Radar Open Systems Architectures

Don Scott Lucero

DDRE/Systems Engineering

Deputy Director, Strategic Initiatives

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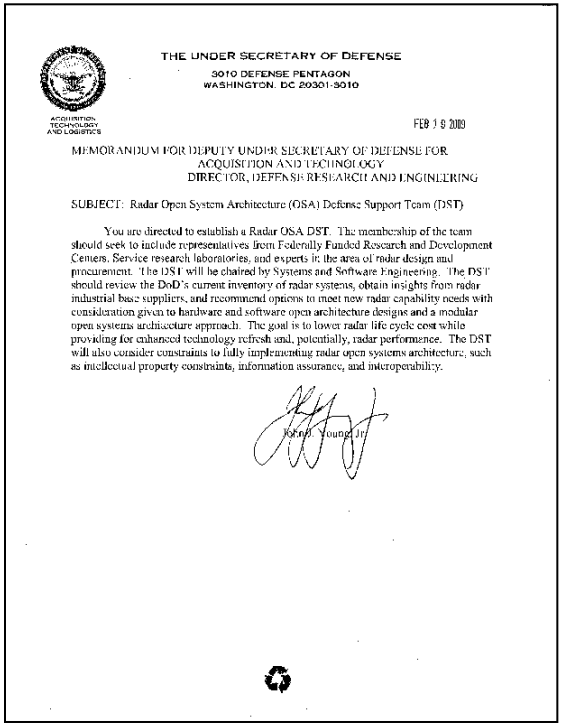
Open Architecture - Today
Radar Open System Architecture DST

- **Acquisition Decision Memo establishes Radar Open Systems Architecture Defense Support Team (DST)**
  - Representatives from Defense Services, laboratories, acquisition community
- **Recommend options for new radar capabilities using open architectures**
- **Obtain insights from industry**
- **Consider intellectual property, information assurance, interoperability**
- **Goals:**
  - Lower Life Cycle Cost
  - Provide for Enhanced Technology Refresh
  - Potentially, Provide Enhanced Radar Performance



THE UNDER SECRETARY OF DEFENSE
3010 DEFENSE PENTAGON
WASHINGTON, DC 20301-3010

ACQUISITION, TECHNOLOGY AND LOGISTICS

FEB 19 2009

MEMORANDUM FOR DEPUTY UNDER SECRETARY OF DEFENSE FOR ACQUISITION AND TECHNOLOGY
DIRECTOR, DEFENSE RESEARCH AND ENGINEERING

