Data Mashups

AMMOS Architecture Theme

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AMMOS Architecture Themes

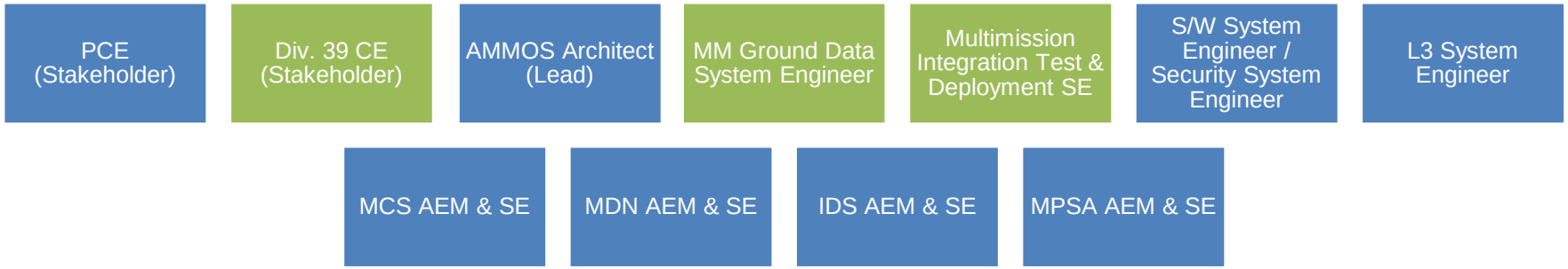
System-Level Focus Areas

1. **Autonomy/Automation (L)** – Future trends in *ground system* mission operations automation
2. **Common Services (M)** – Evolution and adoption of AMMOS Common Services for use by AMMOS functional applications
3. **Data Analytics (M)** – Examining raw operations data with purpose of drawing inferences/conclusions about that data
4. **Mashups (M)** – Easy, fast integration of mission operations data using open APIs and data sources to produce enriched results
5. **OpsData Info Integration (H)** – Address operations data 'information silos' by making data *visible*, *accessible*, and *understandable*
6. **Time Formats / QUDV (L)** – Standardizing time formats (notably, SCET) and dimensionality of physical quantities to support integration of operations data across information silos
7. **Visualization (H)** – New capabilities that facilitate presentation of operations data in pictorial or graphical format (ideally from Web)

Priority Levels: L = Low, M = Medium, H = High

AMMOS Design Tem

Overview (*New in FY2016!*)



- Hold bi-weekly tag-ups with principle focus on AMMOS modernization activities (*Strategic Focus*)
  - Coordinate, develop, and vet AMMOS application integration and data/information integration strategies centered around system-level "Architecture Themes"
  - Coordinate infusion and integration of AMMOS cross-cutting systems and services related to application security, workflow, system deployment
- Coordinate and hold peer reviews of new AMMOS capabilities (including tech refresh of existing capabilities)

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General [Multimission] Problem Statement*

The problem of	The lack of multimission solutions that allow users to search, relate, analyze, and visualize mission operations data across multiple, disparate sources of the mission system
affects	Project, Mission Operations, Operations Teams
The impact of which is	(1) For mission operators, gaining insight into flight system anomalous events can be a tedious, time consuming, and error prone process (1) Flight projects tend to "roll their own" mission operations data management and data integration solutions either from the ground up, or, build on top of the multimission Distributed Object Manager (DOM) system, which today is a legacy system that is limited to cataloging, storage management, and event notification of *file-based* mission operations data products, each with a custom file format
A successful solution would	(1) Improve mission operators' ability to obtain an end-to-end, 'common operational picture' of the mission system; from science and engineering activity planning through science data product generation (1) Improve, over time, the overall quality and understanding of mission operations data by informing information producers which attributes that describe their data (i.e., metadata) is most effective to expose to information consumers

***Vetted by Mr. Steven Wissler, Chief Engineer, Mission Systems & Operations Division, Jet Propulsion Laboratory**

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Investigations in FY2016 (1/2)

- Generalized multimission problem statement summarized on previous slide is a reflection of several operations data integration and access challenges identified during OpsData Workshop held at JPL in Sept 2015
  - The AMMOS does not offer a solution today; this is a known gap
- MGSS program is collaborating with JPL Mission Systems & Operations Division (Div 39) on solicitation of mission drivers and candidate solution architectures
  - Div 39 has launched a team to investigate the concept of the “Common Data Store” (*see N. Dehghani’s presentation*)
  - MGSS effort being led by the AMMOS Design Team under auspices of Mashup Theme
- Scope of MGSS investigations are purely multimission in nature; MGSS will not fund solutions for the near-term needs of flight projects (e.g., M2020 5-hour timeline challenge for surface operations)

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Investigations in FY2016 (2/2)

- MGSS approved proposal for FY2016 Q4 new start at 0.25FTE level for senior software systems engineer (F. Saadat) to further elaborate concept of the 'data warehouse/data lake' hybrid solution to "Common Data Store"
  - Deliverable will be a report as this is intended to be a paper study and not a development & demonstration effort
- MGSS monitoring analyst reports (e.g., Gartner, Forrester Research, etc.) in area of Business Intelligence (BI)
  - Modern BI players are very active in providing solutions that could potentially address need identified by Problem Statement (*cf*., slide 4)
  - Most notable are "search-driven business analytics" providers (see O'Reilly Media report by A. Oram)
- MGSS has initiated hosting demonstrations on JPL campus from leading BI/search-driven analytics players with first visit held on June 16th with ThoughtSpot

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Plans for FY2017

- Continued MGSS/Div 39 collaboration on Data Mashup internally-developed solution architectures, designs, best practices and technologies
  - Further development of “Common Data Store” concept
  - Initiation of realistic demonstrations using actual mission data (ATLO and operations)
- Continued evaluation of COTS solution providers recognizing challenges of acquisition and adoption by missions across the agency
  - Not insurmountable and most important concern is business viability of solution offering and solution provider with long-term commitment; these are known concerns of flight projects
- Potentially include solicitation in future MGSS proposal call for multi-year effort to develop solution
  - Would be required to include ‘make/buy’ trade

Acronyms & Abbreviations

- AEM – AMMOS Element Manager
- AMMOS – Advanced Multi-Mission Operations System
- ATLO – Assembly, Test and Launch Operations
- CE – Chief Engineer
- L3 – Level 3 (System Level)
- MGSS – Multimission Ground System and Services
- IDS – Instrument Data Systems
- MCS – Multimission Control Systems
- MDN – Mission Design and Navigation
- MPSA – Mission Planning, Sequencing, and Analysis
- PCE – Program Chief Engineer

Questions?

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