Military Modeling & Simulation Systems Oriented Architecture Concepts Pilot

Gary W Allen, PhD

Joint Training Integration &

Evaluation Center (JTIEC)

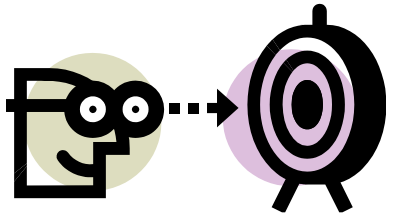
Anita Adams Zabek

The MITRE Corporation

Pilot Objectives

- **Goal**
  - **Provide the DoD M&S Community with:**
    - **Relevant information for decision makers**
    - **An education vehicle about SOA**
    - **A practical application of an LVC Architecture**

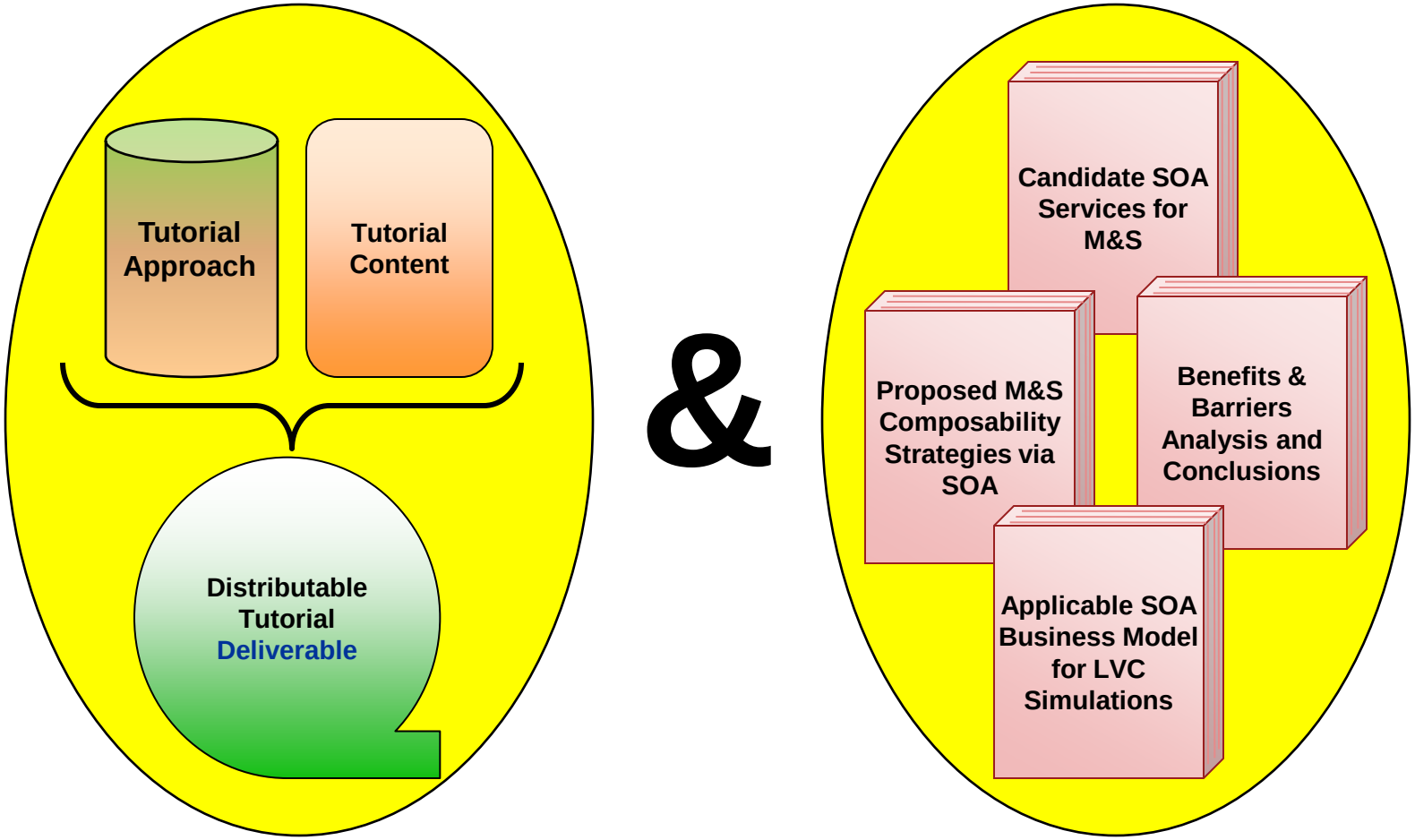
    that employs SOA commercial practices and technology



