Building Mission Assurance with Trusted Suppliers

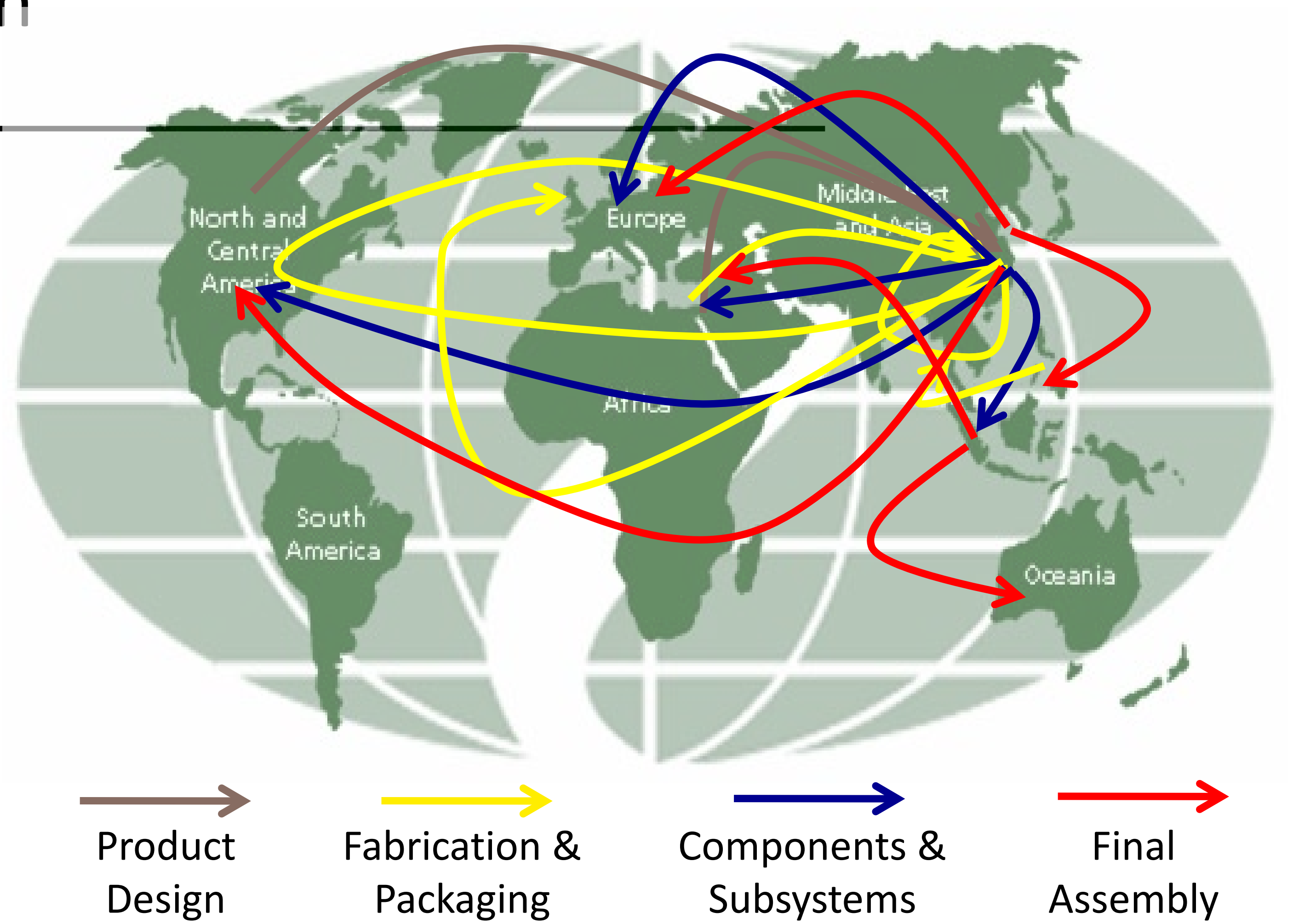
Systems and Mission Engineering Conference

