Disruptions & Capital Markets – Manish Chokhani

Financial Literacy

March 2021

Material in this presentation is for internal educational purposes only. Sources have been stated wherever possible. Sources left out inadvertently, are purely unintentional. Views expressed herein are only that of the presenter.

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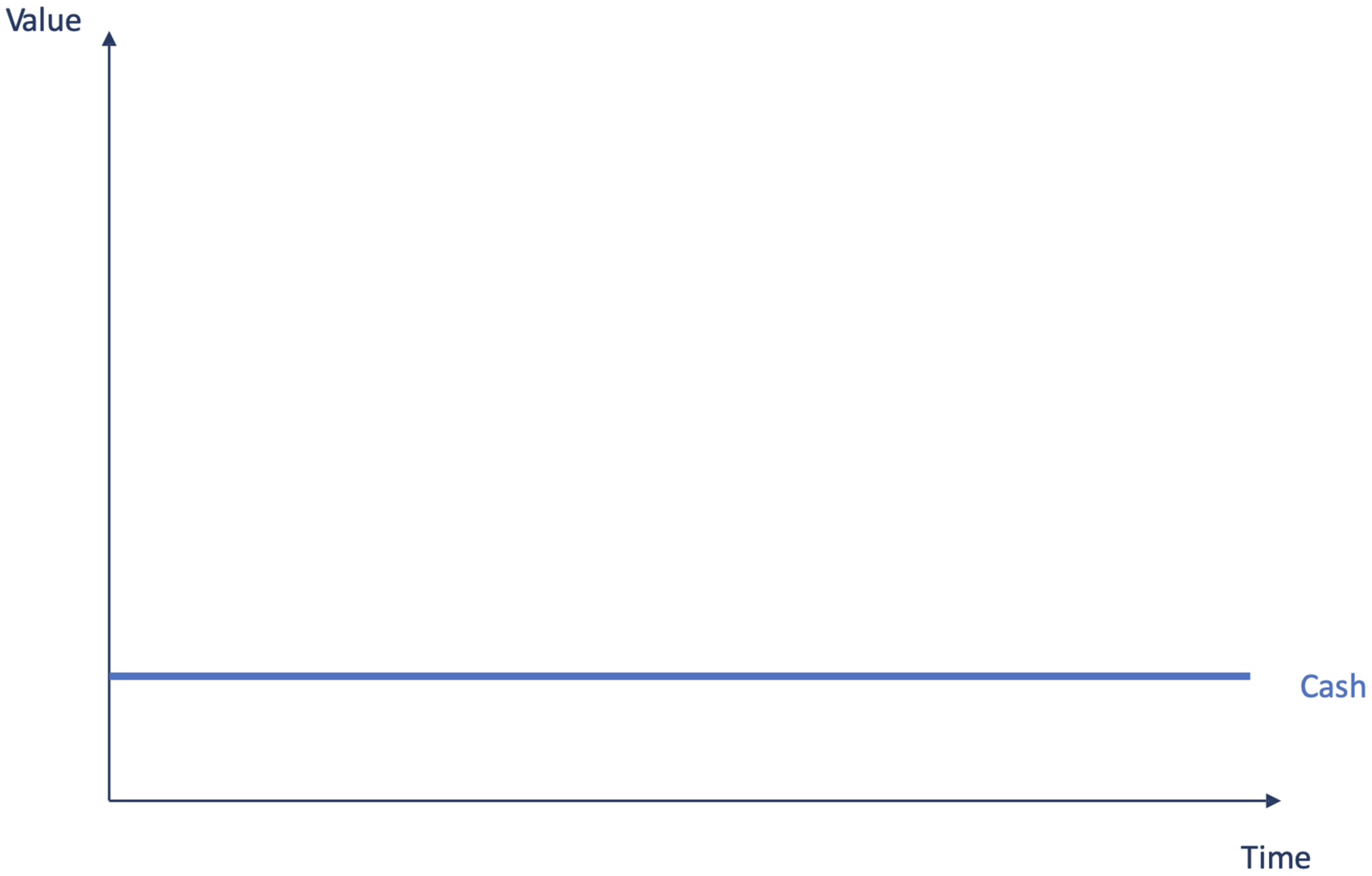
Agenda

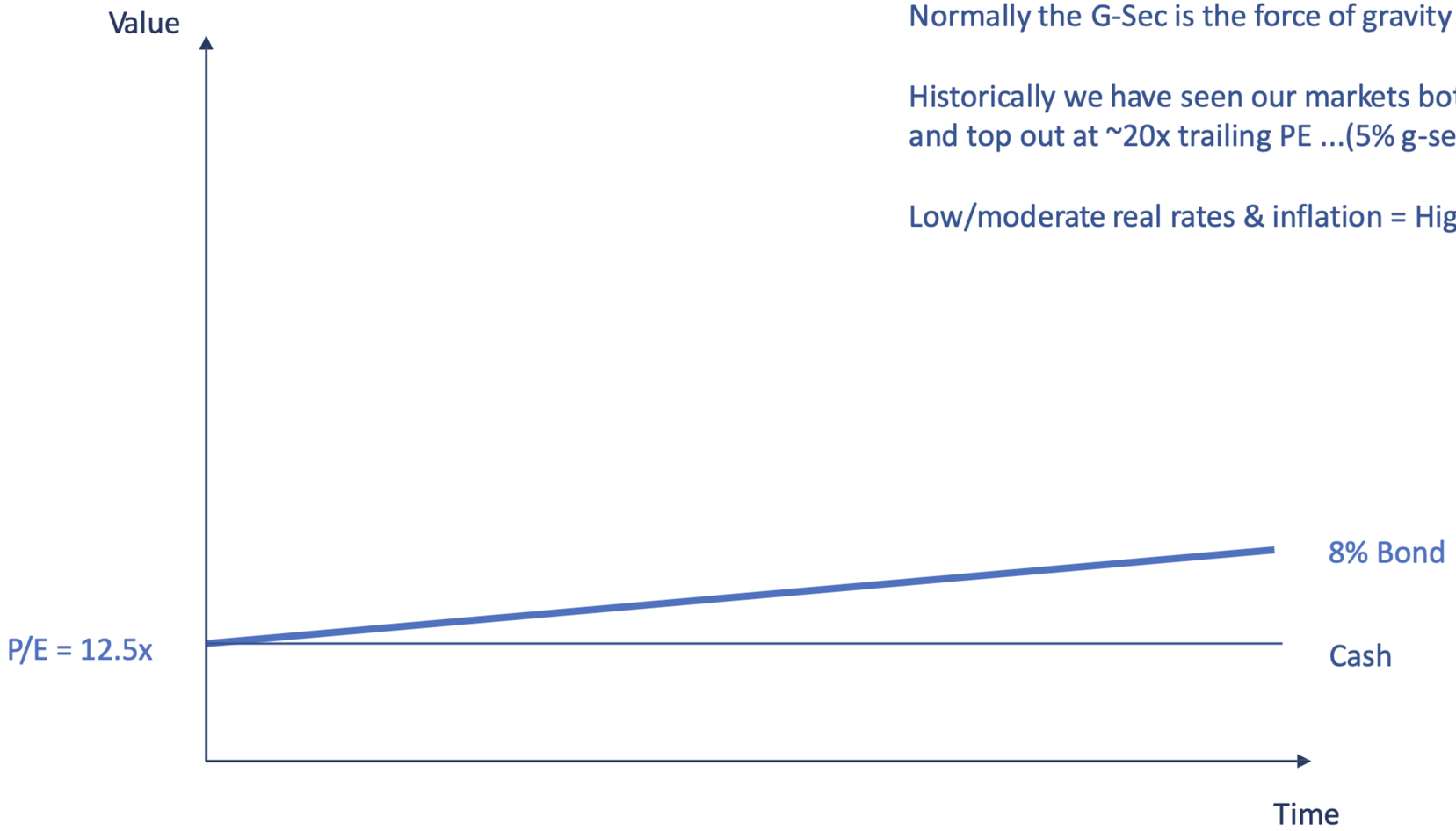
- Implications of disruption for you
- What is disruption?
- Disruption in energy
- Disruption in automobiles
- Internet of things & sensors
- Disruption in manufacturing
- Robotics (AI + Cameras + Sensors)
- Augmented and virtual reality
- Disruption in life sciences
- Disruption in financial services
- Disruption in education

Implications of disruption for you

Confusion in valuation: Lesson 1.01



How do we value? 1.02

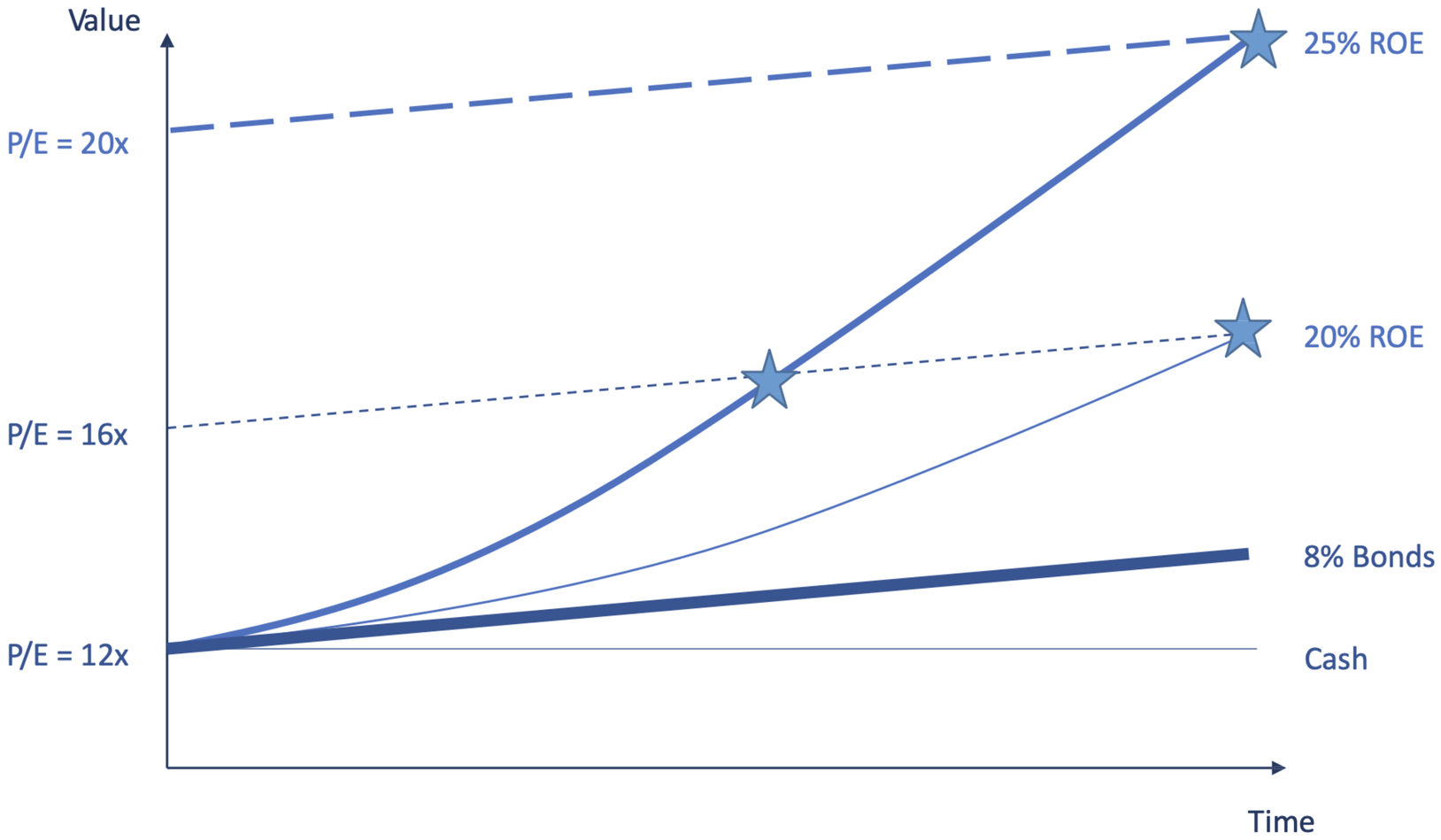


Normally the G-Sec is the force of gravity for valuation…

Historically we have seen our markets bottoming out at 11-12x PE (8-9% g-sec) and top out at ~20x trailing PE …(5% g-sec)

Low/moderate real rates & inflation = Higher P/E

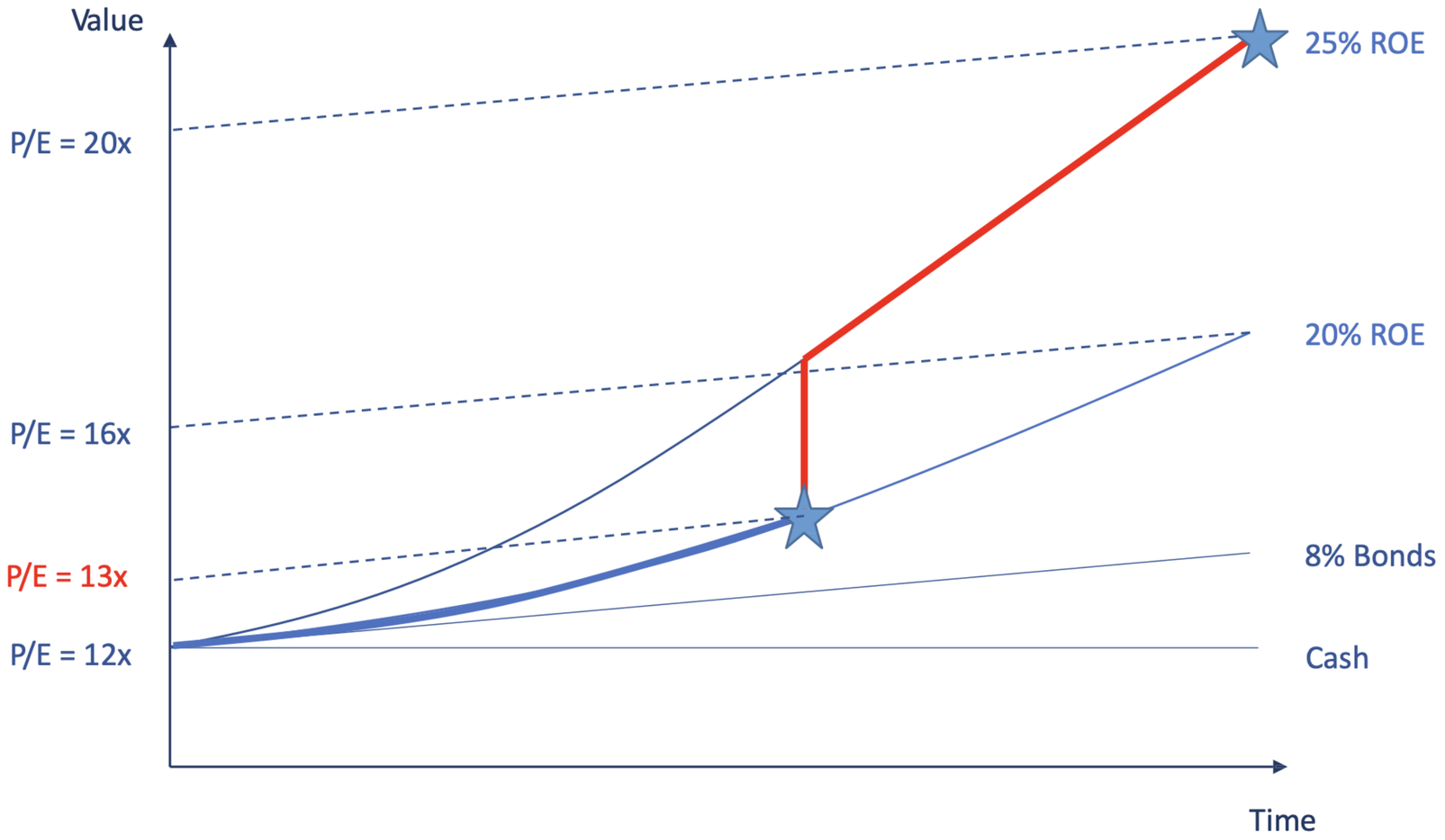
How is value built or lost? 1.03



Higher the ROE and "PSS", the greater the "terminal value" we are willing to pay…

Volatility/ Cyclicality shortens our "discounting horizon period"…

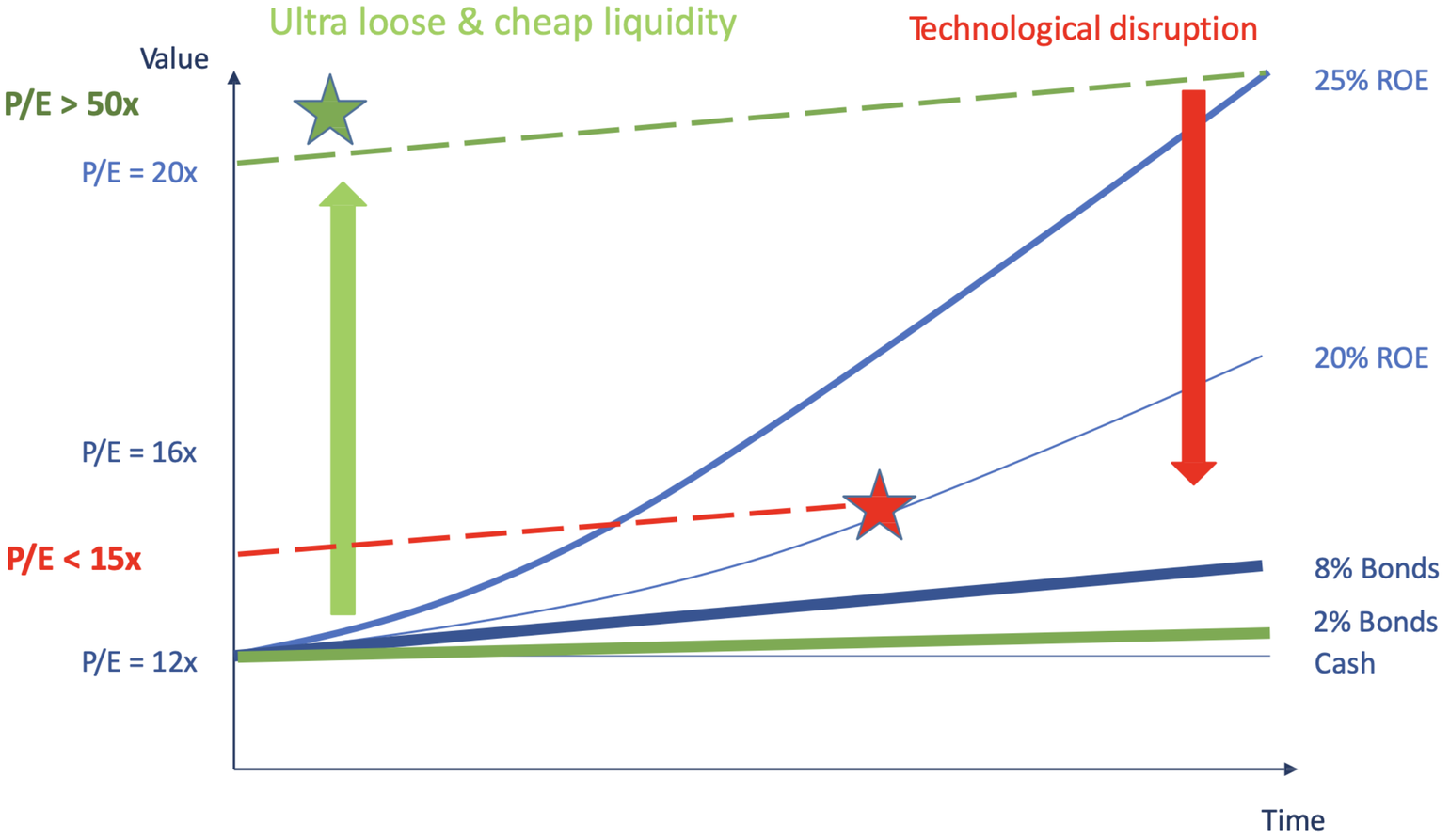
How is value built or lost? 1.04



Small earning surprises can cause massive valuation shifts since our assumptions on duration and gradient change…

A number of things can affect our assumptions: macro, micro, psychology, technology, geopolitics, etc

How do you value this?



