

Purdue: Systems Integrity for Defense Summit



Architectural Design Challenges for Ground Vehicle CBM+ System of Systems

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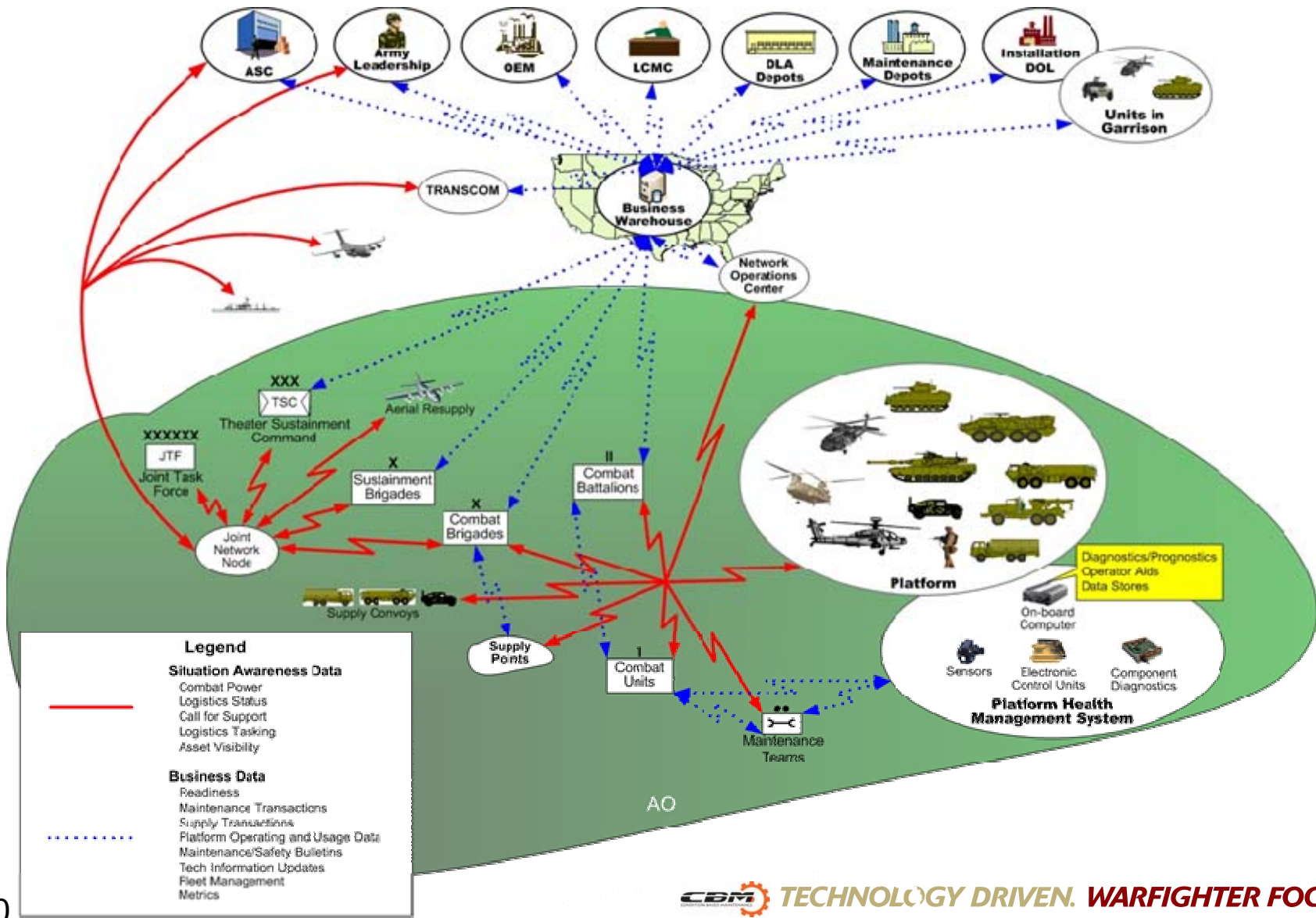
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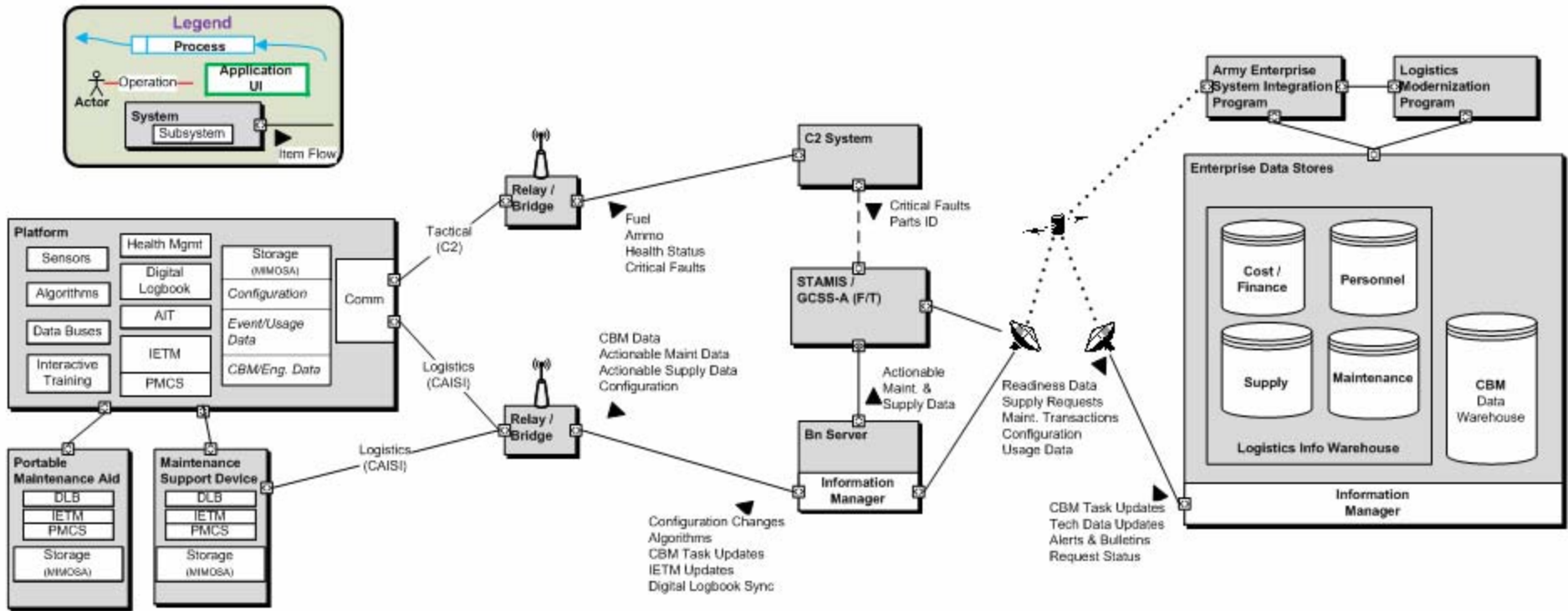
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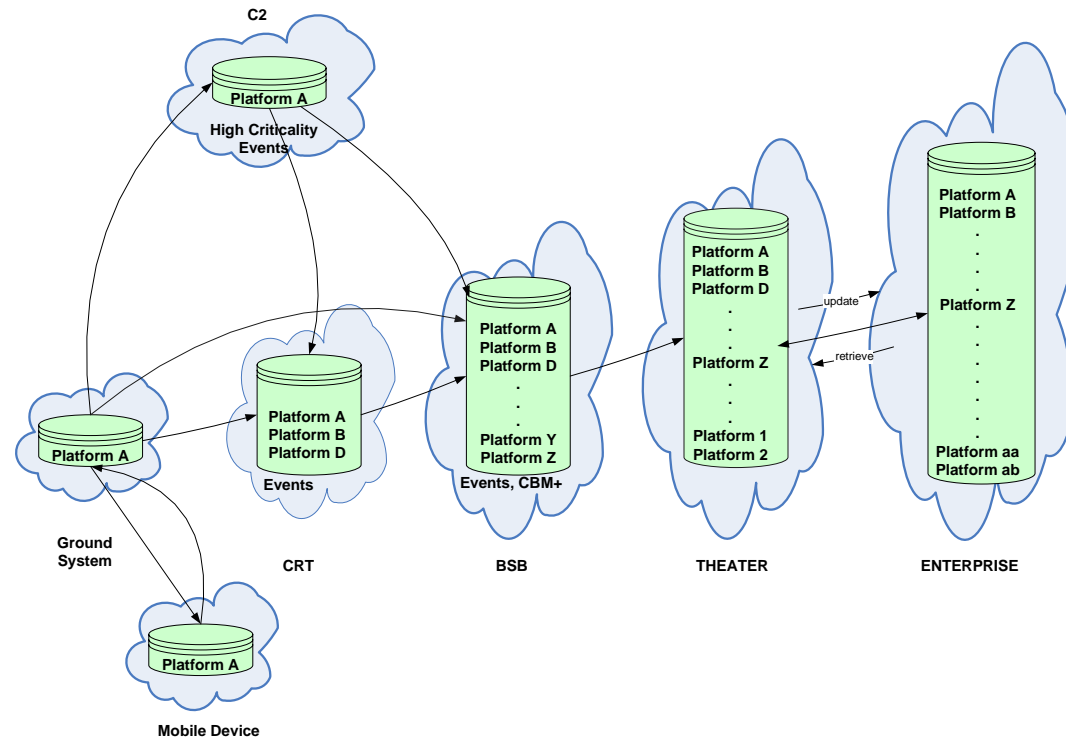
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- ❑ **Operational View for CBM+ Systems of Systems**
- ❑ **Systems: Detailed View**
- ❑ **Data Synchronization Challenges**
- ❑ **Prognostic/Diagnostic Software Challenges**
- ❑ **Application Integration Challenges**
- ❑ **Army Integrated Logistics Architecture (AILA) for Interoperability**
- ❑ **Platform Software Architecture**
- ❑ **Summary**





