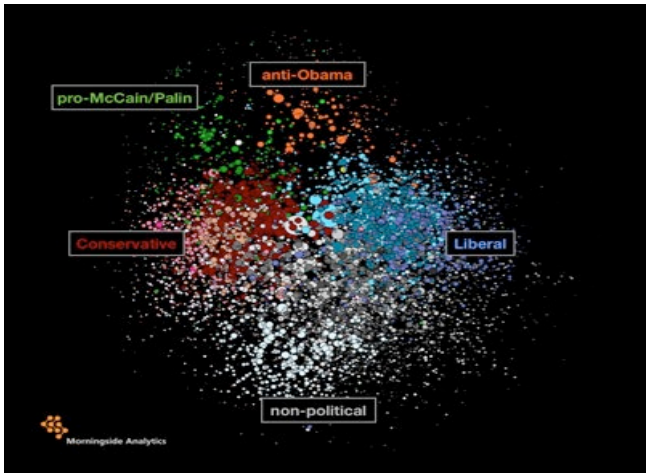
Strategic Thinking Brown Bag 2.0

Dr. Dale L. Moore
The Moore Group LLC

Strategic Awareness & Sensemaking

Economic

Political

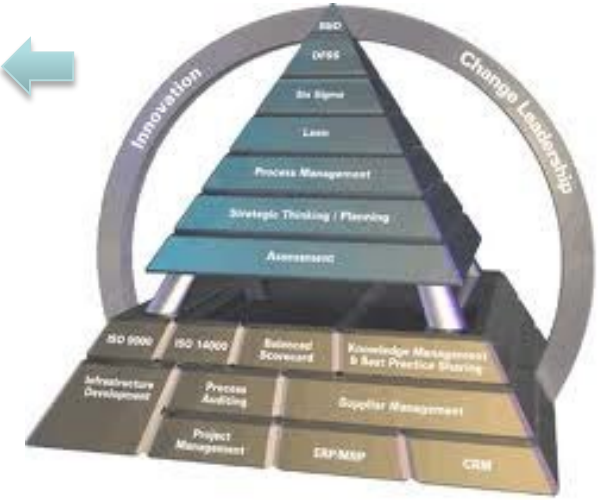


Technology

Social

Synthesis & Meaning Making

Operational



Key Guiding Quote #1

“The Future is Already Here, It’s Just Not Evenly Distributed.”

William Gibson

Important to *Assume* that the Best and Smartest People **<u>are not</u>** in your Organization

Guiding Quote #2

The Challenges are Formidable and Many but…

Guiding Quote #3

"In God We Trust, All Others Bring Data"

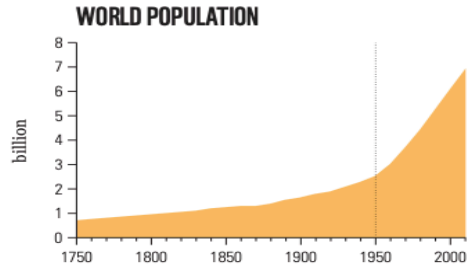
Key Data Sources:

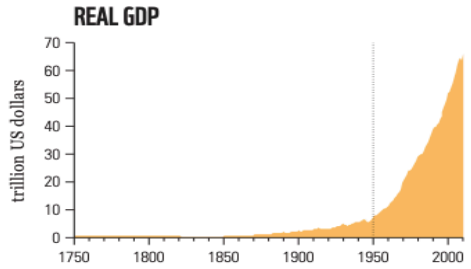
- United Nations (UN)
- World Economic Forum (WEF)
- World Bank
- World Wildlife Federation (WWF)
- International Monetary Fund (IMF)
- Organization for Economic Cooperation & Development (OECD)
- The Millennium Project (TMP)
- Congressional Budget Office (CBO)
- Government Accounting Office (GAO)
- National Science Board (NSB)
- National Defense University (NDU)
- Defense Acquisition University (DAU)
- Harvard Business Review (HBR)
- Heritage Foundation
- Center for Strategic & Budgetary Assessment (CSBA)
- Center for New American Security (CNAS)
- Center for Strategic & International Studies (CSIS)
- Congressional Research Service (CRS)
- The Economist
- MIT Strategic Mgmt Review
- National Defense Industrial Association (NDIA)

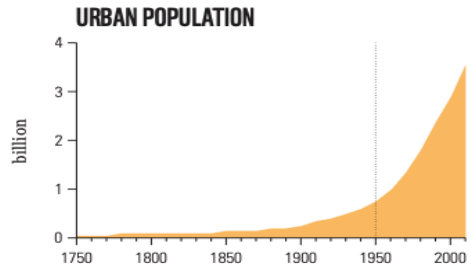
Big Picture Geopolitical Snapshot

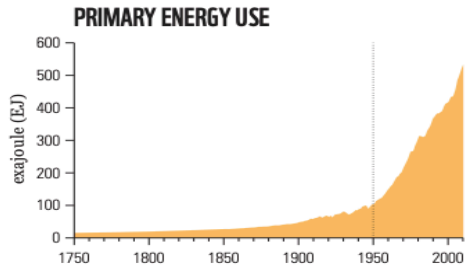
- China – Compensating for "100 Years of Humiliation"
  - Expanding Militarily and Economically, Top-Down Leadership, State-Run, Strategically-Minded, In Debt, Getting Older, Increasingly Fragile i.e. a House-of-Cards
  - One Belt One Road, South China Sea, Taiwan, Regional Hegemony (Made in China 2025)
  - Surveillance State - Social Credit Score, Pollution, Food, Water, Inequality
  - USTR Section 301 Report re. IP Theft, Cyber Crimes, Inappropriate Trade Policies
- Russia – Compensating for Dissolution of the Soviet Union
  - Economy the size of Texas, Sanctions Hitting Hard, Oligarchs, Inequality
  - Military is Source of Prestige, Nuclear Capabilities/Treaty Violations, Antagonistic, PsyOps
  - UN Security Council, China, Ukraine, Syria, Turkey, Iran
  - Focused on Undermining Western Values and Alliances inc. NATO
- U.S. Economic Sustainability/Budget Deficits/Political Divides/Trade
- U.S. and Global Concerns re. Climate Change, Cyber, Terrorism, Sustainability
- Globalization and Inequality
  - Populism, Nationalism, Immigration/Migration, Pandemic, Water Access, Poverty, Energy
- Corruption & Ideology – Governments and Democratic Institutions Under Attack
- Hybrid Warfare & Organized Crime – Cyber/Dark Web & Info Operations
- **Fourth Industrial Revolution – *Exponential Acceleration of Technologies***

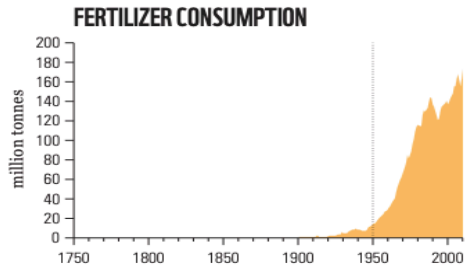
SOCIO-ECONOMIC TRENDS

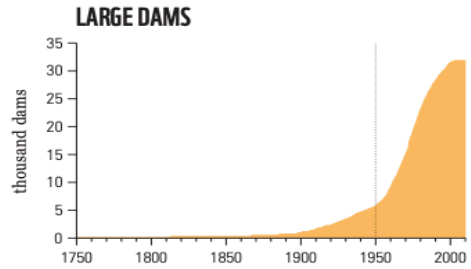


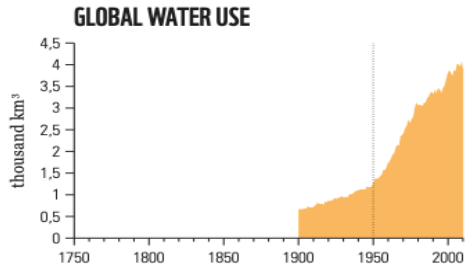


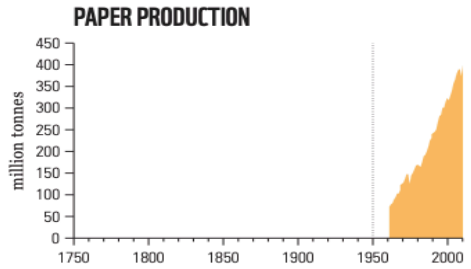


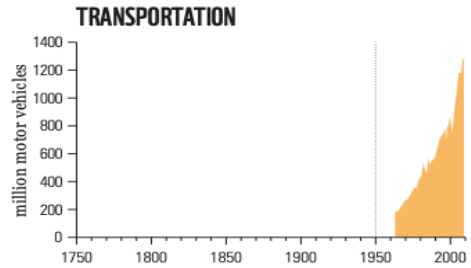


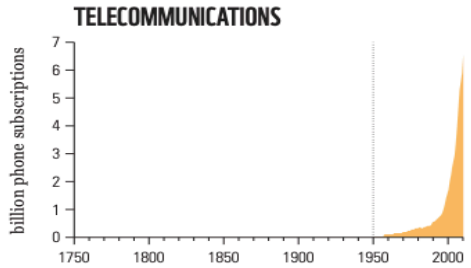




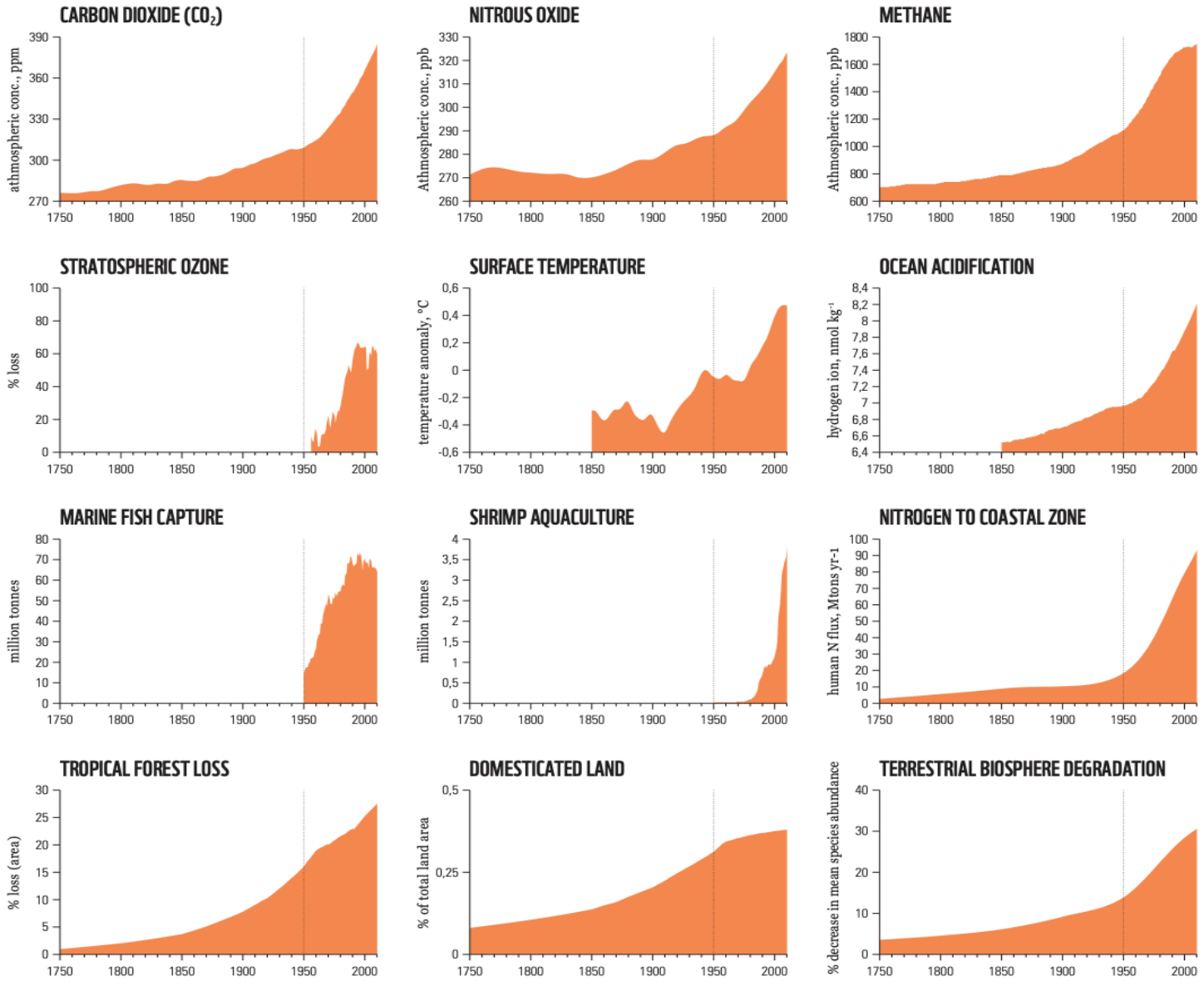








EARTH SYSTEM TRENDS



A SNAPSHOT OF CONSUMPTION WORLDWIDE

Natural resources are unevenly distributed across the Earth. The pattern of human consumption of these resources differs from resource availability, since resources are not consumed at the point of extraction.

Looking at the Ecological Footprint of each person at the national level provides additional insight into where the world's resources are being consumed [12]. Varying levels of Ecological Footprint are due to different lifestyles and consumption patterns, including the quantity of food, goods and services residents consume, the natural resources they use, and the carbon dioxide emitted to provide these goods and services.

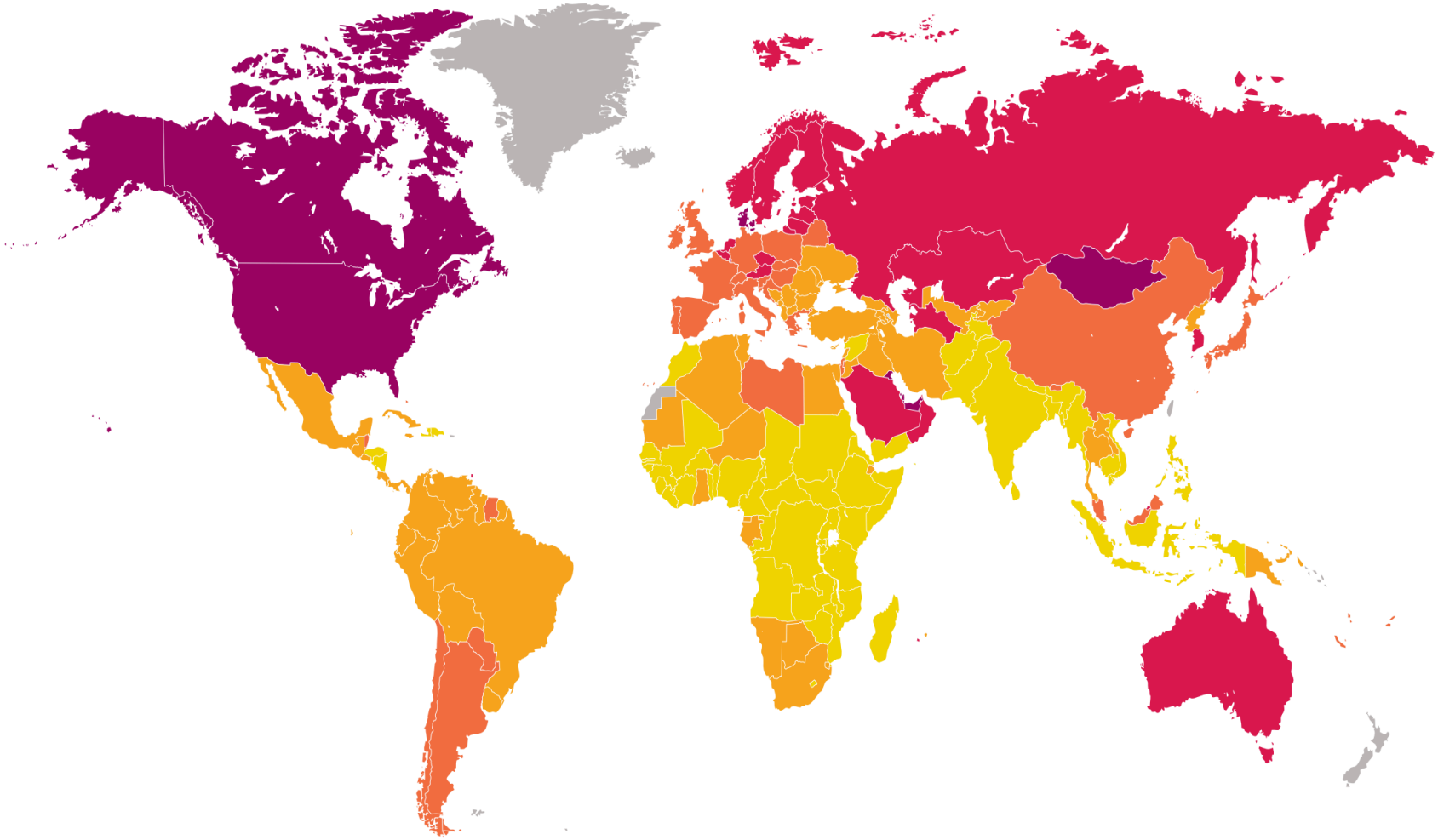


Figure 7: Global map of Ecological Footprint of consumption, 2014
Total Ecological Footprint is a function of both total population and rates of consumption. A country's consumption includes the Ecological Footprint it produces, plus imports from other countries, minus exports [3].

