

16 June 2023

Thematic Investing: A Transforming World Let's Chat(GPT)

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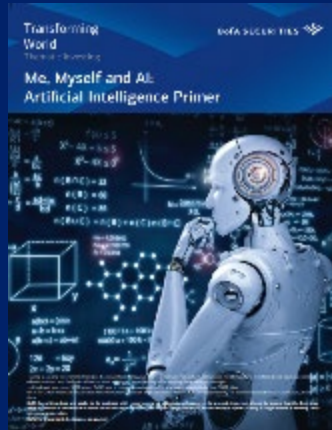
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Innovation: "Techceleration"



Big Data & AI



Future Mobility



Robots



Privacy / Cyber



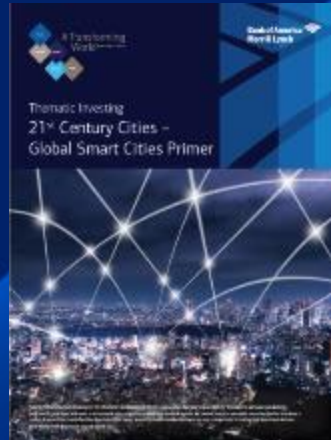
Future Human



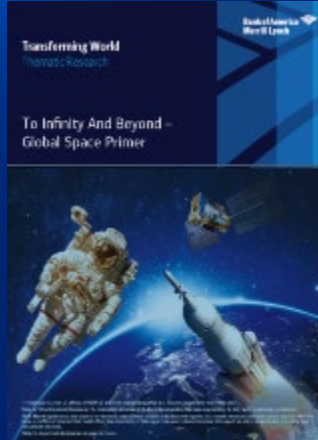
Sharing Economy



Smart Cities



Space



Total Reality



Future Tech



People: Power to the people



Demographics

Transforming World
Thematic Investing
Power to the People: Demographics Primer

Ageing

Transforming World
Thematic Investing
The Silver Economy - Global Ageing Primer

Education

Transforming World
Thematic Investing
Let's Get Smart - Global Education Primer

Womentum

Transforming World
Thematic Investing
Womentum!

Diversity & Inclusion

Transforming World
Thematic Investing
Everybody counts! Diversity & Inclusion Primer

Gen Z

Transforming World
Thematic Investing
OK Zoomer: Gen Z Primer

Obesity

Transforming World
Thematic Investing
Globesity - Obesity and Health & Wellness Primer

Regulation

Transforming World
Thematic Investing
A new world needs new rules. Transforming World Regulation Primer

Bottom Billions

Transforming World
Thematic Investing
Making it Up - Bottom Billions Primer

Public Infrastructure

Thematic Investing
Build It And They Will Come - Global Public Infrastructure Primer

Pandemics

Transforming World
Thematic Investing
Be Prepared! Global Pandemics Primer

Future of Work

Transforming World
Thematic Investing
Robo Sapiens - Future of Work Primer

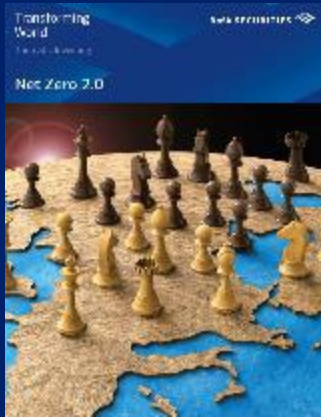
Inequality

Transforming World
Thematic Investing
Mind the Gap - Global Inequality Primer

Earth: The world is not enough



Net Zero 2.0



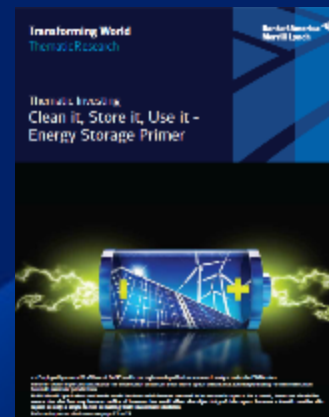
Scarcity



Climate Change



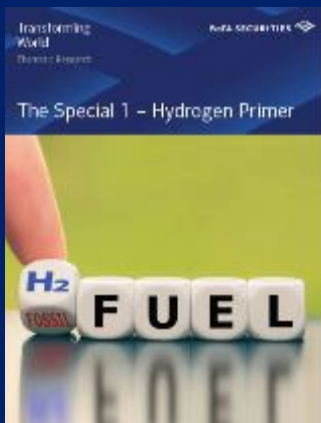
Energy Storage



Energy Efficiency



Hydrogen



Green Bonds



Waste

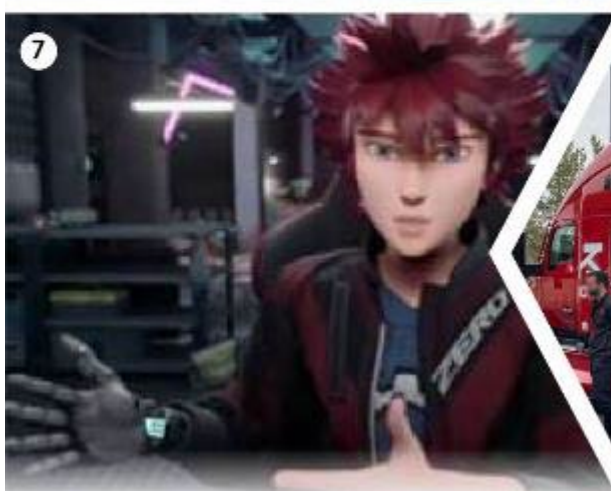


Water



Future Food







When does short-term end...

...and long-term begin?



Every day we generate...

2,500,000,000,000,000,000

2.5 quintillion (million trillion) bytes of data





Since **Apollo 11**

processing power up 1,000,000,000x (one trillion)



ChatGPT is the

‘iPhone’

moment for AI!





