An Allied Approach to Semiconductor Competitiveness

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- Supports policies driving global, innovation-based economic growth.
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2019 Global Go To Think Tank Index Report

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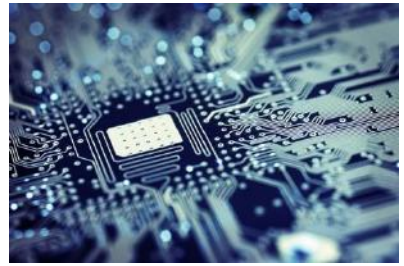
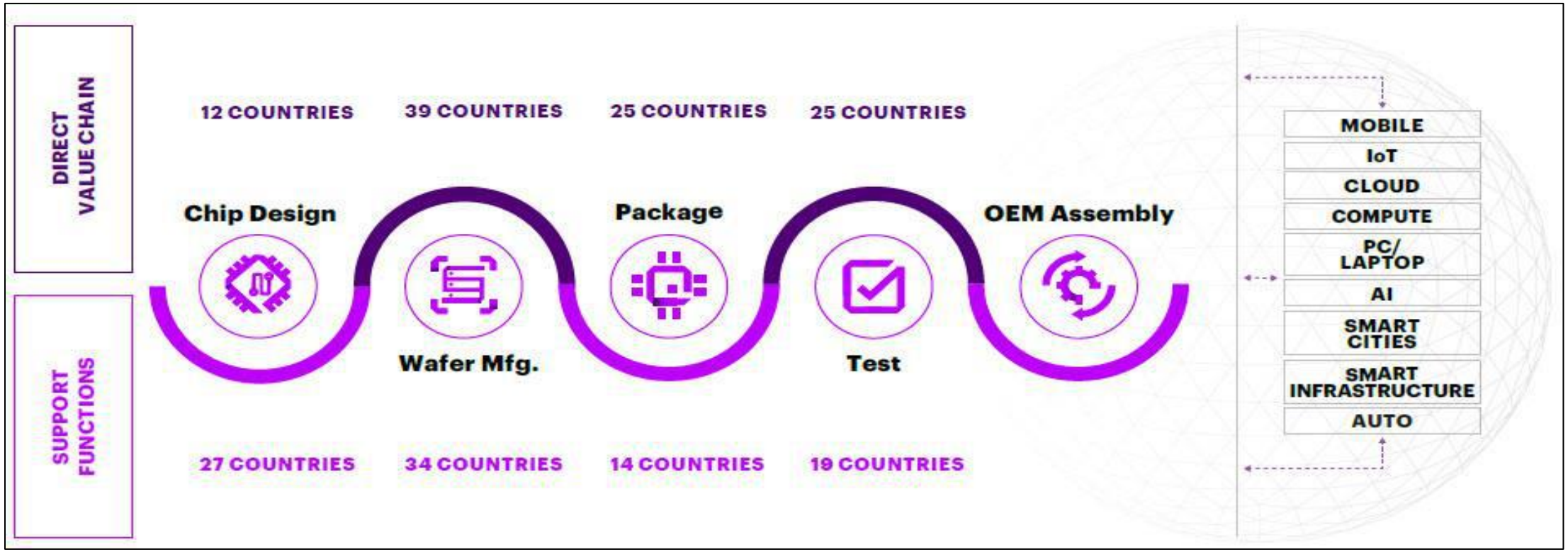
The Global Semiconductor Industry

- $470 billion industry underpinning a $11.5 trillion global digital economy.
- Foundational technology driving advances in AI, HPC, quantum, IoT, etc.
- Moore's Law (doubling of chip density each 2 years) has driven the sector.
- Shipped 1 trillion+ semiconductors in 2019, some containing over 30 billion transistors, at 5nm levels smaller even than the coronavirus.
- An industry that fundamentally depends on global value chains.



Semiconductor Industry Global Value Chains (GVCs)

- Each segment of semi GVCs has enterprises from 25 countries involved in the direct supply chain and 23 involved in support functions (on average).