- **Approach**
  - **Examine SOA within context of DOD M&S environment**
  - **Design and produce a pragmatic tutorial**
  - **Provide the SOA framework to interoperate two disparate federations**

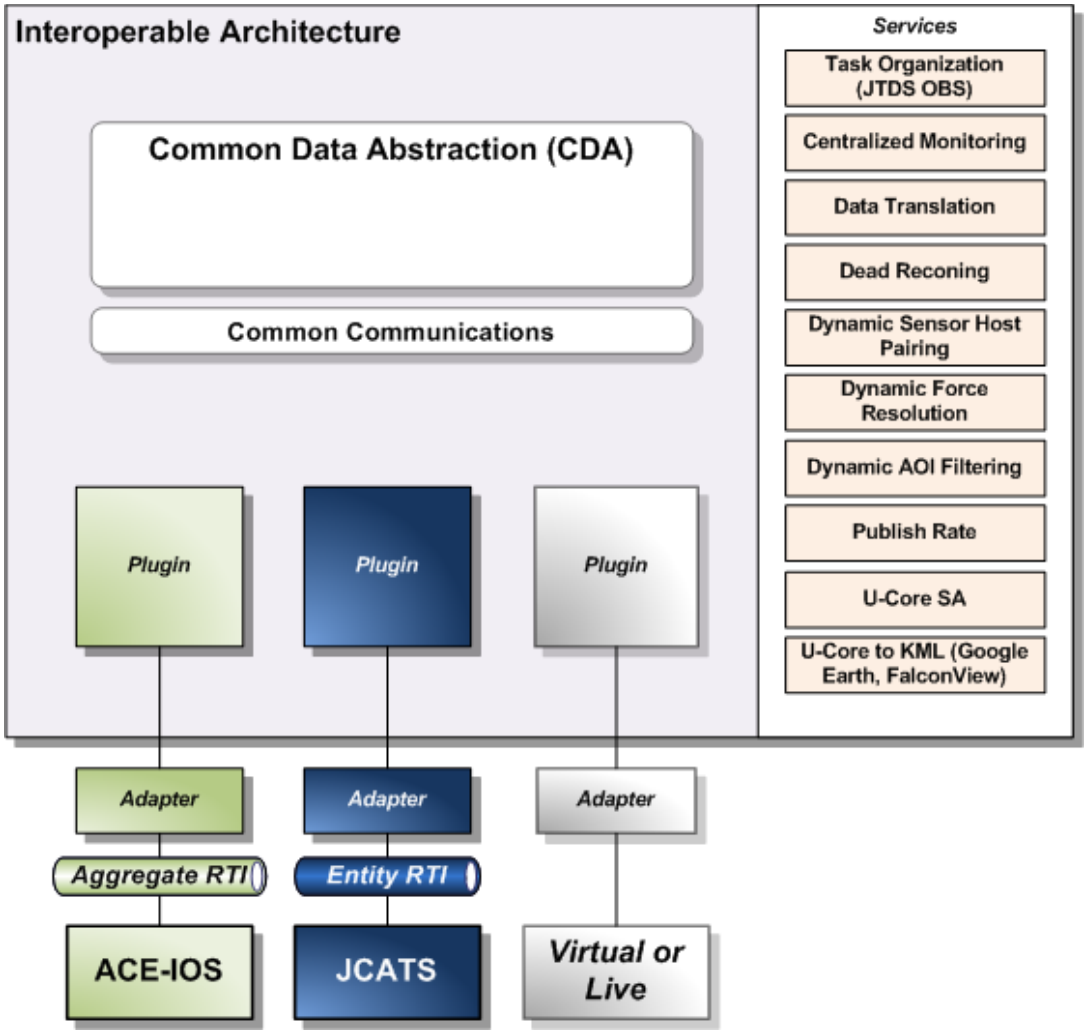
The technical approach, while incomplete with regards to Live and Virtual, never-the-less exercises the technology required to integrate all three in a non-trivial fashion

