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Air Force Enterprise Requirements Management Tool



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WPAFB, OH 45433

28 Oct 2010



Agenda

- **Requirements Management**
- **Problem**
- **Implementation**
- **Accomplishments to Date**
- **Summary**



Overall Approach

- **AF acquisition community is assessing COTS products with the flexibility to address military uniqueness of the requirements management process**
- **SAF/AQXI is sponsoring the acquisition and implementation of an AF Enterprise Requirements Management Tool (RMT) lead by HQ AFMC/EN**
- **View of the future: Sharing information between military domains, acquisition programs, sustainment activities, and contractors**
- **Needs to align with the AF Systems Engineering tools identification and selection effort**



Defining Requirements Management

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- **Requirements Management is:**
 - the identification, derivation, allocation, and
 - control in a consistent, traceable, correlatable, verifiable manner
 - of all the system functions, attributes, interfaces, and
 - verification methods that a system must meet including customer, derived (internal), and specialty engineering needs

Stevens and Martine, 5th Annu. Int. Symp. Of INCOSE, P. 11

- **Requirements are more than just engineering including:**
 - Technical
 - Process
 - Logistics
 - Test
 - Financial
 - Schedule
 - Operating environment
 - Environmental
 - Human factors
 - Human resources



USAF Policy & Guidance

- **Air Force Instruction (AFI) 63-101 & AFI 63-1201**
 - “Collaborative and continuous requirements management”
 - One of the six tenets of ILCM per AFI 63-101
 - “Requirements development and management”
 - One of five fundamental elements that make up systems engineering (AFI 63-101 & AFI 63-1201)
 - “All requirements, ..., must be traceable and documented” (AFI 63-1201)
- **The program manager should institute Requirements Management to (Defense Acquisition Guide)...**
 - Maintain the traceability of all requirements from capability needs through design and test,
 - Document all changes to those requirements, and
 - Record the rationale for those changes.



Requirements Management

- 1. Identify source of requirements**
- 2. Ensure completeness of requirements**
- 3. Capture rationale for requirements**
- 4. Ensure customer and user understanding**
- 5. Explicitly ID interfaces**
- 6. Ensure consistent data usage**
- 7. Capture expectations interpretations/intent**
- 8. Plan for changes, corrections, or clarification of requirements**
- 9. Plan for new requirements**
- 10. Maintain traceability**



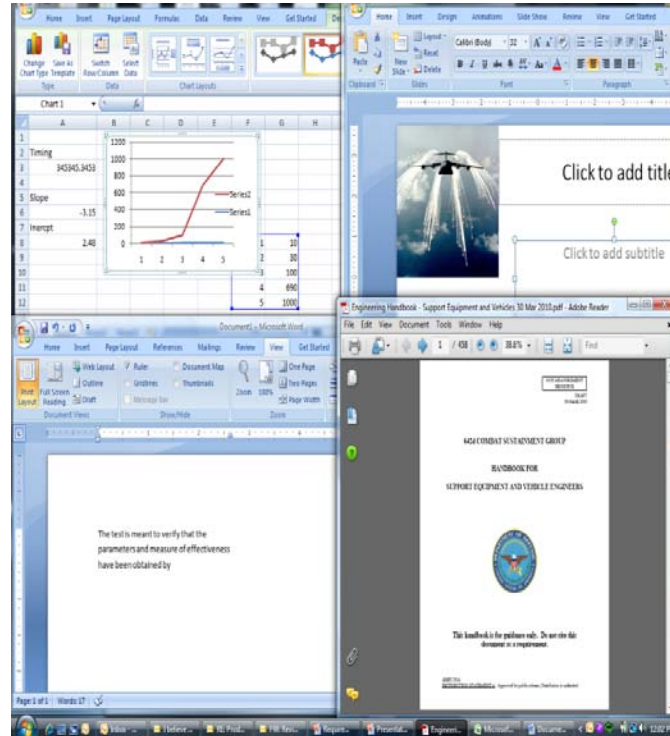
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Defining the 21st Century Toolset

Was

Is

To



- Update content that requires immediate attention, then produce documents
✓ Reduce cycle time
- When new information or changes are in-work people are notified
✓ Push data to users
- Re-use data via relationships to avoid cut 'n paste replicated
✓ Configuration Control



