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# A Recent History of US Semiconductor Policy, 1980-2025

## Trends and Implications for the Department of Defense

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KEY POINTS

- There is no single US national policy for semiconductors. Instead, a variety of legislative and executive branch efforts have targeted research and development (R&D), acquisition, sustainment, and broader national competitiveness in semiconductors.
- The Department of Defense (DoD) has been proactive in funding semiconductor R&D but reactive in formulating policy to regulate semiconductor access, supply, and use.
- DoD policy has transitioned from treating semiconductors as an R&D issue to acknowledging that semiconductors are also an acquisitions and sustainment issue.
- DoD policies to ensure trusted semiconductors continue to have gaps between intent and implementation.
- DoD policy remains unprepared for future shocks to the semiconductor market.

## INTRODUCTION

There is no single national policy for semiconductors. However, a variety of legislative and executive branch efforts have shaped how the US government and the Department of Defense (DoD) approach semiconductors. US policies related to semiconductors, particularly over the last five years, have prioritized national competitiveness with measures to invest in a secure supply chain, ensure trusted access, increase domestic manufacturing, and spur research and development (R&D). The CHIPS and Science Act of 2022 represents the largest recent investment in domestic semiconductors, with $52.7 billion authorized to bolster US-based manufacturing, workforce development, and R&D. National policies like the CHIPS and Science Act and evolving market dynamics have been important framing conditions for the development of DoD semiconductors policy.

## 1980-1990: EMPHASIS ON RESEARCH AND DEVELOPMENT

Modern US semiconductor policy began in the 1980s, with the Defense Advanced Research Projects Agency's (DARPA) Metal Oxide Semiconductor Implementation Service (MOSIS) in 1981. MOSIS revolutionized semiconductor fabrication by developing the multi-wafer project model. By placing multiple projects on a single wafer, MOSIS allowed projects to share fabrication tooling and costs, reducing both production time and costs compared to traditional single-project wafers.[1] MOSIS was an offshoot of DARPA's earlier Very Large Scale Integration (VLSI) Project. Launched in the 1970s, the VLSI Project funded research and development (R&D) across research communities to advanced computer architecture and system design, microelectronics fabrication, and the overall cycle of design, testing, and evaluation.[2]

DARPA's innovation continued through the 1980s through initiatives like the Microwave and Millimeter Wave Integrated Circuit (MIMIC) program. Launched in 1987, MIMIC drove innovations in non-silicone semiconductors, such as gallium arsenide and gallium nitride semiconductors. Since 1987, DARPA had also been the US government's (USG) primary funding source for SEMATECH, a public-private consortium aimed at R&D to advance the United States' advanced chip manufacturing industry.[3]

More broadly, DoD funding in the 1980s sought to develop chips for the military at a time when commercial developments began to outpace government efforts. From 1980 to 1990, the DoD undertook its Very High Speed Integrated Circuits (VHSIC) program. Across the decade, the VHSIC program was the single largest government-funded R&D effort for semiconductors and aimed to create exponentially better integrated circuits than were available in contemporary laboratories. While the program did not result in major advancements, VHSIC's main success was that it spurred US chipmakers to focus on long-term corporate R&D, supply differentiation, and specialization.[4]

## 1990-2005: MEETING DOD NEED AND TRUSTED ACCESS

To meet the defense community's chip needs, the National Security Agency (NSA) launched its Special Processing Laboratory (SPL) in 1990. American semiconductor manufacturer National Semiconductor ran the SPL as part of the NSA's Technology Transfer Program.[5] Yet federal funding dynamics began to change in the mid-1990s. SEMATECH eventually rejected DARPA funding in 1994, when the SEMATECH board decided to decline any future federal funding after fiscal year (FY) 1996.[6] However, a parallel university-based funding effort by DARPA initiated in 1996 did produce several breakthroughs that resulted in fin field-effect transistors (FinFET) and the ability to further shrink node sizes.[7]