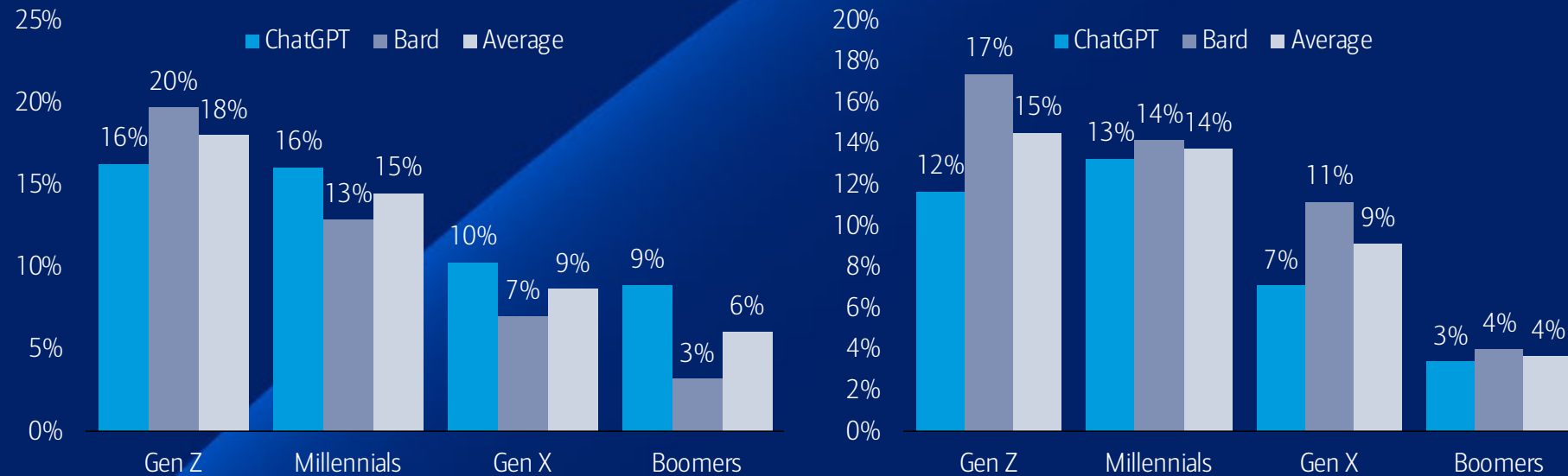
1. Democratization of data

Source: BofA Global Research

Everyone can use it!



Awareness (LHS) positive (RHS) increasing across the board



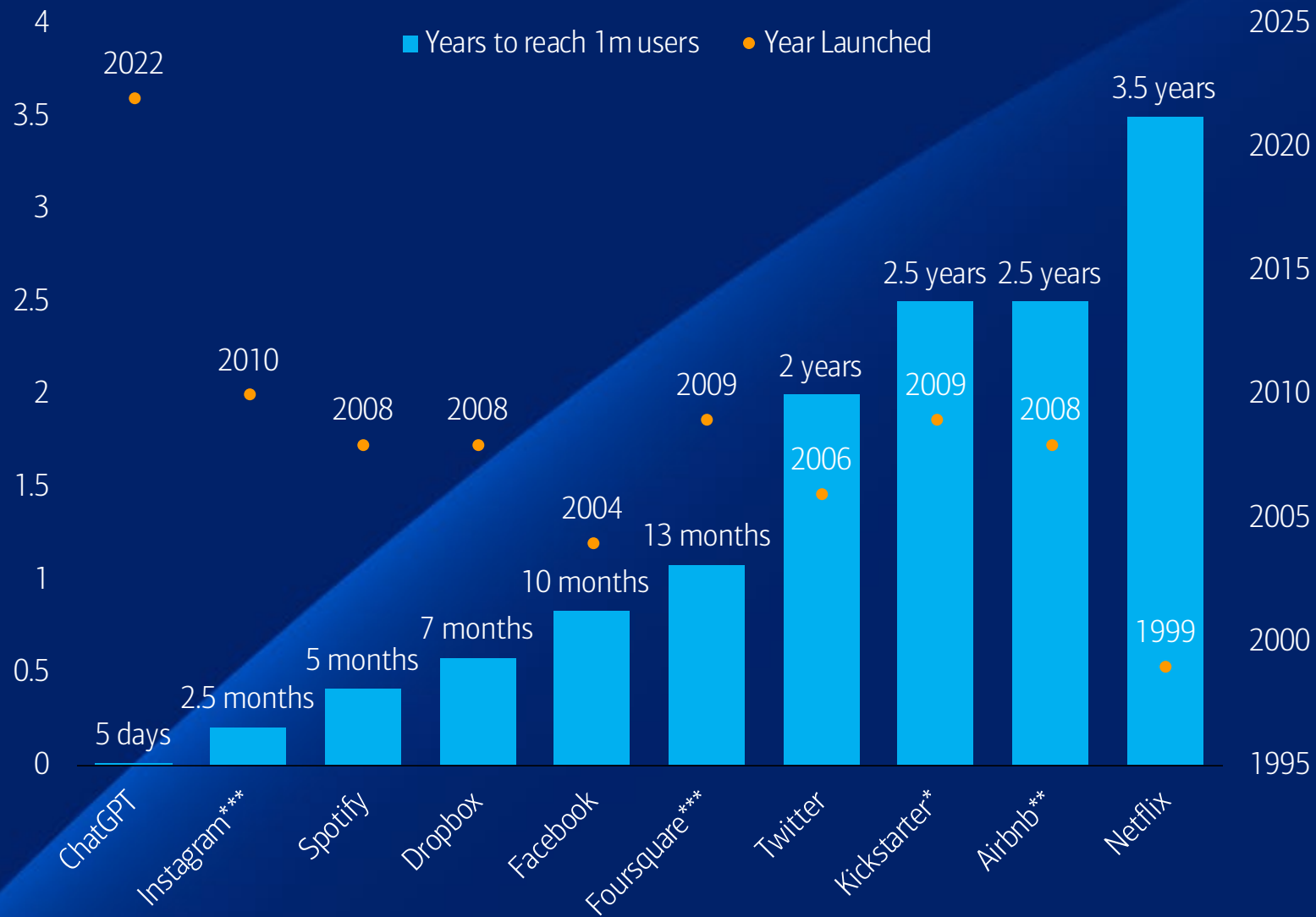
Source: BofA Global Research, MorningConsult. NOTE: LHS is the proportion of correspondents that have seen, heard or read something positive or negative about the platform over the past two weeks. RHS is the proportion of people who responded with very favourable or somewhat favourable



2. Unprecedented mass adoption



...it took Netflix 3.5 years to reach 1m users



Source: BofA Global Research, Statista. *one million backers **one million nights booked ***one million downloads



