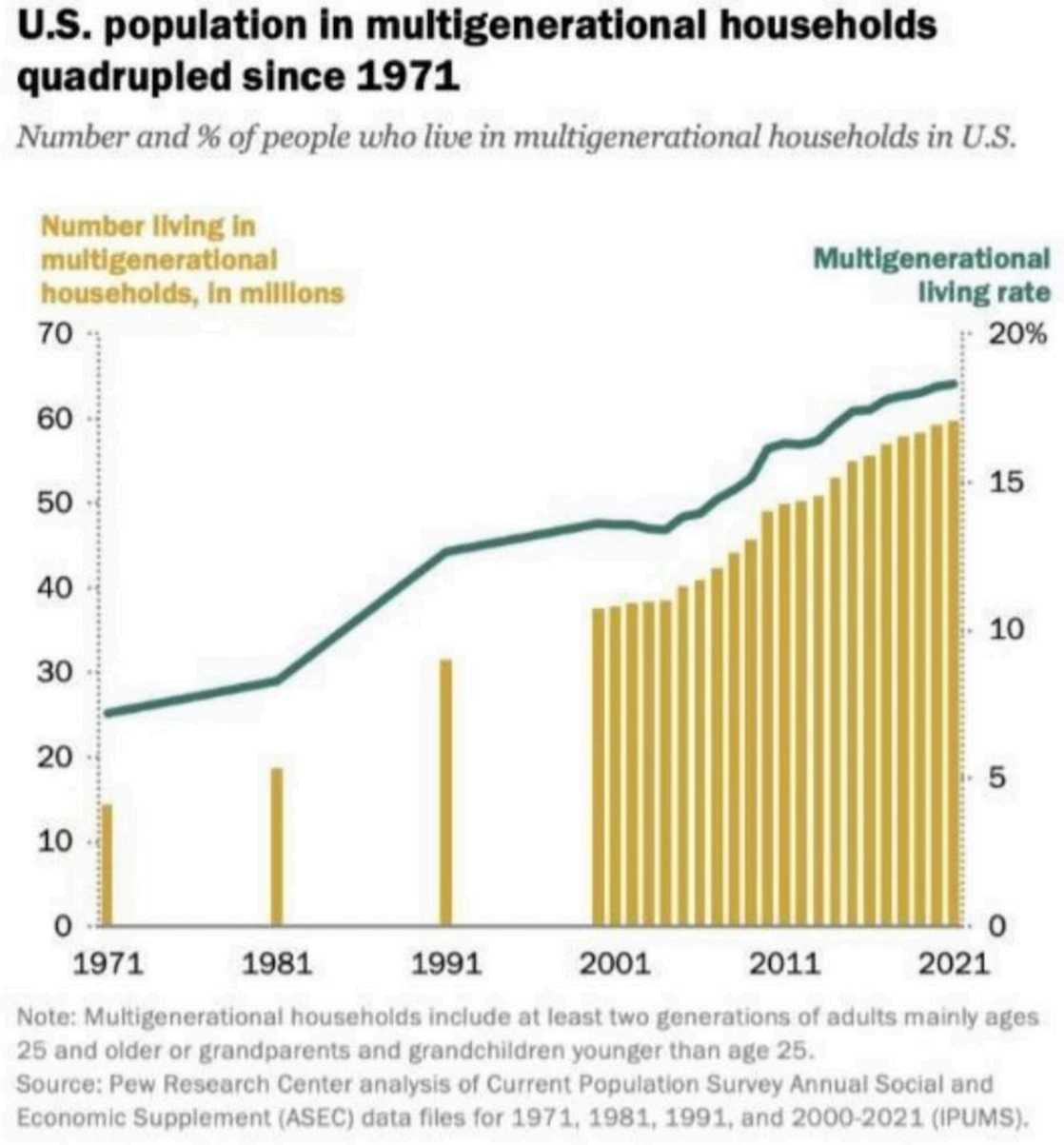
By 2040, Japan will need four times the migrant workers they have today. 6.74 million workers up from 1.73 million

https://publications.iom.int/system/files/pdf/PUB2023-006-E-Economist-Impact-Future-of-labour-migration-Asia.pdf

Figure 8. Robot density (number of industrial robots per 10,000 workers), 2021



Source: International Federation of Robotics, World Robotics 2021 Press Conference slide presentation, 28 October 2021 (livestream). Available at https://ifr.org/downloads/press2018/2021_10_28_WR_PK_Presentation_long_version.pdf.



Source: Pew Research Center

The number of grandparents has tripled since 1960 due to longer life expectancies, now representing 20 percent of the world's population. **By 2050, nearly one in four people will be a grandparent** in what *The Economist* terms "The Age of the Grandparent."

Grandparents often play a crucial role in supporting working mothers, with data showing that the presence of a grandparent increases a woman's likelihood of employment. For instance, **the availability of grandparents for childcare increases a mother's participation in the labor force by 9 percentage points.** Grandparents also actively engage in their grandchildren's lives, with a significant percentage of children spending time with their grandparents weekly.