Cheap money pushing up valuations currently to historic highs

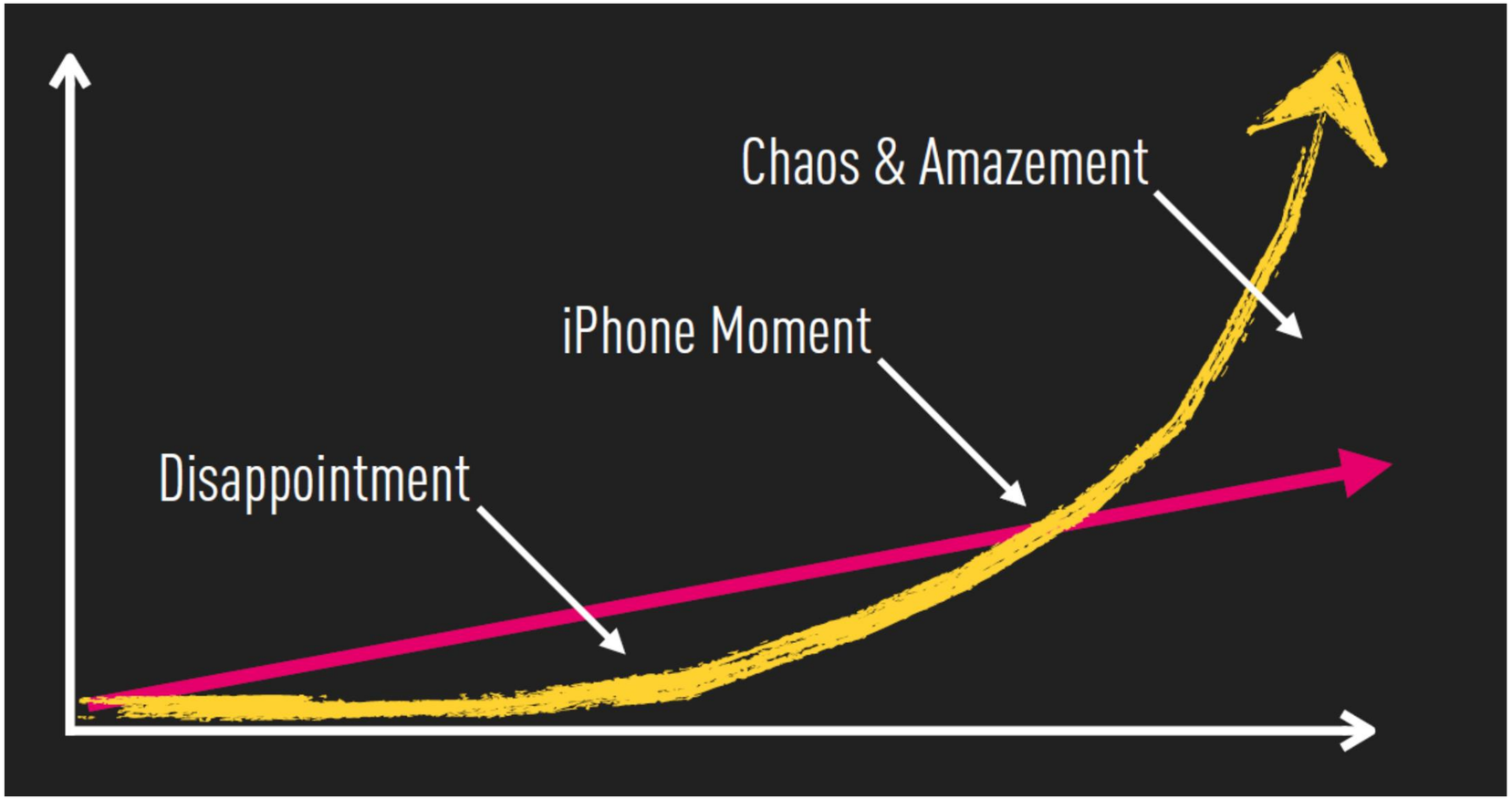
Technological disruptions threaten to erode terminal values and thereby depress valuations

Markets behaving like schizophrenics... Greed & fear alternate every 6 months!

Q: How do you value a world awash with bonds worth $ 13 trillion (temporarily?) at negative rates? Deflation?

What is disruption?

What is disruption?



Source: @lucienengelen 2016

iPhone moment

- **January 7, 2007 : iPhone launched the touchscreen smartphone**
- **August 2007 : <7 months later; Nokia the world leader launched**
  - **“We didn’t do anything wrong, but somehow we lost…..”**
    - **Stephen Elop - CEO**

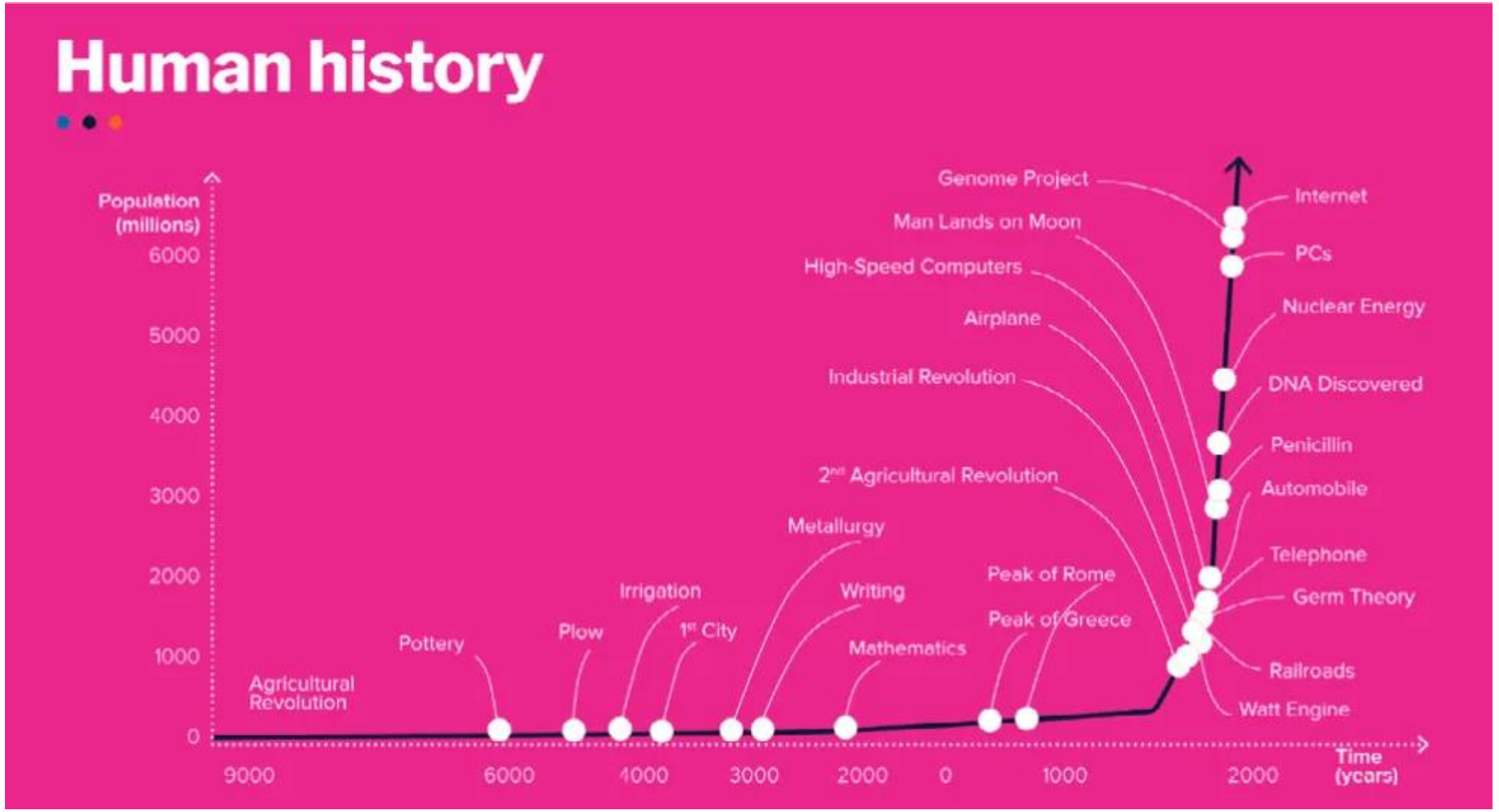
Source: Fortune

Technological change is exponential

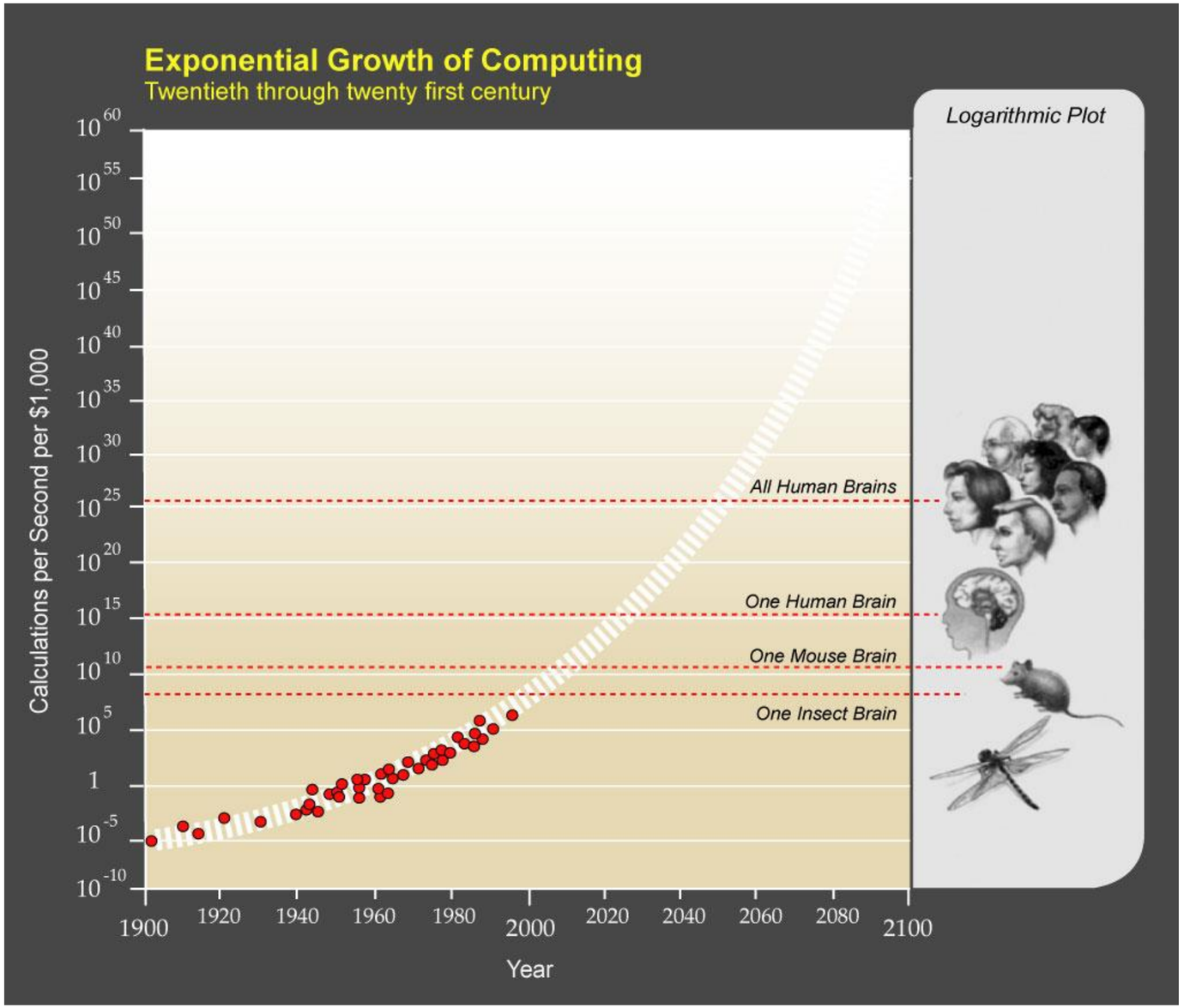
We all know about the magic of compounding – apply this on a LOG SCALE

Source: Medium.com

Disruption has gone exponential



Computing power has gone exponential

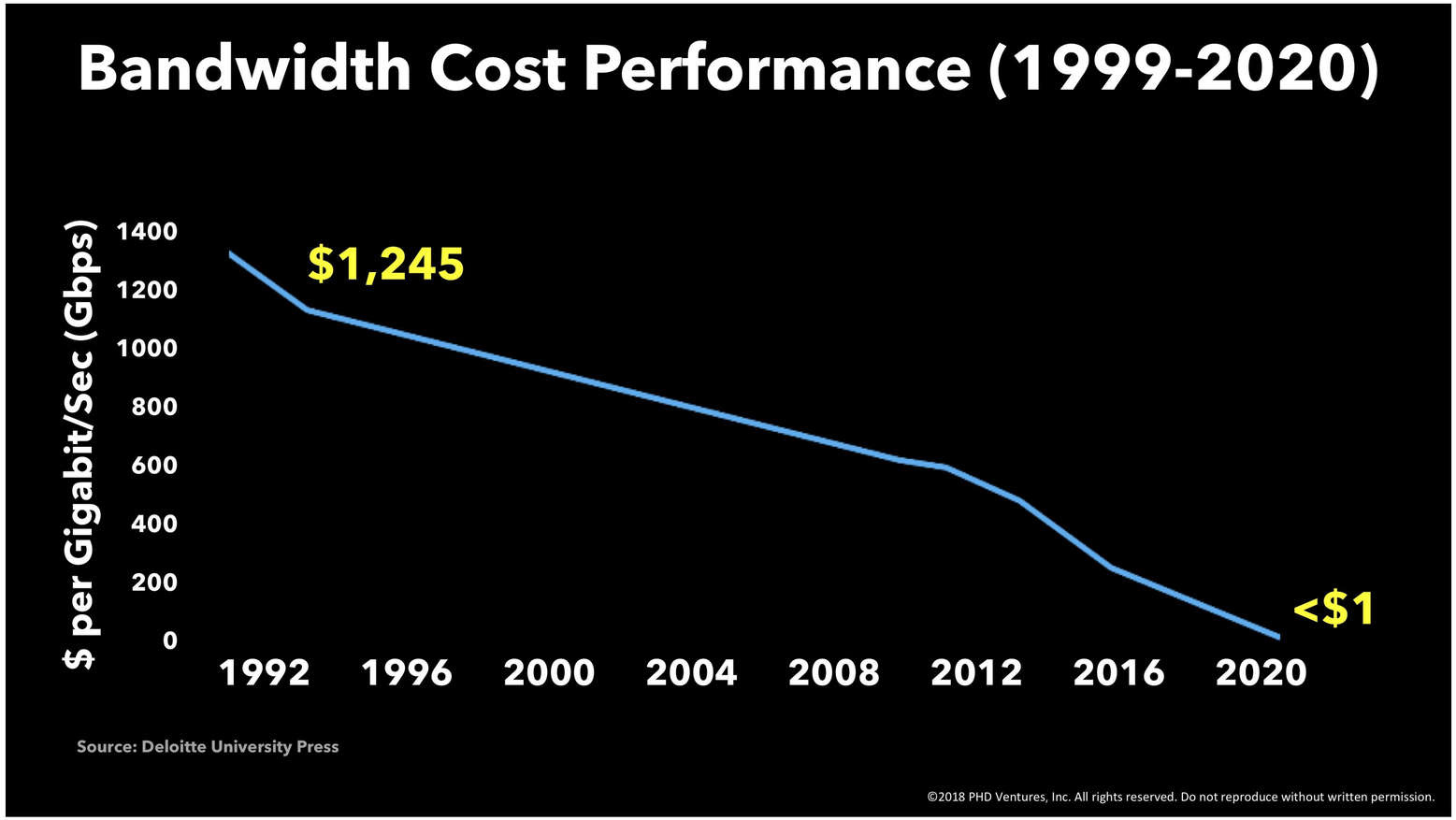


Computers already beating humans at chess, AlphaGo.

AI and Machine Learning already allowing algorithms, digital assistants to make human intervention redundant.

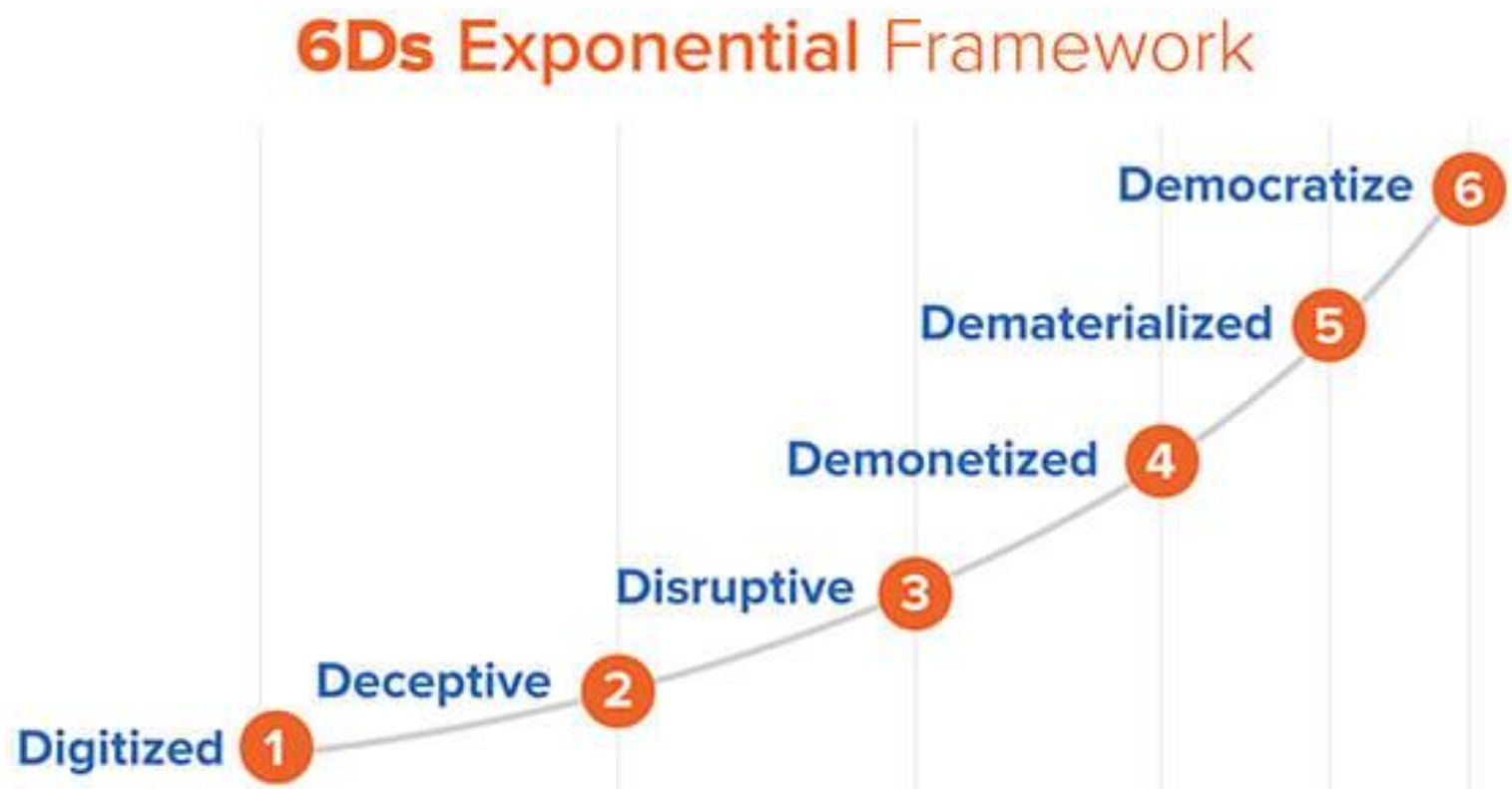
Source: Wikimedia Commons

Bandwidth costs have collapsed



A child in Africa with a smart phone has access to as much information as the President of USA had in 1998!