In **3 months**

100 million users...1 billion cumulative visits



3. Warp-speed tech development

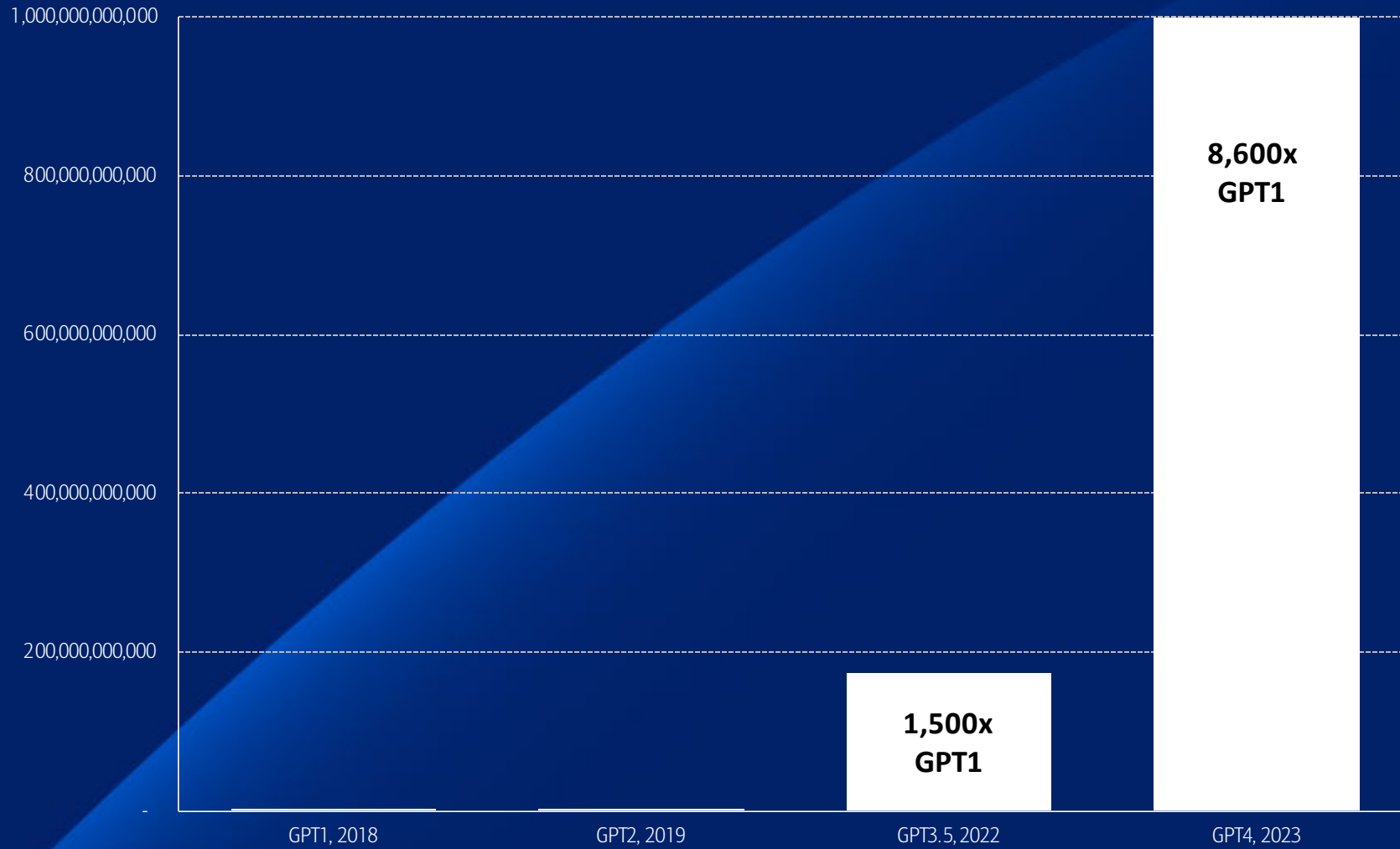




Since **2010**

AI outpaced Moore's law 6x

Number of parameters evolution





4. Abundance of use cases





Multimodality!

Numerous applications



Text

MARKETING

copy.ai Jasper **ws** Writesonic Ponzu frase

copysmith **Mutiny** Moonbeam **Bertha.ai**

anyword Hypotenuse AI Clickable letterdrop

Simplified Peppertype.ai **Omneky** **CONTENDA**

AI ASSISTANTS

Andi
Quickchat

SUPPORT (CHAT/EMAIL)

Cohere
KAIZAN
Typoise
ORESTA
XOXInd

SALES

LAVENDER
Smartwriter.ai
Ivoin
Outplay
Reach
regio.ai
Creatext

KNOWLEDGE

glean
mem
YOU

GENERAL WRITING

Rytr **wordbun** **Subtxt**

LEX **suda** write LAIKA

NovelAI **WRITER** COMPOSER
CHILKIDLAB

MODELS: OPENAI GPT-3 DEEPMIND GOPHER FACEBOOK OPT HUGGING FACE BOOM COHERE ANTHROPIC A2 GPT-NEOX GPTJ A1Z1 ALIBABA, YANDEX, ETC.

Video

EDITING/GENERATION

runway
Fliki
Dubverse
Opus

PERSONALIZED VIDEOS

lavus
synthesis
Hour One.
Rephrase.ai
Classyay
Mavlo

MODEL: MICROSOFT X-CLIP META MAKE-A-VIDEO

Image

IMAGE GENERATION

Midjourney OpenArt
craiyon PLAYGROUND
WOMBO.AI PhotoRoom
ROSEBJOAI **aipaca**
Lexica Nyx gallery
mage.space artbreeder
KREA

CONSUMER/SOCIAL

Midjourney

MLDIA/ADVERTISING

SALT
THE CULTURE DAO

DESIGN

Diagram **vizard**
VIZCOM Aragon
Poly **maket**
INTERIORAI CALA

MODELS: OPENAI DALL-E 2 STABLE DIFFUSION CRAIYON

Code

CODE GENERATION

GitHub Copilot
replit
GhostWriter
tabnine
MUTABLE.AI

TEXT TO SQL

AI 2SQL
seek

WEB APP BUILDERS

Debuild
Enzyme
durable

DOCUMENTATION

Mintlify
Stenography

OTHER

excelformulabot

MODELS: OPENAI GPT-3 TABNINE CODEGEEK

Speech

VOICE SYNTHESIS

RESEMBLE.AI broadn
WELLSAID coqui
podcast.ai **descript** overdub
Fliki Listnr
REPLICA VOICEMOD