October 30, 2024

Distribution Statement A: Approved for public release

A 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

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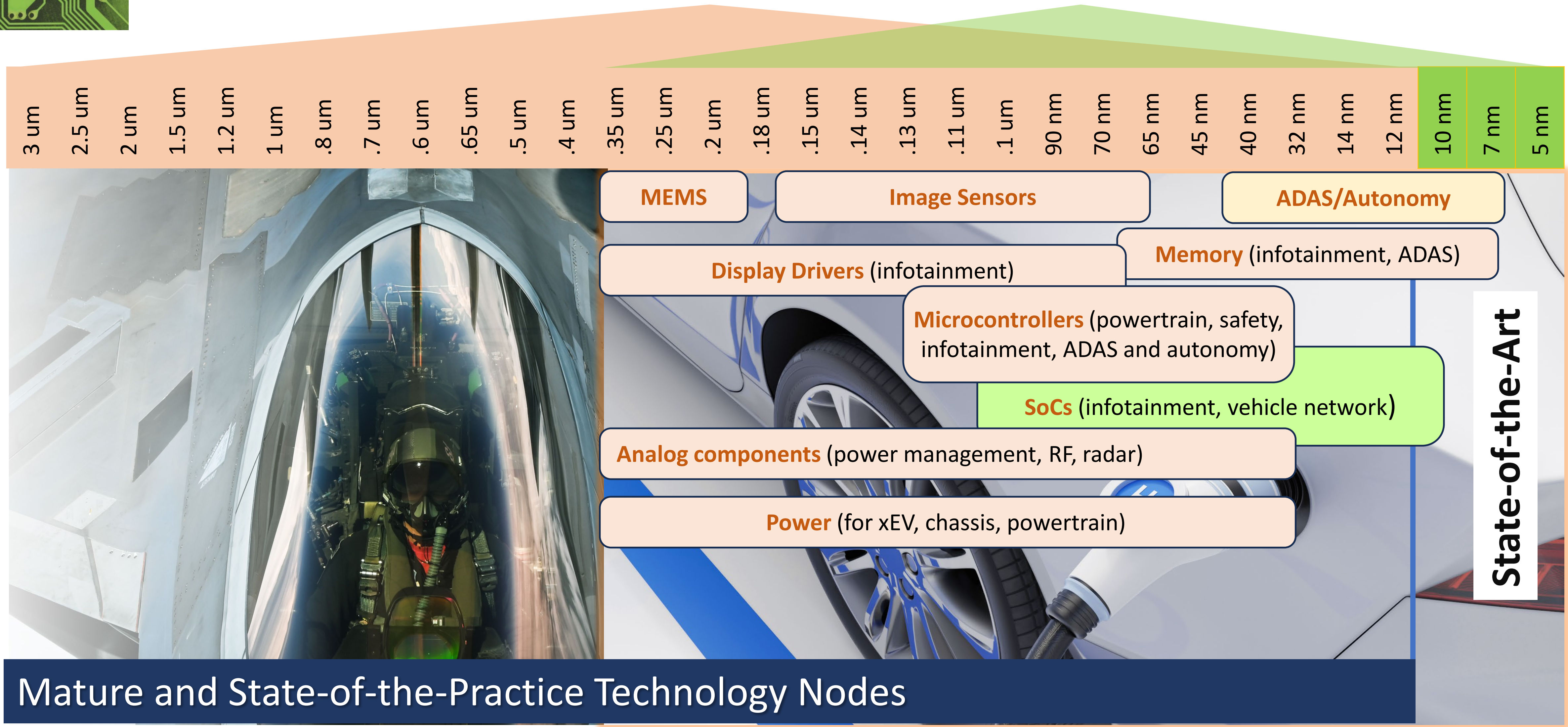
Trusted Supplier - Auto Technology Nodes



3 um, 2.5 um, 2 um, 1.5 um, 1.2 um, 1 um, .8 um, .7 um, .6 um, .65 um, .5 um, .4 um, .35 um, .25 um, .2 um, .18 um, .15 um, .14 um, .13 um, .11 um, .1 um, 90 nm, 70 nm, 65 nm, 45 nm, 40 nm, 32 nm, 14 nm, 12 nm, 10 nm, 7 nm, 5 nm

MEMS

Image Sensors

ADAS/Autonomy

Memory (infotainment, ADAS)

Display Drivers (infotainment)

Microcontrollers (powertrain, safety, infotainment, ADAS and autonomy)

SoCs (infotainment, vehicle network)

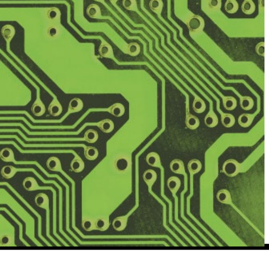
Analog components (power management, RF, radar)

