AI in Construction Industry

SCAPA's Annual Meeting
Feb. 21, 2024
Columbia, SC

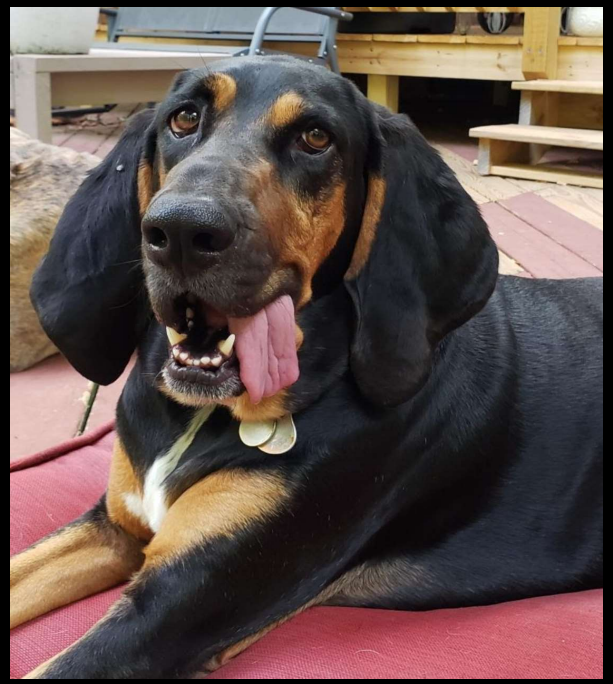
Serji Amirkhanian
Human Being

Why me?

- My dogs think that I can do the job!!
- 40 years ago: My prediction: The TV will be our downfall!!
- 35 years ago: The computers will be our downfall!!
- 30 years ago: The cell phones will be the downfall of humanity!!
- ~30 years ago: “Who the heck will be using gmail. Why not just call?”
- 25 yrs ago: My prediction: “Within 5 years, the construction industry will be utilizing robots everyday”
- My latest conclusion: Our stupidity will be the cause of our downfall!!
- 60 miles away from home!!
- I have stayed in a Holiday Inn Express once!!

I have long ears and
I do not listen to him either!!

Please keep him there.
We don't want him back!!



Agenda

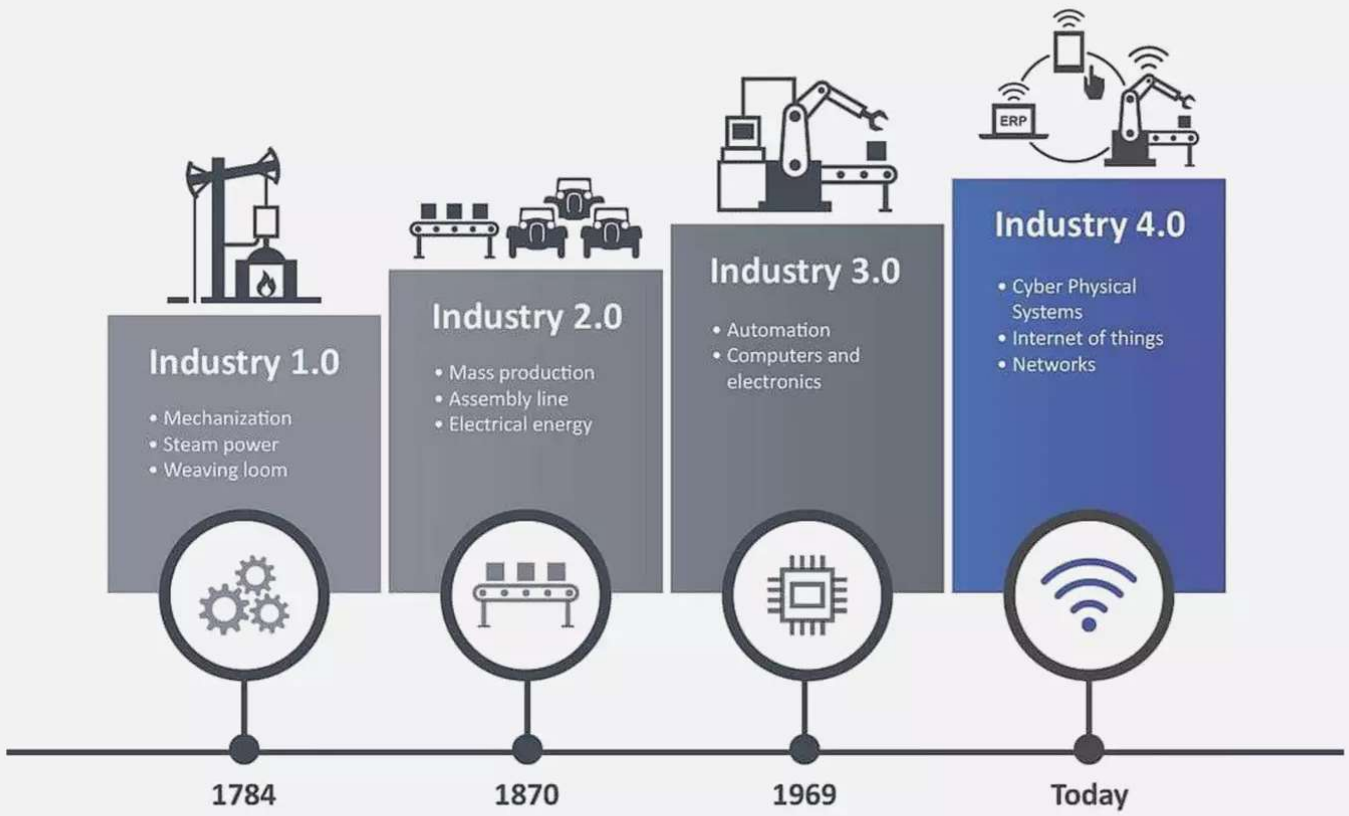
- Make some stupid comments
- Make more stupid comments
- Make confusing comments
- Make more confusing comments
- Make up some stupid conclusions
- Stupid or not, your pay is the same
- Pick up your check from Jason

"You have to understand & study the past to appreciate the future!!"

Serji, nobody that important, neither in the past or the future

INTRODUCTION

History and Introduction to the Industry



Source: https://dzone.com/articles/industry-40-the-top-9-trends-for-2018

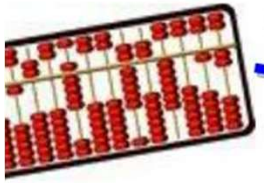
Where did all this start?

- 40,000 years ago: Ancient humans stored information in cave paintings
- As humans evolved: Languages and the invention of writing with the invention of paper in China around the first century AD.
- For over a millennium, books remained the main source of information storage.

Where are we going?

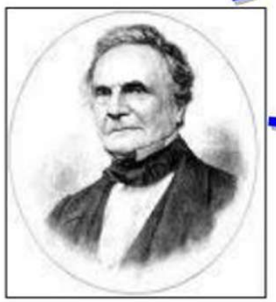
- Humans achieved more technological development in the past 150 years than during the previous 2,000 years.
- 1947: Discovery of the transistor
- 1956: The integrated microchip changed everything
- ~ 50 years: Major computing power, wireless technologies, the internet, artificial intelligence, and advances in display technologies, mobile communications, transportation, genetics, medicine and space exploration.

History of Computers



Abacus – 1100 BC

Slide rule - 1617
Mechanical calculator - 1642
Automatic loom (punched cards) - 1804



Babbage's computer – 1830s
Boolean logic – 1850s

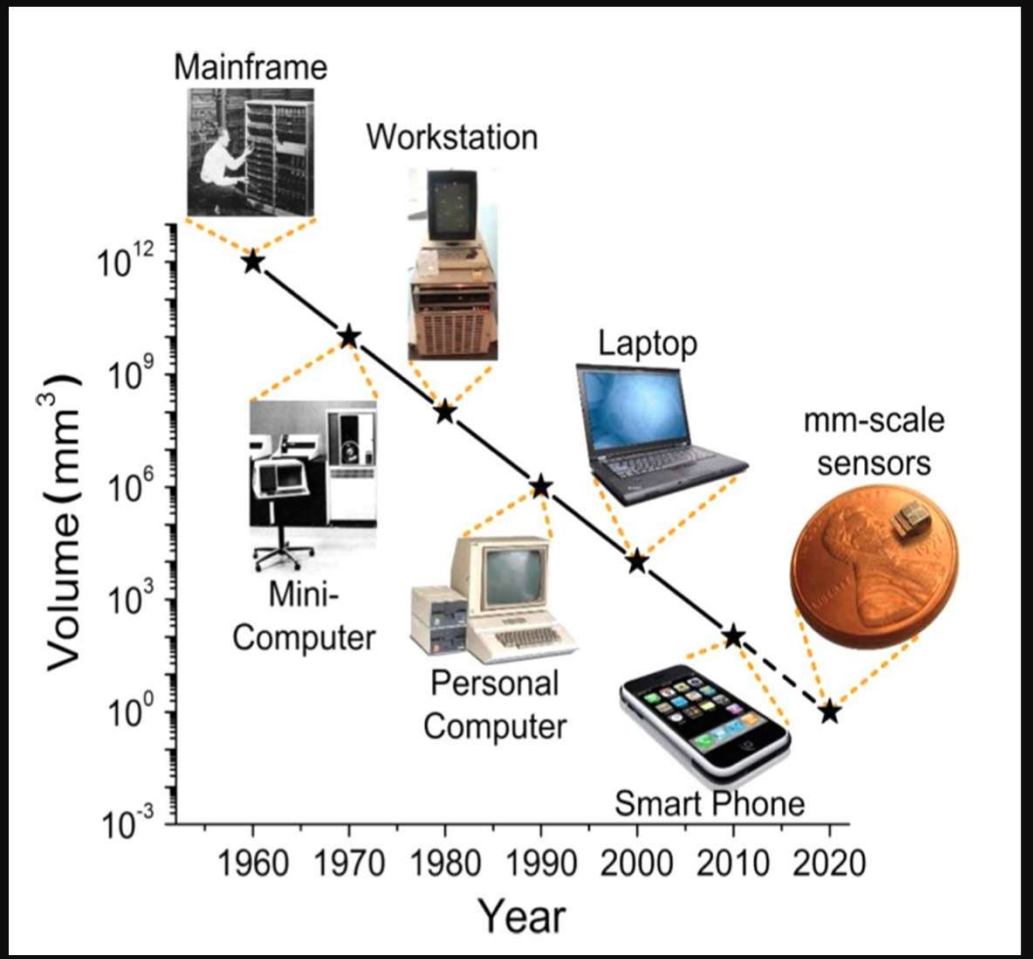
Hollerith's electric tabulator - 1880
Analog computer – 1927
EDVAC – 1946
ENIAC - 1947

Transistor - 1947

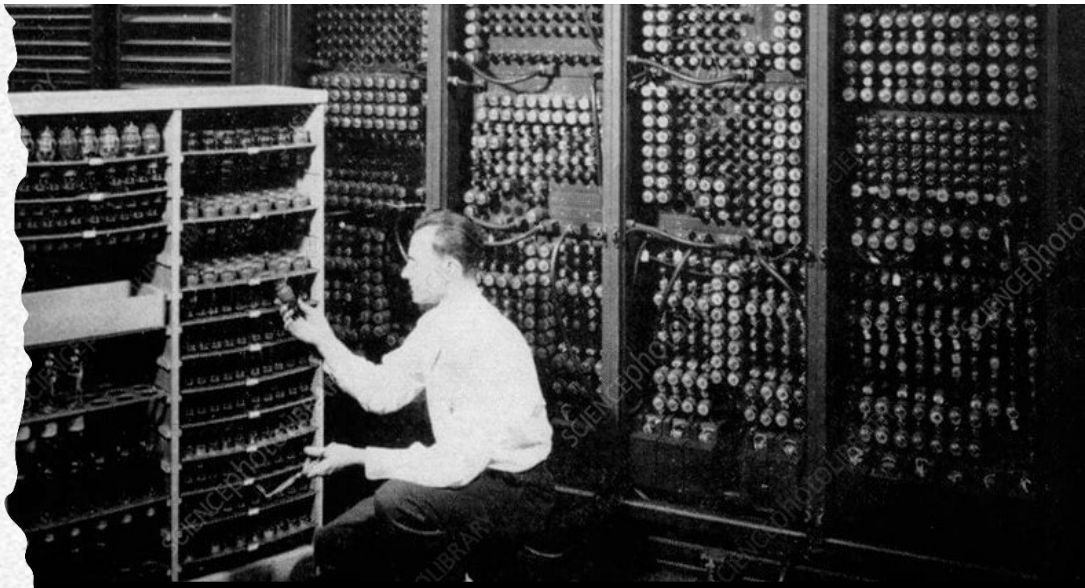
Integrated circuit – late 1950s
UNIVAC – 1951
Microprocessor – 1971
Altair 8880 – 1975
Apple II – 1977
IBM PC – 1981
World Wide Web – 1990s