By 1997, the DoD established the Defense Microelectronics Activity (DMEA), and DARPA launched its Microelectromechanical (MEMS) and Nanotechnology Exchange (MX). Prior to January 2021, DMEA focused primarily on research and engineering under the Director of Defense for Research and Engineering for Research and Technology to help meet DoD semiconductor needs.[8] At the same time, DARPA's MX established a network of government, commercial, and academic fabrication facilities to deliver customizable fabrication services, including to the DoD.[9]

These developments occurred against the backdrop of several international trade disagreements over access to affordable semiconductors. In 1991, the US and Japan successfully renegotiated the 1986 US-Japan Semiconductor Trade Agreement. In part, this agreement sought to prevent Japanese firms from dumping semiconductors on US and global markets, i.e., selling semiconductors at prices below the cost of production and hurting US competitiveness.[10] Shortly thereafter, the US entered into a series of disputes over semiconductor dumping with South Korea and Taiwan. The US launched antidumping investigations into both countries in 1997, with taxes placed on Taiwanese imports but not South Korean imports. The US undertook additional antidumping investigations in 1998 and 2002 related to Taiwanese and South Korean dynamic random-access memory (DRAM) chips. The 1998 investigation into Taiwan did not result in import duties, while the 2002 investigation into South Korea did. In response, South Korea filed a dispute with the World Trade Organization against the US; the dispute resolved only after the US removed duties in 2008.[11]

Amidst concerns about US semiconductor competitiveness and security, Deputy Secretary of Defense Paul Wolfowitz called for a Defense Trusted Integrated Circuit Strategy in 2003 to secure trusted access to semiconductors for weapons, intelligence, and communication systems.[12] In response, the Under Secretary for Acquisition, Technology, and Logistics (USD[AT&L]) issued initial guidance in 2004 on trusted suppliers.[13] With Congressional funding, the USD(AT&L) partnered with the NSA to establish the Trusted Foundry Program in 2004, which would be managed by DMEA. In conjunction, the NSA also established the Trusted Access Program Office (TAPO) to find and maintain trusted suppliers of semiconductors. The DoD eventually signed a ten-year contract with IBM for the company to serve as the Department's sole provider of secure foundry services.[14] While these policy changes occurred, DARPA built on its programs from the 1980s and 1990s to create the Wide Bandgap Semiconductors for Radio Frequency Applications (WBGS-RF) program in 2001. Through this program, DARPA ultimately accelerated and broadened the use of gallium nitride in semiconductors.[15]

## 2005-2009: DOD EXPANDS POLICY AMIDST A CHANGING MARKET

By 2007, DoD semiconductor efforts had expanded. From 2005 to 2007, several task forces emerged to examine high-performance chip supplies, critical defense technologies, and the impact of foreign influence on DoD software.[16] The Trusted Foundry Program also broadened from foundries to include design, assembly, testing, and packaging firms, and DMEA began Trusted Suppler accreditations. However, trusted suppliers were not given yearly contracts with guaranteed US government business. Instead, these firms could leverage trusted status to bid for USG contracts.[17]

The FY2009 National Defense Authorization Act (NDAA) further instructed the Secretary of Defense (SECDEF) to coordinate DoD semiconductor efforts and develop an integrated strategy for ensuring trust and managing supply chain risks.[18] The next year, the DoD delivered a report to Congress outlining its strategy for Trusted Systems and Networks (TSN).[19] The DoD had already issued DoD Instruction (DODI) 5200.39 in 2008, which redefined Critical Program Information to include semiconductor hardware and required Program Protection Plans (PPP) across the Department.[20] After the release of the report, the DoD expanded its TSN strategy via several documents from 2010 through 2014. These included:

- *Directive-Type Memorandum (DTM) 08-048* in March 2010, which mandated supply chain risk management to improve the integrity of components used in DoD systems;[21]
- *Program Protection Plan (PPP) Outline and Guidance* in 2011, which elaborated on PPPs required by DODI 5200.39;[22]
- *DODI 5200.44* in 2012, which mandated the use of a trusted foundry approach to increase semiconductor acquisition security—specifically the use of the IBM trusted foundry program for application-specific integrated circuits (ASICs);[23]
- *DODI 4140.67* in 2013, which established policy and responsibilities for preventing the introduction of counterfeit materials into DoD supply chains, including semiconductors;[24]
- *Defense Federal Acquisition Regulations System (DFARS) Case 2012-D055*, which acted as a partial implementation for the detection and avoidance of counterfeit electronic parts in DoD supply chains, effective May 6, 2014;[25] and
- *Department of Defense Assured Microelectronics Policy: Senate Report 113-85*, a July 2014 report delivered to the Senate that reviews DoD implementation of DODI 5200.44.[26]

As the DoD began enacting semiconductor-related policies, market conditions made for a more complex environment. Over time, semiconductor supply chains had become highly fragmented as firms increasingly specialized in chip processes.[27] For instance, when Dutch company ASML acquired Silicon Valley Group in 2001, it became the sole source for US lithography needs.[28] One of the biggest market changes occurred in 2008, when US-based Advanced Micro Devices (AMD) decided to go "fabless" by splitting its design and fabrication businesses. This resulted in the formation of GlobalFoundries in 2009 as the successor to AMD's fabrication business. However, the transaction required approval from the US Committee on Foreign Investment in the US (CFIUS) since the primary investor for GlobalFoundries was Mubadala, the financing arm of the United Arab Emirates (UAE) government.[29]

## 2010-2018: FABLESS FOUNDRIES AND SHIFTING AUTHORITIES

The trend of fabless foundries continued over the next several years, and by 2014, IBM had made the decision to divest itself of fabrication to GlobalFoundries. The sale in 2015 again required CFIUS approval given UAE investment in GlobalFoundries. CFIUS approval of the IBM foundry sale required the DoD to reassign IBM's original 2004 contract to the US arm of GlobalFoundries. This also gave GlobalFoundries the option to renew the contract each year until 2023.[30] As these contract changes were occurring, so too were program management dynamics. By 2016, the NSA turned over management of the entire Trusted Foundry Program to the DoD. This included responsibilities of the NSA's TAPO, which moved to the purview of DMEA.[31]

The handover of NSA's TAPO to DMEA coincided with additional policy developments. For instance, Section 231 of the FY2017 NDAA directed the SECDEF to develop a strategy for assuring DoD access to trusted electronics no later than September 30, 2019.[32] Executive Order 13806 from 2017 required the SECDEF to produce a study identifying the broader goods and manufacturing capabilities essential to national security and assessing threats to supply chain resiliency.[33] The report, delivered the next year in 2018, contained a host of issues related to semiconductors.[34] Additionally, DARPA launched its Electronics Resurgence Initiative (ERI) in 2017. The ERI spawned at least 50 DARPA programs aimed at overcoming challenges related to improving manufacturing technology, security threats across hardware lifecycles, and leveraging artificial intelligence (AI) hardware to increase information processing speed.[35] In 2018, the DoD also updated DoDI 5200.44, shifting trusted foundry responsibilities from USD(AT&L) to the Under Secretary of Defense for Research and Engineering (USD[R&E]). This precipitated the eventual transfer of DMEA from OUSD(R&E) to OUSD Acquisition and Sustainment (A&S).[36]

