

Department of the Air Force

Integrity - Service - Excellence

Air Dominance Architectures **14 May 2025**





US fielding timelines for new capabilities have increased dramatically while our adversaries have outpaced us.



Next Generation Air Dominance (NGAD) Family of Systems (FoS)

Platform Development

F-77A

YFQ-42A

YFQ-44A

Digital Infrastructure *Software Products* *Open Architecture* *Test Infrastructure*

Architecture and Systems Engineering

Complex network diagram with various icons and a central infinity symbol.

Military Approach

Diagram showing a flow from a single aircraft to a network of aircraft, with a central box labeled 'Military Approach'.

VENOM F-16

Diagram showing a flow from a single aircraft to a network of aircraft, with a central box labeled 'VENOM F-16'.

Labs / Ranges

Diagram showing a flow from a single aircraft to a network of aircraft, with a central box labeled 'Labs / Ranges'.

The diagram illustrates the components of Digital Materiel Management and their impact. At the top, a blue triangle is formed by three circles: 'Agile Software Development' (top), 'Digital engineering, test, manufacturing, sustainment' (bottom-left), and 'Open Architecture' (bottom-right). The center of the triangle is a blue square labeled 'Digital Materiel Management'. Below this triangle are three stacked, light blue rectangular boxes with dark blue borders, each containing text: 'Digital Infrastructure', 'Test & Experimentation Infrastructure', and 'Industry Competition'.

Agile Software Development

Digital Materiel Management

Digital engineering, test, manufacturing, sustainment

Open Architecture

Digital Infrastructure

Test & Experimentation Infrastructure

Industry Competition

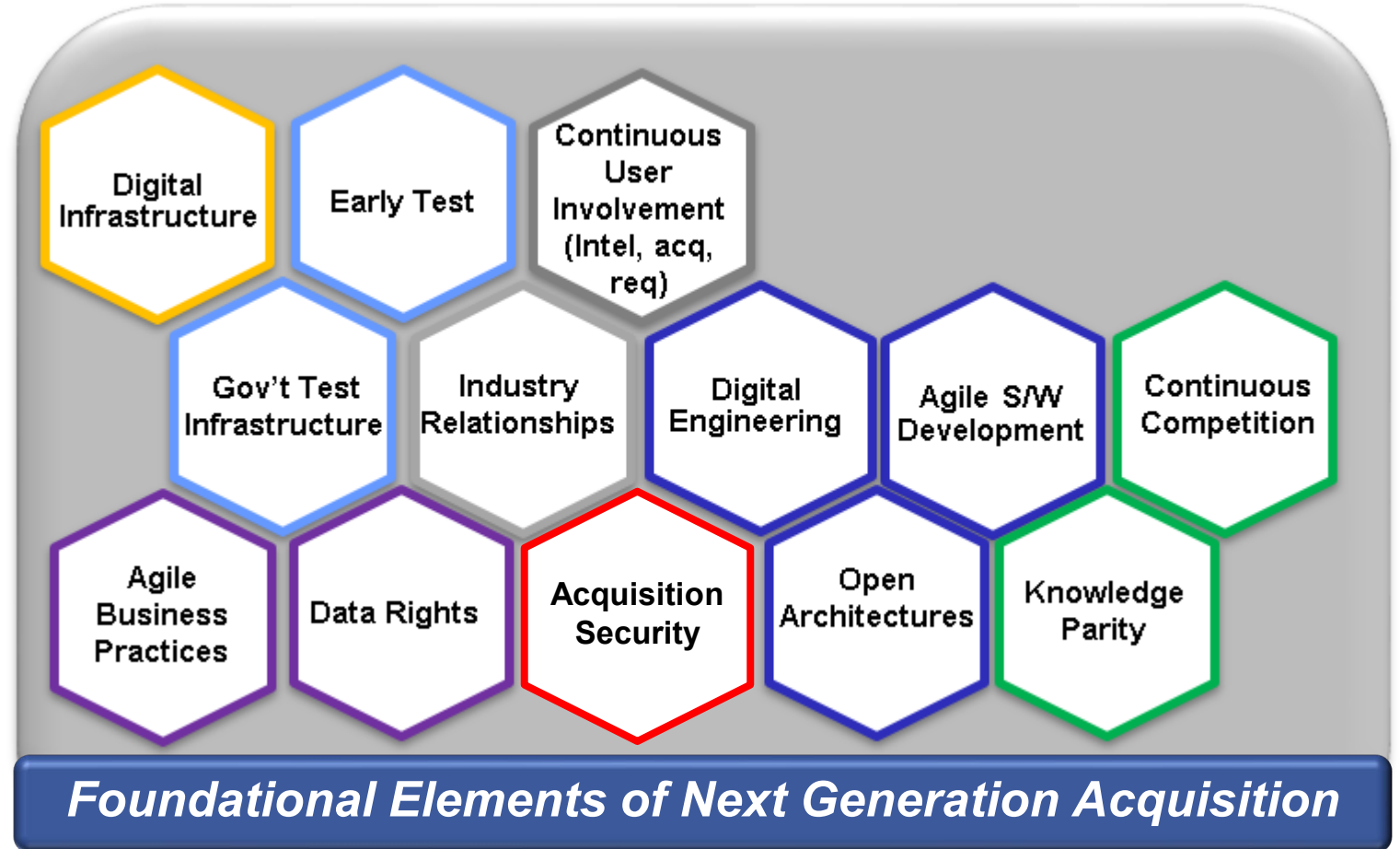
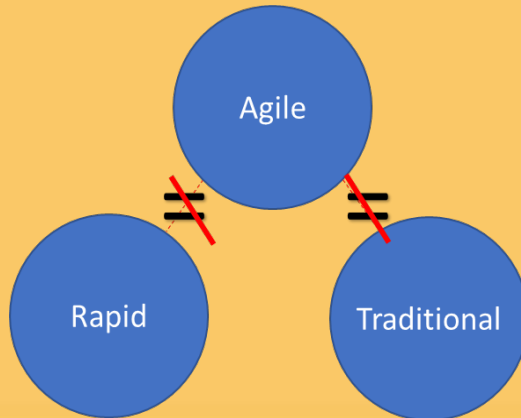
How the ADO Operates...

