Department of Defense Emerging Needs for Standardization

Robert Gold
Director, Engineering Enterprise
Office of the Deputy Assistant Secretary of Defense for Systems Engineering

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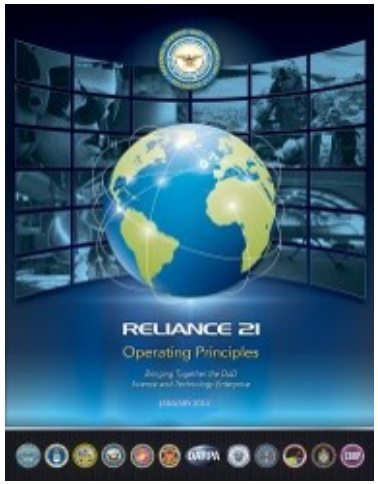
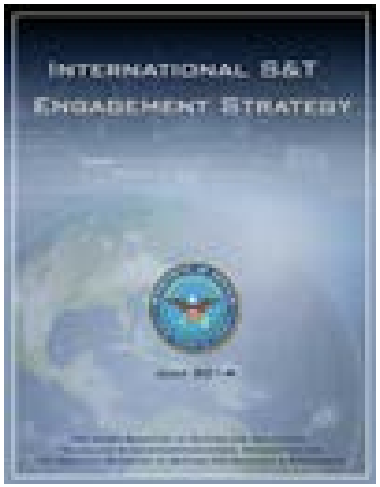
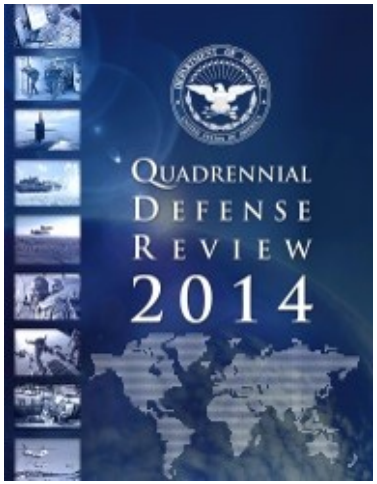
Long-Standing DoD/SAE Partnership

- **U.S. Standard B Liberty trucks built to SAE standards in World War I**
- **DoD has adopted over 3400 SAE standards**
  - Largest number adopted of one standards developing organization
- **SAE is key player in DoD efforts to revitalize standardization in systems engineering**
  - Developed SAE EIA 649, Configuration Management (DoD adopted Mar 2015)
  - Developed SAE AS6500, Manufacturing Management Program (DoD adopted Jan 2015)
- **SAE is key player in DoD efforts to prevent and detect counterfeit parts**
  - AS5553B (in final ballot), Counterfeit Electrical, Electronic, and Electromechanical Parts Avoidance, Detection, Mitigation, and Disposition
  - ARP6328 (in final ballot), Guideline for Development of Counterfeit Electronic Parts Avoidance, Detection, Mitigation, and Disposition Systems
  - DoD will adopt once approved by SAE

Roadmaps for Emerging Technologies







- Advanced electronics
- Air, land, & sea platforms
- Autonomy
- Biomedical
- C4I
- Counter IED
- Counter WMD
- Cybersecurity
- Electronic warfare/protection
- Energy & power technology
- Engineered resilient systems
- Human systems
- Materials & manufacturing processes
- Sensors & processing
- Space
- Unmanned systems
- Weapons technologies

SAE Efforts to Support DoD Emerging Technology Standards Needs

➢ Corrosion Prevention and Control

- Corrosion costs the DoD $22.9 billion annually (GAO-11-490R)
- At DoD request, SAE G-25 committee developing standard for corrosion prevention and control in avionics and electronics
- Future DoD standards requirements
  - New corrosion resistant materials and coatings
  - High performance coatings
  - Multi-scale corrosion damage models
  - Corrosion sensors
  - Tools to predict material performance

➢ Advance Air Platforms

- Defense Advanced Research Project Agency (DARPA) electric aircraft project – Vertical Takeoff and Landing Experimental Plane (VTOL-X)
- SAE Electric Aircraft Steering Group established to help identify needed standards

SAE Efforts to Support DoD Emerging Technology Standards Needs

Human Systems

- At DoD request, SAE G-45 committee developing new human systems integration standard
  - Define, assess, and optimize human-system interfaces
  - Maximize human and human-system performance
  - Minimize personnel-driven customer ownership costs
- Future DoD standards requirements
  - Faster, lighter-weight computing for measuring the warfighters performance in operational environments
  - Increasing predictive capability of selection screens to improve human-machine communication