Power (for xEV, chassis, powertrain)

State-of-the-Art

Mature and State-of-the-Practice Technology Nodes

Source: Semiconductor Trends in Automotive, Yole Intelligence



CISA ICT-SCRM Task Force – Threat Focus SCRM

- Executive Order on Securing the Information and Communications Technology and Services Supply Chain (E.O. 13873), May 2019
- ICT-SCRM cybersecurity overlay approach to defining a threat-focused selection of cybersecurity controls
- Deliberate adversary compromise of a component or service through the supply chain.
- Supply Chain Risk is…

> The risk that an adversary may sabotage, maliciously introduce unwanted function, or otherwise subvert the design, integrity, manufacturing, production, distribution, installation, operation, or maintenance of an item of supply or a system so as to surveil, deny, disrupt, or otherwise degrade the function, use, or operation of a system (The Ike Skelton National Defense Authorization Act for Fiscal Year 2011, Section 806).
>
> - CNSS directive (CNSSD) 505 [9]

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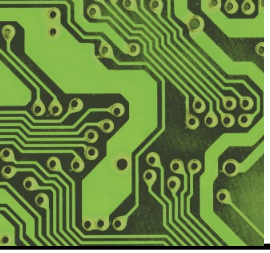
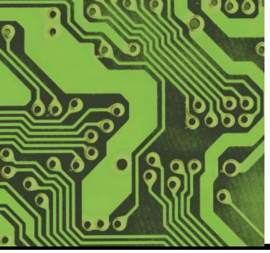


ICT-SCRM Task Force Hardware Threats

- FOCI Compromise of Pre-silicon Hardware (HW) Design
- Compromise of Pre-silicon HW Design
- Compromise of HW Back-end Design, Verification, Fabrication, Test, Packaging, or Distribution
- Compromise of HW During Personalization or Programming
- Compromise of HW During Board Integration
- Compromise of HW Key Architecture Compromised
- Use of High-Risk Markets for Scarce, Obsolete, or Legacy Products

Trusted Suppliers Mitigate These Threats

Source: AEROSPACE REPORT NO. TOR-2023-00502 – REV A, *ICT-SCRM Control Overlay: A Threat Based Approach*, August 2024



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.