Next Generation Acquisition Model

Agile Acquisition is:

- Acquisition approach that allows for maximum flexibility to make decisions with best info possible
- Accommodate new information or changing threat

Agile Acquisition is not:



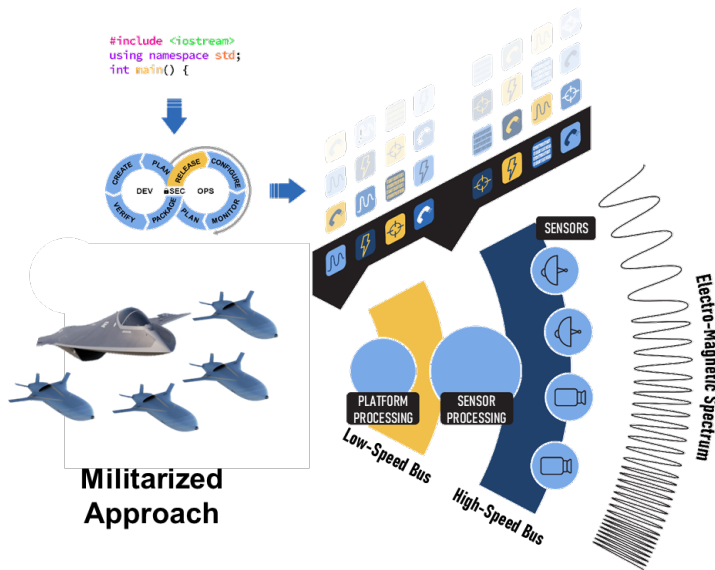
Modern Open System Architectures

Agile Mission Suite Government Reference Architecture

Define Air Vehicle and Mission Systems Interfaces
for both hardware and software



Commercial Approach



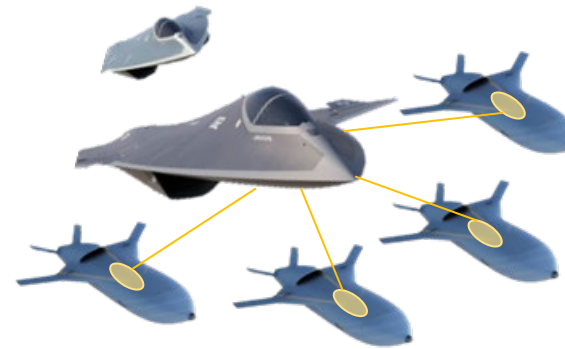
Autonomy Government Reference Architecture

Flight Autonomy

Air Vehicle OEM builds vehicle compliant to A-GRA to
perform primary flight functions

Mission Autonomy

Mission Autonomy Provider builds software compliant
to A-GRA to enable tactical and mission level functions

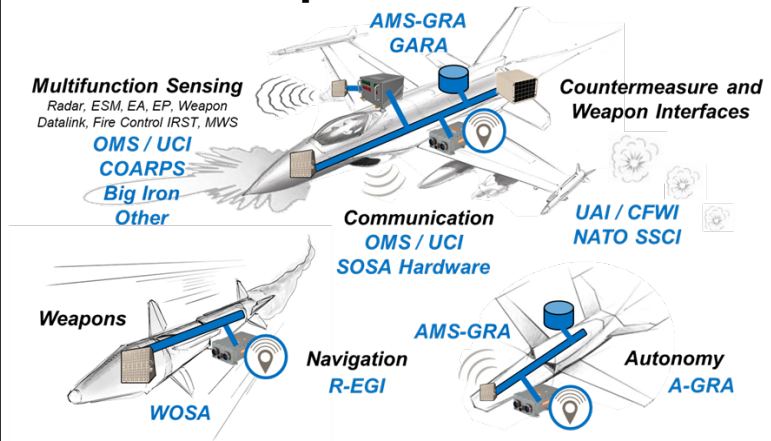