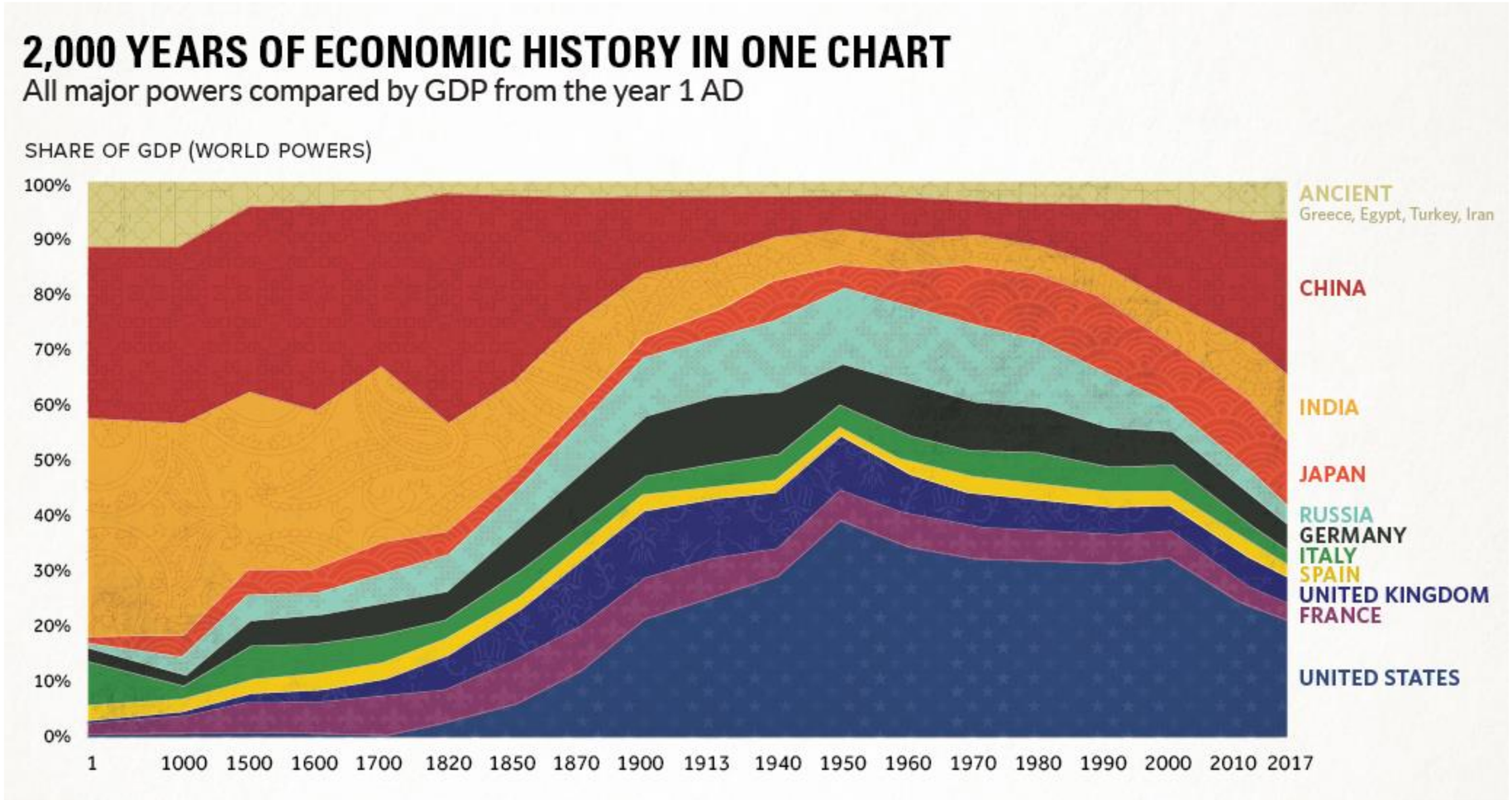
The 6 D's of disruption



Source: Singularity University

In 10 years, it’s predicted that 40% of the Fortune 500 companies will no longer exist as things that were once scarce become abundant.

What missing a big trend can do – A reminder



19th century industrial revolution – India goes from ~25% to <2%

Source: visualcapitalist.com

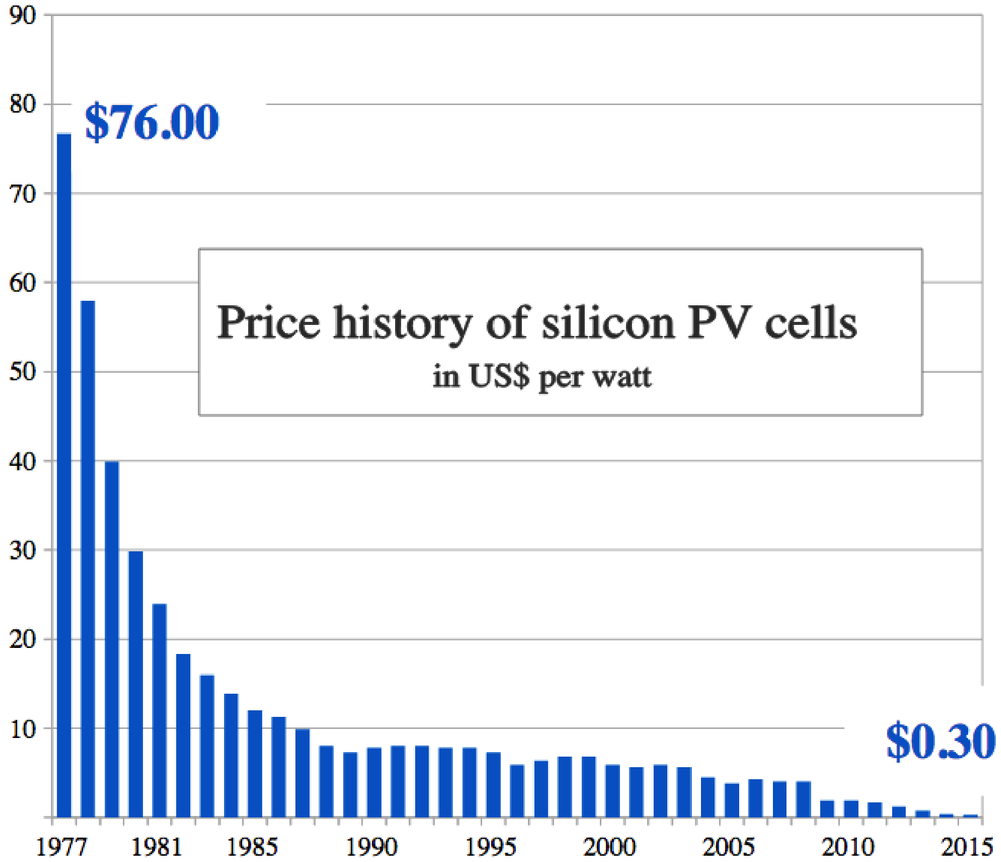
Disruption in energy

Energy

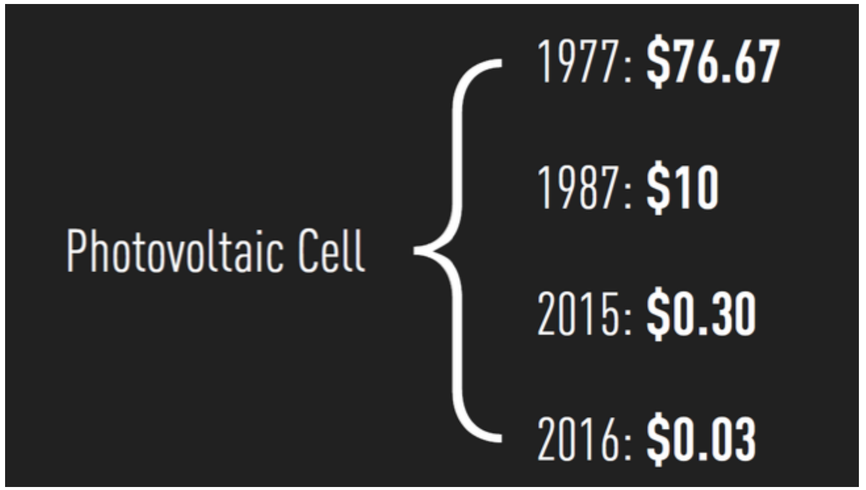
1 Day of Humanity's Energy Use = 10 Seconds of Sunlight