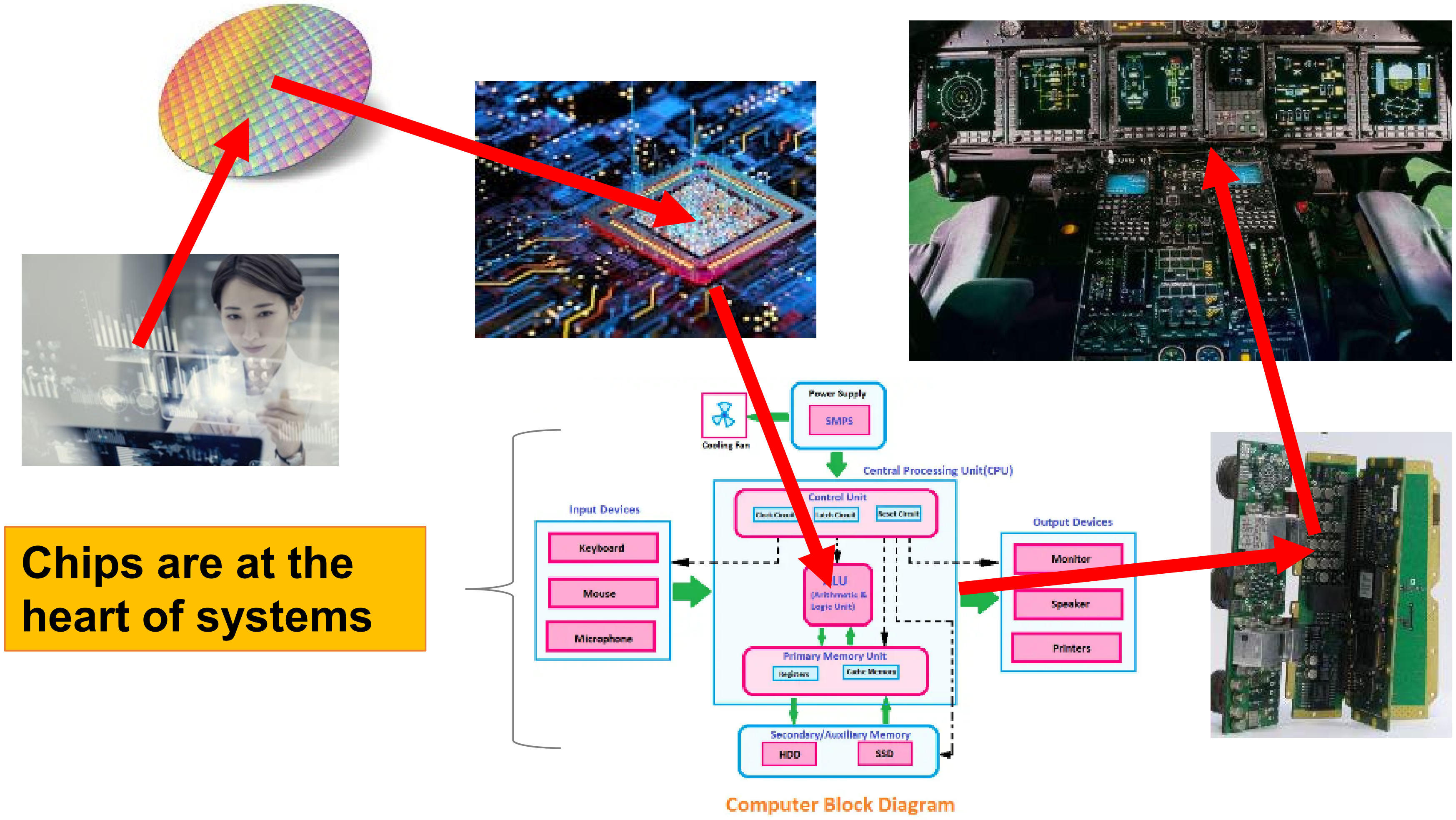
- DMEA Website /Trusted Program

- 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

Security is a Systems Engineering Task

Vulnerabilities and Attack Vectors exist at all layers of the stack

- Application
- Middleware
- OS UI
- OS Devices
- OS Drivers and runtimes
- Hypervisor
- Firmware (Bios)
- PC Boards
- Chips
- Wafers
- Design and IP

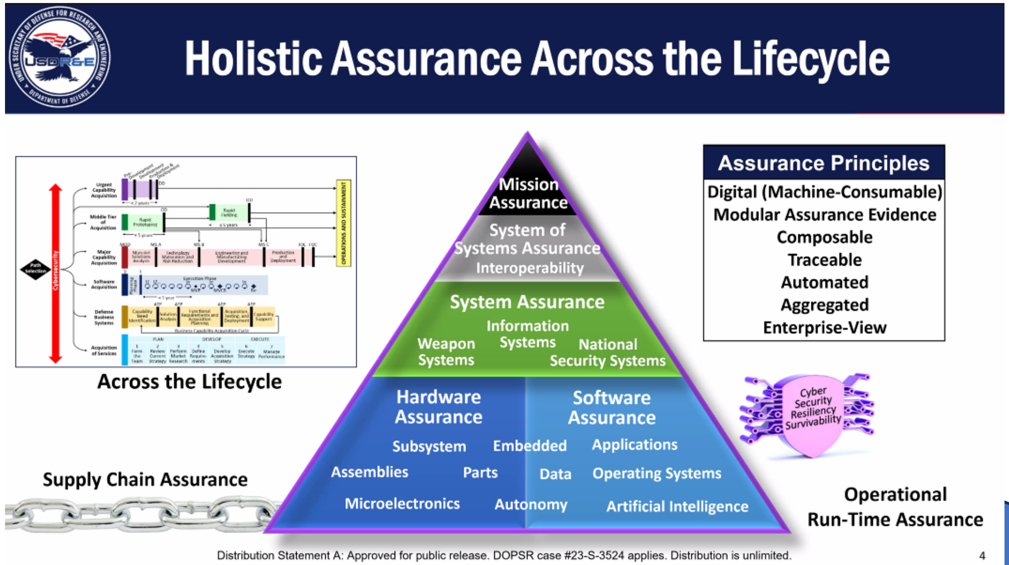


Chips are at the heart of systems

Computer Block Diagram

Source: Ezra Hall, GlobalFoundries, Trusted Supplier Networking Event, August 28, 2024

Foundation for Mission Assurance



Holistic Assurance Across the Lifecycle

Assurance Principles

- Digital (Machine-Consumable)
- Modular Assurance Evidence
- Composable
- Traceable
- Automated
- Aggregated
- Enterprise-View