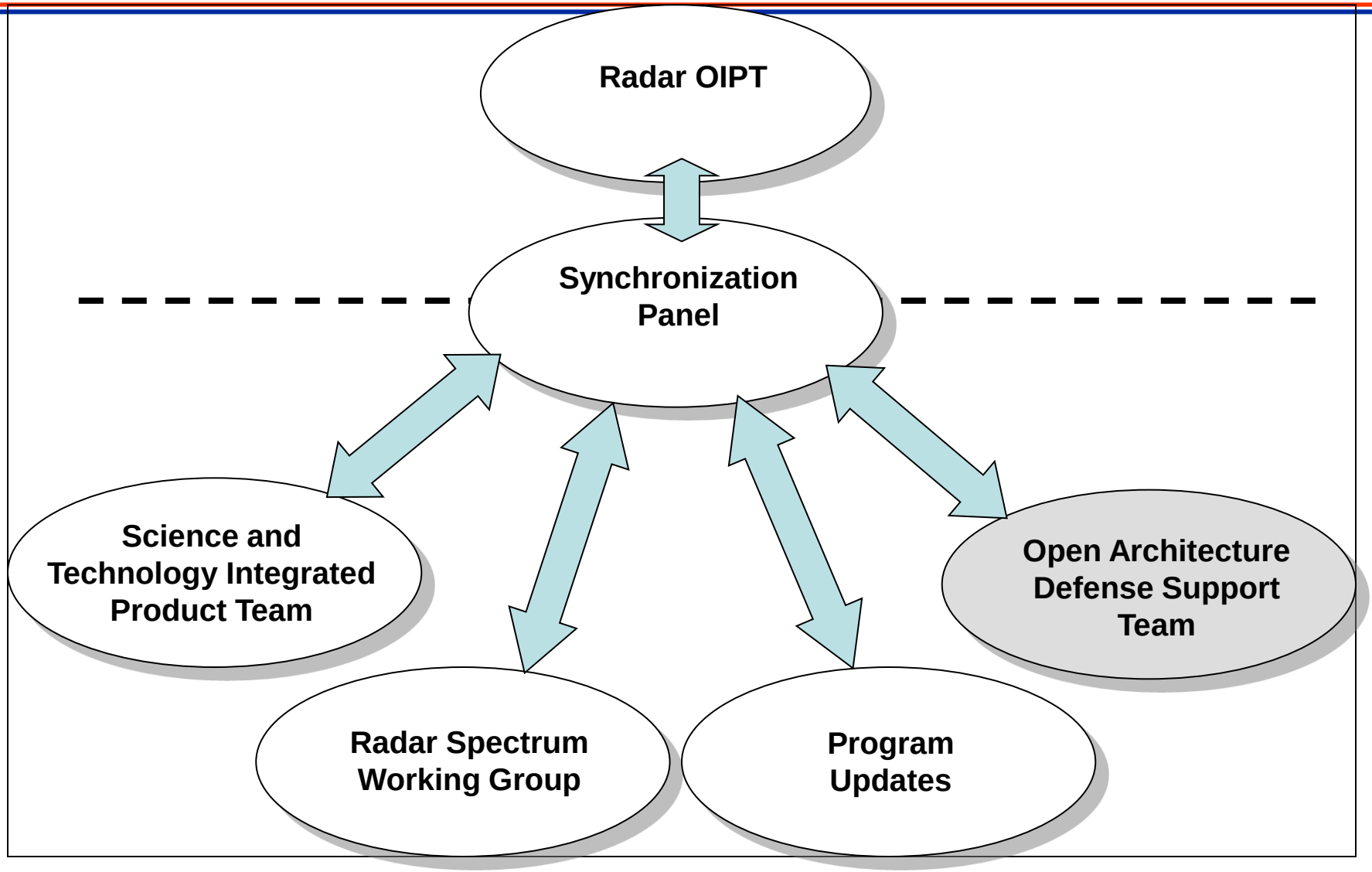
SUBJECT: Radar Open System Architecture (OSA) Defense Support Team (DST)

You are directed to establish a Radar OSA DST. The membership of the team should seek to include representatives from Federally Funded Research and Development Centers, Service research laboratories, and experts in the area of radar design and procurement. The DST will be chaired by Systems and Software Engineering. The DST should review the DoD's current inventory of radar systems, obtain insights from radar industrial base suppliers, and recommend options to meet new radar capability needs with consideration given to hardware and software open architecture designs and a modular open systems architecture approach. The goal is to lower radar life cycle cost while providing for enhanced technology refresh and, potentially, radar performance. The DST will also consider constraints to fully implementing radar open systems architecture, such as intellectual property constraints, information assurance, and interoperability.

Robert Young Jr.

USD(AT&L) Efficiencies Memorandum, Sept 14, 2010
"Promote Real Competition: Require open systems architectures and set rules for acquisition of technical data rights."

OA DST Is Part of a Broader Set of Radar Initiatives



Open Architecture - History
Open Systems Joint Task Force (OSJTF)

- **Formed in 1994 to support transition from military to commercial specifications**
  - Keep the Government from getting locked into proprietary solutions
- **Developed open systems policy, guidance, tools and training materials**
  - **Policy – DoDI 5000.02:** Program Managers shall employ the Modular Open Systems Approach (MOSA)
  - **Guidance – Defense Acquisition Guide:** MOSA should be addressed in the Acquisition Strategy/Technology Development Strategy
  - **Guidance –** Program Manager's Guide to MOSA
  - **Tools –** MOSA Program Assessment and Rating Tool (PART)
  - **Training –** DAU Continuous Learning Module on MOSA – CLE013
- **OSJTF efforts completed in 2004**
  - Folded into the Department's efforts to reinvigorate systems engineering
  - Next step: Develop a tailored approach to specific domains

Radar Open Architecture DST
Accomplishments and Plans

Accomplishments:

- Established in October 2009
- Developed a useful architectural description for modular radar
  - Facilitates focused dialog between the Services and Industry
- Gathered information on open architecture approaches from various radar acquisition programs, laboratory efforts
- Conducted Industry Day to inform development of guidance

Current and Future Activities:

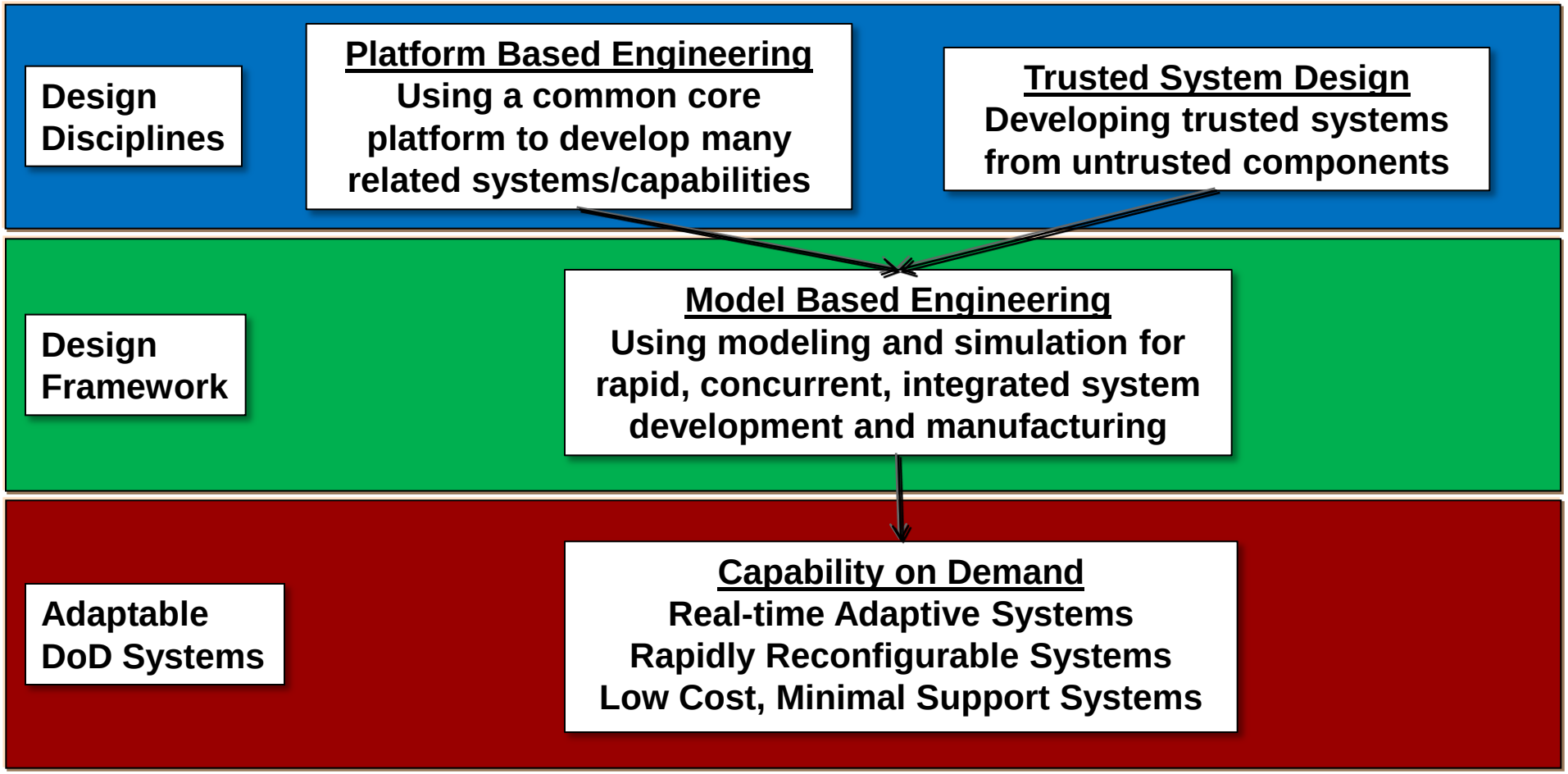
- Completing DST report on Radar Open Architectures
  - Characterize open architecture efforts in the Services
    - e.g., 3DELRR, DAR, INTOP, MOSA Common Back-end, NGA's Sensor Independent Complex Data
  - Findings and recommendations for further efforts
- Work with the Services to identify opportunities to pilot guidance
- Develop lessons learned for open architectures in other domains

