Outline

1. What Do We Do When We Develop Architectures?
2. How Is Architecture Useful to Operators?
3. How Can We Use Operational Information to Prepare for the Next Architecture?
1. WHAT DO WE DO WHEN WE DEVELOP ARCHITECTURES?
Product Lifecycle

- Current Operations and Maintenance
- Future Operations and Maintenance
- Demolition and Disposal

- Architecture Development
- Operational T&E and Transition
- Integration & Verification
- Program Management

- System Design
- Integration and Test

- Hardware/Software Acquisition

- Design & Analysis
Capturing As-Is Architecture Data

- Operational equipment
- Networks and other interfaces
- Operating processes and procedures
- Operating costs
- Operations personnel

We capture information that describes how current systems operate and where problems may occur
Developing To-Be Architecture Data

- Designs for new and modified equipment
- Designs of new and modified processes
- Plans for acquiring equipment
- Training needs

All this information will affect the operations of the as-is systems
When We Finish, What Do We Have?

• A complete database with all the information about the systems that operators (and maintainers) need to effectively and efficiently operate the systems

*Why not put all that data to good use?*
2. HOW IS ARCHITECTURE USEFUL TO OPERATORS?
How Can Architecture Be Useful

• For operators, architecture can provide the basis for understanding the limitations of and standard operating procedures (SOP) for using the components
• For maintainers, the architecture can provide a place to store critical information, such as reliability, availability, and maintenance procedure, for the components
• However, often this kind of information is either ignored by architects or occurs later in the lifecycle, after the architecture database has been ignored for years
• Too often architecture teams do not include the operational and maintenance perspectives
Capturing Operational Data

- Use cases, user stories, scenarios, threads, etc. are all ways to capture how a system is used or operated.

- One way we capture this information is in a Concept of Operations (CONOPS).
  - However, most CONOPS are too high level and do not analyze the scenarios sufficiently to make sure they make any sense or even work in a realistic environment.
  - An architecture-based CONOPS is then essential for this.
  - Such a CONOPS can then form the basis for developing SOPs.
Information Capture Example

• MBSE tool provides means to capture and relate information about any asset.
• This would provide a means to capture and share information about the systems and components.
Visualizing the Comms Architecture Example

- Physical architecture captured in MBSE tool
- Provides constraints for functional modeling and simulation
Next Steps

• Similar information and documentation can support the maintainers

• However, we still need a database for the information that can then be reused for each perspective

• Most tools currently focus on only one lifecycle phase (e.g., architecture, operations, or maintenance), but the overlapping information clearly means that we could use a single database with multiple views

• Here is where the concept of MOSA helps us
Modular Open Systems Approach (MOSA)

“The essence of Open Systems Architecture (OSA) is organized decomposition, using carefully defined execution boundaries, layered onto a framework of software and hardware shared services and a vibrant business model that facilitates competition.”

Defining Modular Open Systems Architecture

What: A technical architecture that leverages technical standards to support a modular, loosely coupled and highly cohesive system structure

How: Customer definition and ownership of product architecture, publication of key interfaces within the system

Why: Enables Open, Competitive Business Model – allowing components to be added, modified, replaced, removed or supported by different vendors throughout the life cycle – driving opportunities to enhance competition and innovation

“Modular Open Systems Architecture in DoD Acquisition”
Mr. Stephen Welby, DASD(SE)
Reference Architecture (RA) supports MOSA objectives through defined interfaces, open standards, and a severable modular design.
Plugin Architecture Example

• Plugins are viewpoints of the Innoslate database

• Plugin features
  o Not a standalone application (requires Innoslate Core)
  o All authentication is through Innoslate Core with the options for:
    ▪ Single-Sign-On CAC (Default)
    ▪ Native Email/Password (Optional)
    ▪ LDAP (Optional)
  o All data is stored in the U.S. Government managed MSSQL database using Innoslate Core
  o Innoslate REST API facilitates plugin data exchange
3. HOW CAN WE USE OPERATIONAL INFORMATION TO PREPARE FOR THE NEXT ARCHITECTURE?
Operational Data Utility

• Operational data can be used to identify problems areas and user needs
  o Issues may provide a window into the kinds of problems users face or unclear features
  o Feature suggestions may also be "hidden" in issues
  o Maintenance logs show where components do not meet their expected lifetimes or where they exceed them

• This data forms the basis for gap analysis that can then be turned into architecture improvements

• This approach requires the creation and maintenance of a reference architecture
Use of Other Tools to Feed Architecture Work

- **Interview Area**
  - Experts

- **Assessment**
  - Made using ADRT
  - Score As-Is

- **Development**
  - Interviews
  - Organization

- **ADRT enables automatic generation of draft DMP**

- **Generic**
  - DMP/DRP

- **Draft**
  - DMP/DRP

- **Tailor Reference Architecture**

- **Perform Needs Analysis**

- **Develop To-Be Architecture**

- **Develop Road Map**
  - Simulators enable verification and visualization of architecture processes

- **Develop Annual Plans**
  - Annual Plan
    - DMP/DRP

- **Engagement Plans**
  - Security Plans

- **Key**
  - DMP = Disaster Management Plan
  - DRP = Disaster Response Plan
  - ADRT = Assessment of Disaster Readiness Tool

- **Local Criteria & Priorities**

- **International Resources**
  - Identified from Tech Match

- **Architectures Development**

- **Assessments**
  - Made using ADRT
Summary

• Architecture work needs to include the perspectives of operators and maintainers
• We need to get more out of the architecture work that’s performed
• Reusing and evolving the architecture databases into operational tools is essential to obtaining the full value for this work