1 Year of Humanity's Energy Use = 1 Hour of Sunlight

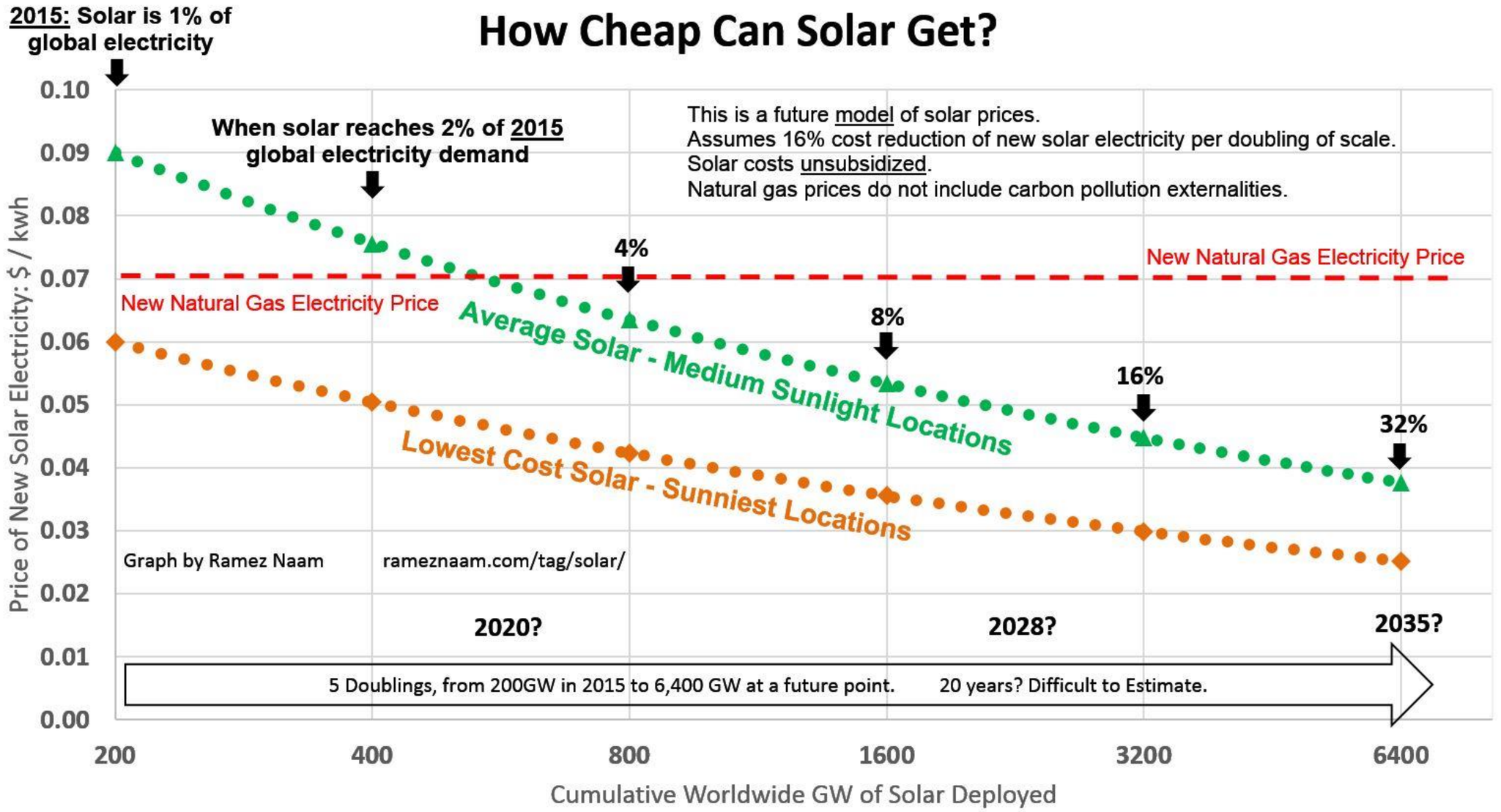
Solar energy



Source: Bloomberg New Energy Finance & pv.energytrend.com

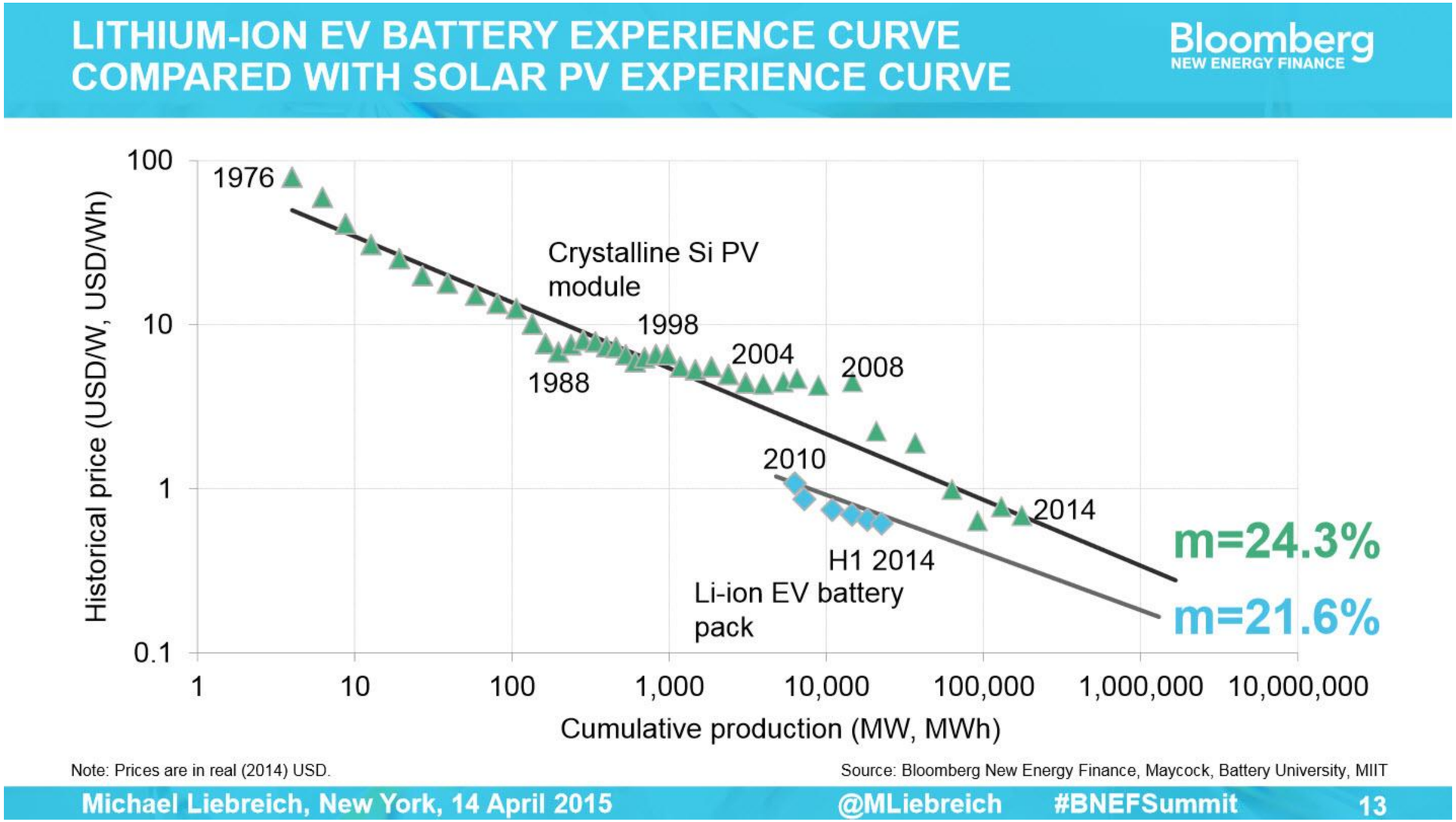


Solar energy

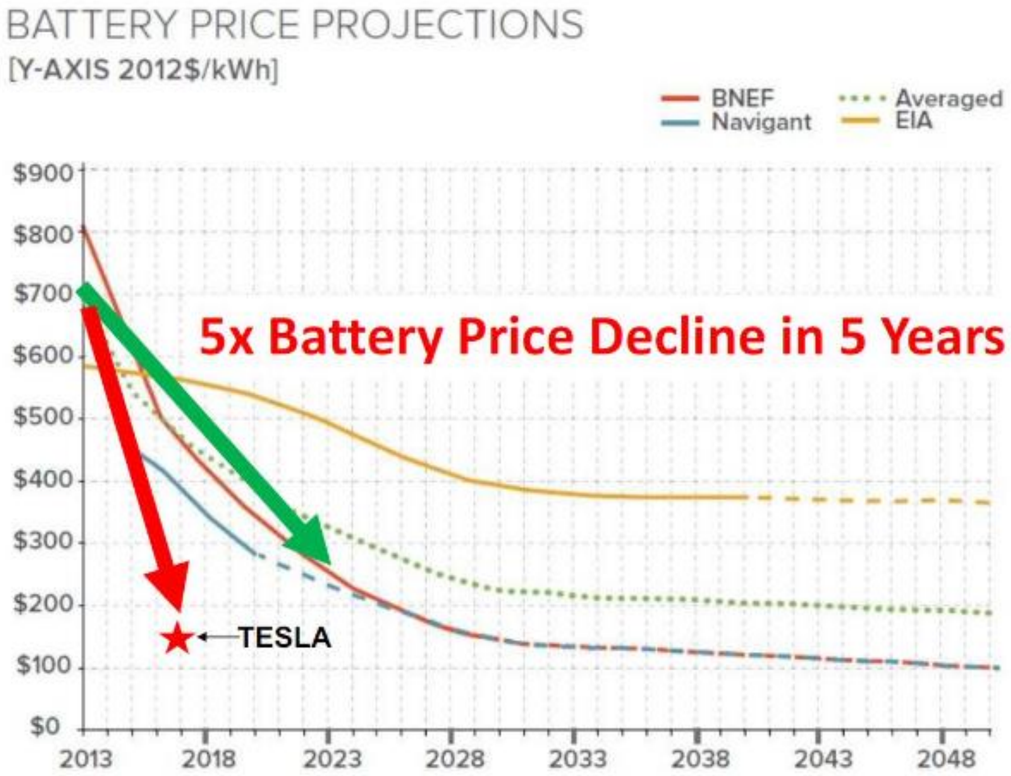


Source: Rameznaam.com

Batteries to follow solar's cost curve

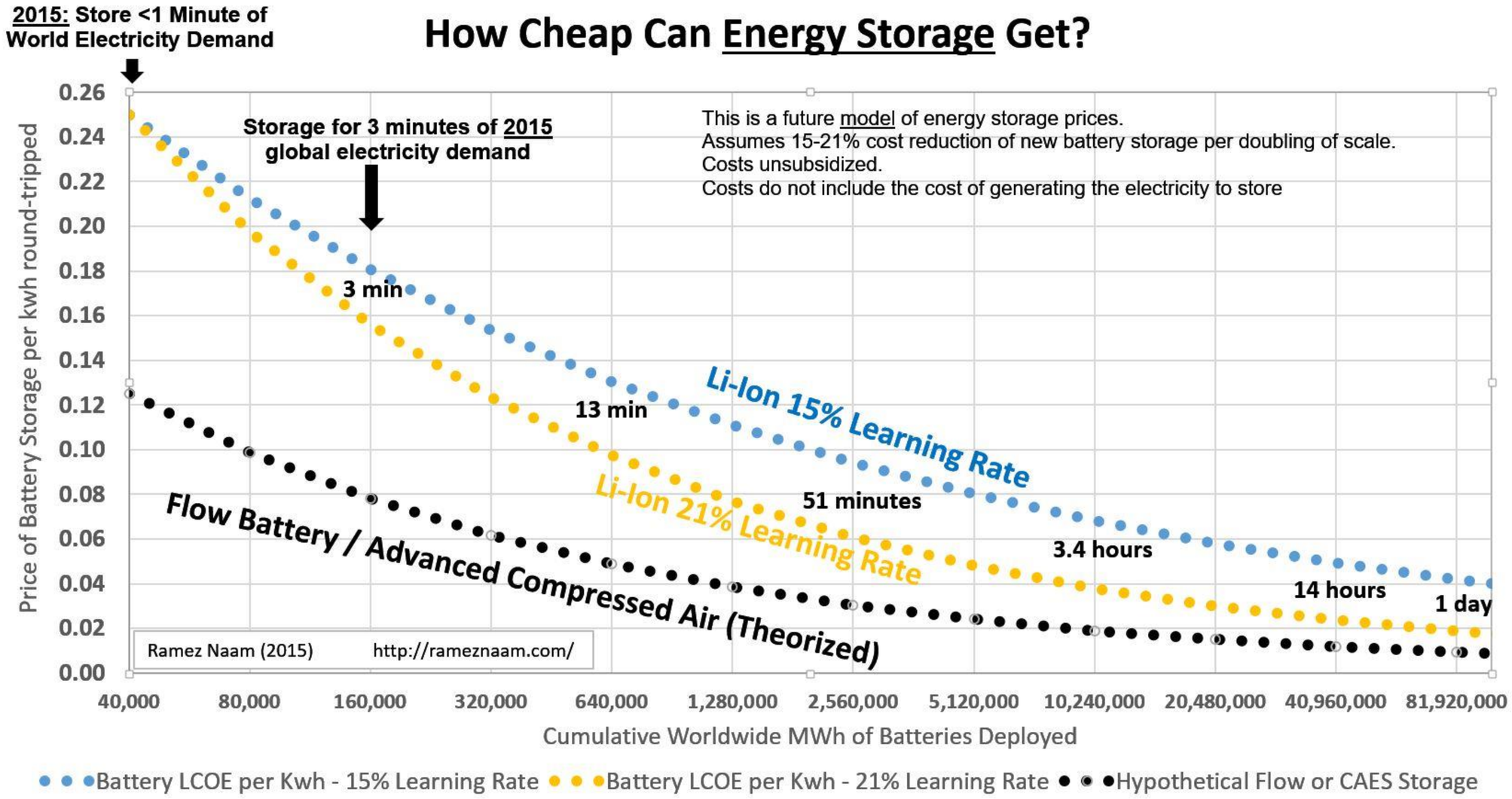


Energy



Source: emc-hp.com/tag/battery-price/

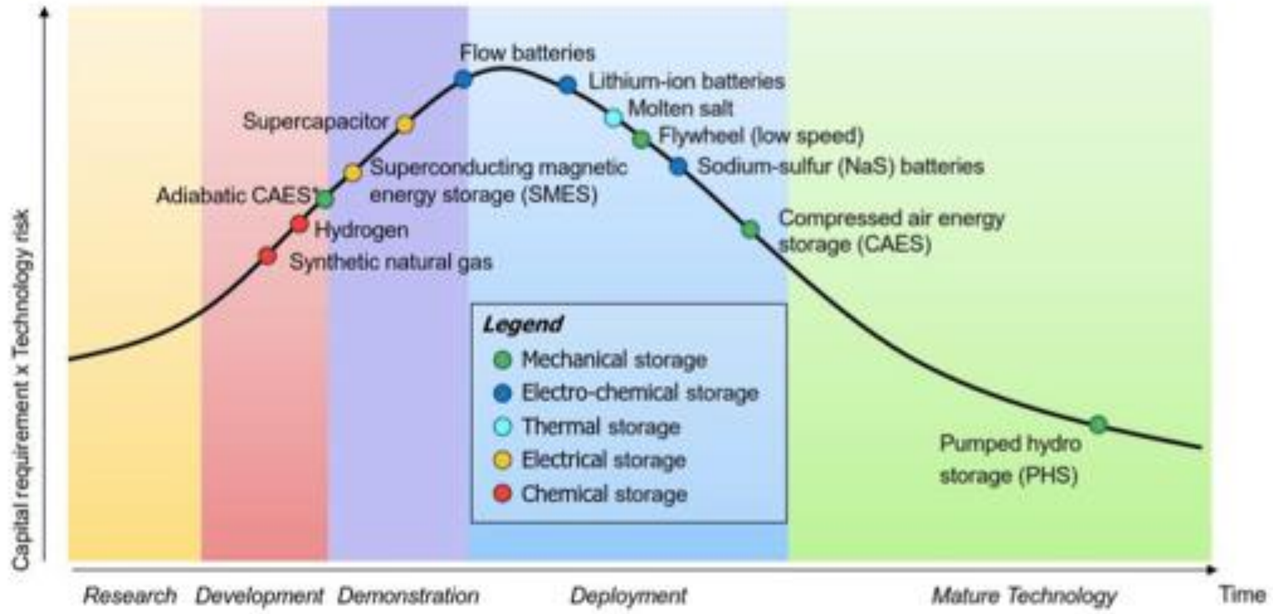
Energy



Source: Rameznaam.com

Many other storage technologies are coming

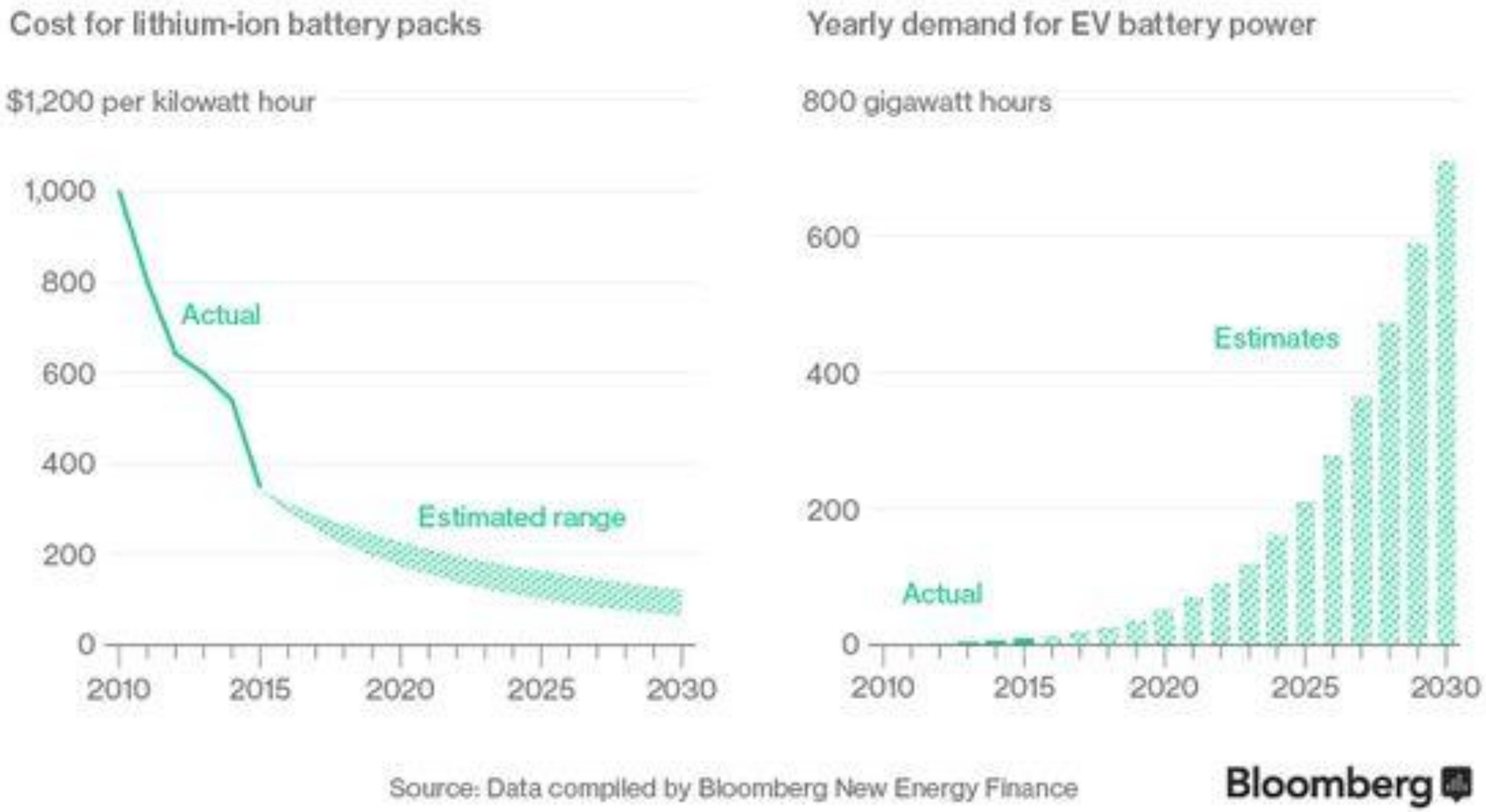
Figure 12 Technology maturity curve, [5]



Source: ResearchGate.net

Disruption in automobiles

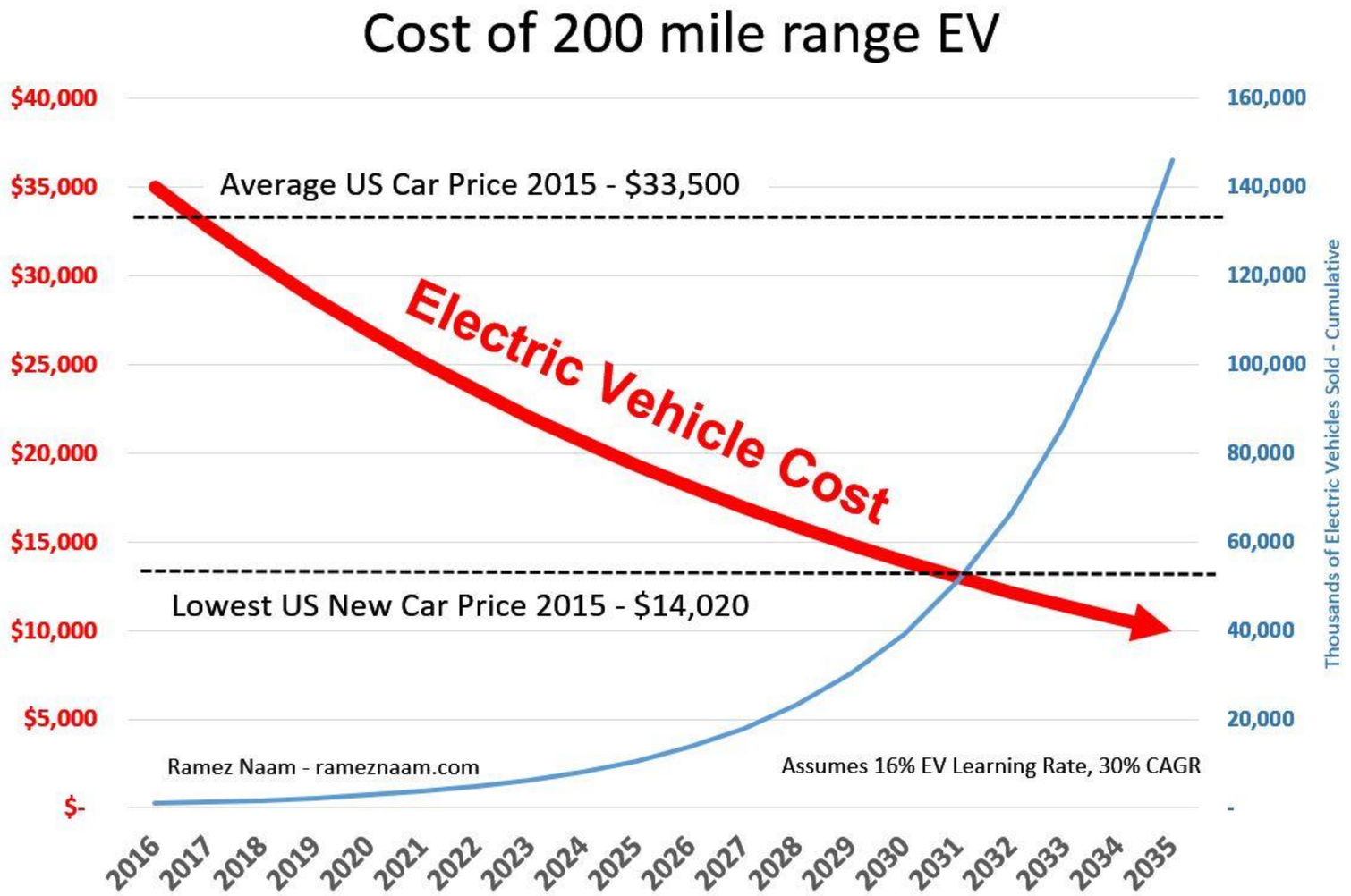
Energy disruption = Electric Vehicles (EV's)



Source: Data compiled by Bloomberg New Energy Finance

Bloomberg

EV's disruption: faster than you think



Source: Rameznaam.com

EV’s disruption: faster than you think

Electrified car sales overtake diesels in Europe for first time

Last month was the first time in history that registrations of electric, plug-in and hybrid cars overtook diesel cars across Europe, new figures reveal.

Ford to sell only electric cars in Europe and UK by 2030

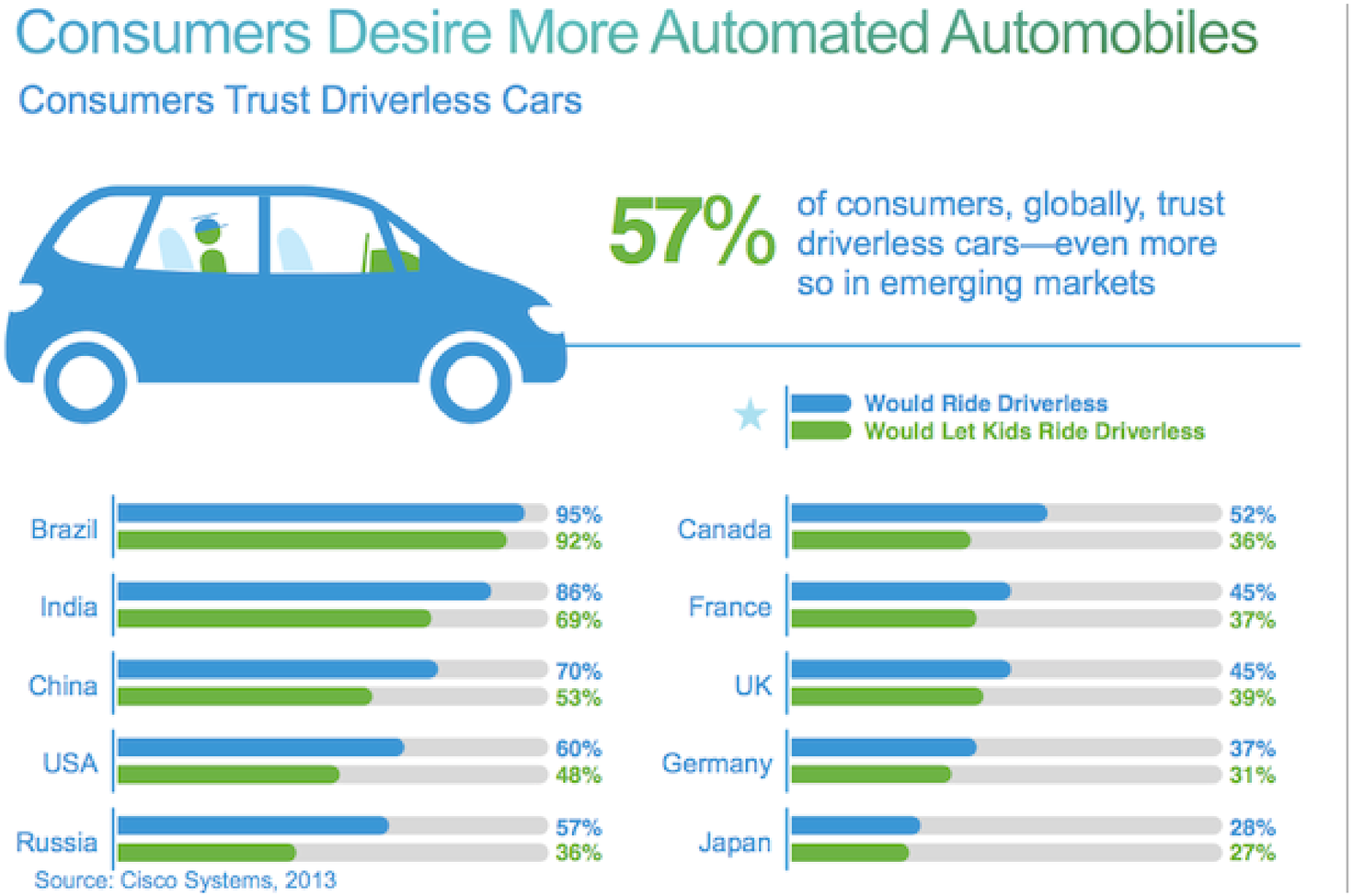
Group is largest carmaker to pledge all-electric sales on continent by end of decade

Wed, Feb 17, 2021, 12:50

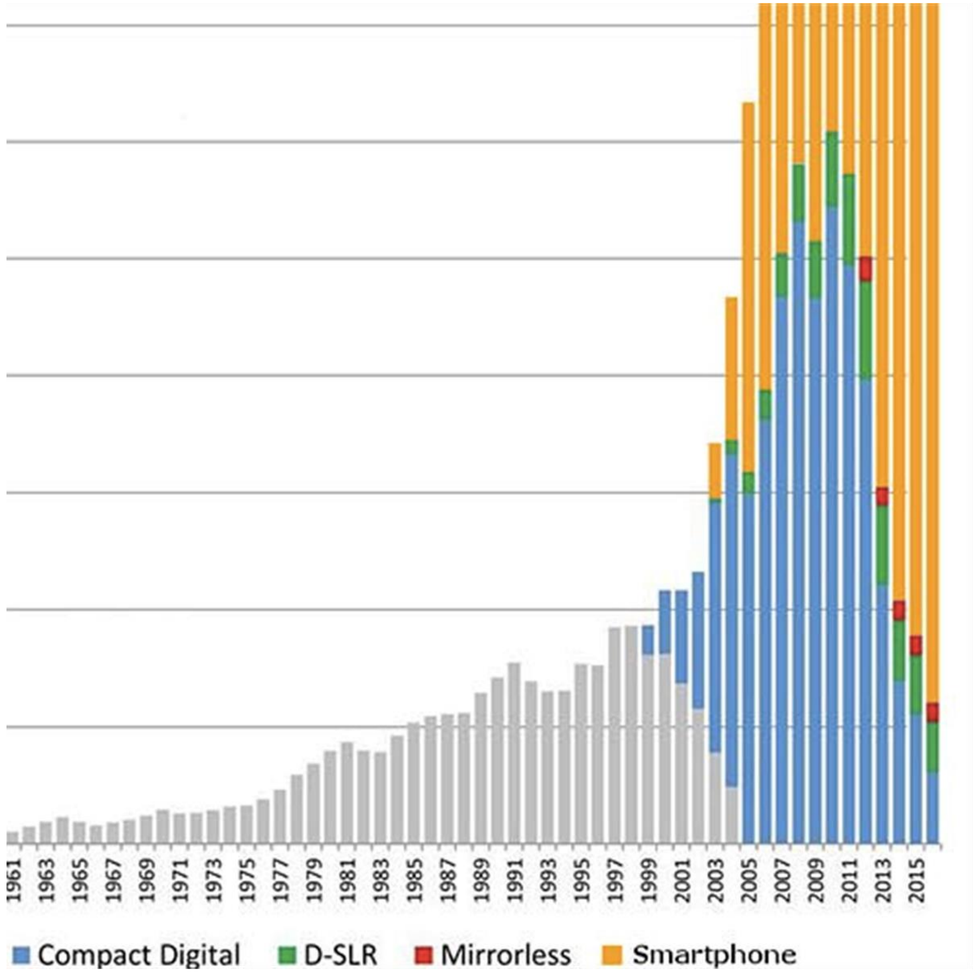
Ford will stop selling cars in Europe and the UK with any form of internal combustion engine by 2030, in the most ambitious regional electrification target of any big manufacturer.

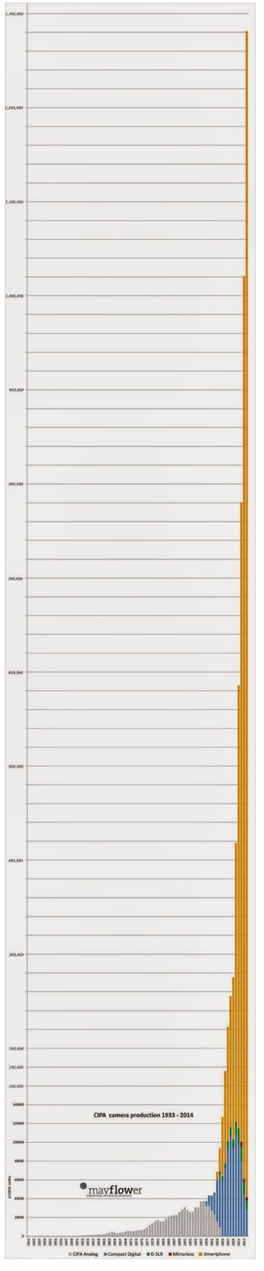
Source: Autocarpro.in and Forbes

Autonomous driving



Digital cameras = Smart phones = Mobility





Source: DPReview

AI image recognition

AI image recognition is now mainstream

Autonomous driving: Cameras + AI + Sensors

Source: Forbes

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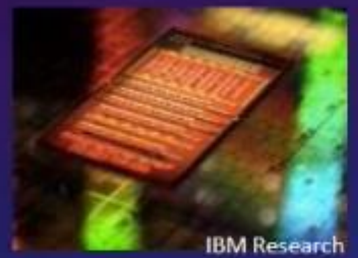
Internet of things (IOT) & sensors

IOT – What is it?

- Relatively small
- Battery/Solar powered
- Sensor-based
- Remotely administered
- No User interface
- Limited network comms

IOT – Why now?