Need for Adaptable Defense Systems

- **Adversary can use commercial technologies and new tactics to rapidly alter the threat to US forces**
  - Increasing uncertainty in future Defense missions & environments
- **DoD engineering, and business processes not structured for adaptability**
  - Sequential, single step progression from fixed requirements
  - Individually designed, monolithic systems
  - Vulnerabilities from global supply chain
- **New research, tools, pilot efforts needed to determine best methods for building adaptable defense systems**

Open System Architectures can be a key enabler for adaptable systems

Systems 2020
Designing DoD Systems for Adaptability

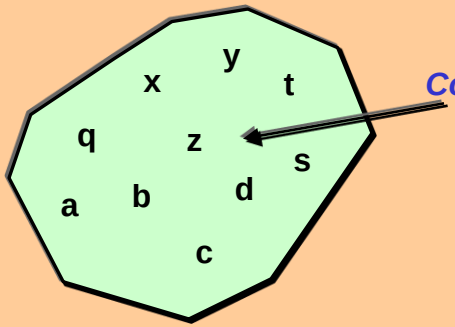


Faster delivery of adaptable systems that are trusted, assured, reliable and interoperable

Platform-Based Engineering and Trusted Systems Design Disciplines

Notional Defense System

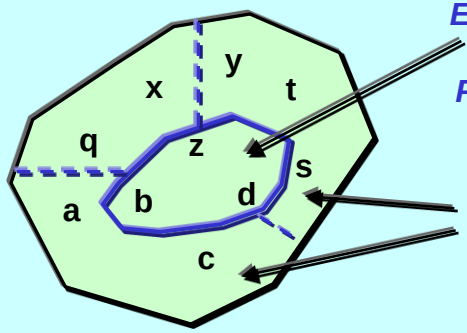
Today
Point design to address fixed, static requirements



Monolithic, Complex, Rigid Design

Threat and mission changes require extensive re-work or start from scratch
- **Expensive, slow to field**

PBE
Inherently adaptable design to address dynamic, uncertain requirements

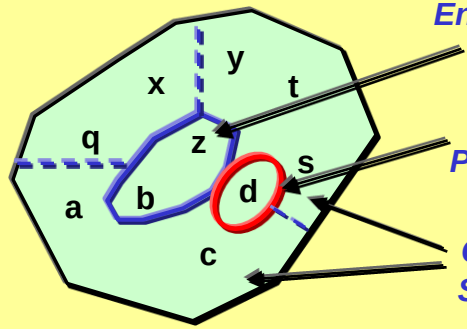


Enduring Core Platform

Rapidly Changeable Subsystems

Core platform capable of rapidly accommodating threat and mission changes
- **Well-defined architectures, interfaces allow a variety of systems configurations**

PBE + TSD
Inherently adaptable and robust design to address dynamic, uncertain requirements



