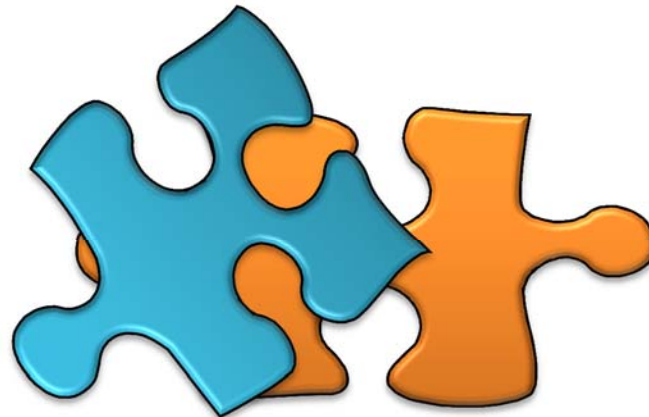
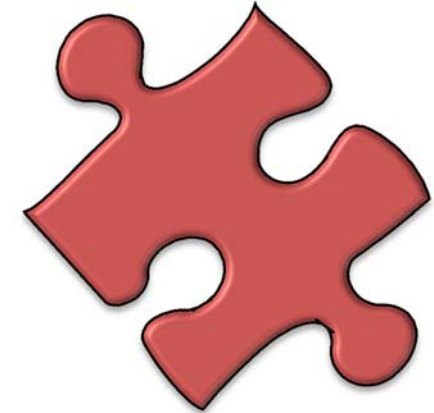
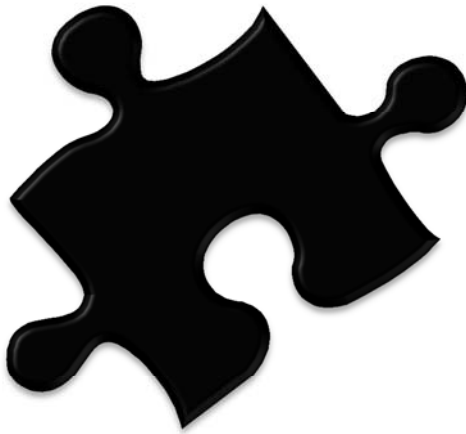




Opening Remarks

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Space and Missile Systems Center



MONA: Framework for Leading Change

GSAW 2014

26 February 2014

**Dr Roberta Ewart
SMC Chief Scientist**



GSAW—Key Ingredient for Success

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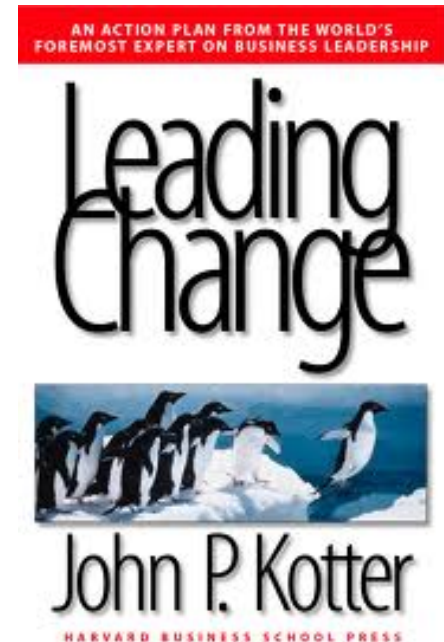
- Industry-wide ground architecture concepts
- Close to emerging space design innovations
- Experienced general space brain trust
- We are presenting:
 - Top Concepts
 - Vision, Urgency, Strategy
 - Broad based tasks and incremental steps, such as SNAP
- Initiating Productive Momentum



Leading Change

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- Establish a Sense of Urgency
- Developing a Vision and Strategy
- Create the Guiding Coalition
- Communicating the Change Vision
- Empowering Broad Based Action
- Generating Short Term Wins
- Consolidating Gains and Producing more Change
- Anchoring New Approaches in the Culture





Establish Sense of Urgency

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USAF Chief Scientist	Policy and Law	GAO
Development is drawn out, creates expensive programs	DoDI 5000.02: "Operation of the Defense Acquisition System"	GAO Report: Assessments of Selected Weapons Programs, Mar 2007*
Tightly integrated, one-of a kind systems further expensive to upgrade	DoDD 8320.02: "Data Sharing in a Net-Centric DoD"	GAO Testimony Before US Senate Subcommittee : Space Acquisitions , March 2008 (SBIRS)*
Poor ability to integrate different platforms and systems developed over time	CJCSI 6212.01F: "Net Ready KPPs"	GAO Report: 09-326SP Defense Acquisitions Assessments of Selected Weapons Programs
Low Technical Agility/Resilience	WSARA 2009	GAO Report 10-477T DoD Persistent Challenges Remain in Developing Space Systems
Inability to upgrade part of the system, requiring major changes	Better Buying Power 2.0 Release (2013) OSD	GAO Report 13-651: Defense Acquisitions: "DOD Efforts to Adopt Open Systems..."