Boosting productivity by enhancing diffusion of digital technologies

New Zealand has considerable scope to boost productivity by fostering growth of its digital sector and stimulating digital innovation. This requires strengthening the domestic pipeline of digital skills, making sure that regulations evolve with technological change and enhancing exports by firms exploiting digital technologies.

New Zealand’s digital sector is smaller than in other OECD countries and has relied heavily on skilled migrants to fill jobs requiring advanced digital skills. It is now facing a severe skills shortage caused by border restrictions in the short term and competition from other countries in the longer term. The domestic pipeline of graduates with advanced ICT skills is narrowing, as weak mathematics and science achievement by students in primary- and lower secondary schools closes the door to tertiary studies in ICT-relevant fields.

https://www.oecd-ilibrary.org/sites/a4fd214c-en/index.html?itemId=/content/publication/a4fd214c-en

New Zealand has a highly centralised government, with limited local government involvement in service delivery. Just 45% of the population reported trusting local government, the lowest of the benchmarking group of countries.

New Zealand is systematically compared to Australia, Canada, Denmark, Finland, Ireland, Norway, the Netherlands, Sweden, and the United Kingdom.

https://doi.org/10.1787/948accf8-en

SHAMEFUL

The Media Cares More About the *Titanic* Sub Than Drowned Migrants

U.S. media has largely ignored a shipwreck with hundreds of migrant deaths but has focused intently on a missing submersible full of rich people.

Titanic sub coverage contrasted with media's disinterest in Greek boat disaster

Netizens are comparing how mainstream media prioritised coverage of the lost submersible over the recent Greek shipwreck, where hundreds are still unaccounted for

Jamal
@JustJamal_ · **Follow**

More than 500 migrants and asylum seekers are presumed dead after their boat sank. While a multimillion-dollar rescue effort is underway for billionaires aboard a Titanic submarine, the response to the missing migrants primarily revolves around tightening borders. #OceanGate

11:33 PM · Jun 22, 2023

Mian_Noorullah
@MianNoorullah4 · **Follow**

7 days, two boats.
5 people, 500 people.
$250,000 per trip, unknown.
Millionaires, migrants.
1 teenager, upto 100 children. 😢
Great media coverage, silence.
#NoComment #OceanGate #Titanic #TitanicSubmarine #Titan
#Messenia #submarinemissing #Submersible

5:00 PM · Jun 22, 2023

15.3K Reply Copy link

Read 635 replies

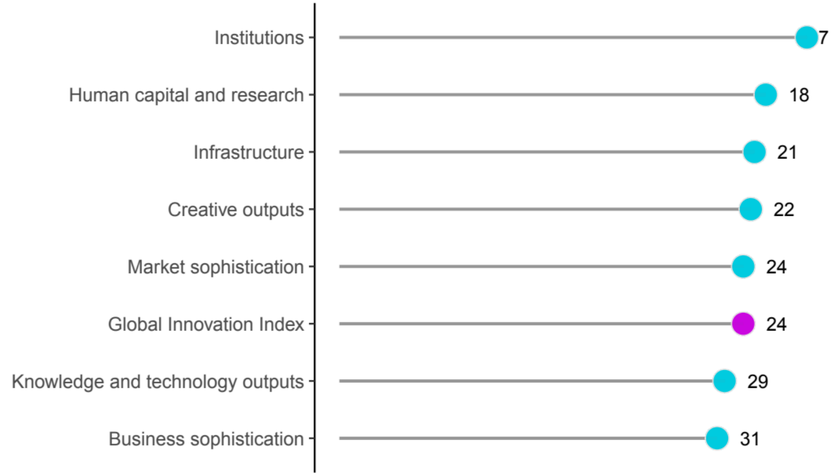
INNOVATION STRENGTHS AND WEAKNESSES

The table below gives an overview of the indicator strengths and weaknesses of New Zealand in the GII 2022.

Strengths and weaknesses for New Zealand

Strengths			Weaknesses		
Code	**Indicator name**	**Rank**	**Code**	**Indicator name**	**Rank**
1.1.1	Political and operational stability	2	2.1.2	Government funding/pupil, secondary, % GDP/cap	63
1.2.1	Regulatory quality	2	2.1.5	Pupil-teacher ratio, secondary	69
1.2.2	Rule of law	3	3.2.3	Gross capital formation, % GDP	73
1.2.3	Cost of redundancy dismissal	1	3.3.1	GDP/unit of energy use	71
2.1.3	School life expectancy, years	2	4.2.4	Venture capital received, value, % GDP	55
2.2.3	Tertiary inbound mobility, %	6	4.3.2	Domestic industry diversification	82
3.1.4	E-participation	4	5.3.4	FDI net inflows, % GDP	85
4.3.1	Applied tariff rate, weighted avg., %	9	6.2.1	Labor productivity growth, %	64
6.2.2	New businesses/th pop. 15–64	5	6.2.5	High-tech manufacturing, %	71
7.2.2	National feature films/mn pop. 15–69	4	7.2.5	Creative goods exports, % total trade	63
7.3.2	Country-code TLDs/th pop. 15–69	9			

The seven GII pillar ranks for New Zealand



Note: The highest possible ranking in each pillar is 1.

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