e-mail

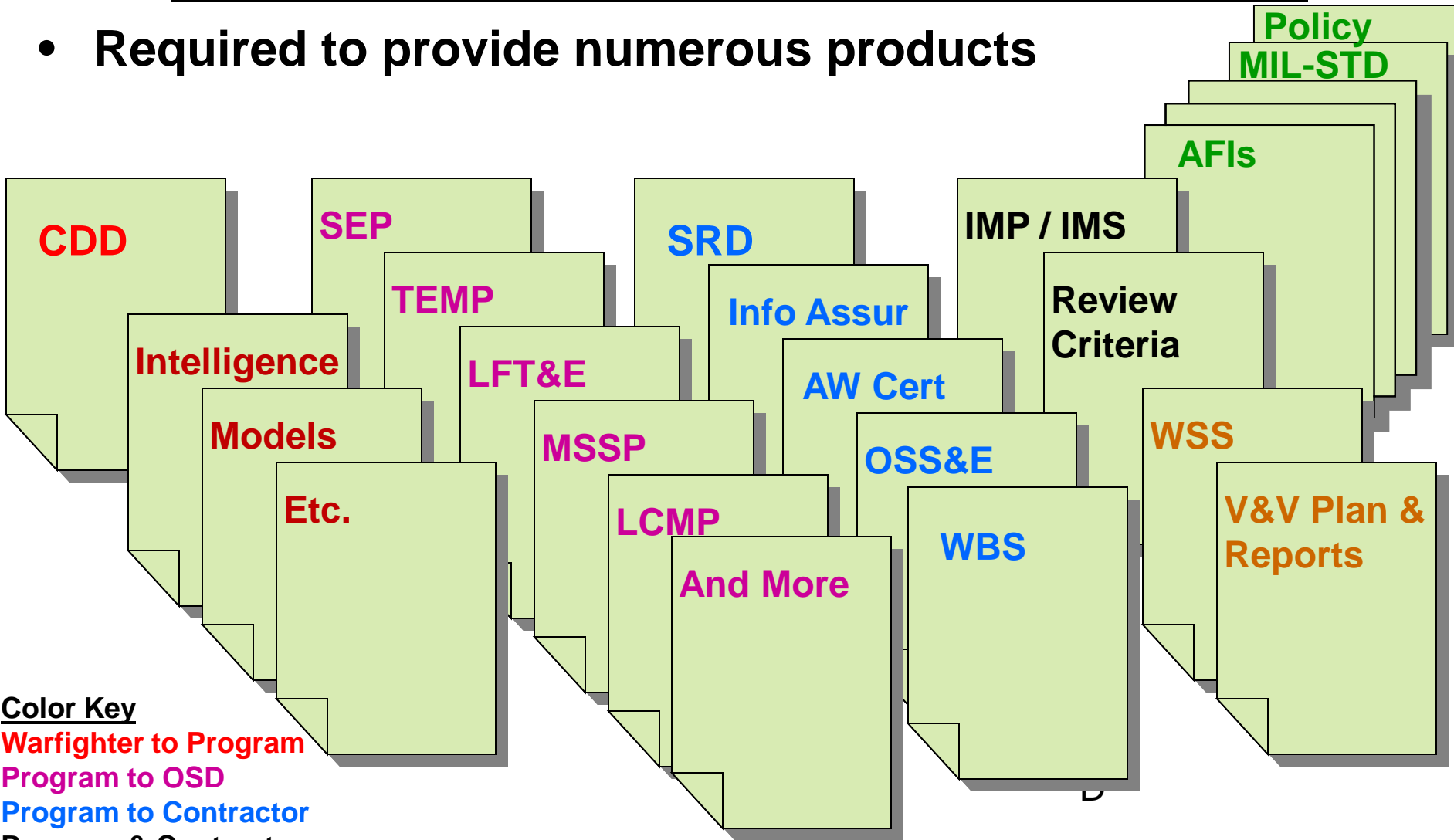


AF Agile Combat Support CONOPS



Problem

- Required to provide numerous products



- Color Key**
- Warfighter to Program
 - Program to OSD
 - Program to Contractor
 - Program & Contractor
 - Contractor to Program
 - FSO to Program
 - GFE