***"The acquisition community has failed at delivering projects that meet cost, schedule and performance baselines:"
Major Systems Acquisitions must change.**



Developing a Vision and Strategy

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- MONA Vision: M->O->N Progression
 - Leverage Existing Investments in physical/electro mechanical **M**odularity
 - Grow **O**peness through carefully chosen interfaces and subsequent standards
 - Transition natl investments in **N**etworked/IT systems for more rapid modernization
- “Step-In/Step Out” Strategy
 - Adopt and Tailor rather than re-invent
 - Join the consensus building and where appropriate nudge the process
 - Get onto the leading edge with DoD Architectural Concepts and Needs
 - Coordinate and Consult with Industry
 - Monitor Market Progress including civil, commercial and international
 - Then government “step out” and let industry “run with it”. Industry shall:
 - Develop and Maintain the Standards
 - Develop and Provide the Enabling Components
 - Develop and Provide the service to confirm MONA components adhere to stds

Examples: Funding railroads, highways, telephone infrastructure, electrification, internet.



Create the Guiding Coalition

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- Government Investments brought down the bulk of the NRE:
 - AFRL SPA/MONARCH (2004... ~\$130M) (DNA)
 - ORSO's MSV (2006...~\$50M)
 - DARPA F6 (2007... ~\$ 70M)
- Natl Security Space coordination and collaboration through SUMO
 - Leveraging ~\$2M in business case/ROI, architecting , standards
 - Business cases close with margin
- Industry working/steering groups
 - In formulation stage
- Professional societies for standards development and training
 - Working with AIAA and NASA CII approaches/strategy

Pulling together a group with enough power to lead change
and getting them to work as a team



Communicating the Change Vision

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- Workshops/Conferences/Associations
 - MONA/SNAP Workshops
 - AIAA SPACE 2014
 - IEEE Aerospace Conference 2014
 - Architecting Conferences (**Ground Systems Architecture Workshops....**)
 - Natl Defense Industry Association (NDIA)
- “Role Models/Pilot Programs”
 - ORS MSV
 - HPO HPIU
 - UAV/UAS/RPA /FLEX (Air and Munitions)
 - Possible Space Test Program option with SIV (modular developmental test)
- Develop Acquisition Workforce (STEM)



Empowering Broad Based Action

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Software Modularity

- Hardware independent
- Adapts to changes with electronic ICDs
- Standard interfaces
- Fully reusable modules
- Software applications support different missions & payloads

Open

- License free standard
- Full insight into workings
- Improves interchangeability



Physical Modularity

- Expandable
- Add future capability

Networked

- Decouples software from physical location
- Packetized (easy translation)
- Enables security auditing
- MLS Foundation

