

Space & Missile Systems Center



Ground Systems Architecture Workshop 2019

Creating Smarter Ground Systems

Thomas R. Rock, Jr.
Col, US Air Force

Agenda



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- Vision
- Plan of Action
- Where Help is Needed
- What Does Success Look Like
- Questions

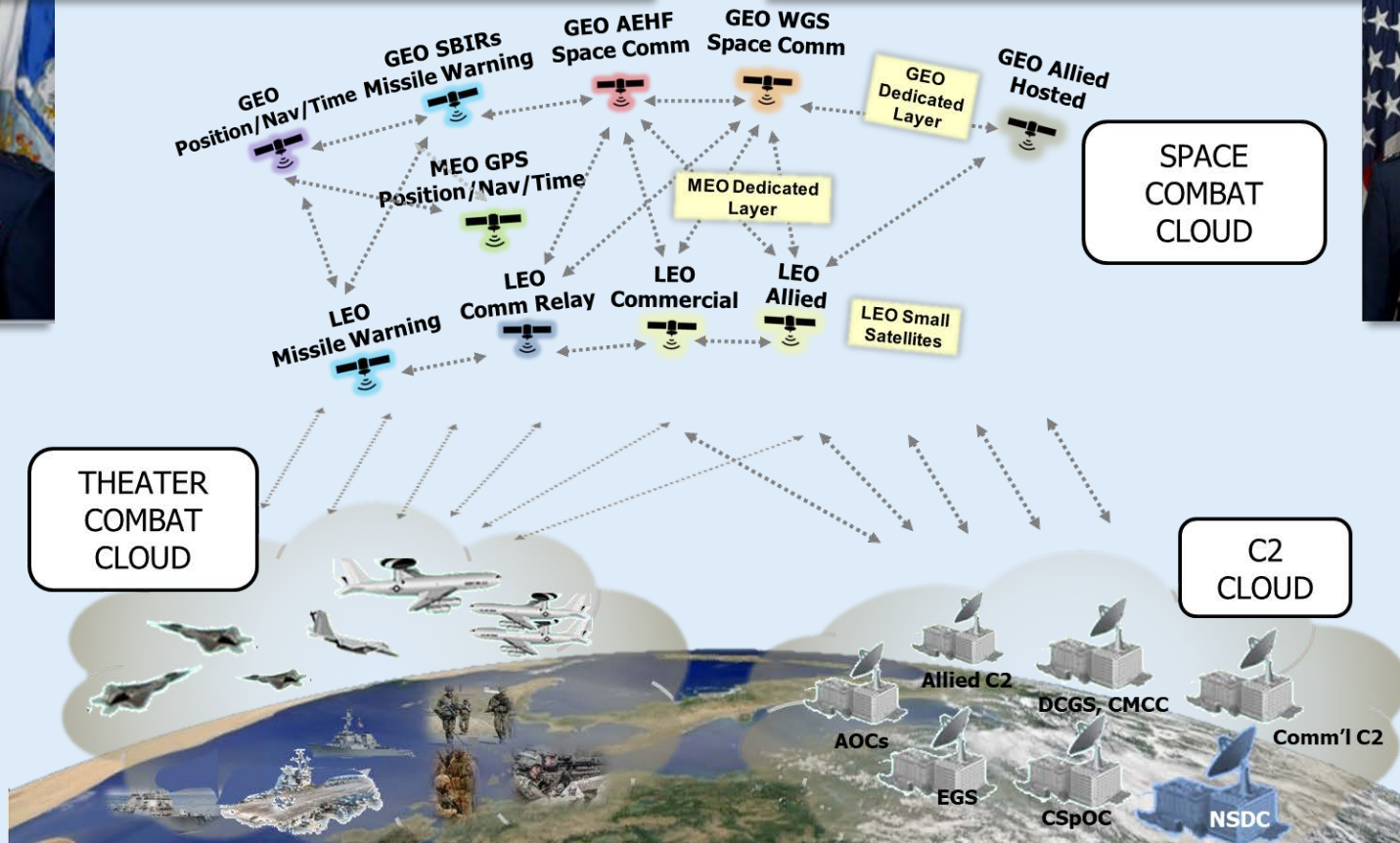


Integrated Multi-domain Battlefield

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"Victory in future conflict ... will go to that leader who can control his or her forces to create multiple dilemmas from multiple domains"

"Space is a warfighting domain just like air, land and sea. We have to be prepared to fight a full range of operations."



