

ECX

CROSS-MISSION GROUND & COMMUNICATIONS ENTERPRISE

G S A W 2 0 2 1






GSAW 2021



Non-Traditional Vendors: Enabling Innovation in the New Space Enterprise

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Ground Systems Architecture Workshop 2021



Bottom Line Up Front (BLUF)

Transformation of the National Security Space Enterprise is being driven by emerging threats and a rapidly evolving industrial base, requiring management and technical agility in developing and deploying capability

- Traditional mission system prime contractor flow-down models must be replaced by a hybrid approach -- utilizing rapid concept to deployment cycles
- Acquisition strategies must rely on direct engagement with industry, often through collaborative projects, focused on competitive alternatives
- New strategy adapts more quickly to adversary actions as well as market-driven changes in industrial base, by leveraging commercial market velocity
- Government program management practice required to become more agile, resilient and continuously responsive to external changes
- Cross Mission Ground and Communications Enterprise (SMC/ECX) is using pathfinder projects to build this transformational capability through engagement with a cross section of industry leaders

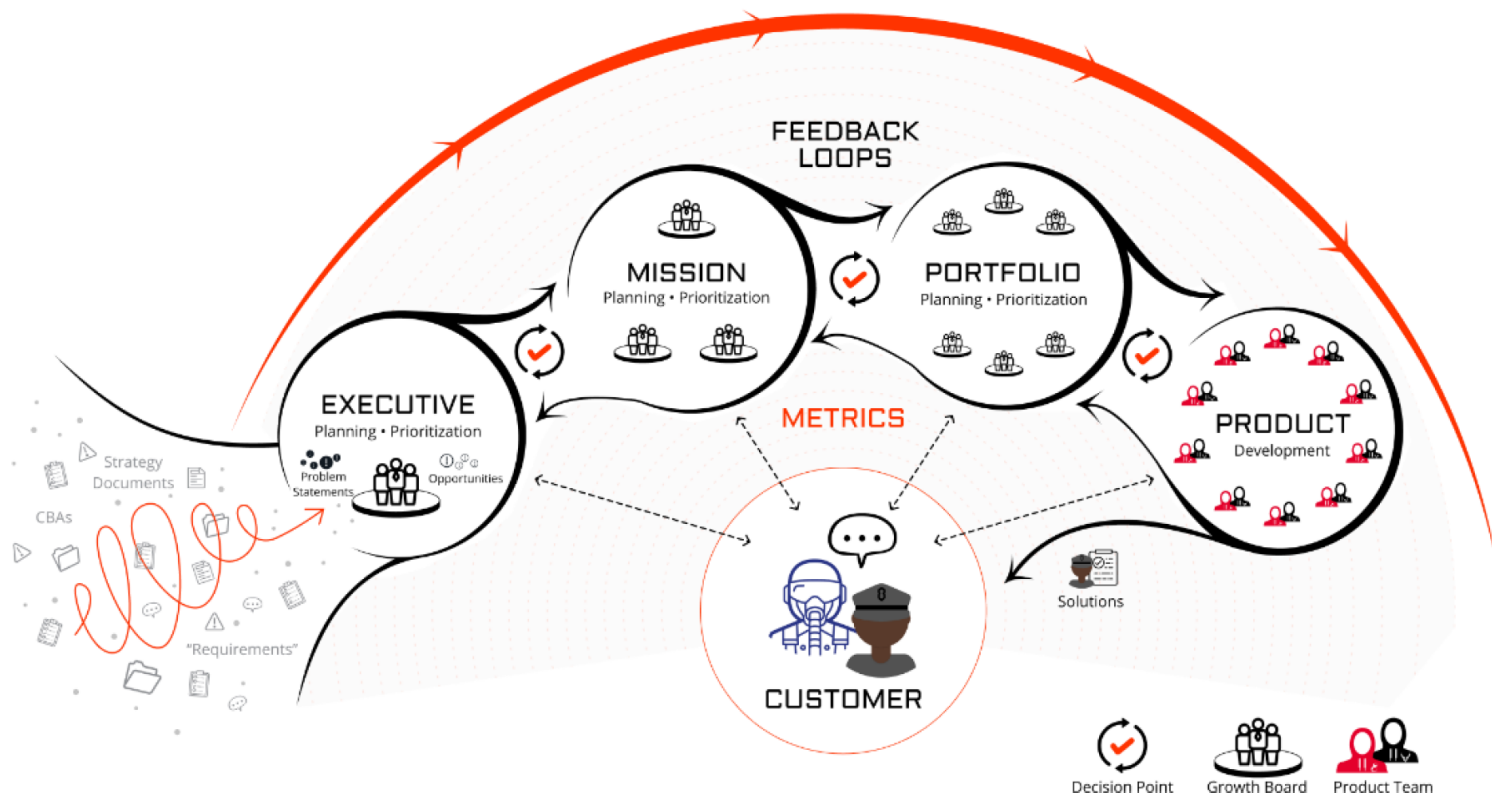


Reimagining Capability Development



“... a no-win scenario, a test of one's character requiring a solution that involves redefining the problem and managing an insurmountable scenario gracefully.”

User
Centered
Everything



Boundary Conditions: High Velocity + User Satisfaction + Program Agility

Key Challenges: Engaging Best in Class Industry Participation and Sustaining Culture Change



Enterprise Pathfinder



- **Major challenge for DoD and USSF is high performance code development for complex systems**
 - Kobayashi Maru is the Space C2 Enterprise Pathfinder
 - Software-intensive system development challenge
- **New models were required for**
 - Code “acquisition”
 - Development, deployment and sustainment processes
 - Organization, management and execution
- **Strategy Drivers**
 - Speed to deployment (Capability OODA Loop)
 - Better code quality at manageable cost
 - Continuous lifecycle to adapt to changes in “requirements”
- **Critical approach is to build on commercial practices with industry enabling tools and capabilities**
 - Tailored for the specific needs of the Space C2 Enterprise

OODA – Observe , Orient, Decide, Act



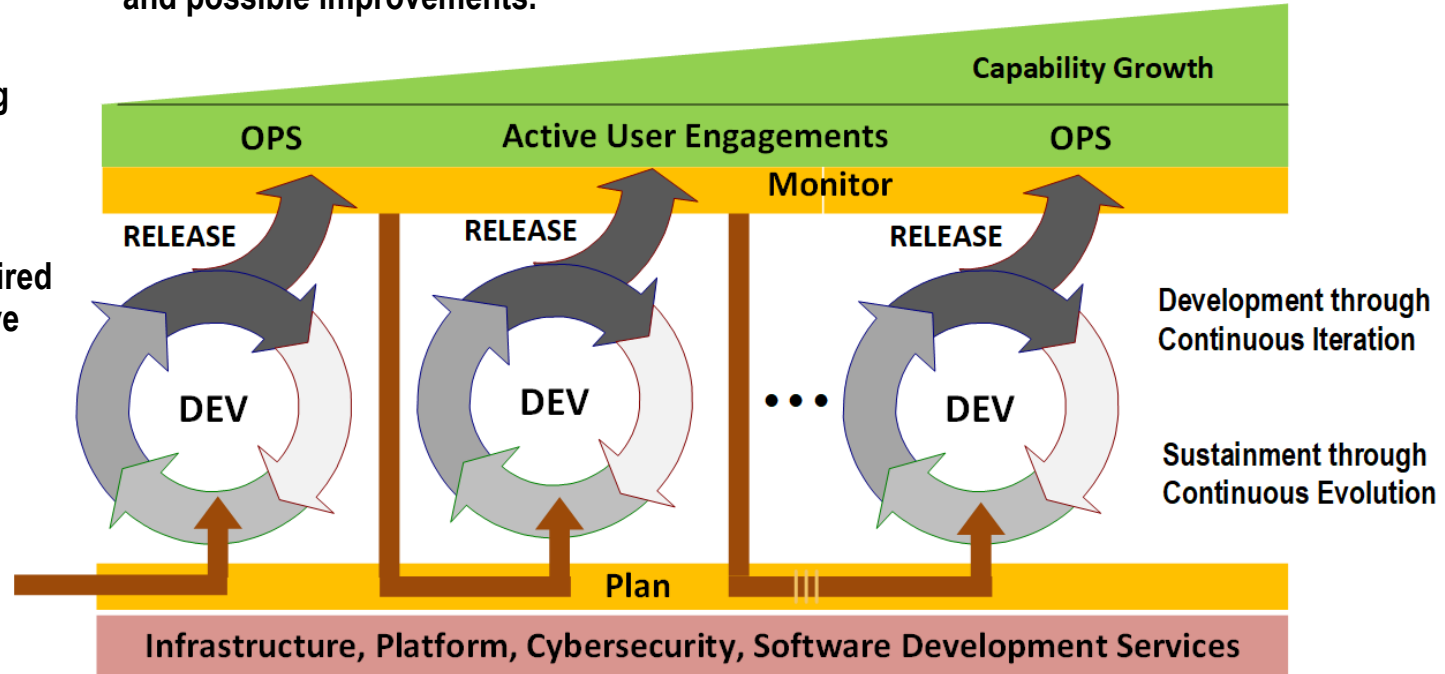
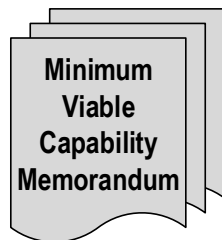
KM Delivery Framework



