Building Mission Assurance with Trusted Suppliers

Systems and Mission Engineering Conference

October 18, 2023

What Is Mission Assurance?

Mission Assurance is a term primarily used to determine the requirements for availability and integrity.

- DAU Definition

A process to protect or ensure the continued function and resilience of capabilities and assets critical to the execution of DoD mission-essential functions in any operating environment or condition.

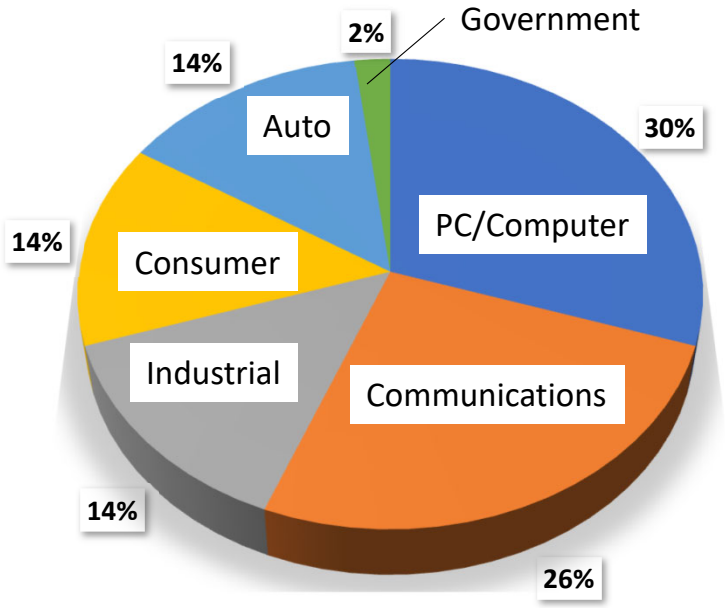
- DoD Directive 3020.40

Defense systems rely on microelectronics

Semiconductor Global Market

- Majority of semiconductor demand driven by products ultimately purchased by consumers
  - Laptops and tablets
  - Communication devices (IoT)
  - Smartphones
- Increasingly consumer demand is driven by emerging growth markets
  - Asia, Latin America, Eastern Europe, Africa
- Data Centers, IoT, EV, 5G, Autonomy, AI (large language models, edge processing)

