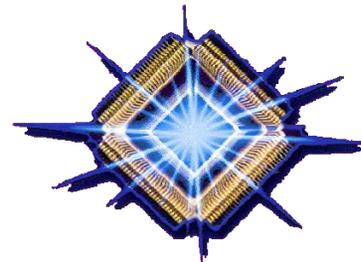




Defense Microelectronics Activity (DMEA)

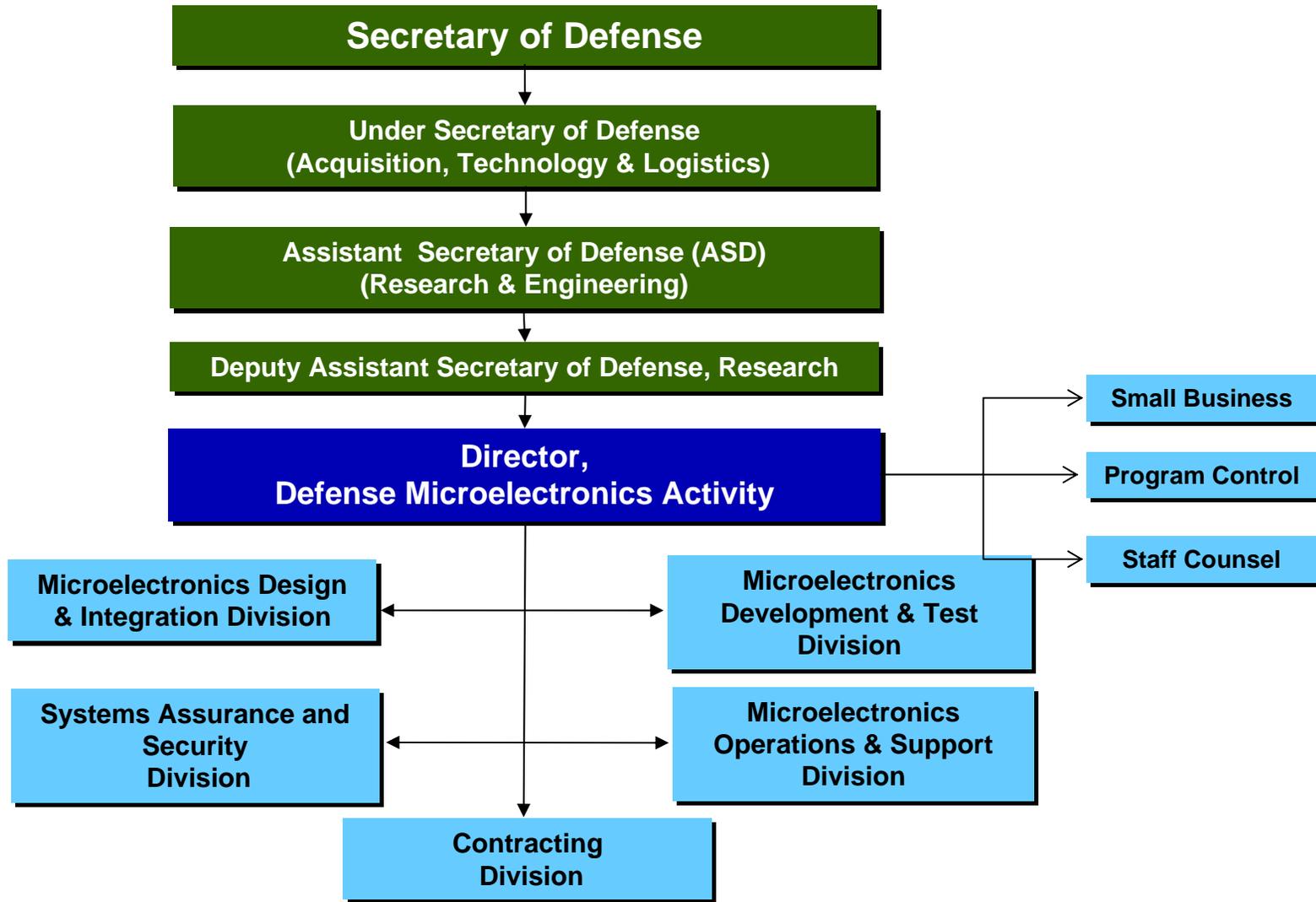


DMEA/ME
18 March 2014





DMEA Organization





Microelectronics Challenges for Defense Systems



Microelectronics: Key Critical Tech for ALL Mil / Intel Operations

- **Extended weapon system life cycles (20 – 40 years)**
 - Rapidly evolving, expanding missions
 - Performance degradation
 - Obsolescence
- **Commercial requirements dictate the technology & market**
 - Very high volumes for short terms
 - Lower environmental temperature ranges & quality thresholds
 - Unsecure manufacturing / distribution
- **Unpredictable Supply**
 - Counterfeits
 - Malicious Changes
 - Engineering Talent Squeeze



Apple sells an average of 385000 iPhones per day



DMEA Responsibilities



- **Provide microelectronics technology solutions**

- Leverage advanced microelectronics technologies
 - Enhance / adapt capability and performance
 - Improve system reliability and maintainability
 - Address effects of rapid obsolescence
- Accelerate delivery of technical capabilities to win the current fight
- Address Increasing Risk in Trust and Assurance for defense microelectronics
- Implement the DoD Trust Program
 - Provide access to DoD for processes / devices
 - Extend Trust to the entire supply chain