MODELS: OPENAI

Other

MUSIC

SPLASH **Mubert** **dB**
Alva Technologies Endel
boomly Harmonal **SONIFY**

GAMING

AI DUNGEON

RPA

Adept
māyā

AI CHARACTERS/AVATARS

Character.AI
inworld
The Simulation
OASIS

BIOLOGY/CHEMISTRY

Cradle

VERTICAL APPS

Harvey

MODELS: OPENAI JUKEBOX

3D

3D MODELS/SCENES

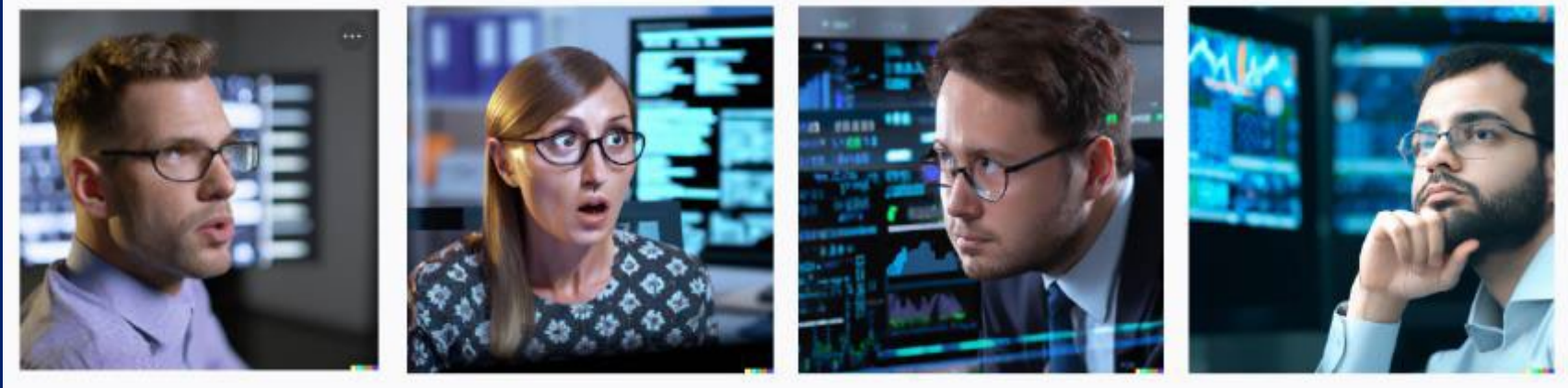
mirage csm

MODELS: DREAMVISION NVIDIA GPT3D MIDJ APPLE ML



A(I) bank research analyst

We asked: An interested and attentive looking bank research analyst, having heard lots of information on Artificial Intelligence



Back to the Future Car?

We asked: Create the car of the future in an '80s retro style



An analysis of how AI/ML/LLMs will likely impact any industry



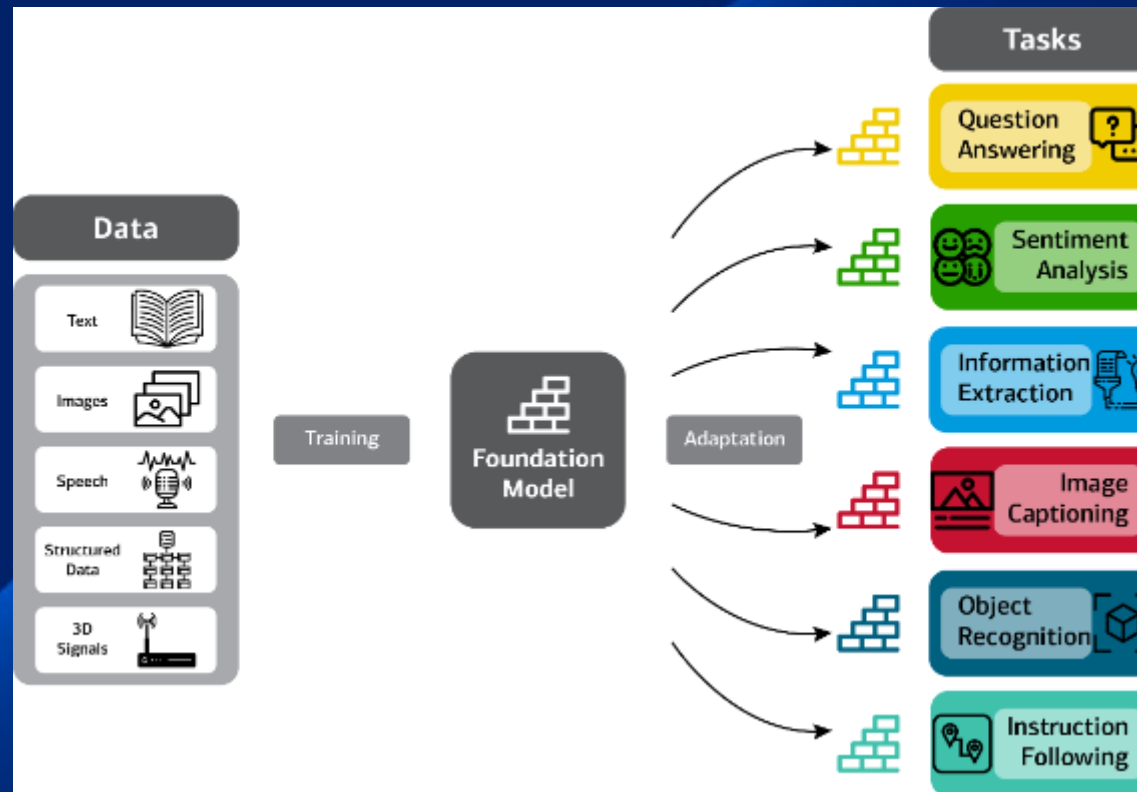
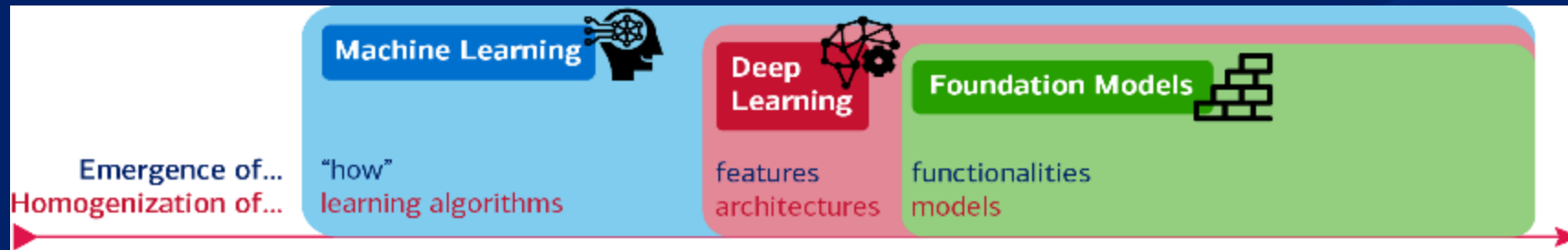
Industry	Impact	Comments
IT		
Software development	++	AI or large language models (LLMs) can help developers write code for program applications and software. It can also debug code and suggest improvements.
Semiconductors	++	The emergence of AI and LLMs could represent one of the strongest upcoming drivers of semis. Computational requirements for running AI models are increasing due to the processing power needed to train them.
Data centres	++	As data continues to grow at an exponential rate, more data centres are required to store that data.
Cybersecurity	++	With the emergence of LLMs like ChatGPT, it is easier for threat actors with limited programming skills to generate code for cyberattacks e.g. legitimate-sounding phishing emails. Hence, ChatGPT and similar models are likely to have broad-based implications on the cybersecurity sector in terms of email security, identity security, and threat detection.
Search engines	++	Traditional search engines could be replaced by chatbot applications like ChatGPT, however, it is likely that search engines are going to be used in conjunction with generative AI to improve the user experience.
Communication services		
Education	++	LLMs could drive online learning, writing textbooks and providing online learning modules.
Media	++	LLMs can be used for content generation e.g., writing news articles, social media posts, marketing content, story-writing, summarising text, media planning and advertising.
Music	++	AI and LLMs can be used to transpose music, generate melodies, chord progressions and lyrics. It can even analyse music and generate reviews and comparisons.
Legal	++	LLMs can write legal documents and summarise legal cases. ChatGPT is even capable of writing legal essays that passed law exams.
Healthcare		
Telemedicine	++	AI can help doctors make more data-driven decisions that improve the patient experience. It can be used for remote patient monitoring, population health management using predictive analytics, reminding patients of health appointments, training junior doctors and providing more accurate patient diagnoses.
Pharmaceuticals	++	AI can help with the initial screening of drug compounds to predict its success rate. It can further identify the right candidates for trials based on their medical history.
Financials		
Banks	++	AI can help analyse the data that banks, diversified financials and insurance companies have to conduct predictive analysis. AI could analyse an individual's credit history and calculate the likelihood of default. These companies can also retain customers for longer by providing additional services based on their spending and financial activities.
Fintech	++	AI can help fintech companies automate the credit risk assessment process, detect bank fraud, increase safety, automate the customer service experience and analyse user behaviour.
Capital Goods		
Aerospace	+	Aerospace companies can use AI to improve fuel efficiency by using recorded data and optimising fuel consumption.
Defense	+	AI-powered weapons could be the focus point of the next arms race. In addition, image and video recognition could be used for surveillance. This could increase national general security while reducing human intervention.