Encourage Ideas, Activities and Actions
to Lower Barriers to Entry



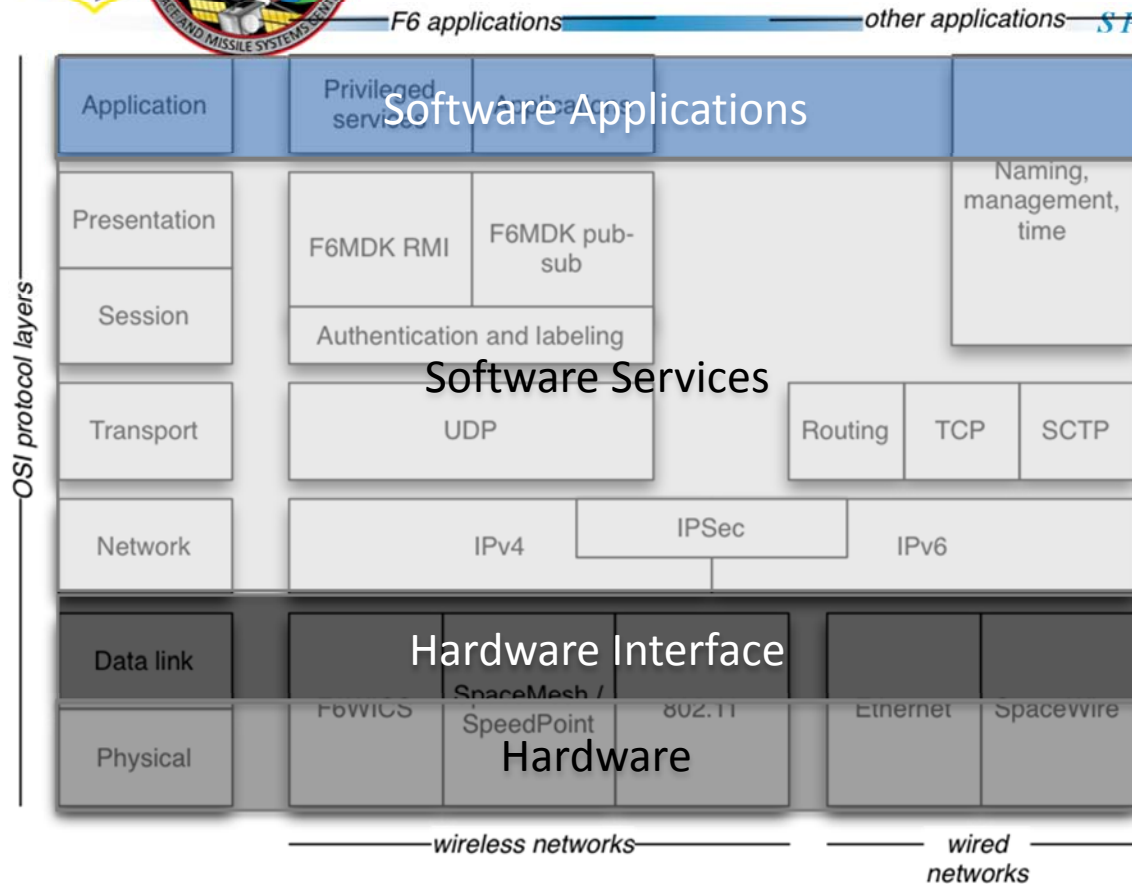
Generating Short Term Wins

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- **SPA/MONARCH**: Validating viability of composable systems
- **SNAP**: Developing a MONA payload interface proof-of-concept demonstration (SMC XR with SDL Program)
- **ORS/MSV**: Validating viability of MONA bus architectures for DoD space applications (ORS Program)
- **F6**: Validating MONA for inter-platform and payload interface applications (DARPA Program)
- **NASA CII**: Common instrument interface **guidelines**
- **SUMO**: Validating business case for MONA and establishing a transition process (ODNI and Aerospace Corp Program); Industry Day in conjunction with National Space Symposium April 9-11
- **MONA** workshop @ NASA AMES 25 FEB 13 developed consensus on fundamental synergies among MONA activities and established desirability of ongoing technical interchange



System F6 – SNAP Architectural Comparison



Characteristics of MONA	SNAP	F6 Design
Modular Software ("Apps")	✓	✓
Open (Physical & S/W Stds)	✓	✓
Networked	✓	✓
Common (e.g., PnP) H/W Stds	✓	✓*
Spacecraft Drivers	✓	✓*
Payload Drivers	✓	✓*
Info Assurance	✓	✓*
Hardware Encryption	✓	
IPSEC		✓*
MLS		✓*
Quality of Service		✓*

*Planned, not implemented

Fundamentally, both SNAP and System F6 are instantiations of the MONA (Modular Open Network Architecture) approach



Consolidating the Gains and Producing more Change

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MONA Gains

Technology for MONA is becoming available—Boeing Phantom Phoenix and NG Eagle M

Government has ability to incentivize or influence MONA—creating a new market

Industry is beginning to see cost savings and competitive advantages emerging with a MONA or similar approach

MONA approach enables reduced timelines and costs savings

More Change

- **Encryption/Information Assurance solutions**
 - F6 residuals: MLS development
 - AFRL R&D and SBIRs
 - Potential SMC/XR-HPO SNAP follow-on effort
- **Power management/control**
- **Develop additional enabling components called out in SUMO**
- **Standards development for Key Interfaces**
 - Government Incentivized
 - Industry Developed
- **Refine and Improve Requirements**
 - Emerging/Refined HPO/HPIU requirements
 - Industry input from SNAP workshop—Survey
- **Provide Training Through professional Societies / Open Forum**

Developing the People with Additional Projects



Anchoring New Approaches in the Culture

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- **Continue MONA socialization**
 - Industry working/steering group
 - SUMO engagement across NSS
 - Training, Training, Training
- **Continue technology infusion**
 - Step-in/step-out strategy
 - Tech demos, flight demos. standards
 - Broad collaboration: SMC/XR, HPO, ORSO, AFRL, DARPA, ODNI/SUMO, NRO, NASA, Industry
- **Target operational on-ramps**
 - Flight technology demonstrations/validations 2017+
 - POR infusion 2020+
 - Gives industry ample time to prepare to compete



Closing Remarks

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