- **Provide critical microelectronics design and fabrication skills**

- Address increasing requirements in traditional and irregular warfare
- Ensure that the DoD is provided with systems capable of ensuring technological superiority over adversaries
- High mix, low volume “unique” microelectronics are endemic to military needs and not commercially viable
- Provide long term assured and trusted supply of microelectronics

- **Payoff**

- Providing critical, quick turn solutions for DoD, intelligence, special operations, cyber and combat missions and the only source for a long term assured supply of microelectronic parts unobtainable in the commercial market.
- Unique capability in world

- **Serve as joint resource for DoD / government agencies / industry / foreign allies**

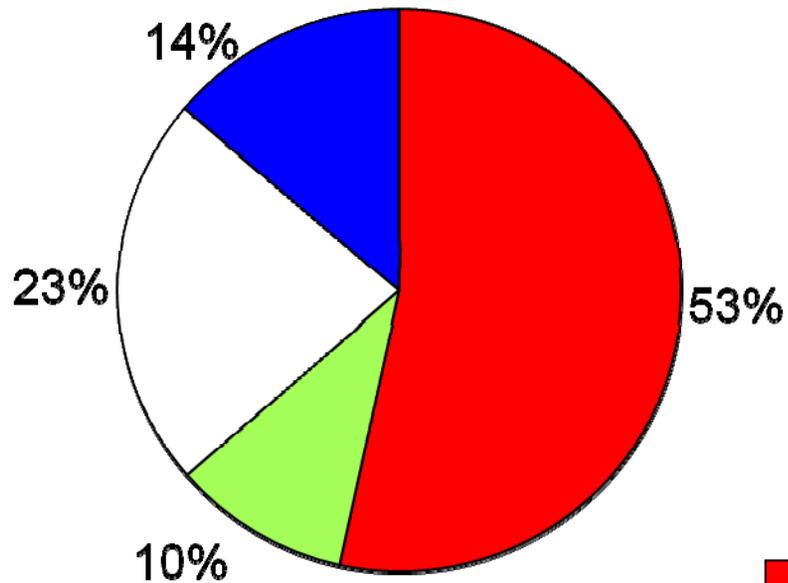




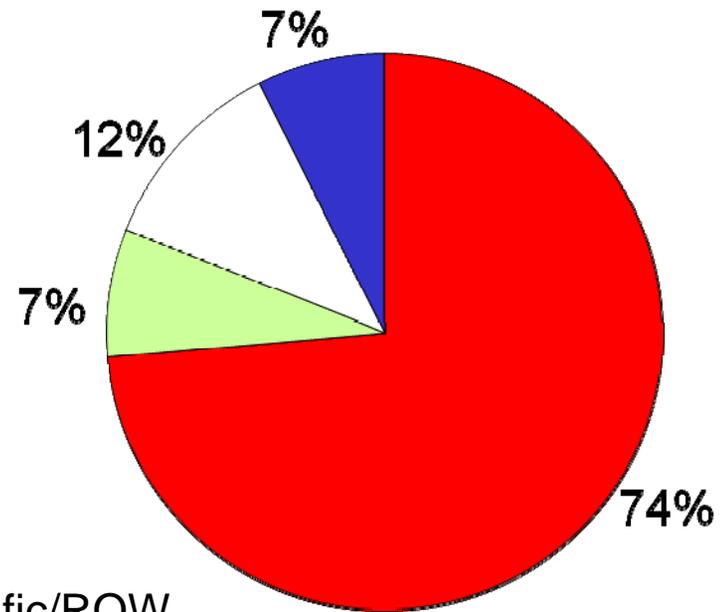
Regional Distribution of Commercial Foundries



2011



2020



- Asia-Pacific/ROW
- Europe
- Japan
- North America

Source: World Fab Watch - Nov 2011



Where Do Your Parts Come From?