Requires Rapid Acquisition, tighter Ops/Rqmnts/Acq Partnership, and a multi-domain open architecture leveraging commercial/allied partners

Today's Threat

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GPS Jamming



SATCOM Jamming



Laser Blinding



Interceptors



Laser Damage (HEL)



Ground Site Attack



NUDET in Space



Malicious Code



Service Denial



Data Theft



Data Manipulation



System Takeover



Attack
Infrastructure



Attack
Weapon Systems



- The current US space enterprise was not designed or optimized to fight through and deliver key warfighting effects in, from and through today's contested space domain
- We must provide a more resilient architecture to prevail if conflict extends into space



Space C2 Enterprise

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Tactical Space C2



Enterprise Ground Services



Mission Agnostic Applications Attitude Control Station Keeping Telemetry/Tracking Ground Resources	Mission Unique Applications Missile Warning Missile Defense BSA Technical Intelligence
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Operational Space BMC2



Enterprise Space BMC2



Mission Unique Applications Space Situational Awareness Indications & Warning Battle Management Orders Dissemination

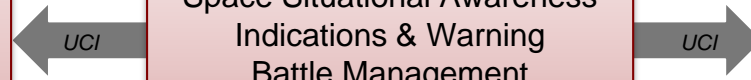
Theater Space C2



TBD Tactical/Theater Space C2



Multi-Domain Applications Theater ISR Theater Comm Theater Missile Warning
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Common Data Pool

Platform Enterprise IT Services
Infrastructure Compute – Network - Storage

Platform Enterprise IT Services
Infrastructure Compute – Network - Storage

Platform Enterprise IT Services
Infrastructure Compute – Network - Storage

AF driving architectural commonality to enable Multi-Domain Ops



The Implementation Strategy

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1. Protect & Synchronize Existing Ops

- **Space Situational Awareness:** Create Common Operating Picture
- **Battle Management C2:** Enable Decision Speed (Synchronize DoD/IC Ops)
- **Space Control:** Enhance capability resilience

2. Create multi-layer architectures

- **Disaggregate:** Sever tactical requirements to small sats, hosted payloads, and low earth architectures
- **Invest in Key Enablers:** Launch, Comms, Ground

3. Proliferate with Comm'I / Allied

- **Proliferate:** Spread capability to multiple platforms/layers
- **Diversify:** Add capability in different orbits and from commercial/allies
- **Distribute:** Multiple sensors/sats work together

Foundational Enablers:

Analytics

Rapid Launch

Ground C2/Comm/Ops

Build more missiles; favors war of attrition

1 v 1 dog fight; war of attrition less attractive

Suppress comm'I/allied; at economic/political expense

Blue Counter: Build multi-layer architectures

Blue Counter: Proliferate via commercial/allied

Blue Counter: Surge, augment, reconstitute

Blue outgunned

Blue and Red at Parity

Too costly on Red



SMC 2.0 Strategic Outcomes

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Strategic Outcomes

Dominate



Deliver



Drive



Enterprise



- **Shared vision and strategy** of an integrated portfolio across programs
- **Resilient, multi-layered architectures** and infrastructure services that leverage economies of scale for all programs
- Ability to **dynamically reallocate resources** based on priorities and promote collaboration and knowledge sharing

Partnerships



- A **wide network of suppliers** including both traditional contractors and innovative start-ups
- **Collaboration with Inter-government and International allies** to share costs, technologies and solutions to move faster and improve capabilities