JHU/APL



EDUCATE **INFORM**

MITRE - Conceptual Pilot Architecture



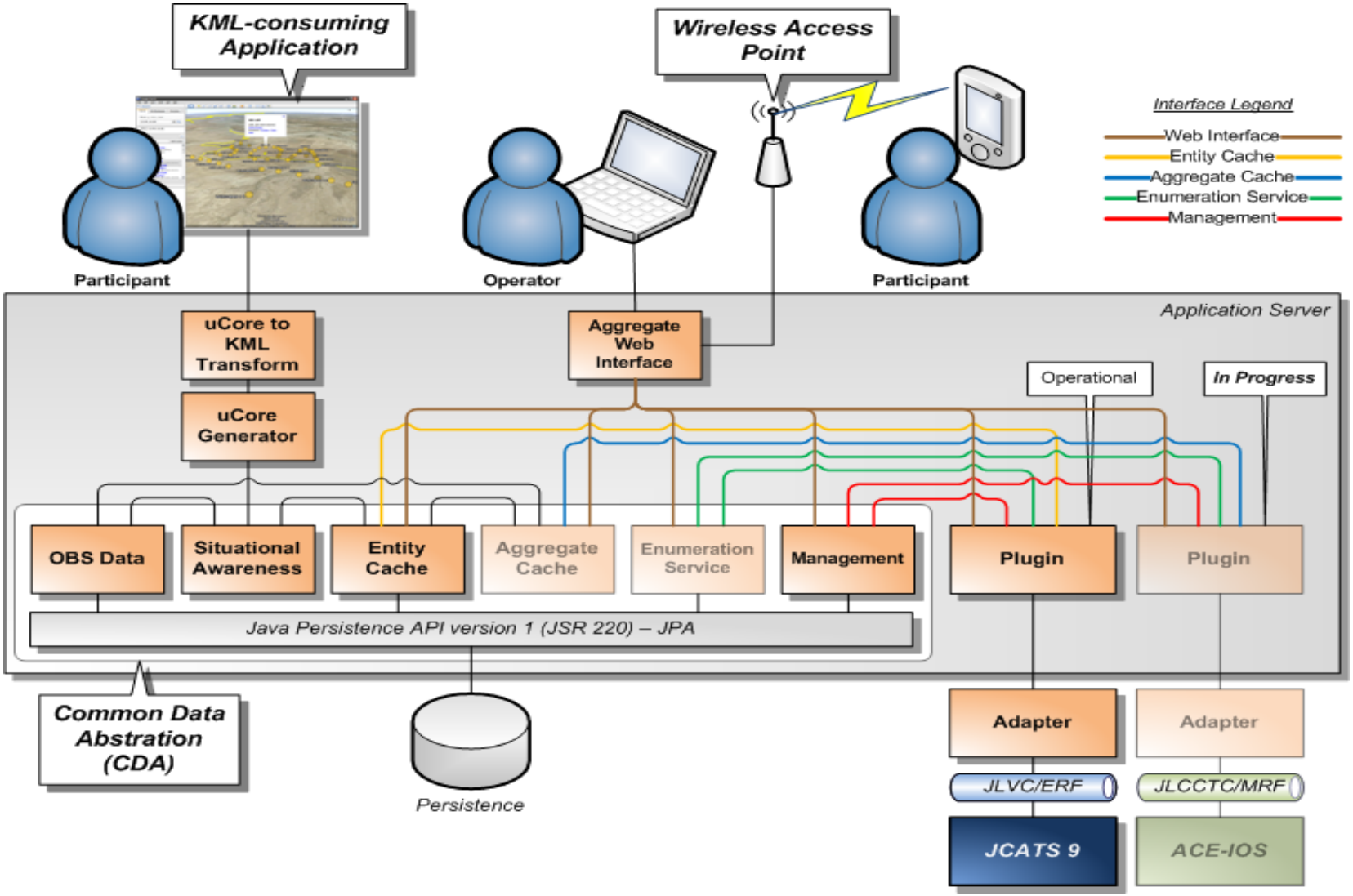
Process:

- **ID Common Services**
- **Decompose Federation (toggle off services that will be SOA based)**
- **Establish a SOA environment**
- **Compose federation around the SOA kernel**

Importance of the CDA

- The Common Data Abstraction (CDA) is a:
  - combination of public services
  - Has an underlying data model
  - Supports interoperability between two or more systems
- With the CDA all systems interface with a single external data model
  - The data model has a semantic and logical aspect
  - The underlying logical data model is accessed via public services
  - Allows changes to the underlying data model while maintaining the existing publicly defined interfaces
  - Supports addition of new public services to provide controlled access to new data

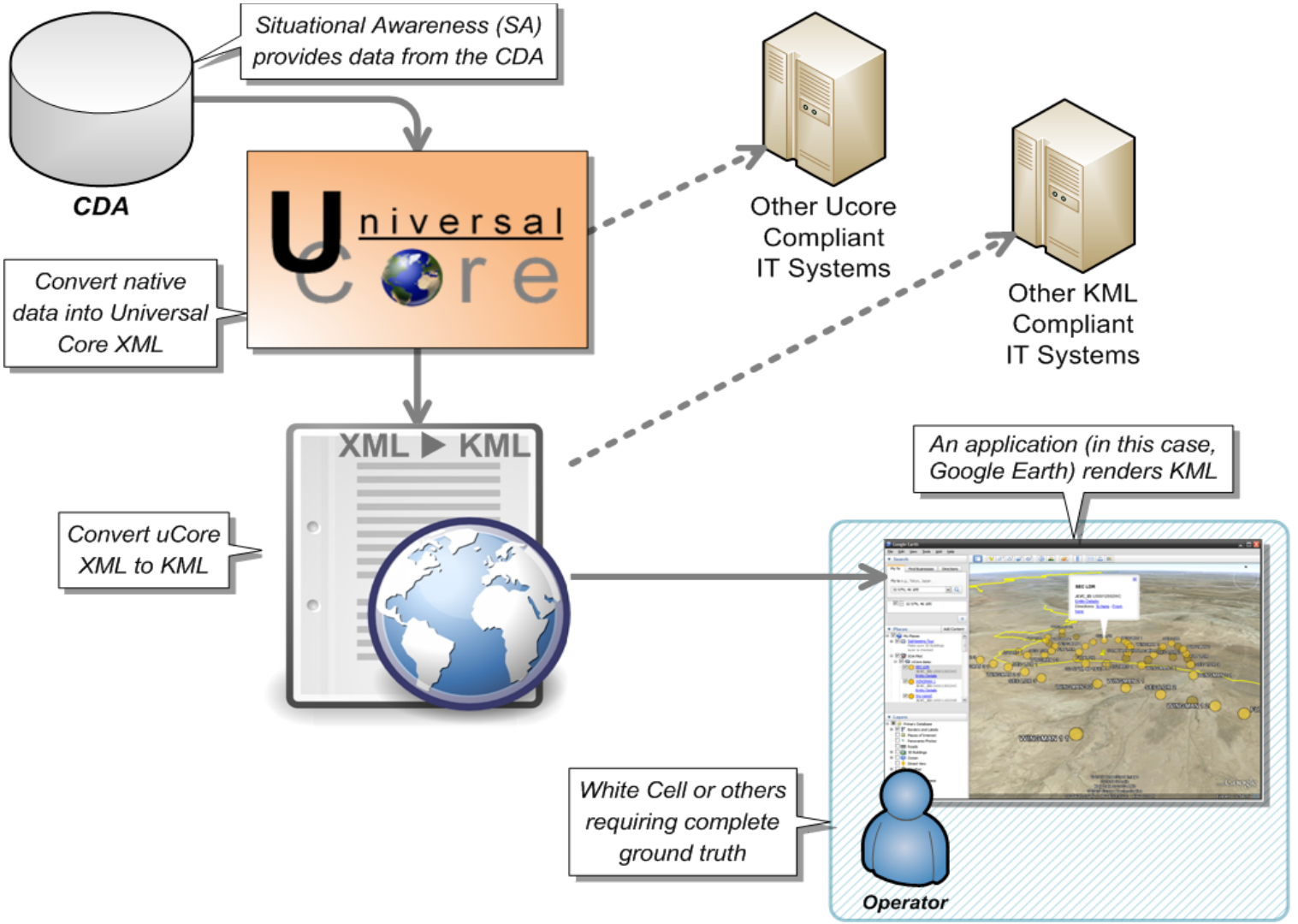
Evolved Pilot Architecture



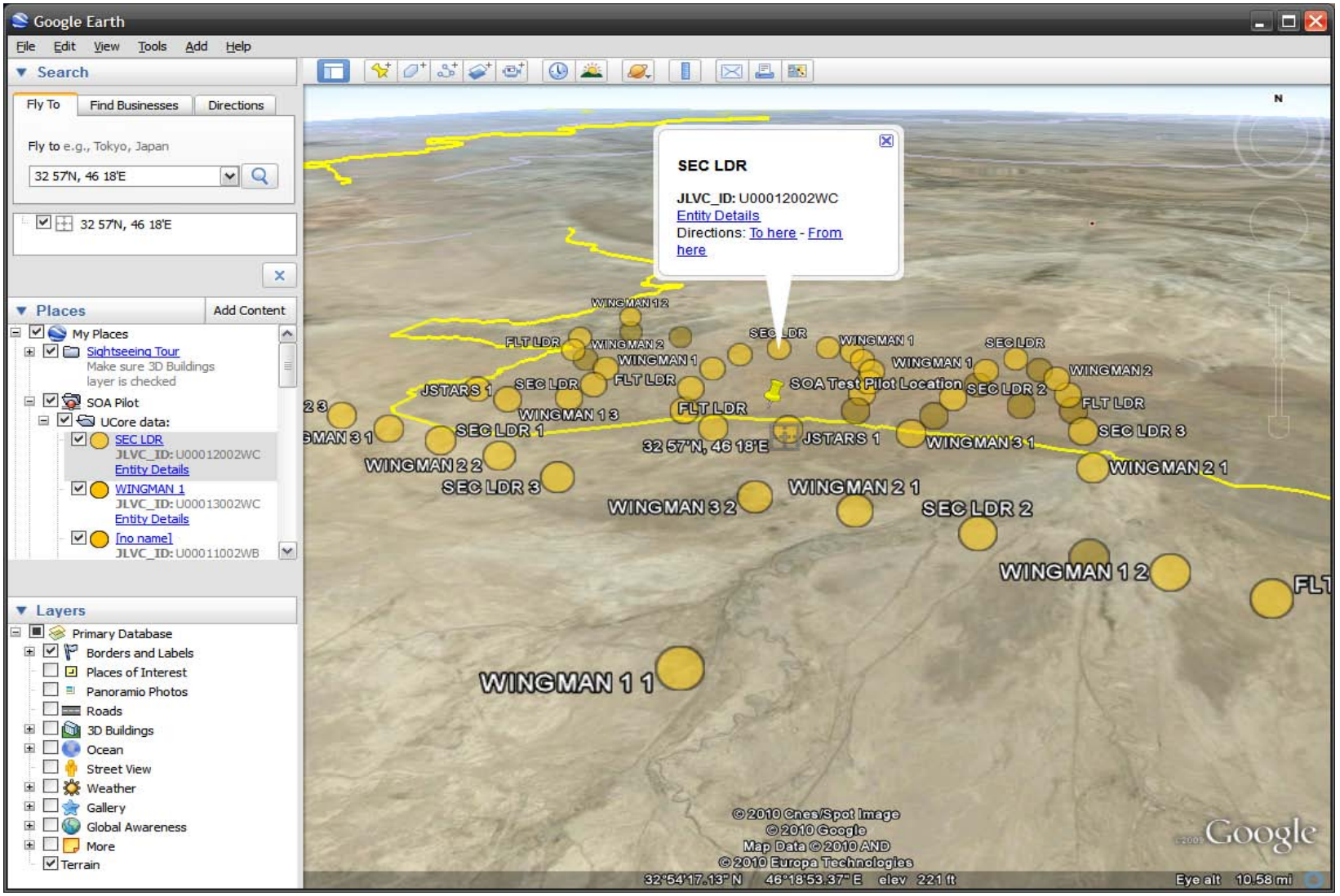
Implemented Services

- **Order Battle Services (OBS) Data**
  - Centralized service-based access to initialization data
- **Situational Awareness**
  - Provides centralized service-based access to ground truth
- **Entity Cache**
  - Provides centralized service-based storage and access of real-time entity information
- **Aggregate Cache**
  - Provides centralized service-based storage and access of real-time unit information
- **Enumeration Service**
  - Provides centralized service-based translation service from native to common data semantics
- **Management**
  - Provides centralized service-based storage of common participant system monitor and control information

SA to UCore to XML to KML to Google Earth



Google Earth: SA Feed



Summary

- Demonstrates SOA capabilities
  - Composition of services
  - Re-usability
  - Future flexibility
- Created a pilot that provides services using industry best practices
  - Order Battle Services (OBS) Data, Situational Awareness, Entity Cache, Aggregate Cache, Enumeration Service, Management
- The pilot is capable of reasonable performance with a non-trivial dataset
  - System easily support a 120K entity scenario on a Dell 690 quad-core workstation
  - Plugin/Adapter and Application Server on the same platform
  - Design provides for ‘expedient adaptability’