Efforts to combat counterfeit chips also remained a priority. Passed in 2016, the Trade Facilitation and Trade Enforcement Act of 2015 sought to further counter the import of counterfeit chips by requiring Customs and Border Patrol to share information on and samples of suspected counterfeits.[37] DFARS Case 2016-D010 in 2016 also addressed counterfeiting by allowing counterfeit mitigation costs for contractors if they had a DOD-approved counterfeit detection system in place and reported to the Government-Industry Data Exchange Program (GIDEP) and respective contracting officer.[38] A 2019 update to the Federal Acquisition Regulation followed suit, requiring contractors and subcontractors to report counterfeit or suspected counterfeit parts to GIDEP.[39] At the same time, DODI 4140.01 from 2019 elaborated management processes to mitigate the risks of counterfeit materials entering DoD supply chains.[40]

## 2018-2022: LOSING TRUSTED ACCESS TO STATE-OF-THE-ART CHIPS

2018 marked another major shock for the DoD semiconductor ecosystem. Four years after IBM sold its fabrication business to GlobalFoundries in 2014, GlobalFoundries decided it would no longer pursue state of the art (SOTA) chips below 12 nanometers (nm). The company would only offer prior node geometries at 12nm and larger, and in 2019, GlobalFoundries sold its New York-based foundry to ON Semiconductor. As a result, TAPO contracts could no longer guarantee DoD access to SOTA semiconductors and could only meet DoD needs for state of the practice (SOTP) chips with nodes greater than 12nm.[41]

The FY2020 NDAA evidenced the government's renewed concerns over semiconductor access and security. Section 224 required all defense microelectronics products and services to meet trusted security requirements and mandated that the SECDEF establish trusted supply chain and operational security standards for DoD acquisition of semiconductor products and services by January 1, 2021.[42] Similarly, the White House's 2020 National Strategy for Critical and Emerging Technologies addressed semiconductors and encouraged PPPs across the industry.[43] The White House followed this strategy with Executive Order 14017 in February 2021, which required a 100-day review of semiconductor manufacturing and advanced packaging supply chain resilience as part of a broader effort to secure US supply chains.[44]

## 2022-2025: THE CHIPS AND SCIENCE ACT AND BEYOND

Several efforts from 2020 to 2022 culminated in the passage of the CHIPS and Science Act in August 2022. First, the FY2021 NDAA authorized funding for expanding semiconductor fabrication in the US and for supporting research and development (R&D) on leading semiconductor technology. It also instructed the DoD to develop plans for removing dual-use and commercial components from adversaries by 2027.[45] Second, in October 2021, the White House placed restrictions on semiconductor exports to seven Chinese computing firms by adding them to the Commerce Department's entity list.[46] Third, the DoD took measures to improve parts management by issuing DODI 5000.88 in 2020[47] and by establishing the Defense Microelectronics Cross-Functional Team (DMCFT) in January 2021. A key goal for the DMCFT was to track the status of DoD, interagency, and industry semiconductors.[48] The DoD also struck an agreement with Intel in 2021 for the company to provide commercial foundry services for several phases of the Rapid Assured Microelectronics Prototypes - Commercial (RAMP-C) program.[49] Finally, Congress revitalized two pieces of bipartisan legislation: the Endless Frontier Act, reintroduced in the Senate in 2020 to invest in high-tech research critical for national security;[50] and the Creating Helpful Incentives to Produce Semiconductors (CHIPS) for America Act, introduced in the House to support US-based semiconductor manufacturing, supply chain security, and research and design (R&D).[51] The Senate combined these two bills to pass the United States Innovation and Competition Act of 2021 (USICA). After reconciling USICA with the House's version (American COMPETES Act of 2022),[52] both chambers of Congress passed the CHIPS and Science Act, which was signed into law by the White House on August 9, 2022.[53]

The CHIPS and Science Act authorized $278.2 billion over ten years to bolster US scientific competitiveness, innovation, and national security. While the Act devotes the majority of funding ($200 billion) to scientific R&D and commercialization, it dedicates $52.7 billion to spur US domestic semiconductor manufacturing, R&D, and workforce development. This includes roughly $39 billion in subsidies for manufacturing semiconductors within the US and $13 billion for semiconductor research and workforce training. The CHIPS and Science Act also enacted a 25 percent tax credit for investments in semiconductor manufacturing and processing equipment. Importantly, most of the funding authorized for the semiconductor sector was in the form of grants or loan guarantees.[54]

