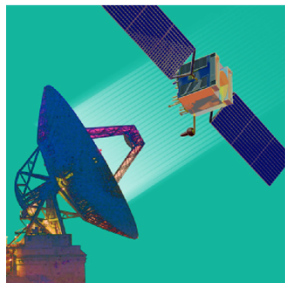




Ground System Architectures Workshop



Session 15

Achieving the Resilient Enterprise

Workshop Summary

Supannika Mobasser
The Aerospace Corporation

Ground System Architectures Workshop



From GSAW 2017 to GSAW 2018

- **MIA Person**
 - Alexa, Ask Jim
 - As-a-service
 - Telemetry / Navigation / Spacecraft / Flight Software / Ground Segment
- **Regular Customers**
 - Stovepipes, Cyber Security, Big Data, Enterprise, Collaboration, Agile, Standards, Machine Learning, Keep it Simple
- **New Kids Moving to the Big Table**
 - DevOps, Stig, Chaos Monkey, Virtualization



Common Themes about Resiliency

- **Being Proactive**
 - From pursuit to the pursuer
 - Let's not worry about catching the threat, let's think about becoming the threat
 - It's a race to find the space cyber vulnerabilities before the bad guys do
- **Impediments**
 - Good news Boss, we will be able to award this program in 2 years
 - Legacy systems designed for benign environment
 - We love the STIGs, but we don't love the STIG very much
- **Standards**
 - Death by DoDAF
 - The difference between a chef and a cook is, a chef can leverage the cookbook and provide fabulous experience
 - Open Standards



XYZ Scaling

- **Standards:** Plug-and-Pray → Plug-and-Play
- **X-Agnostic:** Software/Hardware/Data/People Agnostic
- **Integration:** Vertical to Horizontal, Open Interface Standards at all layers
- **Gigantic Data**
 - In 60's, life is easy, we have two data points, takeoff and landing
 - Now, we generate Petabytes per run
 - NOAA: 60 times more data than we have got before
- **Budget:** Whatever you plan to pay for IT Security now, you will pay more later.
- **Computing:** Thinning Workstations, Adaptive Shared Infrastructures, Machine “decided” Algorithms
- **Satellites:** Micro Satellites, Massive Satellite Fleets, Mega Constellations
- **Planetary Network:** Earth, Moon and Mars – One Architecture



Kill the Stovepipes, Bring in the Fluidity

collaboration, collaboration, collaboration

- **Stovepipes/Silos → xOps**
 - DevOps, AcqOps, ParallelOps, DevService
 - Vertical integration → horizontal integration
 - Consider cyber security to be the part of your crews
 - Star Wars: “If the operators have been involved from the beginning, you might not have these many flashing lights”
- Continuous Integration, Continuous Testing, Continuous Improvement, Continuous Training, Continuous Diagnostics and Mitigation
- Enterprise state of mind
- Fully connected interoperable space domains: multiple access, common architecture, on-demand access,



The magical number of 3

- Reduce, Reuse, Recycle
- Resiliency, Responsive, Reconstitute
- Rework, Re-test, Rebuild
- **DEX:** Responsive, Evolvable, Resilient
- **The Resiliency Triad:** Fragile > Robust > Anti-Fragile
- **The Resiliency Tripod:** Commitments, Capabilities, Community
- **Rule of 3:** big problems come from three simultaneous failures. Your system may not handle that, but your enterprise can and must.

Ground System Architectures Workshop



Important things we have to consider these days

Chaos Monkey
I love my mother, but
Trade Study
Test Automation
Enterprise
Proposals
Legacy
Docker
Standards
CONOPS
Cyber Security
STIG
ISO
Security
CM
Training
MBE
DevOps
Jungle & Feedlot
Six Sigma
CMMI
Collaboration
DFAR
ITAR
Regression Testing
Agile
Automation
Maintainability
Sustainment
Installation

Imagine that future disastrous event and consider how you would prioritize when you desperately need capability restored? What is the minimum essential?



Important things we have to consider these days

I love my mother, but

- *Yes, we have to focus on what is not exactly right*
- *We have to address the BUT*
- *We will work on it and we will come back next year to present our answers at*

GSAW 2019

Creating Smarter Ground Systems

Feb 25 – 28, 2019