MVPs – early software with enough operational features to meet basic minimum functional capabilities and fill a user’s need. The goal is to quickly deliver basic capabilities into user’s hands for evaluation, feedback and possible improvements.

MVC-Rs are a set of features and/or capabilities suitable to be delivered to an operational environment. It provides value and capability on a reduced delivery timeline.

MVCs identify mission capability gaps or enhancements to existing operational capabilities, features, interoperability needs, legacy interfaces, and other attributes required for new software-intensive systems or upgrades to existing systems.



Effective Industry engagement starts with an executable strategy



Segmented Industry Options

Infrastructure Automation Companies

BI/IT MONITORING



COLLABORATION



CONTINUOUS INTEGRATION



BUILD



CLOUD IAAS



DATABASE



DEPLOYMENT



MICROSERVICES



RELEASE MGMT



CONFIGURATION MGMT



CONFIGURATION PROVISIONING



NETWORKING



TESTING



LOGGING



SOURCE CODE MGMT



REPO MGMT



SECURITY



PROVISIONING



Adapted from ProfitBricks 2015

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- Building IT infrastructure with many choices from industry ... presents significant challenges
- Leveraging prototypes with continuous assessment and tool integration requires a different model
- Goal is stable, accredited process and development capability ... **KM has an accredited, proven process and toolchain**



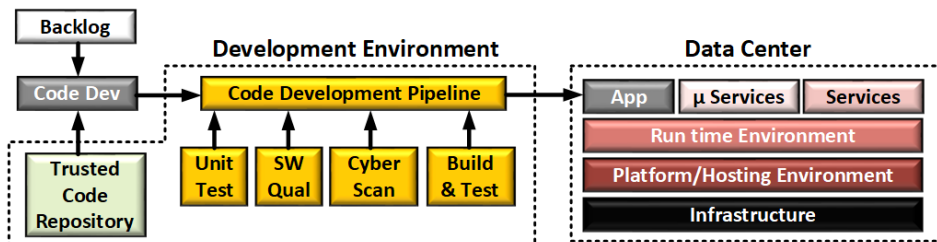
How Well Has It Worked?