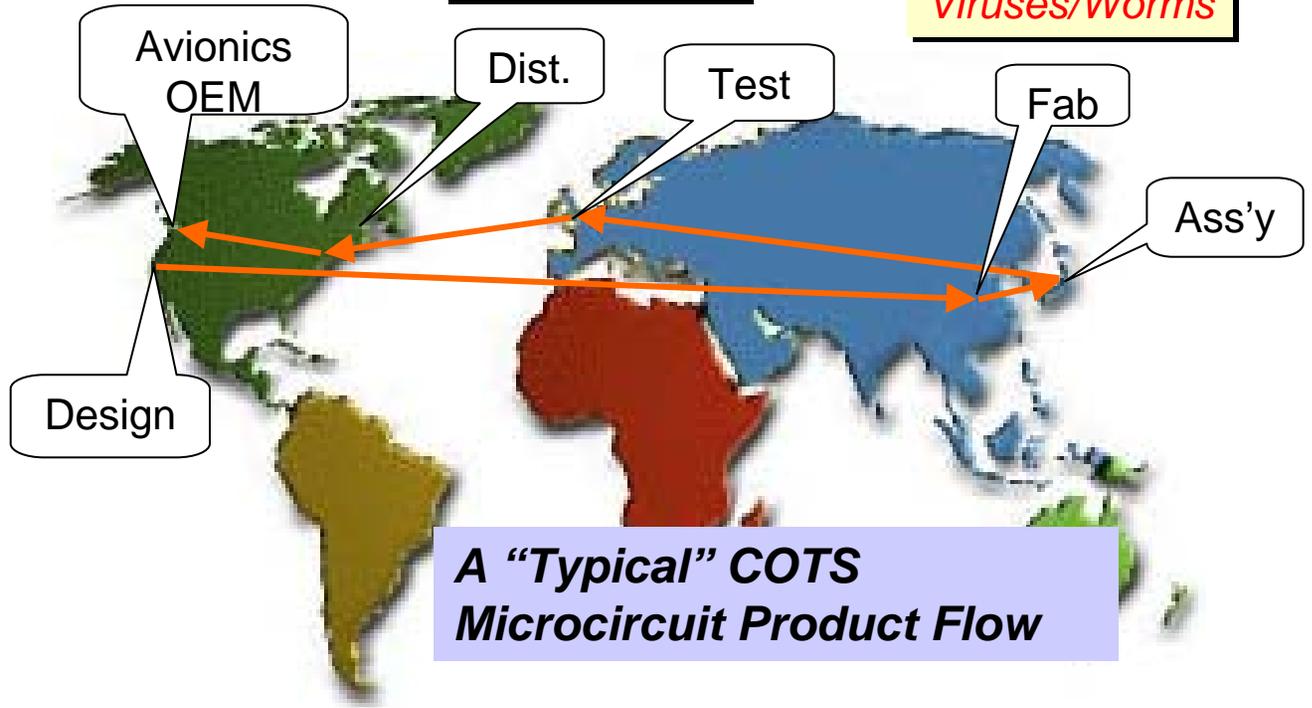
Counterfeit Parts



Trojan Horses



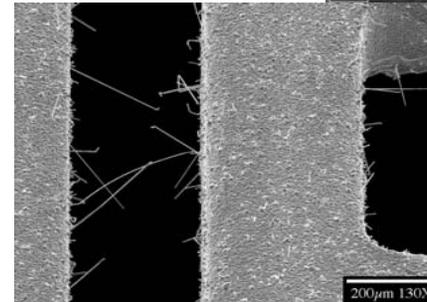
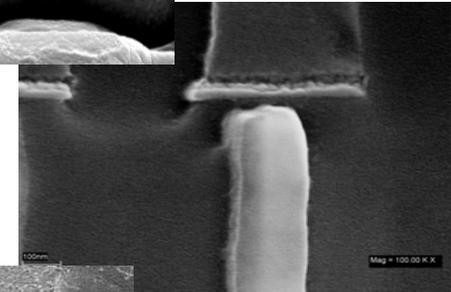
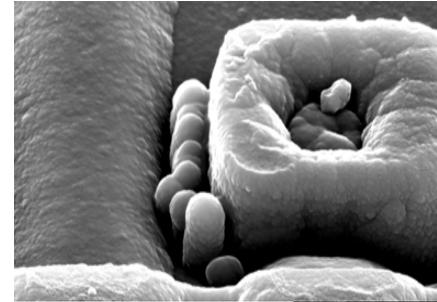
Viruses/Worms





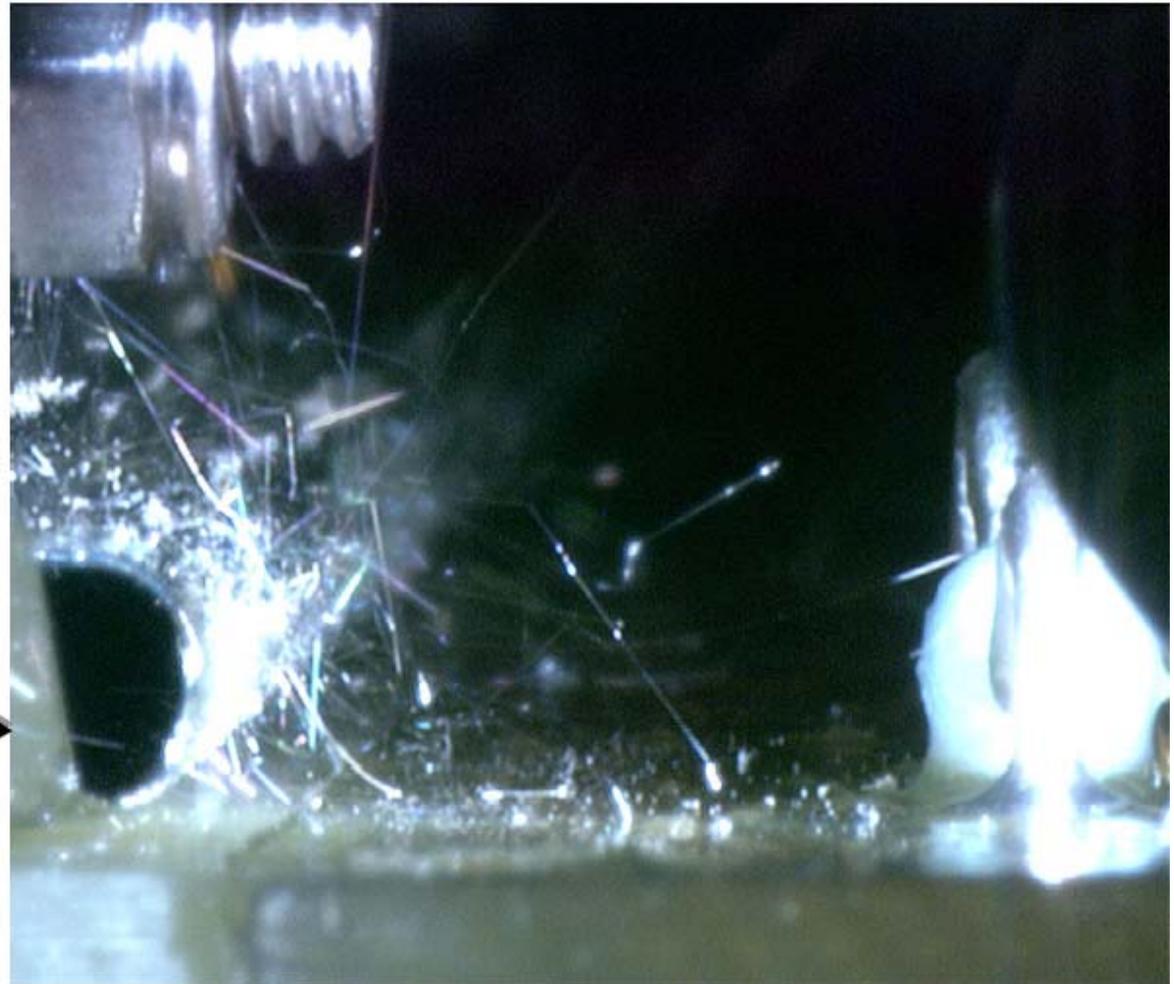
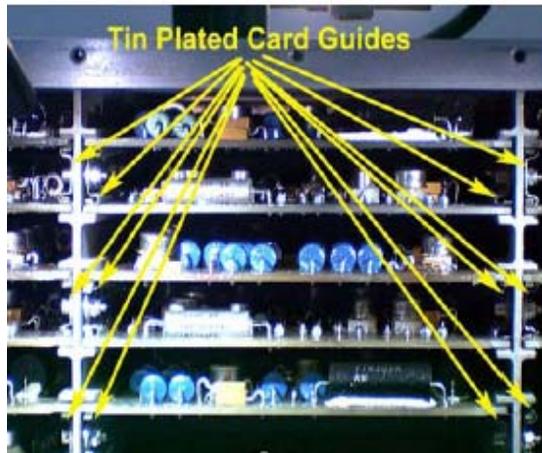
Issues with COTS