Innovation



- Encourage **fast-failure and fast-learning** by maximizing use of prototyping, experimentation and rapid demonstration/feedback
- **Balanced portfolio** of S&T, R&D and fielded capabilities providing incremental improvements and opportunities for innovation
- Make **Strategic innovative investment** in high pay-off technologies and game changing capabilities (Space Control, Rapid Orbital Mobility, Info Agility)

Culture



- **Mission focused**, motivated, knowledgeable, and empowered workforce
- A culture of **risk-taking and continuous improvement** that enables creative problem solving
- **Talent management system** designed to develop leaders, empower teams, and reward performance

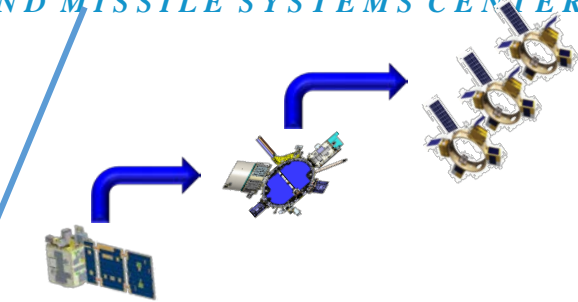
Speed



- **Increase decision-making velocity** with flatter organization and delegated decision authorities
- **Streamlined processes, documentation and reviews** tailored for the acquisition strategy

Experimentation for Multi-Domain Command and Control (MDC2)

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Systems Services Data

Adv Tech CONOPS Test/Train



Partnerships
Commercial & Allied
Node to Assess/Onboard

Rapid Prototyping
DoD + US Govt
Launch, Ground, Ops
OTA contracting

Wargaming, Experimentation, Exercises, TTXs



Need Your Help

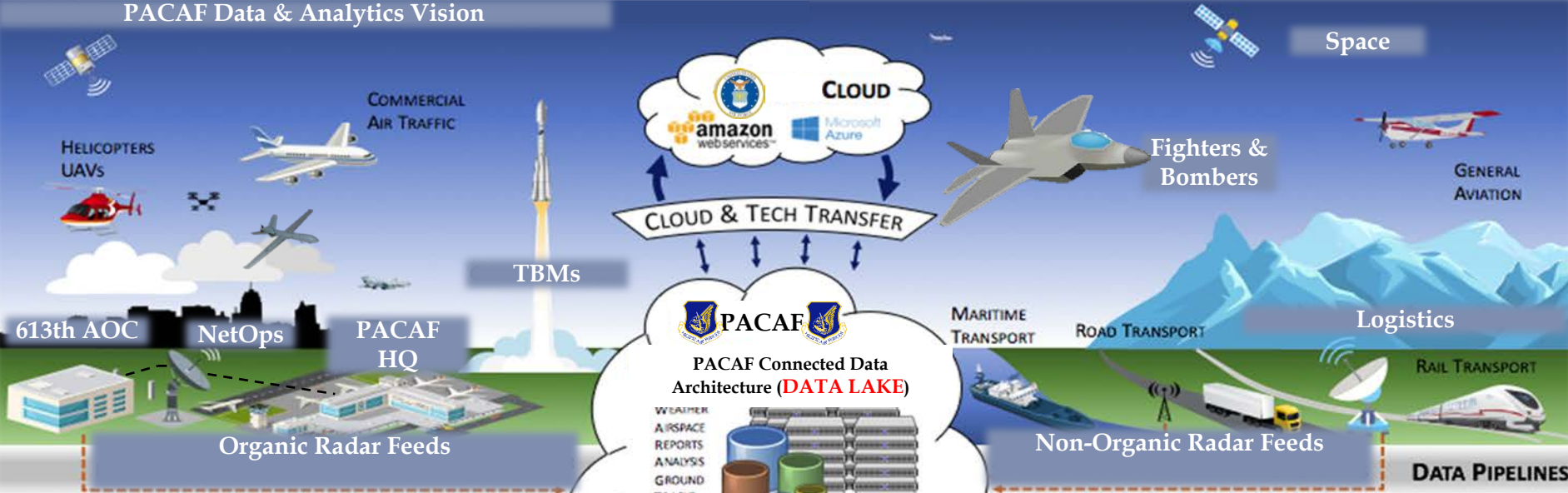
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- Multi-Domain Solutions
- Data Science, Exploitation & Algorithm Development
- Multi-Level Security (MLS) & Inherent Design Security
- Open Systems Architecture
- “As a Service” Approach
- Resiliency & Ability to Fight Through Attack