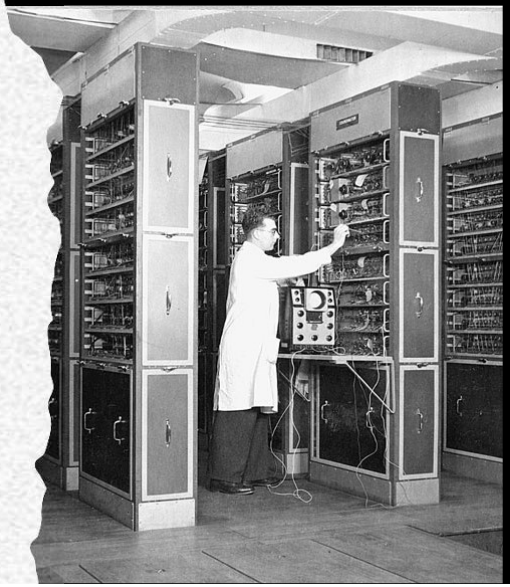
We Have Come a Long Way

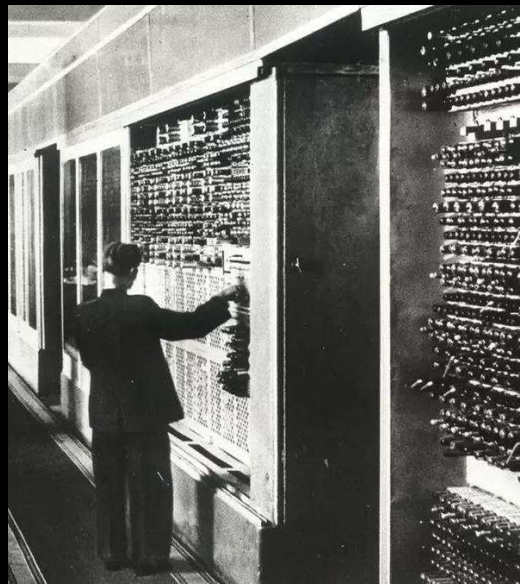
- And a LONG way to go!!
- Good news or bad??
- Your Apple Watch capabilities and the speed are much more and faster than many mainframes of 50 years ago!!
- From occupying a big room to your wrist!!

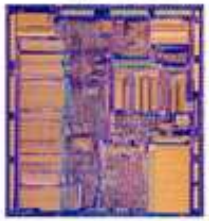
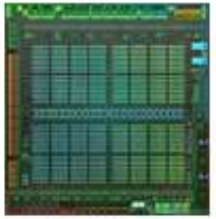



12
9
3







1950s	1960s	1970s	1980s	1990s	2000s	2010s
Silicon Transistor	TTL Quad Gate	8-bit Microprocessor	32-bit Microprocessor	32-bit Microprocessor	64-bit Microprocessor	3072-Core GPU
						
1 Transistor	**16 Transistors**	**4500 Transistors**	**275,000 Transistors**	**3,100,000 Transistors**	**592,000,000 Transistors**	**8,000,000,000 Transistors**

By 2030

Intel says there will be one trillion transistors on chips

The rest of the story

- 1,000,000,000,000: What does this mean?
- 10 times of what is available now!!
- Gordon Moore (Intel's Co-Founder) predicted this in 1965:
- "the speed and capabilities of computers are expected to double every two years as the number of transistors that fit on a microchip increases."

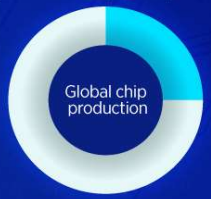
Chip industry eyes $446B investment

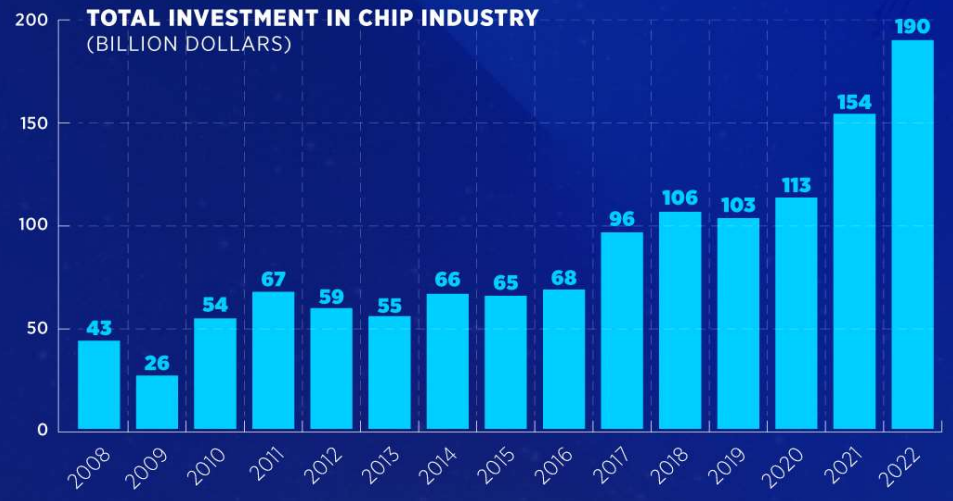
While problems in global chip supply continues, investments in this field intensified around the world

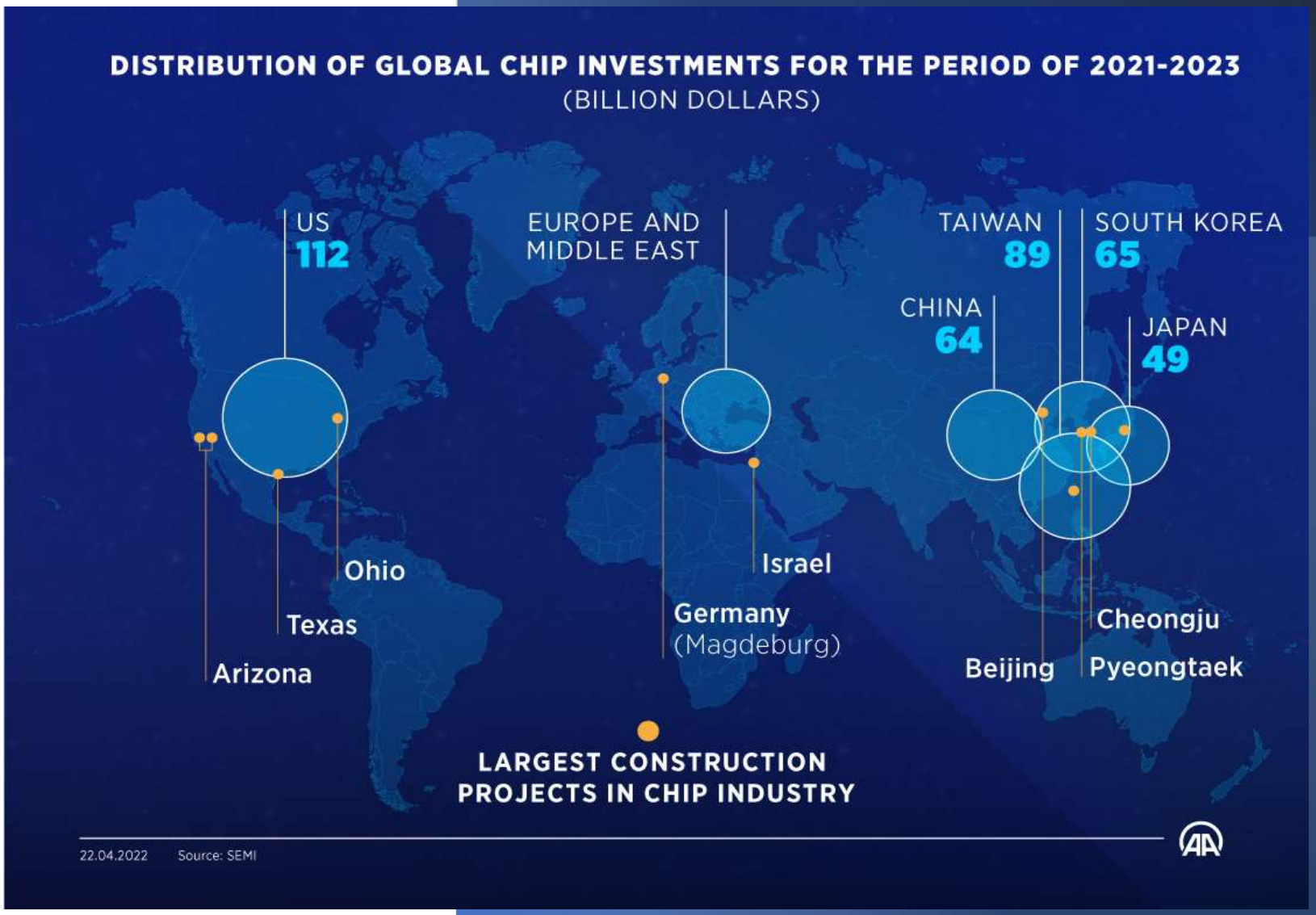
4.

Semiconductors rank the world's fourth most-traded product after crude oil, refined oil and passenger cars

US, China account for **25%** of global consumption






DISTRIBUTION OF GLOBAL CHIP INVESTMENTS FOR THE PERIOD OF 2021-2023
(BILLION DOLLARS)
US
112
EUROPE AND
MIDDLE EAST
TAIWAN
89
SOUTH KOREA
65
CHINA
64
JAPAN
49
Ohio
Texas
Arizona
Israel
Germany
(Magdeburg)
Beijing
Cheongju
Pyeongtaek
LARGEST CONSTRUCTION
PROJECTS IN CHIP INDUSTRY
22.04.2022
Source: SEMI

No thanks, I'll go the other way!!

“And you ask why women live longer?”

"And you ask why women live longer?"


DATA, DATA, DATA Everywhere
Data: New Oil or New Water!!

And you say how much DATA per DAY or Year?

- 500 Million Tweets
- ~300 Billion emails
- 4 Million gigabytes of Facebook data
- 65 Billion Whatsapp messages
- ~700,000 hrs of YouTube

- 2018: Total amount of data: 33 Zetabytes (33 Trillion gigabytes)
- 2020: Increased by 80%
- 2025: ~ x3 times of 2020: 8,000,000,000,000,000,000,000 bits

How to Visualize all These NUMBERS?

