



Bridging the Product Gap towards an Integrated Control Center

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Outline

- COTS Integration Cost Drivers
- Reducing COTS Integration Costs through GSA Standard Interfaces (GSASI)
- Integrated Control Center Architecture Based on the GSASI Concept
- GSASI Adapters for COTS Software Integration with Standard Interfaces
- Benefits to System Integrators and Product Vendors



COTS Integration Costs

■ COTS Integration Cost Drivers:

(as Identified by USC-CSE in the COCOTS Model)

- ◆ COTS Assessment - Evaluation of COTS Products
- ◆ COTS Tailoring - Configuration of COTS Products
- ◆ COTS Releases - Volatility and Integration of COTS
- ◆ COTS Glueware - Development and Test
 - Application Specific Functionality
 - Control and Status (C/S) of COTS and System Components
 - Data Exchange among COTS and System Components



COTS Glueware Cost Drivers

- COTS Products Maturity
- COTS Products Interfaces:
 - ◆ Complex, Proprietary, Non-Standard
 - ◆ Lack Adequate Documentation and Training
- COTS Products Incompatibility
 - ◆ Not Designed to Inter-Operate with other COTS Products or Custom Software
- COTS Integration
 - ◆ Highly Constrained by the Design of the COTS Interfaces
 - ◆ Often Deferred until Late in the Program Schedule
 - Eliminates Possible Vendor Changes to the COTS Product.
 - Eliminates Changes in Selection of COTS Product.
 - Increases Amount and Complexity of the Application Glueware Software

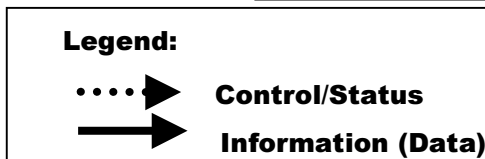
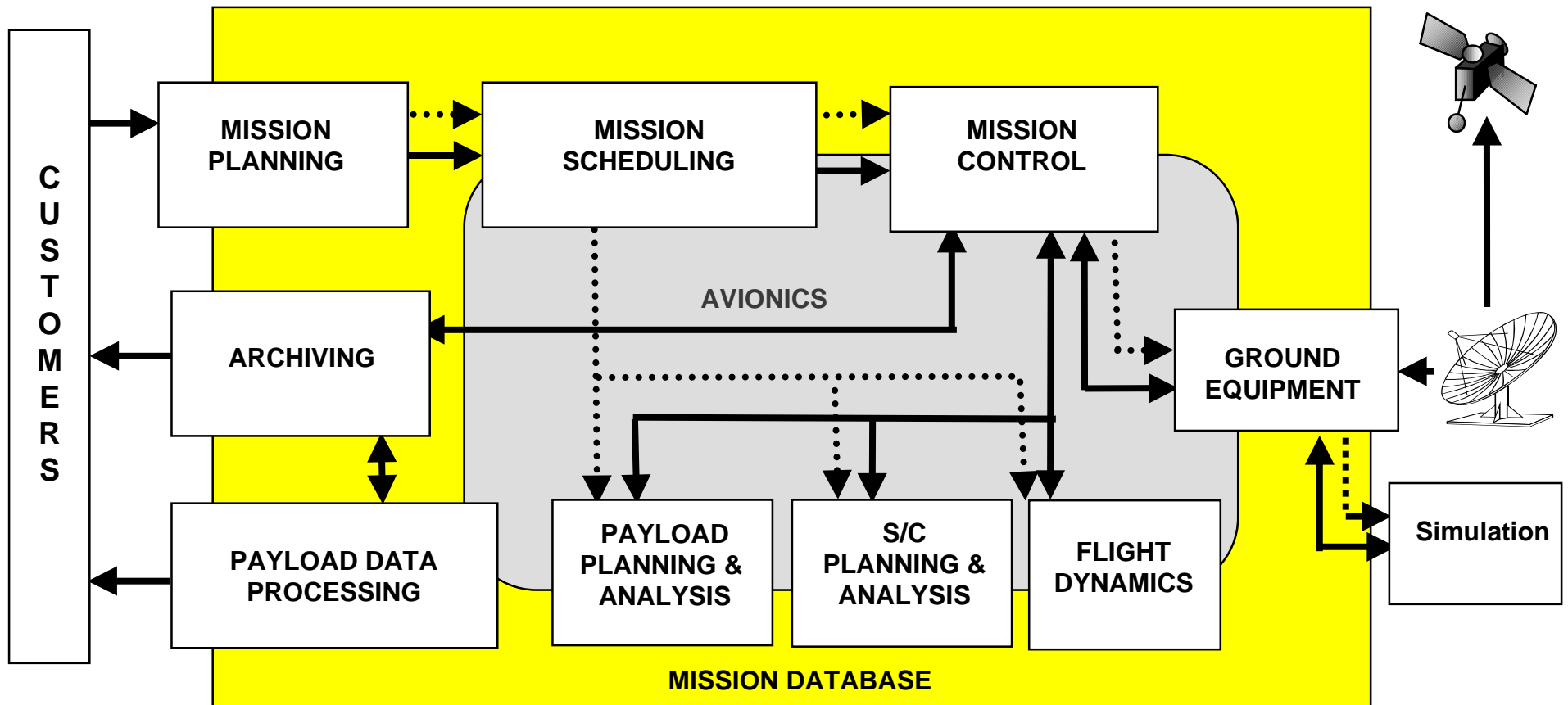