A flurry of activity followed the CHIPS and Science Act. In October 2022, the US placed controls on exports of advanced semiconductors to China, including subject matter expertise for making chips smaller than 14nm.[55] These export controls were subsequently updated in October 2023 to close several loopholes.[56] In 2023, the CHIPS Program Office—established by the CHIPS and Science Act—also released its initial Notices for Funding Opportunity.[57] At the same time, the Internal Revenue Service (IRS) issued a rule with parameters for claiming the advanced semiconductor manufacturing investment tax credit laid out in the CHIPS and Science Act.[58] In 2024, the House introduced the Semiconductor Technology Advancement and Research (STAR) Act to extend the tax credit and expand it to include investments in semiconductor design; the Act was reintroduced in 2025.[59]

At the DoD level, the Department gave two major awards in 2023 and 2024. In September of 2023, the DoD awarded GlobalFoundries a ten-year contract to supply securely manufactured US-made SOTP semiconductors at 12nm and larger. The contract also included access to GlobalFoundries' design ecosystem, intellectual property (IP) libraries, and advanced technologies. To address SOTA semiconductor needs, in 2024, the DoD used funding from the CHIPS and Science Act to award Intel $3 billion for the Secure Enclave program.[60] These awards coincided with an update to DODI 5200.44 in February 2024, which required semiconductor acquisitions from non-trusted suppliers to obtain DoD component head approvals,[61] and the reinvigoration of DARPA's MOSIS program to focus on sharing process knowledge and prototyping compound semiconductors.[62]

Throughout 2023 and 2024, the US also engaged in several international partnerships geared towards securing semiconductor supply chains and enhancing resilience. Thus far, the US has partnered with Mexico and Canada, Korea, Japan, India, and the European Union.[63] However, international trade relations have become strained due to the threat of tariffs on semiconductors in early 2025[64] and an investigation launched in April 2025 by the Department of Commerce into the national security impacts of semiconductor and semiconductor manufacturing equipment imports.[65]

Following the FY2025 NDAA emphasis on greater hardware assurance,[66] efforts to bolster and secure US-based semiconductor manufacturing have continued through 2025. For instance, the US House of Representatives introduced the Building Advanced Semiconductors Investment Credit (BASIC) Act in May of 2025 to expand and extend the CHIPS and Science Act's Advanced Manufacturing Investment Credit (AMIC).[67] Most recently, the Department of Defense issued DODI 5200.50 to require evidence-based assurance in microelectronics decisions.[68] The primary goal of DODI 5200.50 is to expand DoD's risk management toolbox, particularly when trusted suppliers are unavailable.[69]

Figure 1 below summarizes this discussion by highlighting key DoD semiconductor policies from 1980 to 2025 in the context of national-level policy and key market events.