- Imagine that each bit is a quarter coin: 0.069” (1.75 mm)
- One ZB made up of a stack of coins would be 2,550 lightyears.
- 1 lightyear: 6 TRILLION miles
- Each year we produce 59 times that amount of data
- Estimated compound growth rate: ~61%

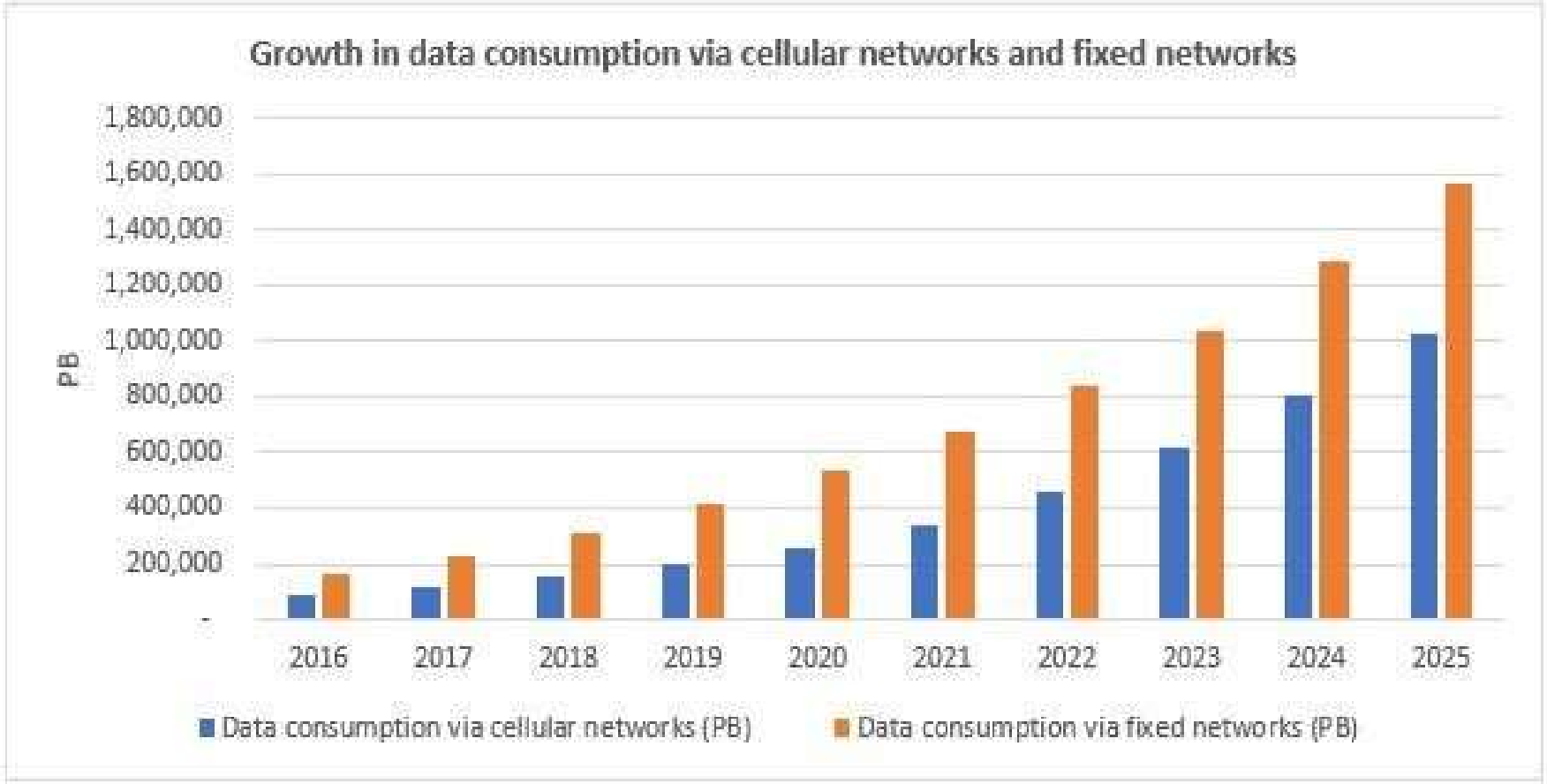

DATA
The MOST Powerful Weapon
in the World?
BIG DATA

Unit	Value	Size
bit (b)	0 or 1	1/8 of a byte
byte (B)	8 bits	1 byte
kilobyte (KB)	1000^1 bytes	1,000 bytes
megabyte (MB)	1000^2 bytes	1,000,000 bytes
gigabyte (GB)	1000^3 bytes	1,000,000,000 bytes
terabyte (TB)	1000^4 bytes	1,000,000,000,000 bytes
petabyte (PB)	1000^5 bytes	1,000,000,000,000,000 bytes
exabyte (EB)	1000^6 bytes	1,000,000,000,000,000,000 bytes
zettabyte (ZB)	1000^7 bytes	1,000,000,000,000,000,000,000 bytes
yottabyte (YB)	1000^8 bytes	1,000,000,000,000,000,000,000,000 bytes

1 MB = A 400-Page book
650 MB = CD-ROM: 70 min of audio

1 GB = around 10 yards of books
7 GB = 1 hr of streaming on Netflix

1 TB = 310,000 pictures; or
500 hours worth of movies
1 PB = 500 billion pages: ~1.5 times of all books in ALL libraries in the USA

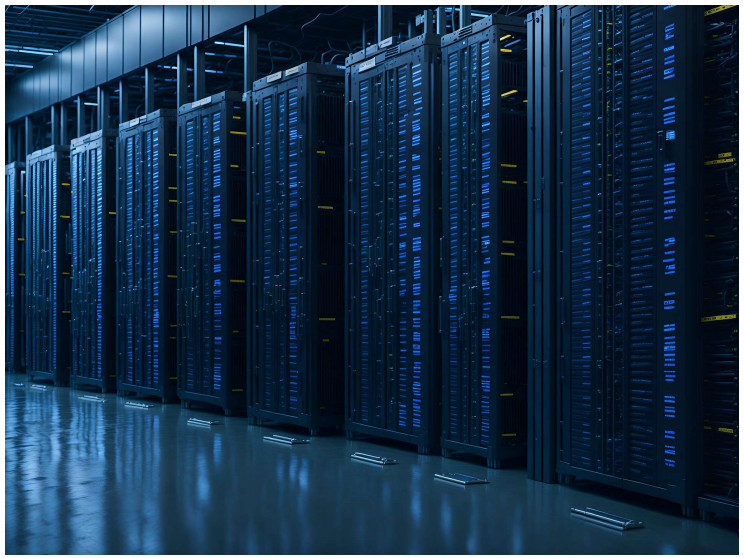

Growth in data consumption via cellular networks and fixed networks
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
-
PB
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
Data consumption via cellular networks (PB)
Data consumption via fixed networks (PB)

“Whoever controls DATA, controls the world!!”

Where do you store all these DATA??

- 600 hyperscale data centers (ones with over 5,000 servers) – in the world.
- ~39% of them are in the US, while China, Japan, UK, Germany and Australia account for about 30% of the total.
- Example: The Citadel (Reno, Nevada) which occupies 7.2 million square feet and uses 815 megawatts of power.
- 100 new hyperscale data centers are built every two years.
- ~100 year from today: the power required to sustain this digital production will exceed the total planetary power consumption today.

Equivalent Water need for a retail data center per year (compared to Olympic size pools)



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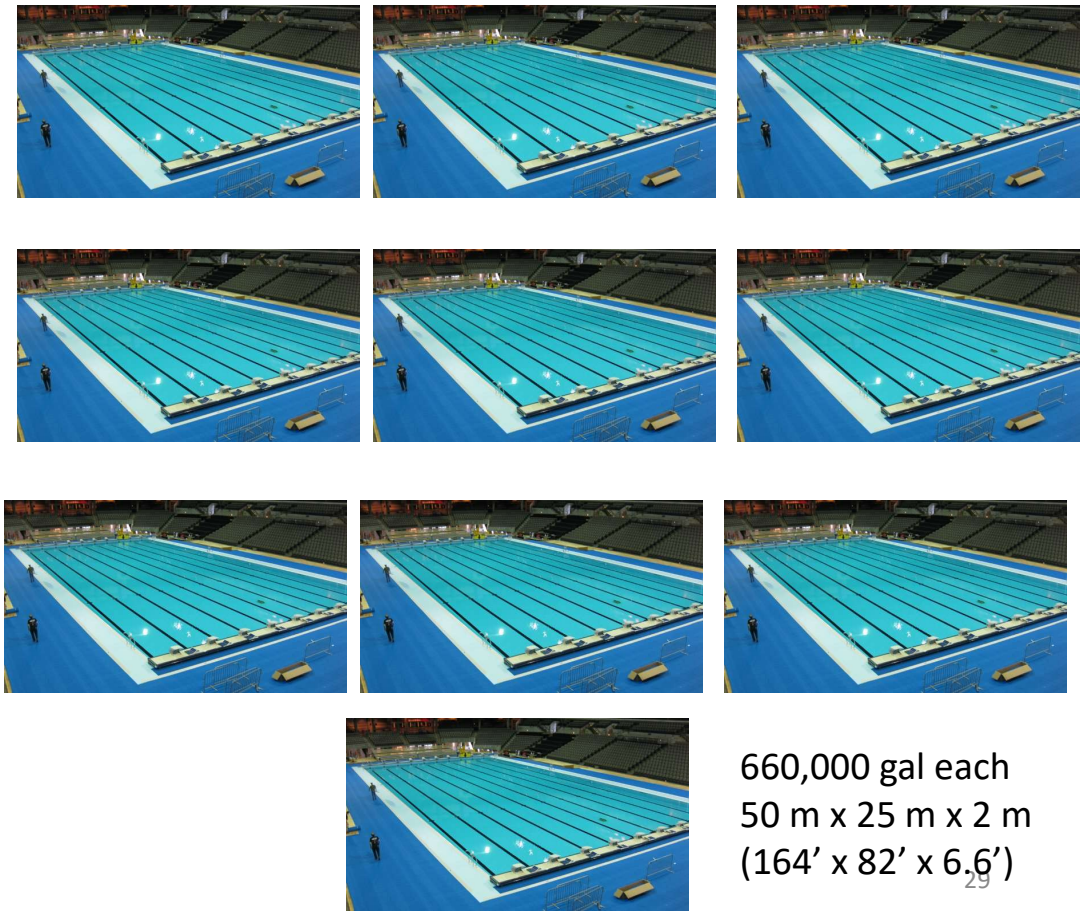
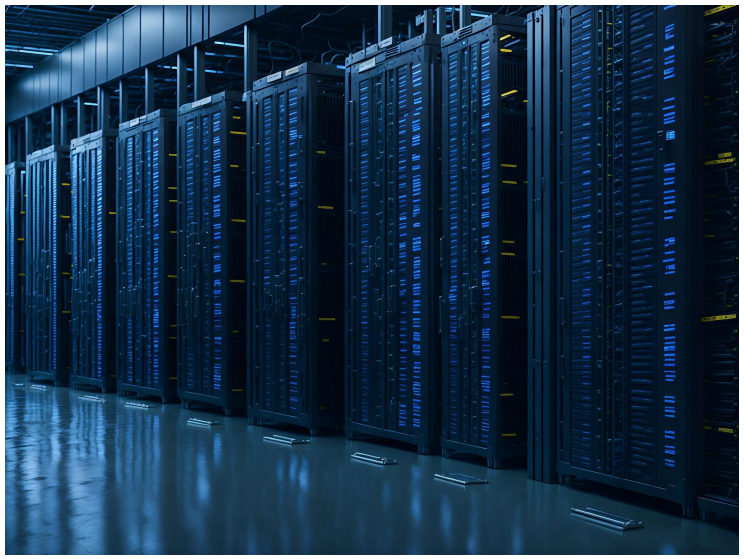


660,000 gal each
50 m x 25 m x 2 m
(164’ x 82’ x 6.6’)

Equivalent Water need for a hyperscale data center per year
Equivalent to 303 Olympic swimming pools)



