

Moore's Law

Compact transistors

MOSFET*

Miniaturization

Semiconductor devices

Electricity

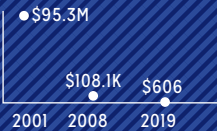
Internet
Percentage of global internet users



Source: ITU, 2019

Economies of scale

Cost of sequencing human-sized genome



Source: National Human Genome Research Institute, 2020

"Enabling" technology

- Satellites
- Data farms
- WiFi
- Robotics

Machine learning

DeepMind's MuZero computer program learned and mastered chess, Go, and Shogi without being taught the rules.

Source: Deepmind, 2019

Device proliferation

Knowledge accumulation

Accumulated digital data was estimated at 33 zettabytes in 2018.

Source: IDC, 2018

Datafication

*Transistors used in modern electronics
Estimated total of 13 sextillion (1.3*10²²) MOSFETs manufactured between 1960 and 2018.
Source: Computer History Museum, 2018

SIGNAL 12

ACCELERATING TECHNOLOGY

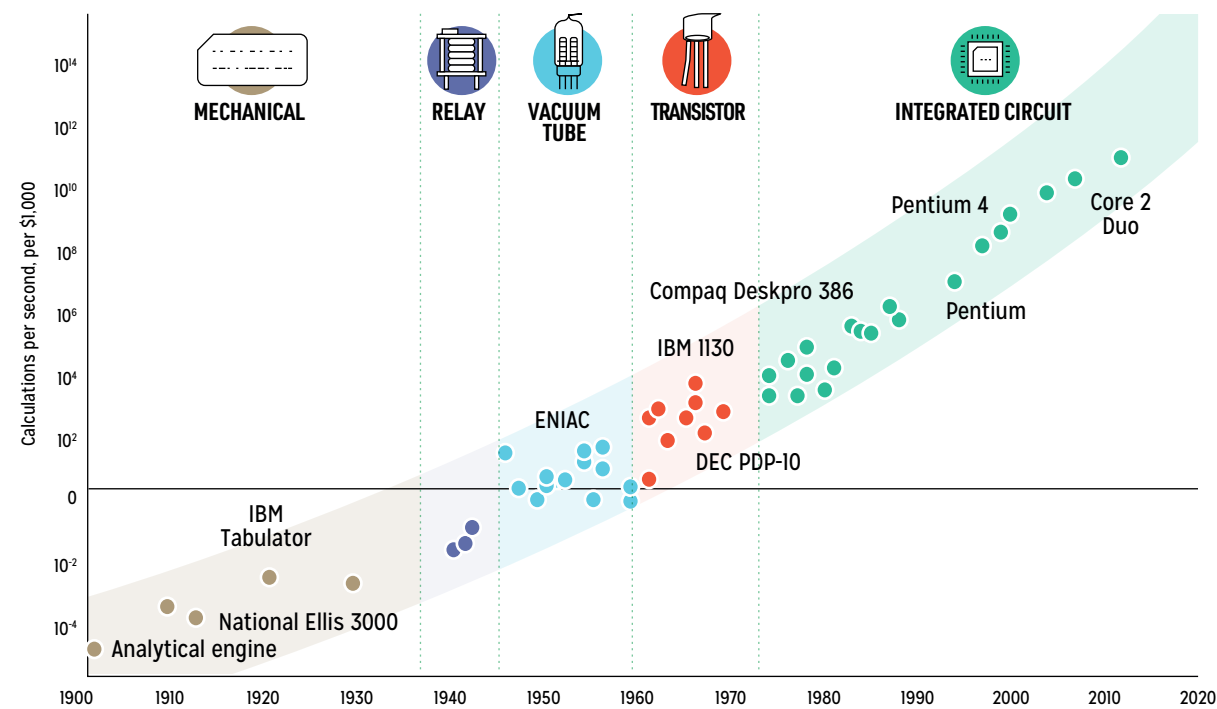
ACCELERATING TECHNOLOGY

Advances in technology are happening exponentially, building on each other and rapidly changing the world.