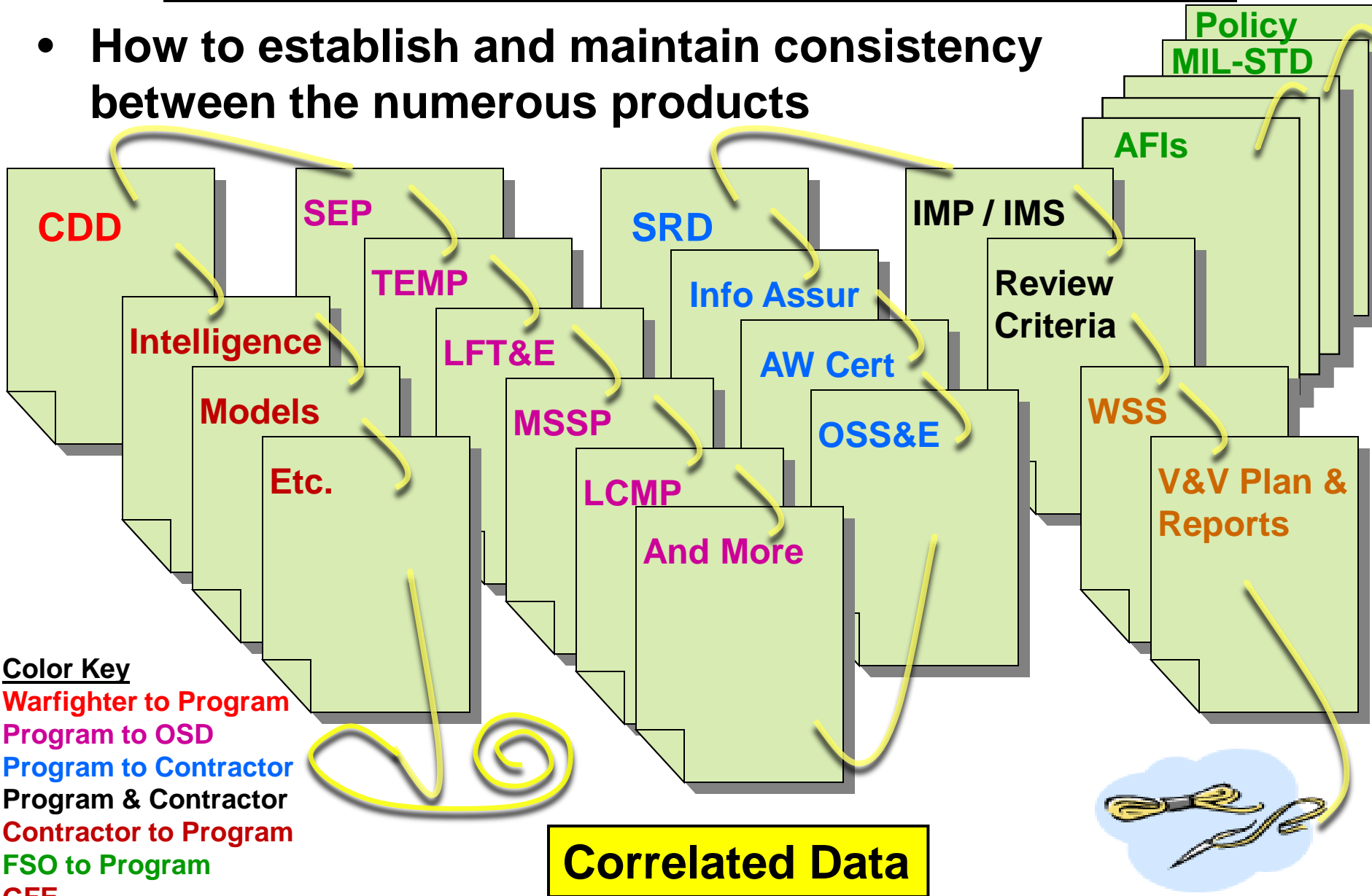
Voluminous Uncorrelated Data



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Problem

- How to establish and maintain consistency between the numerous products





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Request for Information Functionality Needs

- **Many System Engineering tools provide the necessary functionality to enable requirements management**
- **Key attributes to consider:**
 - Collaborative Web Environment
 - Security and host on Government network
 - Decomposition of Requirements
 - Filtering of Requirements
 - Creation of Documents
 - Traceability of Requirements
 - Extensibility
 - Change Control of Requirements
 - Standard Reporting
- **Tool Demonstrations**



RFI – Technical Requirements

- **Secure Web Based Access/Common Access Card**
- **Extensibility/Customizability**
- **Interfaces to Other Common Acquisition Tools**
- **Import/Export/Publishing Capability**
- **Traceability Management**
- **Change/Configuration Management Features**
- **User Schema Set-up**
- **Vendor Training**
- **Maintenance and Affordability**
- **Part of an Enterprise Tool Set**
- **Vendor Qualification**
- **Data Propagation/Metrics Generation & Collection**
- **Digital Signatures**



Pathfinder Overview

Completed Jul 2010

- **Requirements Traceability Tool Pathfinder effort— demonstrate utility of a requirements traceability tool in an IT development environment**
 - **9 month pathfinder effort**
 - **Aeronautical Systems Center demonstrated one aspect of SRD generation based on CDD, Joint Service Specification Guide (JSSGs) , and Airworthiness**
 - **Deep dive into the Material Availability Key Performance Parameter**
 - **Space and Missile Systems demonstrated tracing/managing requirements between System, Subsystem, & Segment Specs**
 - **Populated tool with subset of authoritative technical data (MIL-STD/ HDBK/ Guides)**
 - **Imported and cross-referenced data**