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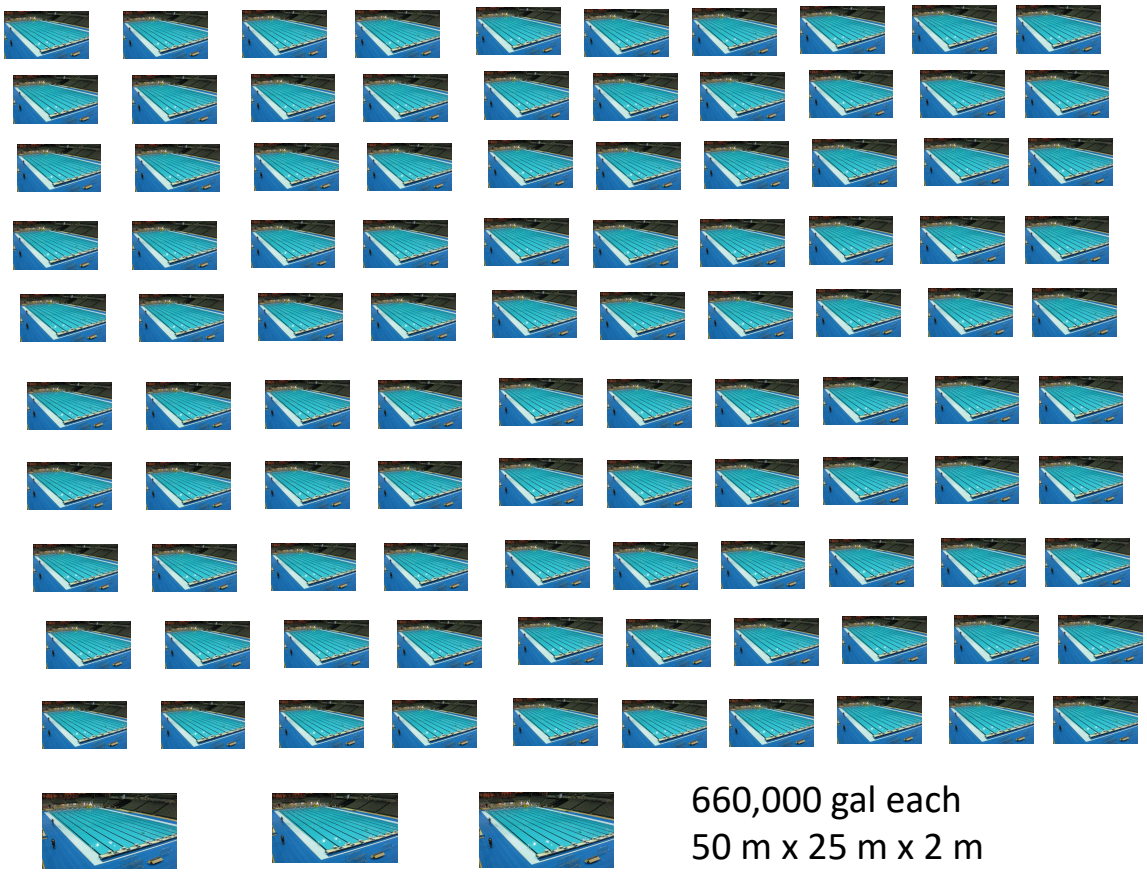
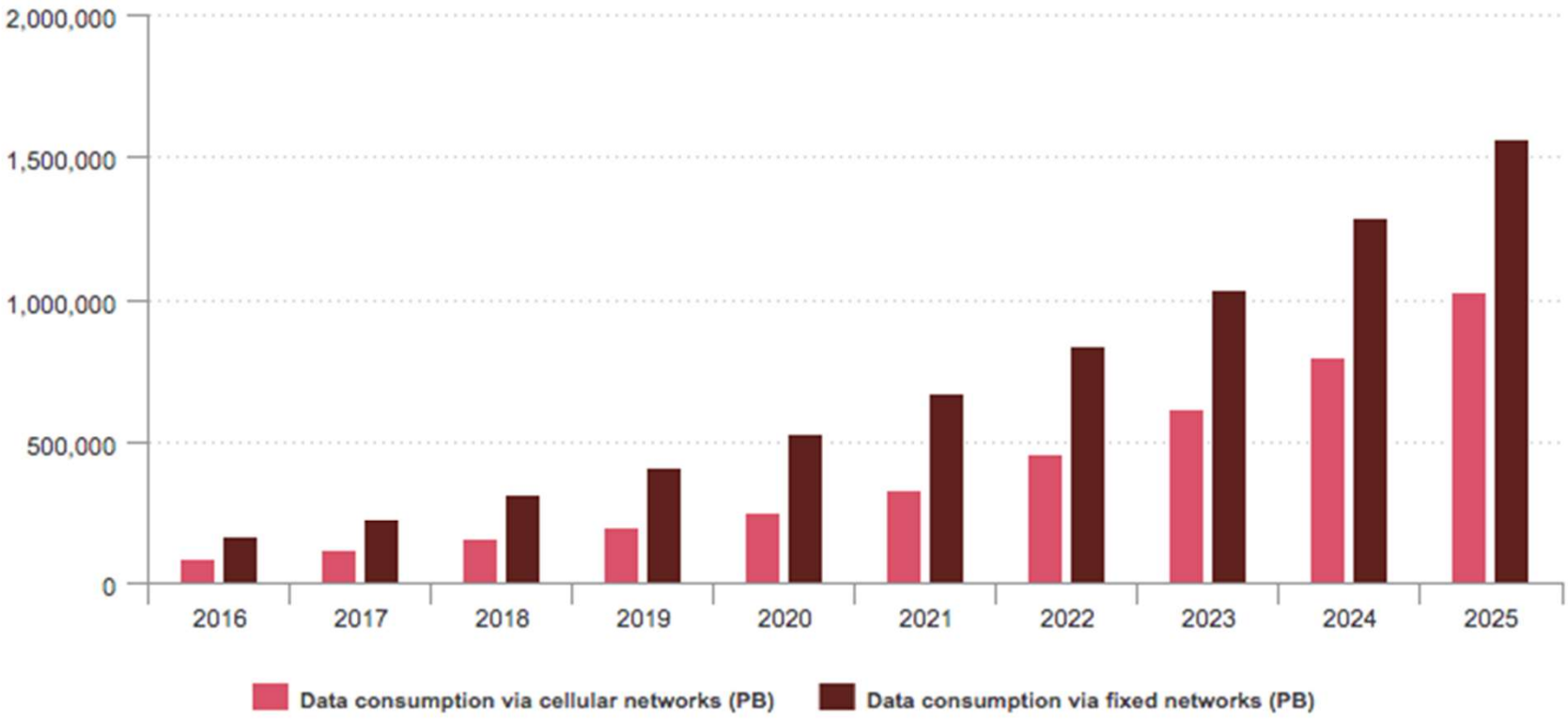


660,000 gal each
50 m x 25 m x 2 m
(164’ x 82’ x 6.6’)

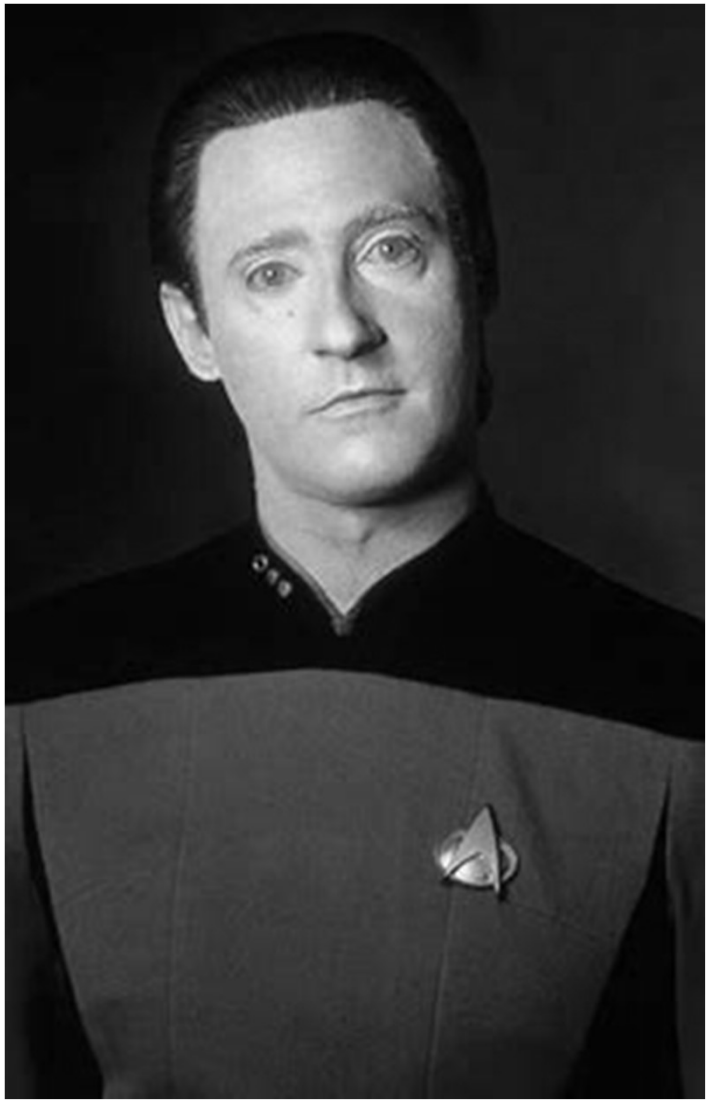
Growth in smartphone data consumption via mobile handsets & cellular networks

Global, data consumption by content category, 2016-25



Source: Global Entertainment and Media Outlook 2021–2025. PwC. Omdia

Our Future?

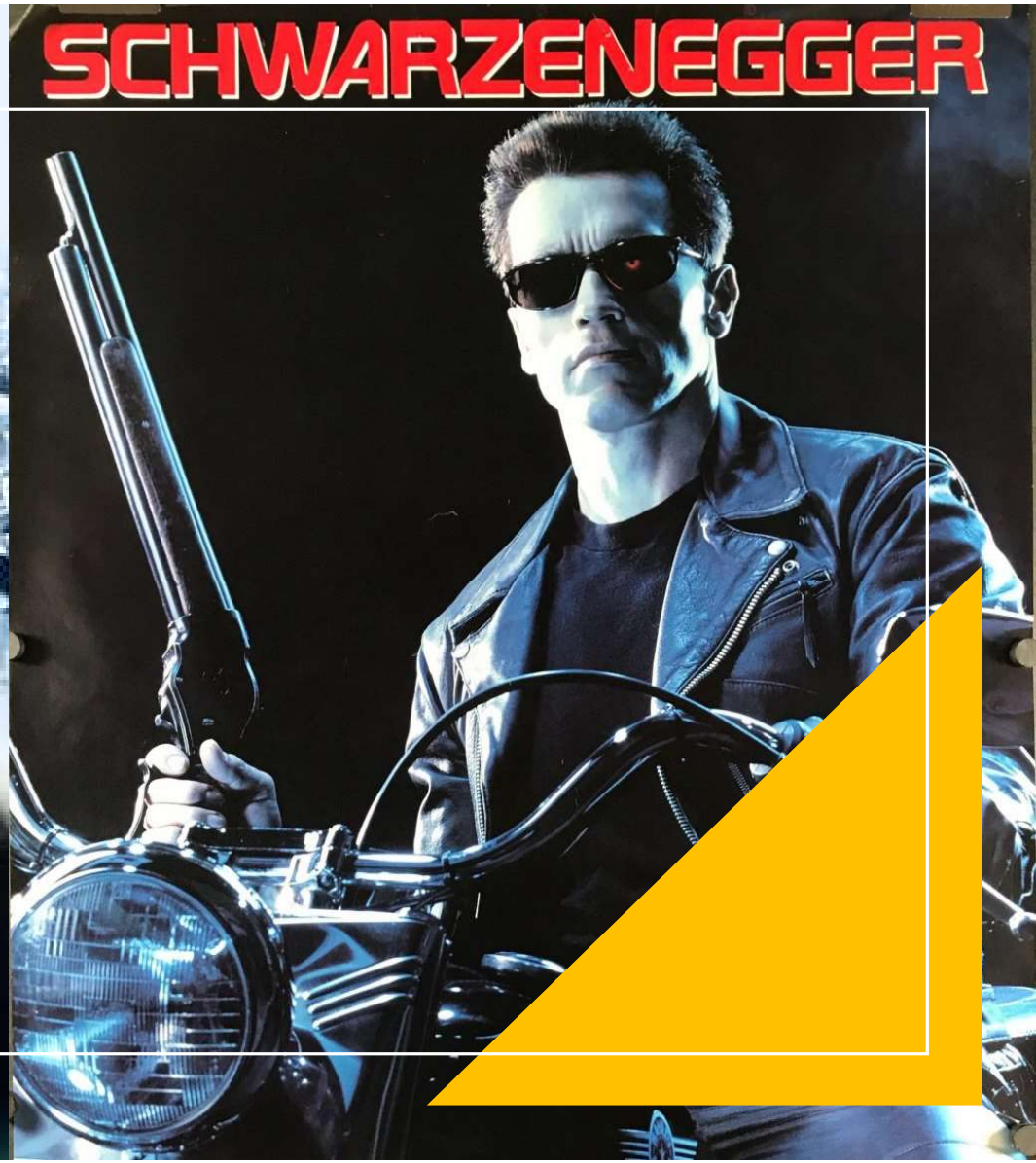


Or, our downfalls!!

