Logistics Support Systems

Uniquely Capable of Total Support

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Business Problem

- Integrated Defense Systems / Logistics Support Systems (IDS/LSS) requires information systems to support a wide range of Sustainment-type contracts.
- The information systems must support multiple contracts, multiple operating environments, and diverse functional requirements.
Support Systems

- Integrated sustainment organization
- Full spectrum of logistics support
- Diversified across multiple services
- Shifting from platform to systems focus
- Expanding from traditional to capability-based logistics

Unique Capability in the Market

Upgrades
- Modifications
- Maintenance
- Personnel Support
- Support Equipment
- Technical Data
- Supply Chain Management
- Engineering Support
- Training
- Production
- Development
- Design
The Sustainment Environment

• Customer has identified integrated information and decision support as key to fleet support and war-fighter readiness:

• Customer and Industry are investing in system capabilities to leverage automation and decision support in the support environment. Integration with customer and partners is key

• Operations are critical and each customer will have unique needs. Need robust, flexible, tailor able, systems and processes.

• Boeing has the capability to create a network-centric system of systems which will enable our support business, and help our customer.
Sustainment Data System Vision

◆ Provide our customers war fighting agility, increased readiness and weapon systems availability at a reduced TOC, meeting Future Logistics Enterprise and Global Combat System Support strategies
  – SDS will allow contracting and execution of Performance Based Logistics and will be configurable and scalable to meet customer needs
◆ SDS will capitalize on Boeing’s large scale system integration capabilities to provide support systems, tools to provide an enterprise approach for total fleet support of new and legacy systems
  – A unique capability that differentiates Boeing in the marketplace including supplier alliances

Develop a “World Class” Sustainment Data System enabling support of our customer needs
Sustainment Data Systems

A network-centric system-of-systems support architecture that includes support system elements to provide decision-aided, seamless integration and management of support resources and processes to optimize cost, availability, capability of supported systems.

Without SDS Automation
- Time Delays
- Resource Contention

With SDS Automation
- Efficient Operations
- Reliable, Repeatable Processes
A Service Oriented Architecture for Net-Centric System Sustainment

- The Sustainment Data System (SDS) is a configurable and adaptable information system for support of IDS/LSS Sustainment-type contracts, including components that support:
  - Integrated Material Management
  - Integrated Vehicle Health
  - Maintenance Management
  - Engineering and Logistics Fleet Analysis
  - Training Management Systems
  - Command and Control
  - Mission Planning
  - Sustainment Program Manager’s Decision Support
A Service Oriented Architecture for Net-Centric System Sustainment

- Sub-systems of SDS are themselves systems-of-systems solutions, built using the SDS service oriented architecture.
# SDS—Functionality & Integration Focus

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<td>- ILS Planning &amp; Mgmt</td>
<td>- Inventory/Repair Mgmt</td>
<td>- Flight Data Acquisition &amp; Mgmt</td>
<td>- Maintenance Planning/Scheduling</td>
<td>- Pilot/Maintainer training scheduling</td>
<td>- Route planning (way point, configuration, etc)</td>
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<td>- Integration with ILS/LSA sys (Reliab./Maint., Provisioning, Training, PHS&amp;T, SE, etc)</td>
<td>- Demand Forecasting &amp; Planning</td>
<td>- Debrief</td>
<td>- Work Management</td>
<td>- Proficiency tracking</td>
<td>- Resource assignment to mission (inc. aircraft, pilot, etc)</td>
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<td>- Closed Loop CA process (inc. Design &amp; Prod. interfaces)</td>
<td>- Spares Ordering</td>
<td>- Fault Diagnosis &amp; Prognosis</td>
<td>- A/C Configuration Mgmt</td>
<td>- Point of maintenance training/JIT</td>
<td>- Fleet Ops planning</td>
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<td>- Business Simulation</td>
<td>- Transportation/Distribution Mgmt</td>
<td>- Service Life Monitoring &amp; Mgmt</td>
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**HUB:** Integration, Security & Data Mgmt

**Program Life Cycle Mgmt/Integration:** As Designed, Built, Delivered & Supported Configuration Mgmt

**Dynamic Resource Mgmt:** Global Resource Mgmt

**SMW:** Program Mgmt Visibility & Decision Support
The Challenge

• SDS requires
  – A portfolio of functional applications
  – A method for assembling these applications, along with Boeing standard and Customer-dictated applications, into seamless, systems-of-systems solutions for managing Sustainment-type contracts.
Technical Problem

- A common method for assembling these applications, along with Boeing standard and Customer dictated applications, into seamless and maintainable systems-of-systems solutions for managing Sustainment-type contracts.
- Support systems are a mix of CLS and organic with potentially conflicting systems of record and systems of operation requirements.
- Data exchange between multiple systems/applications of differing heritage with widely varying levels of data definitions and maturities.
- No readily-available method to collecting and analyzing data/experience in order to enhance future sustainment and enhance OEM performance and feedback.
Solution to the Technical Problem

– A set of standard services, based upon customer’s currently accepted set of common tools with extensibility to embrace future “common tools”.