In a web-based environment



SRD Generation

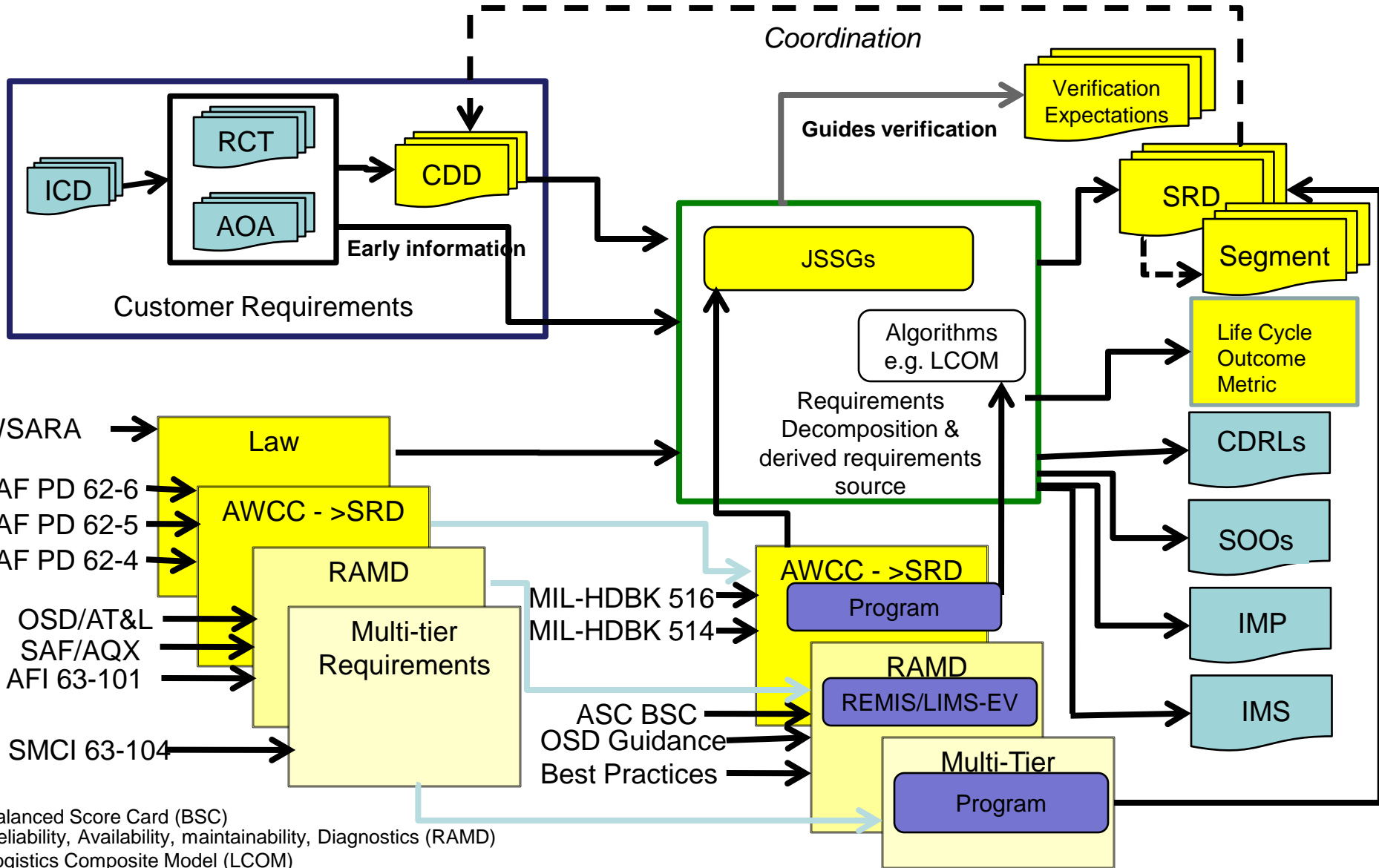
- **Authoritative Sources (Law, Air Force Policy Directives, AFIs, Policy)**
- **Guidance (MIL-STDs, JSSGs, Local Operating Instructions)**
- **Questions to refine SRD content**
- **Using MIL-HDBK-520 (draft) for SRD format**
- **Source data can be:**
 - **Linked directly to SRD format**
 - **Linked to Question Set that are tied to SRD format**
 - **Can be added, modified or deleted by users**
- **Subject Matter Experts assess information provided by RTT and creates the appropriate SRD requirements**

Does not eliminate the need for an engineer in the loop



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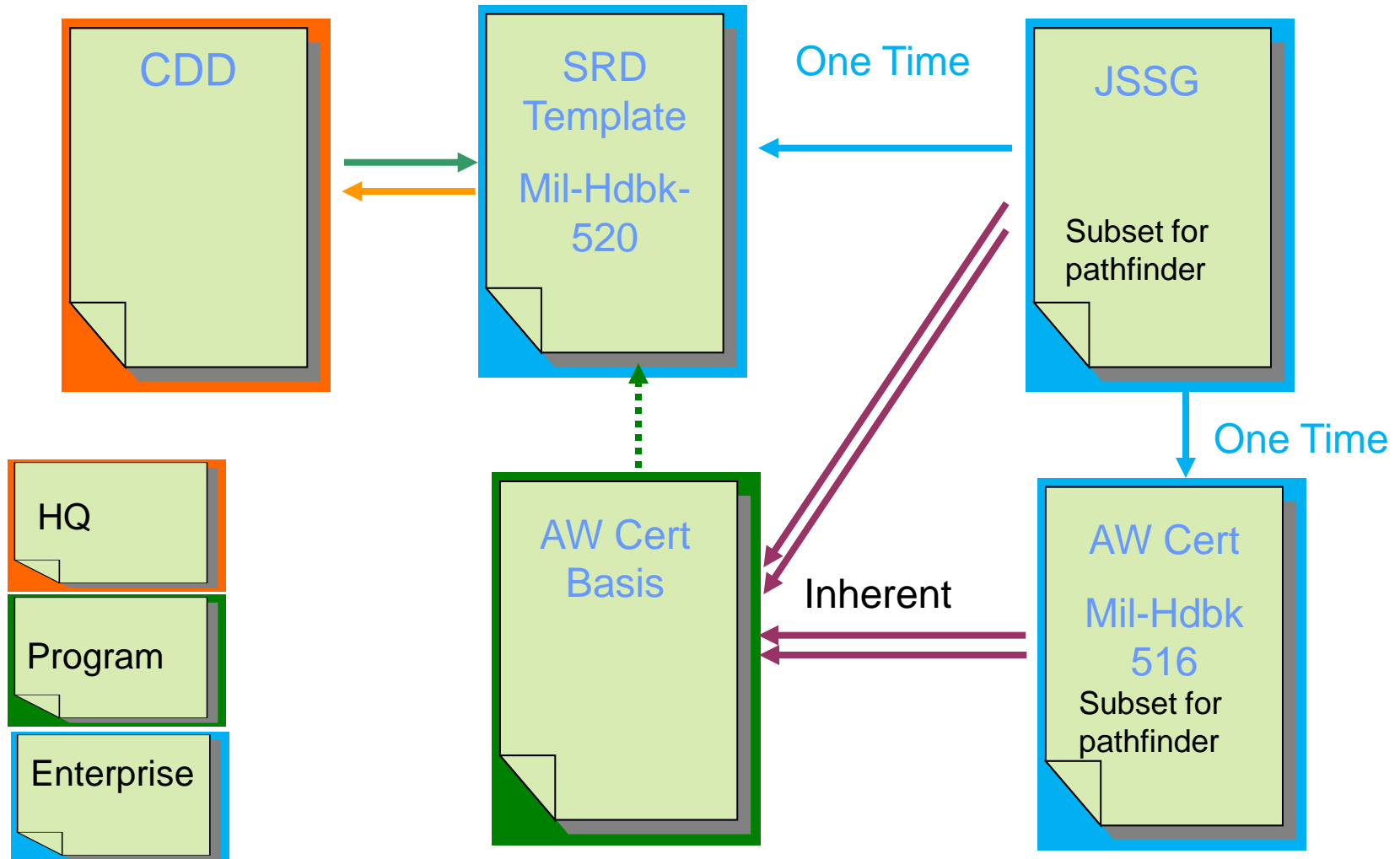
Pathfinder and Deep Dive: Mechanization of Integrated Information