Global Deforestation

DEFORESTATION FRONTS

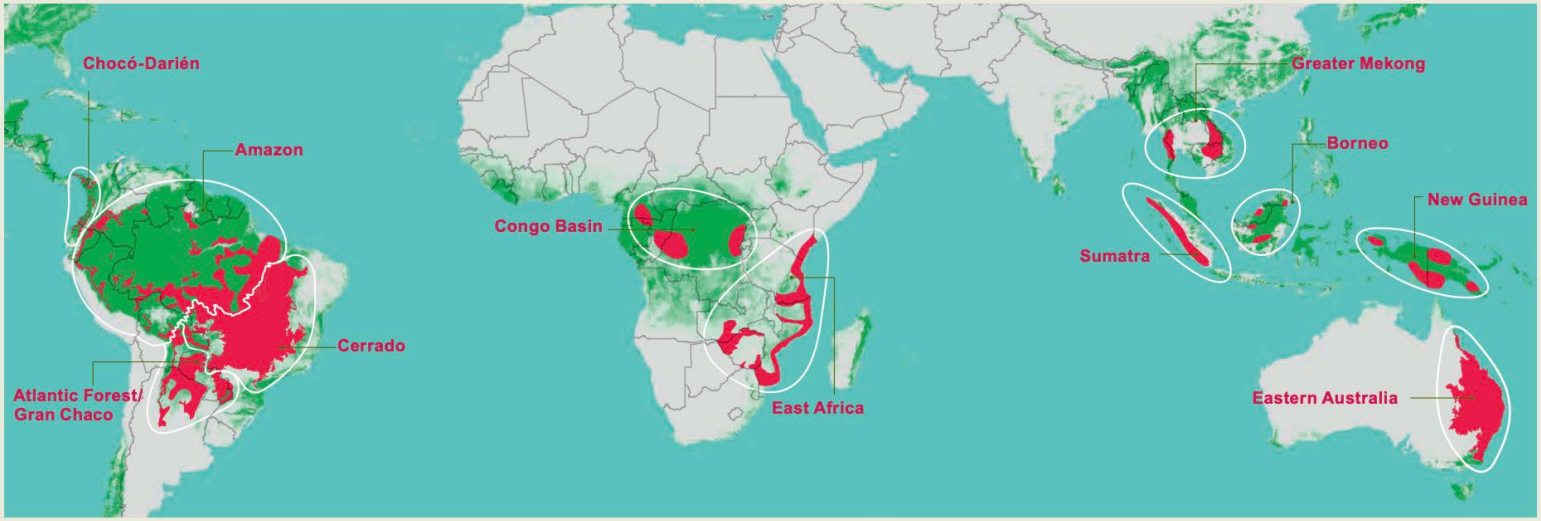


Figure 10:
Hotspots of projected forest loss between 2010 and 2030[59].

Key

- Forest
- Deforestation fronts and projected deforestation, 2010-2030

Global Biodiversity Loss

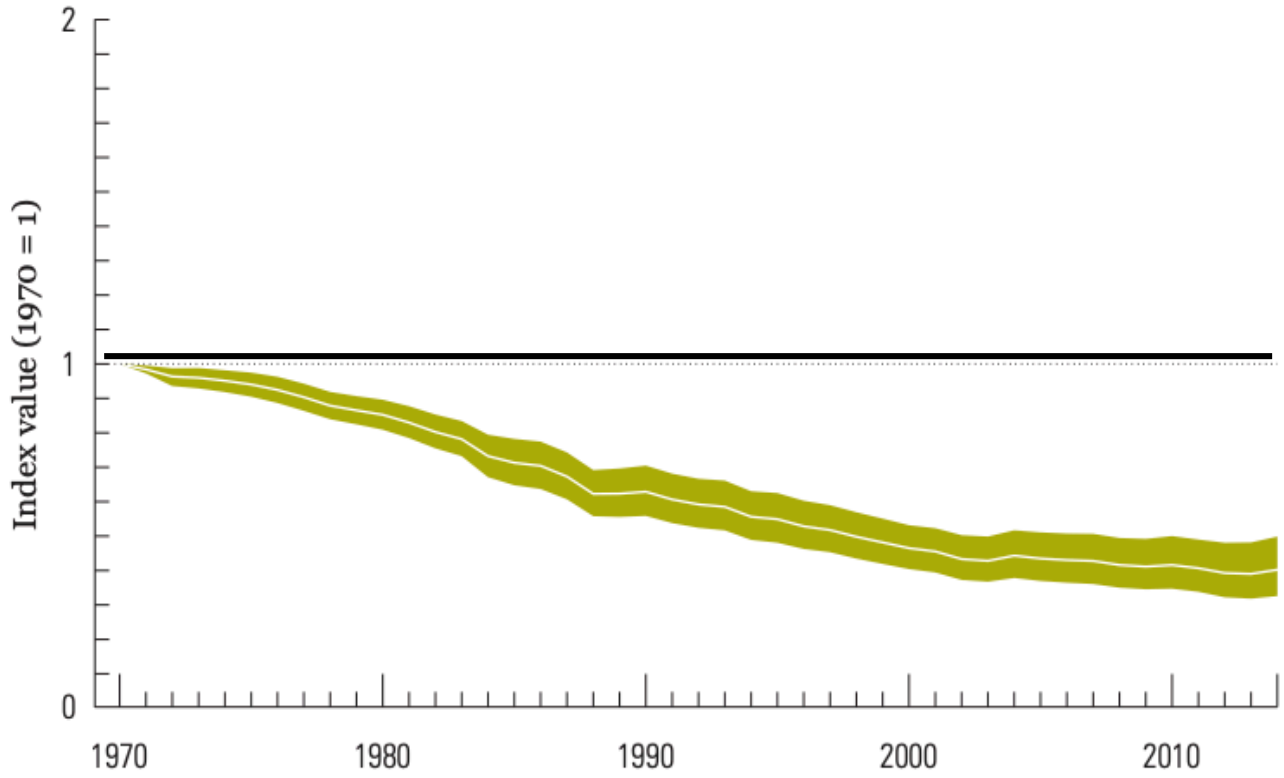


Figure 20: The Global Living Planet Index: 1970 to 2014

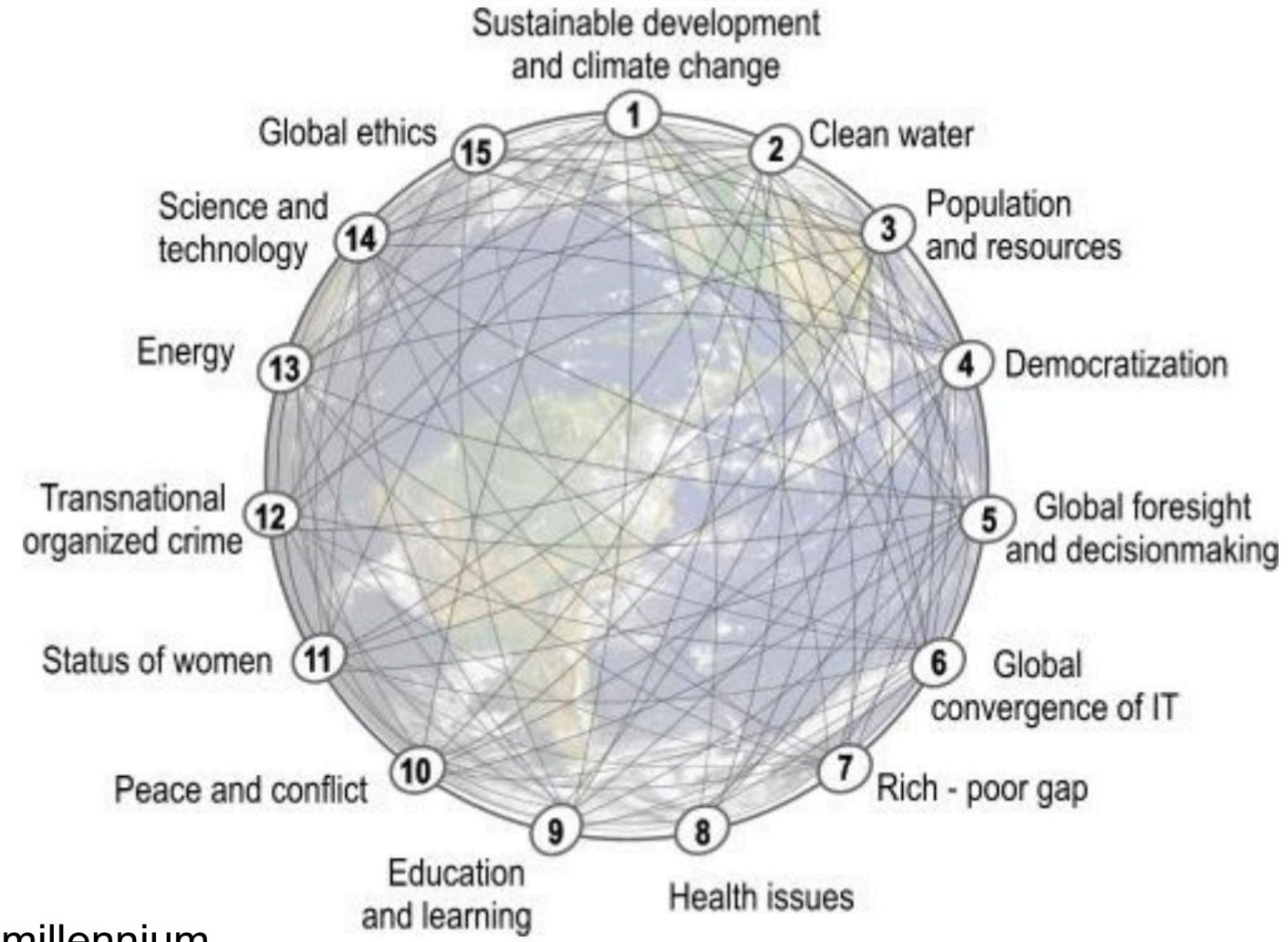
Average abundance of 16,704 populations representing 4,005 species monitored across the globe declined by 60%. The white line shows the index values and the shaded areas represent the statistical certainty surrounding the trend (range: -50% to -67%)[1].

Key

Global Living Planet Index

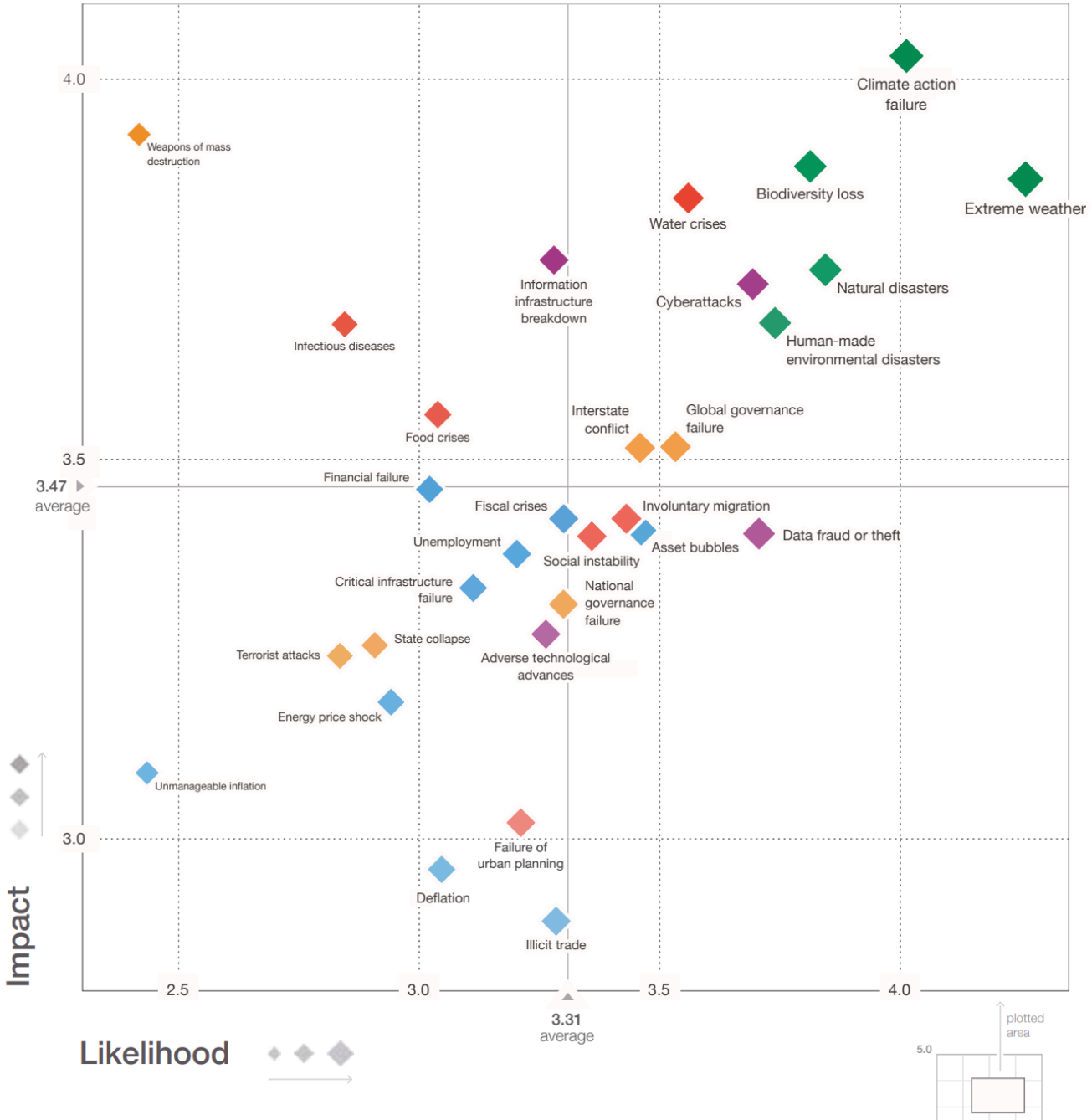
Confidence limits

The Millennium Project
15 Global Challenges

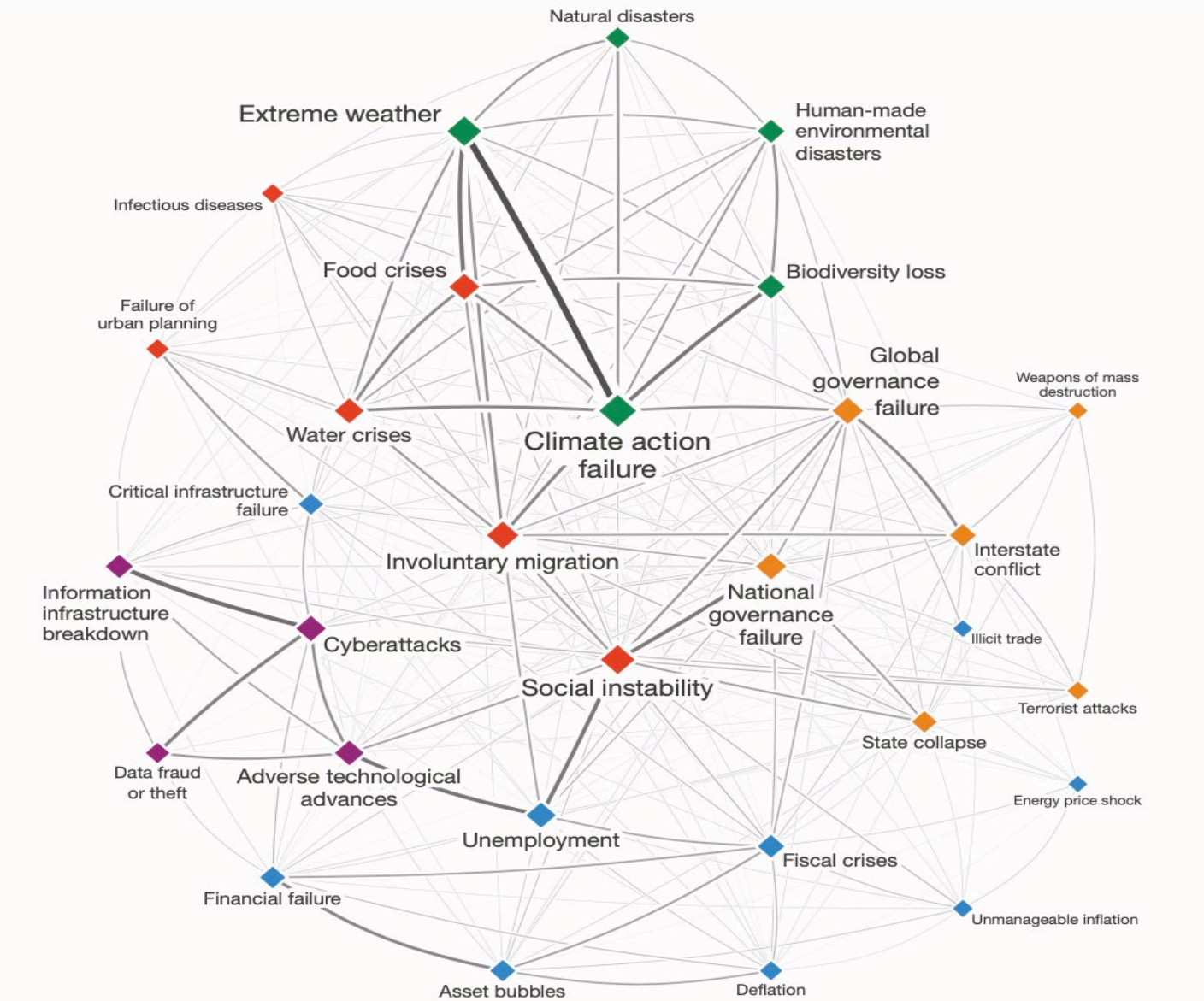


http://www.millennium-project.org/projects/challenges/

World Economic Forum Global Risk 2020 Landscape



WEF Global Risks Interconnections Map 2020



WEF Short Term Risks

FIGURE 1.1

Short-Term Risk Outlook

Percentage of respondents expecting risks to increase in 2020

Multistakeholders

Economic confrontations	78.5%
Domestic political polarization	78.4%
Extreme heat waves	77.1%
Destruction of natural ecosystems	76.2%
Cyberattacks: infrastructure	76.1%
Protectionism on trade/investment	76.0%
Populist and nativist agendas	75.7%
Cyberattacks: theft of money/data	75.0%
Recession in a major economy	72.8%
Uncontrolled fires	70.7%

Global Shapers

Extreme heat waves	88.8%
Destruction of ecosystems	87.9%
Health impacted by pollution	87.0%
Water crises	86.0%
Uncontrolled fires	79.8%
Economic confrontations	78.4%
Loss of trust in media sources	77.1%
Loss of privacy (to companies)	76.2%
Loss of privacy (to governments)	76.1%
Domestic political polarization	75.3%

Economic Environmental Geopolitical Societal Technological

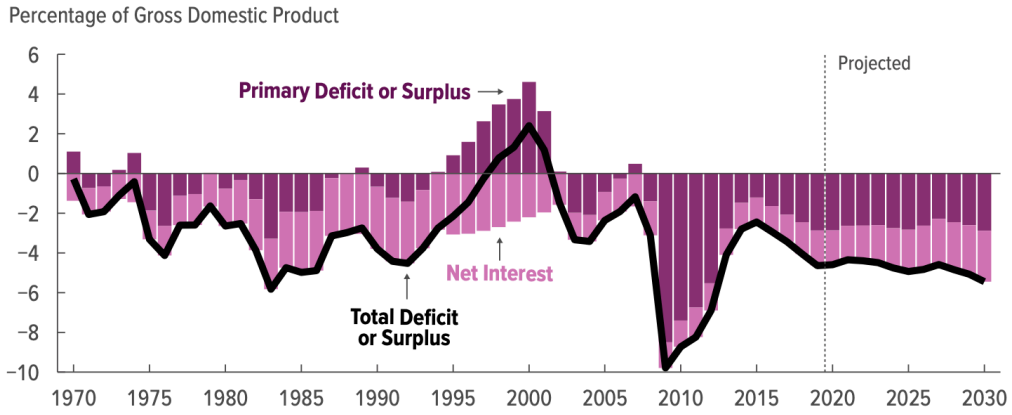
Note: The Global Shapers Community is the World Economic Forum's network of young people driving dialogue, action and change.
Source: World Economic Forum Global Risks Perception Survey 2019-2020. See Appendix B for details.