KM Practice and Performance Metrics

- **Commit Frequency:** on average ~4x/day with automated tests running after every commit
- **Build Cycle Time:** up to 2 weeks, depends directly on deployment frequency
- **Average Build Down Time:** up to 8 hrs when build breaks due to codebase issues, up to 4 weeks when build breaks due to pipeline issues
- **Development Cycle Time:** 1 hour to 1 week of development, plus up to 2 weeks of Build Cycle Time (depends directly on deployment frequency)
- **Code Coverage:** average ~88.36%
- **Software Quality:** achieved through Test Driven Development, automated testing, in-line security scans, pairing, architecture and engineering training
- **Productivity:** teams on average tackle 5-10 user stories per week, pointing systems and velocity are specific to coding team. Teams strive for consistent velocity and when it declines they perform root cause analysis to increase productivity
- **Work In Progress (WIP):** each coding team has two development pairs and no more that 2 stories or tracks of work are in progress at any point in time

Industry Practice

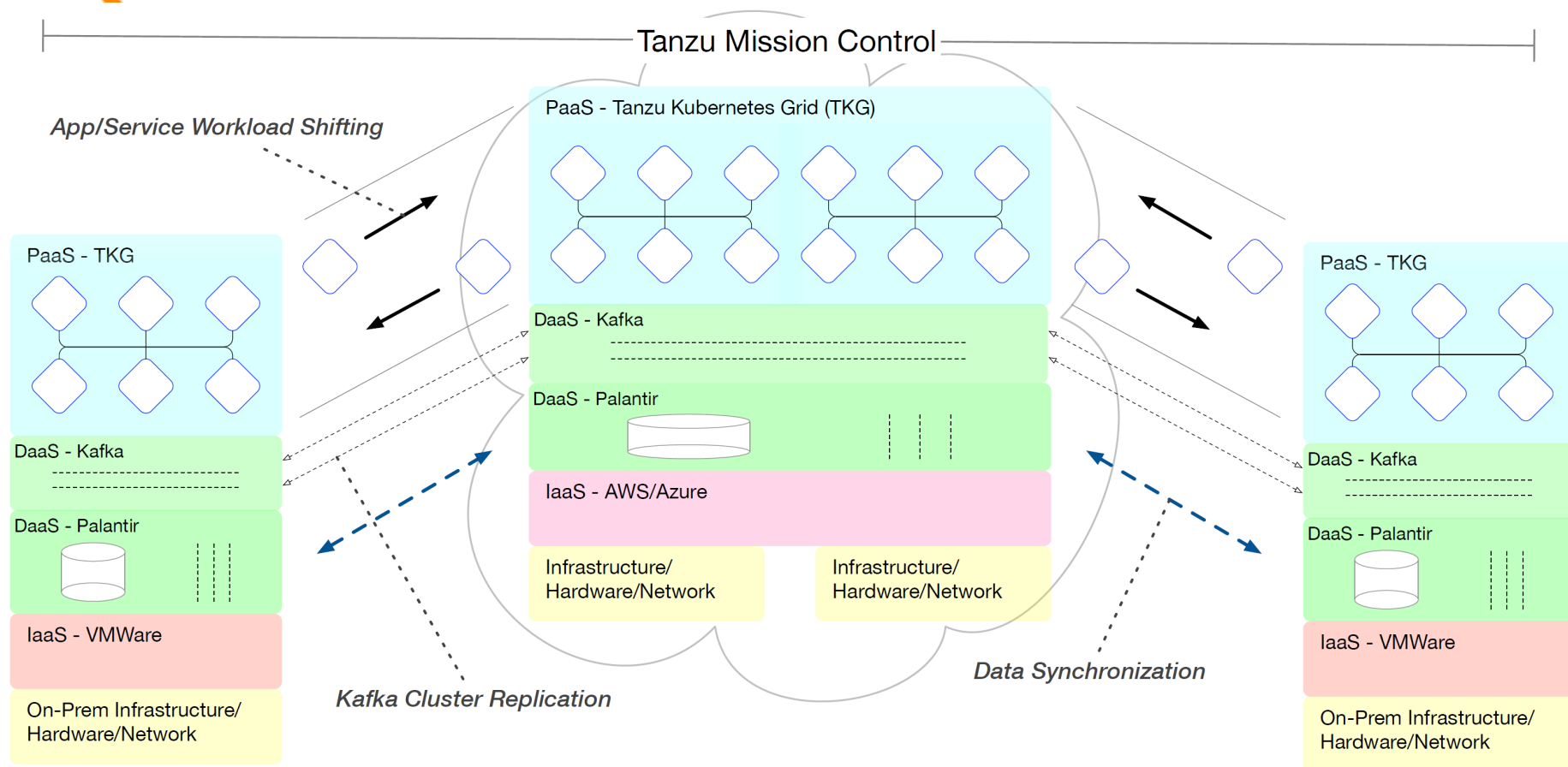
- Several times/day
- Shorter is better
- 70-80%