Not inclusive of all policy/guidance



ASC Functional Links Governance





Question Samples

- Enterprise Documents

- Acquisition Questions

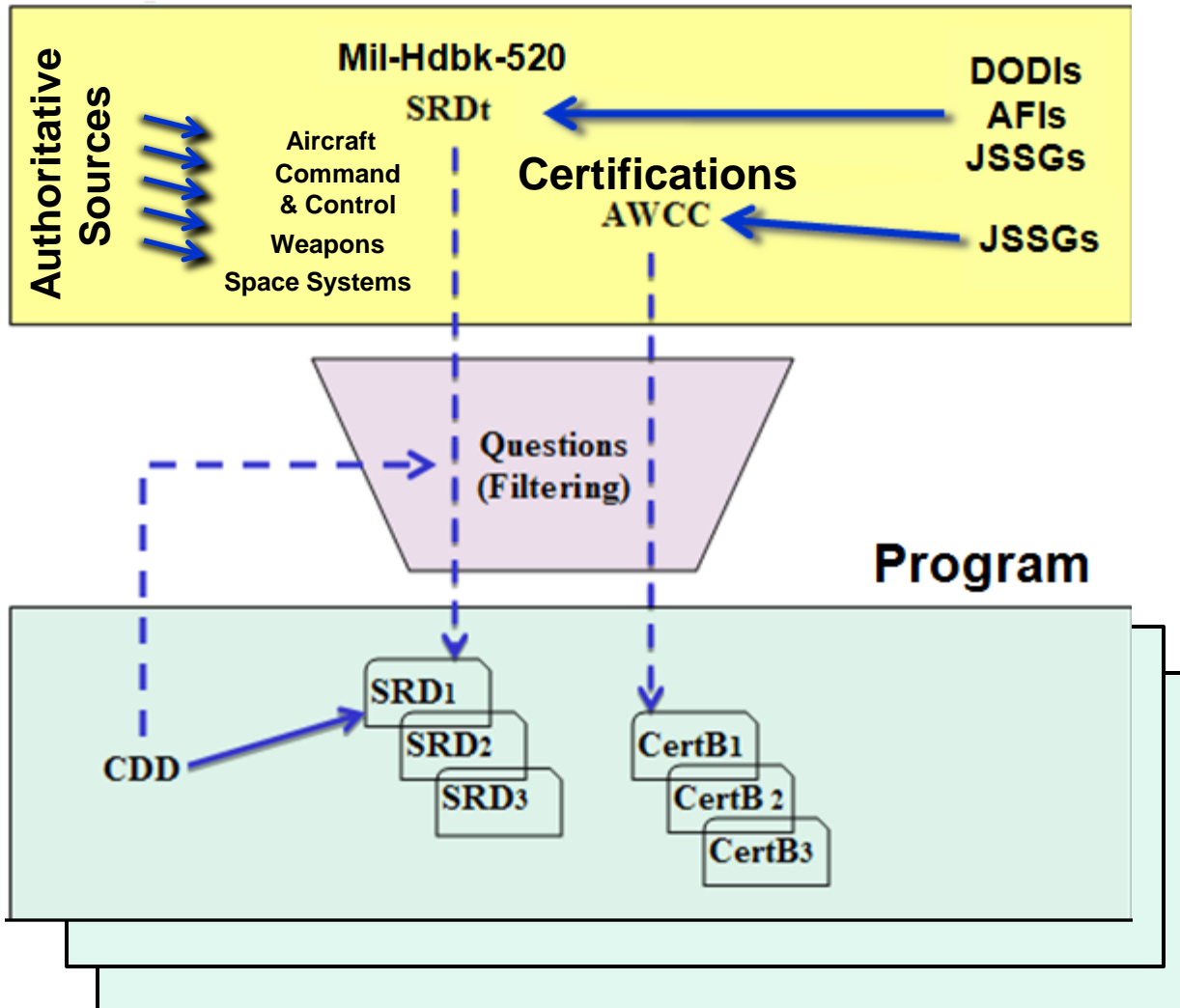
- Program specific

- ? Is this an ASC program?
- ? Is this an AAC program?
- ? Acquisition Category
 - ? Is this an ACAT I program?
 - ? Is this an ACAT II program?
 - ? Is this an ACAT III program?
 - ? Is this a Non-ACAT program?
- ? Acquisition Phase
 - ? Is this program in Pre-Milestone A?
 - ? Is this program in Pre-Milestone B?
 - ? Is this program in Pre-Milestone C?
- ? Program Type
 - ? Is this a new system acquisition?
 - ? Is this an Aeronautical Platform/System?
 - ? Is this a Space Platform/System?
 - ? Is this a Ground System/Station?
 - ? Is this a new capability or modification to a subsystem?
 - ? Does it impact the Aircraft Structure?
 - ? Does it impact the Avionics Subsystems?
 - ? Does it impact the Propulsion/Engines, Aircraft?



Structure & Organization

Enterprise Foundational data



- Foundational data that users have access
- Selection of program specific content and information
- Program data with limited users and access



Pathfinder Implementation

Address: Program Name

- Projects
 - Program Name
 - Program Name
 - 1-CDD
 - 2-SRD
 - Demo
 - 1-CDD
 - 2-SRD
 - Imported Comment
 - Review Document
 - Documents
 - Folder
 - Project Configuration
 - Tailored AWCC
 - Temp
- Mission Support
 - Program Name
 - Program Name
 - Program Name
 - Program Name
- TEST AREA
- ZZGAC
- Recycle Bin

Project – Folder Window

Name	ROIN	Number	Text /
↑ CDD T Pam System Capabilities Required for	28386	1	Future Growth. Size... none
↑ CDD T Systems Integration Laboratory (SIL)	28446	1.18	A SIL shall be provid... none
↑ CDD T Network Centric Operat...	28417	1.7	All activity interface... KPP
↑ CDD T Force Protection KPP#		1.10	All aircraft controls a... none
↑ CDD T BIT and BITE		1.17	BIT and BITE shall pr... none
↑ CDD T Digital Air Data Comput		1.5	DADC must provide ... none
↑ CDD T Data Management		1.19	Data Management w... none
↑ CDD T Engineering Data		1.20	Engineering data sh... none