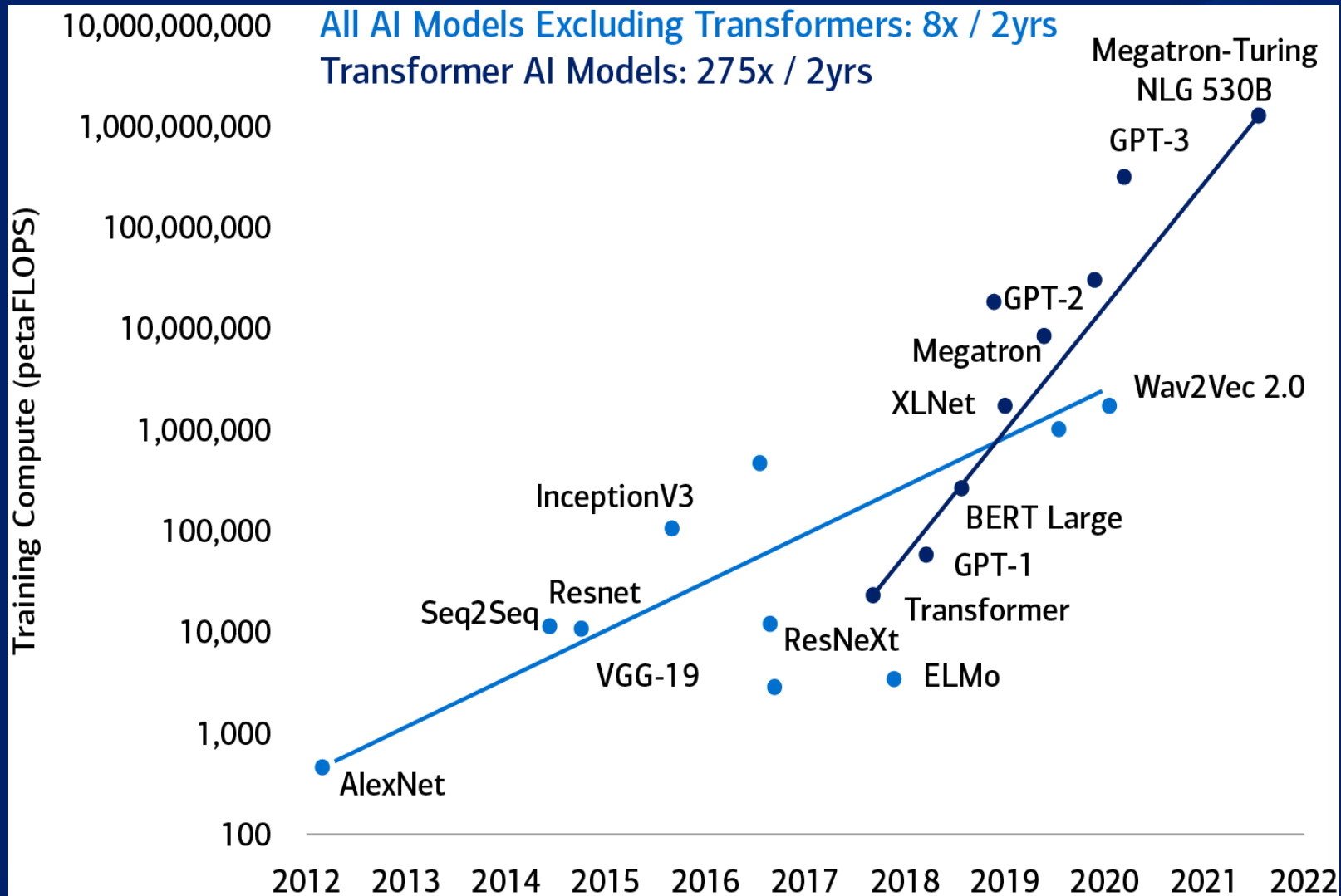
How did we get here?

What is a Large Language Model and what does it do?