UN Sustainability Development Goals

U.S. Economic Status

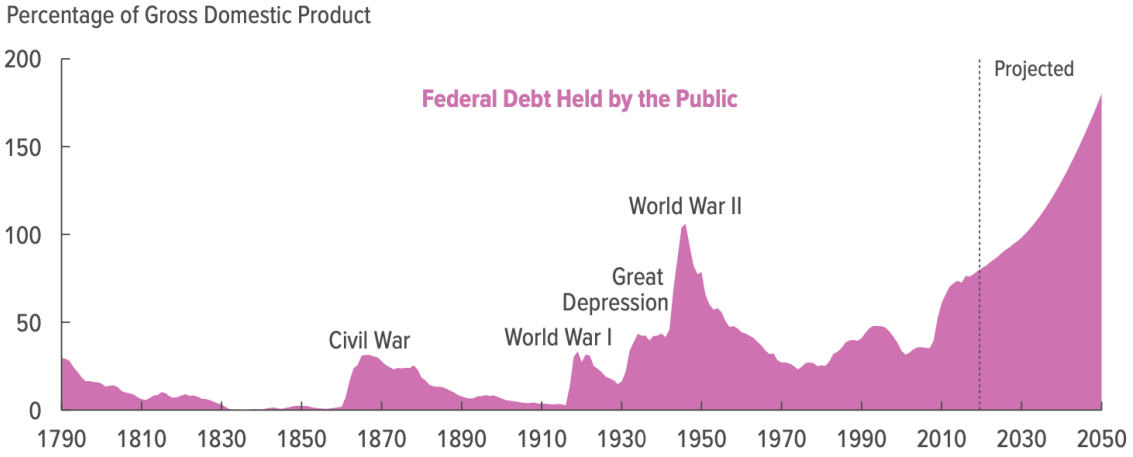
Deficits and Debt

CBO estimates a 2020 deficit of $1.0 trillion, or 4.6 percent of GDP. The projected gap between spending and revenues increases to 5.4 percent of GDP in 2030. Federal debt held by the public is projected to rise over the coming decade, from 81 percent of GDP in 2020 to 98 percent of GDP in 2030. It continues to grow thereafter in CBO's projections, reaching 180 percent of GDP in 2050, well above the highest level ever recorded in the United States.



Over the 2020–2030 period, primary deficits—that is, deficits excluding net outlays for interest—are projected to average 2.6 percent of GDP. Over the same period, federal debt and interest rates are both projected to rise, causing net outlays for interest to increase steadily, from 1.7 percent of GDP in 2020 to 2.6 percent of GDP in 2030.

See Figure 1-3

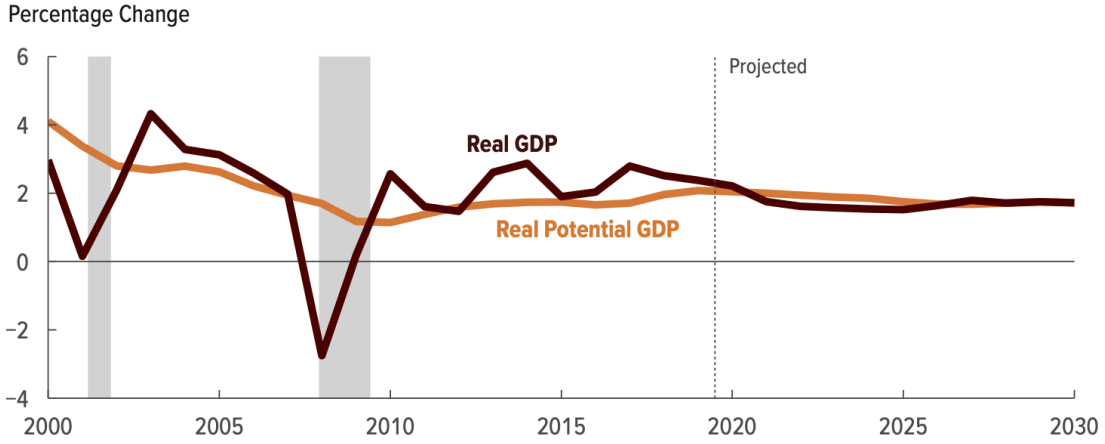


High and rising federal debt would reduce national saving and income, boost the government's interest payments, limit policymakers' ability to respond to unforeseen events, and increase the likelihood of a fiscal crisis.

See Figure 1-4

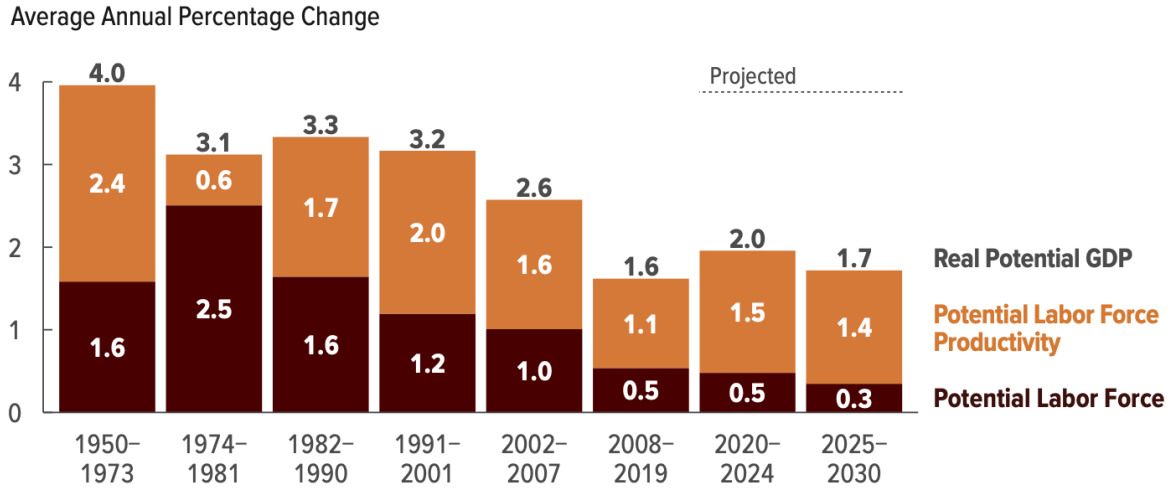
The Economy

Adjusted for inflation, GDP is projected to grow by 2.2 percent in 2020. From 2021 to 2030, output is projected to grow at an average annual rate of 1.7 percent, roughly the same rate as the economy's maximum sustainable output (or potential GDP), which is determined by factors such as the size of the labor force, the average number of hours worked, capital investment, and productivity growth.



In CBO's projections, output grows faster than potential GDP in 2020, largely because of strong consumer spending and a rebound in business fixed investment. In later years, economic growth slows as growth in consumer spending and private investment moderates.

See Figure 2-1



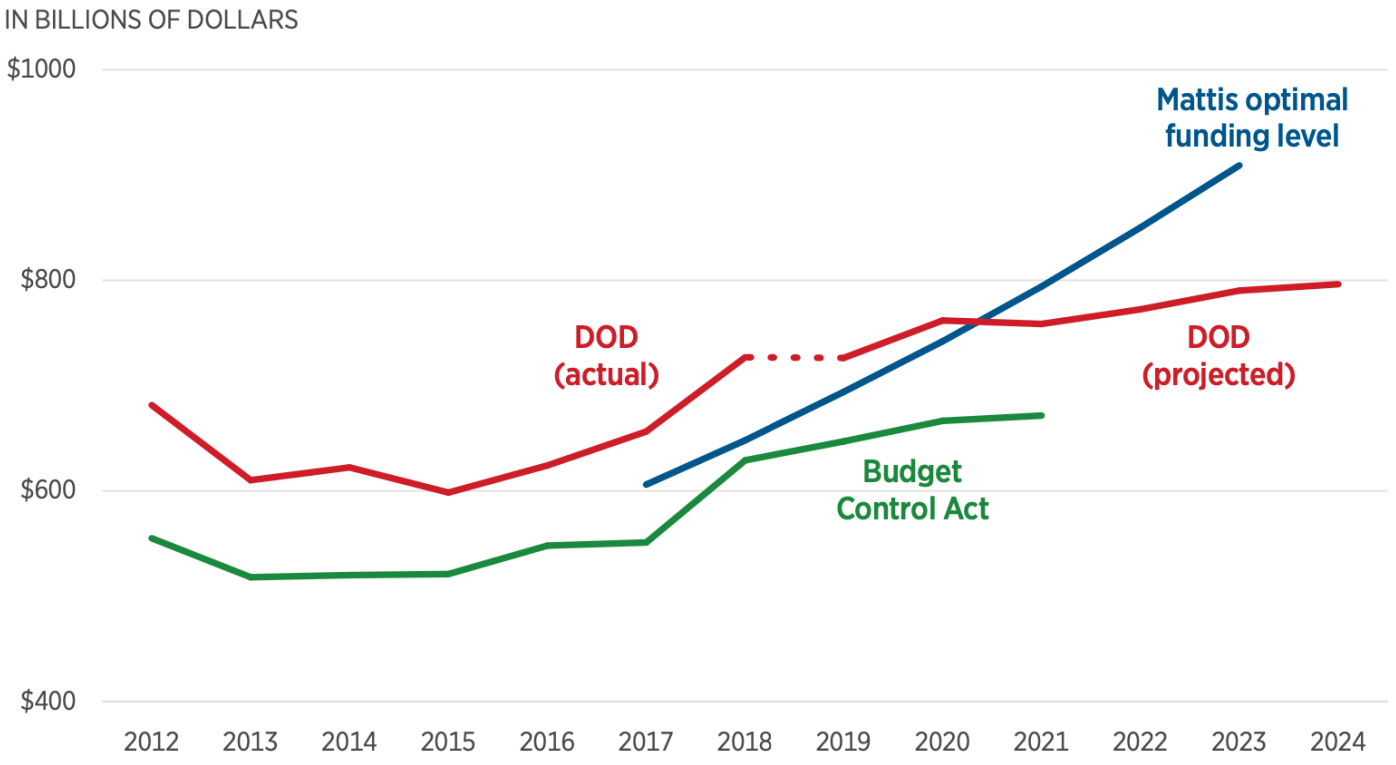
Over the next decade, real potential GDP is projected to grow more slowly than it did before 2008, primarily because the labor force is expected to grow more slowly than it has in the past.

See Figure 2-6

Budget Projections

Defense Spending Improves but Falls Short of Optimal Levels

Despite expected increases, defense spending is projected to fall short of former Defense Secretary Gen. Mattis's optimal funding levels.



NOTES: DOD spending includes mandatory spending (about $9 billion per year) and OCO spending, which is exempt from the BCA.

https://www.heritage.org/military-strength

FIGURE 4-10

Federal obligations for R&D and R&D plant, by selected agencies: FYs 2008–18

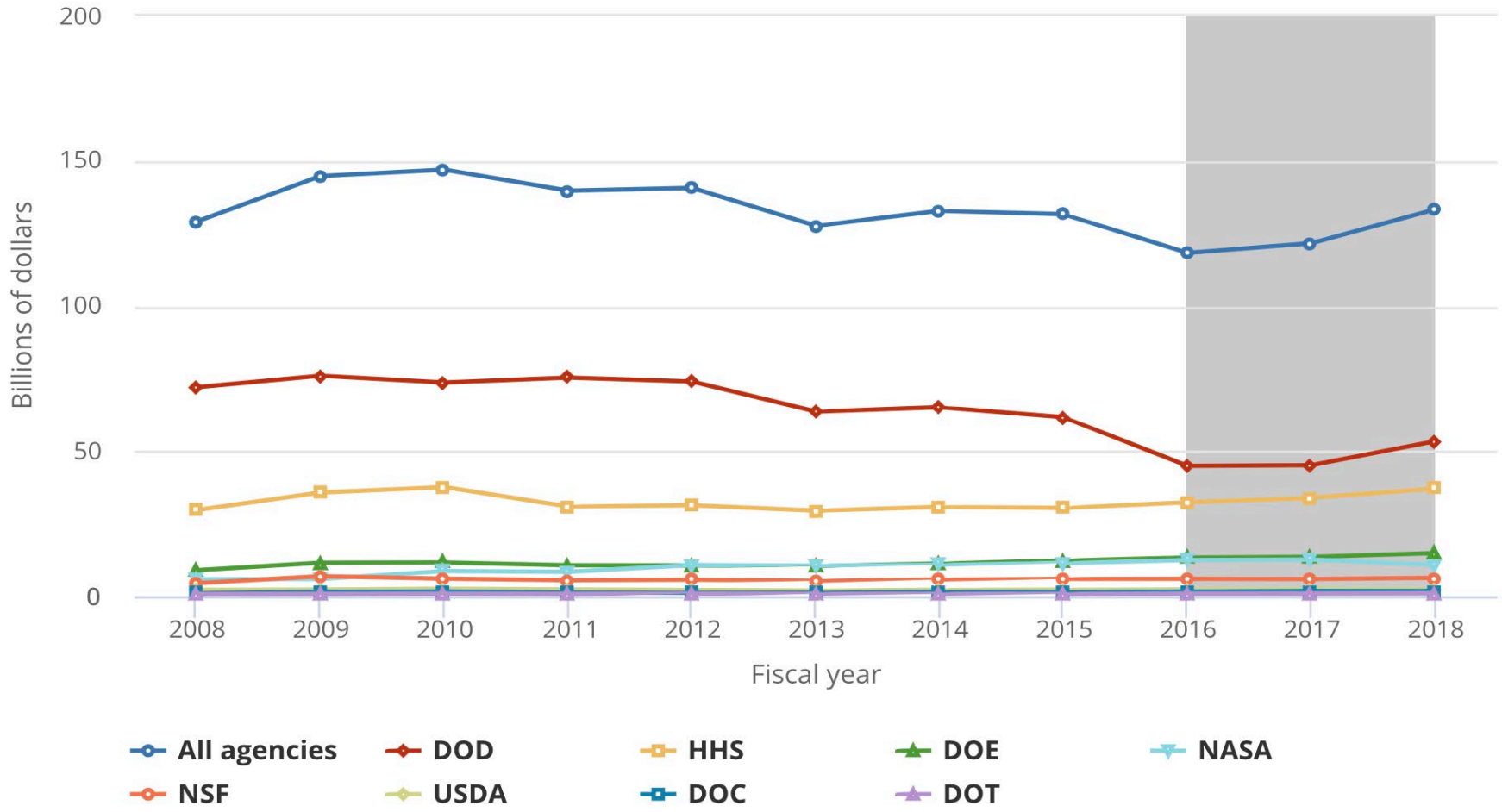


FIGURE 4-7

Gross domestic expenditures on R&D, by the United States, the EU, and selected other countries: 1990–2017