What is this AI?
What's the fuss?
Who decides what to do?

Any Intelligence? Real of Artificial?


I,ROBOT

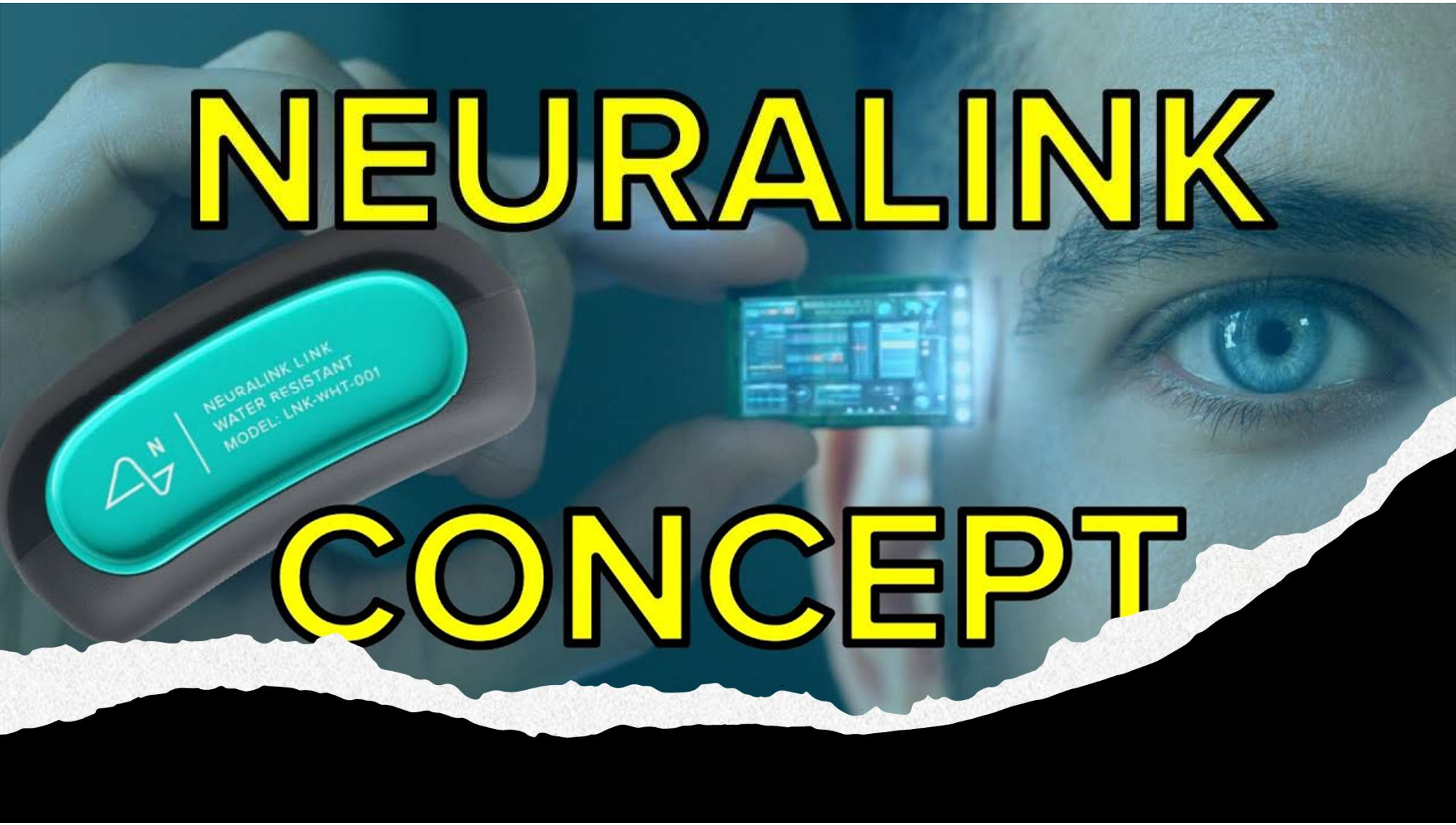

SCHWARZENEGGER

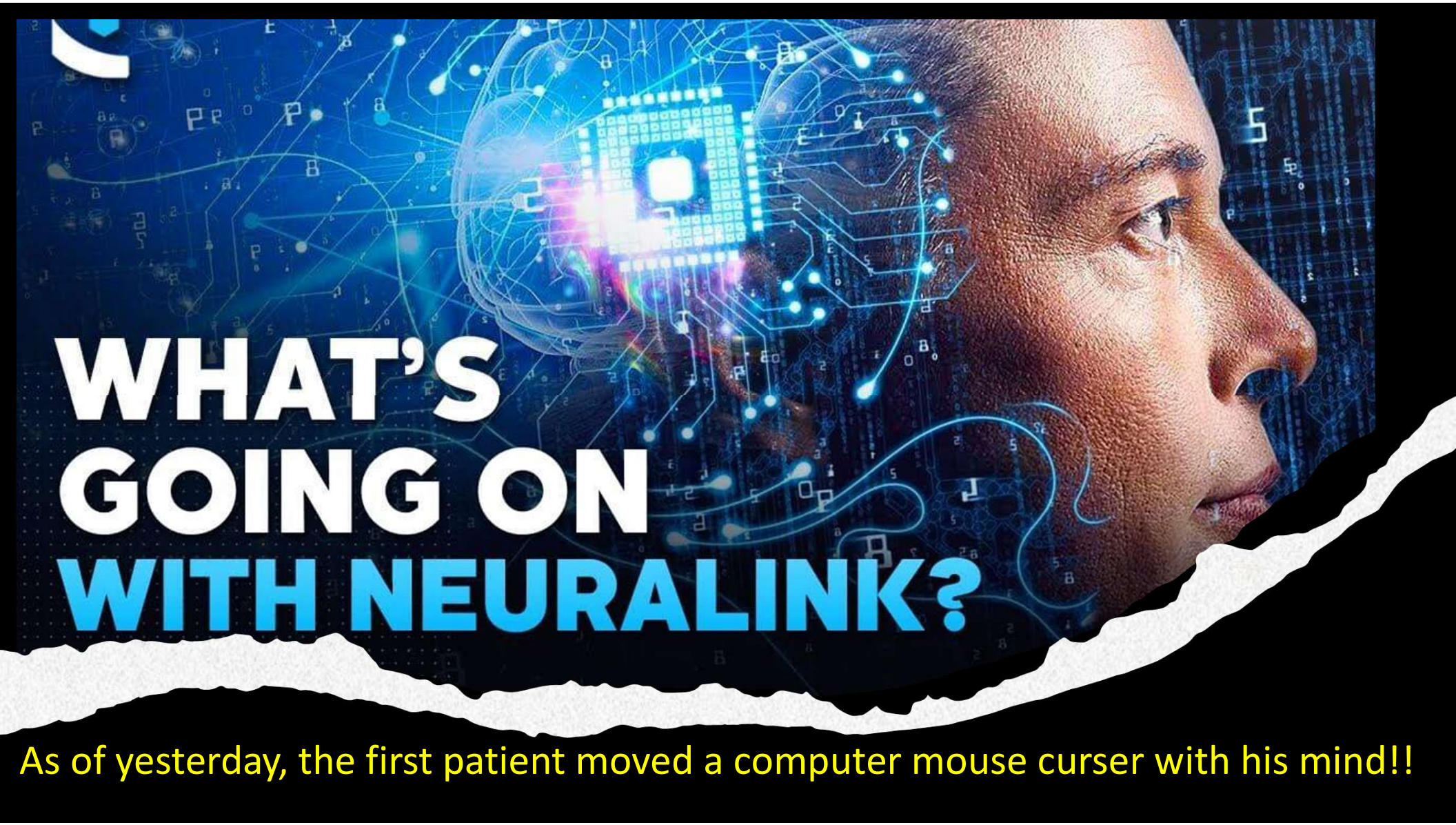
They Are Coming

Are you ready??

What Does he Know?

- “Humanoid robot called Optimus could eliminate dangerous, repetitive, boring tasks.”
- Robots will integrate into daily lives, helping people with both mundane chores like doing the dishes to working in hazardous conditions.


NEURALINK
CONCEPT
NEURALINK LINK
WATER RESISTANT
MODEL: LNK-WHT-001



As of yesterday, the first patient moved a computer mouse curser with his mind!!

Neuralink can solve all these things!

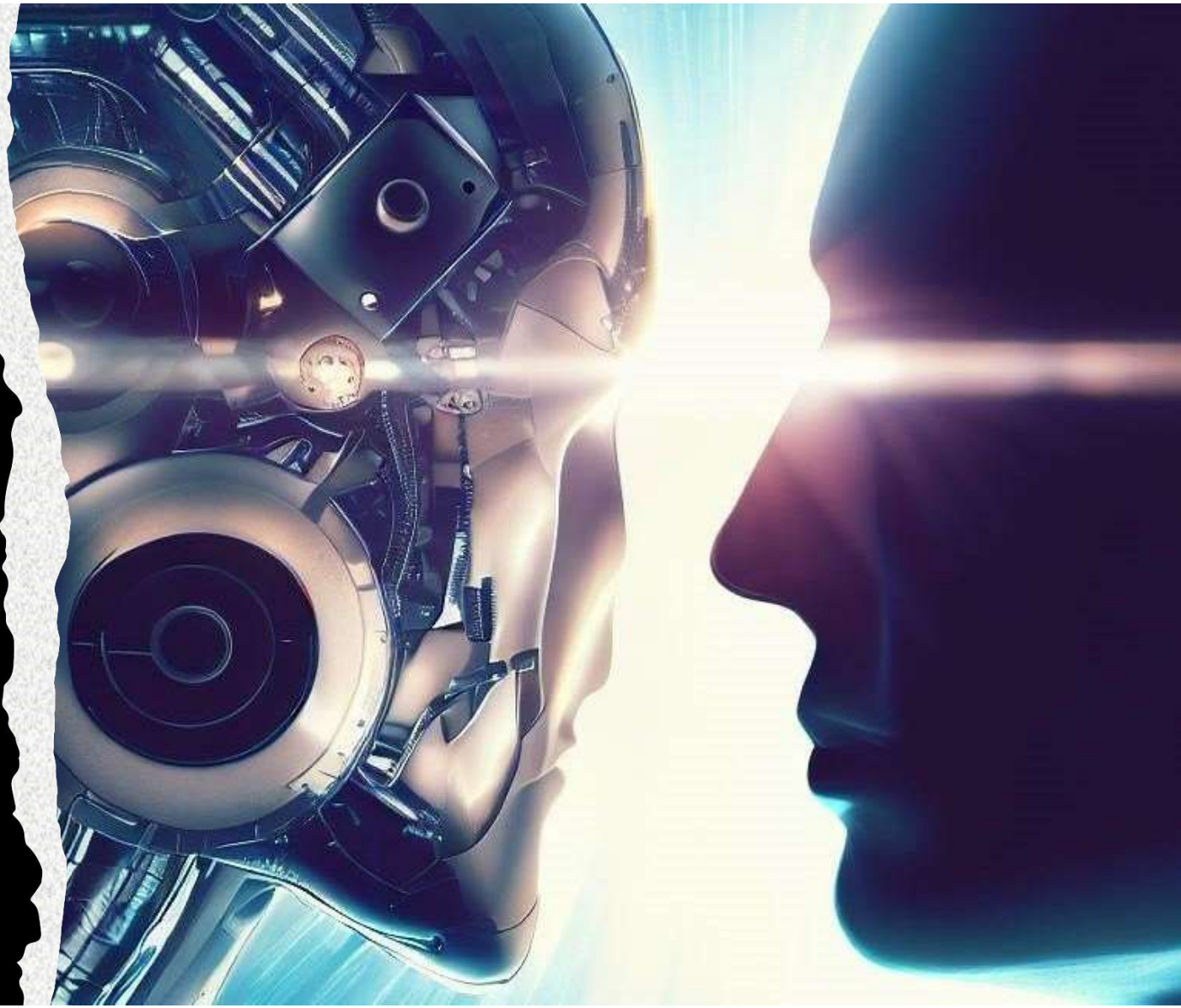
- Memory loss
- Depression
- Hearing loss
- Brain damage
- Anxiety
- Strokes
- Insomnia
- Extreme pain
- Seizures
- Addiction
- Blindness
- Paralysis

Scarry?