– A set of standard messages based on common interactions between standard services.

– A methodology for defining and managing the messages and contracts for the interaction between the standard services.

– An integration framework built on a set of reusable components, including service bus, adapters, messages and message transports.
Sustainment Data System
Service Level System Diagram
Service Oriented Architecture

• You cannot “buy” SOA
  – Services are defined as coarse-grained, loosely coupled components that perform business functions.
  – Services exist within an interdependent family of business processes.
  – A SOA is created by defining the boundaries of the services, the messages to be exchanged, and the contracts behind those messages.
  – Equivalent services can be readily interchanged.
  – SOA is an emergent property of a system that is designed to receive, operate upon, and respond to service requests.

• Vendors are representing existing “Web Services” as SOA
  – Exposing existing functionality and APIs as “Web Services” may simplify implementation but does not present a complete business service.
  – Equivalent “Web Services” are not always interchangeable.

• Validation and Testing of an SOA is complex and time consuming
  – Validation and Testing of SOA is based upon understanding the business process and constituent business transactions.
  – Services may be tested and validated individually, decreasing integration costs and issues.
Sustainment Data System
SOA Overview

Stakeholders document the business process as Business Event Flows (BEFs)

Business Requirements dictate the required Services and Messages

Business Value of SOA is derived from the integration of Services, Messages, and the Business Processes

The messaging infrastructure (AIM/Gateway) is an entirely replaceable element of the architecture and is transparent to the implementation

SDS Application Integration Manager - Domain System Bus

Applications provide the capabilities required to implement services.
Sustainment Data System
Functional Components and Services

- **Classic design**
  - Network
  - Message Converter
  - API Translator
  - Integrated Vehicle Health Management

- **SOA**
  - SDS AIM
  - SDS Gateway
    - AIM Instantiation Layer
    - BOD Layer
    - Business Logic Layer
    - Persistence and Storage Layer
    - Application Adapter (Gateway)

Application Group Built and Maintained
Integrated Vehicle Health Management
Business Requirements to SOA Application Functions

- **Business Requirement**
  - Customer identifies mission need
  - Identified in ConOps or boundary discussions
  - Ex. “Need to provide Aircraft Configuration”

- **Service to Support the Business Requirement**
  - Logical grouping of application function(s)
  - Ex. “VehicleConfigurationSvc”

- **SDS BODs that support the service**
  - Define data necessary to satisfy business requirement
  - Exs. “GetAircraftConfiguration,” “ShowAircraftConfiguration”

- **Application Functions that Support the BODs**
  - API calls which map to the production of necessary data
  - Exs. “IVHM Internal Function,” “MxM Internal Function”
OAGIS Business Object Documents, Services and Contracts

- BODs, Services, and Contracts are derived from customer requirements and business processes.
- BODs are modeled using Rational Rose in compliance with the OAGIS standard, realized using XMLSpy, and managed in the COOLER (patent pending)
- Contracts between Services are modeled in Rational Rose as sequence diagrams
- SDS Gateway stubs are automatically generated from Rational Rose models.

SDS program fully embraces Boeing’s direction on Model-Driven Architecture
Highly configurable, flexible SOA designed to support deployments with world-wide extent.

