Enabling Quality Supplier Requirement Development and Exchange Supporting MBSE

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Quality Requirements and Digital eXchange
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Neil is an Subject Matter Expert at Boeing in Business Capabilities development and a specialist in the Supplied Parts business lifecycle. He is responsible for long term Boeing Business Process & Tool Strategies in these areas, where he influences new and emerging Boeing technologies evolving Supplied Parts Business life cycle.

Neil represents Boeing at Industry forums to configure Standards, drive strategies and support Boeing initiatives to evolve the engineering products and the digital thread enabling the interoperability across company organizations.
Quality Requirements and Digital eXchange

Agenda

• GPDIS reflection 2017, 2016
  MBSE Requirements Integration
  MBSE DID Standards and Format

• Current State of Requirements Exchange

• Digital Thread Across Model Based Buy Package
Package Integration from GPDIS 2016

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Requirement Sets

- Requirement
  - Notes
  - Rationale
  - Guidance
- Verification
  - Notes
  - Rationale
  - Guidance
- Deliverable
  - Notes
  - Rationale
  - Guidance

Attachments

DIDs
- Plans
- Procedures
- Reports

Supplier Verification

Functional Organizations

Supplier

Guidance

Rationale

Notes

Allocation

Behavior
DID standards from GPDIS 2017

- **Document based data**
  - Examples of Typical Document format:
    - PDF
    - Word
    - Excel
    - JPG
    - TIFF

- **Model based design**
  - Model Based Functional Data Standard
  - Model Based Logical Data Standard
  - Model Based Physical Data Standard
  - AP242

- **Modeling Standards**

- **Number**

- **Title**

- **Format**

- **DID Titles Library**

- **SDRL**

- **CDRL**
Current State for Requirements

Current Methods – Document Based exchange

- Requirements Management focused, verification methods and deliverables have a weak or no association to requirements
- MSWord, Adobe PDF, Drawings, Associated Files
- Separately managed activities for validation, allocation and verification
- Documents released to requirements author for approval
- Reuse consists of uncontrolled copy paste
- Metrics almost non-existent
- Metrics are focused on performance to schedule
Today.....Buy-packages contain document based SCDs.

The SCD process collects Design Requirements and stores them in PLM as Bookform drawings.
Enabling a Digital Thread Across the Model Based Buy-package

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Digital Thread and Interoperability

Supplier Requirements eXchange - SRX

Buy Package

Procurement

Supplier Access

Digital Package Content

Buy Package ID Revision Controlled

Supplier Chain Engagement for each revision

Supplier Acknowledge Package

Configured Package

Model Data

Reqmt Content

Package Workflow

Models

Program Requirements

Program Buy Decision

Model Apps

Digital Package Content

Model Apps

Configured Package

Model Data

Reqmt Content

Package Workflow

Buy Package ID Revision Controlled

Supplier Chain Engagement for each revision

Supplier Acknowledge Package

Digital Thread and Interoperability
• Program/product requirements are created as new product demand emerges across the industry

• Model Based Engineering improves the quality of requirements and enables product digital twins during the front end of the development lifecycle

• It’s essential Requirement Owners can digitally flow product requirements to design suppliers

• SRX enables model based buy-packaging for product development and requirements exchange, interoperability, and collaboration with suppliers, ensuring configuration control during transfer of requirements and models to suppliers.
Enabling a Digital Thread Across the Model Based Buy-package

Digital Package Content

- Configured Package
- Model Data
- Reqmt Content
- Package Workflow

Buy Package

- Buy Package ID
- Revision Controlled

Procurement

- Supplier Chain Engagement for each revision

Supplier Access

- Supplier Acknowledge Package

Digital Thread and Interoperability
SRX Virtual Shared Workspace

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MBE Engineering

Supply Chain Procurement

Partners

Suppliers

SRX Virtual Shared Workspace

Package Rev A
Configuration Control

Firewall
Opportunities presented with Model Based Engineering

- **Requirement Quality and Reuse**
  - Improves Data Quality
  - Reduces effort for creation and review
  - Takes advantage of previous work
  - Provides consistency for compliance

- **Advanced Analytics Available**
  - Ability to use metrics to assist the user in creating quality Data relationships to requirements
  - Availability of customized group and program metrics and reporting

- **Product Reliability & Maintainability**

- **Expanded capability for integration of requirements and data**
Enabling a Digital Thread Across the Model Based Buy-package

Digital Thread and Interoperability

Supplier Requirements eXchange - SRX

Configured Package
Model Data
Reqmt Content
Package Workflow
Buy Package
Procurement
Supplier Access
Buy Package ID Revision Controlled
Supplier Chain Engagement for each revision
Supplier Acknowledge Package