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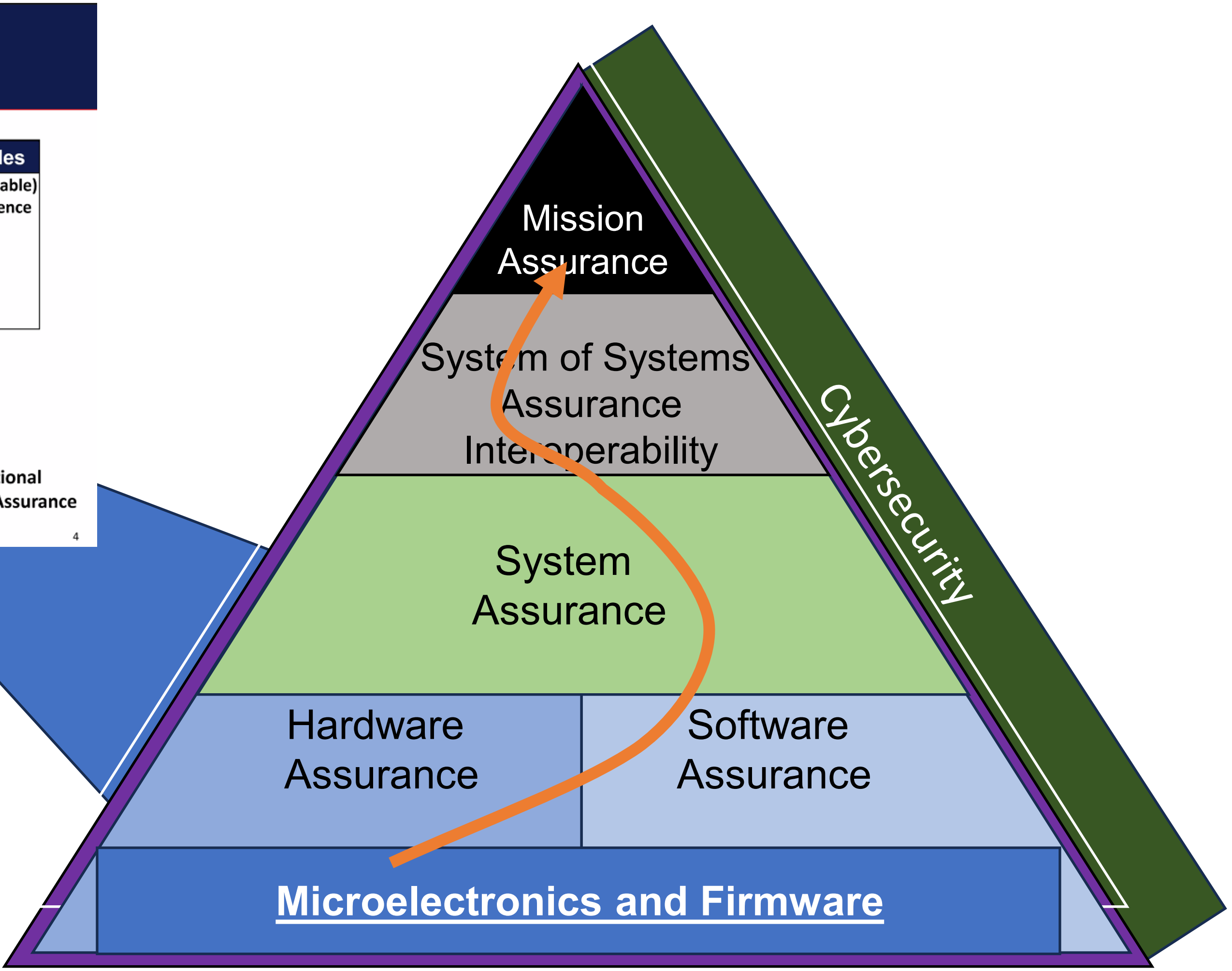
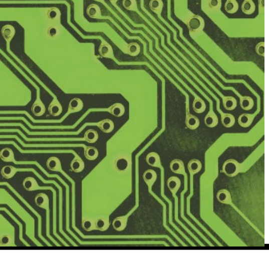
Joint Federated Assurance Center