MOORE'S LAW OVER TIME

INCREASING PROCESSING POWER

Moore's Law suggests that the number of transistors on integrated circuits doubles every two years, effectively doubling performance.



Source: Jurveston, S., 2016; Kurzweil, R., 2005

SIGNAL RANGE
Very broad (5/5)

SIGNAL-TO-NOISE RATIO
High (4/5)

FROM THE LIGHTBULB TO AI-DRIVEN CARS, the rate of technological innovation has continued to increase. At first, Moore's Law of exponentially increasing processing power referred only to circuits. Now, we understand that rapid technological advancements started long ago, and are set to continue—bringing societal change with them.

VISUALIZING TECHNOLOGY EQUIVALENTS

14,000+ Books



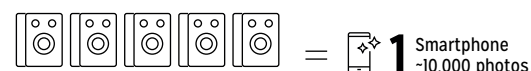
1 Kindle

213,000 5.25" floppy disks



1 256GB MicroSD card

100 Kodak Box Camera No.1 (100 exposures)

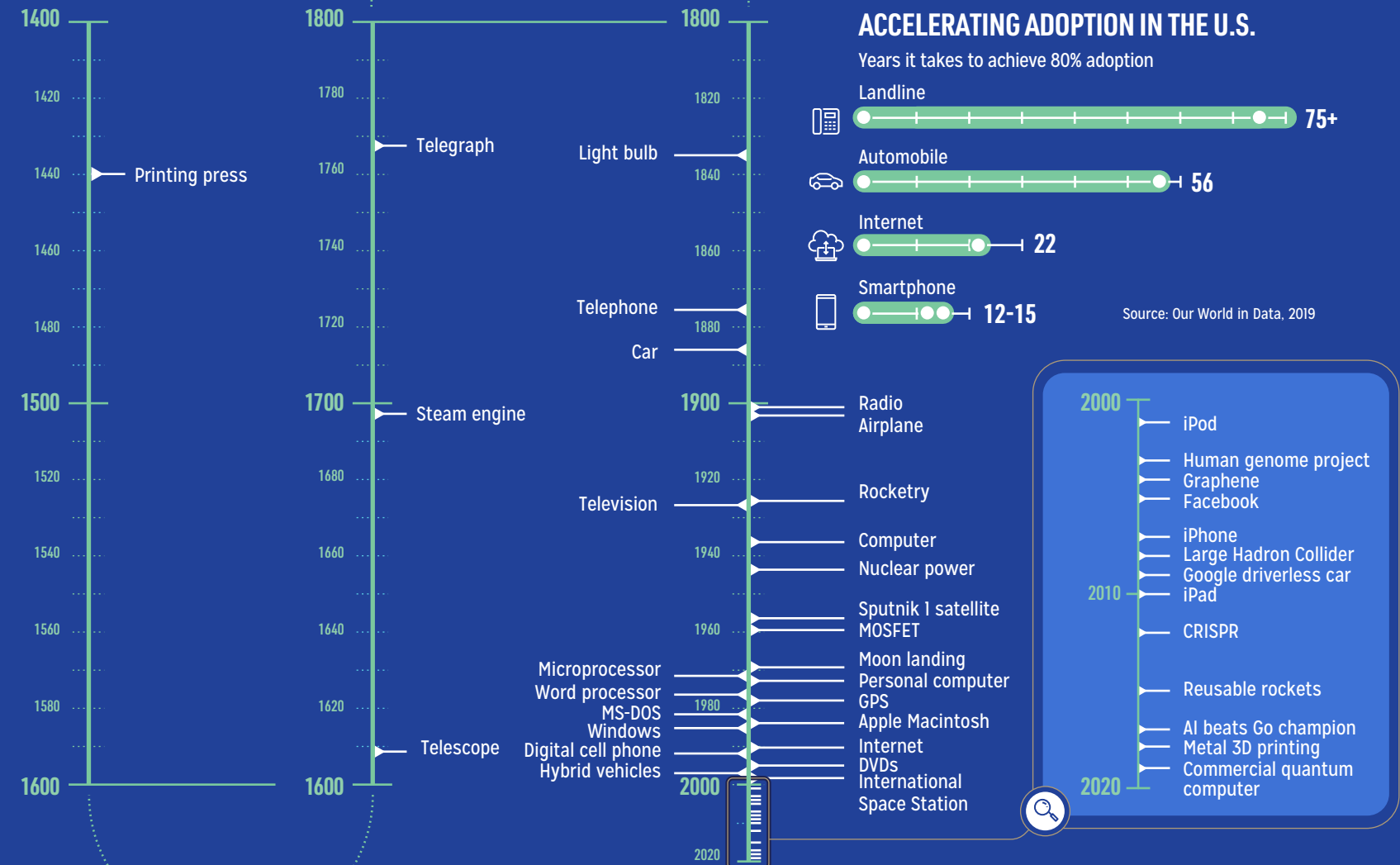


1 Smartphone -10,000 photos

Source: Experts Exchange, 2015

THE SHRINKING TIMELINE OF TECHNOLOGICAL BREAKTHROUGHS

Technology powers its own evolution—each iteration builds on the last, enabling breakthroughs in shorter time frames.