- ❑ Common data model needs to be maintained across the battlefield to avoid losing information or relationships in translation.
- ❑ Helps to reduce communication transfer by exploiting static information (severity, effect, ambiguity group, maintenance tasks for an event, etc.)



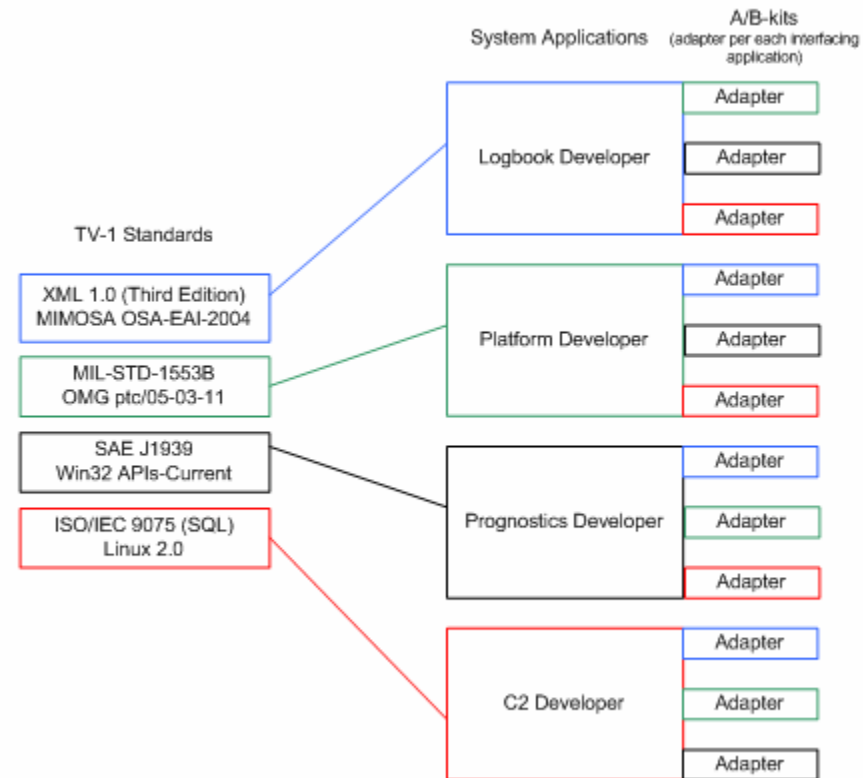
Challenge: How to maintain data integrity across the Enterprise?

- ❑ **Challenge 1: Deploying N proprietary systems with little to no interoperability between them due to tightly coupled/closed system designs. Creates a huge logistics burden: N training courses for maintainers, N software systems to configuration manage throughout the system lifecycle.**
- ❑ **Challenge 2: Availability of the RIGHT data to properly perform diagnostics, let alone prognostics.**
- ❑ **Challenge 3: Integrating disparate vendor code - could be implemented in several different languages, operating systems, and computer architectures.**
- ❑ **Challenge 4: No standard look and feel at the user interface level between systems.**

- Each application makes adjustments to talk to other applications (system to system basis)
- This requires up to n-1 additional adapters for each new application (N^2 problem)

Incompatible:

- Physical buses
- Message protocols
- Operating Systems
- Databases



Platform Enablers

- ❑ Self-reporting Assets & Components
- ❑ Fleet Management
- ❑ Supply Parts Ordering
- ❑ Maintenance Scheduling
- ❑ Digital Log Book
- ❑ Interactive Electronic TMs

Off-Platform Enablers

- ❑ Network Infrastructure
- ❑ Data Mining & Analysis Tools
- ❑ Fleet Trending and Pattern Recognition – Actionable Data
- ❑ Data Synchronization
- ❑ Logistics System Integration

Interoperability

Onboard & At-Platform Prognostics/Diagnostics



- ❑ Sensors w/ Sensor Integration HW
- ❑ Vehicle Integrated Diagnostic Software (VIDS) w/ Algorithm Manager
- ❑ Vehicle Computer System