Terrestrial Systems Government Reference Architecture

Includes models and software solutions at GRA and GRI
levels, pedigreed from best of breed ground systems



Other Open Architectures





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Agile Mission Suite (AMS) Government Reference Architecture (GRA)

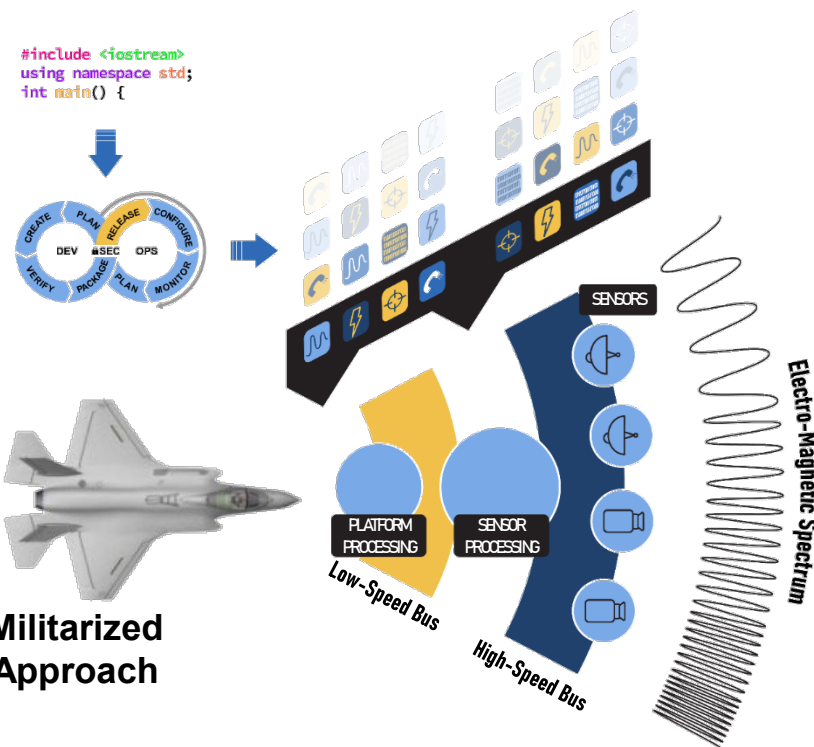
- Built on the foundation of previous Open Architecture developments but decomposes previous “black boxes” into software-defined modules
- Government-owned Sensor-to-Glass interfaces
- Strong isolation between safety/flight-critical and mission-critical components to enable adopting platforms to field rapid software updates
- Well-defined, high-speed mission-systems interfaces allowing adopting platforms to leverage best-of-breed capabilities