Enduring Core Platform

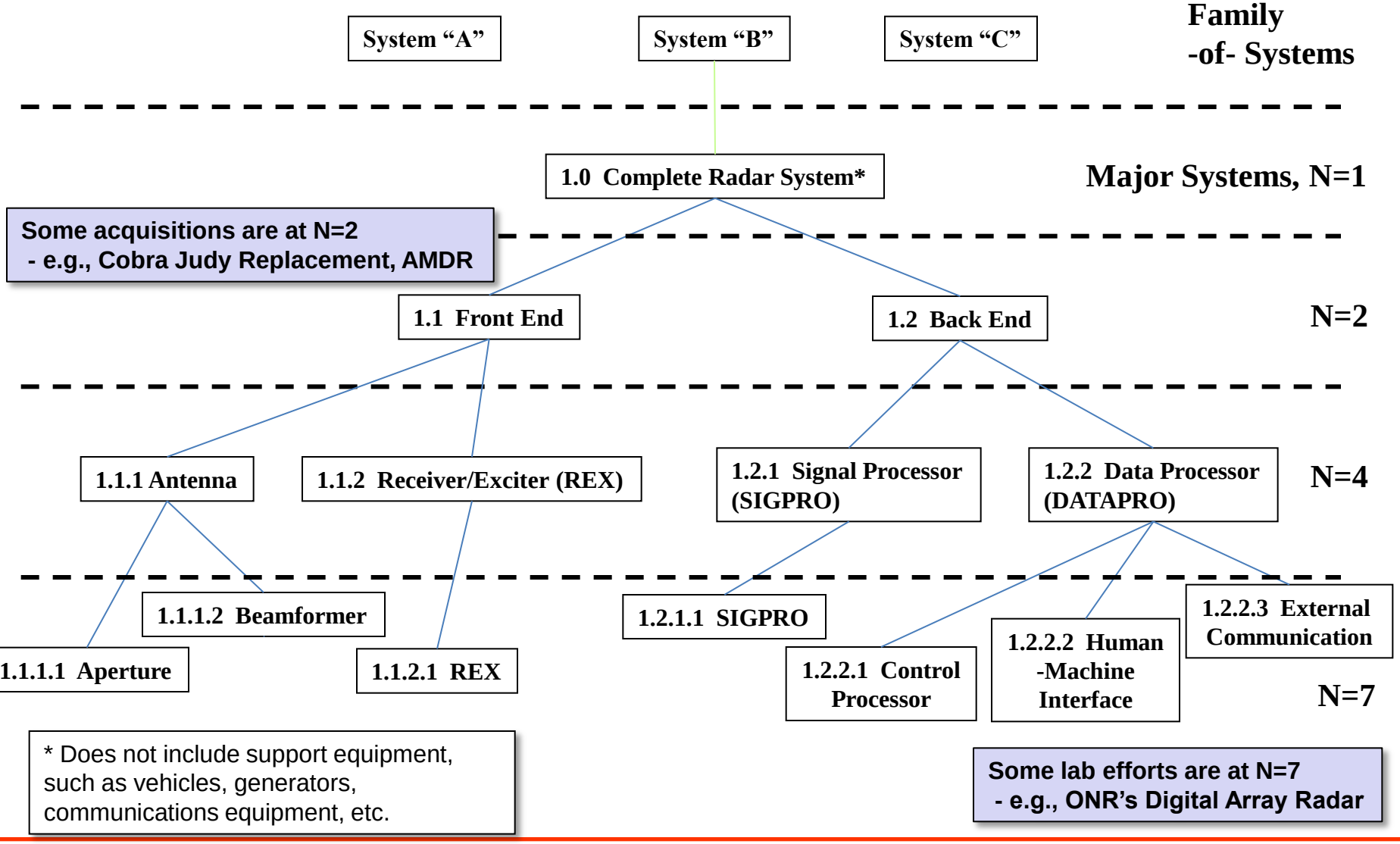
Trust Partitioning

Rapidly Changeable Subsystems