Percent of Semiconductor Demand, by End Use

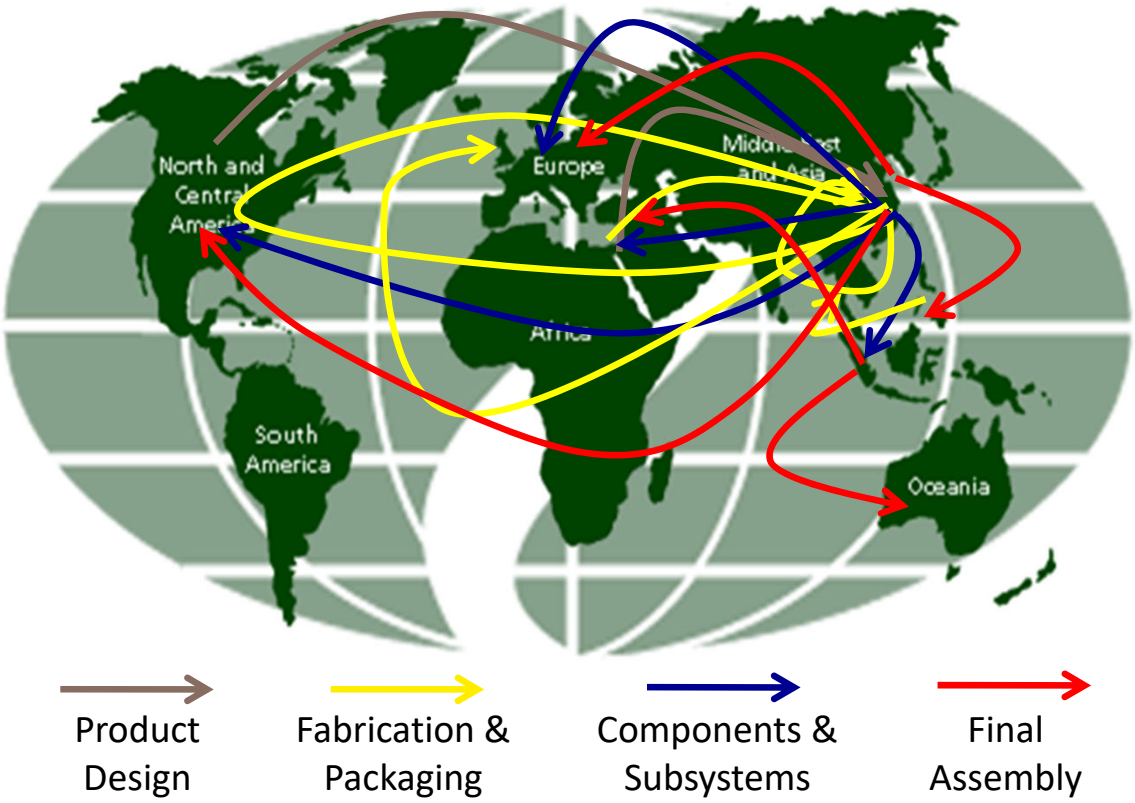


Source: Semiconductor Industry Association 2021 Factbook www.semiconductors.org

PC/Computer Communications Industrial Consumer Automotive Government

Global Supply Chain

- Disruptions in the global supply chain, intentional or not, can greatly impact business and national security
- Defective and counterfeit parts are growing concerns and testing measures are inadequate
- Domestic systems developers can experience decreased ability to design and innovate information and communication technology



The sheer number of suppliers for a single electronic component makes security challenging, if not impossible, for commercial products and presents great opportunity for mischief

Trusted Foundry and Trusted Suppliers

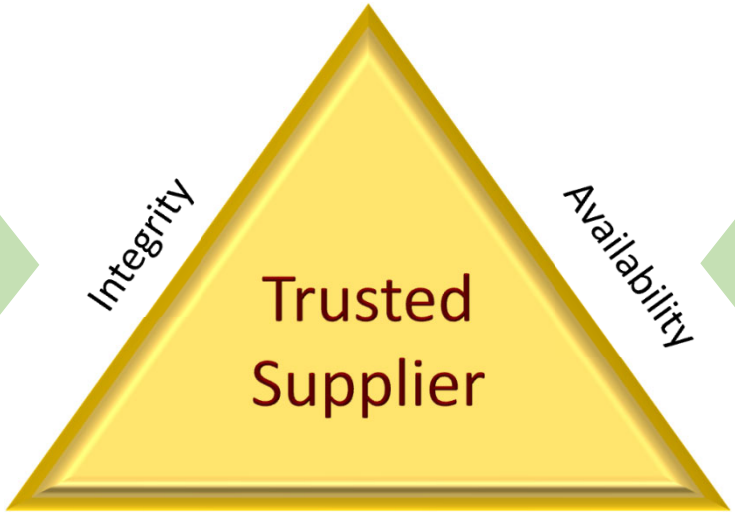
Trusted - Is the confidence in one's ability to secure national security systems by assessing the integrity of the people and processes used to design, generate, manufacture and distribute national security critical components.

- DMEA Website /Trusted Program

- Within this context, "trusted sources" will:
  - Provide an assured "Chain of Custody" for both classified and unclassified ICs
  - Ensure that there will not be any reasonable threats related to disruption in supply
  - Prevent intentional or unintentional modification or tampering of the ICs
  - Protect the ICs from unauthorized attempts at reverse engineering, exposure of functionality or evaluation of their possible vulnerabilities

The Trusted Program Provides Assurance

- ✓ Prevents intentional or unintentional modification or tampering
- ✓ Provides an assured "Chain of Custody" for both classified and unclassified components



- ✓ Ensures that there will not be any reasonable threats related to disruption of supply beyond commercial lifecycles