Commercial Approach



Militarized Approach



Disclaimer: The discussion of non-federal entities, methods, products, or services does not imply any endorsement by the United States Government, the Department of Defense, or the Department of the Air Force.

AMS GRA ensures adopting platforms respond to dynamic threat environment at the speed of software (vs. hardware)



Autonomy Government Reference Architecture (A-GRA)

- A-GRA is:
 - Adaptable, Modular, **Autonomy Architecture extensible to multiple platforms & missions**
 - **Affordable and scalable**
- A-GRA Enables:
 - Not vendor lock, interfaces are open and common
 - Minimizes Airworthiness impacts to deploy new capability
 - “**Marketplace**” of autonomy vendors
 - **Common user experience**
 - **Reduced manpower and logistics footprint**

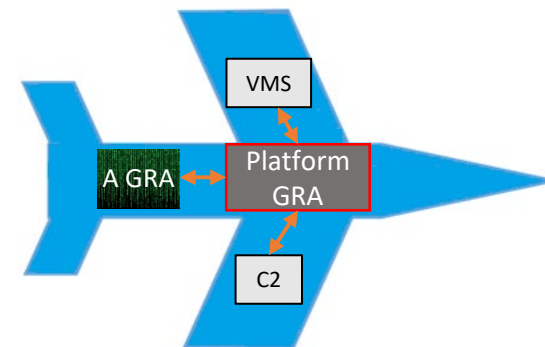
Flight Autonomy
Flight Autonomy Provider (Air Vehicle OEM) builds vehicle compliant to A-GRA



Mission Autonomy
Mission Autonomy builds software compliant with A-GRA



Air Vehicle OEM
Air Vehicle OEM Integrates Mission Autonomy into vehicle



A-GRA avoids vendor lock, enables rapid iteration, is extensible to other platforms, and underpins interoperability



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Broader Look at Architectures & Standards

Spectrum of Open Architecture Implementation

Notional examples:

F-15E Platform



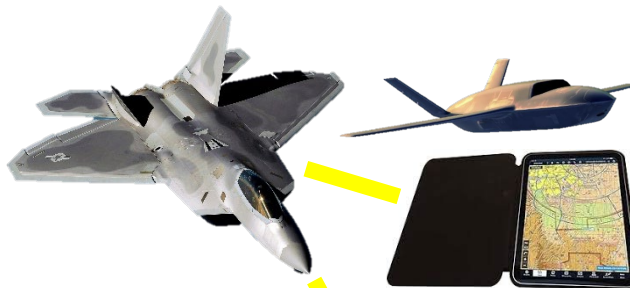
Modifications can be federated or implemented within a vendor-locked legacy system

R-EGI on F-15



Open architecture subsystems can be integrated into a vendor-locked OFP

F-22 CCA Control



A hybrid approach may use a narrow open architecture enclave within a vendor-locked system

Future Program



Future systems may integrate open subsystems into an open GRA

How are component technologies integrated?