- **Quality (Commercial vs. mil)**
- **Physics of failure**
 - Plasma residue
 - Mechanical weakness
 - Hot carrier damage
 - Gate oxide failure
 - Interconnection current density faults
 - Electromigration
- **Lead-free impacts**
 - **Restriction of Hazardous Substances Directive 2002/95/EC, RoHS**
 - Reliability
 - Tin whisker failures
 - Solder cracks – configuration control
 - Lack of availability (DMS) of traditional SnPb finished components
 - Commercial industry is going lead-free





Flight Control System (FCS) avionics box with cover removed



"Space Shuttle Program-Tin Whisker Mitigation", K. Nishimi, Intl. Symposium on Tin Whiskers, Apr. 2007



DMEA / Industry Partnerships



- **More than one “industry”**

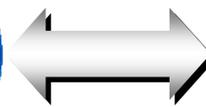
- Semiconductor
- Defense
- Aftermarket

- **Each deals with microelectronics issues, but ...**

- Different issues for each industry
- Different motivations
- Different business models



DMEA



Defense

- **Different partnerships for different industries**

- DMEA created specific partnerships for specific industries
- Each partnership combines unique technical approach with unique business models

Semiconductor



After-Market





Defense Industry Partnership



Program Offices



ATSP III – \$6.047B

Fourth generation

- **Joint Service Use**
 - Unique Skill Set
 - Leveraged Technology
- **ALL SOLUTION OPTIONS**



ATSP contracts

CRADAs

- Single PM Point of Contact
 - Coordinated Programs
- Total Life Cycle Systems Management
 - Adaptive Opportunities
 - New Capabilities
 - Multiple Problem Resolution

BAE SYSTEMS



GENERAL DYNAMICS

Honeywell



NORTHROP GRUMMAN



Raytheon



Task Examples in the Next Briefing

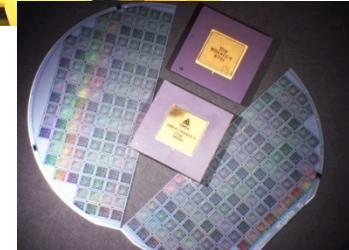




DMEA Outreach Semiconductor Foundry Industry



- **Unique Government / Semiconductor Industry partnership**
 - Innovative adaptable **foundry**
 - Innovative business model
- **Government-held process licenses**
 - Prototype / low volume production by DMEA for government needs
 - High volume production by industry
 - No commercial conflicts – first right of refusal by industry
- **Transfers industry-developed (commercial) IP & technology**
 - COTS as a solution, not a problem
 - Saves processes, not parts
- **Assures continued DoD supply as industry moves with market**





DoD's Advanced Reconfigurable Manufacturing for Semiconductors (ARMS)

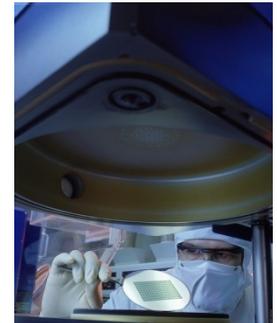


- **Main focus – Adaptive operations for conventional & irregular warfare**

- Insert advanced technology into DoD weapon systems
- Prototype / low volume production of new designs
- Quick turn design / prototype / production

- **War surge support**

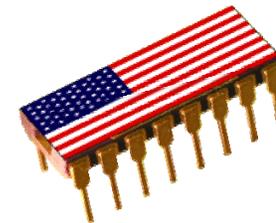
- Agile
- Responsive



- **Trusted Parts**

"Offset state-of-the-practice & state-of-the-art"
- Adm. Timothy Keating, USN, Commander USPACOM