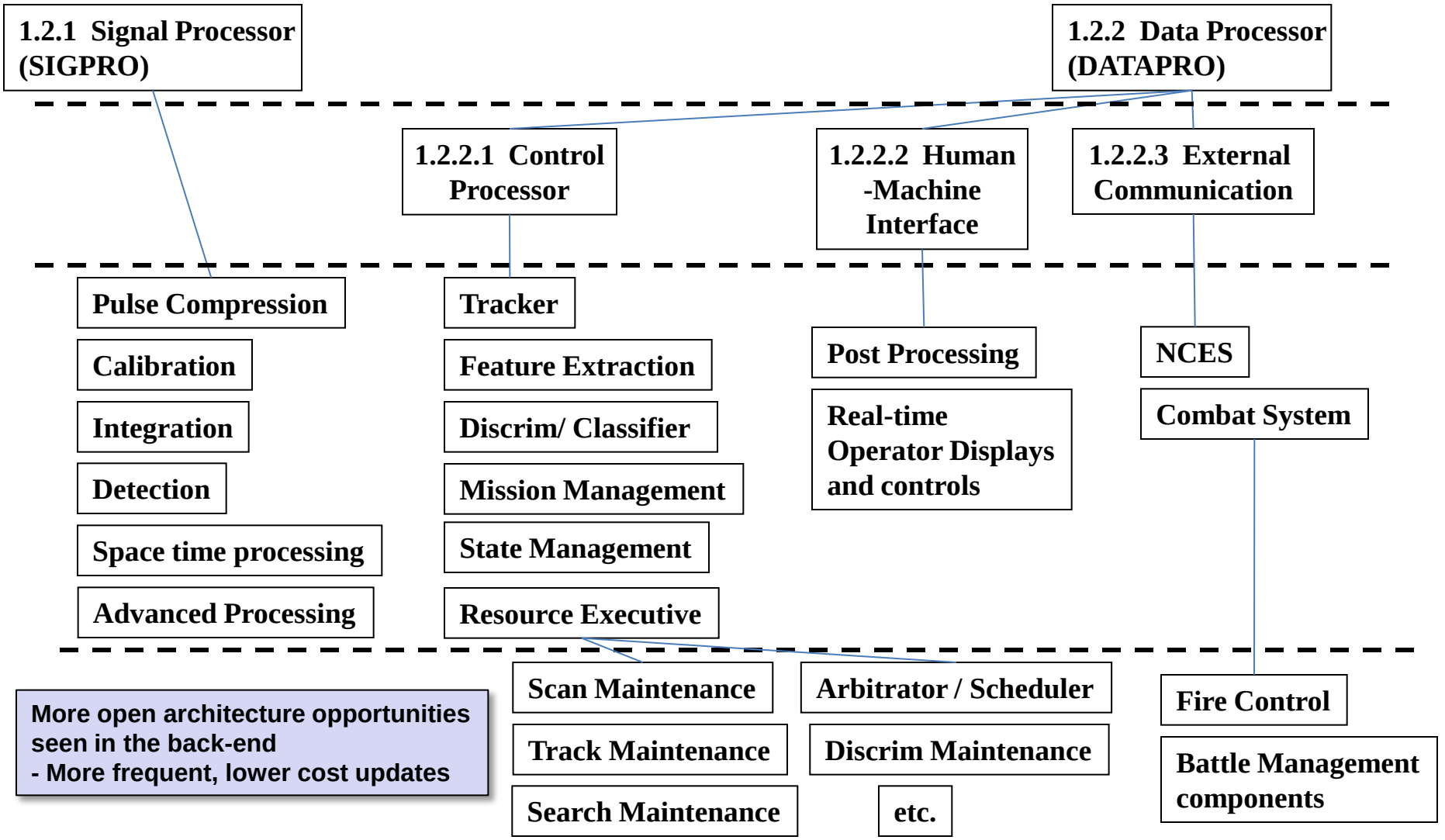
Additional partitioning of untrusted components and subsystems
- **Allow rapid response to trust violation**