- ✓ Protects components from unauthorized attempts at reverse engineering, exposure of functionality or evaluation of their possible vulnerabilities

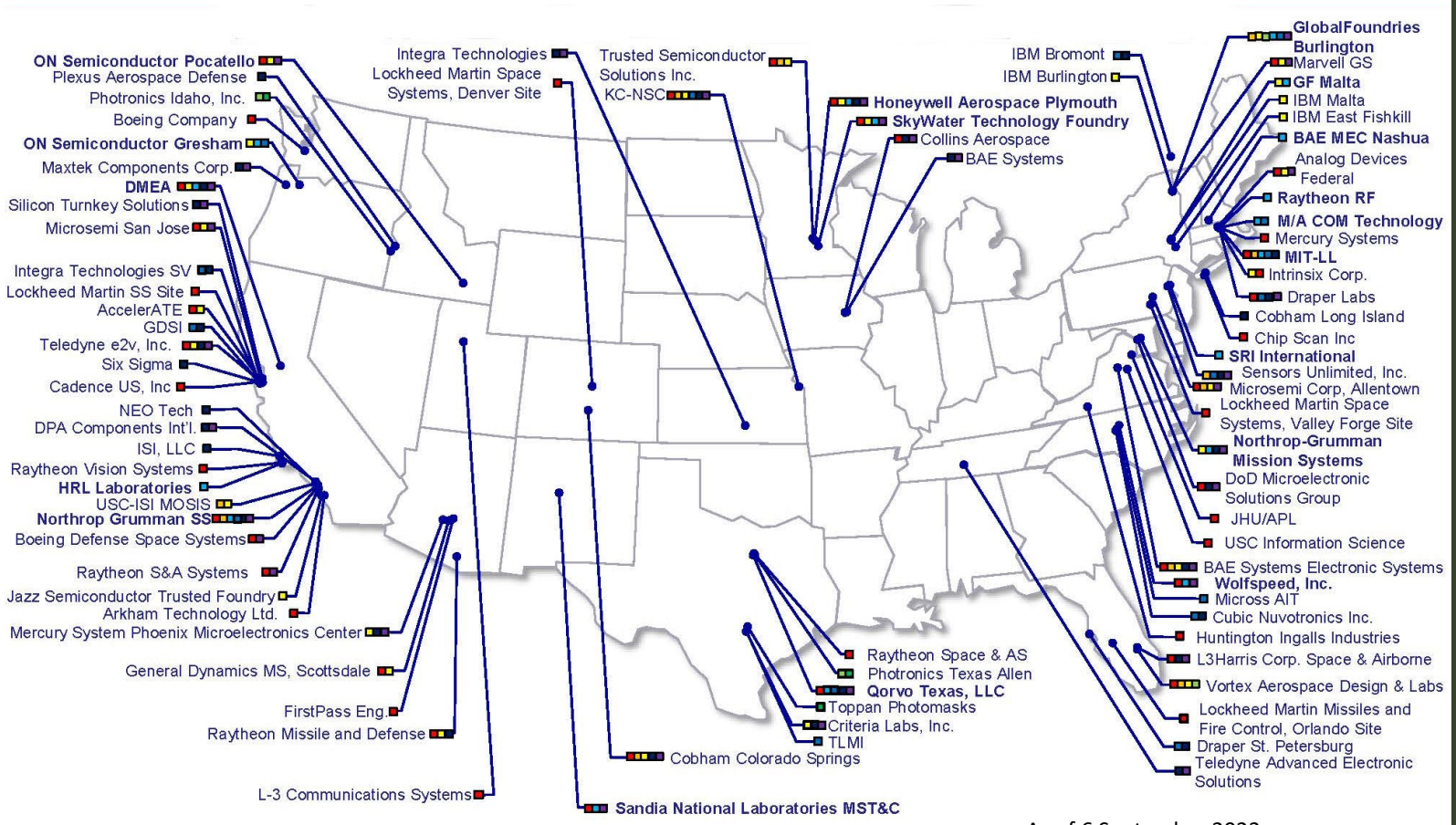
Trusted Foundry Program

- The Trusted Foundry Program (TFP) was established in 2003 as a joint effort between DoD and National Security Agency
- Trusted Foundry Access contract awarded by DMEA to GlobalFoundries
  - Foundry services for ASIC manufacturing
  - Pricing based on aggregated demand
  - Commercial, ITAR, and Trusted flows for all commercially available technologies from GFUS2
  - Facilitates advanced access to other SOTA semiconductor technologies (case-by-case)
  - Enterprise licenses for common design IP
- Provided many prototypes for the RAMP projects

Fab 9 (Burlington, VT)

Fab 8 (Malta, NY)