- **Assured Supply**





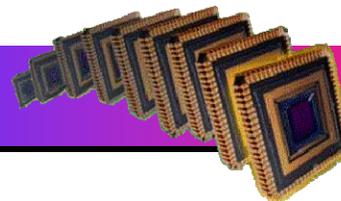
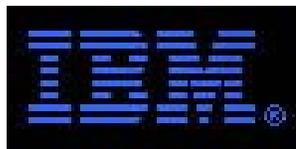
The Trusted Foundry Initiative



- **Implements DOD Trusted IC Strategy**
 - Provides access to DoD for processes / devices
 - Classified circuits
 - Trusted designs / manufacturing



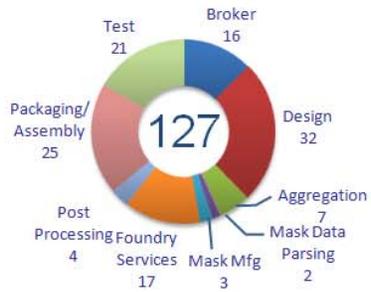
- **Trusted Accreditation Program**
 - Provides a **“Trusted Process Flow”** at each vendor
 - Vendors must be located in US / UK / Canada / Aus / NZ
 - DMEA is the vendor accreditation authority
 - Extended beyond foundries to entire supply chain