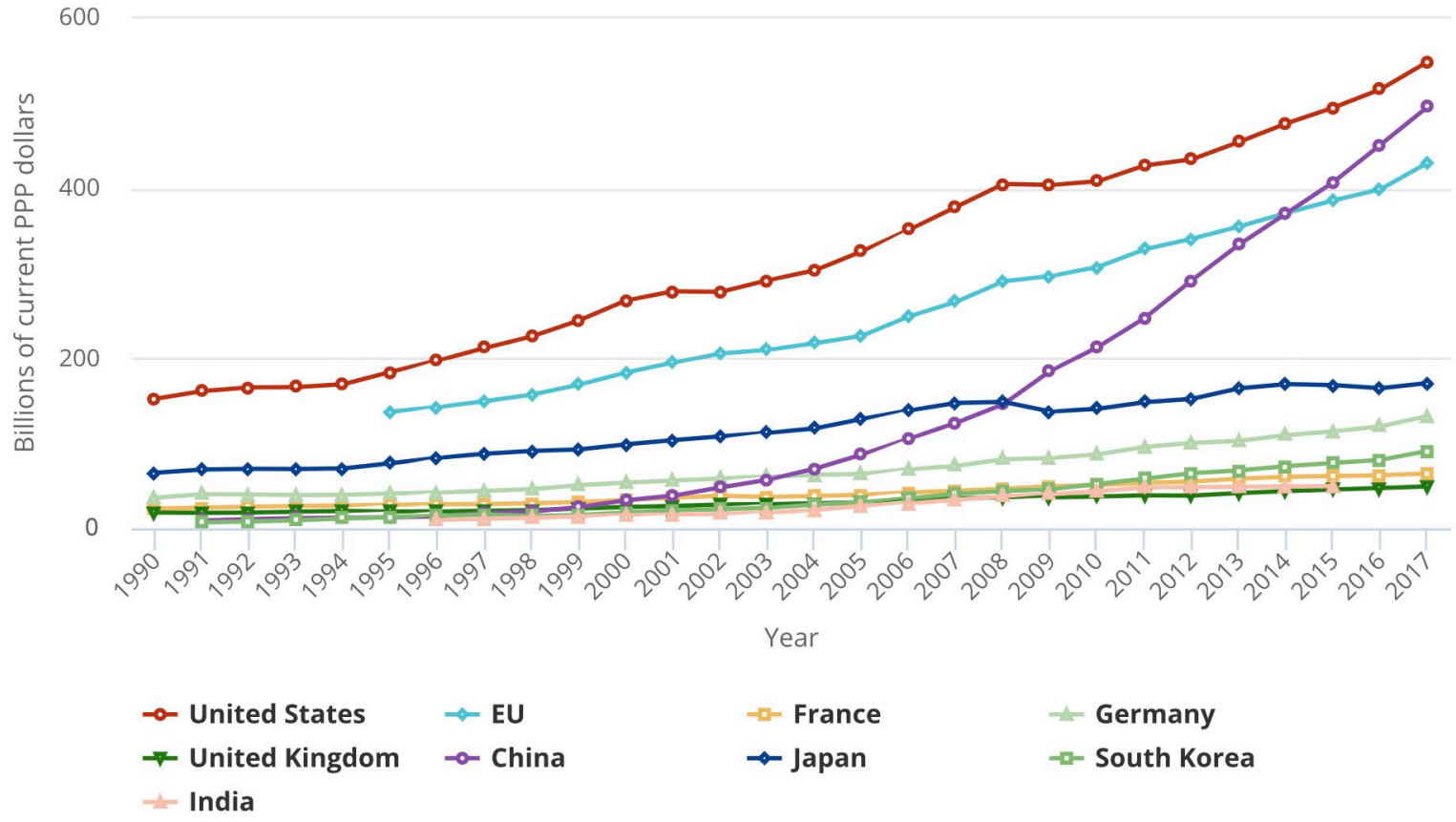
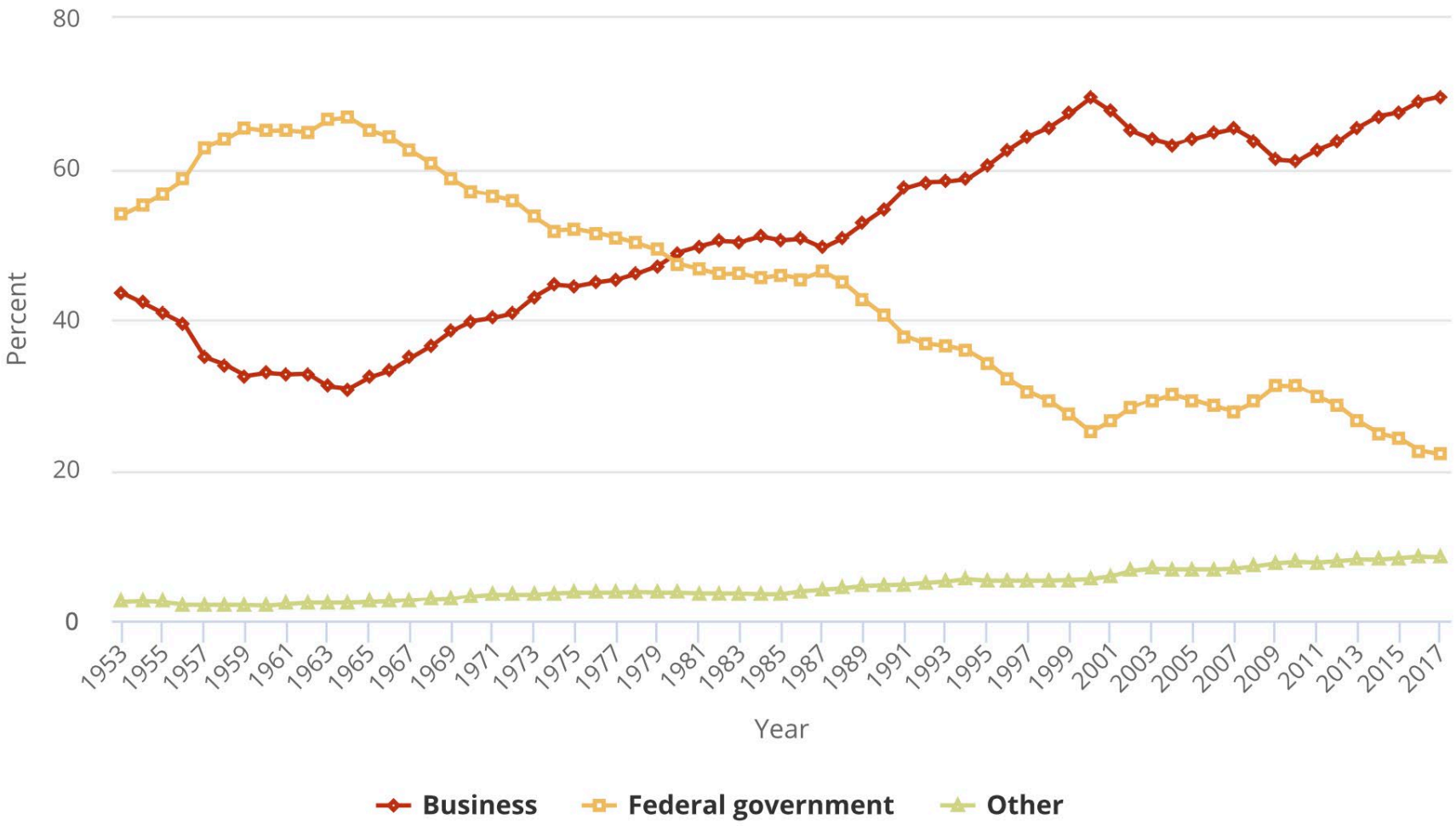
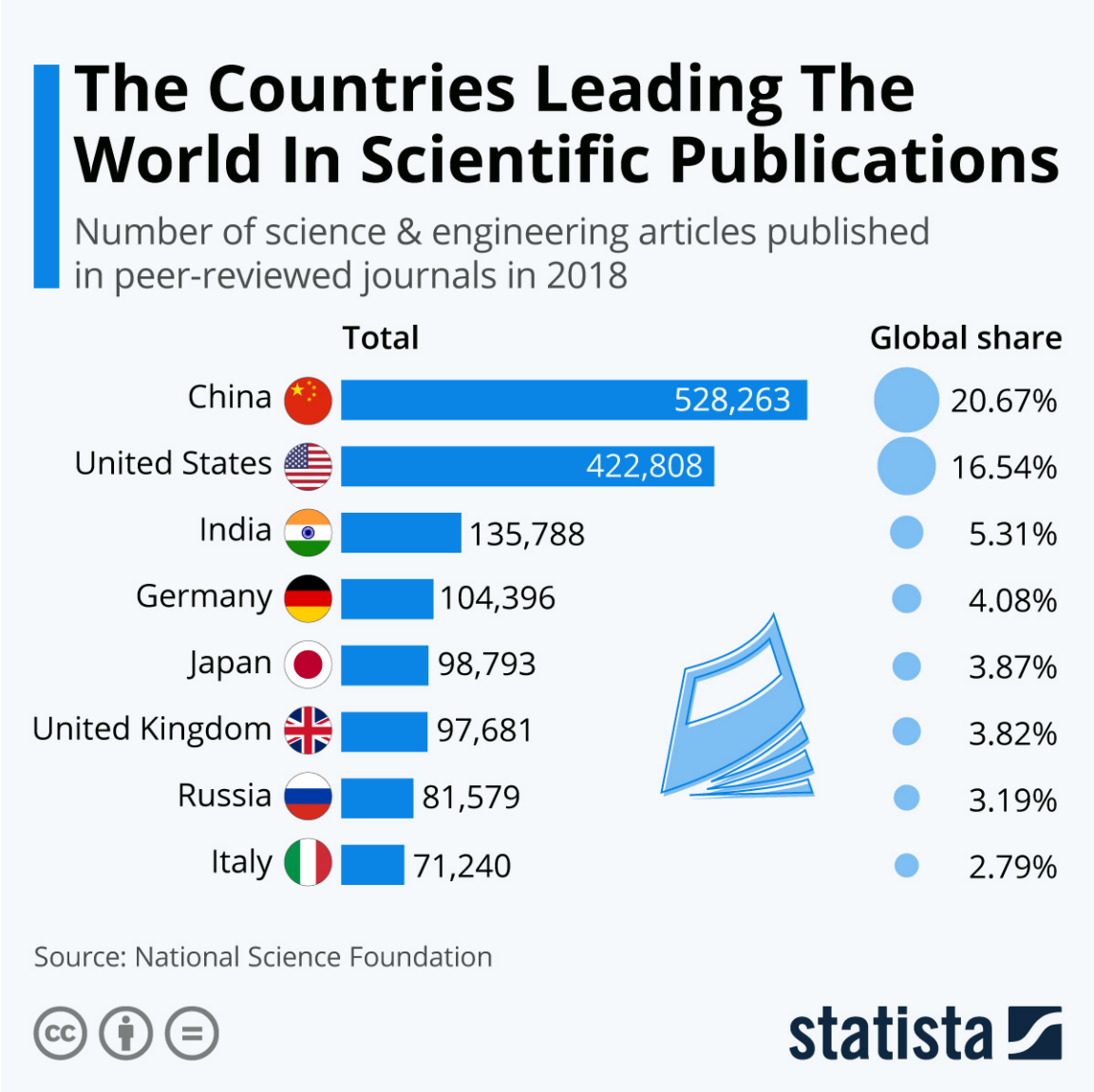


FIGURE 4-4

U.S. total R&D expenditures, by source of funds: 1953–2017

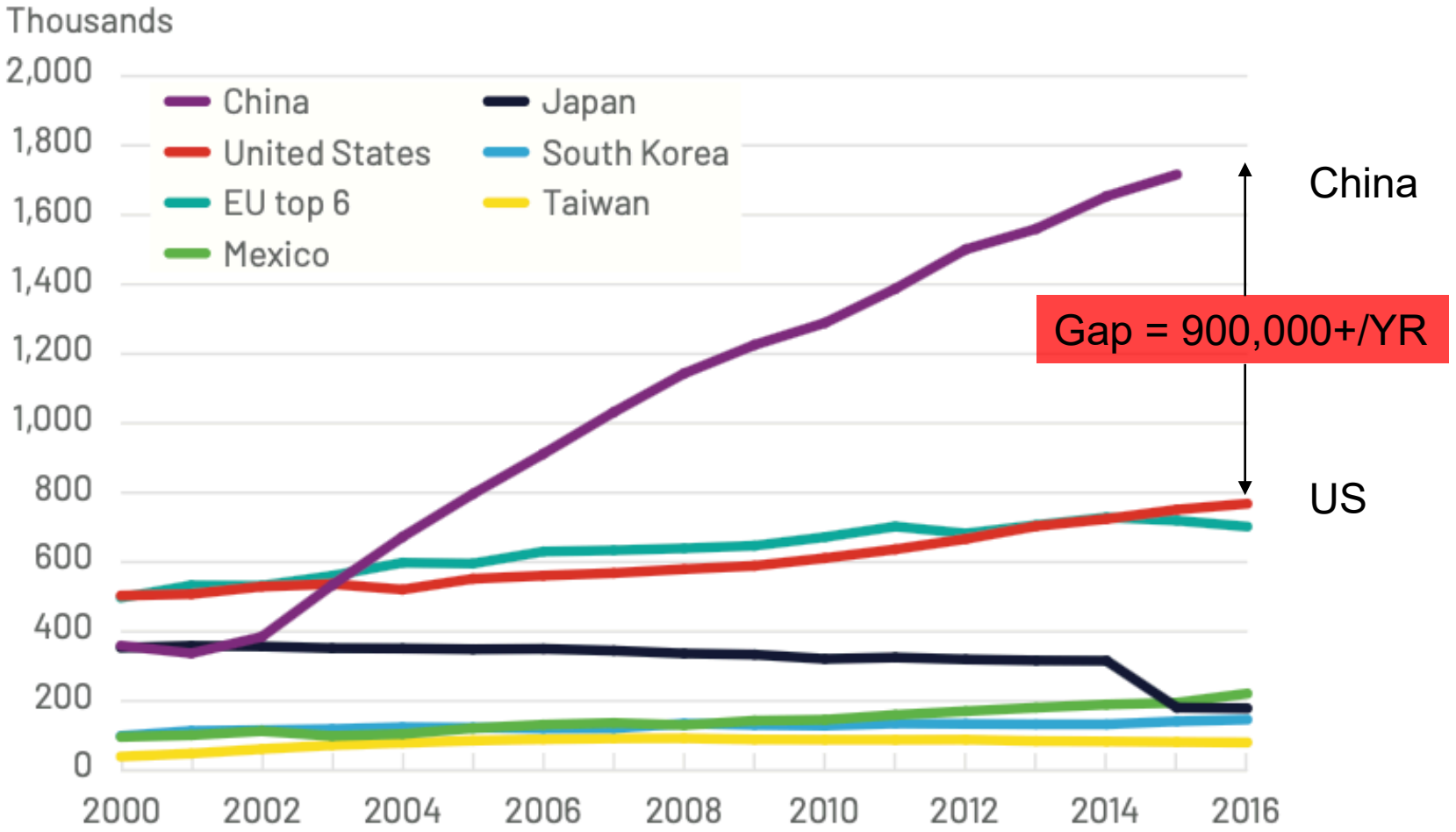


Global R&D Productivity



First University Degrees in S&E

Figure 3. First university degrees in S&E, by selected region, country, or economy: 2000–16



World Economic Forum
Fourth Industrial Revolution

"The scale, scope and complexity of how technological revolution influences our behavior and way of living will be unlike anything humankind has experienced."

Klaus Schwab
Founder and Executive Chairman
World Economic Forum

Key Exponentially Accelerating Technologies:

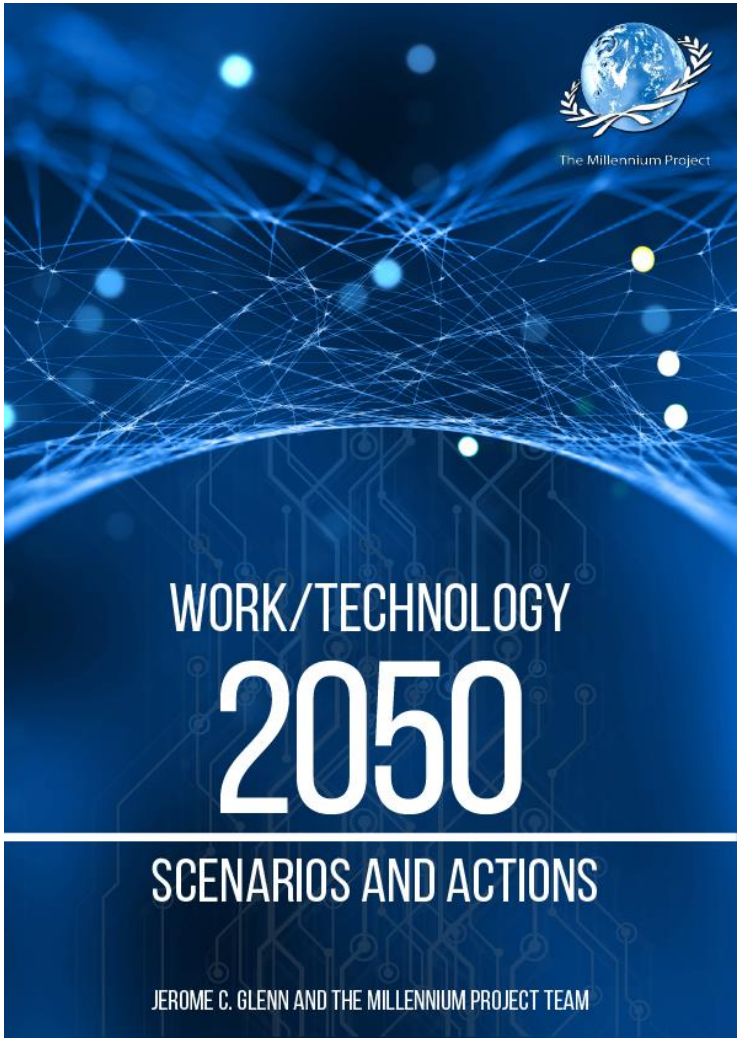
- Big Data and Analytics
- Internet of Things
- 5G Telecommunications
- Mobile & Cloud Computing
- Nano- and Neuro-technologies
- 3D Additive Manufacturing/Digital Thread
- Augmented Reality/Virtual Reality/Mixed Reality
- Blockchain Technologies
- Machine Learning/Artificial Intelligence
- Quantum Technologies
- Synthetic Biology

What Does this Mean?