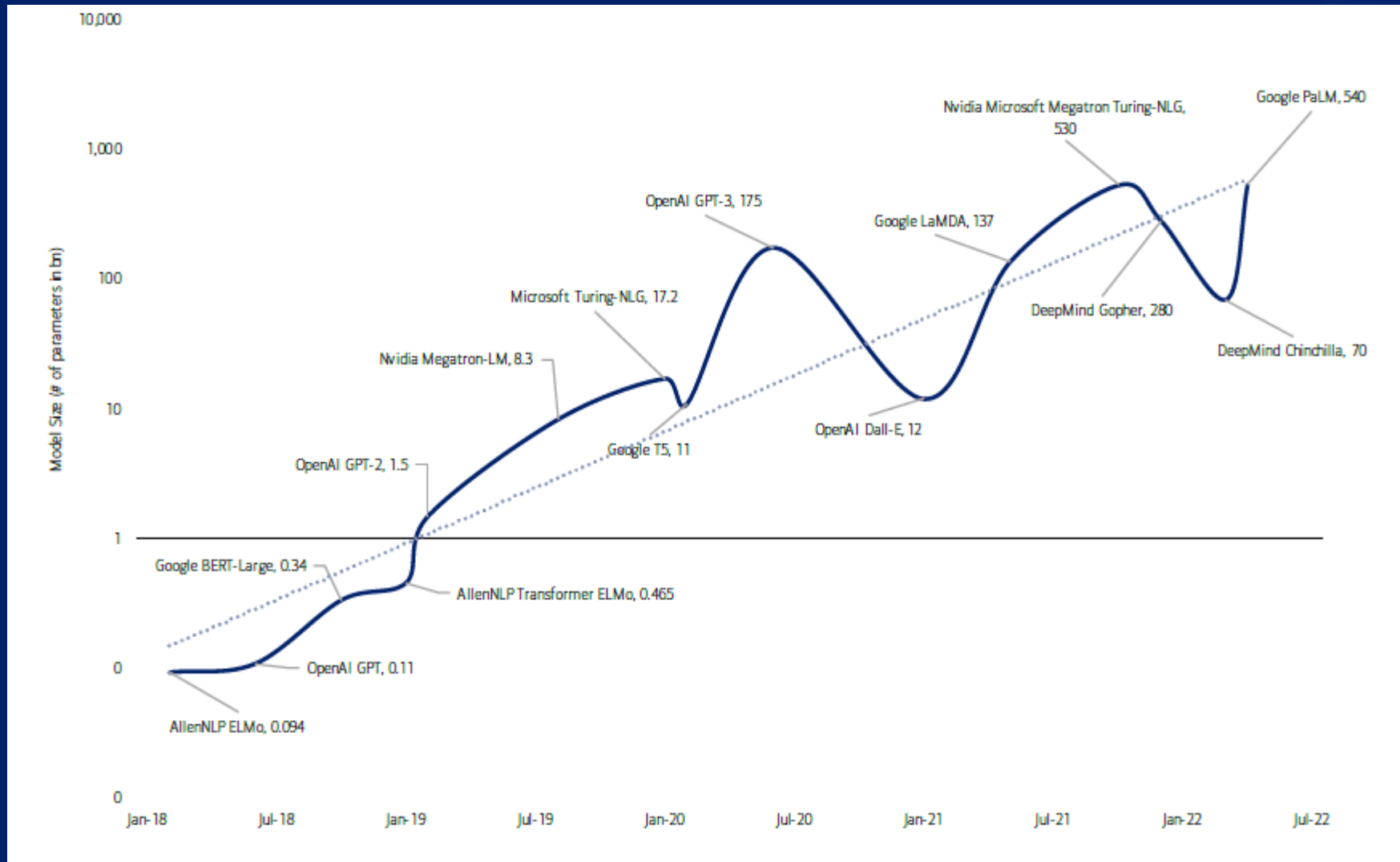
LLMs can centralise information from several modalities to perform a variety of tasks



Transformer AI models require 275x more computing power every two years



Size matters...but so does Data & Training



What has made language models so good?

Attention, scale, feedback



Increasing model and dataset size and compute improves performance

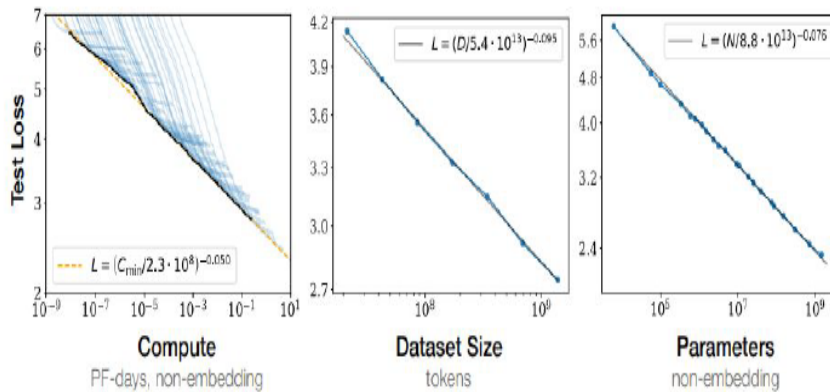
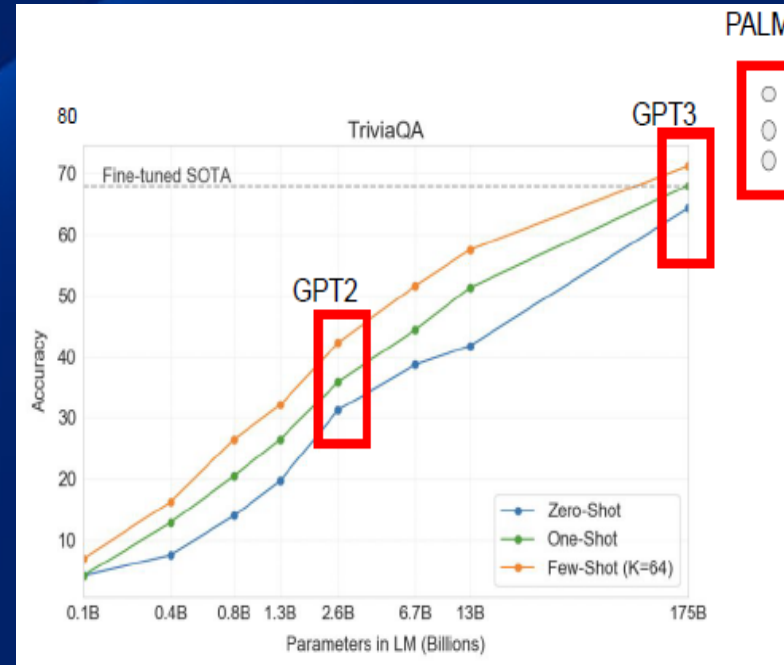


Figure 1 Language modeling performance improves smoothly as we increase the model size, dataset size, and amount of compute² used for training. For optimal performance all three factors must be scaled up in tandem. Empirical performance has a power-law relationship with each individual factor when not bottlenecked by the other two.