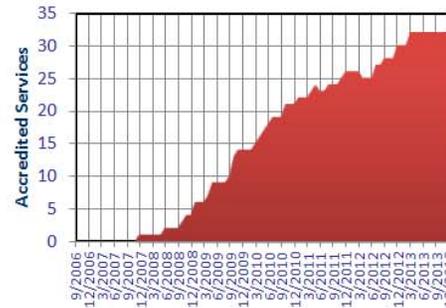


Dashboard

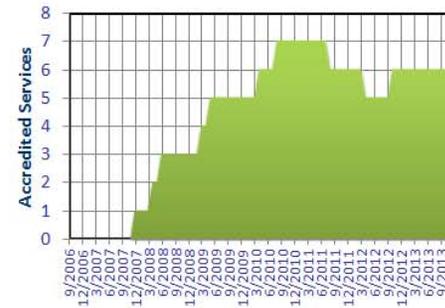
Total Accredited Services



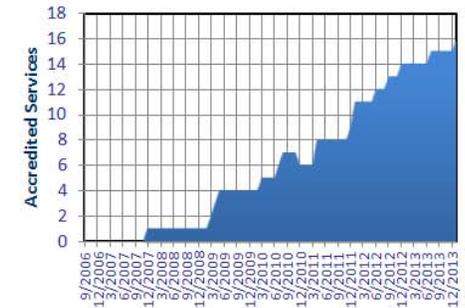
Design



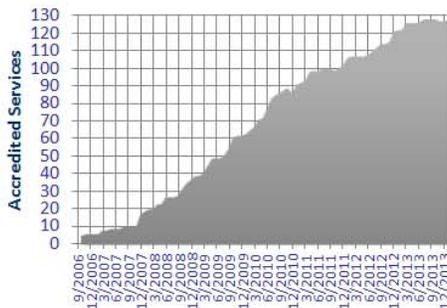
Aggregation



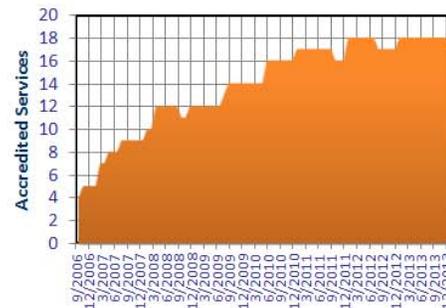
Broker



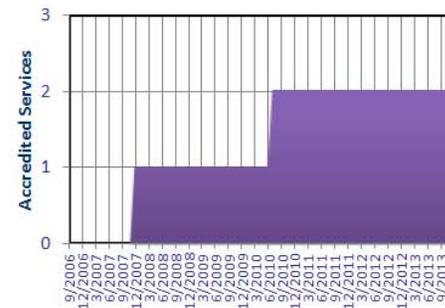
Total Accredited Services



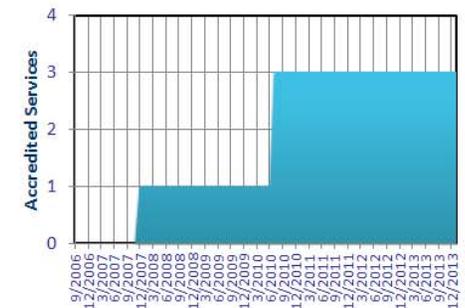
Foundry



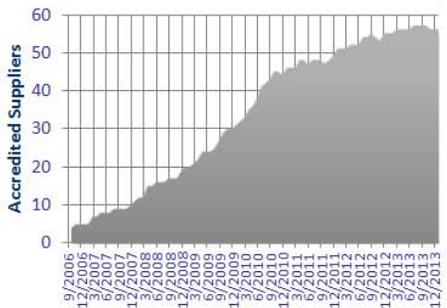
Mask Data Parsing



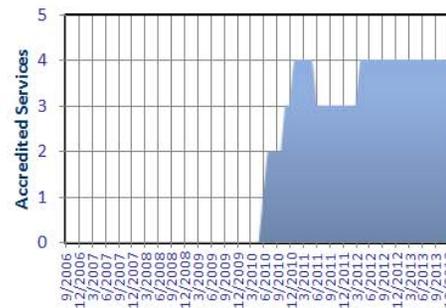
Mask Mfg



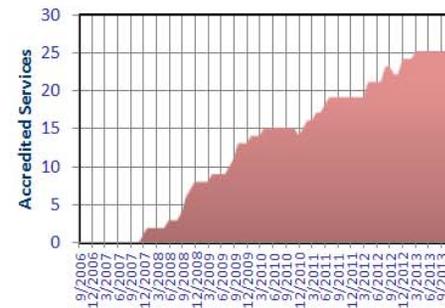
Total Accredited Suppliers



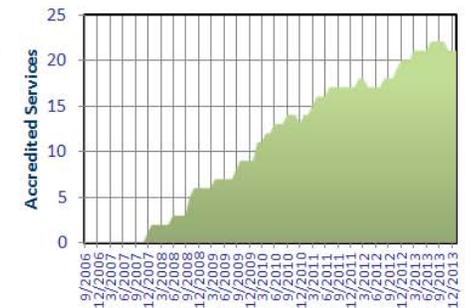
Post Processing



Packaging/Assembly



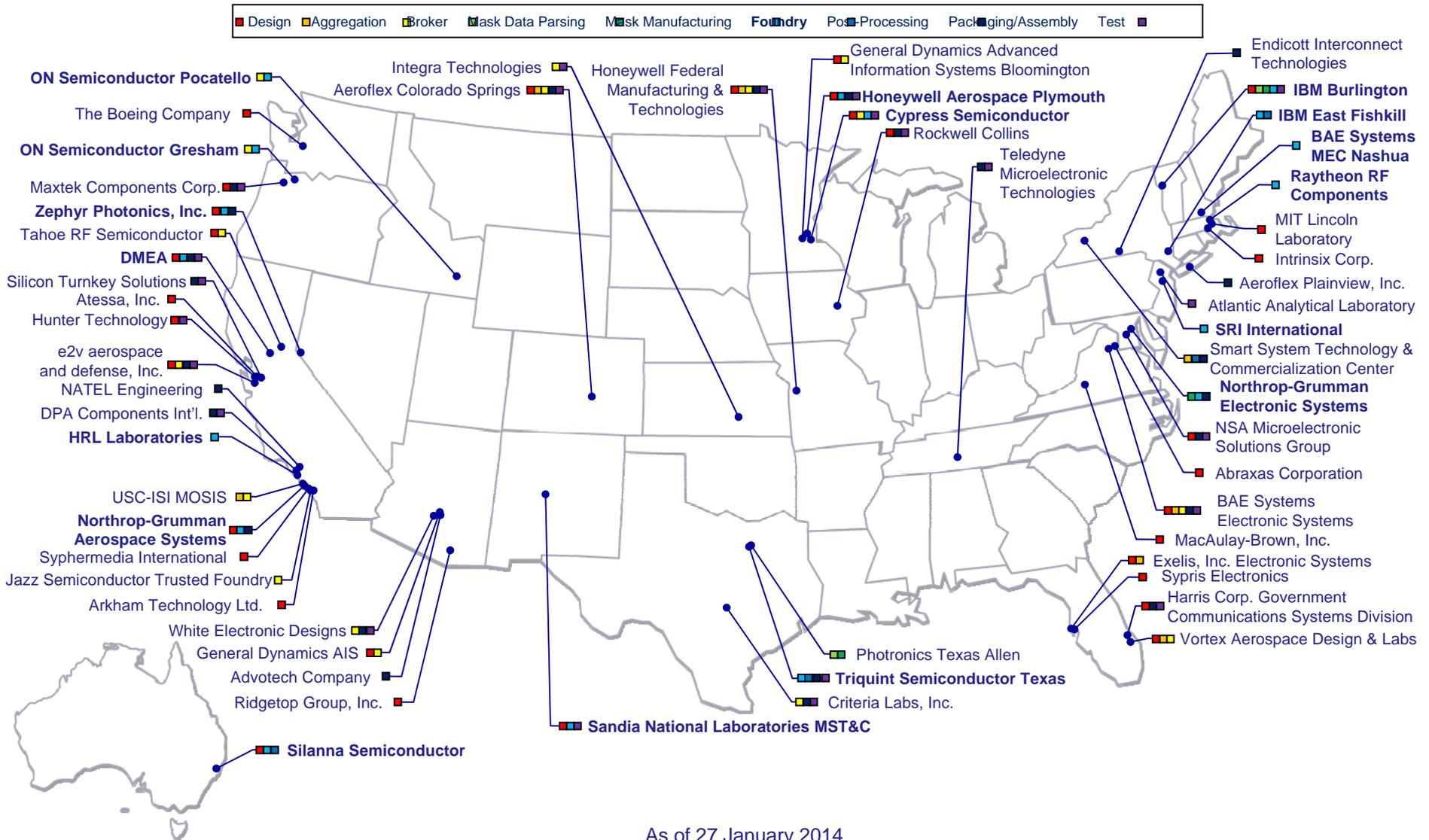
Test



As of 27 January 2014



56 Trusted Suppliers



As of 27 January 2014

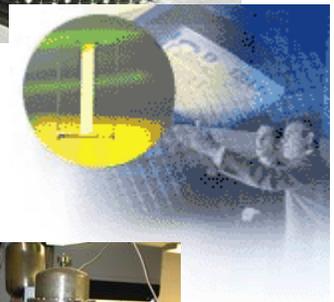
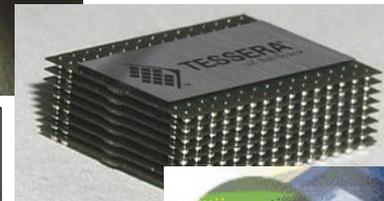
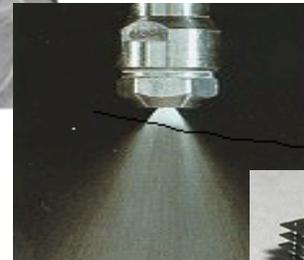
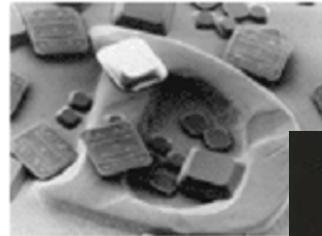