Trusted Suppliers



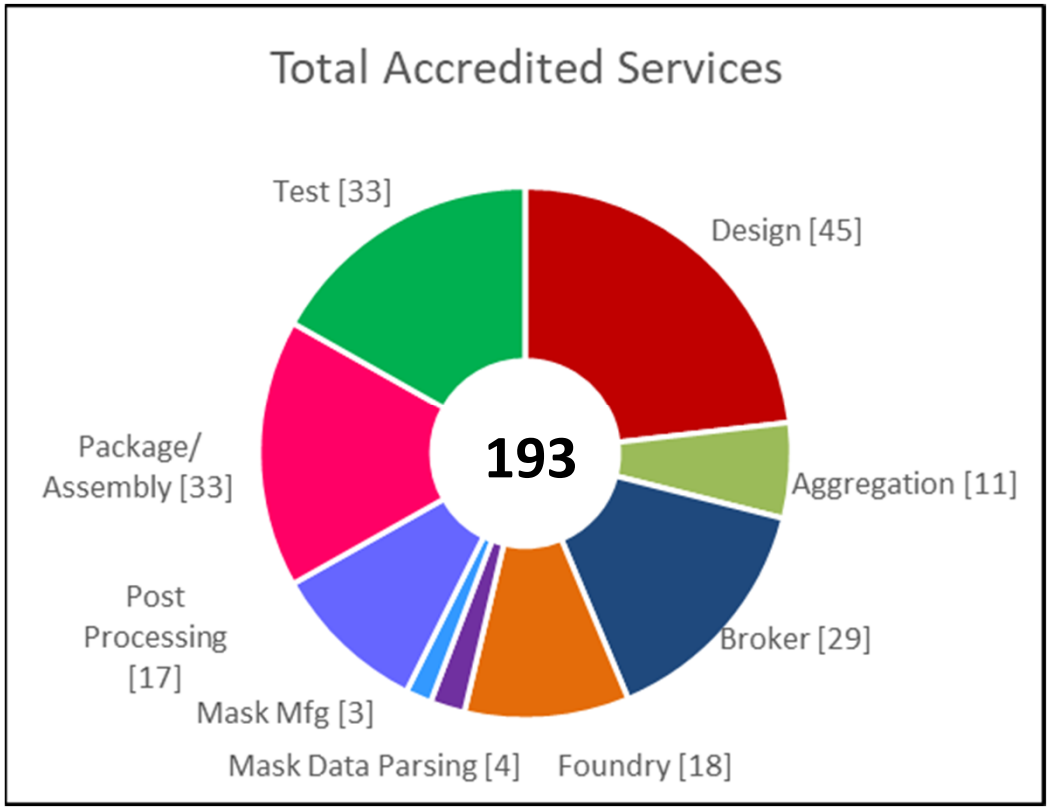
As of 6 September 2023

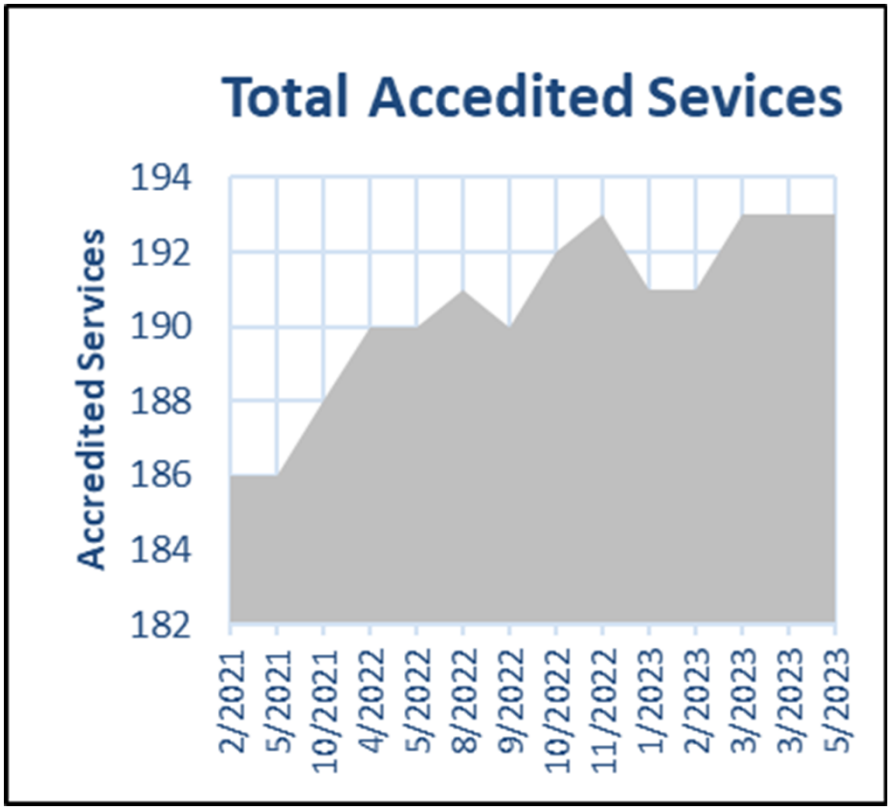
By unique Cage Code

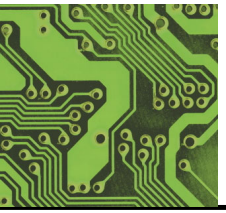
- 3 Universities
- 4 Government Organizations
- 51 Companies
- 16 Foundries
- 83 in total

Note: These charts are available on DMEA's website at https://www.dmea.osd.mil/otherdocs/AccreditedSuppliers.pdf

193 Accredited Services Across Nine Areas







DoDI 5200.44 - Policy

4. Policy – It is DoD policy that

4.a Mission critical functions and critical components within applicable systems shall be provided with assurance consistent with criticality of the system, and with their role within the system.

4.c Risk to the trust in applicable systems shall be managed…(2) employ protections that manage risk in the supply chain for components or subcomponent products and services (e.g., **integrated circuits, field-programmable gate arrays (FPGA), printed circuit boards**) when they are identifiable (to the supplier) as having a DoD end-use.

4.d In applicable systems, **integrated circuit-related products and services** shall be procured **from a trusted supplier using trusted processes** accredited by the Defense Microelectronics Activity (DMEA) **when they are custom-designed, custom-manufactured, or tailored for a specific DoD military end use** (generally referred to as application-specific integrated circuits (ASIC)).