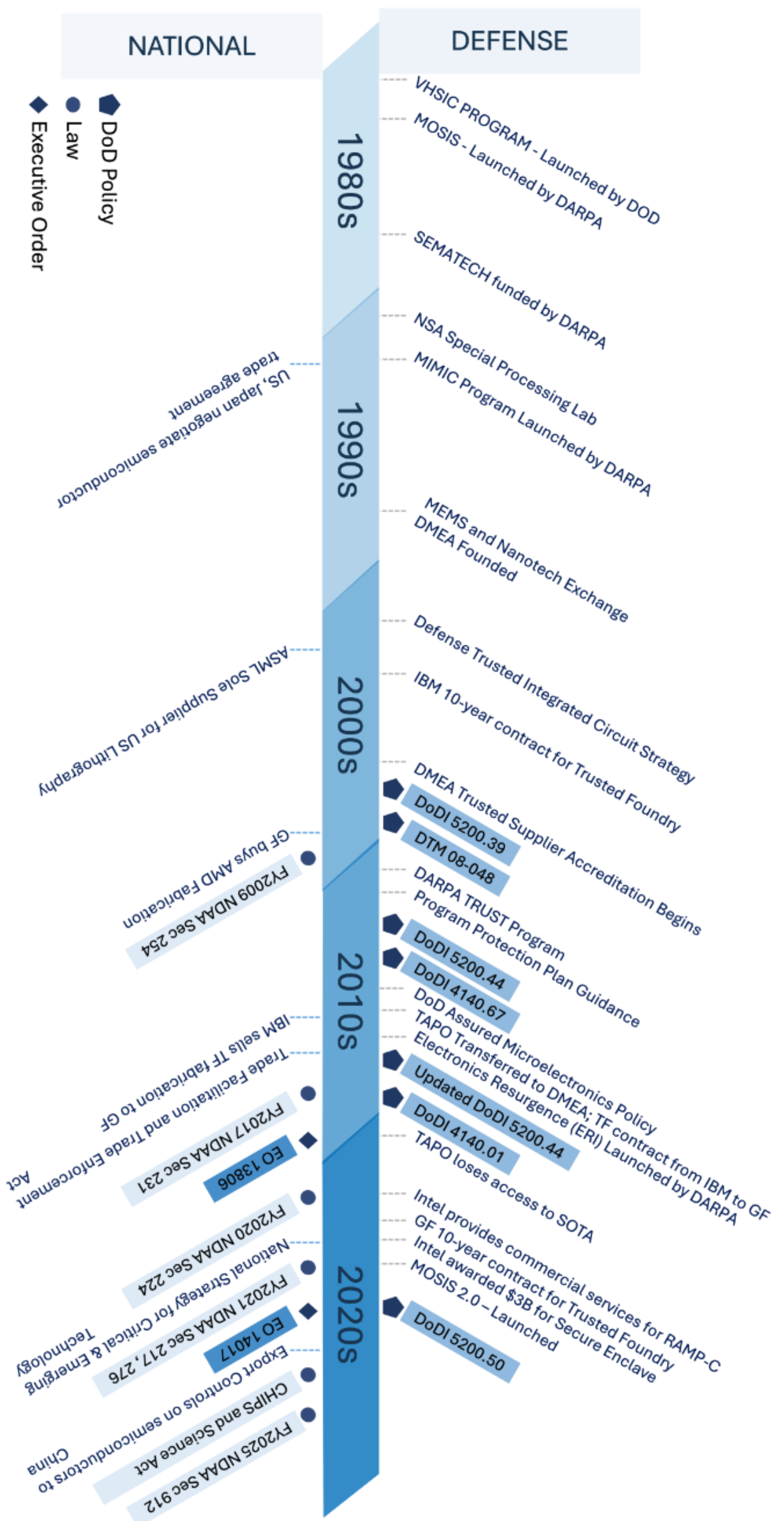


Figure 1. Abbreviated US Semiconductor Policy Timeline

## KEY TRENDS AND IMPLICATIONS

Across four decades, several trends have emerged in DoD policy:

1. **DoD has been proactive in funding semiconductor R&D but reactive in formulating policy to regulate semiconductor access, supply, and use.**

Initiatives like the Very High Speed Integrated Circuits (VHSIC) program, the Metal Oxide Semiconductor Implementation Service (MOSIS) program, the Microwave and Millimeter Wave Integrated Circuit (MIMIC) program, the Microelectromechanical (MEMS) and Nanotechnology Exchange (MX), and the funding of SEMATECH were proactive attempts to keep the DoD at the forefront of semiconductor technology. These forward-looking investments sought to drive innovation for DoD needs. In contrast, DoD policy to regulate secured and trusted access to semiconductors emerged largely in response to an increasingly decentralized industry, market-shifting trade disputes, and national-level policies like executive orders and National Defense Authorization Acts (NDAA) that mandated DoD action.