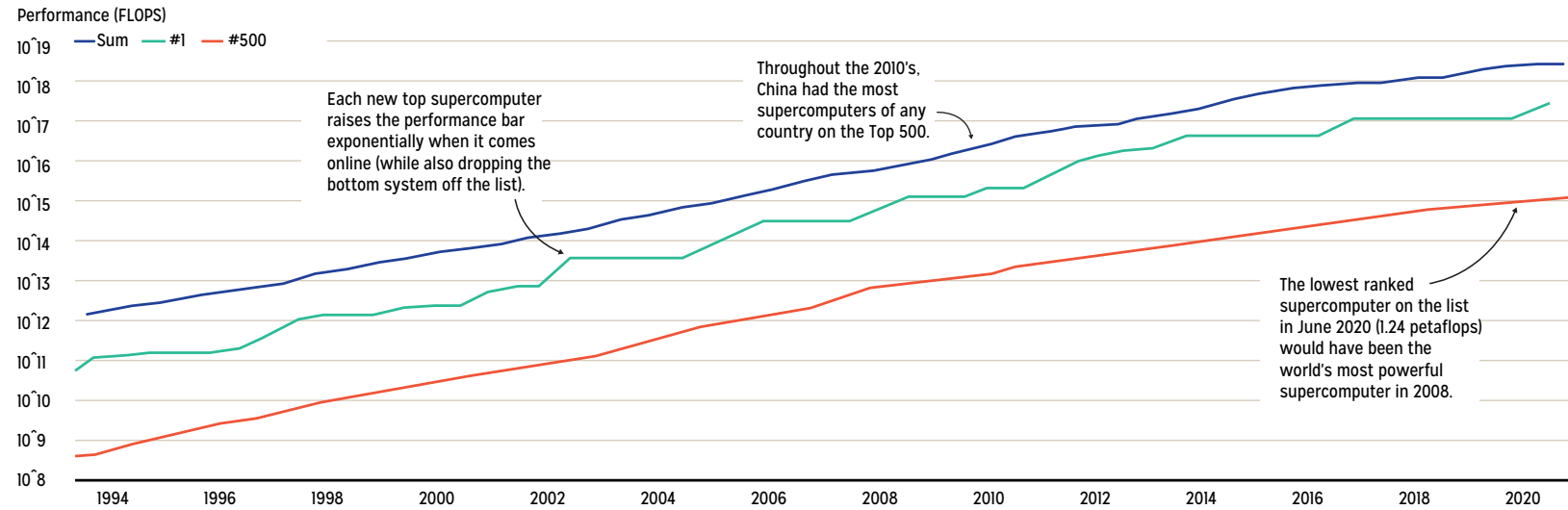
Source: Our World in Data, 2019

RAPID GROWTH ACROSS TECHNOLOGICAL FIELDS

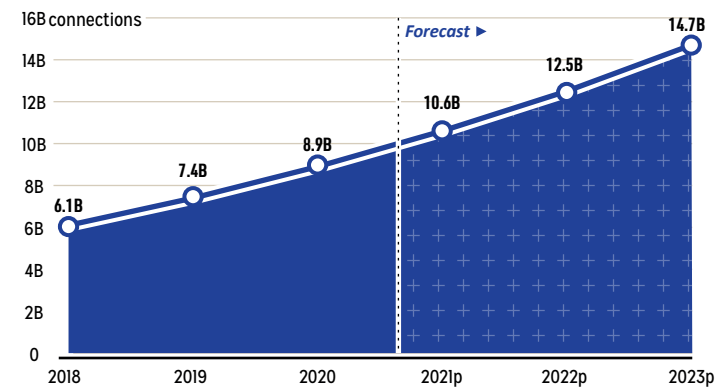
It's not just semiconductor devices (such as circuits) that are improving exponentially. We can see evidence of "Moore's Law" type growth in multiple different sectors.

PERFORMANCE OF THE 500 MOST POWERFUL SUPERCOMPUTERS LOGARITHMIC

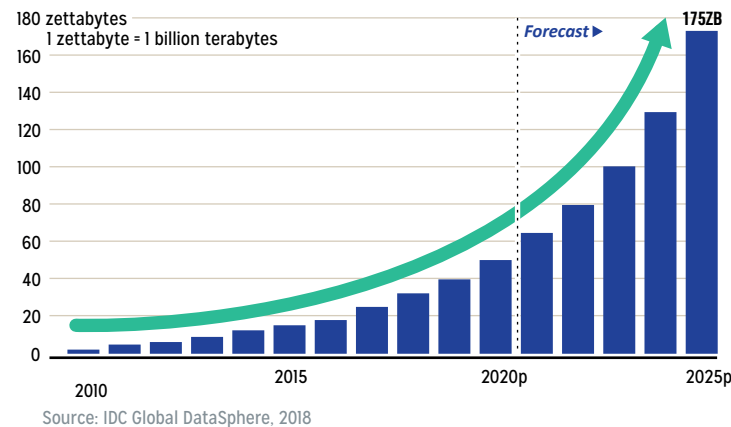
Supercomputer performance is measured in floating-point operations per second (FLOPS), the number of complex arithmetic calculations the system can complete in one second.