- The Perfect Storm of factors:
  - Dense chips + cloud compute + ML algo + New Devices



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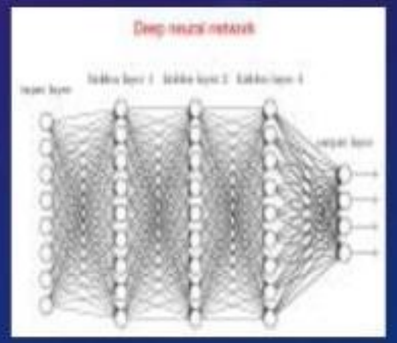

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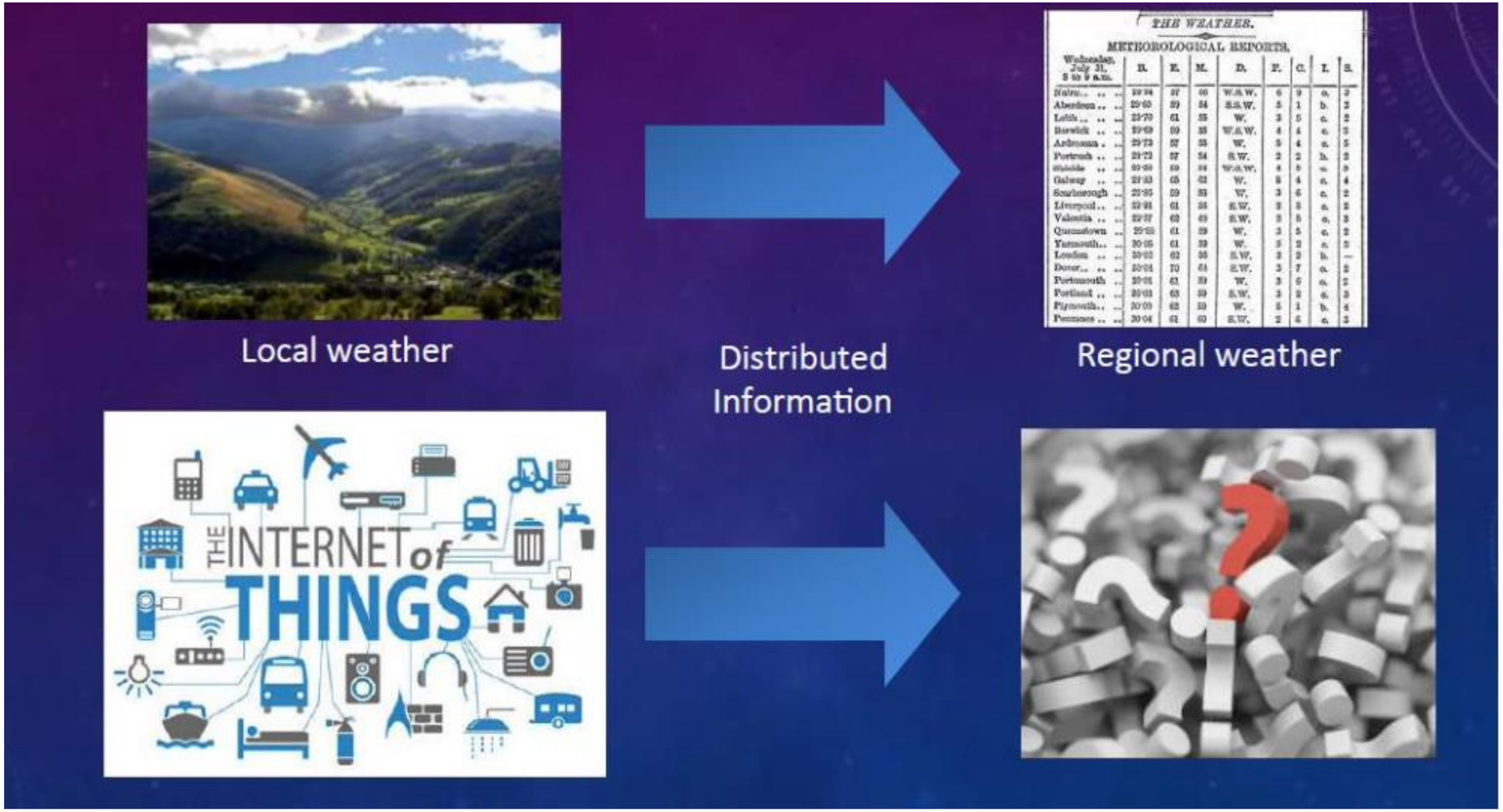
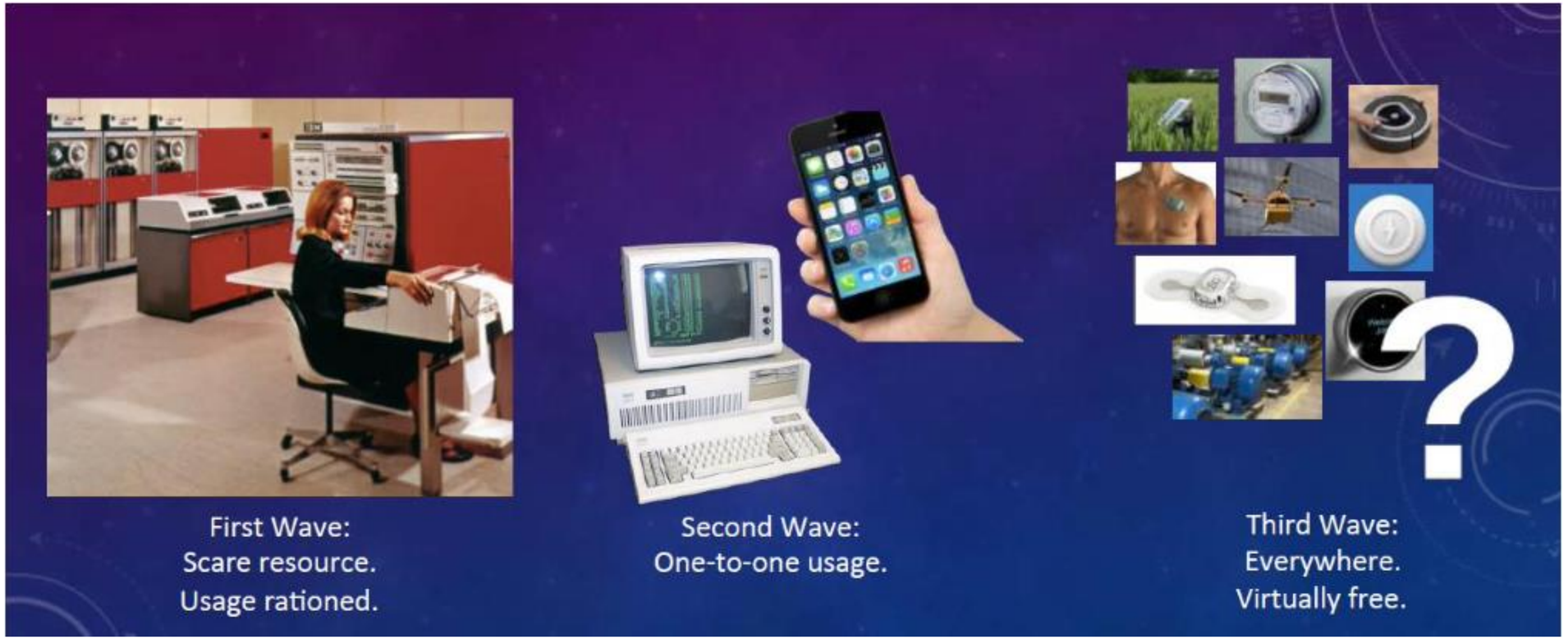
IOT – Weather reports were remote sensing



IOT – Third wave effects



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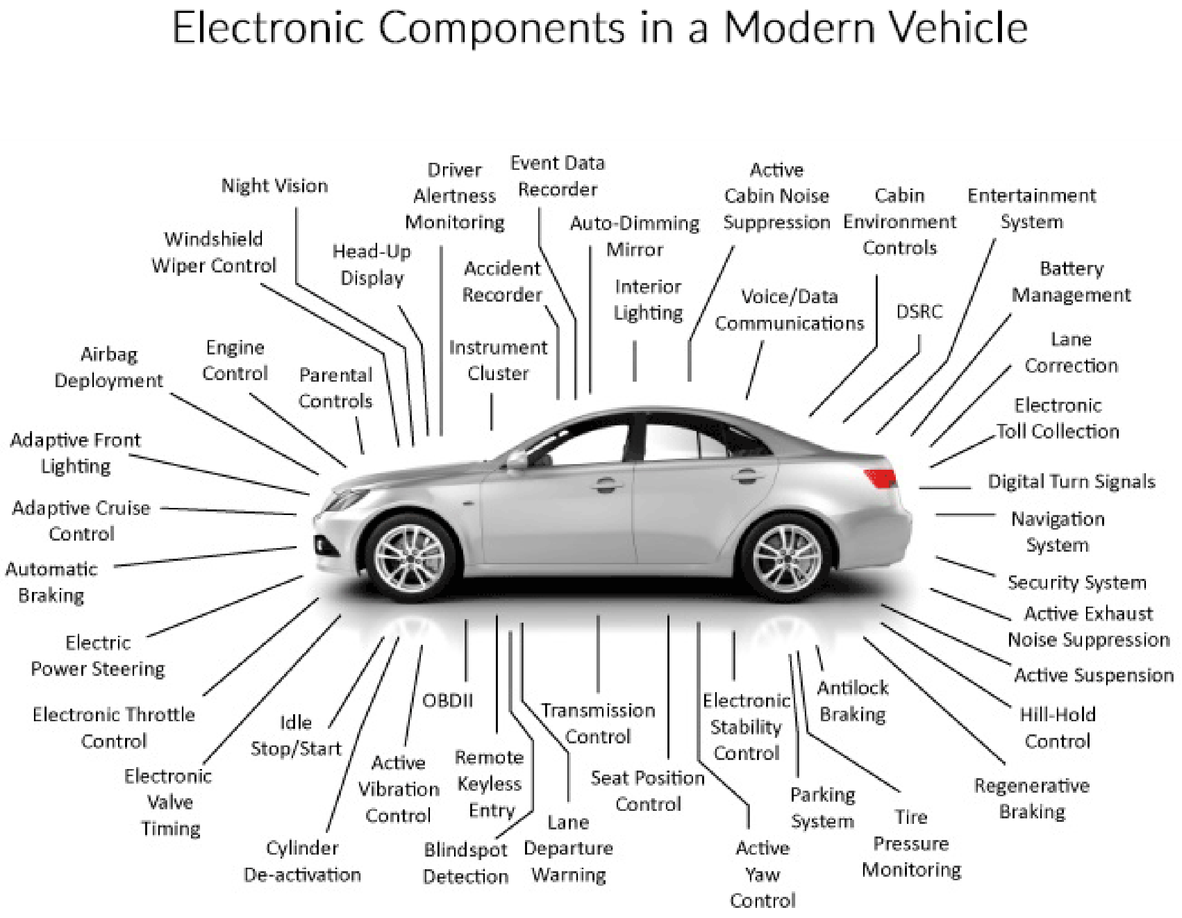
… are those that disappear!

Sensor explosion

- The list of available sensors is enormous…and growing
  - Acceleration / Motion
  - Gasses / VOCs
  - Cameras / Traffic / Road speed
  - Particulates / Smog
  - Humidity / Temperature / pH
  - Tilt / Rotation
  - Touch / Voice / Presence
  - Arrival / departure
  - Location / Proximity
  - Seating / Engine coolant / TPMS
  - Torque / Wheel speed / Hall effect

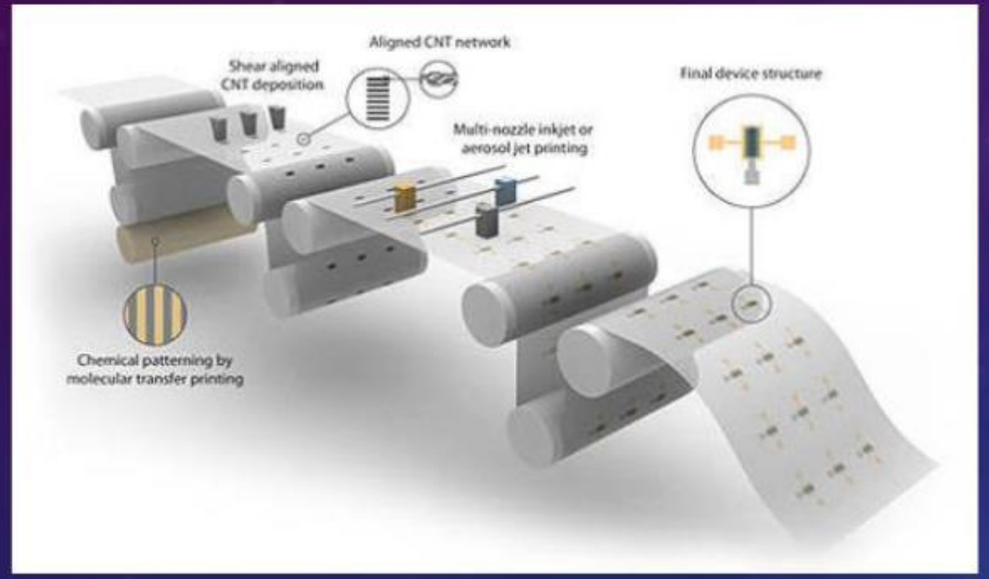
Your phones are already sensing more than you!

Sensing a revolution: Cars

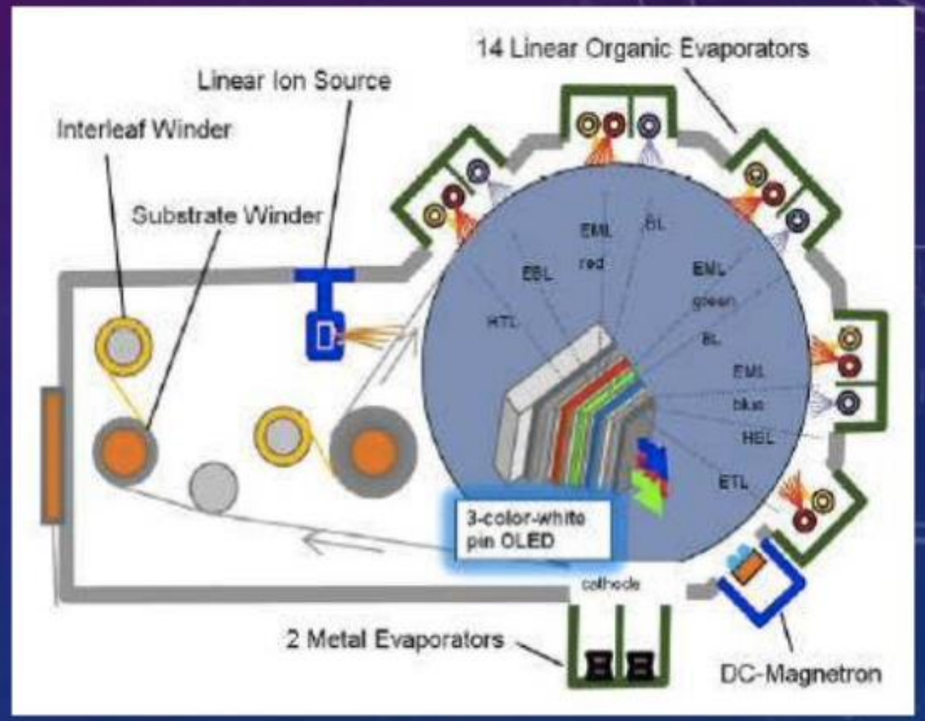


Courtesy: Vehicular Electronics Laboratory, Clemson

Sensing a revolution: Manufacturing



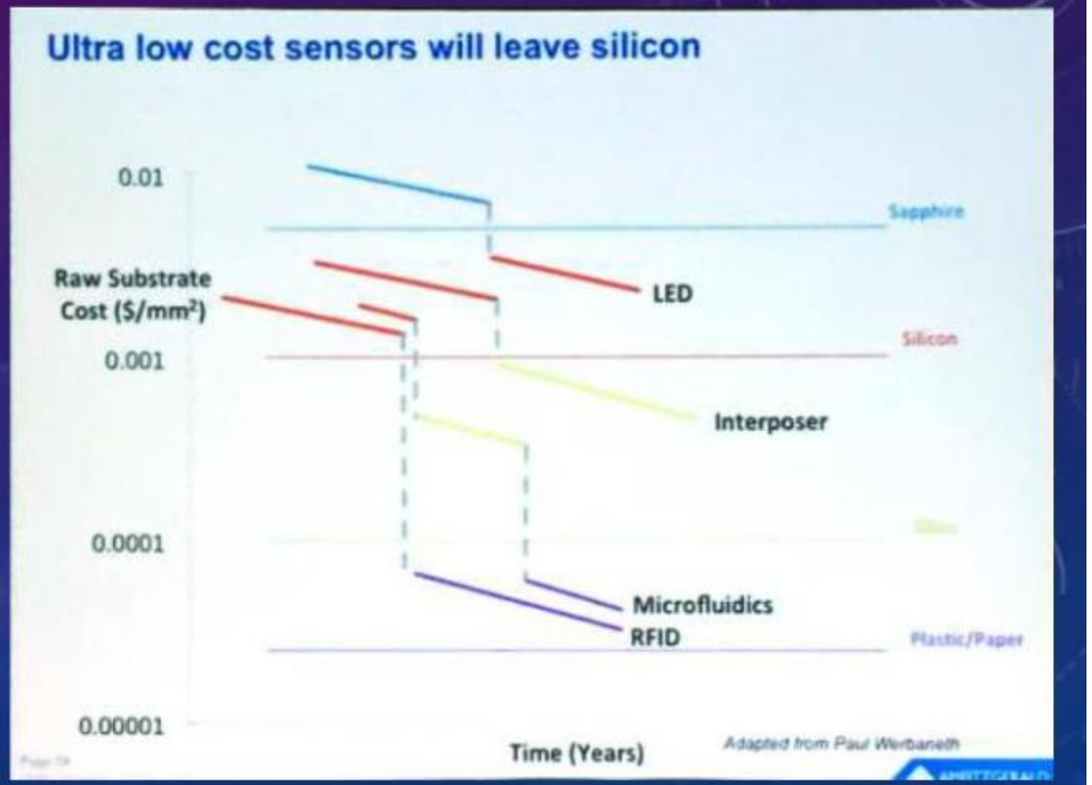
Ink Jet printed electronics



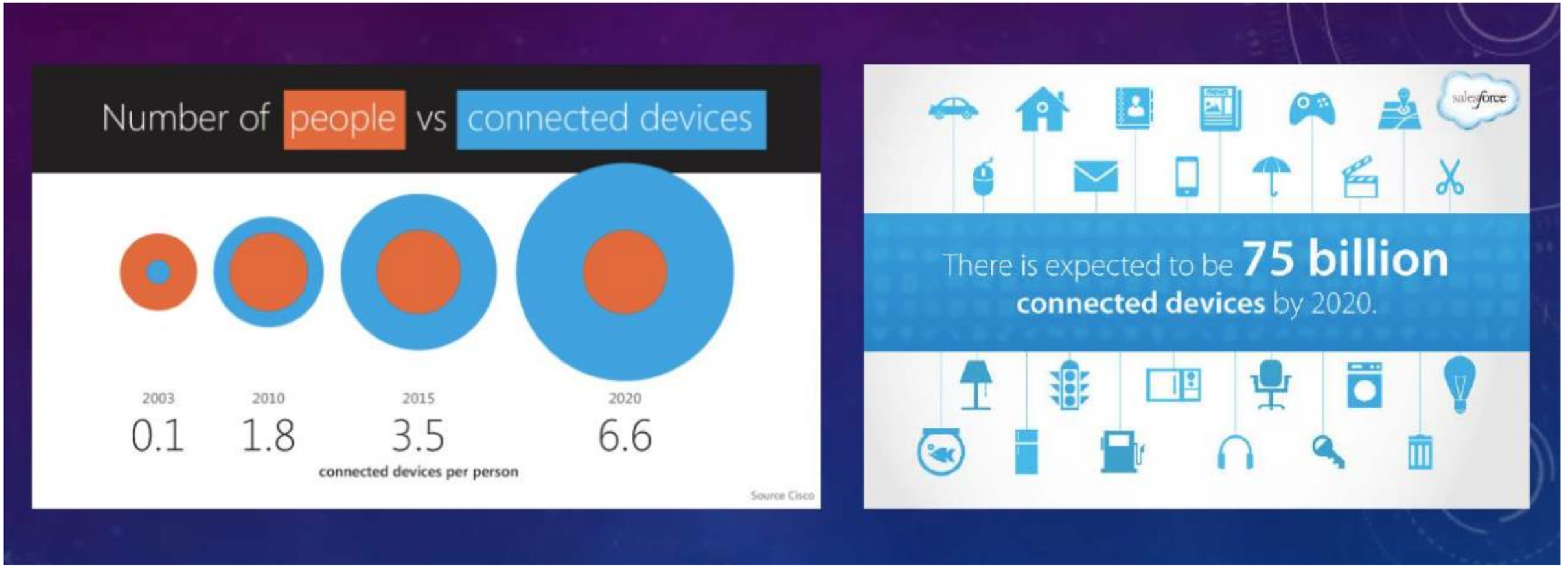
OLED evaporators

Sensors going exponential

- Silicon is dominant for performance, but not cost
- Major efforts for Paper/Plastic substrates
- Requires new manufacturing infrastructure