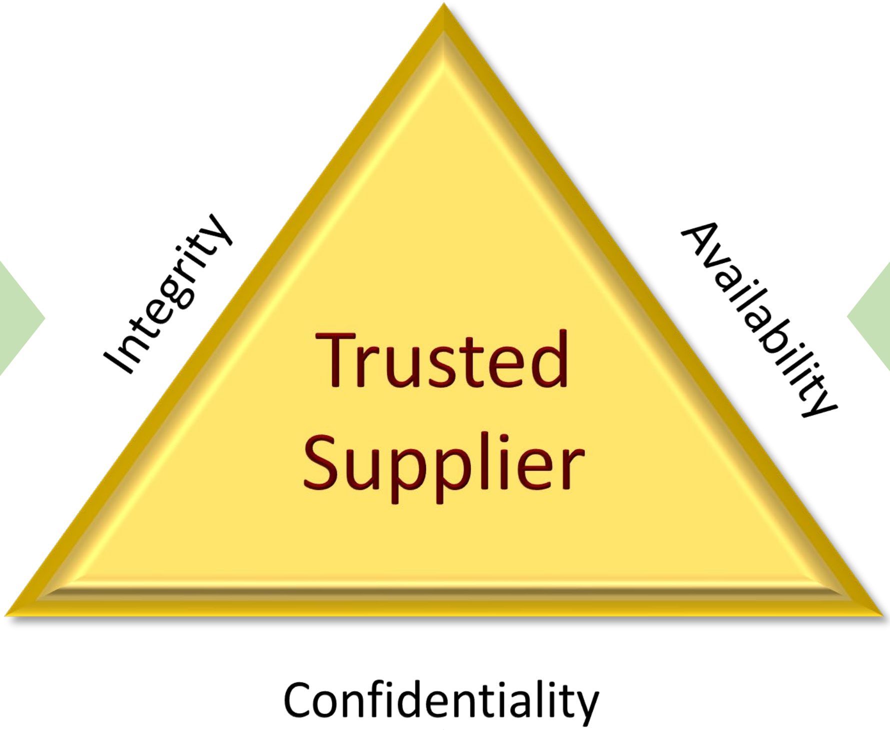
Trusted and Assured Microelectronics are the foundation of mission assurance





The Trusted Program Provides Assurance

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



Integrity

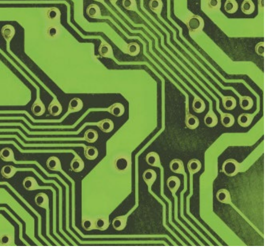
Trusted Supplier

Availability

Confidentiality

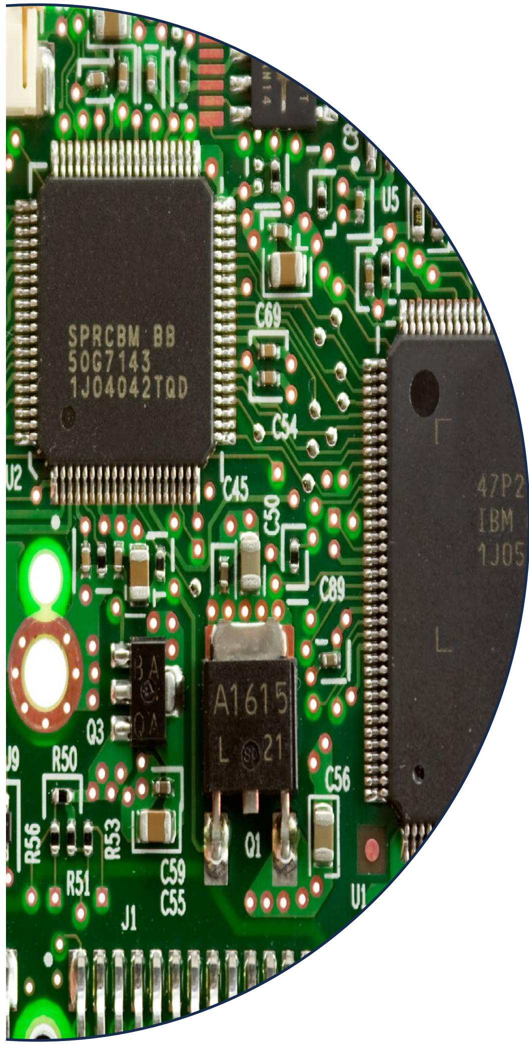
- ✓ Ensures that there will not be any reasonable threats related to disruption of supply beyond commercial lifecycles