Hopeful?

What's the fuss?

Can we coexist?
Should we?
Resist or ……?
Conflicts?
Who is right?
Who is running the "show"?
Conflict of interest of the developers?
???????



People you
work with...

Remember those people

The happy worker

The greedy employee

The Joker

The Leader

The Loud Mouth

The Busy Body

The Disgruntled Employee

The Information Specialist

Keeper of the nuts

The Expert

higher learning...

The New Guy

The Supervisor

The Mole

The Frustrated Employee

And
Tadaaaa....

Da BOSS !!!!

The Boss’ Secretary

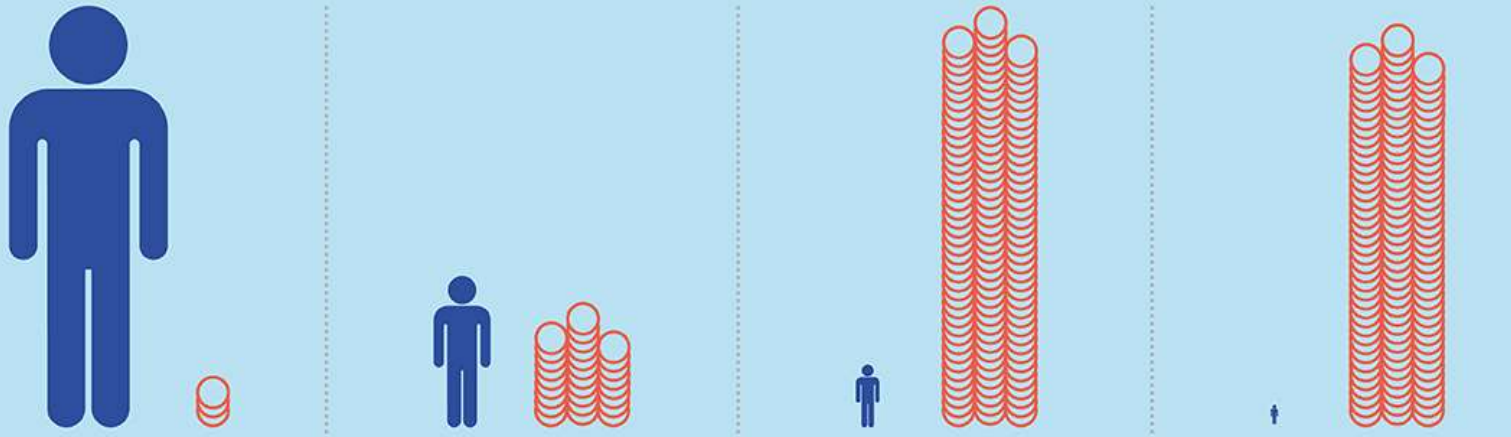
The CEO

How is the **world's wealth** shared amongst its population?

WORLD ECONOMIC FORUM
COMMITTED TO IMPROVING THE STATE OF THE WORLD

% of the world's population

% of the world's wealth

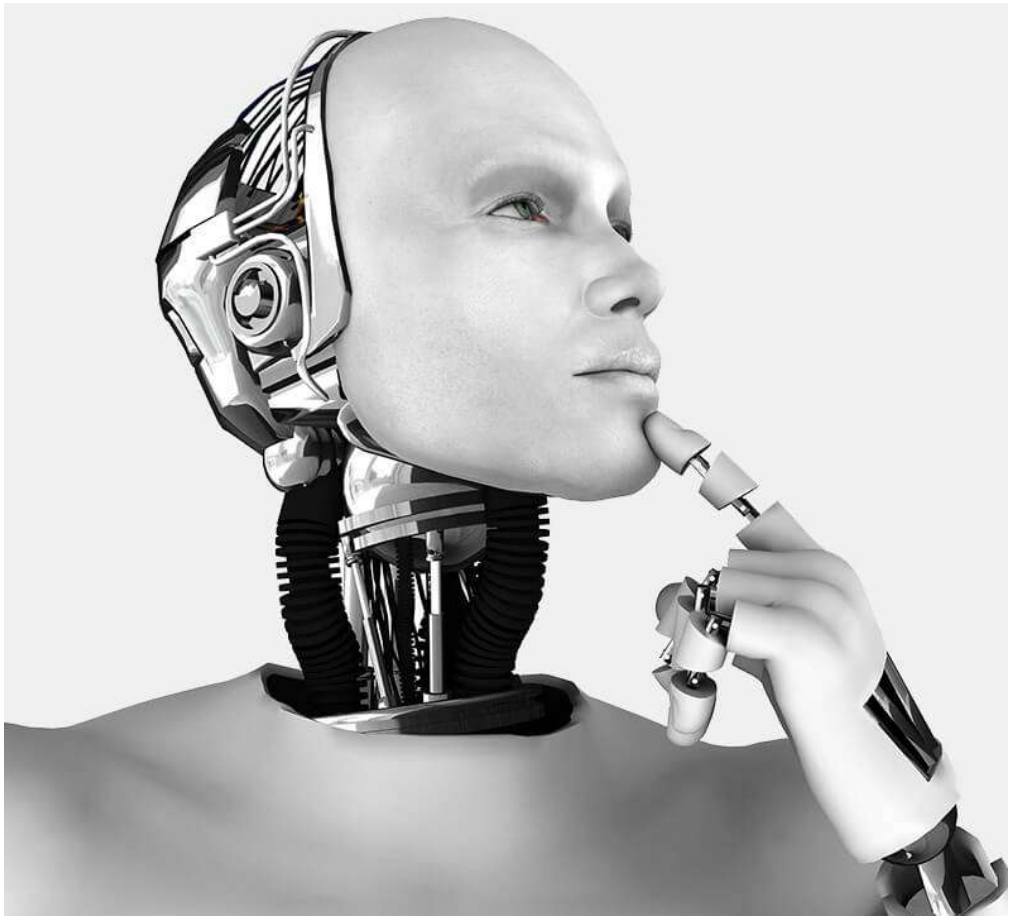


71.0%	3.0%	21.0%	12.5%	7.4%	39.4%	0.7%	45.2%
> $10,000		> $10,000 -100,000		> $100,000 -1 million		> $1 million	

Wealth (USD)

"Wealth" is defined as the marketable value of financial assets plus non-financial assets (principally housing and land) owned by an adult, less debts
Source: Global Wealth Report 2015, Zurich: Credit Suisse


Humans achieved more technological development in the past 150 years than during the previous 2,000 years, mainly due to the invention of digital electronics.

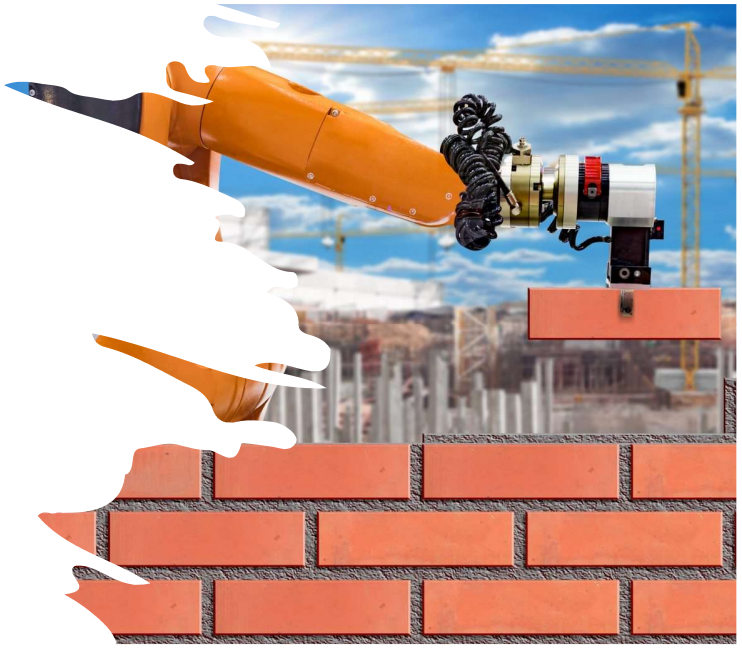


Concerns??

- Security??
- Who is Regulating it?
- Terminator Moment?

Skilled Workers?

- Who does the “training”?
- What tasks are the most effective?
- Where to buy?
- Who repairs them?
- Who controls the cost? Monopoly?
- Can you fire them?
- Can you argue with them?
- Will they listen?
- Chargers? EV vehicles? Not a good start!!
- Cyber Security? Hacking?
- Weather related issues!!

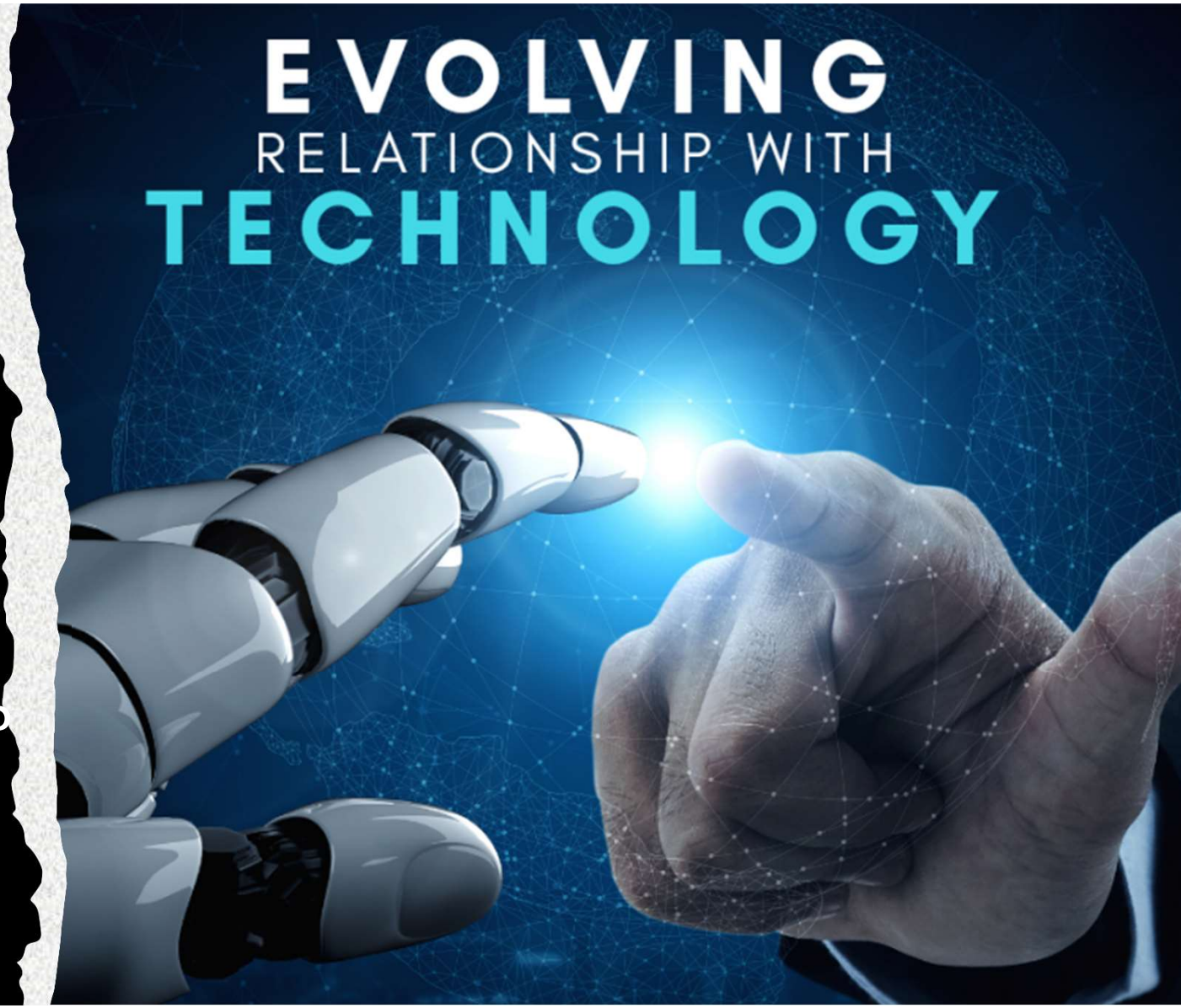


Concerns

- Special Interest
- Military Applications
- Who is programming the robots?
- Chips? What country will control it?
- Do we have enough electricity?