What are We Doing About it?

What Does our Future Look Like?

The Millennium Project



A Three-Year Global Study

on what to do about Potential Futures for Work and Technology Actions

Jerome C. Glenn, CEO
The Millennium Project

The Millennium Project
Info@Millennium-Project.org

Next Technologies (NT): Imagine How NT Synergies Will Create New Businesses

Artificial Intelligence

Robotics

Synthetic Biology & Genomics

Computational Science

Cloud & Big Data Analytics

Artificial & Augmented Reality

Nanotechnology (two kinds)

IoT, Tele-Everything & Tele-Everybody, the Semantic Web

Quantum computing

Tele-Presence, Holographic Communications

Intelligence augmentation

Collective Intelligence

Blockchain

3D/4D Printing Materials/Biology

Drones, Driverless Cars (and other autonomous vehicles)

Conscious-Technology

Synergies Among These

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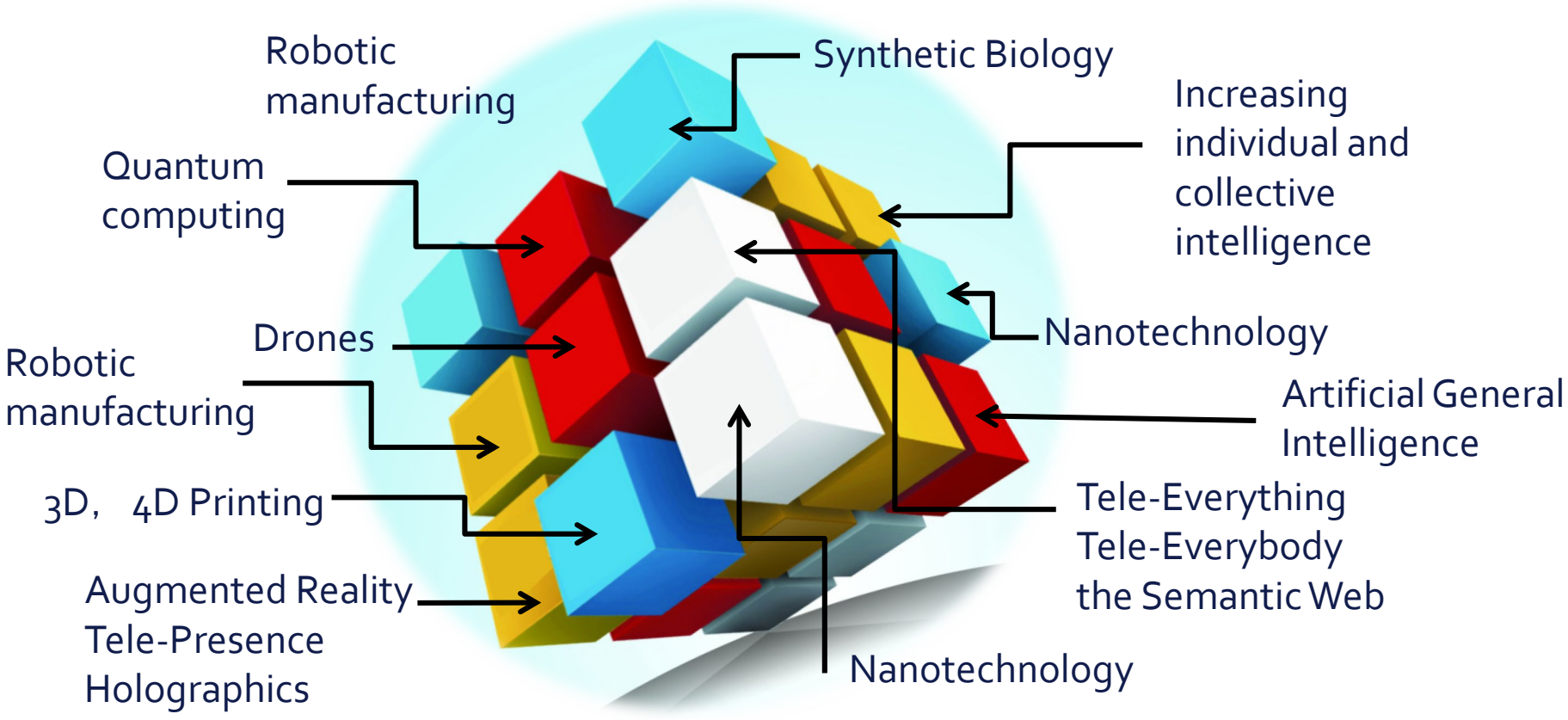
Future Way of Seeing Future of Technologies: Integration and Synergies



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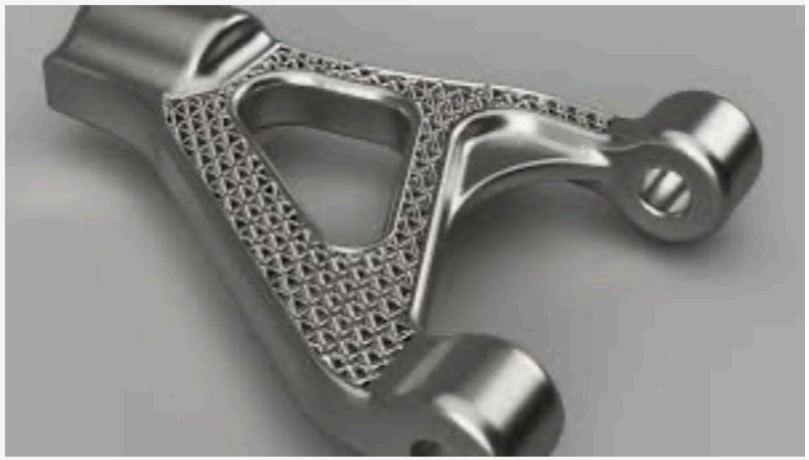
3D Additive Mfg – Integrated & Optimized



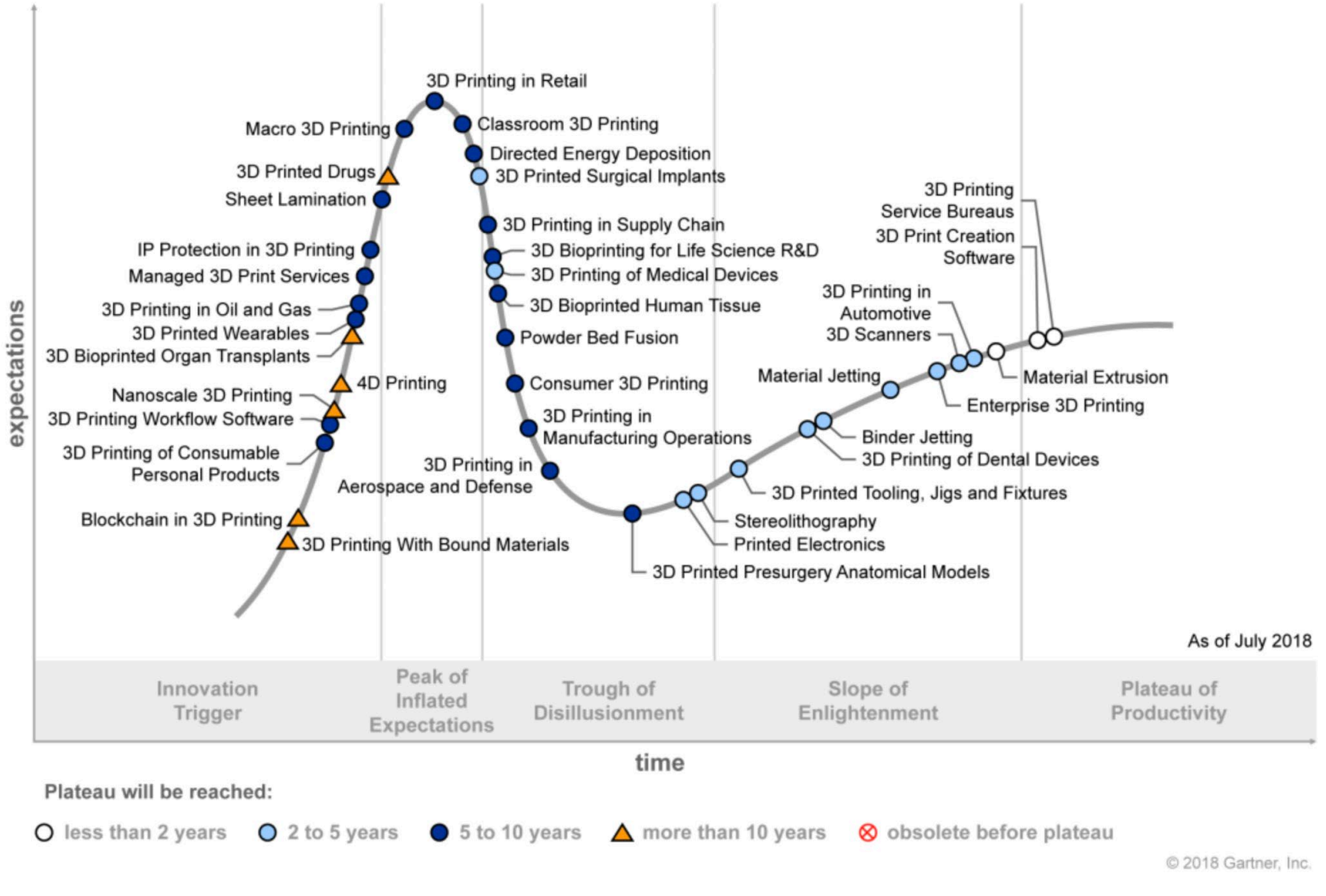
3D Printing or Additive Manufacturing ...
insights.globalspec.com

Additive Manufacturing | What Is ...
autodesk.com

DESIGN OF Mechanical PARTS FOR ADDITIVE ...
dragonfly.am

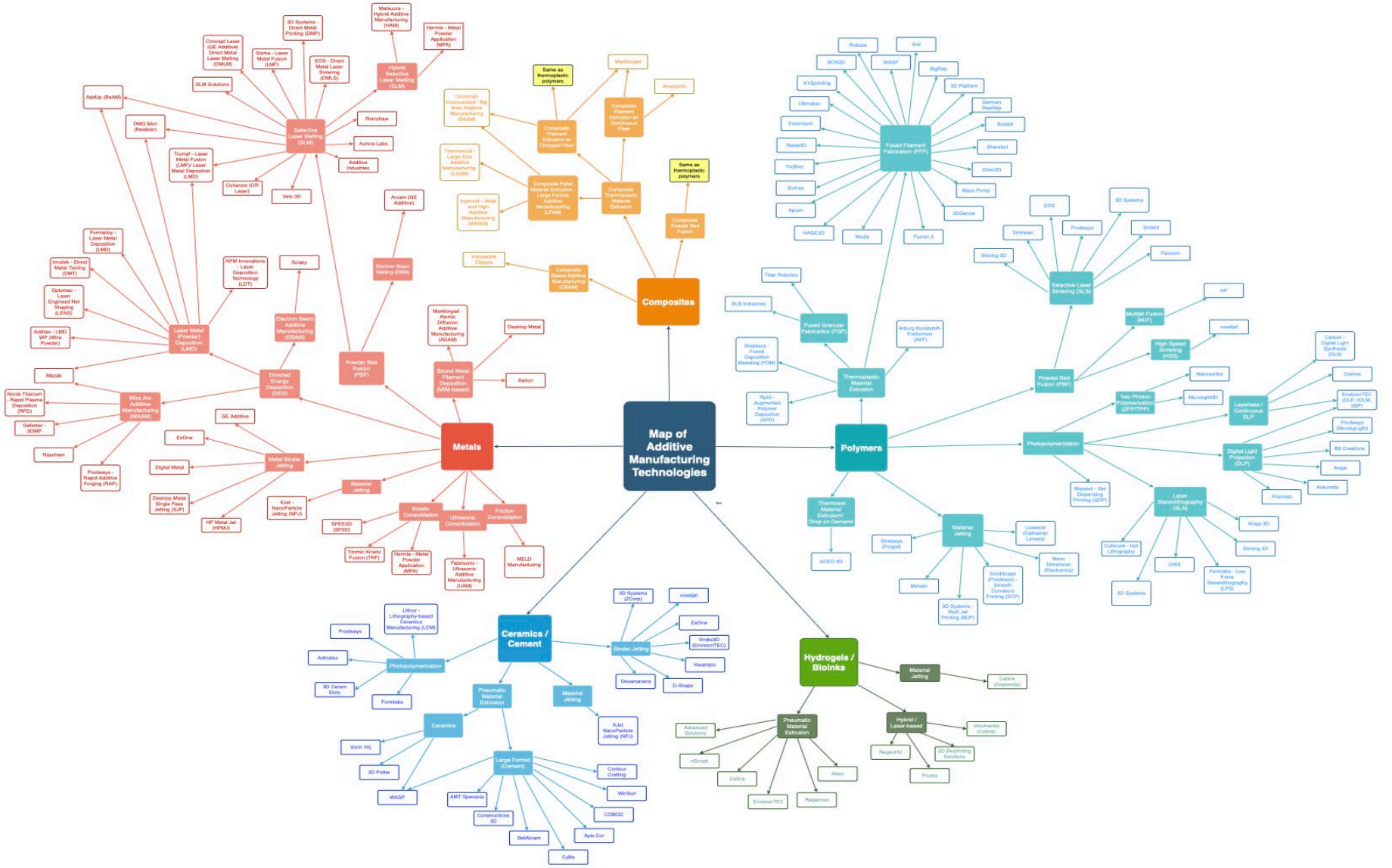
cuts 25% of parts from truck engines
imeche.org

Gartner Hype Curve 3D AM



Source: Gartner (December 2018)

Map of 3D AM Mfg Technologies



The 3D AM Ecosystem

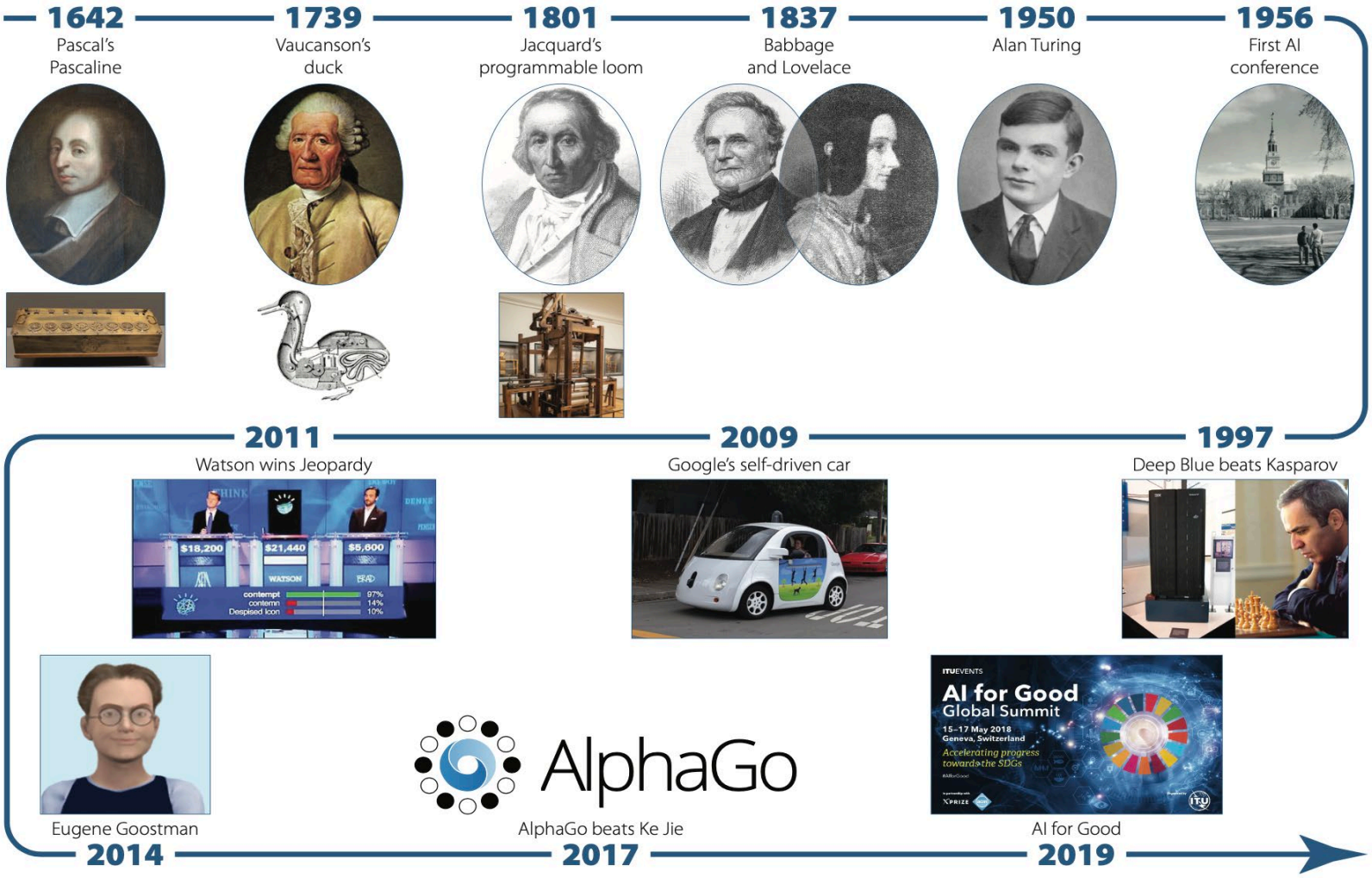
THE ADDITIVE MANUFACTURING LANDSCAPE: 171 COMPANIES & INSTITUTIONS DRIVING THE INDUSTRY FORWARD (APRIL 2019)