Sensors



Electronic Control Units



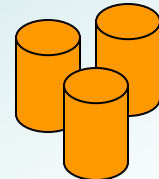
Component Diagnostics



Army Integrated Logistics Architecture (AILA)

- ❑ Enables Net-Centricity
- ❑ Defined using DoD Architectural Framework (DoDAF)
- ❑ Facilitates **Interoperability**

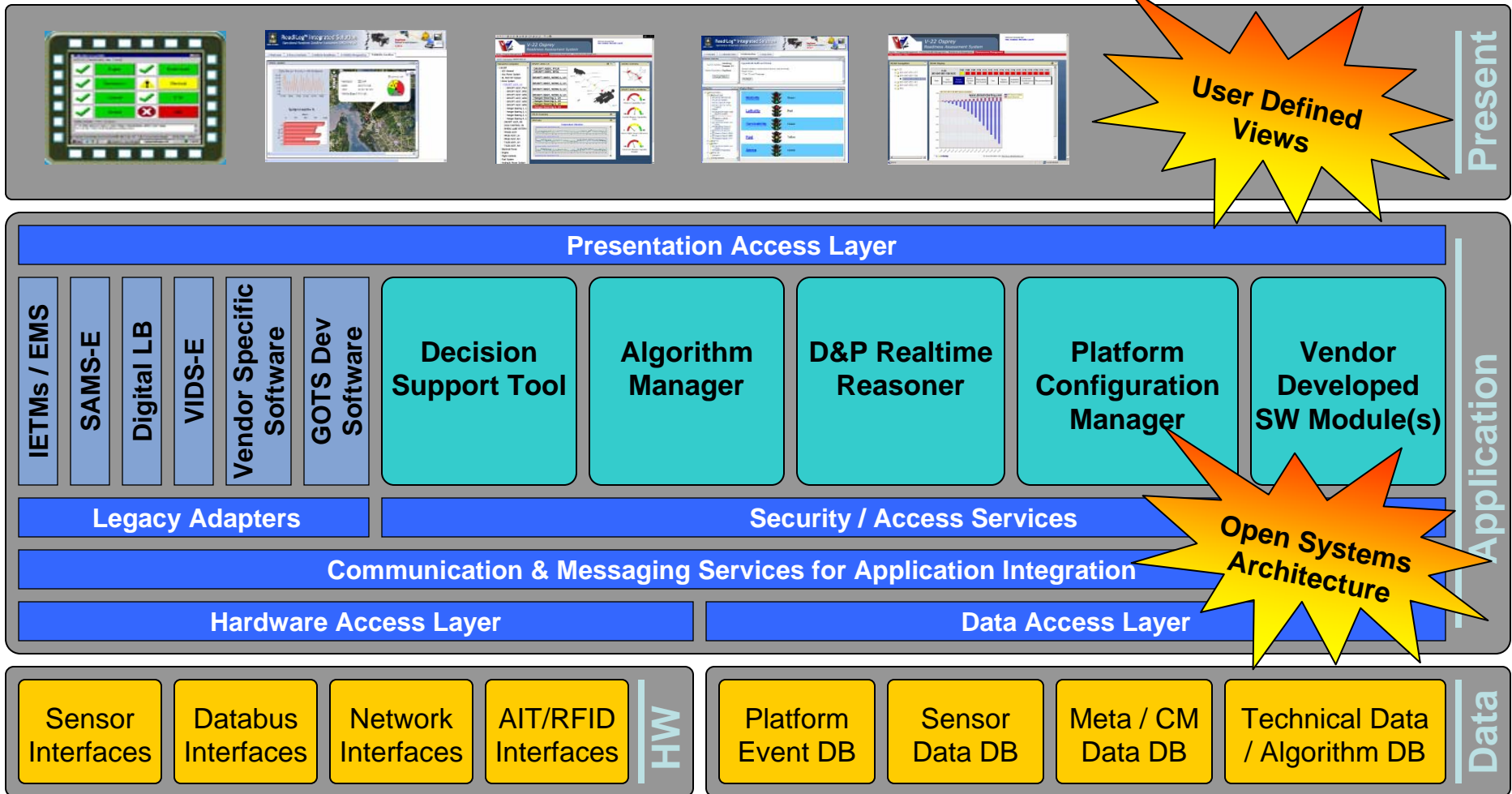
Data Standards



- ❑ Common Data Format (CDF)
- ❑ MIMOSA
- ❑ Data Exchange Standards
- ❑ Defined Technical Views



Platform Software Architecture



- ❑ **Need to design architectures with openness, upgradeability, and scalability in mind.**
- ❑ **Must define the DoDAF Technical Views for systems with CBM+ community adopted standards using trade-off studies and proof of concept demonstrations.**
- ❑ **Design challenges are plentiful....**