Acquisition Considerations – Translating Policy to Contracts

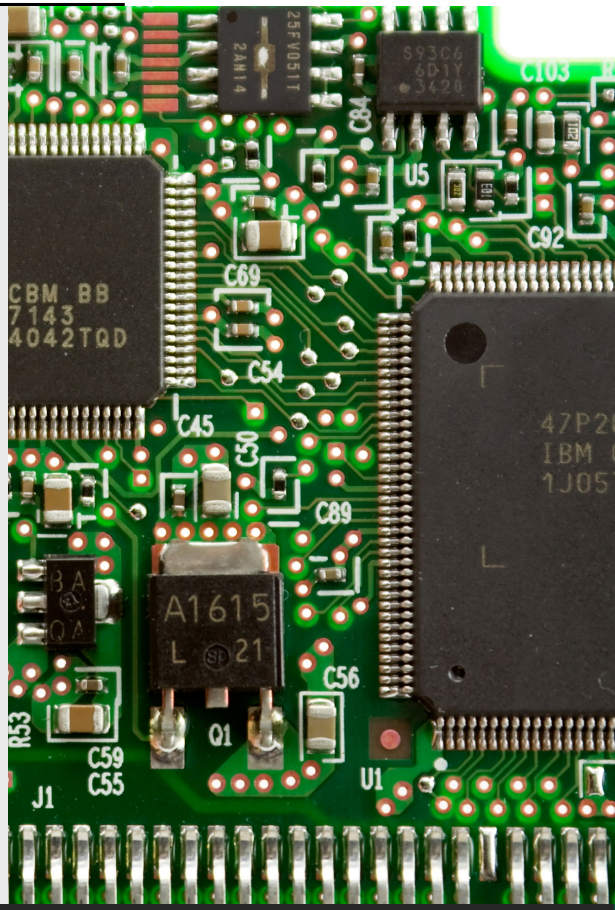
- DoD Policy applies to DoD organizations, not contractors
- Program Offices must work with their Contracting Officer to assure appropriate requirements are properly reflected in solicitations
  - Statement of Work
  - Contract Clauses
- Follow proper practices for imposing contractual requirements
  - Cost and schedule impacts
  - Flow down

Why Seek Trusted Suppliers

- Assures microelectronics provenance
- Culture of security (people, processes, facilities)
- Affords measure of supply chain risk mitigation
- Fulfills DoD policy for certain categories of microelectronics
- Addresses microelectronics obsolescence
- Provides classified and ITAR production capabilities
- Delivers warfighters dependable and reliable equipment they need

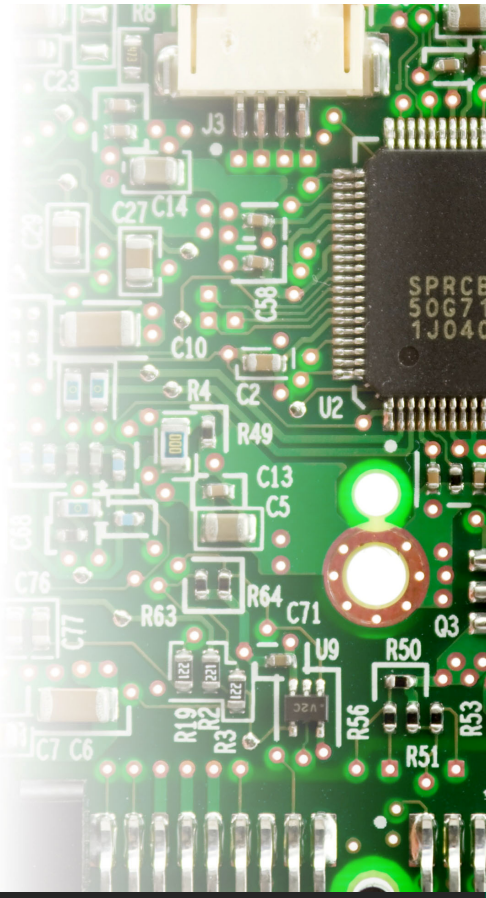
Trusted Foundry Benefits

- Central and rapid contracting for access to processes and parts
- Available to all Government organizations
- Contracts for guaranteed access regardless of project size
- Procurement of specialized IP for DoD applications (hardened IP, temperature specs, etc.)
- Efficient foundry interface and packaging sources
- Access to advanced microelectronics technologies
- ITAR/EAR/Trust
- TAPO Support/Designer Mentoring
- Quantifiably Assured Manufacturing