Unmanned Systems

- SAE AS-4 committee suite of Joint Architecture for Unmanned Systems (JAUS) standards
- Must be compatible with DoD open systems architecture efforts, e.g., Future Airborne Capability Environment (FACE)
- Must be consistent with NATO unmanned standards, e.g., STANAG 4586, Standard Interfaces of UAV Control System for NATO UAV Interoperability

SAE Efforts to Support DoD Emerging Technology Standards Needs

Cybersecurity

- SAE Vehicle Electrical System Security committee developing cybersecurity standards
- Need to expand efforts to other platforms, systems, and capabilities to
  - Identify, prevent, and detect adversarial breaches
  - Mitigate undesirable effects if breach occurs

Additive Manufacturing

- SAE Additive Manufacturing committee established
- Standards needed for
  - Manufacturing processes
  - Additive materials
  - Post-process heat treatment
  - Dimensional inspection
  - Mechanical inspection
  - Non-destructive testing
  - Quality assurance

Emerging Technologies in Need of Standards Developer

- **Space**
  - Rapidly growing government/commercial sector need for interface standards
    - Joint ventures, e.g., SpaceX and international space station
  - DoD need for space standards
    - Reusable launch systems
    - Sensors for whole-Earth staring
    - Orbital navigation
    - Anti-jam capability
    - Integrate space, air, ground based intelligence, surveillance, and reconnaissance
    - Space object detection
    - Miniature components
    - Ultra-high efficiency power systems
    - Space robotic capabilities for servicing and repair
  - DARPA announced plans to establish satellite-serving consortium to develop in-orbit satellite repair standards

Emerging Technologies in Need of Standards Developer

Energy and Power Generation

- Next generation standards for
  - Alternative fuels and energy from renewable, sustainable sources
  - Electrical and electrochemical storage devices that are smaller, lighter, more affordable, and will work in extreme temperatures and environmental conditions
  - Smart energy networks for platforms, forward operating bases, and facilities
  - Reconfigurable power systems, such as energy networks and microgrids

System of Systems Interoperability

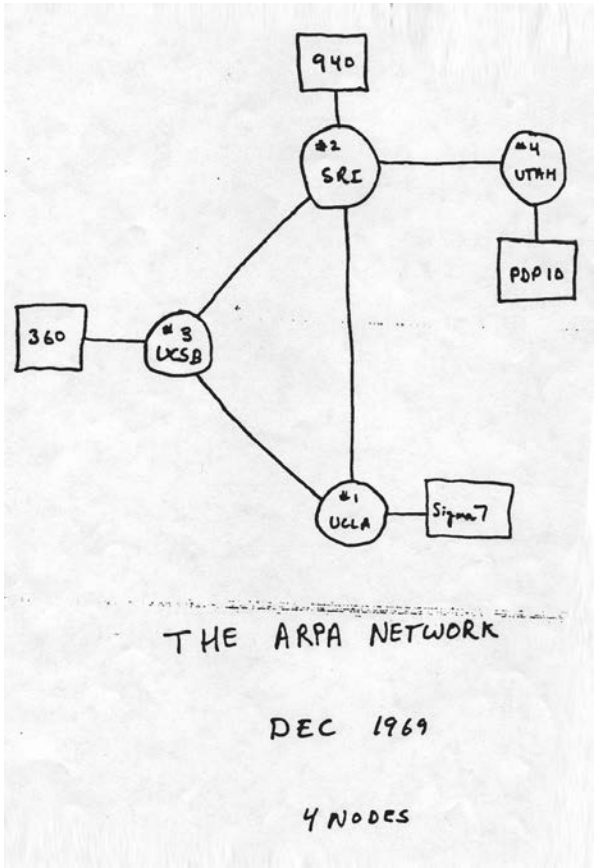
- Senate and House drafts of FY17 National Defense Authorization Act (NDAA) require
  - System architectures to be logically and functionally segmented
  - Interfaces between major system elements to be established and allow content flow to enable integration and interoperability

Standards to Support Modularity

- Well-defined interfaces between platform and its components or between components to allow addition, removal, or replacement of components without redesign
- House draft of FY17 NDAA requires modular interfaces be consistent with widely-supported, consensus-based standards

Standards Help Establish Emerging Technologies

- The internet began with emerging DoD requirement
- Standards allowed the internet to transform the world
- DoD is looking for the next generation of transformational standards



Thank You