**BOEING Controlled (Customer A)**

- Sustainment Data Systems (SDS)
- BOEING Controlled
- INTERNET
- BOEING Apps (APP #1)
- CUSTOMER Apps (APP #1)
- CUSTOMER INFRASTRUCTURE

**BOEING / CUSTOMER MIX (Customer B)**

- Sustainment Data Systems Supports
- APPLICATIONS
- SERVICES
- INFRASTRUCTURE

**CUSTOMER DOMAIN (Customer C)**

- Sustainment Data Systems Supports
- CUSTOMER INFRASTRUCTURE
- CUSTOMER APPS
- APP #1
- APP #2

**Support Systems**

EXCELLENCE everyday!
Service Created

- AccessAgreement Service
- Session Service
- Debrief Service
- DeliveryReceipt Service
- DiscrepancyReport Service
- EndpointRequest Service
- EquipmentTransfer Service
- ITAR Service
- EquipmentTransfer Service
- InstrumentationData Service
- InventoryMovement Service
- ListSDSCustomers Service
- Qualification Service
- MaintenanceEvent Service
- MaintenanceSchedule Service
- PartsRequisition Service
- Personnel Service
- ProductAvailability Service
- ReferenceData Service
- ScheduledEvent Service
- SoftwareUpdate Service
- MetricData Service
- TrainingDeviceStatus Service
- TrainingRecordsUpdate Service
- UserInformation Service
- VehicleConfig Service
- VehicleList Service
- VehicleUsage Service
- WorkContainer Service
- WorkExperience Service
New NOUNs

- AccessAgreement
- Customer
- DebriefRecord
- Discrepancy
- Event
- HealthAndUsage
- InstrumentationData
- LogMessage
- MaintenanceEvent
- MaintenanceSchedule
- Personnel
- ReferenceData

- Session
- SoftwareUpdate
- SupplyChainData
- TechnicalManual
- TrainingDevice
- TransferData
- VehicleConfigurationDetails
- VehicleConfigurationSummary
- VehicleList
- WorkContainer
- WorkOrder
Boeing Aerospace BODs and Overlays

- AcknowledgeDebriefRecord
- AcknowledgeDeliveryReceipt
- AcknowledgeDiscrepancy
- AcknowledgeInstrumentationData
- AcknowledgeInventoryMovement
- AcknowledgeItemMaster
- AcknowledgePersonnel
- AcknowledgeReferenceData
- AcknowledgeRequisition
- AcknowledgeSupplyChainData
- AcknowledgeTransferData
- AcknowledgeWorkContainer
- CancelItemMaster
- CancelRequisition
- CancelSession
- ChangeRequisition
- ConfirmBOD
- ConfirmItemMaster
- ConfirmPersonnel
- ConfirmWorkOrder
- ShowWorkOrder
- SyncDebriefRecord
- SyncDeliveryReceipt
- SyncInventoryMovement
- SyncItemMaster
- SyncMaintenanceEvent
- SyncRequisition
- SyncTransferData
- SyncWorkContainer
- SyncWorkOrder
- UpdateDiscrepancy
- GetAccessAgreement
- GetCustomer
- GetHealthAndUsage
- GetInstrumentationData
- GetItemMaster
- GetLocation
- GetPersonnel
- GetProductAvailability
- GetSupplyChainData
- GetTechnicalManual
- GetTrainingDevice
- GetVehicleConfigurationDetails
- GetVehicleConfigurationSummary
- GetVehicleList
- GetWorkContainer
- GetWorkOrder
- LoadInstrumentationData
- LoadLogMessage
- LoadSupplyChainData
- PostInstrumentationData
- PostMaintenanceSchedule
- PostPersonnel
- PostReferenceData
- PostSoftwareUpdate
- ProcessItemMaster
- ProcessRequisition
- ShowAccessAgreement
- ShowCustomer
- ShowHealthAndUsage
- ShowInstrumentationData
- ShowItemMaster
- ShowLocation
- ShowPersonnel
- ShowProductAvailability
- ShowSupplyChainData
- ShowTechnicalManual
- ShowTrainingDevice
- ShowVehicleConfigurationDetails
- ShowVehicleConfigurationSummary
- ShowVehicleList
- ShowWorkContainer
Summary

- SDS is a Model-Driven Architecture utilizing open standards and common tools.
- SDS Service Oriented Architecture in a net-centric environment supports multiple customer deployments and dynamic business processes across a wide range of environments.
- SDS provides standardized services and messages in support of business processes for sustainment-type contracts.
- SDS integration framework minimizes rework and reduces costs by leveraging modeling tools and reusable components.
Back-up Slides
SDS Hub / Integration

- Business Process Implementation
- Integrated Requirement & System Development
- Manage Interaction of System Elements
- Infrastructure for Communication between System Elements
- Defines, Manages and Data and Messages Sent or Received Between Elements
- Authentication / Verification
- Data Consolidation Management
- Provide Program Management Visibility
- Decision Support Capabilities (Local & Global Level)
- Integration with Customer System