MACHINE TO MACHINE CONNECTIONS



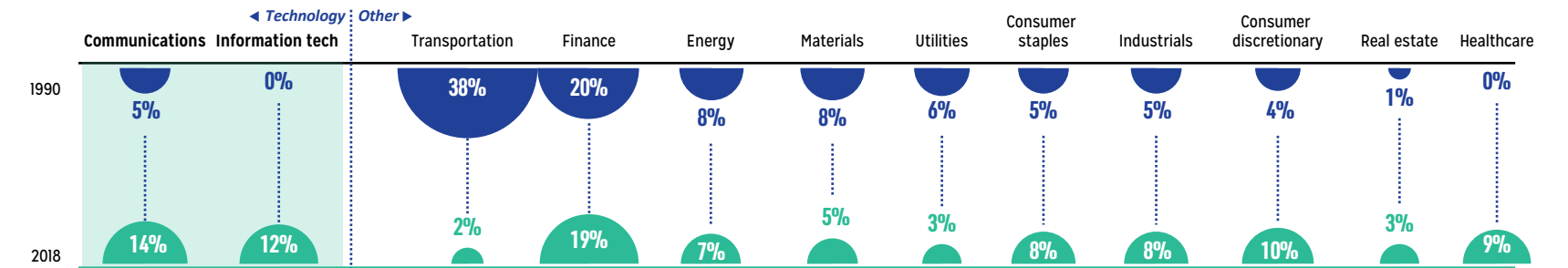
ACCUMULATED GLOBAL DATA



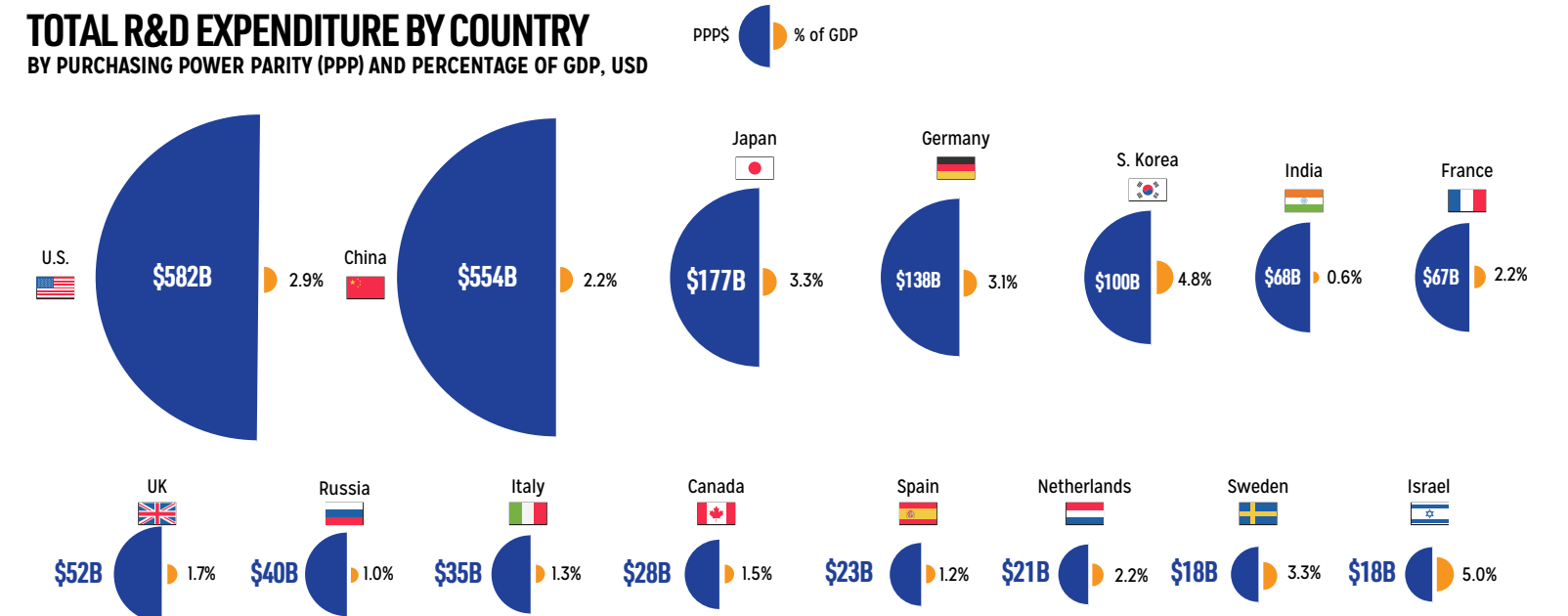
MORE ADVANCEMENTS (AND INVESTMENTS) ON THE HORIZON

As technology has advanced, so too has the market share of the sector and the amount of money being invested in further inventions.

