Strategic Thinking Brown Bag 2.0

Dr. Dale L. Moore
The Moore Group LLC
Strategic Awareness & Sensemaking

Economic

Political

Technology

Social

Operational

Synthesis & Meaning Making
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 are not in your Organization
Guiding Quote #2

The Challenges are Formidable and Many but…

THE FUTURE IS OURS TO CREATE.
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
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. 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.

Key:
- < 1.75 gha
- 1.75 - 3.5 gha
- 3.5 - 5.25 gha
- 5.25 - 7 gha
- > 7 gha
- Insufficient data
Global Deforestation

**Deforestation Fronts**

*Figure 10: Hotspots of projected forest loss between 2010 and 2050.*

**Key**
- Forest
- Deforestation fronts and projected deforestation, 2010-2050
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%).

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

- Weapons of mass destruction
- Infectious diseases
- Food crises
- Information infrastructure breakdown
- Interstate conflict
- Global governance failure
- Involuntary migration
- Fiscal crises
- Social instability
- National governance failure
- Adverse technological advances
- Terrorist attacks
- State collapse
- Energy price shock
- Unmanageable inflation
- Failure of urban planning
- Deflation
- Illicit trade
- Climate action failure
- Extreme weather
- Biodiversity loss
- Human-made environmental disasters
- Natural disasters
- Water crises
### Short-Term Risk Outlook
Percentage of respondents expecting risks to increase in 2020

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<thead>
<tr>
<th>Multistakeholders</th>
<th>Global Shapers</th>
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<tbody>
<tr>
<td>Economic confrontations</td>
<td>Extreme heat waves</td>
</tr>
<tr>
<td>Domestic political polarization</td>
<td>Destruction of ecosystems</td>
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<tr>
<td>Extreme heat waves</td>
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<td>Destruction of natural ecosystems</td>
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<td>Cyberattacks: infrastructure</td>
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<td>Protectionism on trade/investment</td>
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<td>Populist and nativist agendas</td>
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<td>Cyberattacks: theft of money/data</td>
<td>Loss of privacy (to companies)</td>
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<tr>
<td>Recession in a major economy</td>
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<td>Uncontrolled fires</td>
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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.

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.
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.

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.
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.

IN BILLIONS OF DOLLARS

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
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

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<th>Year</th>
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<th>EU</th>
<th>France</th>
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</table>
FIGURE 4-4

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

Percent

Year


Year

- Business
- Federal government
- Other
Global R&D Productivity

The Countries Leading The World In Scientific Publications

Number of science & engineering articles published in peer-reviewed journals in 2018

<table>
<thead>
<tr>
<th>Country</th>
<th>Total</th>
<th>Global share</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>528,263</td>
<td>20.67%</td>
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<tr>
<td>United States</td>
<td>422,808</td>
<td>16.54%</td>
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<tr>
<td>India</td>
<td>135,788</td>
<td>5.31%</td>
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<tr>
<td>Germany</td>
<td>104,396</td>
<td>4.08%</td>
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<tr>
<td>Japan</td>
<td>98,793</td>
<td>3.87%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>97,681</td>
<td>3.82%</td>
</tr>
<tr>
<td>Russia</td>
<td>81,579</td>
<td>3.19%</td>
</tr>
<tr>
<td>Italy</td>
<td>71,240</td>
<td>2.79%</td>
</tr>
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</table>

Source: National Science Foundation
First University Degrees in S&E

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

Thousands

- China
- United States
- Japan
- South Korea
- EU top 6
- Taiwan
- Mexico

Gap = 900,000+/YR
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?
A Three-Year Global Study on what to do about Potential Futures for Work and Technology Actions

Jerome C. Glenn, CEO
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

The Millennium Project
Info@Millennium-Project.org
Future Way of Seeing Future of Technologies: Integration and Synergies

The Millennium Project
Info@Millennium-Project.org
3D Additive Mfg – Integrated & Optimized

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

Additive Manufacturing | What Is ...
autodesk.com

designs of Mechanical parts for additive ...
dragonfly.am

cuts 25% of parts from truck engines
imeche.org
Gartner Hype Curve 3D AM

As of July 2018

Plateau will be reached:
- ○ less than 2 years
- ○ 2 to 5 years
- ▲ 5 to 10 years
- △ more than 10 years
- ☒ obsolete before plateau

Source: Gartner (December 2018)
The 3D AM Ecosystem
Figure 1
The AI Timeline

1642
Pascal’s
Pascaline

1739
Vaucanson’s
duck

1801
Jacquard’s
programmable loom

1837
Babbage
and Lovelace

1950
Alan Turing

1956
First AI
conference

2011
Watson wins Jeopardy

2009
Google’s self-driven car

1997
Deep Blue beats Kasparov

2014
Eugene Goostman

2017
AlphaGo beats Ke Jie

2019
Al for Good

Source: GTCI team.
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 Project Tasks](image)
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 billion USD in 2015
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.