Trusted Supplier Benefits

- Chain of custody
  - documentation showing the full process of acquisition, transfer, handling and disposition of materials and components
  - Material and personnel logging and line-of-sight monitoring
- Access
  - guaranteed access to DoD and its contractors beyond commercial lifecycles who wish to place orders for microelectronics regardless of quantity
- DMEA accredits Trusted suppliers IAW DoDI 5200.44
  - DMEA establishes accreditation criteria, performs accreditation of Trusted integrated circuit service suppliers, and issues guidance on their use
- Mitigation of supply chain risk
  - Counterfeits, quality, IP protection



Trusted Supplier Selection Involves

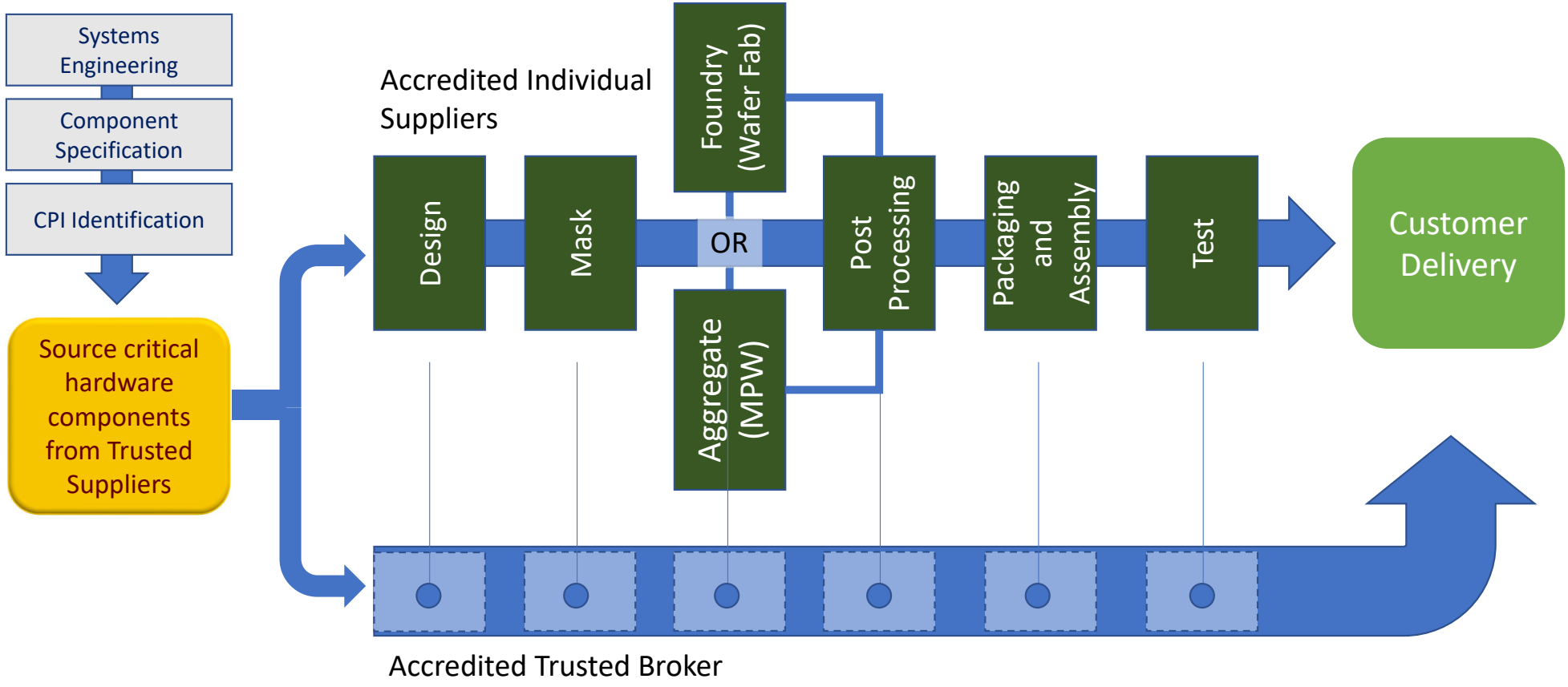
Program Office
- Customer facing
- Program definition
- Compliance
- Cost/Schedule