VISION: Enabling Multi-Domain Operations through Cloud, Data & Analytics

PACAF Data & Analytics Vision



ANALYSTS

RESEARCH – DEVELOPMENT
ANALYSIS - ALGORITHMS
VISUALIZATIONS - TRENDING

Clojure, Java, python, Scala, R

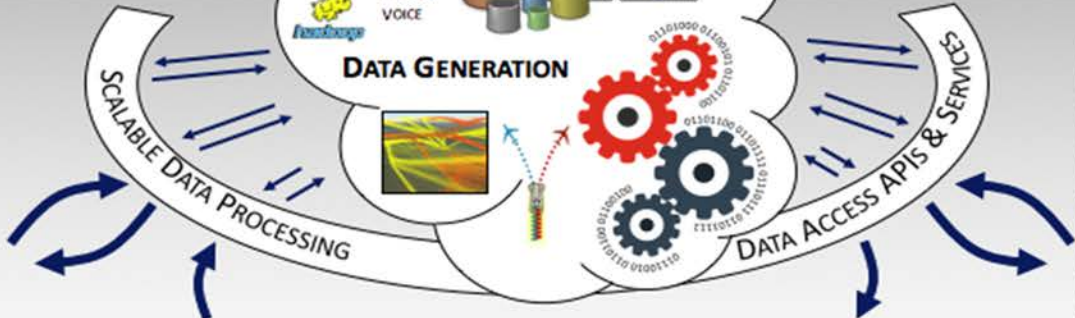
Projects

Network Analysis
Historical Air Picture Analysis
Kessel Run Features
Programs of Record (MADSS)

APPLIED ANALYTICS

Operational Tools
Analytic Findings
Director Dashboards

MITRE, Tableau, What if

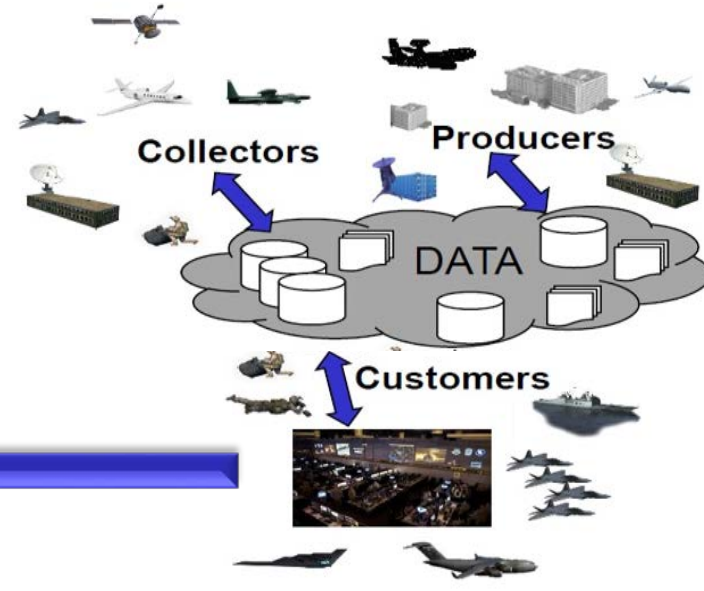




MDO Endstate

Enablers

- Universal Access
- Global Connectivity
- Interoperability
- Highly Resilient



Decision Making Process (B2C2WG, JEVb, and CDBs)

(Input To The CDR)

Commander's Decision

Everyone can connect, share, & access all data all the time

Integrity - Service - Excellence

QUESTIONS?



Always the Predator, Never the Prey!