Connected devices = Exponential growth

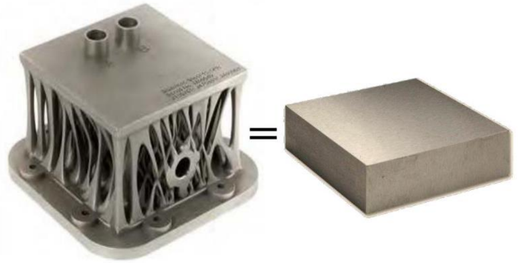


Disruption in manufacturing

3D printers following the computer industry

Disruption in manufacturing

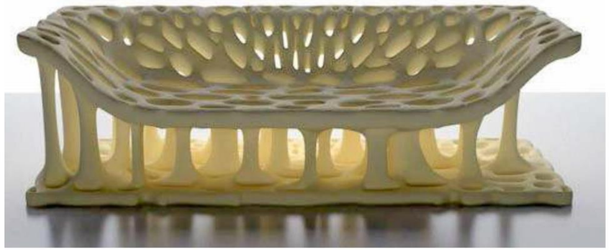
Disruption 1:
Complexity is free



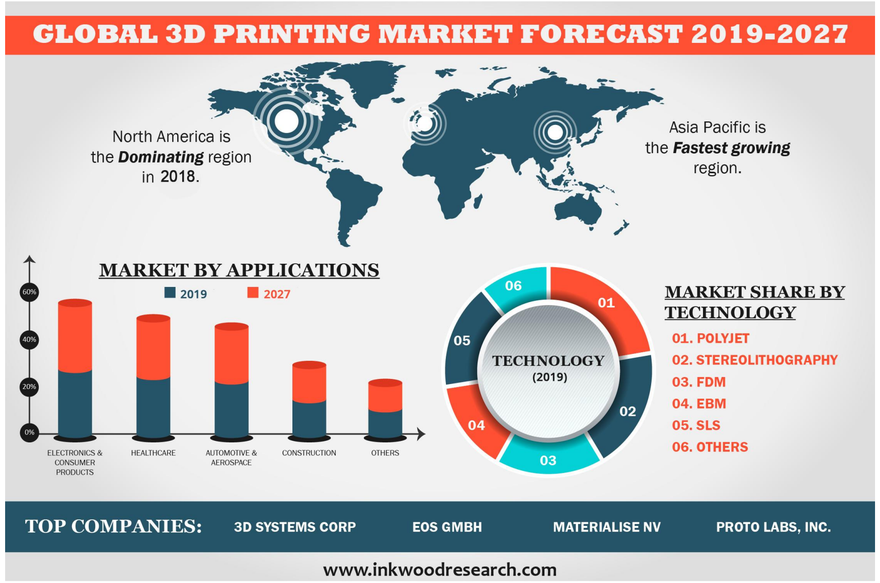
Disruption
No assembly required

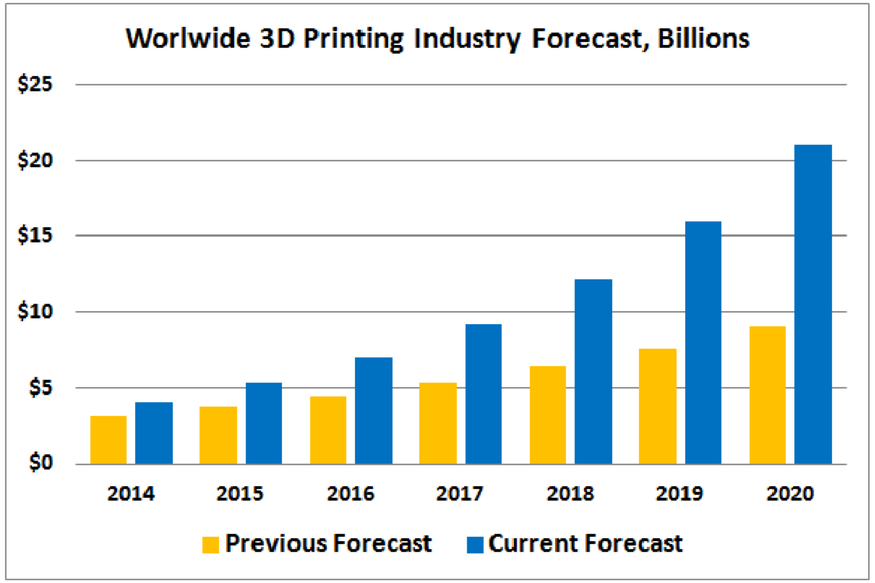
Disruption
Zero lead time

Disruption
Zero constraints

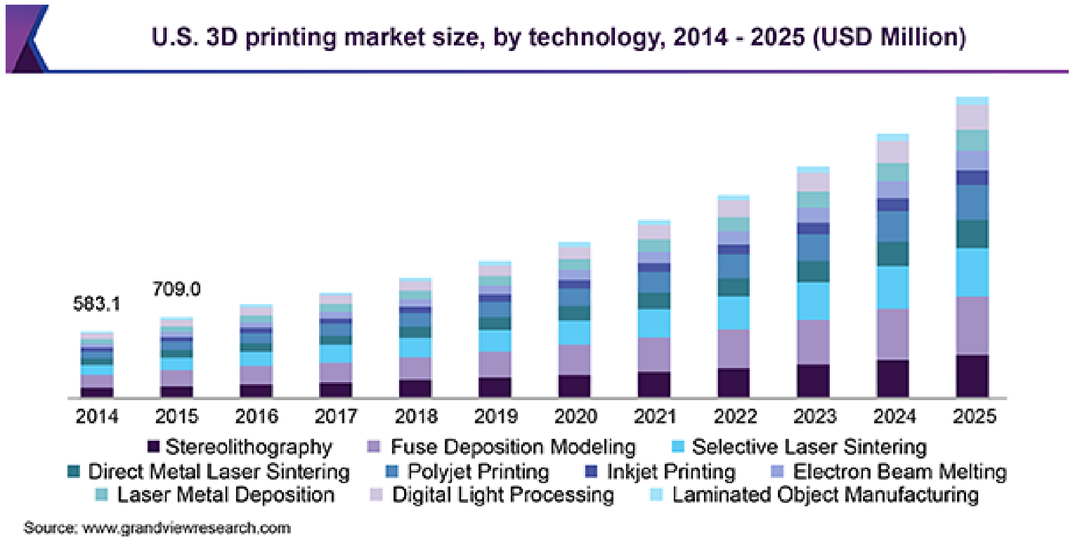


Digital manufacturing: Plethora of options

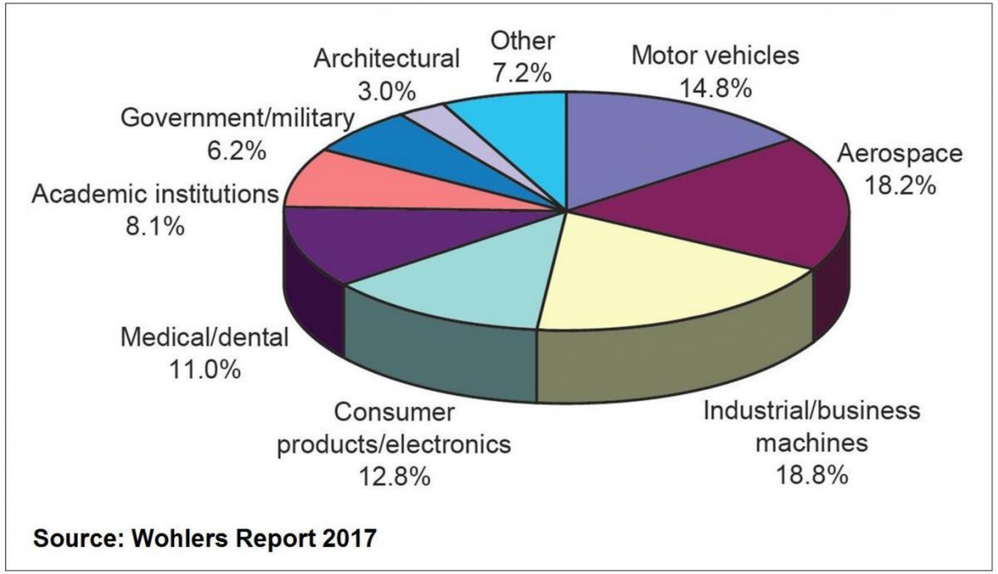




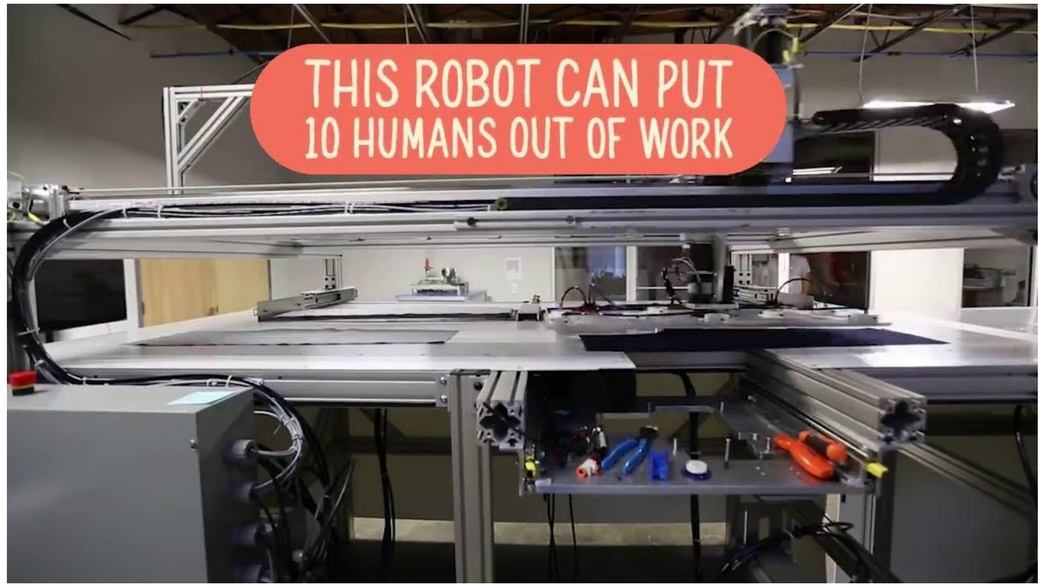
Source: The Motley Fool



Digital manufacturing



Source: Wohlers Report 2017

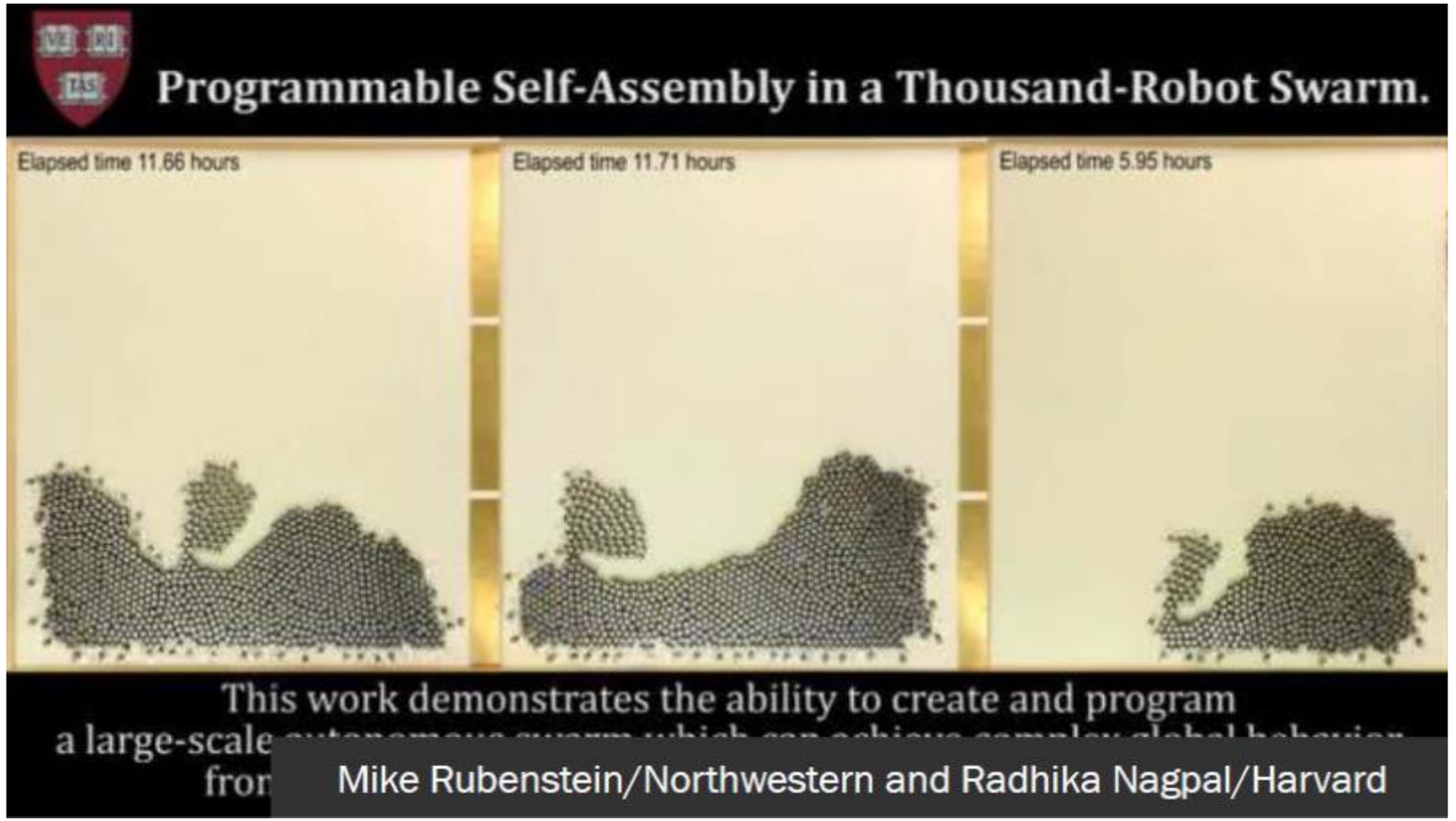


Arkansas factory, 21 production lines manned by the Sewbot, capable of making 1.2 million T-shirts a year– and the ripple effects will be felt in garment factories in the developing world.

Robotics (AI + Cameras + Sensors)

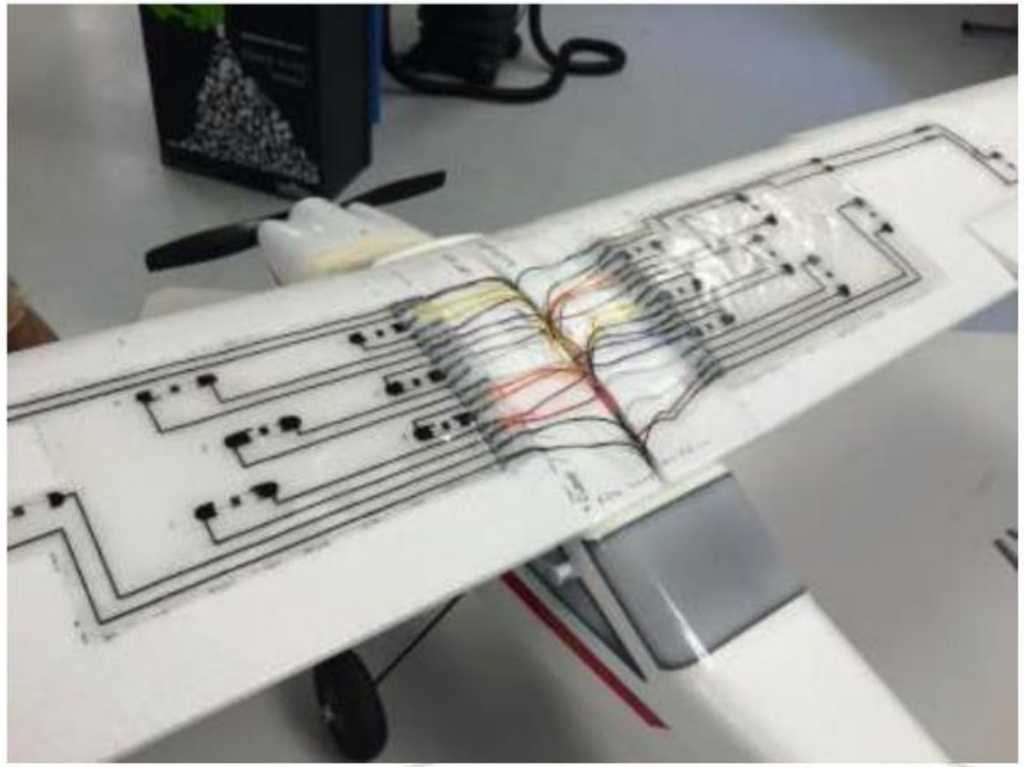
Robots as we imagine them

Micro-robots open up IOT possibilities

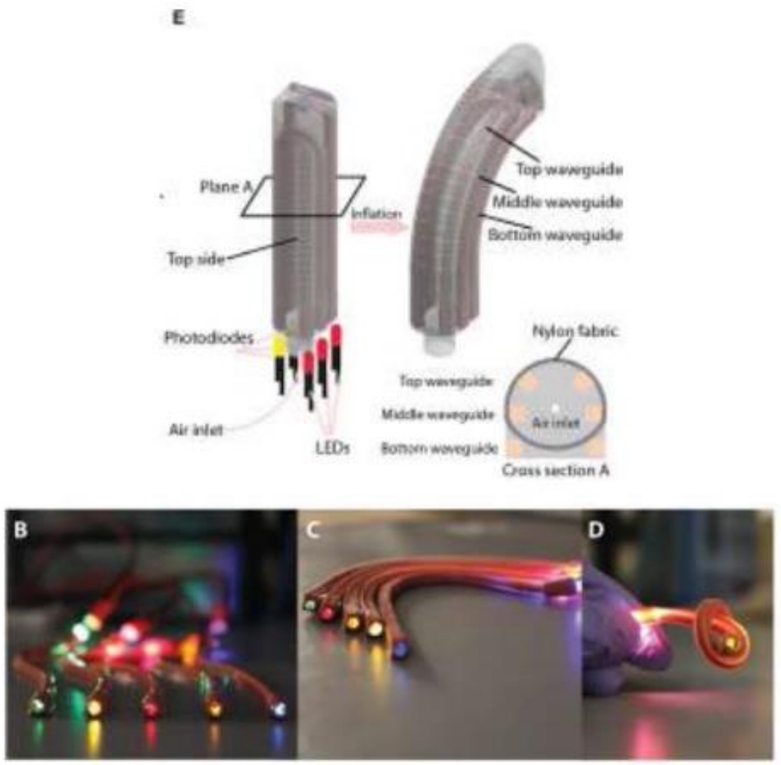


Small size reduces cost and opens up IoT for robots.

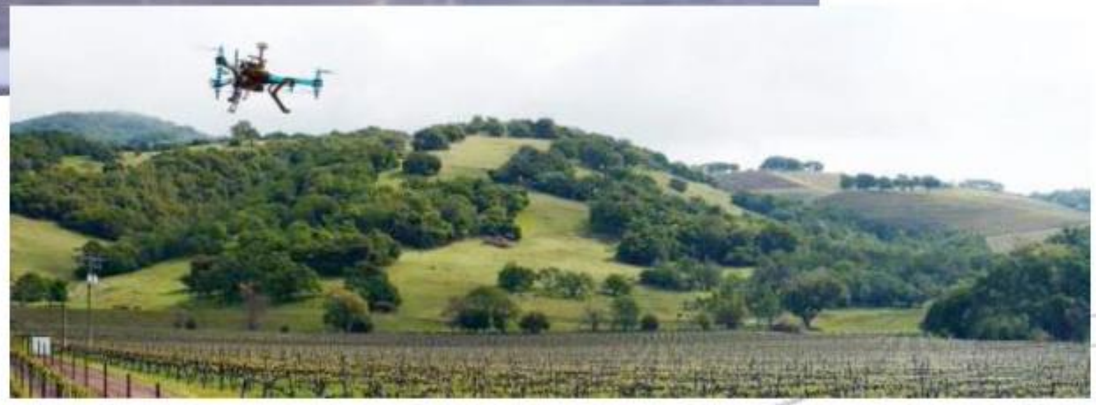
Soft sensors for robots open up “services”



Object recognition for soft robots



Drones are flying robots



Just as cars are computers / robots on wheels!