- Lean, agile development
- User centered design (UCD)
- Short feedback loops with users
- Current CI/CD toolsets



Federated Architecture



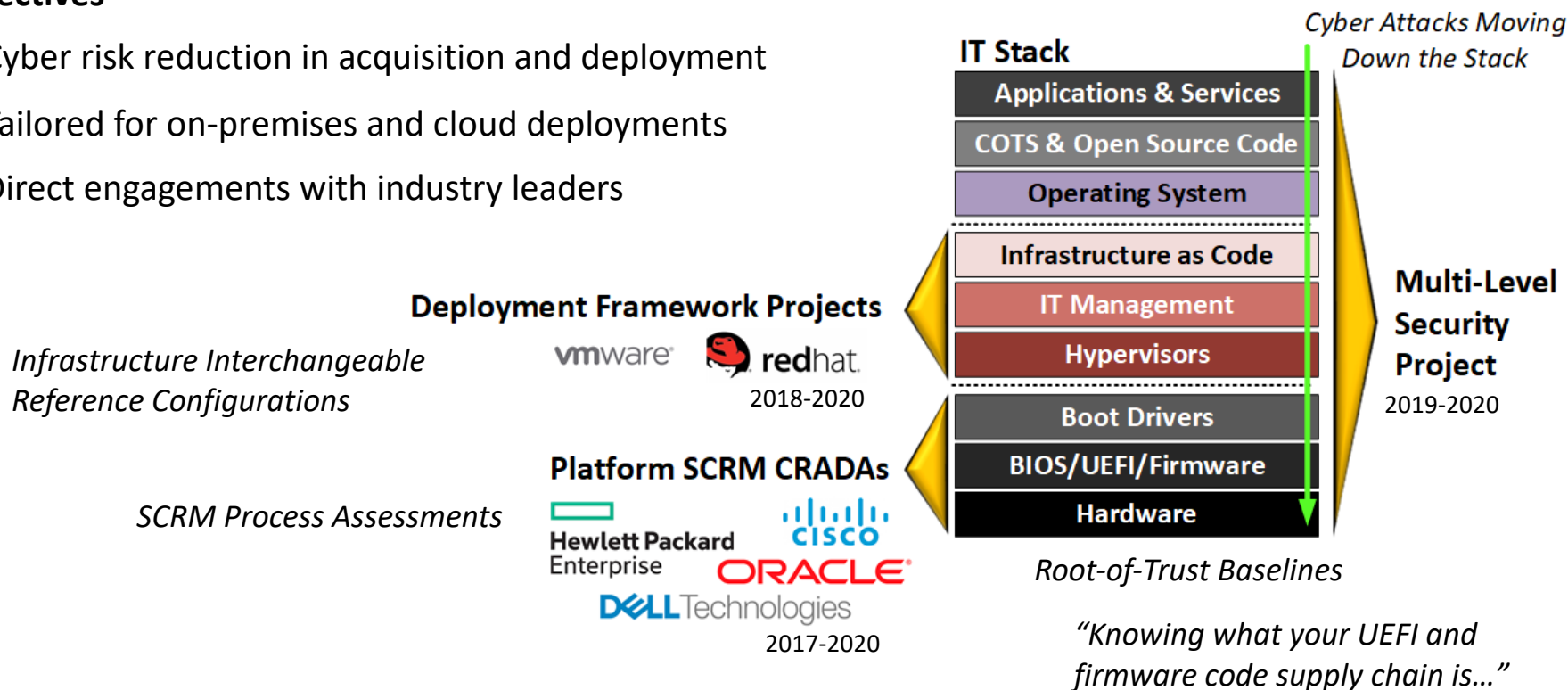
Leveraging non-traditional industry for solutions with critical commercial foundations