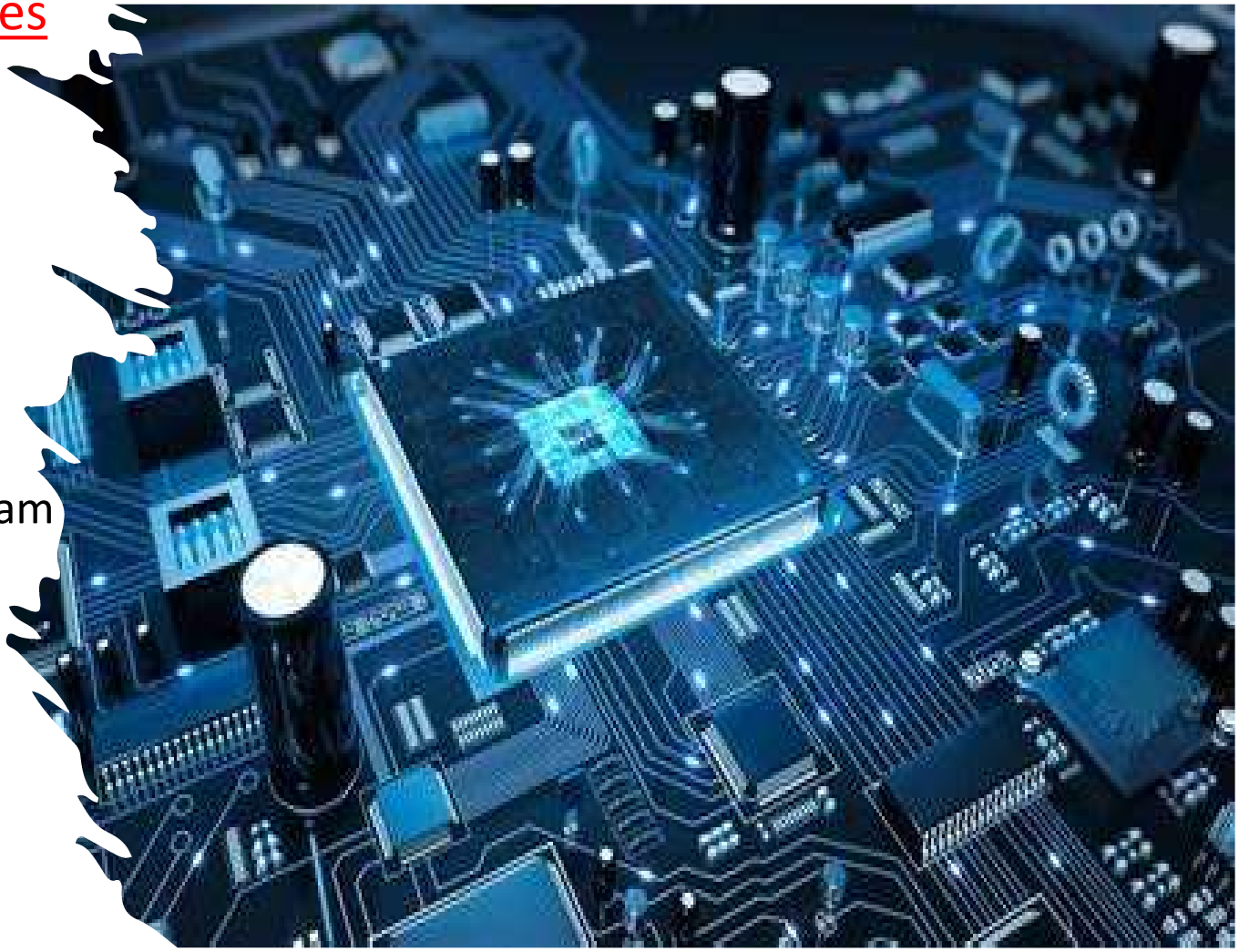
Can they:

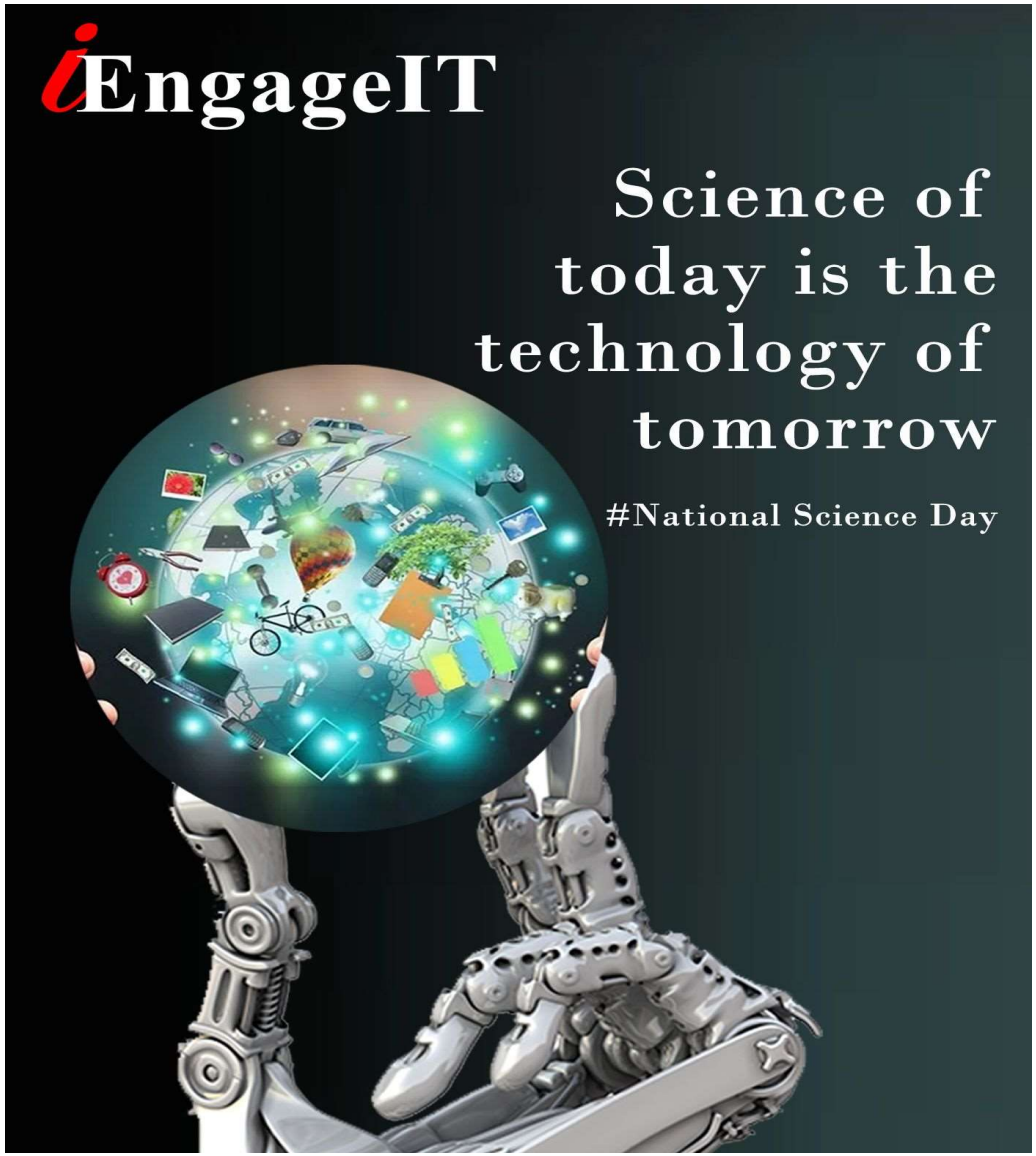
Read blueprints?
Interpret blueprints?
Read Contracts?
Write contracts?
Interpret contracts?
Operate pavers?
Perform compaction?
Operate asphalt plants?
Do traffic control?
Negotiate?

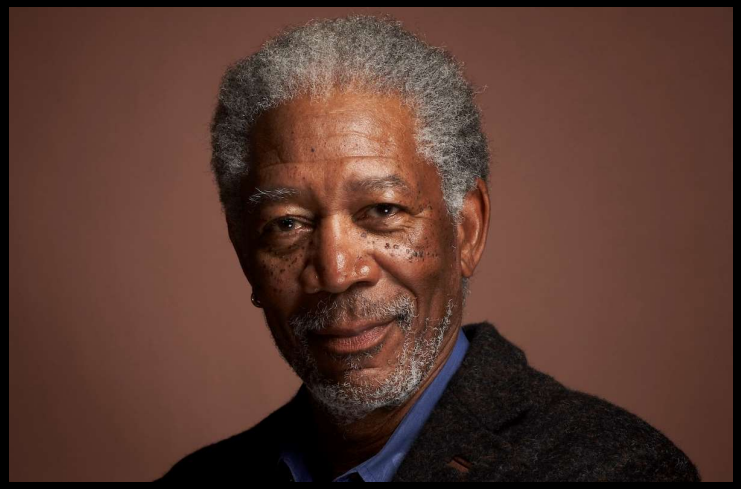


Contractor’s AI Opportunities

- Estimating
- Project Management
- Bid Evaluations
- Mix Designs
- Strategic Planning
- Develop Company’s QC Program
- Training of Technicians
- Predict Other’s Activities
- Open Source Opportunities




iEngageIT
Science of today is the technology of tomorrow
#National Science Day



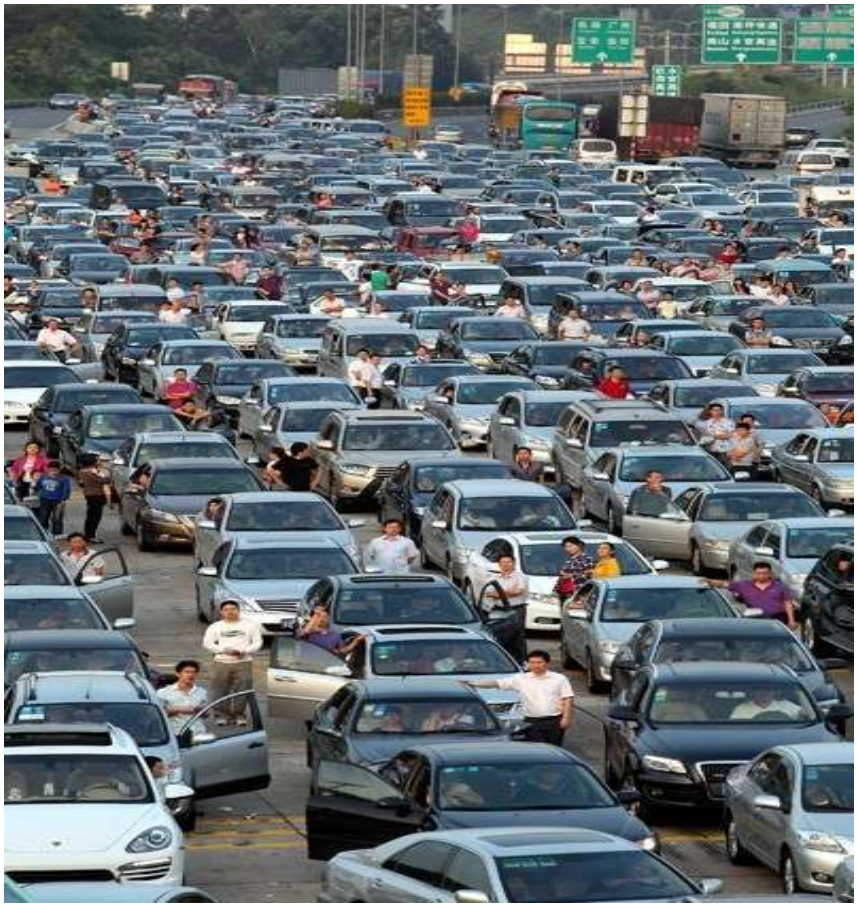
Morgan Freeman

https://youtu.be/oxXpB9pSETo

Where are you going sir??