<table>
<thead>
<tr>
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<th>Annualized Growth Rate</th>
<th>Compound Growth Over 10 Years</th>
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<tr>
<td>Nielsen's law</td>
<td>Internet bandwidth</td>
<td>50%</td>
</tr>
<tr>
<td>Moore's law</td>
<td>Computer power</td>
<td>60%</td>
</tr>
</tbody>
</table>

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

44 billion GB of data were created every day in 2016.

463 billion GB of data will be generated daily by 2026.

Advanced Air Mobility (AAM) Announcement of Urban Air Mobility (UAM) Ecosystem Working Groups
Advanced Contested Battlespace Threats
Emerging Forms of Warfare

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

- Major Theater War
- Limited Conventional War
- Irregular Warfare
- Terrorism
- Low intensity conflict

HYBRID THREATS

Intensity: Confrontation, ‘Gray zone’, Armed conflict
2020 Index of U.S. Military Strength

Chart 1: Military Operating Well Below Recommended Levels

- Army BCTs: 70% of 50
- Navy Ships: 73% of 400
- Air Force Fighters: 79% of 951
- Marine Corps: 67% of 36

*2020 Index recommendation* < Current capacity


U.S. Military Power

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https://www.heritage.org/military-strength
### U.S. Military Power: Navy

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### U.S. Military Power: Marine Corps

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[https://www.heritage.org/military-strength](https://www.heritage.org/military-strength)
# Threat Assessment

## Behavior of Threats

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<tr>
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## Capability of Threats

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## Threats to U.S. Vital Interests

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

<table>
<thead>
<tr>
<th>Industry sector</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Information Technology</td>
<td>AI, IoT, smart appliances</td>
</tr>
<tr>
<td>Robotics</td>
<td>AI, machine learning</td>
</tr>
<tr>
<td>Green energy and green vehicles</td>
<td>energy efficiency, electric vehicles</td>
</tr>
<tr>
<td>Aerospace equipment</td>
<td></td>
</tr>
<tr>
<td>Ocean engineering and high tech ships</td>
<td></td>
</tr>
<tr>
<td>Railway equipment</td>
<td></td>
</tr>
<tr>
<td>Power equipment</td>
<td></td>
</tr>
<tr>
<td>New materials</td>
<td></td>
</tr>
<tr>
<td>Medicine and medical devices</td>
<td></td>
</tr>
<tr>
<td>Agriculture machinery</td>
<td></td>
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</tbody>
</table>
Examples of Risks Facing the Defense Industrial Base

- Obsolete items
- Financial viability of suppliers
- One available supplier
- Limited production capacity
- Facility damage by disaster
- Loss of skill or equipment

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

Source: FBI’s Internet Crime Complaint Center
National Counterintelligence Strategy of the United States of America 2020-2022

NATIONAL COUNTERINTELLIGENCE STRATEGY OF THE UNITED STATES
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

Tenets of the Defense Acquisition System
1. Simplify Acquisition Policy       4. Conduct Data Driven Analysis
2. Tailor Acquisition Approaches   5. Actively Manage Risk

DoDD 5000.01: The Defense Acquisition System
DoDI 5000.02: Operation of the Adaptive Acquisition Framework

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

December 2019
Moving Toward a
“Complex Adaptive & Anticipatory Ecosystem”

Rate of Change & Complexity

Sensing ➔ Anticipating ➔ Responding

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

Loosely Coupled & Empowered Seamless Leadership

Hierarchy

Range of Futures

Today

Time
Questions?
Dr. Dale L. Moore, Ed.D
Founder and President, The Moore Group LLC
Strategy, Innovation and Transformation Services

Email: daleleemoore@gmail.com
Web Site: drdalelmoore.com
LinkedIn: https://www.linkedin.com/in/dale-moore-edd-4422a914/
Cell: 240-682-9077 (c)