DMEA Outreach Government / Industry / Academia



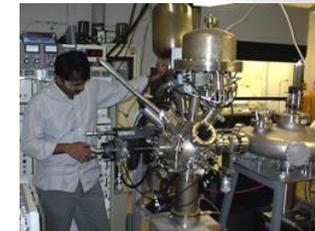
- **Develop researched technology for fielded applications**

- Productize / Producibility
 - Defense applications
 - Commercial use
 - Manufacturability
- Supportability
 - Repairability
 - Reliability / Maintainability
 - Availability



- **Utilize small business & university developed technology**

- Small Business Innovation Research (SBIR) and
- Small Business Technology Transfer (STTR) projects



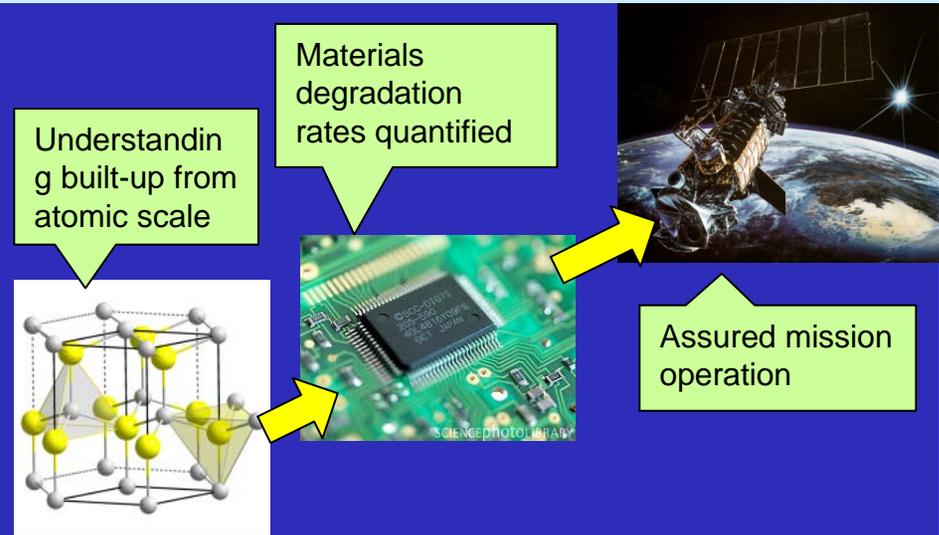


National High Reliability Electronics Virtual Center (HiREV)



MOTIVATION

- Recent costly electronics failures in DoD programs highlighted need for government led quantitative assessments and lifetime prediction capability
- Acquisition community forced to use highly-accelerated tests that are unlikely to correlate with operational use
- Customers: National Security Space and others inserting emerging electronics



TECHNICAL IDEAS

- Physics-based approach to replace current practice of statistics-driven projections
- Characterization of atomistic and interfacial phenomena in electronics — identify degradation mechanisms and rate of change
- Develop and apply multi-scale materials models – model and simulate degradation rates
- Multi-Organization Collaboration
- Government led program

HiREV PAYOFF

- **Near-term** – Validated government owned lifetime analysis for acquisition decisions
- **Mid-term**- Updated practices (standards, guides, specs and methods)
- **Long-term**-No anomalies due to poorly understood electronics
- **Risks** – Difficult problem – Requires discovery
- **Costs** – Function of device technologies



DMEA Outreach - Other Engagements



- GOMAC – Steering Committee
- International Microelectronics And Packaging Society - Technical Team
- Semiconductor Industry Association
- SEMI World Fab Watch
- OSD Anti-Counterfeit Team
- NPGS & ICAF





GOVLINK
Keeping you informed about testing

Volume 13, Issue 5

Naval Postgraduate School Students Tour Defense Microelectronics Activity

Engineering students from the Naval Postgraduate School (NPS) in Monterey, California, recently toured Defense Microelectronics Activity (DMEA) at McAfee's Business Park in Sacramento. During the tour, Dr. Gary Gaugler, DMEA Technical Advisor, briefed the students on DMEA's vital role in providing solutions to a wide range of microelectronics problems all across electrical systems that are required for the fleet. DMEA supports not only the Department of Defense (DoD), but other U.S. Government departments, foreign military allies, and commercial industry as well.

A highlight of the tour was DMEA's Advanced Reconfigurable Manufacturing

for Semiconductors (ARM) Facility, which can produce microelectronics parts from several different manufacturing processes in a short period of time. These microelectronics parts solve specific challenges, reliability and maintainability problems, as well as expedite the performance capabilities of operational systems to simplify their operational lives.

Dr. Gaugler emphasized the fact that DMEA does not compete with commercial facilities that make large quantities of parts based on a single manufacturing process for mass production. In fact, DMEA buys the products or designs from the commercial facilities that have records in the state-of-the-art technology to manufacture the next generation of microelectronics parts.

The FTC has been helping to will enable them to be better informed managers, problem solvers, and leaders in their future engagements.

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Dr. Gaugler learned from right with students from the Naval Postgraduate School in Monterey, California.