PALM (a 540bn parameter model) beat GPT-3 further in terms of accuracy





Risks? ESG

Training an AI model creates

5x more

CO2 emissions than an average car



Ethical concerns

e.g. StableDiffusion crawled copyrighted images. The watermark seeps into generated data.





69%



of US executives think Cybersecurity is their biggest AI-related risk

A futuristic coffee shop scene featuring a white robotic arm holding a white cup of coffee with latte art. The background shows other robotic arms and a menu board with items like 'Ice coffee' and 'Flav'.

We will need to re-skill 1 billion people... 1/3 of all jobs

by **2030**

Source: WEF

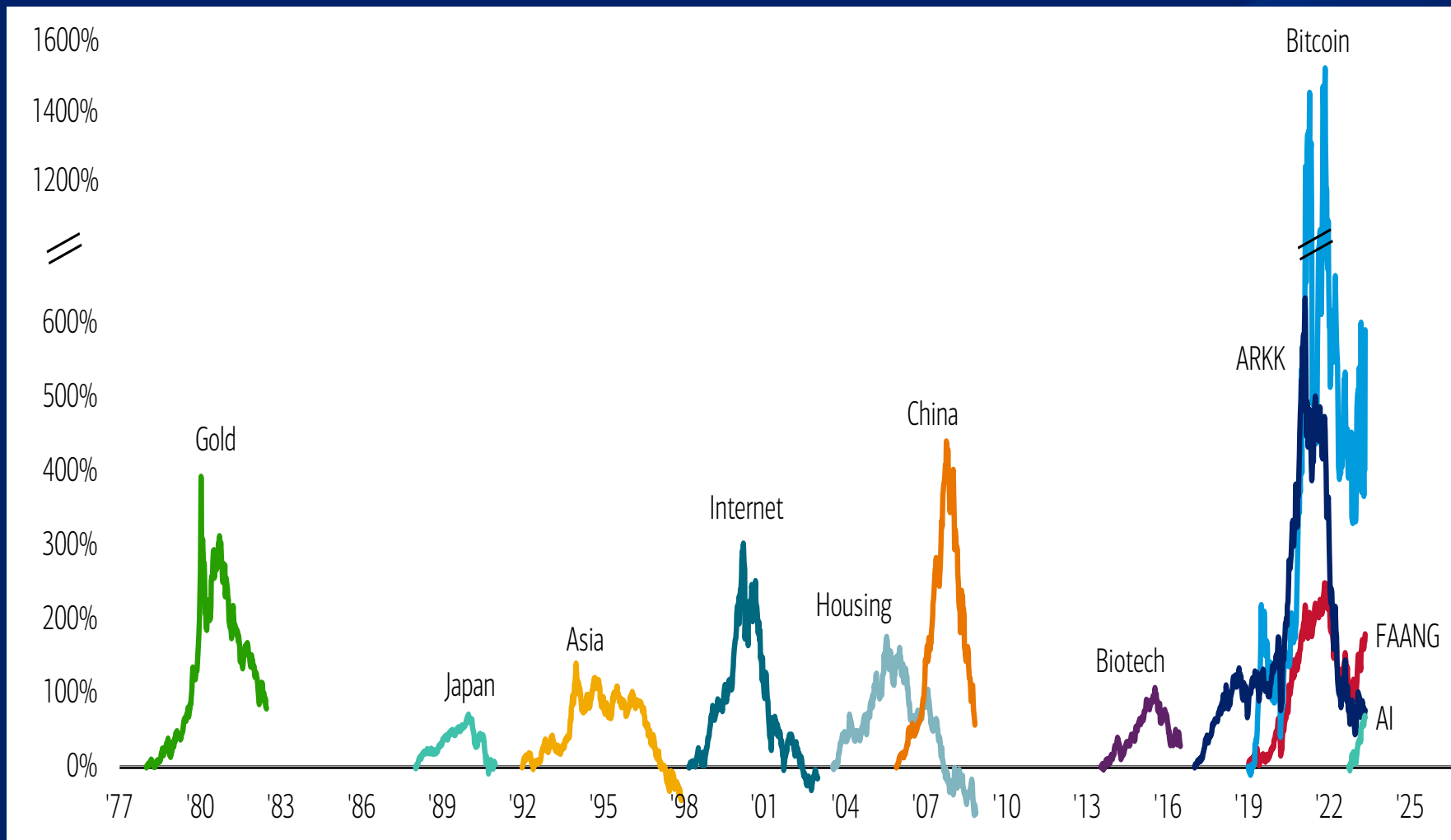




Food for thought



Generative AI is in early stage compare to historical cycles





90% of online content...

...will be generated by AI

by **2025**



Source: Media articles, Bloomberg.



















One more thing...



Eureka Moonshots 1.0



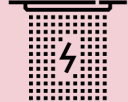










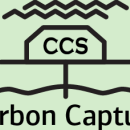
COMPUTING	CLIMATE ACTION	COMMUNICATIONS	NEXT GEN MATERIALS	DISTANCE
 Quantum Computing	 Geoengineering	EG 6G	 Nanotechnology	 Hyperloop
 Technological Singularity	 Nuclear fusion	 Nanosatellites	 Graphene	 Space Tourism
 Behavioural biometrics for security	 Mass Vertical & Greenhouse Farming	 LiFi	 3D bioprinting	 Deep sea mining