AMFG / Autonomous Manufacturing

AI Timeline

Figure 1

The AI Timeline



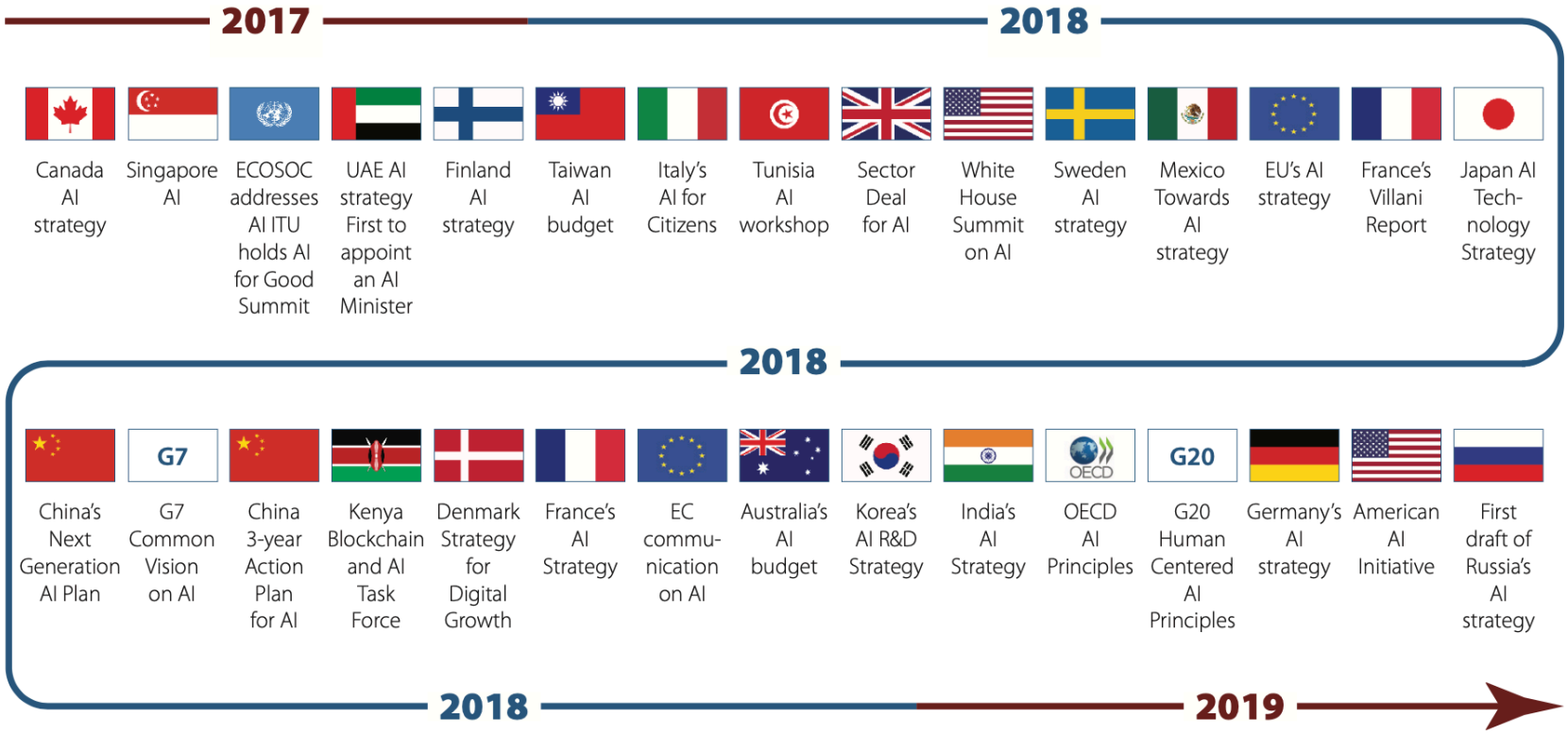
Source: GTCI team.

Photos of Pascaline and Jacquard's loom courtesy of Bruno Lanvin. Photo of Dartmouth College Baker Library courtesy of Dartmouth College Library. Photo of Deep Blue by James the photographer – https://www.flickr.com/photos/22453761@N00/592436598/, CC BY 2.0, https://commons.wikimedia.org/w/index.php?curid=3511068. Photo of Garry Kasparov Copyright 2007, S.M.S.I., Inc. – Owen Williams, The Kasparov Agency. – http://www.kasparovagent.com/photo_gallery.php, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=4507359. Photo of Google's self-driven car by Grendelkhan – Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=47467048.

Global AI Snapshot

Figure 4

The growing number of AI strategies around the world (2017–2019)

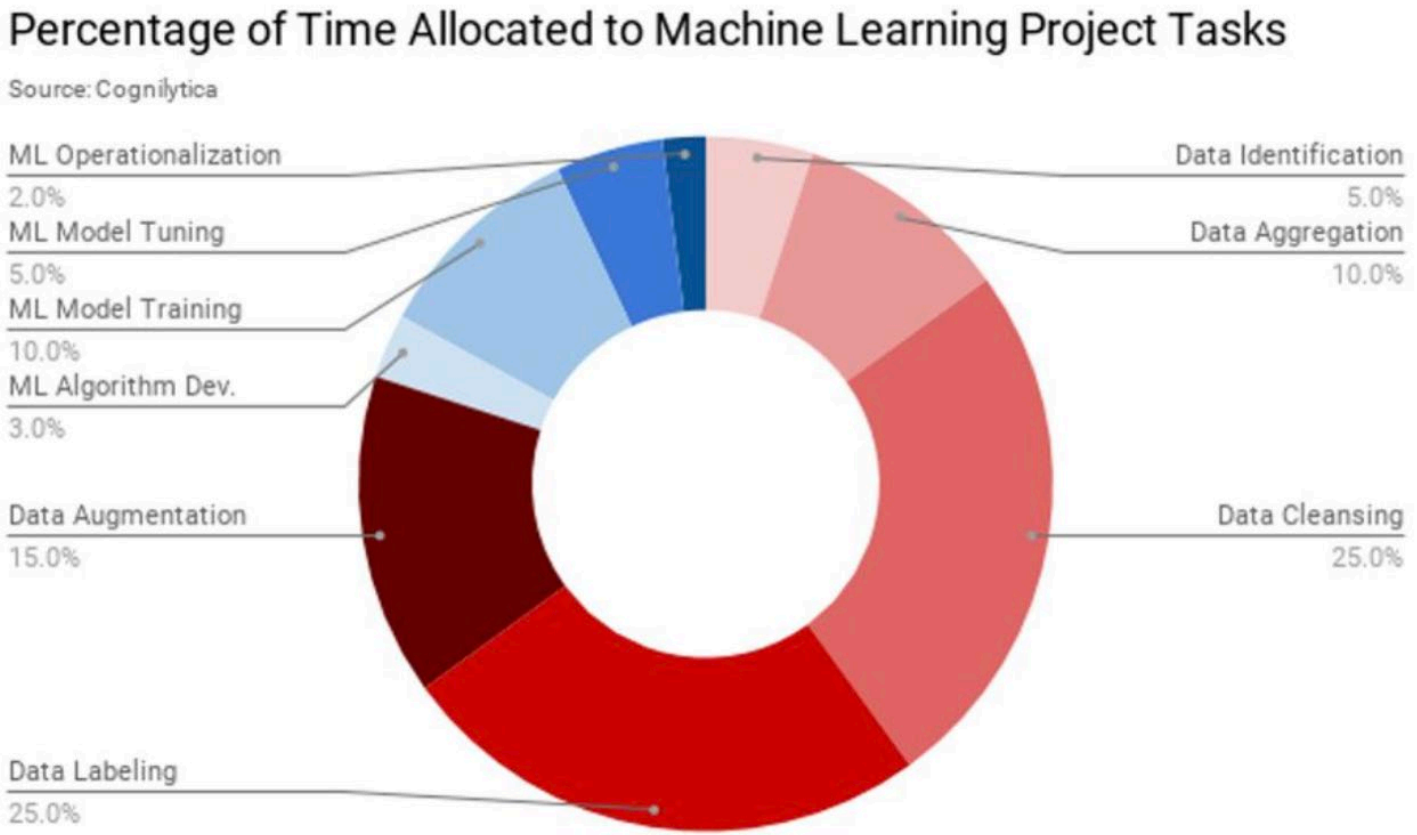


Sources: GTCI team, based on data from Dutton (2018) and the Future of Life Institute (2019).

"VentureBeat: I did a call with Nvidia about their tracking of AI. They said they're aware of between 12,000 and 15,000 AI startups right now."

AI – Where the Time & Effort are Spent

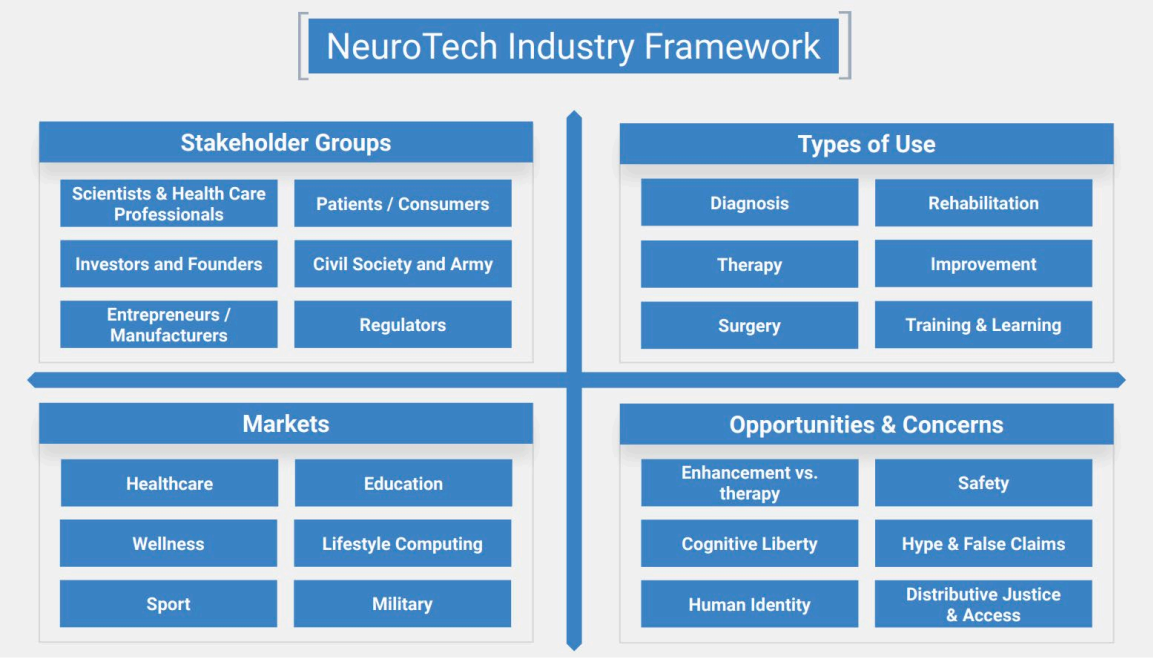
According to analyst firm Cognilytica, over 80% of AI project time is spent preparing and labeling data for use in machine learning projects:



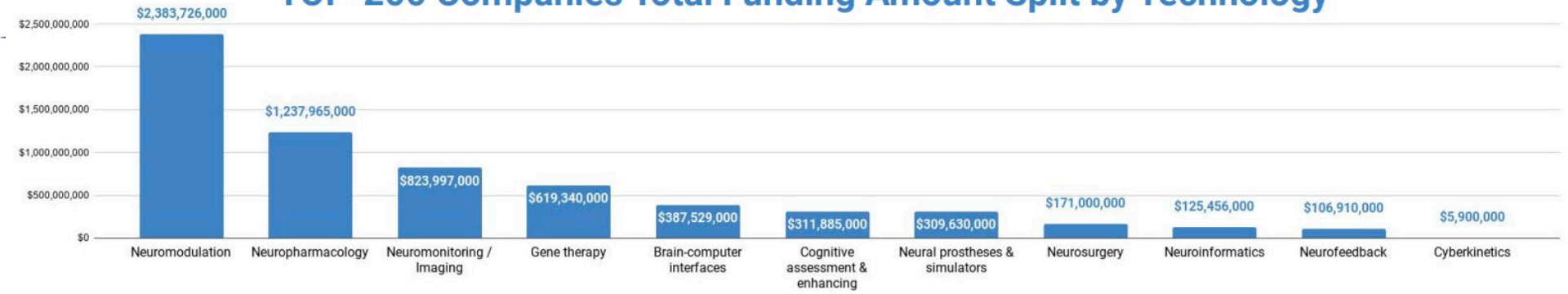
Percentage of time allocated to machine learning tasks (Source: Cognilytica) COGNILYTICA

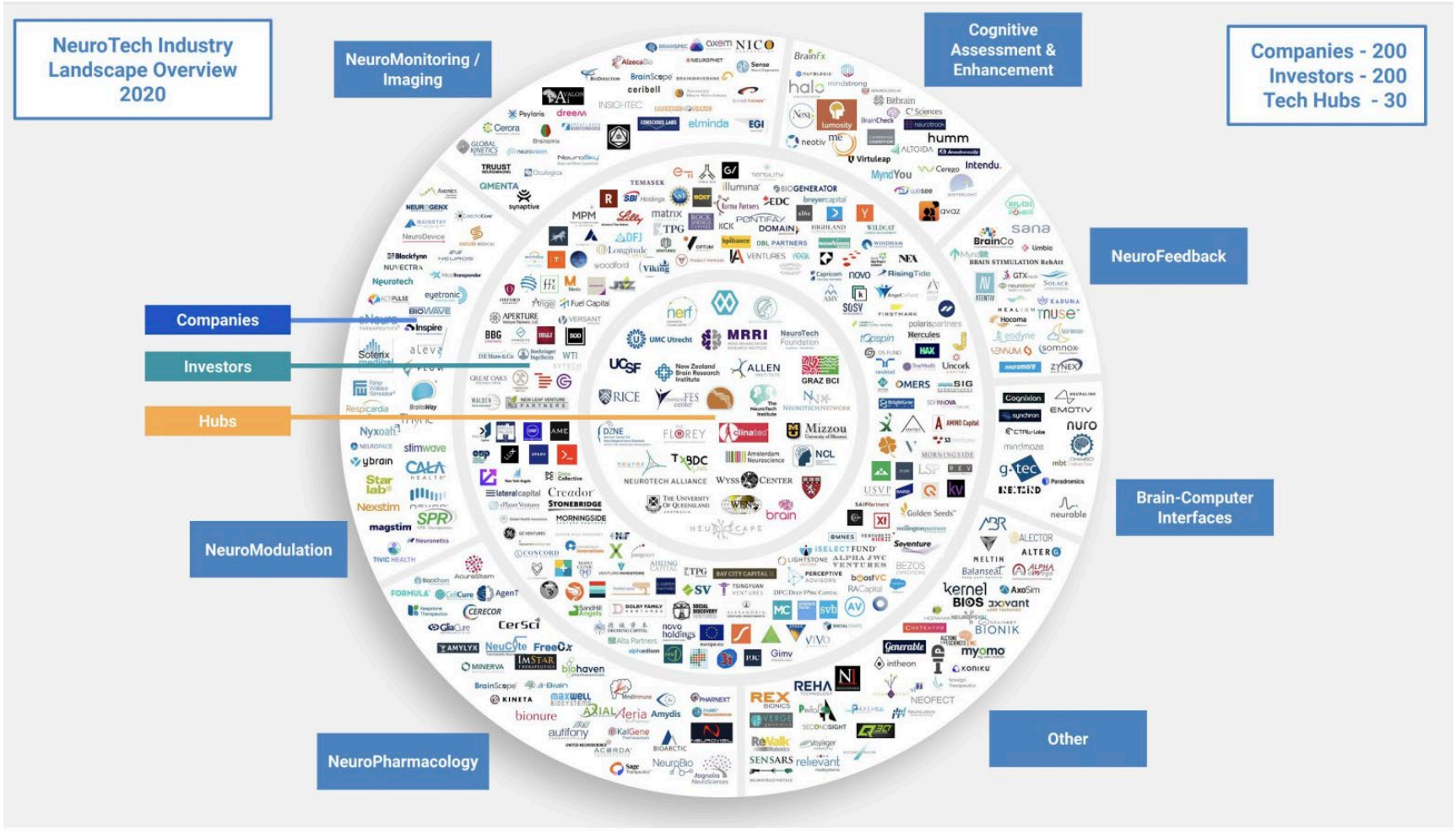
Neurotechnology

- Over $19 billion has been invested in NeuroTech companies in the last 20 years
- There are currently over 200 NeuroTech companies in the world
- The country with the most NeuroTech companies is the US with 121. Canada has 14, the UK has 13, Switzerland has 8, Israel has 7, and France has 6.
- There are currently over 200 NeuroTech investors in the world
- The country with the most NeuroTech investors in the US with 136. Japan and the UK both have 10, Canada has 7, China and France both have 6.
- The value of NeuroTech patents was $2 billon USD in 2015



TOP-200 Companies Total Funding Amount Split by Technology





What We Can Expect…

What 2034 Will Bring

If I keep up my exercise schedule, I stand a good chance of experiencing computers thirty years from now. According to Moore's Law, computer power doubles every 18 months, meaning that computers will be a **million times more powerful** by 2034. According to Nielsen's Law of Internet bandwidth, connectivity to the home grows by 50% per year; by 2034, we'll have **200,000 times more bandwidth**.