↑ CDD T Air Refueling (AR) Boon		1.4	Improve AR Boom El... KSA
↑ CDD T Reliability and Maintainability	28433	1.11	Installation of AMP s... KSA
↑ CDD T Basic Cockpit Configuration	28408	1.2	Modernize and cons... KSA
↑ CDD T Digital Weather Radar/Wind Shear Warn	28416	1.6	Multi-color digital we... none

Program Content

Name	ROIN	Number	Text /
SRD Air Vehicle	27987	1.1	
SRD R Integrated Dis	28178	1.1.1	The AEP systems sh...
SRD R BIT Report	28182	1.1.1.4	Self diagnostics shall...
SRD R Fault Data Storage	28180	1.1.1.2	Self diagnostics shall...
SRD R Self Diagnostics Modes	28179	1.1.1.1	Self-diagnostics shall...
SRD R Integrated Diagnostics	28181	1.1.1.3	The AEP shall enable... KSA
SRD R BIT Reporting for Mission Critical Ft.	28183	1.1.1.5	The BIT shall identif...
SRD R Bit Detection Rate	28184	1.1.1.6	The probability of co...
SRD R Fault Isolation Rate	28185	1.1.1.7	The probability of co...
SRD R BIT False Alarms	28186	1.1.1.8	The probability of fal...

Link symbol

Relationship - Complying

Notebook - Bit Detection Rate



Pathfinder Implementation

Address: Program Name

Projects

- Program Name
- Program Name
- 1-CDD
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- Imported Commen
- Review Document
- Documents
- Folder
- Project Configuration
- Tailored AWOC
- Temp
- Mission Support
- Program Name
- Program Name
- Program Name
- Program Name
- TEST AREA
- ZIGAC
- Recycle Bin

Name	ROIN	Number	Text /
System Capabilities Required for	28086	1	Future Growth. Size... none
Systems Integration Laboratory (SIL)	28446	1.18	A SIL shall be provid... none
Network Centric Operations (NCO) - The	28417	1.7	All activity interface... KPP
Force Protection KPP#4-Counter-CBRNE	28432	1.10	All aircraft controls a... none
BIT and BITE	28445	1.17	BIT and BITE shall pr... none
Digital Air Data Computers (DADC)	28415	1.5	DADC must provide ... none
Data Management	28451	1.19	Data Management w... none
Engin	28452	1.20	Engineering data sh... none
Air R	28414	1.4	Improve AR Boom El... KSA
Relia	28433	1.11	Installation of AMP s... KSA
Basic	28408	1.2	Modernize and cons... KSA
Digit	28416	1.6	Multi-color digital we... none