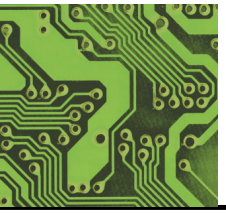
Engineering
- Requirements decomposition
- Trade studies
- Engineering design
- Component specification

Subcontract/Supply Chain Management
- Flow down
- Supplier management
- Purchasing
- SCRM

System Security Engineering
- Program protection
- CPI determination
- Cybersecurity
- Risk analysis

Procuring from Trusted Suppliers





Conclusion

- Trusted Suppliers Enhance Mission Assurance
  - The current standard for confidentiality
  - Preventative security before and during fabrication
  - Accredited chain of custody provides assurance of integrity
  - Process and data protections increase assurance ofboth integrity and availability
  - Accreditation assures reasonable assured supply

Trusted Suppliers have a culture of security that benefits all customers

Applicable Policy and Guidance

DoD policies to assure trust in ICs

- DoDI 5200.44 - Protection of Mission Critical Functions to Achieve Trusted Systems and Networks (TSN), October 15, 2018
- DoDI 5000.83 - Technology And Program Protection To Maintain Technological Advantage, May 21, 2021
- DoDI 5200.39 - Critical Program Information (CPI) Identification and Protection Within Research, Development, Test, and Evaluation (RDT&E), October 1, 2020
- DoDI 5200.47E - Anti-Tamper (AT), December 22, 2020
- DoDI 4140.67 - DoD Counterfeit Prevention Policy, April 26, 2013
- DoDI 8510.01 – Risk Management Framework for DoD Systems, July 19, 2022
- Directive-Type Memorandum (DTM) 09-016 – Supply Chain Risk Management (SCRM) to Improve the Integrity of Components Used in DoD Systems, March 23, 2012
- Technology and Program Protection (T&PP) Guidebook, July 2022

Resources and Materials

- DoDI 4140.67, Change 2, DoD Counterfeit Prevention Policy (August 2018) http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/414067p.pdf
- DoDI 5200.39, Change 2, Critical Program Information (CPI) Identification and Protection Within Research, Development, Test, and Evaluation (RDT&E) (October 2018) http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/520039p.pdf
- DoDI 5200.44, Change 3, Protection of Mission Critical Functions to Achieve Trusted Systems and Networks (TSN) (October 2018) http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/520044p.pdf
- DoDD 5200.47E, Change 2, Anti Tamper (AT) Change 1 (August 2018) http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodd/520047E.pdf
- Defense Microelectronics Activity (DMEA) https://www.dmea.osd.mil
- Department of Defense Risk, Issue, and Opportunity Management Guide for Defense Acquisition Programs (January 2017) http://www.acq.osd.mil/se/docs/2017-RIO.pdf
- Defense Acquisition Guidebook (DAG), Chapter 9 Program Protection (October 2017) https://www.dau.mil/guidebooks/Shared%20Documents%20HTML/Chapter%209%20Program%20Protection.aspx#toc6
- DoD Response to FY2017 NDAA, Section 231: Strategy for Ensuring Access to Assured Microelectronics April 2018) https://www.acq.osd.mil/se/docs/2018-NDAA231-A.pdf 8

Contacts

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DBS – Outreach (contractor) - dchesebrough@definedbusiness.com

Trusted Supplier Panel

Trusted Supplier Steering Group

Building Mission Assurance with Trusted Suppliers

Trusted Supplier Steering Group

The TSSG is a self-formed alliance of 12 companies that have been accredited by DMEA as trusted suppliers.

BAE SYSTEMS

NORTHROP GRUMMAN

Honeywell

IBM

skywater

onsemi

PHOTRONICS

Vortex Aerospace Design & Labs, Inc.

jstf

TELEDYNE TECHNOLOGIES INCORPORATED

Building Mission Assurance with Trusted Suppliers Panel Discussion

Sam Hernandez
Trusted Foundry CTO, IBM

John Monk
Consulting Engineer, Advanced Technology Laboratory, Northrop Grumman Mission Systems

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