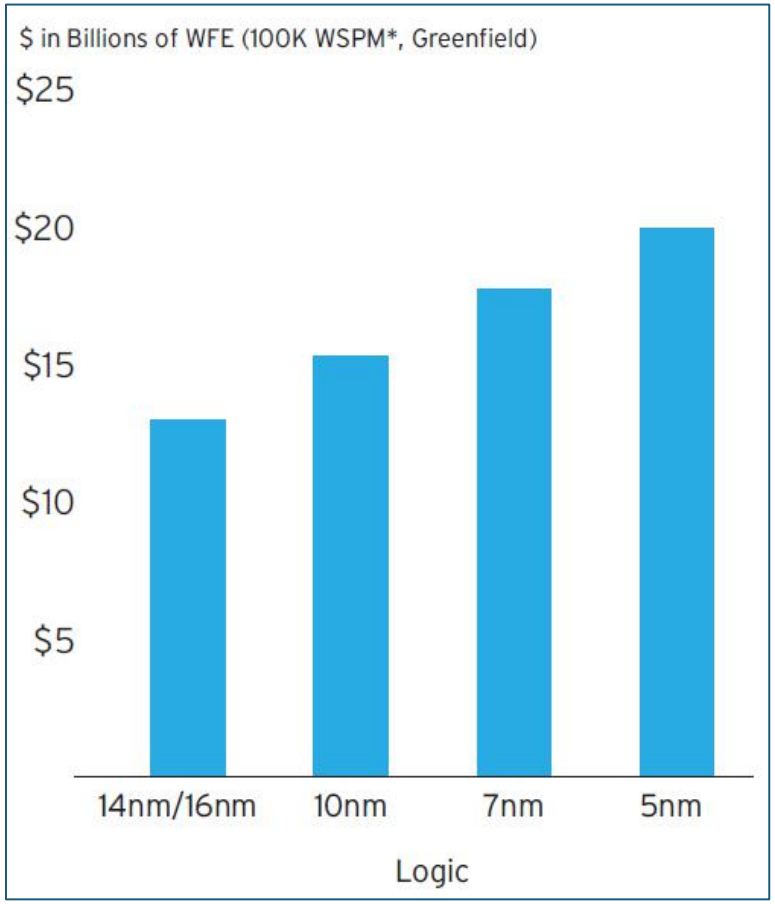
Source: Accenture and Global Semiconductor Alliance, "Globality and Complexity of the Semiconductor Ecosystem"

Enabling Conditions Needed for Global Semiconductor Innovation

Innovating in semiconductors entails tremendous scale, cost, and complexity, thus key conditions must attain:

1. Access to large markets (e.g., economies of scale).
2. No excess, non-market-based competition (e.g., no excessive subsidization).
3. No forced localization requirements that unnecessarily fragment global production systems.
4. Protection of intellectual property rights.

Capital Intensity (Logic Chips)*



*Source: Semiconductor Industry Association (SIA), "2020 State of the U.S. Semiconductor Industry"

Competition for Global Semiconductor Leadership Fiercely Growing

National “Integrated Circuit” Strategy commits to $150 billion investment; seeks to establish a fully closed-loop Chinese semiconductor ecosystem by 2035.

In 2019, launched new semiconductor competitiveness strategy investing $830 million in semis technology/talent development.

In 2018 launched eight-step, $1.75 billion action plan to bolster European competitiveness in microelectronics and an IPCEI “Important Project of Common Interest” in Microelectronics.

The (Merged) CHIPS Act/American Foundries Act

2020 legislation introduced to revitalize U.S. semiconductor competitiveness.

- Increase up to $12 billion R&D investment at U.S. federal research agencies;
- Provide up to $15 billion in matching grants for WTO-consistent state/local incentives to attract semiconductor fabs (i.e., match other nations' incentives);
- Launch new semiconductor-focused Manufacturing USA Institutes;
- Introduce a refundable 40% tax credit for investment in semiconductor equipment and facilities expenditures;
- Introduce a $750 million multilateral security fund to support development and adoption of secure microelectronics and supply chains therefore.

An Allied Approach to Semiconductor Competitiveness

Collectively advance the competitiveness of like-minded nations' semiconductor industries through:

1. Coordinated technology development.
2. Coordinated ecosystem support.
3. Coordinated technology protection.
4. Supportive trade policy, regimes, and practices.

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An Allied Approach to Semiconductor Leadership

STEPHEN EZELL I SEPTEMBER 2020

Many countries rightly seek to maximize their value added in the global semiconductor industry. But like-minded allied nations can also advance their leadership collectively by collaborating on technology and ecosystem development, intellectual property, and trade liberalization.