SECTOR SHARE OF THE U.S. STOCK MARKET OVER TIME



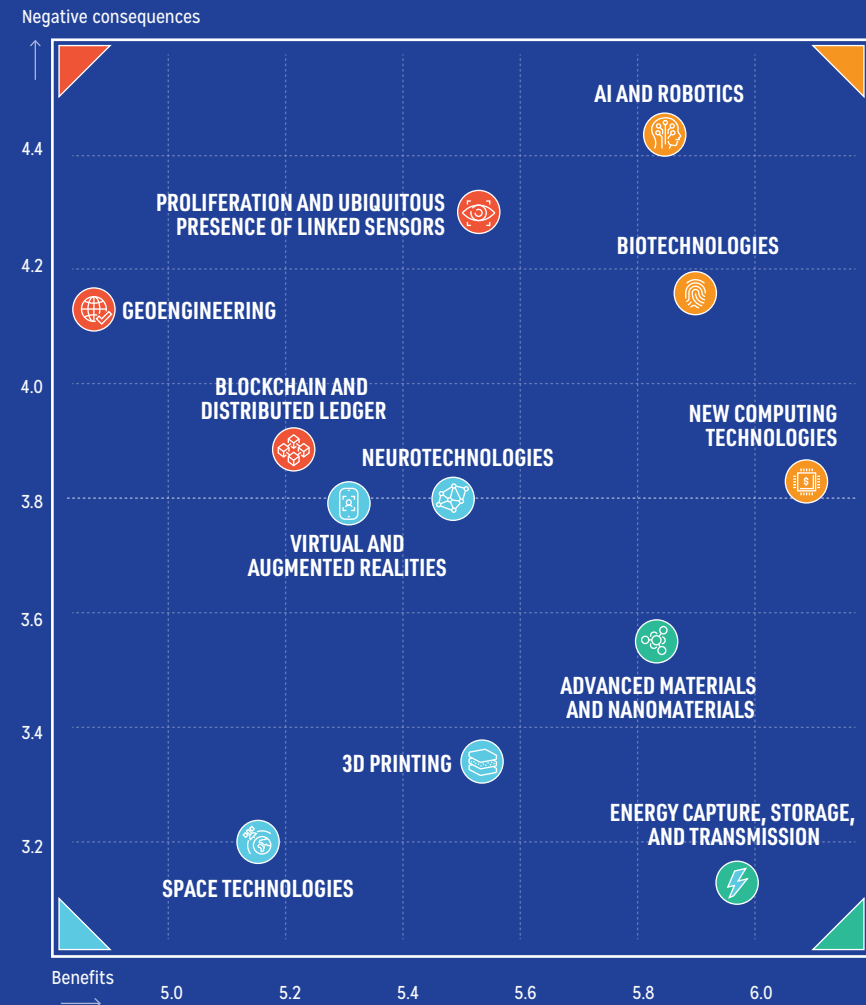
TOTAL R&D EXPENDITURE BY COUNTRY BY PURCHASING POWER PARITY (PPP) AND PERCENTAGE OF GDP, USD



INCREASINGLY CONSEQUENTIAL ADVANCEMENT

Technology's momentum shows no signs of slowing down, and investors are focused on new opportunities. However, unchecked advancement may have negative consequences.