Reducing COTS Integration Costs through GSA Standard Interfaces

- Adopt a set of GSA Standard Interfaces (GSASI) for the Ground Station Domain.
- GSASI Provides:
 - ◆ Interface Definitions for each GSA Functional Area
 - ◆ Open, Non-Proprietary Definition of Interfaces based on Industry Accepted Standards (e.g. IDL)
 - ◆ Plug and Play of COTS Products which Support the GSASI
 - ◆ Program Risk Reduction - Vendors would Support Defined Mission Operations GSASI and Associated Services
- GSASI Adapters
 - ◆ Provides the Connector From the Existing COTS Product, or Custom Software, to the GSASI.



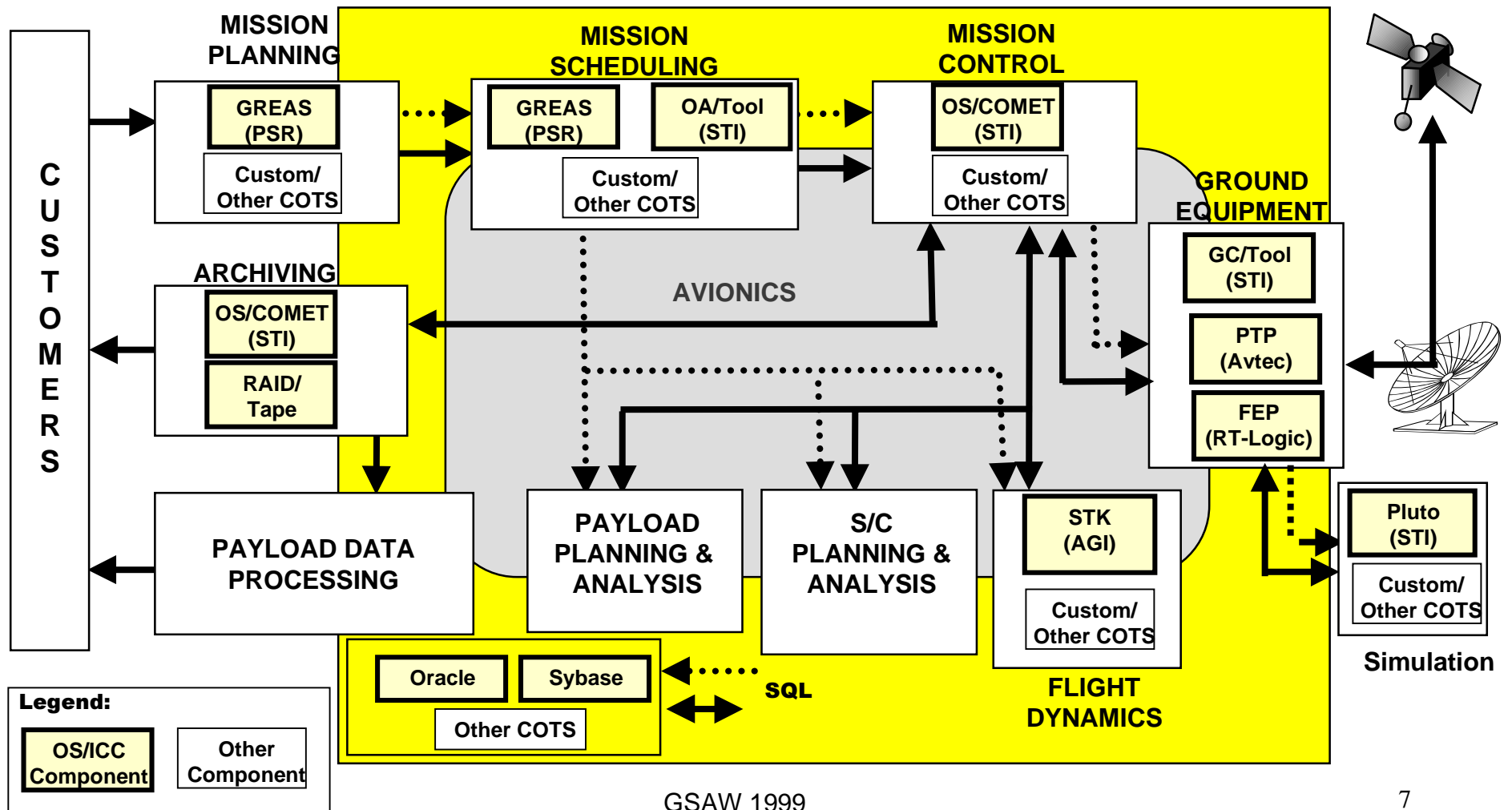
Mission Operations Functions and Interfaces



Source: Adapted from "ANSI/AIAA R-023A-1995 Recommended Practice: Human-Computer Interfaces for Space System Operations; Appendix A: Architectural Views of Space Missions Operations"
Ref: Adapted from "Cost Effective Space Mission Operations." Boden and Larson, McGraw-Hill, New York. 1996.