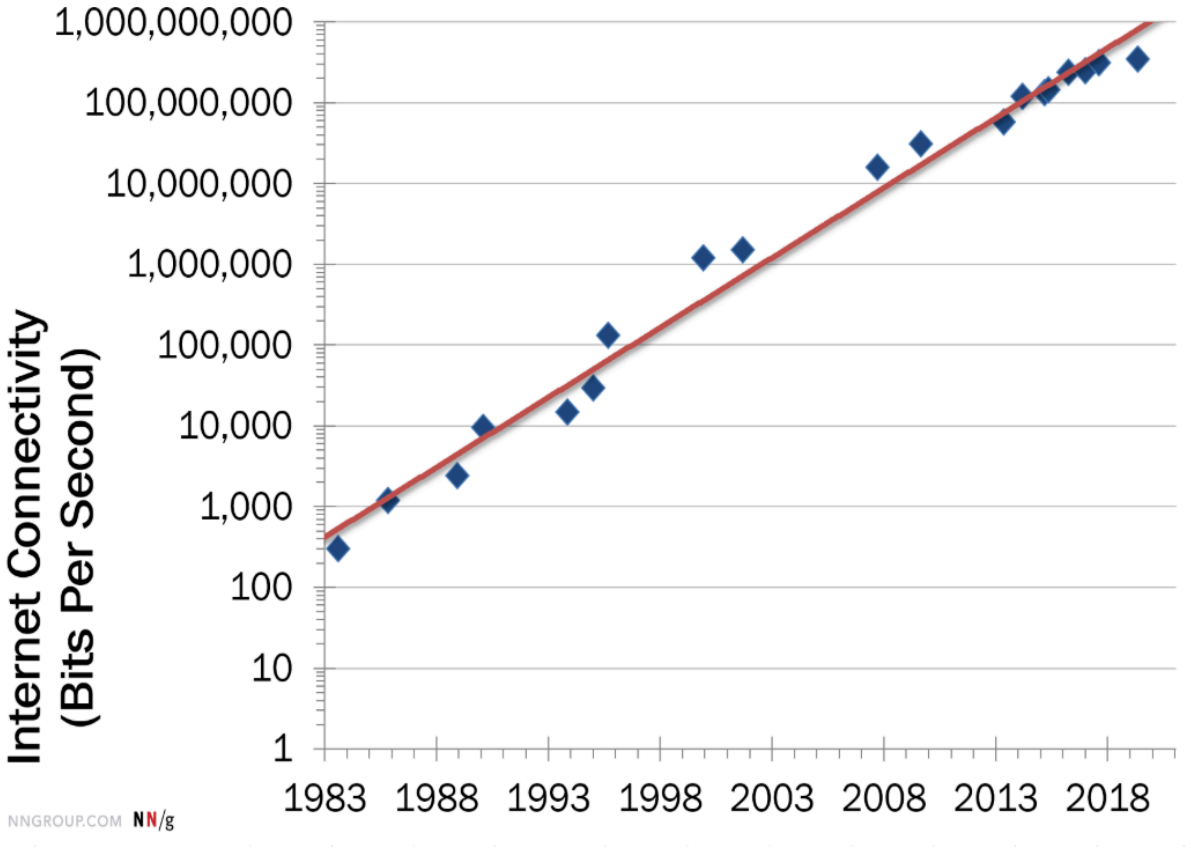
That same year, I'll own a computer that runs at **3 PHz CPU speed**, has a **petabyte of memory**, half an exabyte of hard-disk–equivalent storage, and connects to the Internet with a bandwidth of a **quarter terabit per second** (peta is 10^{15}, or a million giga; exa is 10^{18}, or a billion giga).

The specifics may vary: instead of following current Moore's Law trajectories to speed up a single CPU, it's likely that we'll see multiprocessors, smart dust, and other ways of getting the equivalent power through a more advanced computer architecture. But users shouldn't have to care about such implementation details.

		Annualized Growth Rate	Compound Growth Over 10 Years
Nielsen's law	Internet bandwidth	**50%**	57×
Moore's law	Computer power	**60%**	100×

https://www.nngroup.com/articles/30-years-with-computers/

Neilson's Law of Internet Bandwidth



https://www.nngroup.com/articles/30-years-with-computers/

Exponential Data Growth

Exponential data growth

44 billion GB

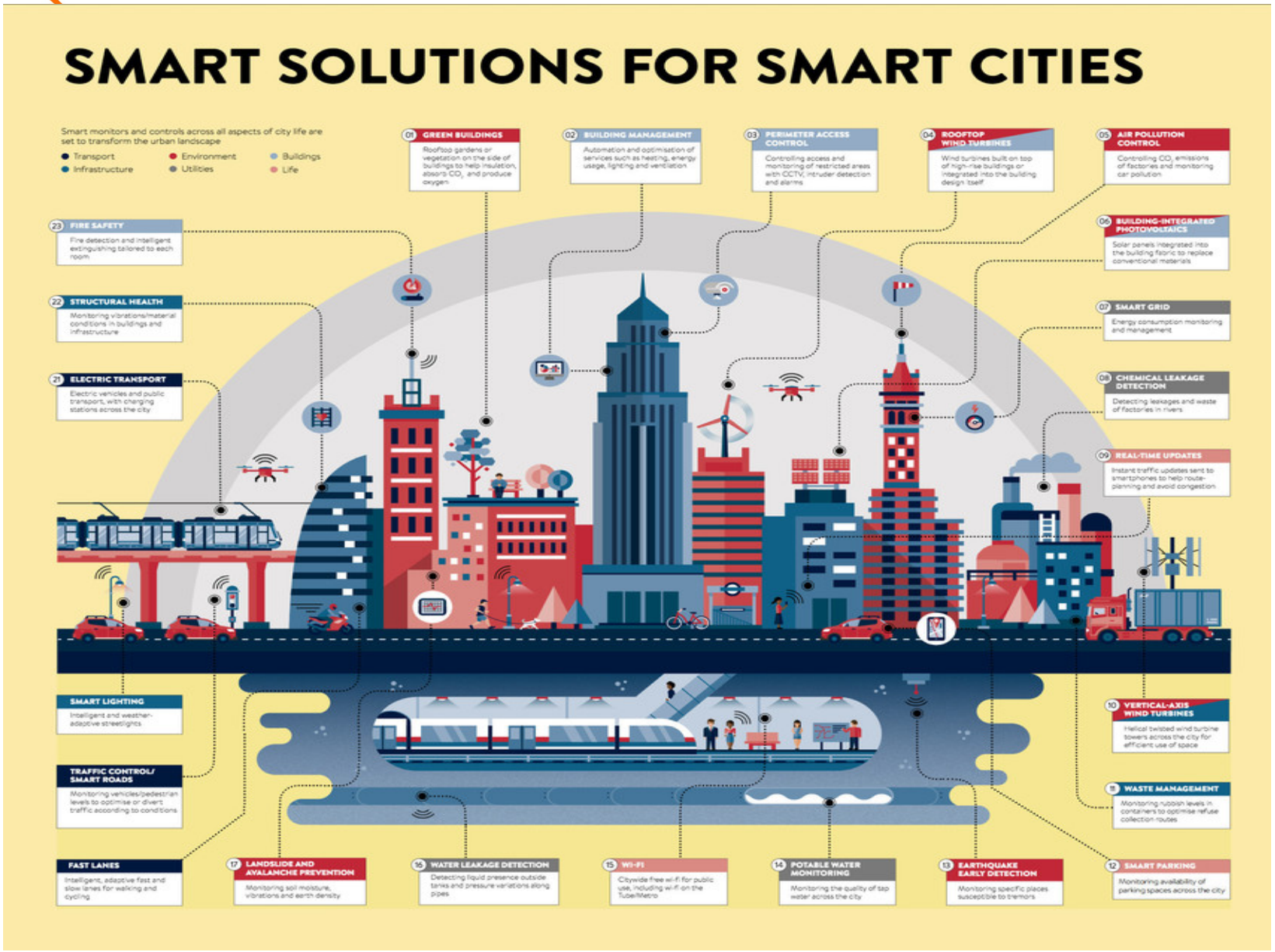
of data were created every day in 2016

463 billion GB

of data will be generated daily by 2026[4]

Source: Micro Focus, Growth of Data – 2017, Linkedin SlideShare, November 6, 2017.

WEF Smart Cities



NASA Urban Air Mobility Initiative

ADVANCED AIR MOBILITY (AAM) PROJECT Home

Advanced Air Mobility (AAM) Announcement of Urban Air Mobility (UAM) Ecosystem Working Groups

Advanced Contested Battlespace Threats

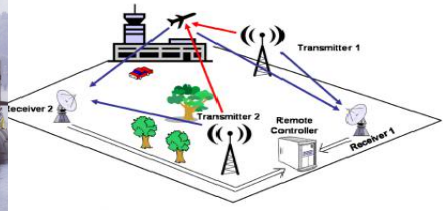


Fig. 1. PCL multistatic configuration

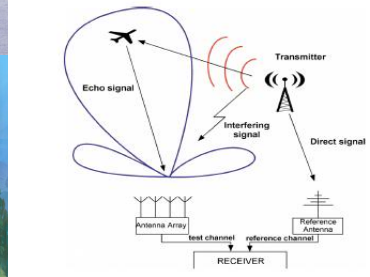
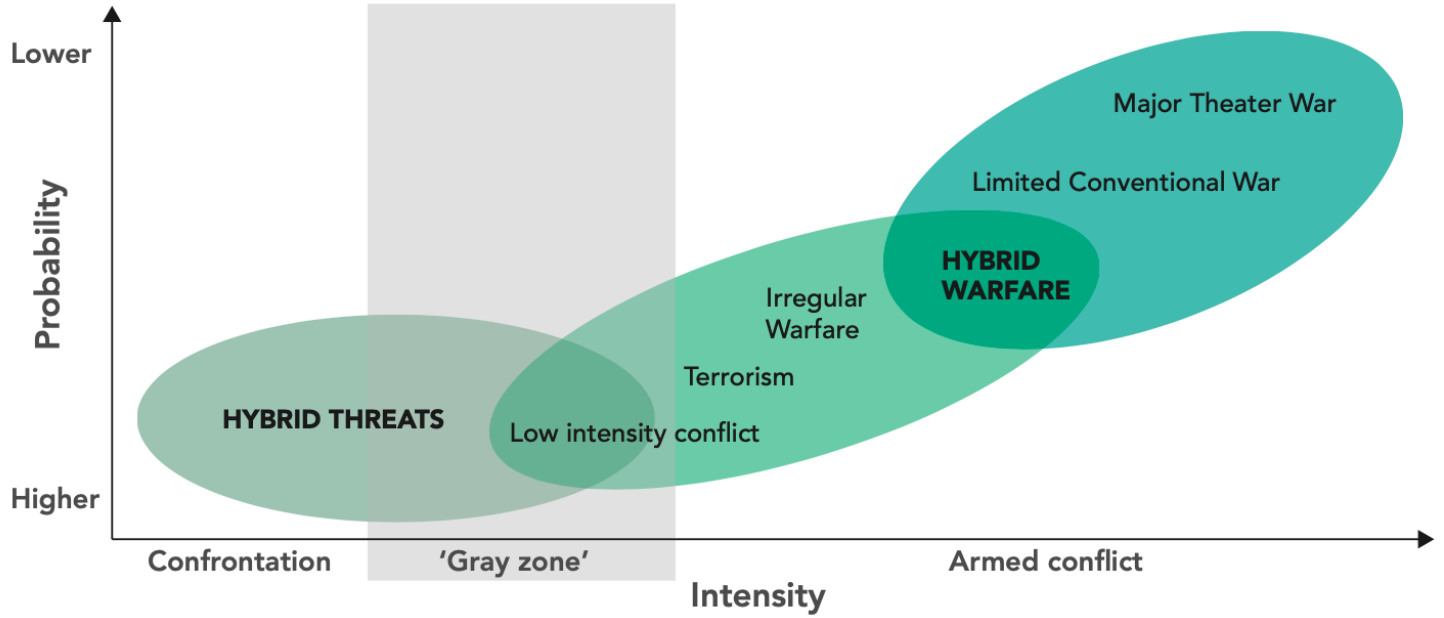


Fig. 2. Configuration of the receiver

Emerging Forms of Warfare

FIGURE 1. Hybrid Threats and Hybrid Warfare Shown on a Continuum of Conflict[35]



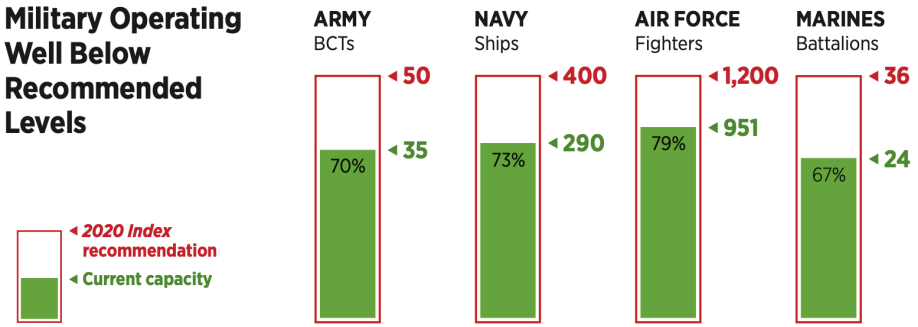
National Defense University
https://ndupress.ndu.edu/Journals/PRISM/PRISM-8-2/

Heritage Foundation
2020 Index of U.S. Military Strength

https://www.heritage.org/military-strength

CHART 1

Military Operating Well Below Recommended Levels



SOURCE: Dakota L. Wood, ed., *2020 Index of U.S. Military Strength* (Washington: The Heritage Foundation, 2020), https://www.heritage.org/military-strength.

heritage.org

U.S. Military Power

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Army			✓		
Navy			✓		
Air Force			✓		
Marine Corps			✓		
Nuclear			✓		
OVERALL			✓		

Navy and USMC Assessment

U.S. Military Power: Navy

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Capacity		✓			
Capability			✓		
Readiness			✓		
OVERALL			✓		

U.S. Military Power: Marine Corps

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Capacity		✓			
Capability			✓		
Readiness			✓		
OVERALL			✓		

https://www.heritage.org/military-strength

Threat Assessment

Behavior of Threats

	HOSTILE	AGGRESSIVE	TESTING	ASSERTIVE	BENIGN
Russia		✓			
Iran		✓			
Middle East Terrorism		✓			
Af-Pak Terrorism			✓		
China		✓			
North Korea			✓		
OVERALL		✓			

Capability of Threats

	FORMIDABLE	GATHERING	CAPABLE	ASPIRATIONAL	MARGINAL
Russia	✓				
Iran		✓			
Middle East Terrorism			✓		
Af-Pak Terrorism			✓		
China	✓				
North Korea		✓			
OVERALL		✓			