“The day before something is a breakthrough, it’s a crazy idea” Peter Diamandis



Eureka Moonshots 2.0

What are the next future technologies?
14 disruptive moonshot technologies

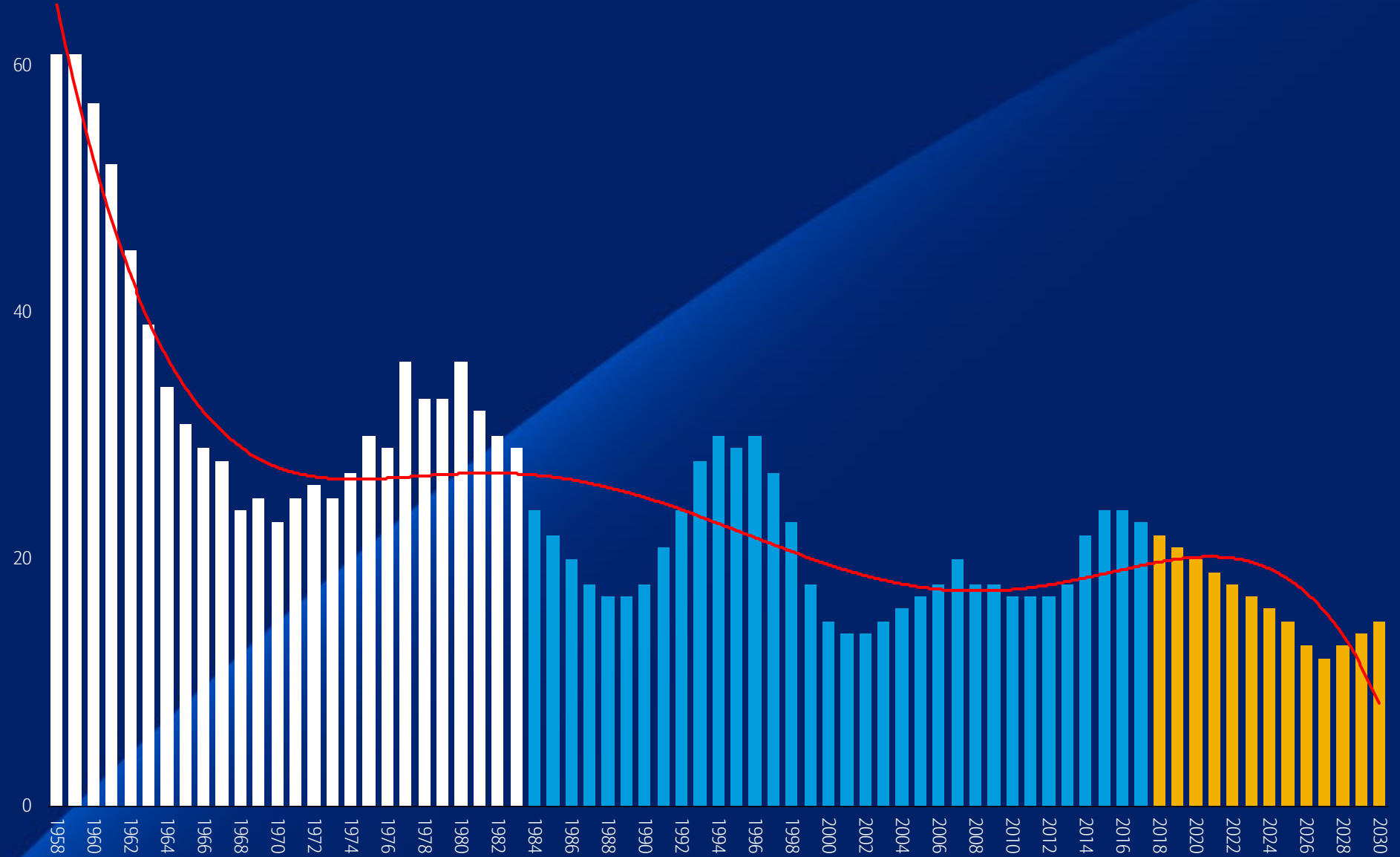
COMPUTATIONAL TECH	HUMAN TECH	CONSUMER TECH	GREEN TECH
 6G	 Bionic Humans	 Wireless Electricity	 Oceantech
 Emotional AI	 Immortality	 Holograms	 Nextgen batteries
 Brain Computer Interfaces	 Synthetic Biology	 Metaverse	 Green Mining
		 eVTOL	 Carbon Capture & Storage

Source: BofA Global Research

BofA GLOBAL RESEARCH



Avoiding the next “Kodak Moment”?



Source: innsight



Source: BofA Global Research, Bloomberg, DataStream. Chart shows market cap of MSCI equity indices of each country. Market caps as of June 14th, 2023



In **2022**

Genomic sequencing cost of \$100...

...compared to \$2.7 billion in 2003



In **2023**

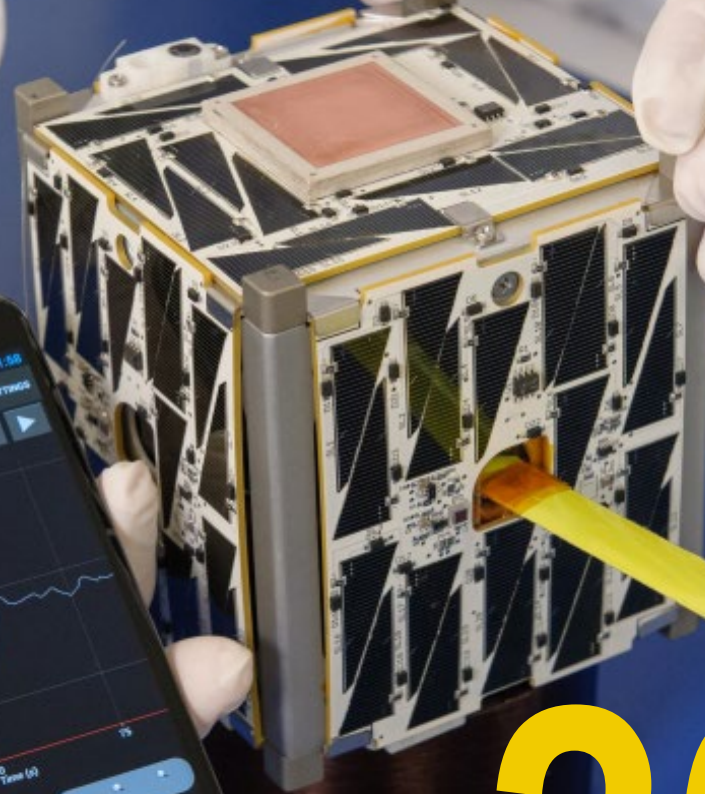


Cyber crime total economic damage will reach ...

...more than 2x that of climate change



25x more satellite in orbit than today



By 2029



By **2030**

A quantum computer will be able to process more calculations than there are atoms in the universe (10^{80})

A high-angle, wide shot looking down into the central column of a tokamak fusion reactor. The structure is circular and filled with complex machinery, including various pipes, cables, and structural supports. The central column is a prominent white cylindrical structure. The overall scene is industrial and technical.

With nuclear fusion we could power the world every day

with the equivalent of only 11 barrels of oil...

By 2035



Thank you!

Transforming
World
Thematic Research



16 June 2023

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