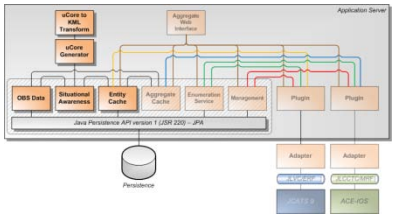
Potential Next Steps

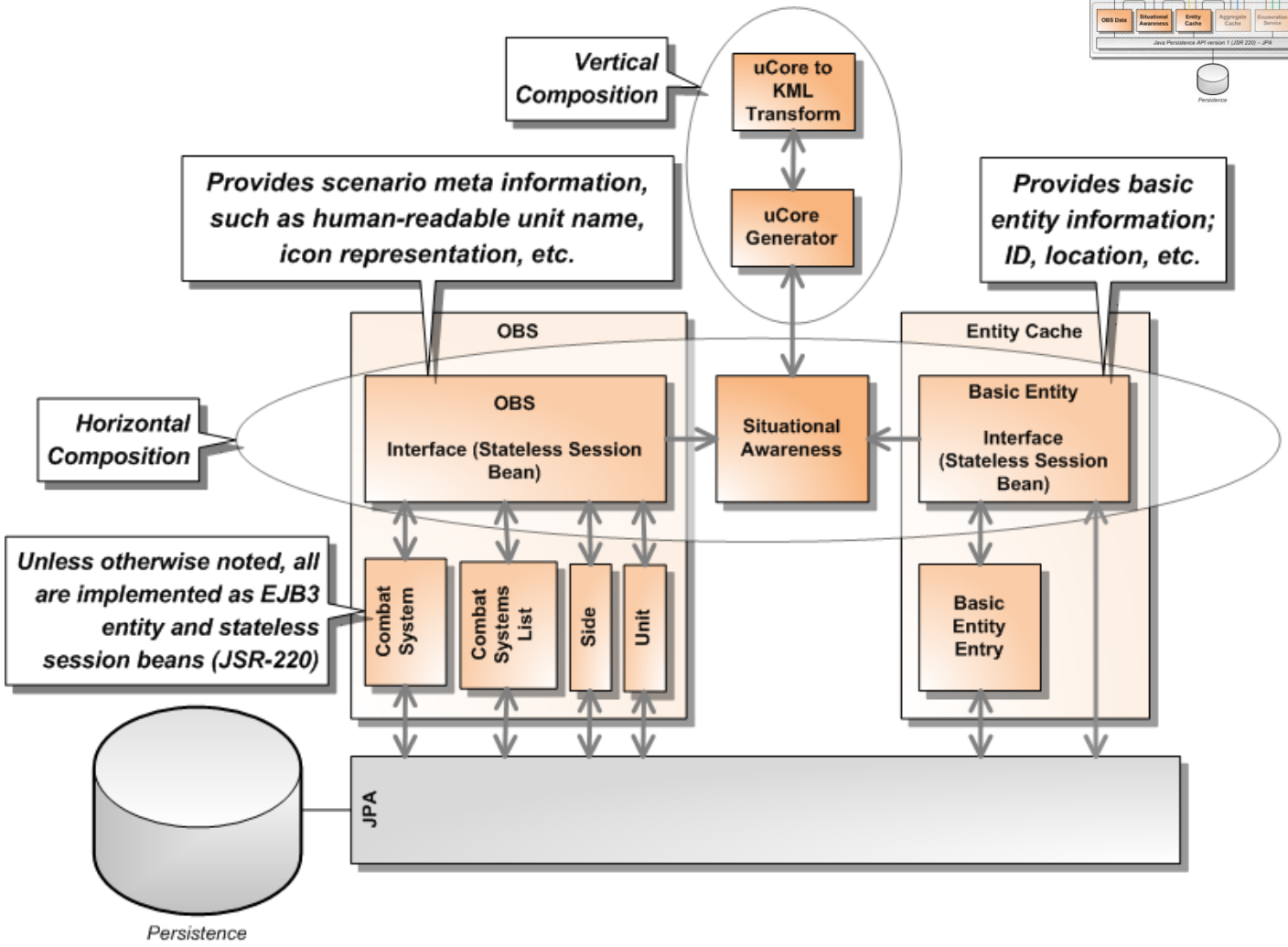
- Explore applicability to domains other than training
- Further performance testing and tuning
- Publish aggregate objects to the CDA to enable bidirectional exchange of aggregate and entity data
- Further refinement of the CDA
  - Enhanced scalability
  - Explore impact of more diverse endpoints

Gary W Allen, PhD
Joint Training Integration & Evaluation Center (JTIEC)
Orlando, FL
407-208-5607
Gary.allen@us.army.mil