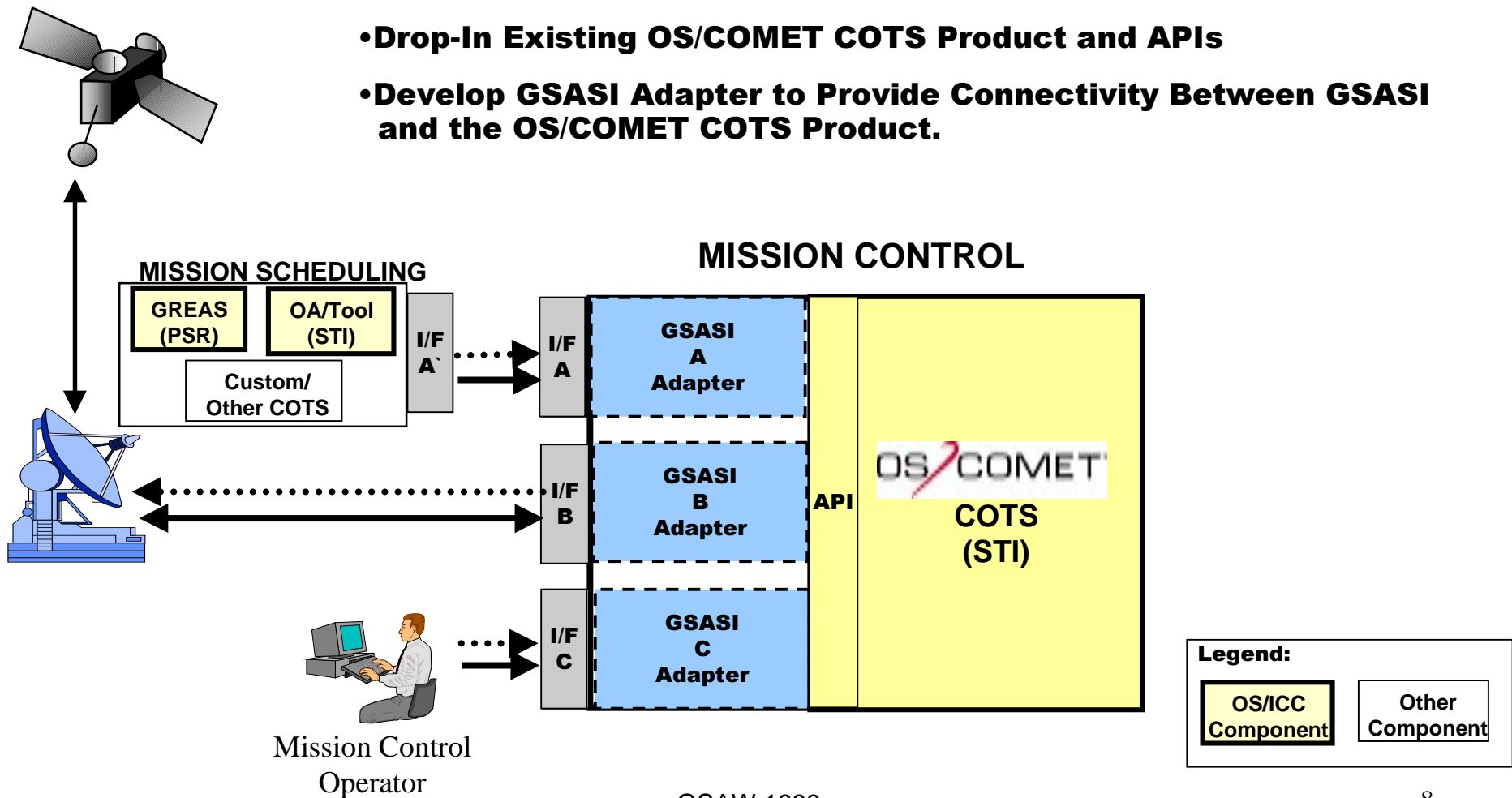
Sample Architecture Based on the GSASI Concept





Sample GSASI Adapter for COTS Integration with GSASI

- Define GSA Standard Interfaces (GSASI) for Mission Control
- Drop-In Existing OS/COMET COTS Product and APIs
- Develop GSASI Adapter to Provide Connectivity Between GSASI and the OS/COMET COTS Product.





Examples of Standard Interfaces In Other Domains

■ Simulation

◆ HLA - High Level Architecture

- Developed by the Defense Modeling and Simulation Office (DMSO)
- General purpose architecture for simulation reuse and interoperability under the HLA federated concept.
- HLA was adopted by the Object Management Group (OMG) in November 1998 and is now in the process of becoming an open standard through the IEEE.

■ Software Data Radios

◆ MMITS - Modular Multifunction Information Transfer System

- Open, Non-profit Corporation with Government and Industry Participation
- Support the development, deployment, and use of open architectures for advanced wireless systems.
- Developing Standard Architecture and Interfaces for Plug-in of RF Waveforms



Benefits

- System Developer Benefits
 - ◆ Reduces Costs and Risk associated with COTS Integration
 - COTS Packages Support Defined GSASI
 - ◆ Support for Open, Industry Standard Interfaces
 - ◆ Substitutability of COTS Products that support the GSASI
- Vendor Benefits
 - ◆ Makes Basic Services Commodities , Allowing R&D Funding to be Redirected for Add-on Services
 - ◆ Provides an Avenue for Competing Directly with Custom Software Components.
 - ◆ Standardizes Interfaces for Inter-COTS Communications, Increasing the Use of COTS Products in Ground Station Architectures.