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



Trusted Supplier DMEA Accreditation

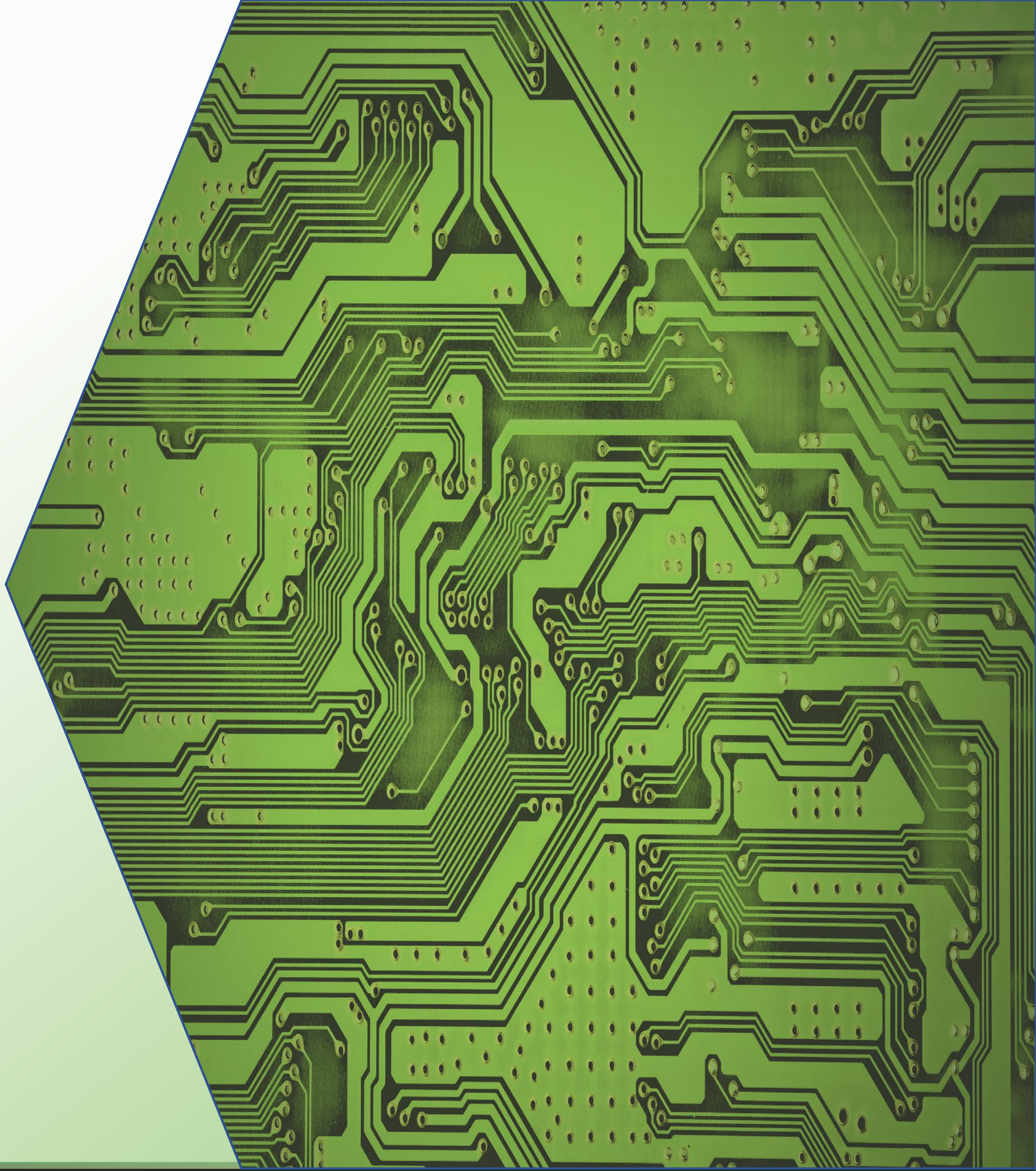
- Trustworthiness – Processes, Integrity, Quality, Data
  - Known accreditation criteria across entire microelectronics supply chain
  - Assures integrity, confidentiality, and availability for design and manufacturing
  - Design/Process/Product Integrity Provisions
    - ✓ Cleared facilities and personnel
    - ✓ Quality and Configuration Management Systems
    - ✓ Chain-of-custody plan, procedures and documentation
    - ✓ External and internal audits
    - ✓ Process controls



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 companies that have been accredited by DMEA as trusted suppliers.