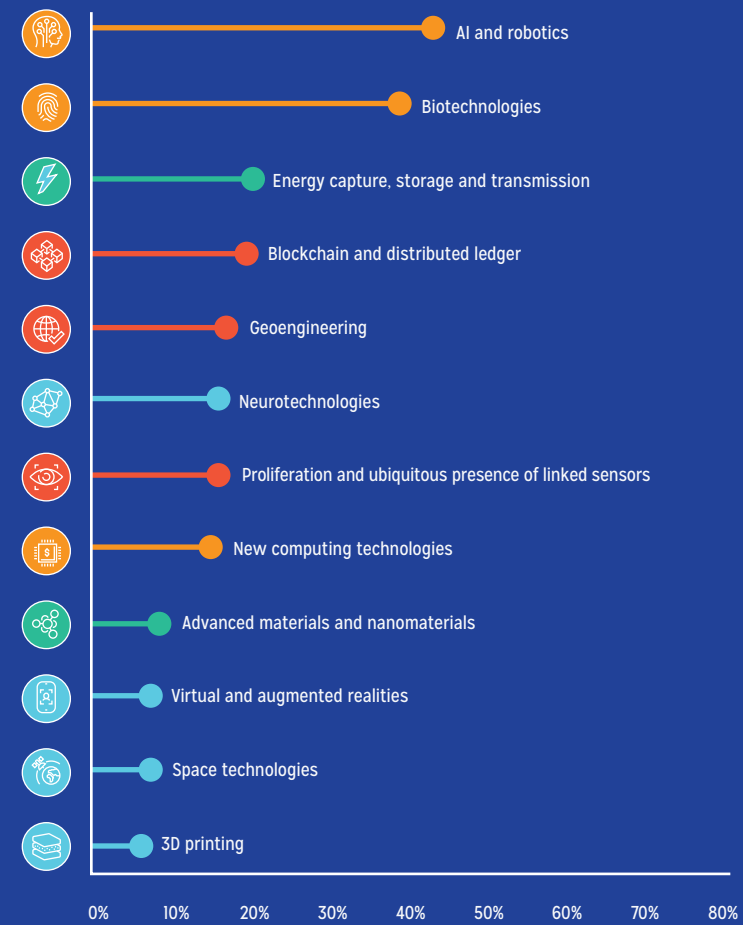
PERCEIVED BENEFITS AND CONSEQUENCES OF EMERGING TECHNOLOGIES



Source: World Economic Forum, 2016

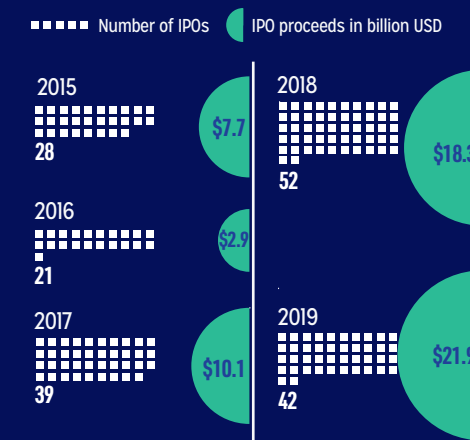
PERCENTAGE OF LEADERS WHO SAY TECHNOLOGY NEEDS BETTER GOVERNANCE

Based on a survey of 745 leaders in business, government, academia, and non-governmental organizations.



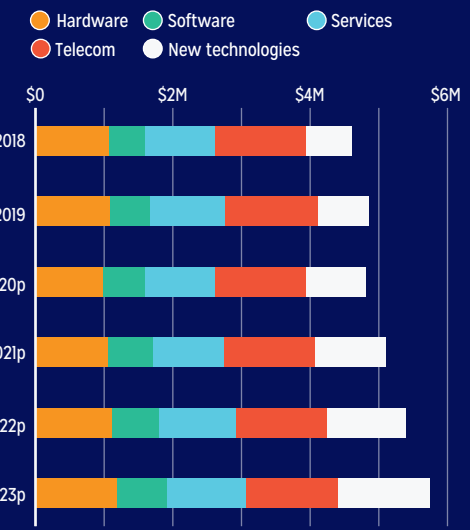
TECH IPOs AND PROCEEDS IN THE U.S.

Innovation and investor interest are thriving in the tech sector.



Source: Renaissance Capital, 2019

GLOBAL INFORMATION AND COMMUNICATION TECHNOLOGY SPENDING 2018-2023P



Source: IDC, 2020

TECHNOLOGY IS ADVANCING AT LIGHTNING SPEED.

It has become entrenched in both the market and society, with an almost endless array of applications.

While the sector creates promising opportunities for investors, it can also have negative consequences. How will we govern an ever-changing future?