2. **DoD policy has transitioned from treating semiconductors as an R&D issue to acknowledging that semiconductors are also an acquisitions and sustainment issue.**

DoD policies throughout the 1980s and 1990s emphasized semiconductors as a primarily R&D issue, while access and acquisition demands were met by the National Security Agency's (NSA) Special Processing Laboratory. The 1997 standup of the Defense Microelectronics Activity and the 2004 establishment and subsequent expansion of the Trusted Foundry Program signified a shifting awareness and concern for semiconductor acquisition and sustainment. Efforts across the DoD and the broader US government slowly expanded from early working groups and research reports to include acquisition-specific strategies and DoD Instructions (DoDI). While not a unified effort, semiconductor acquisition and sustainment in the DoD took on greater importance over time. This trend was most clearly solidified with the post-2018 transfer of Defense Microelectronics Activity (DMEA) from the Office of the Under Secretary of Defense for Research and Engineering (OUSD[R&E]) to the Office of the Under Secretary of Defense for Acquisition and Sustainment (OUSD[A&S]). However, acquisition efforts under Secure Enclave and ongoing research projects from entities like DARPA and OUSD(R&E) remain largely disconnected.

3. **DoD policies to ensure trusted semiconductors continue to have gaps between intent and implementation.**

While DoD policies and strategic guidance documents address the acquisition and use of semiconductors, many of the guidelines and restrictions remain unimplemented. There is no publicly available Capability Development Document (CDD) that lays out Key Performance Parameters (KPPs) or Key Performance Indicators (KPIs) for the use of trusted semiconductors. As such, there appears to be a gap between the intent of policy and strategic documents and the thresholds for trust needed for DoD and Defense Industrial Base (DIB) implementation. The DoD has often offered exemptions or waived the use of a trusted foundry or trusted suppliers for the DIB based on financial or schedule reasons. Many DIB entities have therefore been able to circumvent DoDI guidelines for the use of a trusted foundry approach, trusted suppliers, and program protection plan. For instance, while the recent DoDI 5200.50 from 2025 intended to mitigate risks when trusted suppliers are unavailable, DoD component heads can still waive requirements. As a result, DoD attempts to institute different trust, quality assurance, and evidence-based assurance measures have lacked consistent implementation.

**4. DoD policy remains unprepared for future shocks to the semiconductor market.**

The DoD's relatively low demand for semiconductors compared to commercial demand leaves the DoD vulnerable to market changes. The semiconductor industry's move towards fabless foundries and GlobalFoundries' business decision not to pursue chips below 12nm caught the DoD off guard. These market changes threatened DoD's ability to retain access to trusted semiconductor suppliers for state-of-the-art (SOTA) chips. While current DoD policies have sought to define and implement assurance when using non-trusted suppliers, DoD remains unprepared for decisions that Intel may make based on commercial demands and manufacturing capabilities.

DoD policy planning for SOTA chips must account for uncertainty surrounding Intel's long-term commitment to 18A or the commercial viability of its fabrication business.[70] If 18A is phased out, users need alternatives and transition plans to avoid supply chain gaps or stranded intellectual property (IP). A coalition of users, supported by regular roadmap updates from Intel, would help manage lifecycle risk and support both government and industry planning for legacy, transition, and future nodes like 14A.

## CONCLUSION

National policies, legislation, and international market dynamics have been key forces shaping how the DoD has approached semiconductor policy and ensured access to trusted semiconductors. Legislative support and Congressional funding have been crucial enablers of DoD semiconductor policies and activities. Funding from the CHIPS and Science Act is set to end in 2026, and maintaining DoD and government-wide momentum on semiconductors will require additional Congressional action. Additional funding paired with DoD engagement with Congressional offices will be critical in maintaining the progress of and confidence in DoD's various programs aimed at ensuring trusted access to semiconductors.

## ABOUT THE AUTHOR

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