Defining the Challenge

*Creating Knowledge but Not National Wealth*

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Grand Challenges in U.S. Manufacturing

**Grand Challenge:** “Invent here, Manufacture there” has reached its logical conclusion: “Innovate there, Manufacture there”

Convened 7 roundtables across the nation with **over 100 thought leaders**, spent **over 1200 hours** discussing potential solutions

**2018 Round Tables and Partners**

Boston, MA  
Washington D.C.  
Austin, TX,  
San Jose, CA  
Raleigh, NC  
Indianapolis, IN  
Detroit, MI
Contrary to popular reports of a strengthening manufacturing sector ...

Since 2011 labor productivity has risen by a total of 0.7 percent; worse, **total factor productivity** fell 5.8 percent.

Between 2006 and 2016, some of the largest reductions in output were in advanced industries:

- pharmaceuticals 3.1 percent,
- industrial machinery 2.9 percent,
- communications equip 2.5 percent
- computers & peripherals 2.3 percent.

Imports increased in all of these industries.

Source: Bureau of Labor Statistics
Defense Manufacturing Challenges

DoD’s unclassified summary (Sept 2018) of its response to Executive Order 13806, provided specific instances of key parts, components, and technologies of which reliability of supply is threatened.

DoD alone cannot solve the gaps and weaknesses in the total national industrial base on which defense production must rely.

A coordinated, whole-of-government approach is essential to meet the grand challenges facing the future of U.S. manufacturing.
Invent Here, Make There: Creating Knowledge, Not National Wealth

Leading the world in R&D is little comfort if we are simply subsidizing it for other countries

Underlying research funded by the federal govt.

Computers
Flat Panel displays
Cell phones
Solar Cells
Li-Ion Batteries
Etc.
From Offshoring Manufacturing to Offshoring Innovation

~45% of foreign R&D centers in China are from U.S. multinational companies

According to a recent survey of 369 manufacturers on factors driving manufacturing R&D to China,

**Top three reasons** cited:
- Proximity to manufacturing,
- Proximity to key suppliers
- Proximity to high growth markets

Other:
- Access to technical talent
- Lower development costs
Willingly giving away many promising technologies to other countries for further development and manufacturing.

*Lack of engineering talent and production know-how, lack of equipment, investment and supply chains.*

*Examples: Flexible electronics, Nanotechnology*

*Is the U.S poised to establish, let alone lead, in the industries of the future?*
Of 150 manufacturing startup firms based on MIT technology founded between 1997 and 2008, none of the companies were able to scale in the U.S due to lack of funding and know-how. All scaled in foreign countries; 70% of them scaled in China.
Closing the Gaps in the U.S. Innovation Pipeline

Establish Translational Research Centers (TRCs) at Universities

Fund pilot production and Leverage Defense Procurement

Empower small & med sized companies

Create public-private investment fund to support scale-ups

4X domestic graduate fellowships in engineering

Federal investment

Fund R&D in Engineering and Manufacturing (MRLs)
The National Manufacturing Initiative (NMI) is a multi-agency initiative designed to drive innovation and growth in US manufacturing. It involves investments in translational R&D, facilitating pilot production, and scale-up investments. The initiative connects various public and private sector entities, including Federal Labs, National Labs, DoD Procurement, and the Private Sector.

Key components of the NMI include:
- **Invest**: Translational R&D
- **Enable**: Hardware Startups
- **Facilitate**: Pilot production, scale-up investments

The NMI works through a pipeline of activities including basic research by existing agencies, precompetitive translational R&D by NMI, pre-production/early procurement DoD & private sector applied R&D, and high-volume manufacturing.
U.S. $150 billion S&T budget: Of which, ~$770 million invested in Industrial Production and Technology

Germany: $36 Billion: $4.34 billion (12%); 6X the amount U.S spends

Japan – 7% of its budget; 3X U.S

S. Korea – 30% of its budget; 8X US

Source: U.S. Census Bureau

Is 5% a reasonable investment for the U.S.?
Budget constraints?

The U.S. IP Commission has estimated that the cost to the U.S. economy of IP theft, counterfeit goods, etc. by Chinese actors could be nearly $2 billion per day!

Since 2009, total imports from China alone grew by more than $200 billion, with five advanced industries accounting for over 70 percent of that growth.
Promising Trends

Growing trends in digital, democratized and distributed manufacturing technologies play to American strengths.

According to a recent survey, 37 percent of millennials perceive manufacturing as a high-technology career choice, notably higher than both Generation X (27 percent) and Baby Boomers (23 percent).

Foreign MNCs continue to invest in manufacturing facilities in the U.S.

Investments in Battery and Electric vehicle manufacturing in the U.S.
Summary

From Offshoring Production to Offshoring Innovation
- A Dangerous Trend for a Developed Country

A piecemeal approach and band-aid solutions has not worked, and will not work.

We need a national strategy, a whole-of-government approach, with focused, sustained, long-term investments to reclaim American leadership in advanced manufacturing

Other countries are not standing still. The onus is still on U.S.