Robots will soon be everywhere

Robots will do more **on their own**, without the need for human intervention

Augmented and virtual reality

Virtual and augmented reality is here

Virtual reality

Reality is not so exciting…

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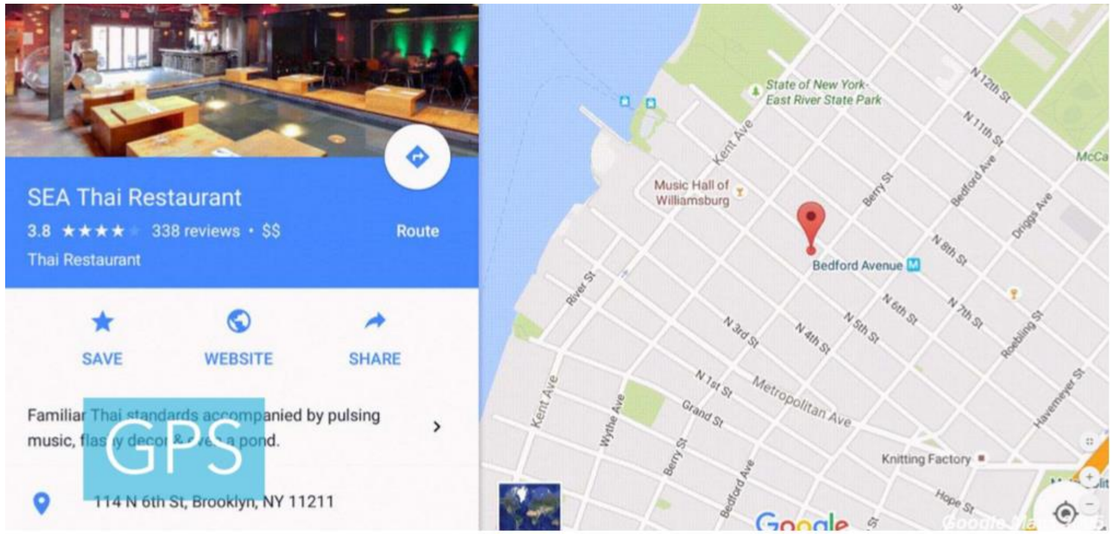
Virtual reality is bringing sports alive

Augmented reality – You already use AR everyday



AR = Virtual teleportation

Gaming / AR is the future of technology

I like video games. In fact, that's what got me into software engineering when I was a kid. I wanted to make money so I could buy a better computer so I could play better video games.

- **Elon Musk**, CEO Tesla & SpaceX, 10/16

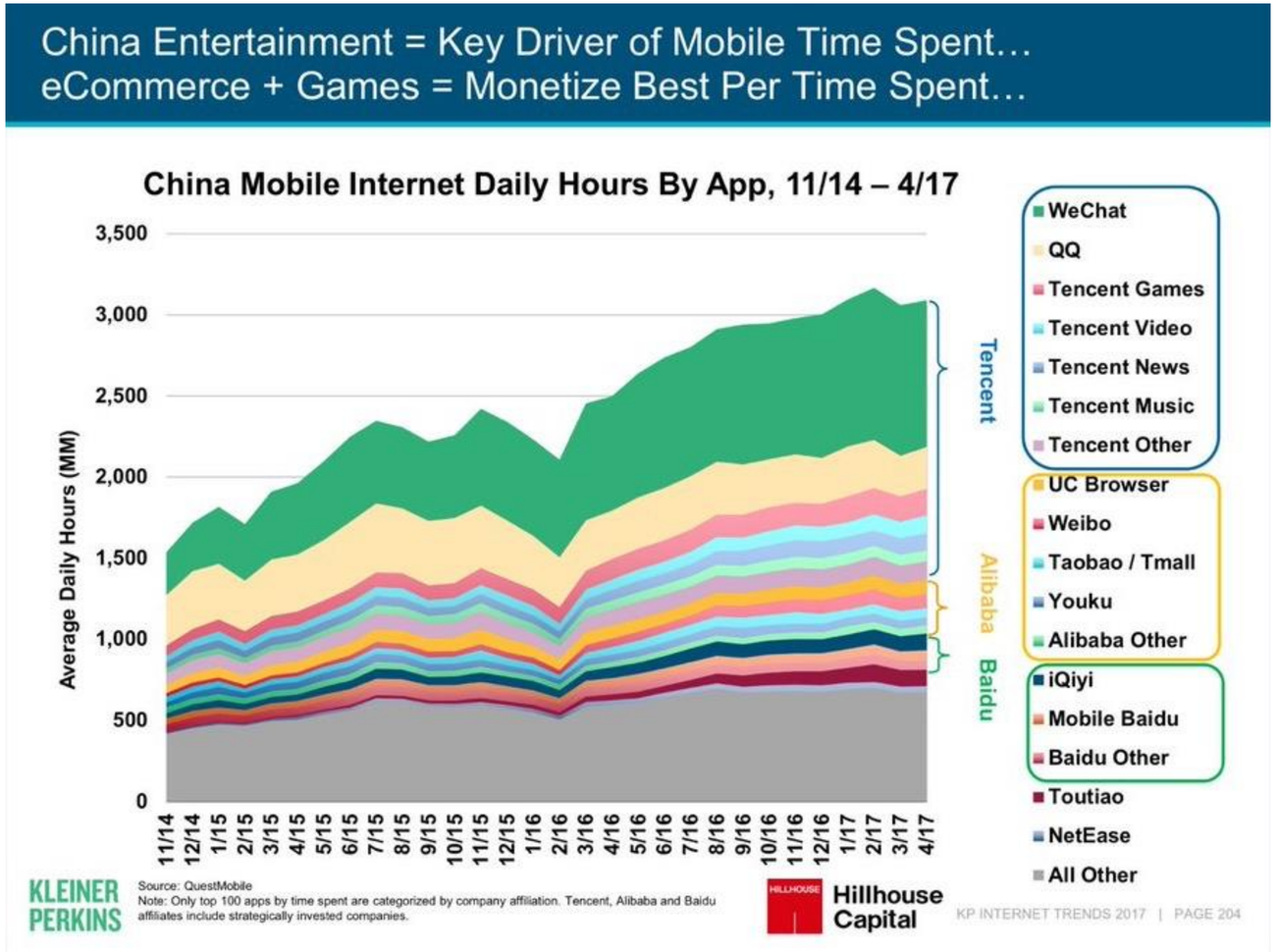
As a child I played a lot of Avalon Hill board games. And each board game is actually a complex set of rules and circumstances… So it was actually in fact my childhood gaming — for being able to build a model of what a game was — that was essentially the fundamental thing that informs my strategic sense.

- **Reid Hoffman**, Co-Founder of LinkedIn, 8/15

I do think this dynamic around kids growing up, building games, and playing games, is an important one because I think this is how a lot of kids get into programming. I definitely wouldn't have gotten into programming if I hadn't played games.

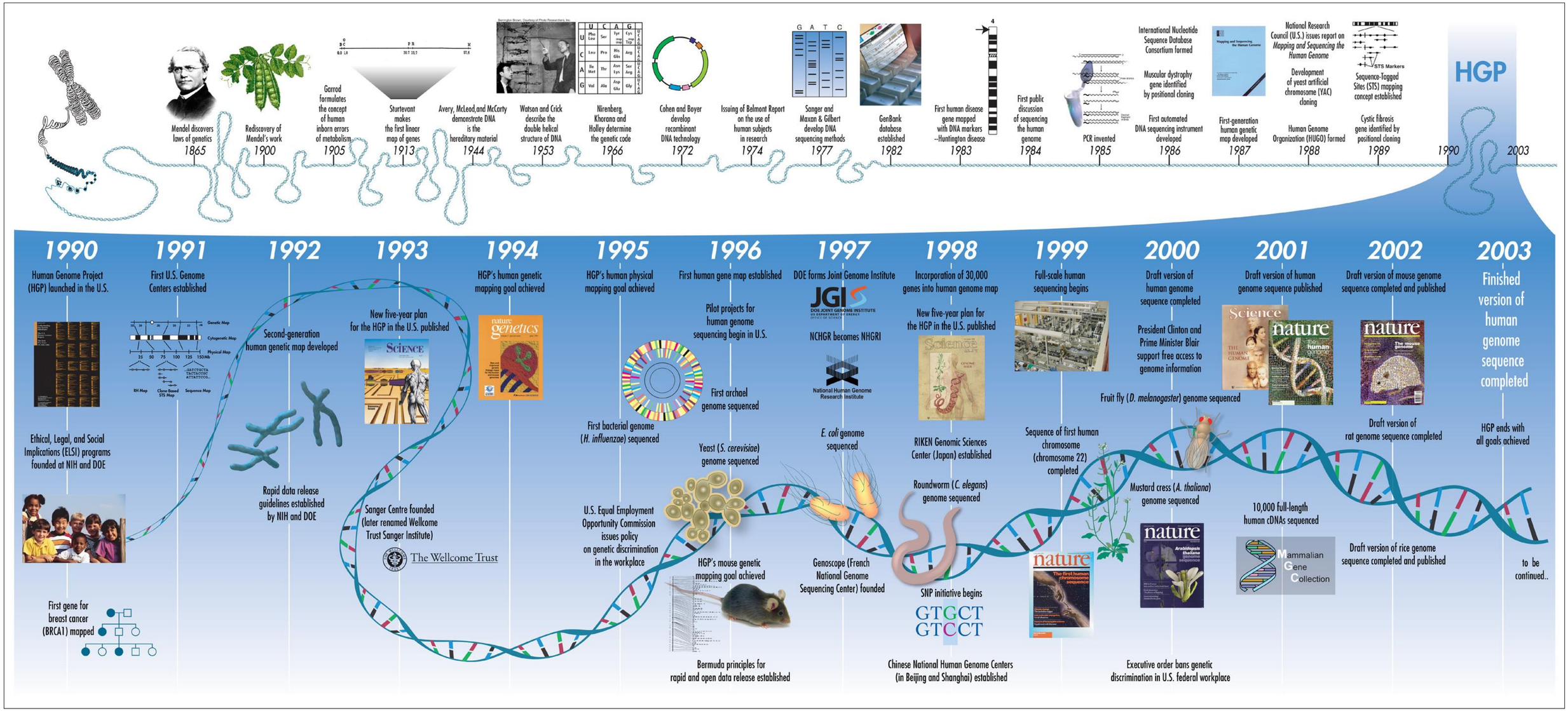
- **Mark Zuckerberg**, CEO Facebook, 5/15

China Mobile = Games + eCommerce



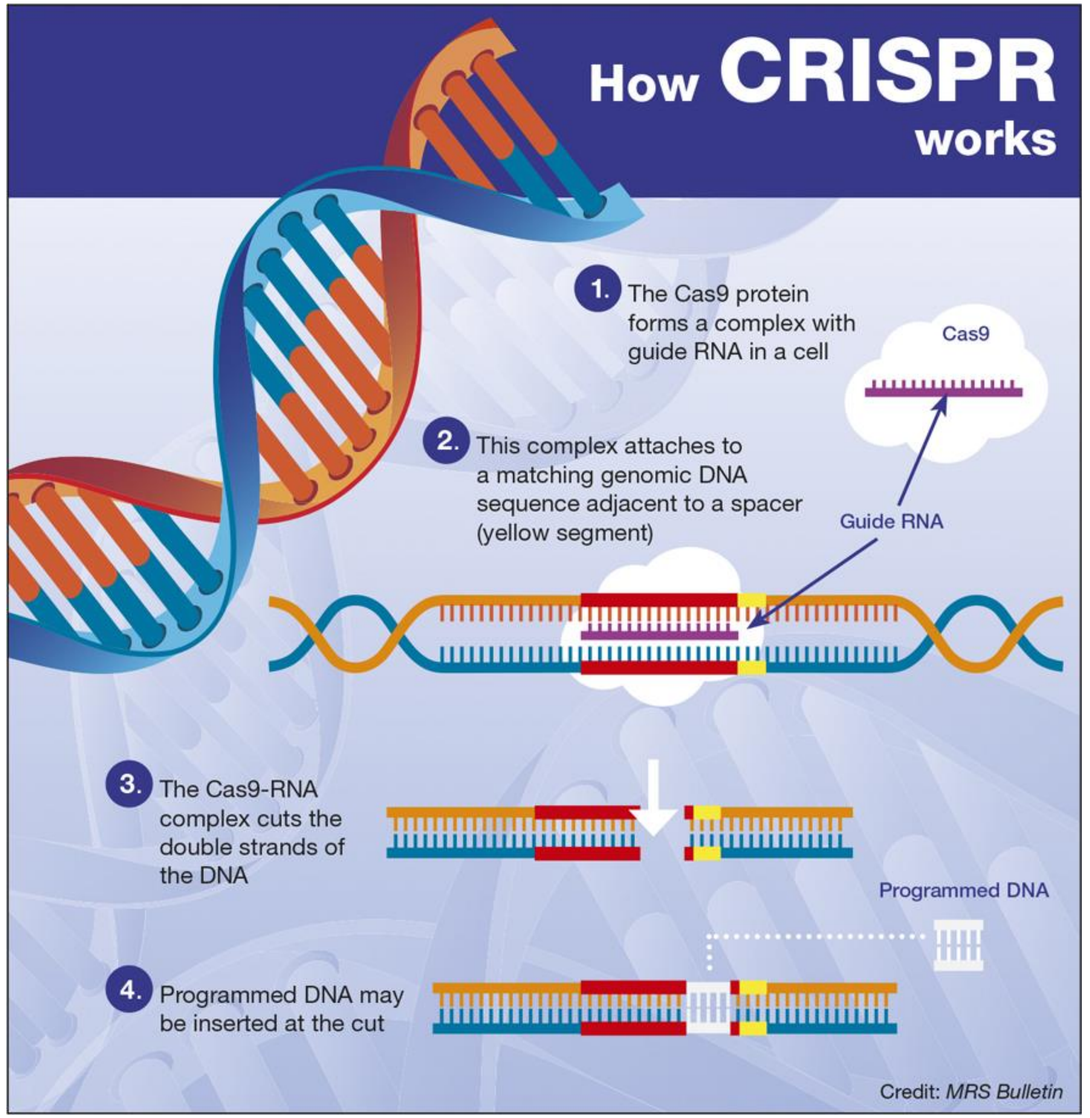
Disruption in life sciences

Digital biology is going exponential

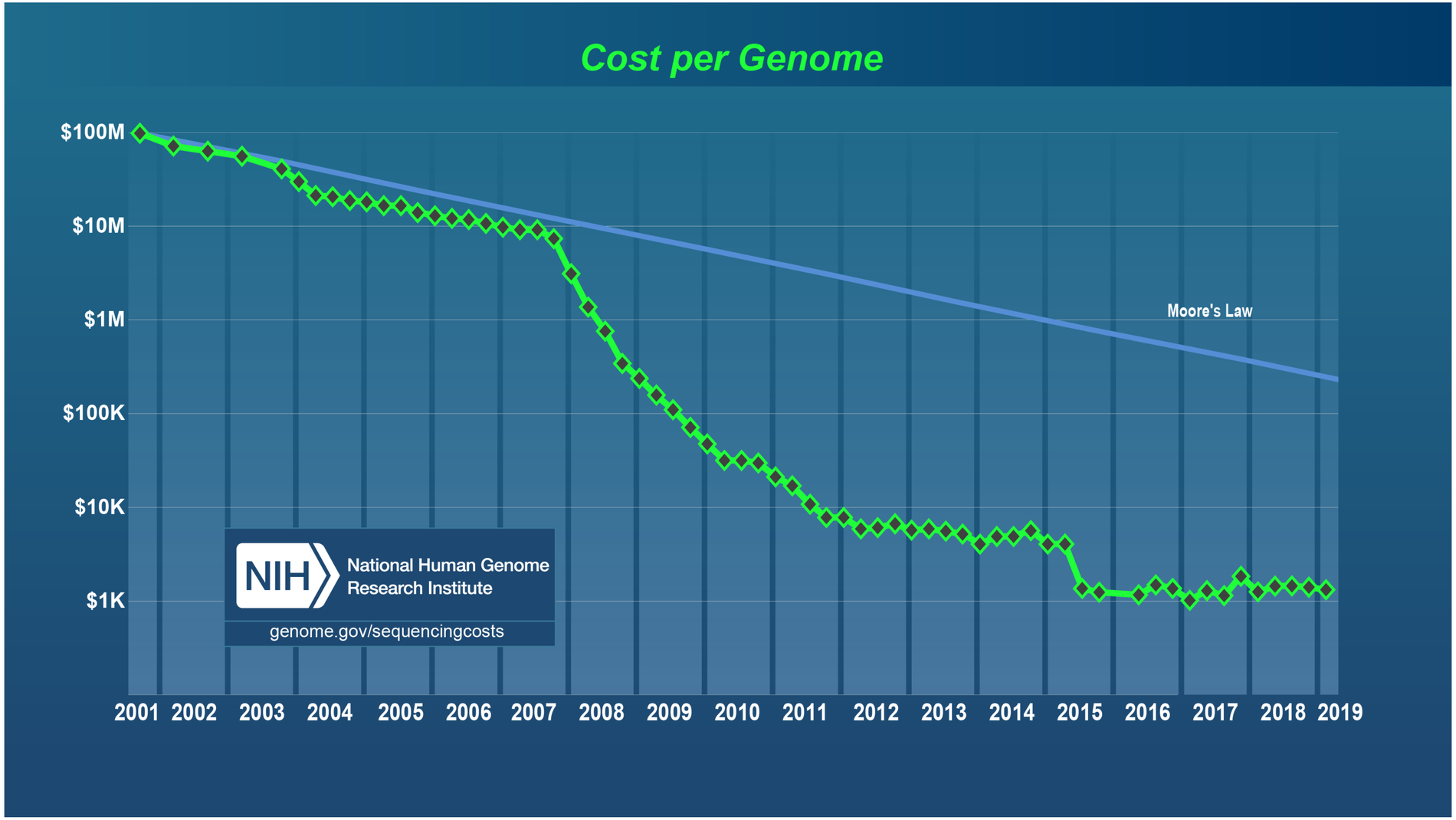


Source: National Human Genome Research Institute

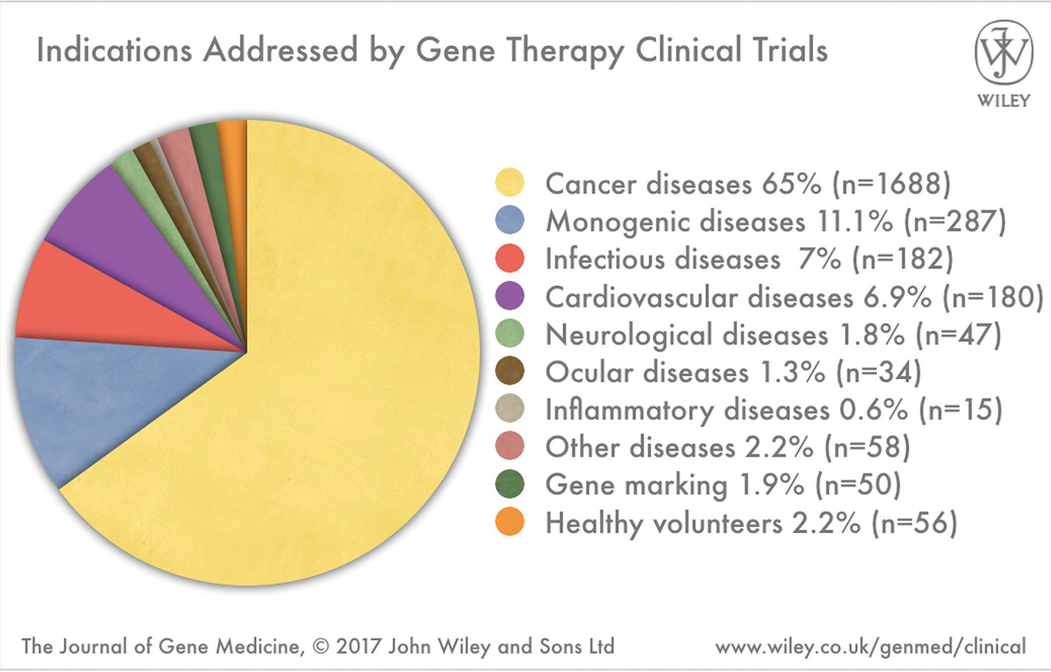
Digital biology

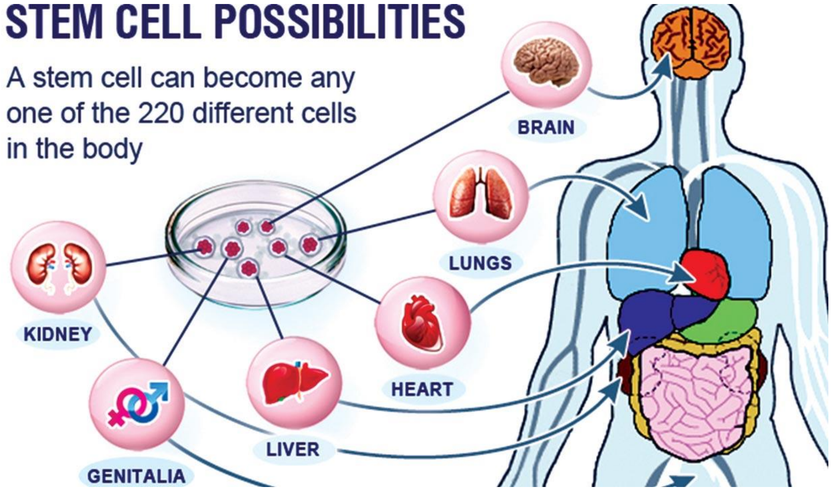


Cost of DNA sequencing

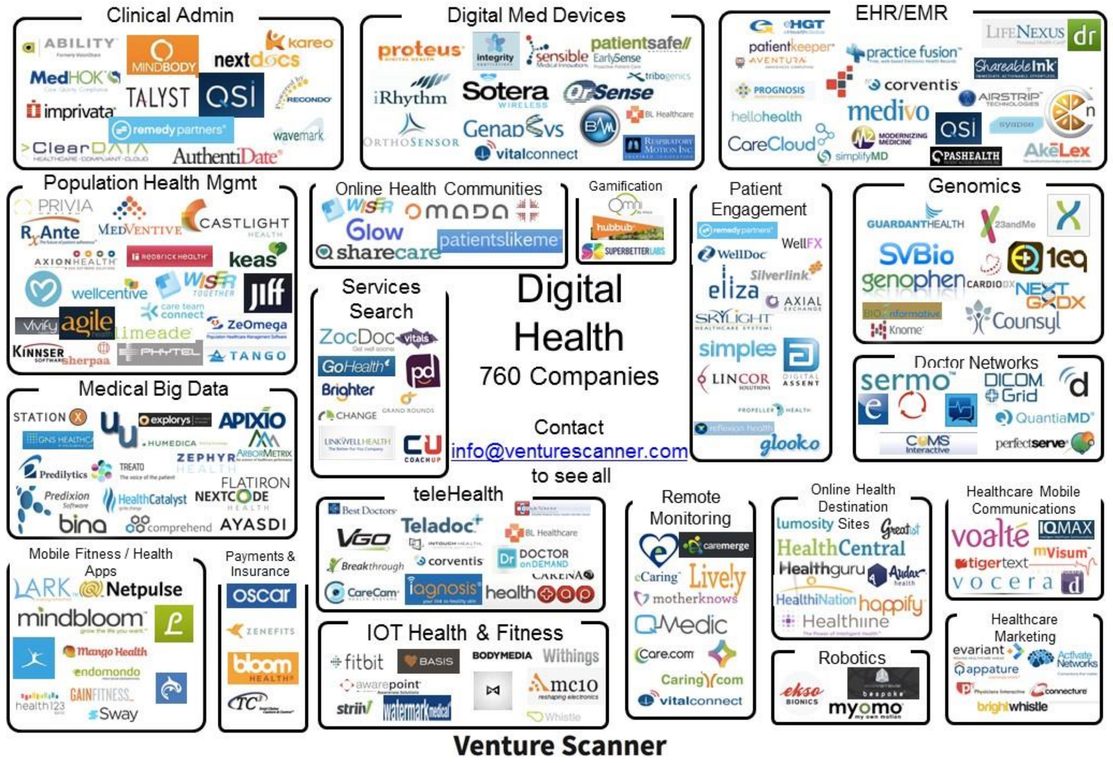


Healthcare being disrupted





Synthetic biology funding



Healthcare being disrupted

- **Robotics: A robot dentist in China successfully implanted 3D-printed teeth into a female patient's mouth with "high precision." The only human medical staff involvement was to conduct light setup and a pre-test. Imagine when such robots are in every healthcare facility on the planet, delivering service for the cost of electricity.**