NAVAL POSTGRADUATE SCHOOL

The FTC Expands Curriculum of Free Classes with New Price and Cost Analysis Course

The Federal Technology Center (FTC) is pleased to announce a new course, Price and Cost Analysis, that will soon be added to its curriculum of classes offered throughout the state of California. These Price, Instructor and Counselor at The FTC explains, "This advanced course was developed specifically for businesses that prepare price proposals for the government and price competitors. The class will explain the several methods of price analysis, cost analysis, and details the elements of cost and profit that should be considered in creating a well supported bid, proposal, or quote."

Other advanced courses available in our curriculum include: Responding to an Invitation for Bid (IFB), Responding to RFPs (Request for Proposal), Ful-

Price & Cost ANALYSIS

Learn to prepare price proposals and Contract Negotiation, Project Management for the Small Business Government Contracting, Federal Contract Administration, and Contract Services Administration (CSA) Schedules. For more information visit us on government.

Price and Cost Analysis
Responding to RFPs (Request for Proposal), Ful-

Continued on page 6






IMAPS Advanced Technology Workshop on High Reliability Microelectronics for Military Applications

Holiday Inn Baltimore-BWI International Airport
(Soon to be the Doubletree BWI)
Linthicum Heights, Maryland - USA
May 17 - 19, 2011

Final Program



General Chair:
Greg Caswell
DR Solutions, LLC
gcaswell@drsolutions.com

Technical Team:
Bruce Romnesko, JHU-APL - Bruce.Romnesko@huapl.edu
Jeremy Palmer, Sandia National Laboratories - jpalmer@sandia.gov
~~Bill Kennedy, Calcelec, Inc. - bill.kennedy@calcelec.com~~
Carolynn Drudik, DMEA - carolynn.drudik@dmea.osd.mil

 Organized by: The International Microelectronics And Packaging Society (IMAPS)
Bringing Together the Entire Microelectronics Supply Chain!

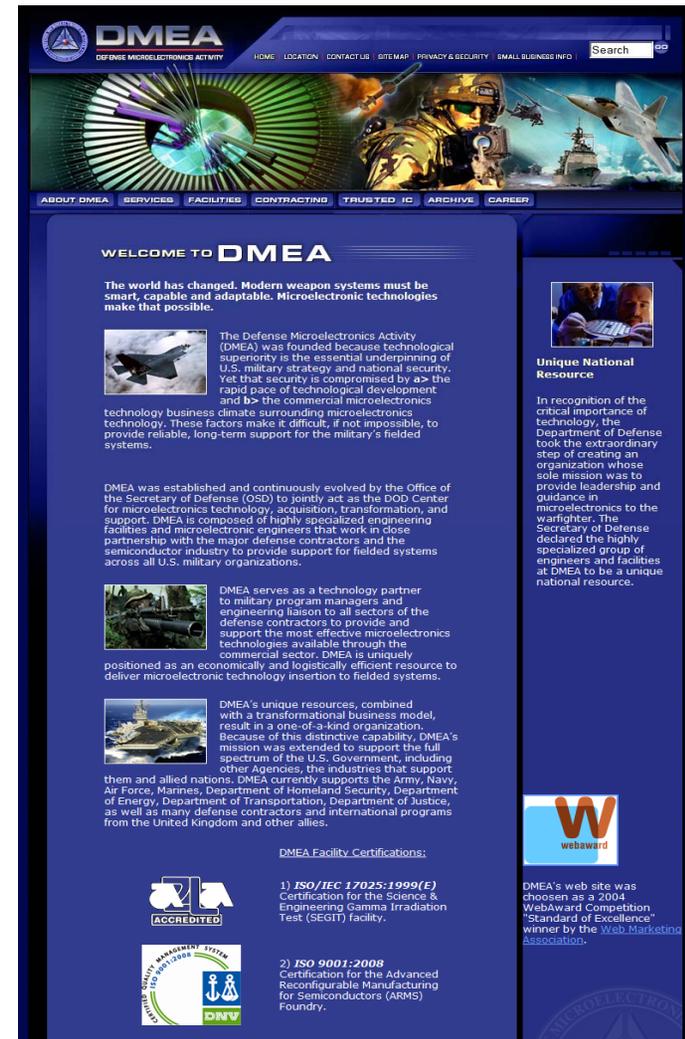


DMEA Outreach Website*



<http://www.dmea.osd.mil>

- Program Description
- Services
- Facilities
- Contracting
 - ATSP Contract Page
 - Doing Business with DMEA
 - CRADAs
- Trusted Program
 - Links to List of Accredited Suppliers
 - How to become accredited
- Business Model
 - DMEA / Defense Industry Partnership
 - Semiconductor Industry Partnership
 - DMEA procurement flow chart for ICs
- Careers at DMEA
 - Internships
 - SMART Program
- Contacts



* Award Winning Website



DMEA: A Complete Strategy for Defense Microelectronics



- **Unique challenge**

- Increased reliance on critical technology
- Technology transition / Adaptive Operations
- Decreased market leverage
- No long term commercial support
- Increased unstable manufacturing
- Trusted supply for mil applications
- Decreased skilled resources available



- **Unique solution**

- License and transition OEM lines to DMEA's ARMS foundry
- Leverage DMEA /defense industry requirements / capabilities
- Full use of commercial development – technology transition
- Practical long term solution strategy



- **Investigate future DoD specific microelectronics issues & develop solutions**

- **Develop researched technology for quick application insertion**

- **Total Life Cycle Systems Management approach**

Agile – Adaptive - Supportable