70 what?

Toll Road: 7 a.m.!!



Asphalt smells, but ……

Speaking of stupid men!!
OSHA??

Will you do it??

Free mammograms at Chevron station

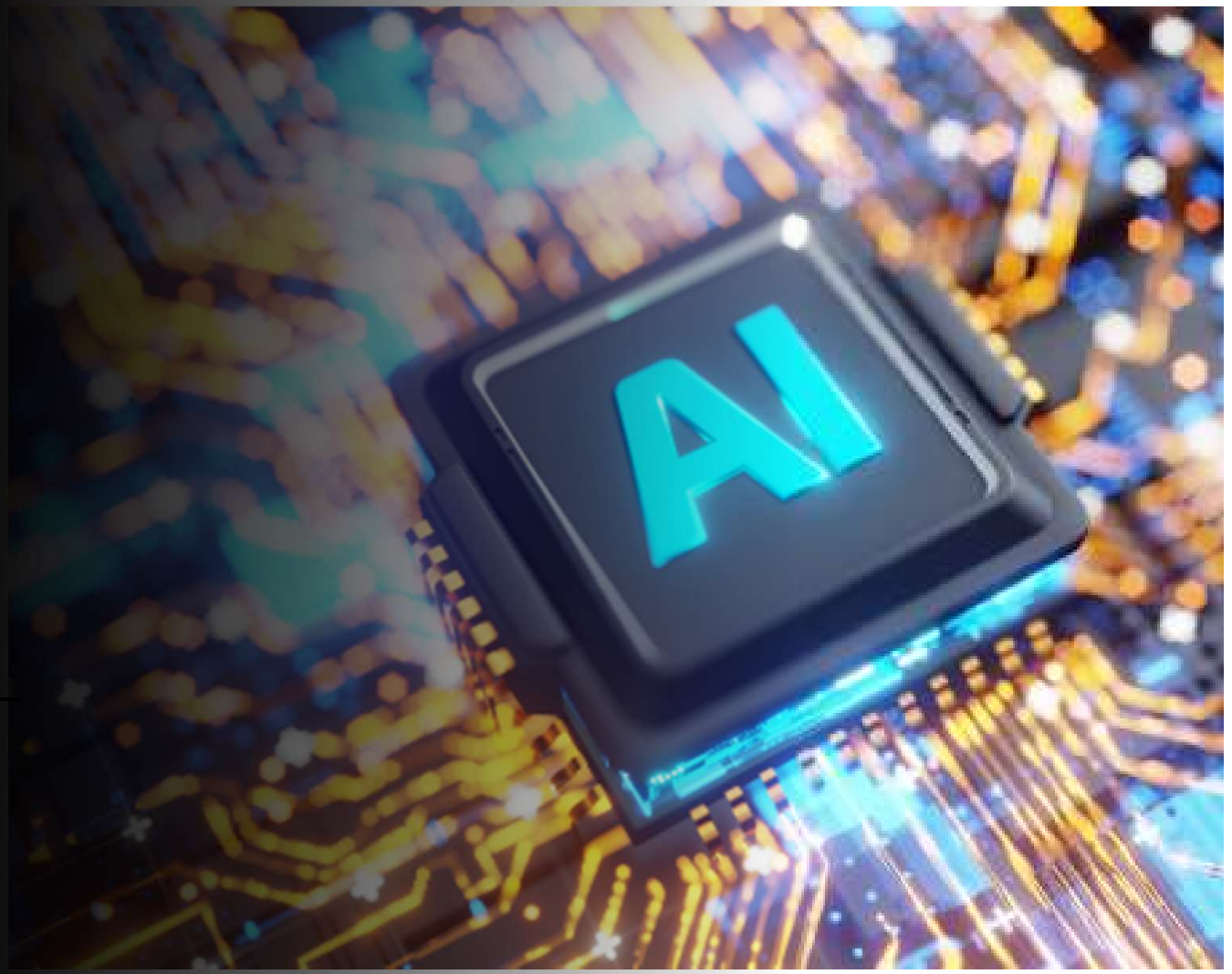
PHOENIX — Fifty free mammograms will be offered today to women 40 years and older at the Chevron station at Seventh Street and Camelback Road. The mammograms will be offered from

Do you have one with 50 stars?

Miscellaneous 201

AMERICAN FLAG
60 stars. Pole included.
$100. Call 815/929-[redacted]
any time.

Conclusions

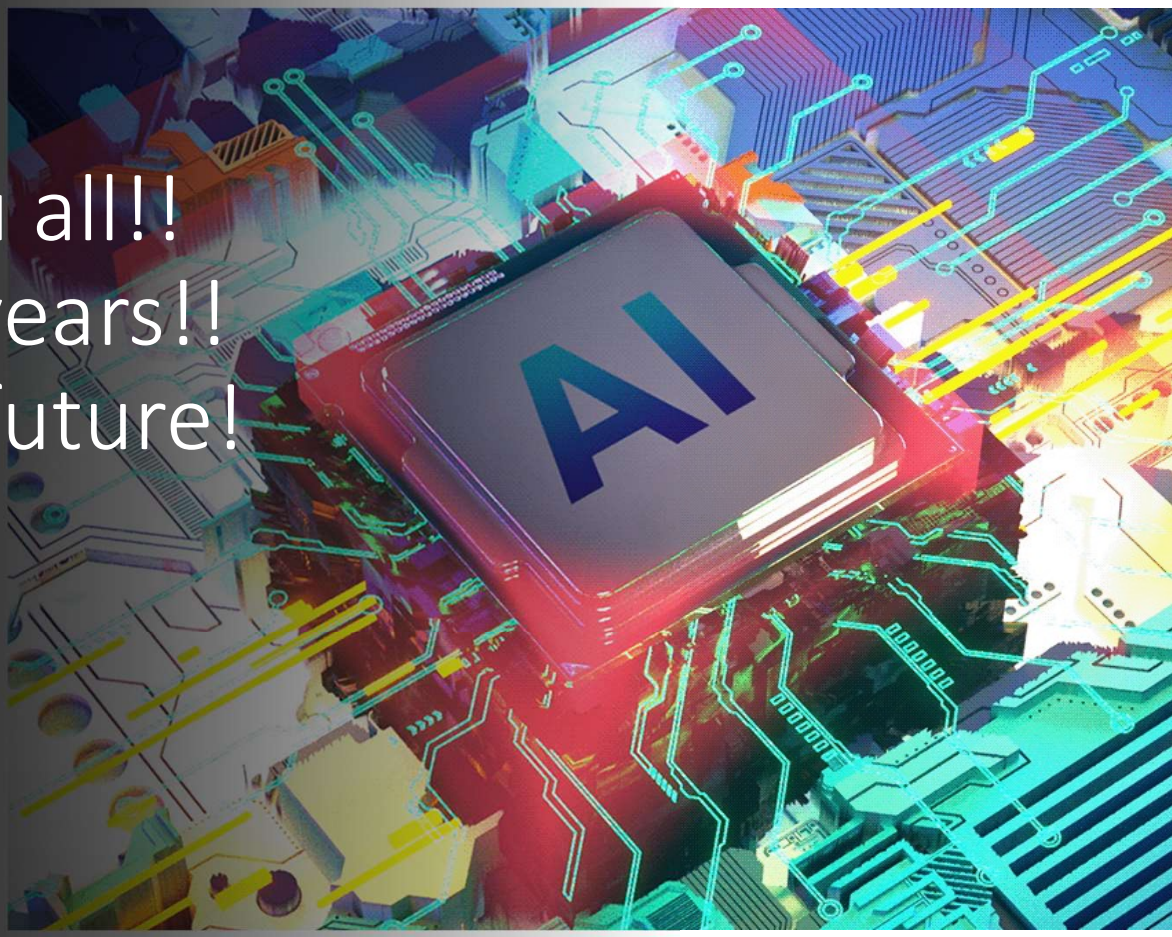


We are all screwed!!

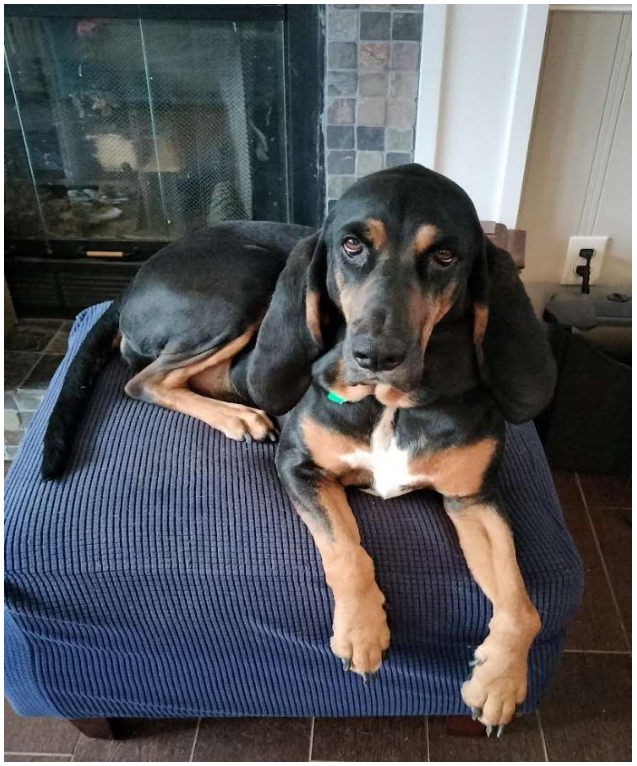
Final conclusion!!

It was nice knowing you all!!
Good luck the next 50 years!!
Have a good life in the future!

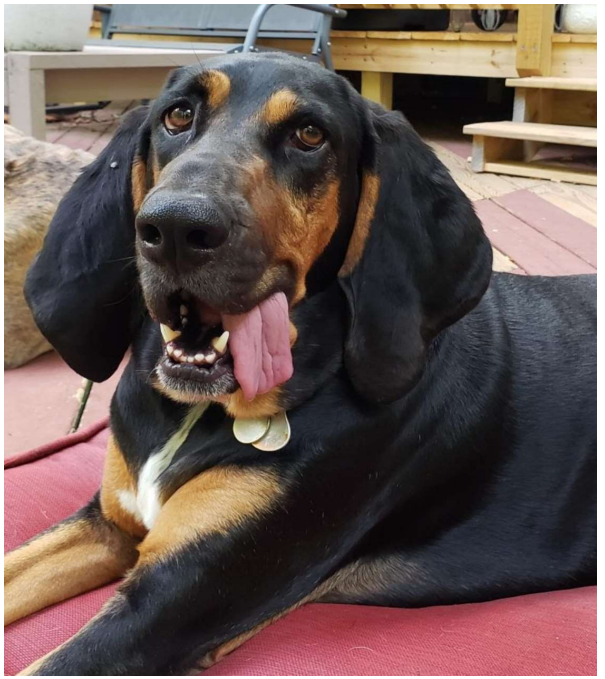
Final Conclusions



I'm still not going to listen
To him!!



Oh no, he's coming back!!




Thank You!!