x, y, z, etc – subsystems and/or components

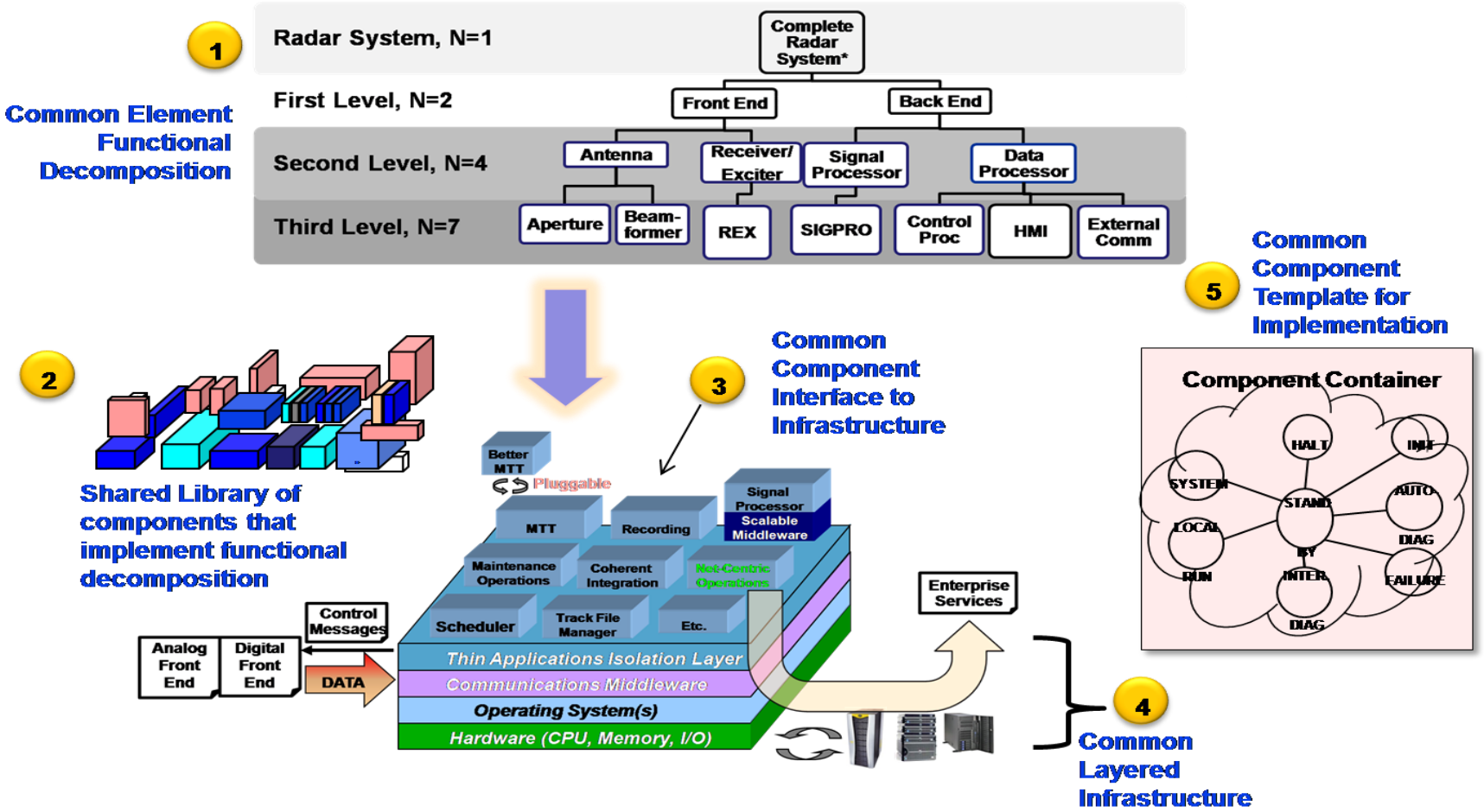
Radar Architectural Hierarchy Functional Decomposition



Functional Decomposition of Radar Back End



Component-Based Radar Open Architecture



Findings from Radar Open Architecture Industry Day

- **Industry will provide open architecture solutions, if asked**
- **General acknowledgement that the goals of the Radar open architecture effort are achievable**
  - Government will need to lead effort
- **Need for further guidance:**
  - Clarify definitions, determine how to comply, how to measure openness, how to ensure that open architecture is an element of an effective radar enterprise model
- **Opportunities in both the front-end and back-end**
- **Interest in participating in Government/Industry effort to:**
  - Identify key architectures and interfaces
  - Document appropriate interface standards

Application of Open Architectures

- **Biggest impact is in planning the Acquisition Strategy Sample questions:**
  - **What the key interfaces, in terms of volatility, cost, life cycle support?**
  - **What are the tradeoffs – performance vs. OA benefits?**
  - **What incentives are there for developers to use OA?**
  - **Are there opportunities for radar portfolio management?**
  - **Are we purchasing necessary rights to reap the benefits of OA?**
    - **Do we have the necessary facilities and support?**

- **People are more important than guidance**
  - **Talented people will achieve great things with or without guidance**
  - **But what about the rest of us?**

Tentative DST Recommendations

- **Establish Government/Industry working group to define reference radar architectures and key interfaces**
  - **Build on the success of the NGA's Sensor Independent Complex Data, Derived Data standards**
  - **Develop reference architectures for different radar types**
    - **e.g., ground/ship, surveillance/fire control**
- **Develop guidance to quantify the benefits of radar open architectures for RFPs**
  - **Capitalize on 3DELRR's efforts**
  - **Document considerations for identifying key radar interfaces**
- **Work with Services to identify opportunities to pilot the guidance**