CDD paragraph with color coded icon and "T" for threshold

Name	ROIN	Number	Text /
Air Vehicle	27987	1.1	
Integrated Diagnostics	28178	1.1.1	The AEP systems sh...
BIT Reporting	28182	1.1.1.4	Self diagnostics shall...
Fault Data Storage	28180	1.1.1.2	Self diagnostics shall...
Self Diagnostics Monitor	28179	1.1.1.1	Self-diagnostics shall...
Integrated Diagnostics	28181	1.1.1.3	The AEP shall enable... KSA
BIT Reporting for Mission Critical Fl.	28183	1.1.1.5	The BIT shall identif...
Bit Detection Rate	28184	1.1.1.6	The probability of co...
	28185	1.1.1.7	The probability of co...
	28186	1.1.1.8	The probability of fal...

SRD paragraph with color coded icon and "R" for requirement

Notebook - Bit Detection Rate



Pathfinder Implementation

Address: Program Name

- Projects
 - Program Name
 - Program Name
 - 1-CDD
 - 2-SRD
 - Demo
 - 1-CDD
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 - Mission Support
 - Program Name
 - Program Name
 - Program Name
 - Program Name
 - TEST AREA
 - ZZGAC
 - Recycle Bin

Name	ROSN	Number	Text /
Program System Capabilities Required for	28386	1	Future Growth. Size... none
Systems Integration Laboratory (SIL)	28446	1.18	A SIL shall be provid... none
Network Centric Operations (NCO) - Te	28417	1.7	All activity interface... KPP
Force Protection KPP#4-Counter-OBNE	28432	1.10	All aircraft controls a... none
BIT and BITE	28445	1.17	BIT and BITE shall pr... none
Digital Air Data Computers (DADC)	28415	1.5	DADC must provide... none
Data Management	28451	1.19	Data Management =... none
Engineering Data	28452	1.20	Engineering data sh... none
Air Refueling (AR) Boom Electronics	28414	1.4	Improve AR Boom EL... KSA
Reliability and Maintainability	28433		SA
Basic Cockpit Configuration	28408		SA
Digital Weather Radar/Wind Shear Warn	28416		none

CDD paragraph (KPP) is not allocated to SRD

Name	ROSN	Number	Text /
Air Vehicle	27987	1.1	
Integrated Diagnostics	28178	1.1.1	The AEP systems sh...
BIT Reporting	28182	1.1.1.4	Self diagnostics shall...
Fault Data Storage	28180	1.1.1.2	Self diagnostics shall...
Self Diagnostics Modes	28179	1.1.1.1	Self-diagnostics shall...
Integrated Diagnostics	28181	1.1.1.3	The AEP shall enable... KSA
BIT Reporting for Mission Critical Fl.			Identif...
Bit Detection Rate			ity of co...
Fault Isolation Rate			ity of co...
BIT False Alarms			ity of fal...

Supplement Information attached



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Retain Substantiation of Requirements

Address: \\ENS Test Project\Engineering\SRD\SRD Documents\Aircraft SRD\Aircraft System SRD\Aircraft SRD Document View: AddressView.ResetToSys... Effectivity: Current Version

Projects

- 1. Enterprise Area
- 643 ELSS/TE Nina
- 669 Test Project
- Airforce Enterprise Support Testin...
- Bryan's CDD Email Test Folder
- Bryan's Development Test Project
- CVLSP Test Project
- ENS Test Project
 - Contracting
 - Engineering
 - Airworthiness
 - Eds Test files
 - SRD
 - SRD Documents
 - Aircraft SRD
 - Aircraft S...
 - Aircraft S...
 - Aircraft S...
 - SRD Questions
 - Financial Mgt
 - IPTs
 - Logistics
 - Program MGT
 - Review Groups
 - RTT Import Area
 - Test
 - Trashcan
 - Users Documents
 - KC-X Test Project
 - Nicole's test project
 - Phil's Approval Reimport 2010_05_...
 - Phil's Development Approval Test f...
 - RTT Generic Schema and Folders
 - RTT Test Project
 - RTT Test Project Versions
 - Scott's Airforce Enterprise Dev Are...
 - Scott's Proj Dev Area V1
 - Scott's Proj Dev Area V2
 - Scott's Proj Dev Area V3
 - SGS RTT Enterprise Dev.
 - SGS RTT Integration Project
 - SGS RTT Integration Project V2
 - SGS RTT Integration Project V3
 - SGS RTT Project Dev.
 - SGS RTT Requirements
 - SGS Temp Project
 - SMC Enterprise Support
 - SMC Performance Test