- **Virtual Reality: VR is also entering the operating room. In July 2017, University of Minnesota doctors used VR to prepare for a challenging non-routine surgery -- separating a pair of twins conjoined at the heart. Not only was the life-saving surgery a success, the VR prep gave doctors unforeseen insights that prompted them to accelerate the surgery by several months. It won't be long until we refuse to have surgery completed by any human who hasn't prepared in virtual reality using a personalized 3D model.**

- **CRISPR/Gene Editing: Finally, in August 2017, the Food and Drug Administration (FDA) approved the first-ever treatment that uses gene editing to transform a patient's own cells into a "living drug." Kymriah, a one-time treatment made by Novartis, was approved to treat B-cell acute lymphoblastic leukemia - an aggressive form of leukemia that the FDA calls "devastating and deadly." The FDA is currently considering over 550 additional experimental gene therapies. What happens to our healthy human lifespan as these life-saving treatments demonetize and become universally accessible?**

Healthcare being disrupted

Pioneering cancer drug, just approved, to cost $475,000 — and analysts say it's a bargain

The Food and Drug Administration on August 30, 2017 approved a futuristic new approach to treating cancer, clearing a Novartis therapy that has produced unprecedented results in patients with a rare and deadly cancer. The price tag: $475,000 for a course of treatment.

The therapy, called a CAR-T, is made by harvesting patients' white blood cells and rewiring them to home in on tumors. Novartis's product is the first CAR-T therapy to come before the FDA, leading a pack of novel treatments that promise to change the standard of care for certain aggressive blood cancers.

Novartis's therapy is approved to treat children and young adults with relapsed acute lymphoblastic leukemia. It will be marketed as Kymriah.

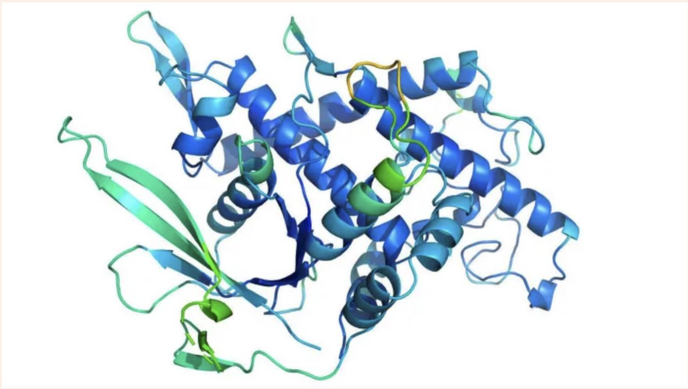
In a clinical trial, a single dose of Kymriah left 83 percent of participants cancer-free after three months, results oncologists have hailed as a major advance for patients with few other options.

Each dose is custom-tailored for an individual patient, requiring a complex process in which human cells must be safely ferried across the country, reliably re-engineered, and soundly returned. To get Kymriah, patients will have to travel to one of just 32 sites around the country. From there, doctors harvest patients' white blood cells and ship them off to a Novartis facility in New Jersey where they can be edited and mailed back. The entire process takes about 22 days, the company said.

Healthcare being disrupted

DeepMind claims major breakthrough in understanding proteins

Discovery may dramatically speed up discovery of new drugs



DeepMind's AlphaFold program can predict how proteins fold into three dimensions. © DeepMind

Siddharth Venkataramakrishnan in London NOVEMBER 30 2020

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DeepMind, the UK-based artificial intelligence company owned by Alphabet, has said it can predict the structure of proteins, a breakthrough that could dramatically speed up the discovery of new drugs.

Scientists have spent decades trying to work out how proteins, which begin as strings of chemical compounds, fold into three-dimensional shapes, which then define their behaviour.

Identifying the shape of even a single protein can take years, but DeepMind said its AlphaFold system was able to provide accurate results, to within the width of an atom, within days.

"This advance is our first major breakthrough in a longstanding grand challenge in science," said Demis Hassabis, founder and chief executive of DeepMind, adding that he hoped it would have "a big impact on our ability to understand disease and the biology of life". DeepMind was acquired by Google in 2014 for £400m.

Science

AI has almost solved one of biology's greatest challenges — how protein unfolds

By better predicting how proteins take their structure, scientists can develop drugs more quickly.

MARC ZIMMER 7 December, 2020 1:33 pm IST

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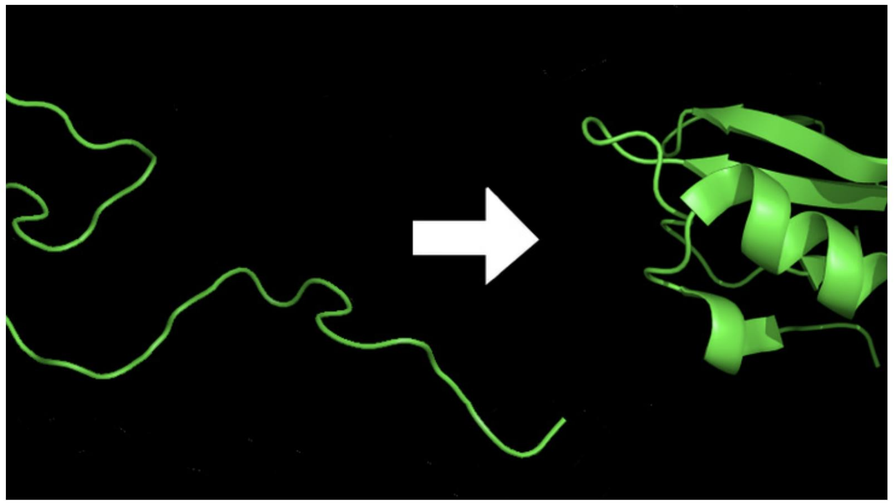

A simple chain of amino acids folds into a complex three-dimensional structure | Marc Zimmer

Text Size: A- A+

Solving what biologists call "the protein-folding problem" is a big deal. Proteins are the workhorses of cells and are present in all living organisms. They are made up of long chains of amino acids and are vital for the structure of cells and communication between them as well as regulating all of the chemistry in the body.

This week, the Google-owned artificial intelligence company DeepMind demonstrated a deep-learning program called AlphaFold2, which experts are calling a breakthrough toward solving the grand challenge of protein folding.

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Source: Financial Times and The Print

Bioprinting is already a reality

Kamen to lead $294 mn effort in Manchester Millyard to grow human organs on industrial scale.

Disruption in financial services

Financial services being disrupted

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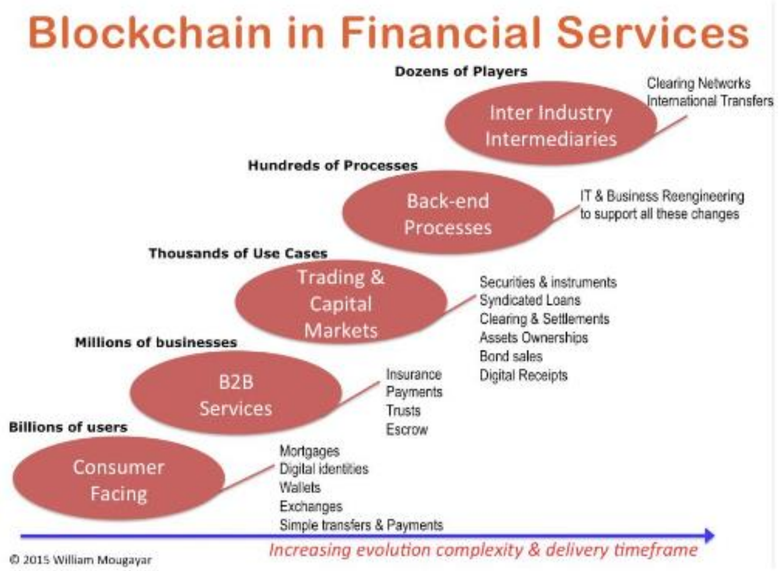
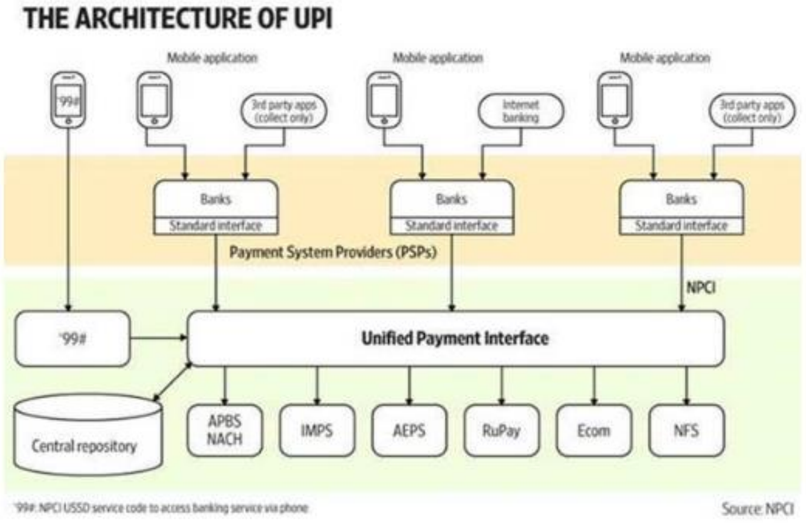


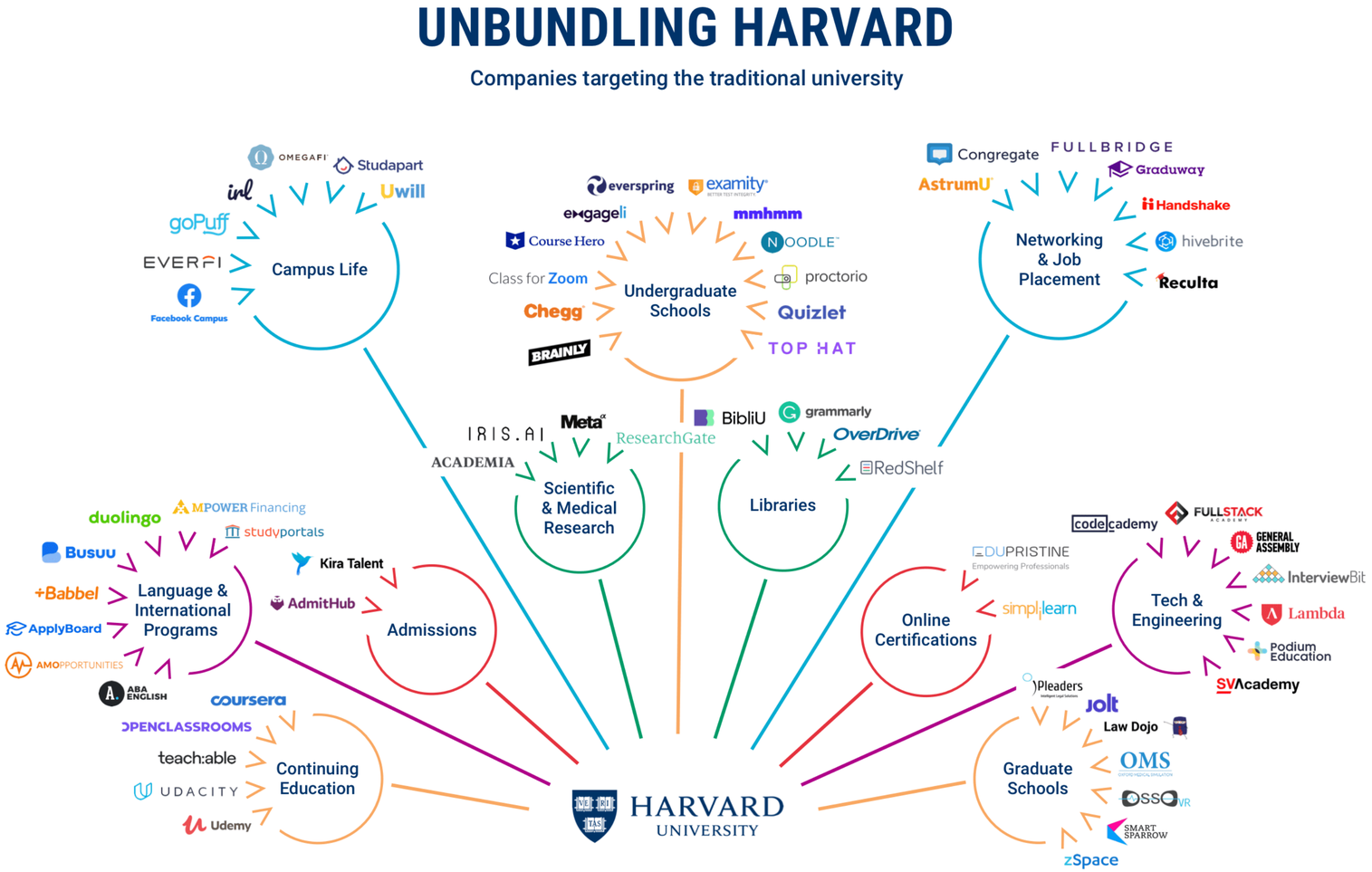


Chinese financial services platforms

	Payment	Wealth Management	Financing	Insurance	Credit Rating / History
Ant Financial	支付宝 ALIPAY **451MM** Annual Active Users[1]	余额宝 YU'E BAO **>300MM** Cumulative Users[2]	蚂蚁花呗 ANT CREDIT PAY 蚂蚁借呗 ANT CASH NOW 蚂蚁小贷 ANT MICRO LOAN **>100MM** Cumulative Consumer Finance Users[3], **>5MM** Cumulative SME Borrowers[4]	保 蚂蚁保险服务 Ant Insurance Service **380MM** Cumulative Users[5]	芝麻信用 ZHIMA CREDIT **130MM** Cumulative Users[6]
Tencent	WeChat Pay **>600MM** MAU[7]	腾讯理财通 **>80MM** Cumulative Users[8]	微粒贷 **>30MM** Cumulative Users[9]		腾讯信用
JD Finance	京东支付 JD Pay **119MM** Annual Active Users[10]	小金库 JD Golden Wallet **>20MM** Cumulative Users[11]	白条 Credit Pay 金条 Cash Loan 京保贝 **>30MM** Cumulative Users[11]	保险 京东金融 JD Finance Insurance **168MM** Cumulative Users[11]	小白信用 JD credit **>35MM** Cumulative Users[11]

Disruption in education

Education being disrupted

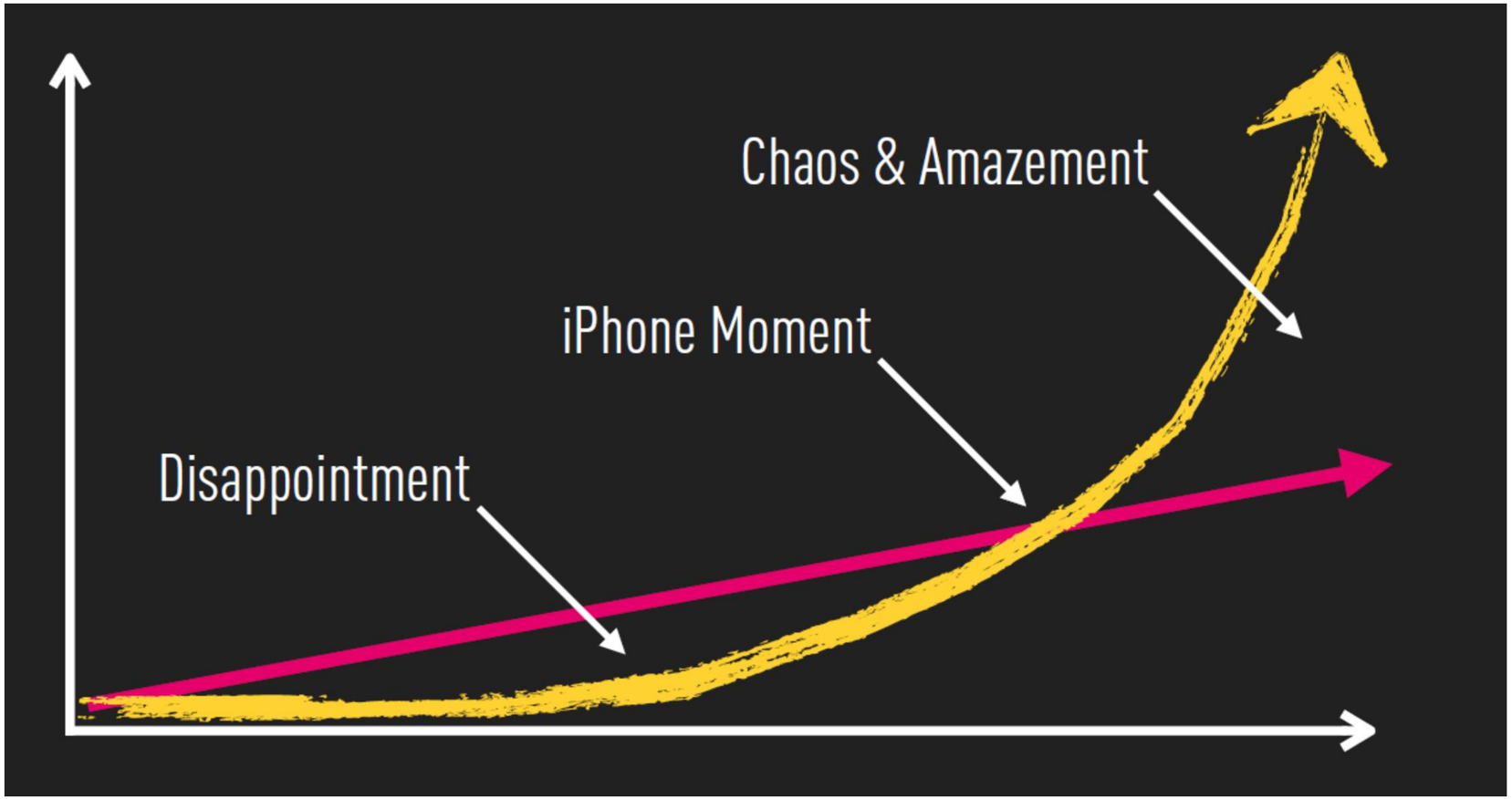


Source: cbinsights.com

CBINSIGHTS

Leadership focus

What will you disrupt?



Source: @lucienengelen 2016

Thank You

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