Models
Digital Package Content

Model Apps

Program Requirements
Program Buy Decision

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SRX Relational Requirement Set Integration

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Using SRX to Package Requirements

SRX Configuration Hub

Suppliers

Sub tier Suppliers

Internal Partners

Partners

Customers

External Employee Access

Internet

SRX

Immediate Update

Coordination

Comments

Rqmts Verification

Rqmts Integration

Engr work flow

Doc Storage

Rqmts Mgmt

Rqmts Exchange

Supplier Coordination

Corporate Intranet

FIREWALL w/Access Security

Internal Employee Access

Interfaces to Core Systems

Patent Pending No. 14/811,315
What is Supplier Requirement eXchange (SRX)?

- SRX enhances the Buy-package integration between Design Engineering, Supplier Management and Design Suppliers

- SRX supports systematic generation of Supplier design requirements and enables innovative, affordable and value driven Aerospace product designs
  - Suppliers can access SRX without costly licensing fees
  - Supplier collaboration in a shared environment
  - Establishes metrics for managing requirement first pass quality
  - Improves requirement quality by using Structured Requirements
  - Aligns with Industry Model Based Engineering initiatives

- SRX customizes interaction based on roles for Engineering, Stakeholders and Procurement Agents during the model based requirements development and exchange to first pass quality of the design requirements

- SRX leverages digital data to accelerate change throughout the business
  - Support Model Based Systems Engineering (MBSE)
  - Enable packaging various models and requirements, while maintaining configuration control during exchange with suppliers
Engineering Requirements Authoring Tasks

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Program Decision
SOW Definition
Change Authorization

Product Requirements
FAR Requirements
Industry Requirements
Reference Documents & Processes
Administrative Reqmts
Change Notification

Allocated Requirements
Specs
Logical Models
Sketches, Tables, Charts
Physical Models
Functional Models
Component Requirements

SDRL
Validation
Verification
Development Assurance
Stakeholder Reviews
Approvals
Risk Review

Procurement Engagement
Solicitation
Supplier Collaboration
Supplier Feedback

Digital Package Content
Enabling a Digital Thread Across the Model Based Buy-package

Supplier Requirements eXchange - SRX

Digital Package Content
- Configured Package
- Model Data
- Reqmt Content
- Package Workflow

Buy Package
- SRX

Procurement
- Supplier Chain Engagement for each revision

Supplier Access
- Supplier Acknowledge Package

Digital Thread and Interoperability

Program Requirements
- Program Buy Decision

Models
- Model Apps

Buy Package ID Revision Controlled

Configured Package
Buy-package Procurement Engagement

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Diagram:
- Procurement
- Risk Assessment
- Solicitation
- Supplier Collaboration
- Business Contract

Packaging through SRX:
- Administrative Agreement
- Supplier Submittal
- Supplier Consumption
Enabling a Digital Thread Across the Model Based Buy-package

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Supplier Requirements eXchange - SRX

Program Requirements
Program Buy Decision

Models

- Model Apps
- Configured Package
- Model Data
- Reqmt Content
- Package Workflow

Digital Package Content

Buy Package

Buy Package ID
Revision Controlled

SRX

Procurement
Supplier Chain Engagement for each revision

Supplier Access
Supplier Acknowledge Package

Digital Thread and Interoperability
Supplier Access to SRX Buy-package

Packaging through SRX

- Administrative Agreement
- Supplier Submittal
  - Manifest
  - Supplier Accepts Pkg
  - Supplier Submittal
  - Supplier P/N Identification
- Supplier Consumption
  - Manifest
  - Package Consumption
  - SDRL
  - Reqmt Deviations
  - Reqmt Feedback
  - Supplier Collaboration
  - Verification
Changing the Culture of Buy-Package Development

- Creating a working environment—a culture—that enables step-change improvement in our Supply Chain and in the areas of Quality and Engineering

- Leveraging data and analytics to accelerate change throughout the business – changes that are necessary for us to compete

- Removing silos to capitalize on collaboration and replication

- Disrupting our business-as-usual mindset by incorporating speed and agility into everything we do

- Enabling reuse of supplier product across domains aligned with product requirements and compliance
Business Value of SRX

- Provides single source data and establishes baseline metrics for requirement cost & quality improvements
- Provides visibility of requirements performance relative to product milestone completion
- Mitigates cost overruns due to requirement quality and defects
- Digital requirement reuse
- Utilizes Collaboration to validate and verify requirements
- Reduces effort for Engineering requirements development
- Supports Model Based Systems Engineering (MBSE) interoperability
Questions and Discussion