BAE SYSTEMS

NORTHROP GRUMMAN

Honeywell

IBM

skywater

cadence

PHOTRONICS

Vortex Aerospace Design & Labs, Inc.

jstf

TELEDYNE TECHNOLOGIES INCORPORATED

Building Mission Assurance with Trusted Suppliers Panel Discussion

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Dr. Brad Ferguson

SVP Special Programs
President SkyWater Federal

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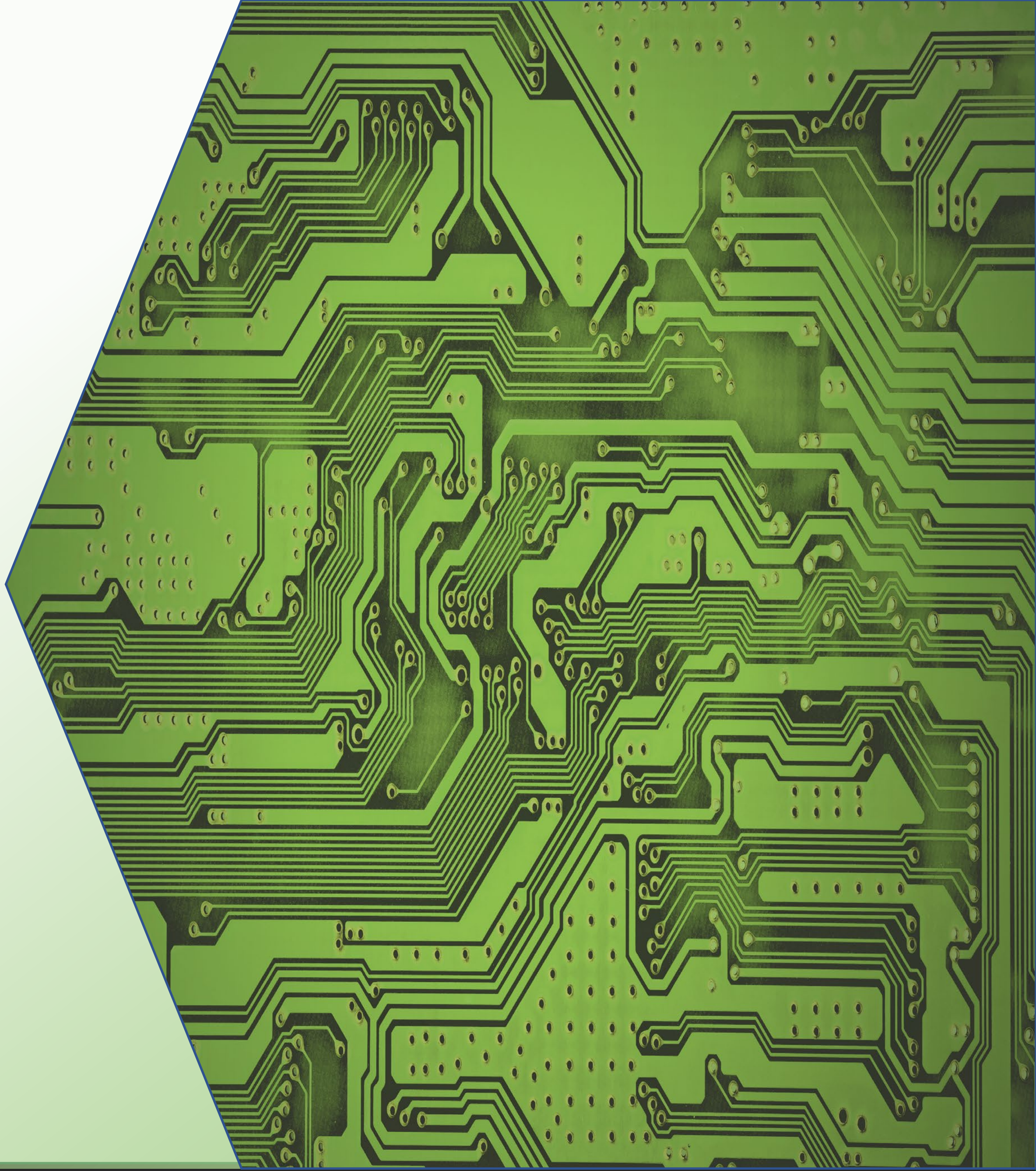

Contacts

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