Threats to U.S. Vital Interests

	SEVERE	HIGH	ELEVATED	GUARDED	LOW
Russia		✓			
Iran		✓			
Middle East Terrorism		✓			
Af-Pak Terrorism			✓		
China		✓			
North Korea		✓			
OVERALL		✓			

https://www.heritage.org/military-strength

Made in China 2025

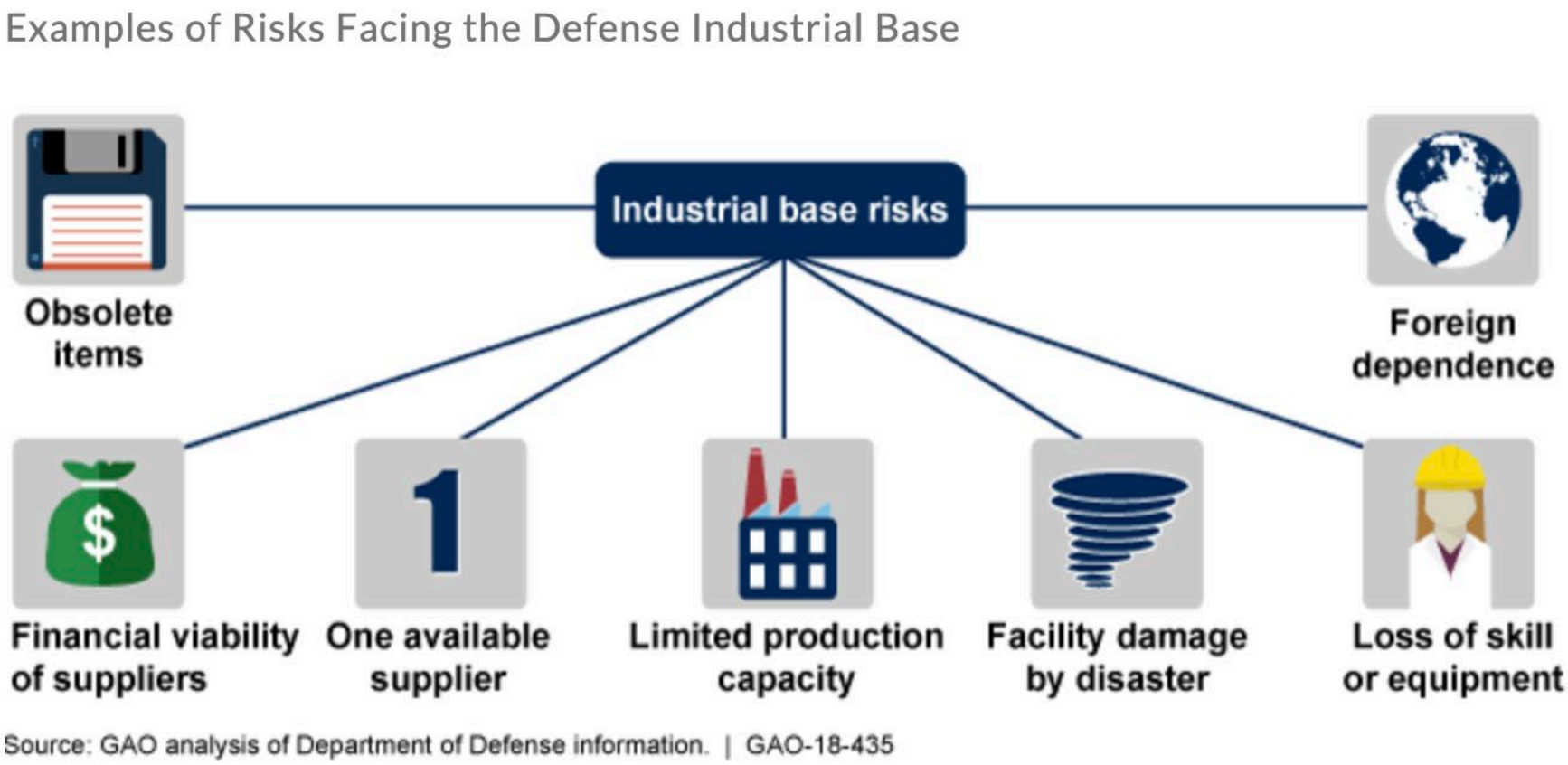
Key industries [edit]

The plan lists 10 key industries on which Chinese government focused to become a world leader.[13]

Key Industries of the Made in China 2025

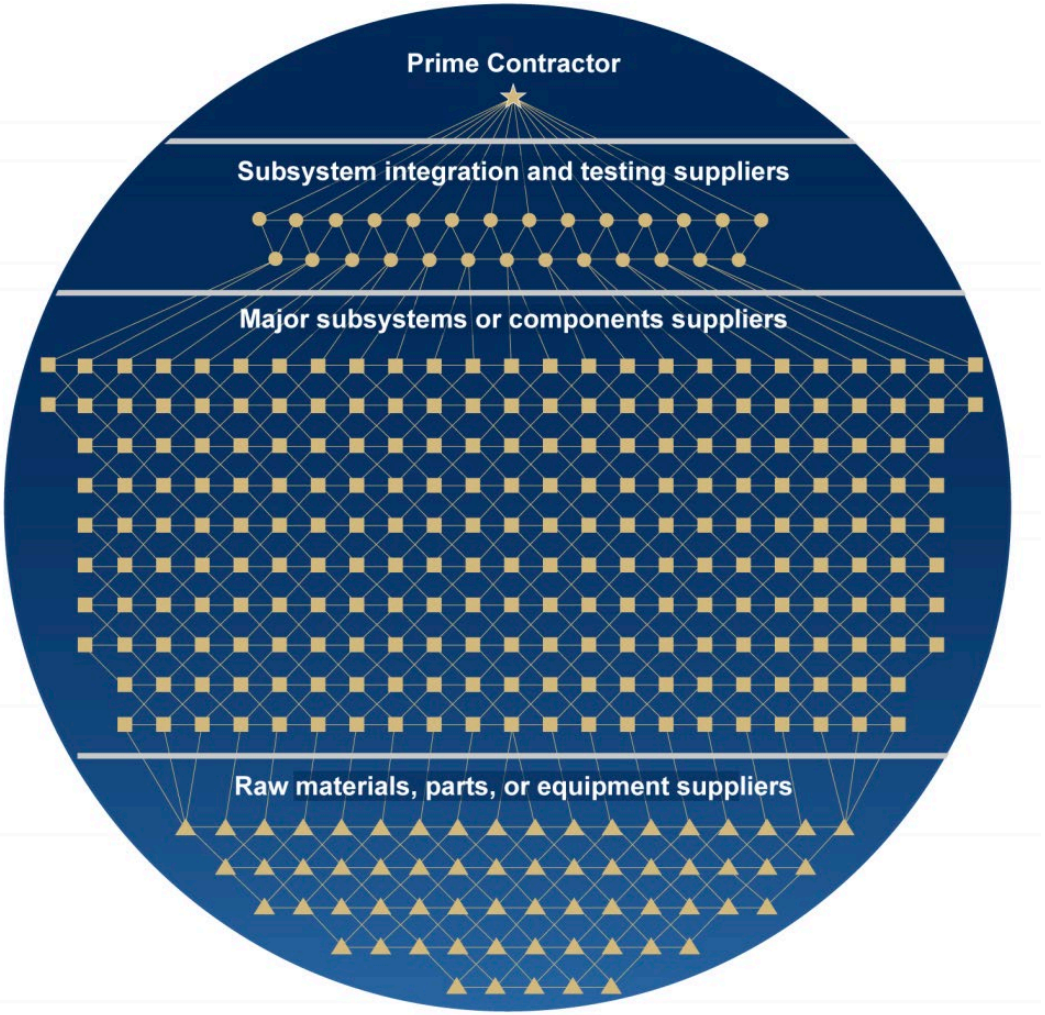
Industry sector	Description
Information Technology	AI, IoT, smart appliances
Robotics	AI, machine learning
Green energy and green vehicles	energy efficiency, electric vehicles
Aerospace equipment	
Ocean engineering and high tech ships	
Railway equipment	
Power equipment	
New materials	
Medicine and medical devices	
Agriculture machinery	

GAO Analysis of DoD Supply Chain

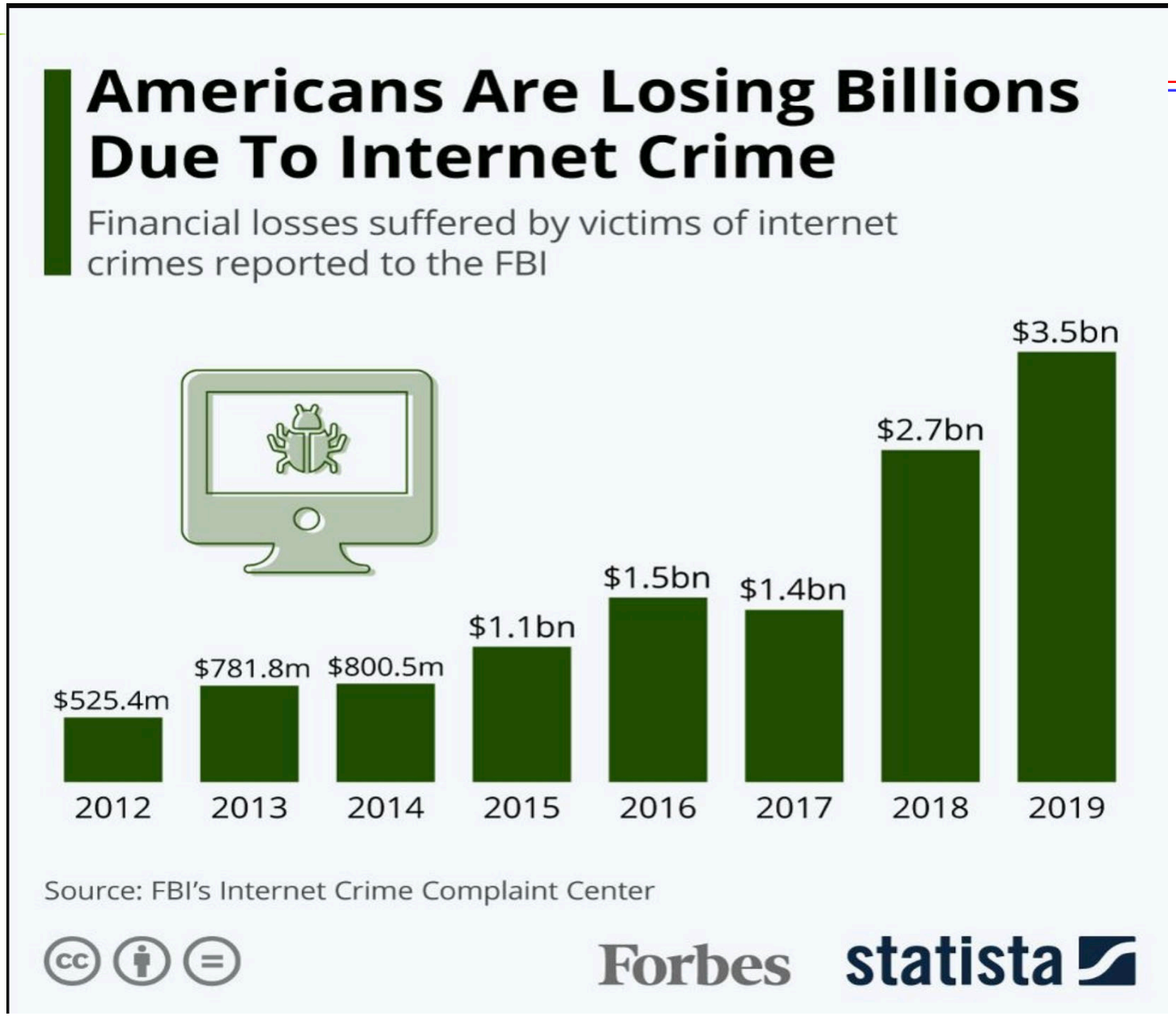


GAO Analysis of DoD Supply Chain

Figure 1: Notional Illustration of a Ground Vehicle Supply Chain



Source: GAO analysis of Department of Defense supplier data. | GAO-18-435


Americans Are Losing Billions Due To Internet Crime
Financial losses suffered by victims of internet crimes reported to the FBI
$525.4m
$781.8m
$800.5m
$1.1bn
$1.5bn
$1.4bn
$2.7bn
$3.5bn
2012
2013
2014
2015
2016
2017
2018
2019
Source: FBI's Internet Crime Complaint Center
Forbes
statista

National Counterintelligence Strategy

of the United States of America
2020-2022

STRATEGIC OBJECTIVES

PROTECT THE NATION'S CRITICAL INFRASTRUCTURE

Protect the nation's civil and commercial, defense mission assurance and continuity of government infrastructure from foreign intelligence entities seeking to exploit or disrupt national critical functions.

REDUCE THREATS TO KEY U.S. SUPPLY CHAINS

Reduce threats to key U.S. supply chains to prevent foreign attempts to compromise the integrity, trustworthiness, and authenticity of products and services purchased and integrated into the operations of the U.S. government, the Defense Industrial Base, and the private sector.

COUNTER THE EXPLOITATION OF THE U.S. ECONOMY

Counter the exploitation of the U.S. economy to protect America's competitive advantage in world markets and our technological leadership, and to ensure our economic prosperity and security.

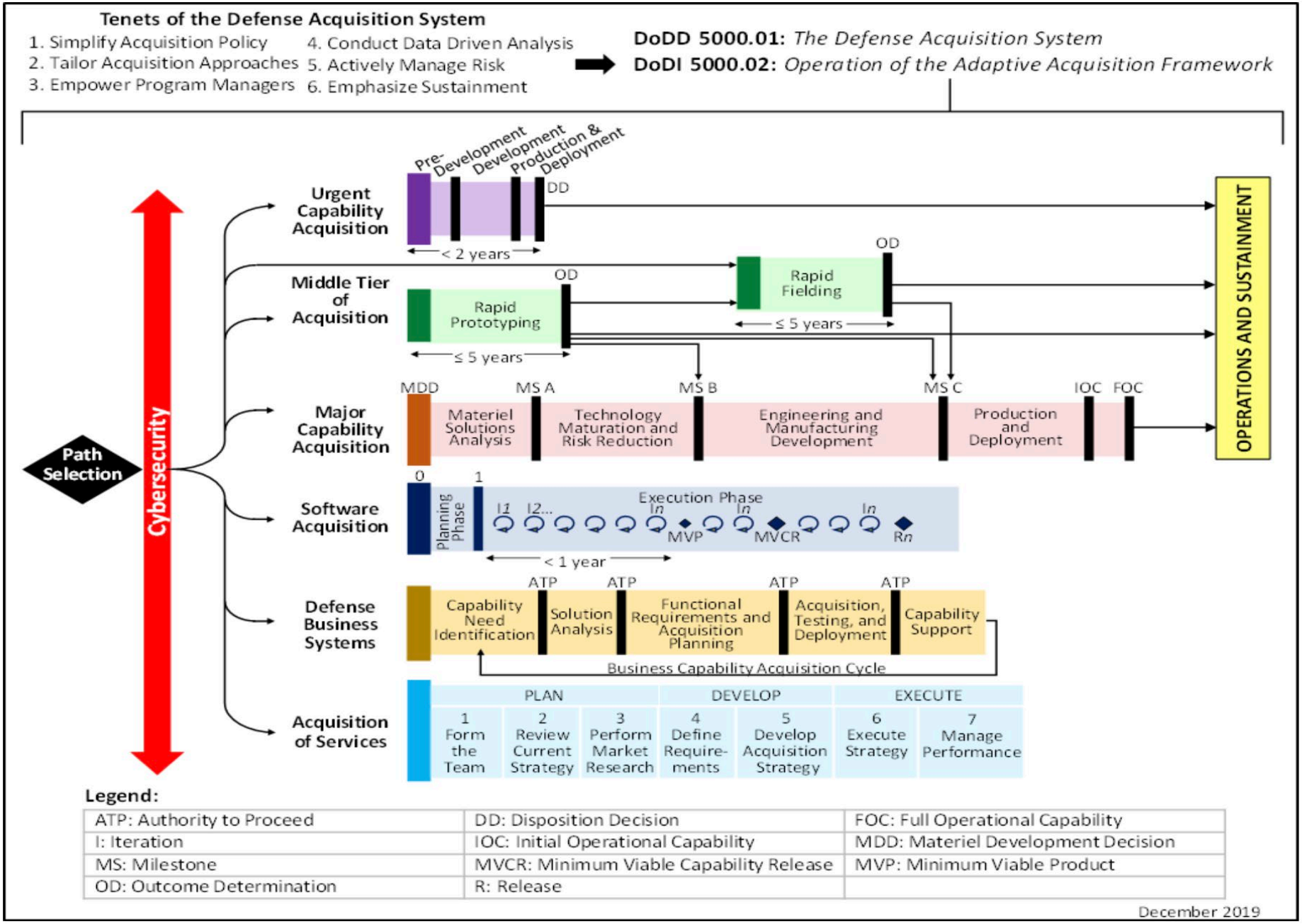
DEFEND AMERICAN DEMOCRACY AGAINST FOREIGN INFLUENCE

Defend the United States against foreign influence to protect America's democratic institutions and processes, and preserve our culture of openness.

COUNTER FOREIGN INTELLIGENCE CYBER AND TECHNICAL OPERATIONS

Counter foreign intelligence cyber and technical operations that are harmful to U.S. interests.

DoD Adaptive Acquisition Framework



Legend:

ATP: Authority to Proceed	DD: Disposition Decision	FOC: Full Operational Capability
I: Iteration	IOC: Initial Operational Capability	MDD: Materiel Development Decision
MS: Milestone	MVCR: Minimum Viable Capability Release	MVP: Minimum Viable Product
OD: Outcome Determination	R: Release	

December 2019

Moving Toward a "Complex Adaptive & Anticipatory Ecosystem"

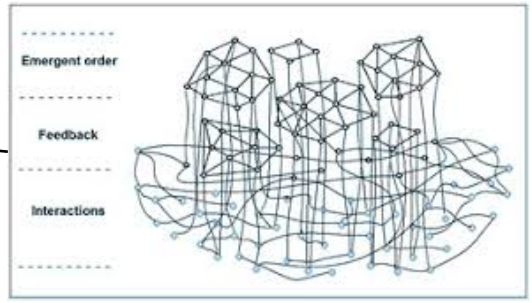
Strategy Unleashed

Range of Futures

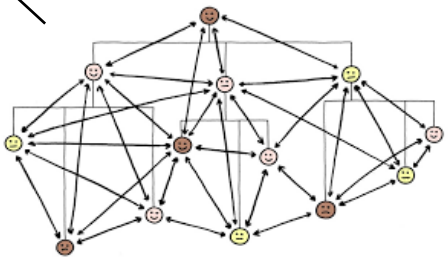
Sensing

Responding

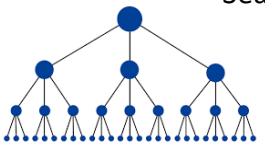
Anticipating



Self-Organizing, Emergent & Open Leadership
w/Simple Rules, Mission, Vision & Purpose



Loosely Coupled & Empowered
Seamless Leadership



Hierarchy

Rate of Change & Complexity

ADAPTABILITY

Today

Time

Questions?

INNOVA-CON 2020

INNOVATION IN MILITARY AVIATION

A 2.5 DAY WORKFORCE DEVELOPMENT TRAINING EVENT

APRIL 28-30, 2020

HOLIDAY INN SOLOMONS ISLAND, MD

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AGENDA BY DAY | DOWNLOAD BROCHURE | REGISTER NOW

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Cell: 240-682-9077 (c)