KEY TAKEAWAYS

- The semiconductor sector constitutes one of today's most important industries, providing the core technology that powers the modern digital world and spurs innovation and productivity across virtually every sector of the economy.
- The increasing expense, complexity, and scale required to innovate and manufacture semiconductors means that no single nation or enterprise can go it alone. In the face of challenges from China, allied cooperation in semiconductors is critical.
- Successful semiconductor innovation depends on scientists, researchers, and engineers working together internationally across companies, universities, government agencies, research institutions, and public-private research consortia.
- Each segment of the global semiconductor value chain has, on average, enterprises from 25 countries involved directly, and enterprises from 23 countries in support functions.
- Some nations have focused on building their domestic semiconductor ecosystems, but the U.S. industry's track record of success shows how to effectively leverage global supply chains for mutual benefit.
- Countries that would seek self-sufficiency in the sector, especially through unfair mercantilist means, risk inflicting considerable damage on the industry, slowing global semiconductor innovation.
- The United States should increase funding for collaborative, pre-competitive R&D and incentives for greater domestic production.

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Source: ITIF, "An Allied Approach to Semiconductor Competitiveness"

Coordinated Semiconductor Technology Development Activities

- At the 3-10 year timeframe there exist opportunities for pre-competitive research collaborations that nations wouldn't likely undertake alone.
- The SRC-led Decadal Plan for Semiconductors develops strategic ecosystem vision to solve common challenges, align key stakeholders.

✓ U.S. should launch more semiconductor-related Manufacturing USA Institutes, encouraging companies from like-minded nations to join.

✓ Participation should be predicated on reciprocity, with U.S. companies invited to join others' pre-competitive research consortiums.

Coordinated Semiconductor Technology Development Activities

- ✓ Identify long-term semiconductor sector moonshots and encourage allied participation therein (with benefits proportionate to investment).
  - Develop affordable desktop semiconductor fabrication facilities;
  - Build a commercial, gate-based computer to work on large-scale problems.
- ✓ Enroll enterprises from allied nations in a trusted foundry-light approach.
  - E.g., TSMC-Purdue Center for Secured Microelectronic Systems.
  - Recognize difference between cutting-edge defense systems vs. those that could be reasonably satisfied with 14-nm “legacy silicon.”

Coordinate Semiconductor Technology Protection Regimes

- ✓ Ensure any “emerging or foundational technologies” identified aren’t readily commercially available from foreign competitors.
- ✓ U.S. should eschew the application of unilateral export controls, seeking to develop a more ambitious and effective plurilateral approach.
- ✓ Leverage MAST (Multilateral Action on Sensitive Technologies) platform.
- ✓ Increase information exchange and align foreign investment screening practices among allied nations.
- ✓ Expand list of “excepted foreign states” for investment screening procedures.

Combatting Foreign Semiconductor IP Theft

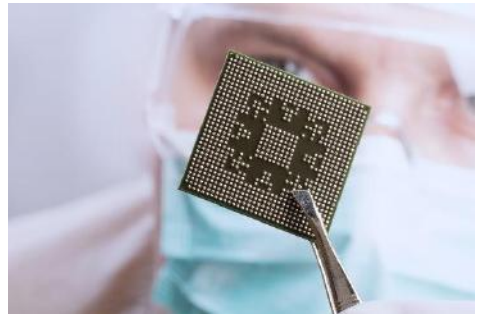
- ✓ Develop and exchange lists of foreign enterprises/individuals engaged in IP theft and restrict them from competing in allied nations' markets.
- ✓ U.S. should develop a "Five Eyes"-like alliance focused on combatting state-sponsored economic espionage in advanced-technology industries.
- ✓ Work with allied nations to strengthen their trade secret regimes.

Trade Policy Recommendations

- ✓ Expand the Information Technology Agreement (ITA).
- ✓ Maintain the WTO e-commerce customs duties moratorium.
- ✓ Expand subsidies disciplines at the WTO.
- ✓ Have the U.S. join the CPTPP, bringing like-minded nations aboard.

Conclusions

- It's appropriate (within WTO rules) for nations, and enterprises therein, to compete fiercely to maximize value-add from semiconductor industries.
- However, there exist ways like-minded nations can collaborate to collectively advance the competitiveness of their semiconductor industries.
- Nations that elect to do so are likely to enjoy a competitive advantage over ones that elect to pursue autarkic, closed-loop strategies.



Thank You!

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