Other ECX Pathfinder Projects

Objectives

- Cyber risk reduction in acquisition and deployment
- Tailored for on-premises and cloud deployments
- Direct engagements with industry leaders



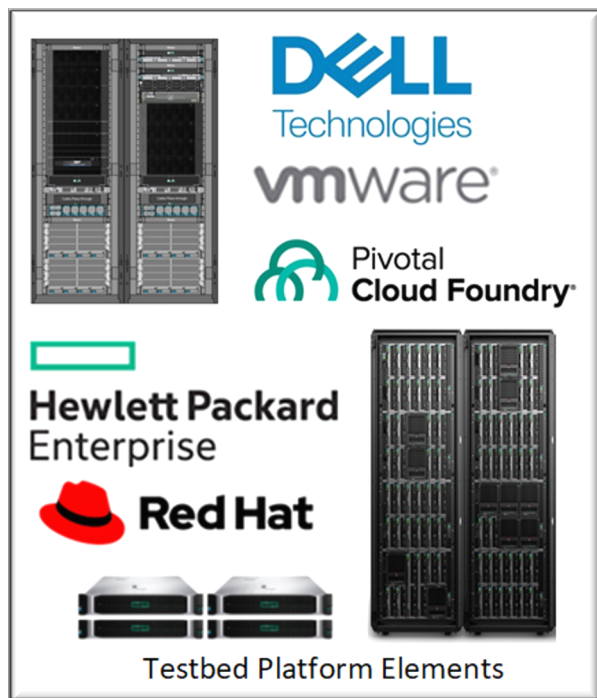
Why focus on lower layers of the stack? ... In a modern IT environment, before you ever load the first application, you could easily have >100 million lines of code deployed in the firmware and infrastructure management.

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SCRM – Supply Chain Risk Management, CRADA – Cooperative Research and Development Agreements, UEFI – Unified Extensible Firmware Interface



MLS Project Testbed



Other Industry Testbed Participants

- Testbed Operational in Q3 – 2019
- Environment for Industry to demonstrate and collaborate on multi-level security capabilities
- No funding supplied to industry participants beyond acquisition and standup of platform elements
 - Industry provides internally funded engineering resources
 - ECX provides testbed and technical support resources
- Industry interaction examples
 - General Dynamics evolved Pitbull OS to MLS-as-a-service
 - Demonstrations of data feeds from Space C2 DAAS
 - ForcePoint (Cross Domain Solution) installed and operational as virtual machine capability
 - Intel provided Secure Runtime Environment (SRE) Platforms and collaboration engineering
 - Integration of Morpheus Data into MLS Environment for abstract control

MLS an important capability for integrated space C2 systems...
Access micro-segmentation becoming essential for commercial cloud and on-premises systems... **MLS Testbed** leverages common objectives to identify solution paths and emerging capabilities



Epilogue

- **New space environment demands new strategies for the warfighter**
- **Space Dominance requires domination in Ground Capabilities**
 - Enterprise Command and Control
 - Responsive, reactive, scalable, resilient capabilities
 - Focus on Data Management Plane
 - *Generation, Processing, Transport, Controlled-Access, Storage ... Resilience*
- **New models for industry engagement have yielded important insights**
 - Gives a broader cross-section of industry a greater voice in presenting options
 - Enables informed Government risk taking through early engagement
- **Key Concepts in continuing industry engagement**
 - Adapt, integrate and tailor capabilities from commercial foundations
 - Drive solutions from industry in a competitive marketplace
- **Cross Mission Ground will continue to use and expand engagements with non-traditional industry**
 - Use innovative engagement and collaboration mechanisms (CRADAs, OTAs...)
 - Expand opportunities with more small business

Adopt the best... Integrate because there is no other way...
Drive to fill the gaps



Contact Information

Where To Find KM



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