An Agile, Cloud Based Common Software Framework

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Containerization of the PGMM Framework and benefits of leveraging common frameworks and development environments to accelerate development and deployment of new capabilities

Collaboration space, Alexandria, VA
OVERVIEW

- Background
- PGMM Framework Evolution Approach
- Common Framework and Development Environment Benefits
PGMM BACKGROUND

- Persistent GEOINT Mission Manager (PGMM) develops a common software infrastructure/framework for OPIR constellation mission management

- Evolve Virtual Mission Operations Center (VMOC) to open, modular, loosely coupled cloud-based architecture with standard interfaces and data models
  - VMOC is a single tightly-coupled monolithic deployment of a Java Enterprise Architecture

- Extend framework to add new and updated mission capabilities
  - Sensor agnostic constellation scheduling
  - Advanced scheduling and feasibility capabilities

- Provision and provide a common Government-owned cloud-based development environment for third-party app developers
  - Support third-party developers throughout their development efforts
  - Serve as system integrator responsible for end-to-end system performance
PGMM FRAMEWORK EVOLUTION APPROACH

• Leverage Containerization technologies and micro service architecture principles
  - Migrate framework functions to containers incrementally over time
  - Enables open, modular and loosely coupled architecture
  - Allows third-party application developers to deliver self-contained applications to PGMM’s plug and play architecture
  - Allows simplified deployments, finer grained scalability, improved resiliency and resource consumption
  - Provides ability to update individual components without redeploying entire Framework

• Replace COTS with FOSS
  - Replace Weblogic and Oracle DB with Wildfly, Artemis and Postgress DB
  - Keycloak for identity and access management
ORIGINAL VMOC GFE FRAMEWORK

- GFE Framework is a single tightly-coupled monolithic deployment of a Java Enterprise Architecture
  - Third party components integrated at build time
  - Upgrades to any single component requires new build and deployment of the entire Enterprise Application
  - Existing design does not easily scale and requires significant server resources
  - Not easily extensible
MIGRATING TO CONTAINERIZED ARCHITECTURE

- Centralize message broker and authentication first
  - Enable messaging between components
  - Enable identity management and access control
MIGRATING FRAMEWORK COMPONENTS

- New features are added separately from main Enterprise Application
- Look for common separation points within architecture
  - Loosely coupled, self contained, or limited dependencies
- Create service layers to abstract interfaces and hide migration
- Create Rest or JMS implementation of services
OBJECTIVE CONTAINERIZED ARCHITECTURE

- Objective architecture is fully containerized
  - Message broker and Restful services
- Modular loosely coupled framework that is easily scalable and extensible
  - Micro services architecture
- Modernize as services are rebuilt
  - Springboot, NodeJS, React
  - Minimalistic container OS
  - Lower resource usage
  - Common base container image
  - Reduced A&A effort
PGMM IOC ARCHITECTURE
• Provides re-use of common infrastructure elements and services
• Provides applications access to Enterprise IT and Mission Services
PGMM COMMON DEVELOPMENT ENVIRONMENT BENEFITS

• Provides access to and sharing of common capabilities; framework APIs, software developer guides, repositories, data sets, simulators, security
• Faster project start-ups, lowers cost and safely lowers the bar for entry
• Increased developer efficiency during dev, integration and test
• Lowers bar of entry for new/small industry partners
COMMON DEV ENVIRONMENT AND PROCESSING FRAMEWORK

- Provides Gov possession of software baselines and CM, build, CI/CD environments
- Prevents vendor lock-in and allows smooth hand-off between outgoing and incoming contractors
- Maximizes re-use of common dev environment and framework capabilities
- Reduces integration, test and O&M costs, speeds ops transition
- Enables rapid insertion of new technologies from QRC/R&D efforts
QUESTIONS