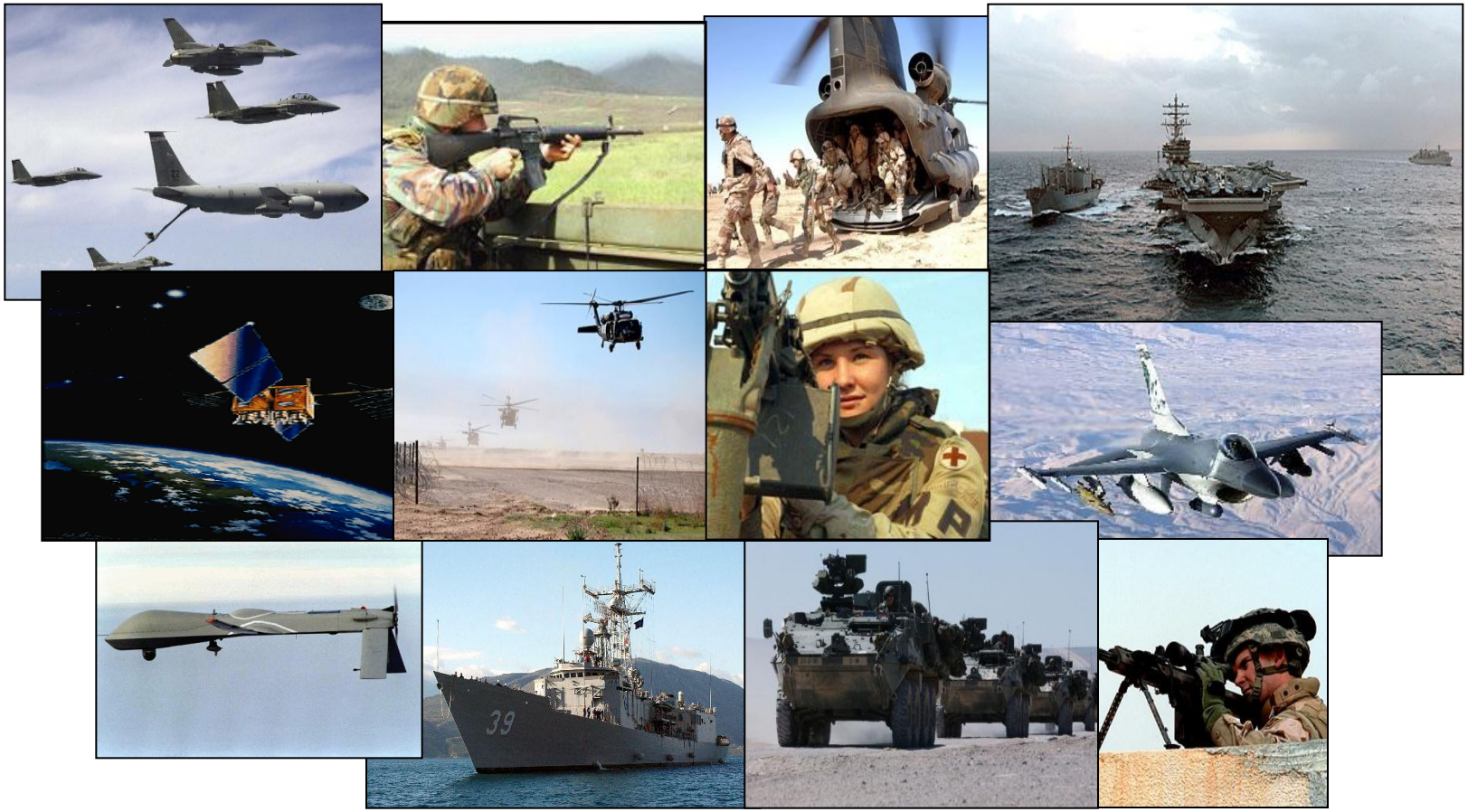
For Additional Information

Don Scott Lucero

ODDR&E/Systems Engineering

703-681-6654 | scott.lucero@osd.mil

Systems Engineering: Critical to Program Success



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