Black-box subsystem integrated in vendor locked OFP

Black-box subsystem integrated in Open Gov't Ref Architecture

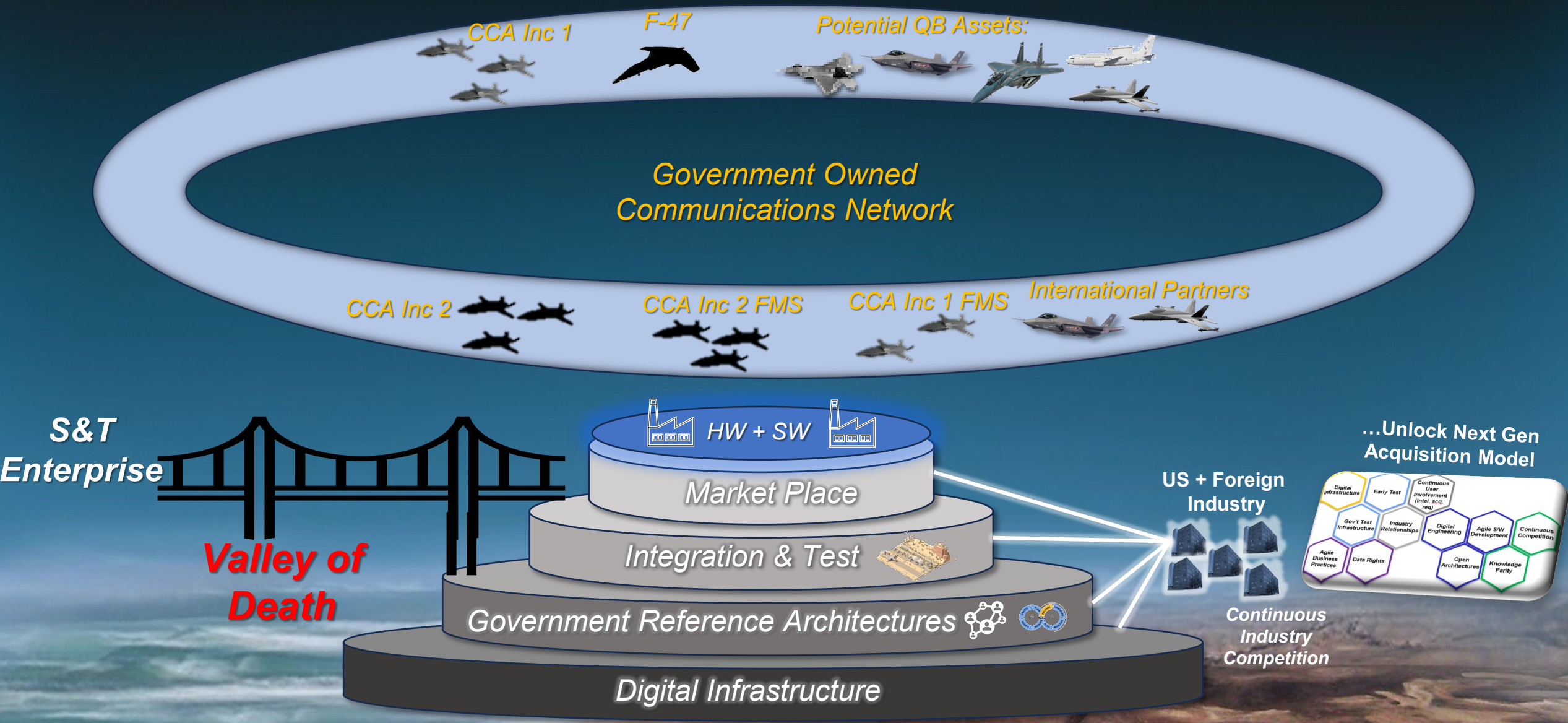
Open subsystem integrated in vendor locked OFP

Open subsystem integrated in Open Gov't Ref Architecture

iPEO ASE will consider a range of implementation options according to lifecycle ROI analysis



NOTIONAL DEPICTION of Future TACAIR Opportunity



A robust ecosystem across One AFMC required to deliver system-of-system, integrated vision for GPC.

Contact Us



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Questions?