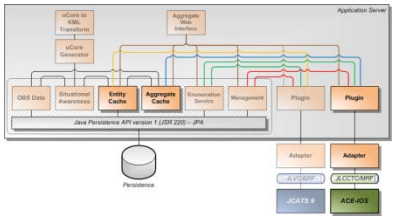
BACKUP

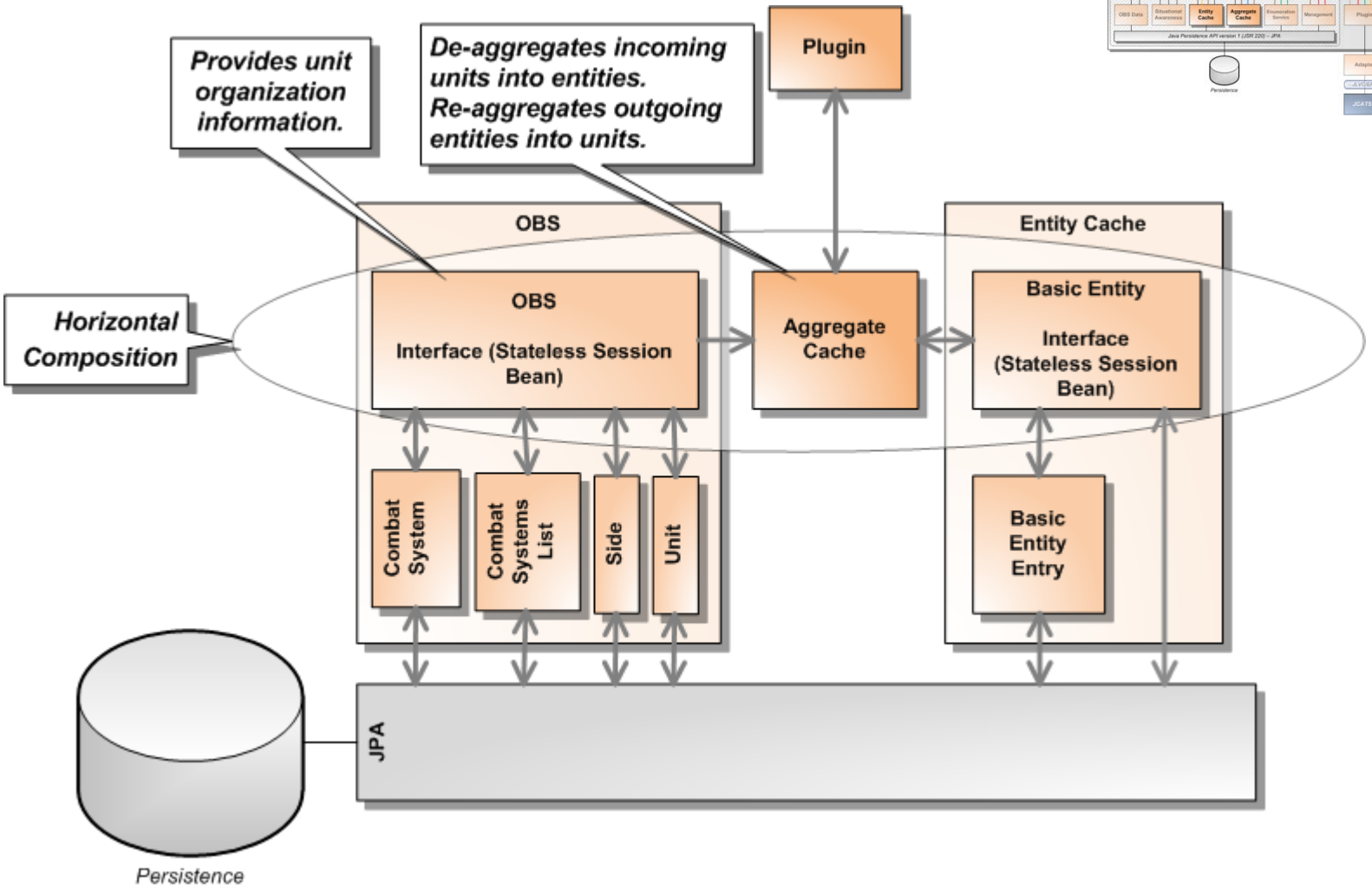
Service Composition within CDA



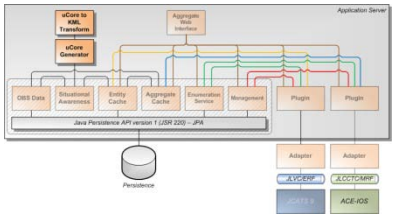


Aggregate Service Composition within CDA





Situational Awareness Feed Service Composition



UCoreGenerator

REST-based Servlet

EJB3 – JPA

Request: REST query
Response: UCore

Request: Dynamic bounding box
Response: KML

UCoretoKMLTransformer

REST-based Servlet

CDA
(Persistence)

EJB3 – JPA

EntityDetails

REST-based Servlet

Google Earth

Request: Embedded REST query
Response: HTML