Name	...	ROIN	Type Name	Create User	Create Time
(SRD) Logistics related requirements	3.15	1636	Requirement	scott.m.mcgee	5/18/2010 2:11... Intentionally
(SRD) System maintenance concept	3.15.1	1639	Requirement	scott.m.mcgee	5/18/2010 2:11... Intentionally
(SRD) System service life	3.15.2	1640	Requirement	scott.m.mcgee	5/18/2010 2:11... Intentionally
(SRD) Availability	3.15.3	1641	Requirement	scott.m.mcgee	5/18/2010 2:11... Intentionally
(SRD) (5) PMs for all programs shall...	3.15.3.1	4937	Requirement	gilbert.j.wagner	6/2/2010 7:43 AM DoDI 5000.0
(SRD) 4.5.1 Develop RAM Program Plan	3.15.3.2	4938	Requirement	gilbert.j.wagner	6/2/2010 7:43 AM DOD RAM GC
(SRD) 4.3.1 Basic Reliability Activities.	3.15.3.3	4939	Requirement	gilbert.j.wagner	6/2/2010 7:43 AM MIL-HDBK-0C
(SRD) 3.47. Reliability, Availability, Maintainability, and Su	3.15.3.4	4940	Requirement	gilbert.j.wagner	6/2/2010 7:43 AM AFI 63-101 -
(SRD) Reliability Law	3.15.3.5	4941	Requirement	gilbert.j.wagner	6/2/2010 7:43 AM Weapon Sys
(SRD) Material Availability	3.15.3.6	5263	Requirement	gilbert.j.wagner	6/2/2010 10:38... The CVLSP a
(SRD) System dependability	3.15.4	1642	Requirement	scott.m.mcgee	5/18/2010 2:11... Intentionally
(SRD) System capability					
(SRD) Protective Structu					
(SRD) Supply support					
(SRD) Facility interfaces					
(SRD) Common Support					
(SRD) System usage info					
(SRD) Diagnostics					
(SRD) Asset identificatio					
(SRD) Other requirements					
(SRD) Packaging requirement					
(SRD) Statutory, Regulatory					
(SRD) Precedence and critic					
(SRD) Demilitarization and d					
(SRD) VERIFICATION PROVISIO					
(SRD) REQUIREMENTS TRACEA					

Notebook - Material Availability

Properties Attachments

Name

- Availability analysis
- SRD Population Notes

TcR-Note-12912f2db2d_1275926584032 - Microsoft Word

Home Insert Page Layout References Mailings Review View Get Started

Times New Roman 12

Paste Clipboard

Font Paragraph Styles

AaBbCcL AaBbC AaBbC
Emphasis Heading 1 Heading 2

This is Gil Wagner's analysis for CVLSP Ao. Ao must be factored to Ai for contractual implementation. Analysis of 4 other Helicopter programs is below

Program	Ao	Ai	Ai/Ao
XXX	73.3	82.1	1.12
YYY	65.8	77.6	1.16
ZZZ	80.4	91.6	1.14

Field Performance

Program	MTBF	MTTR	MDL
XXX	5.2	1.10	0.79
XXX	4.3	1.20	1.10
ZZZ	6.5	0.98	0.6

REMIS data 2004-2009 all MDS.

Average
Ao/Ai = 1.14, for the 81.6 Ao in the CDD, program ZZ is closest. The planned support concept, Ute Rate, and mission profiles are also very similar and therefore at this time, the 1.14 ratio appropriate.



Owner reviews all comments

- All comments grouped
- E-mail/notification to users
- Hyperlinks into tool
- Can review in
 - Word
 - Excel
 - Tool native environment
- Live updates from review
- Feedback to commenter

3.1 Required States and Modes [0992]
 Current Requirement Text:
 The text is this and that

Internal Review Comments 5_Jan_10
 Reviewed Text:
 The text is this and that

Reviewer	Criticality	Disposition
Scott McGee - 5_Jan_10	Administrative	

Comment:
 The other government documents do not list the Air Force and AFMC Life Cycle Systems Engineering Instructions, or the DOD Information Assurance (IA) Directives and Instructions.

Suggested Text Improvements:
 Under Air Force add: AFI 63-1201, LIFE CYCLE SYSTEMS ENGINEERING and AFMCI 63-1201, LIFE CYCLE SYSTEMS ENGINEERING. Under DoD add: DoDD 8500.01, INFORMATION ASSURANCE (IA), DoDI 8500.2, INFORMATION ASSURANCE (IA) IMPLEMENTATION, and DoDI 8510.01, DOD INFORMATION ASSURANCE CERTIFICATION AND ACCREDITATION PROCESS (DIACAP) Maybe we can insert a reference for Life Cycle Systems Engineering into Paragraph 3.1: This SRD handbook supports AFI10-601, Capabilities Based Requirements Development, AFI 10-604, Capabilities Based Planning, and AFI63-101, Acquisition and Sustainment Life Cycle Management, by providing a bridge between warfighter and acquisition communities. It has been developed to standardize and formalize the requirements analysis process to translate warfighter capabilities into acquisition requirements using Data Item Description (DID) DI-IPSC-81431A, System/Subsystem Specification, and MIL-STD-961, Department of Defense Standard Practice Defense and Program-Unique Specifications Format and Content, as the framework. {Add the following: The development of an SRD is a one product of the core systems engineering functions identified in AFI63-1201 Life Cycle Systems Engineering and AFMCI63-1201 Life Cycle Systems Engineering}.

Rationale/References:
 Although not called out per se in the document body, they are very relevant to the Addendums, especially Addendum B, Sample C2 Sample SRD Format, when addressing AF and AFMC Life Cycle Systems Engineering planning, management and execution activities and CJCSI 3170.01G Net-Ready Key Performance Parameter (KPP) Information Assurance requirements.

Disposition Rationale:
 Added AFI/AFMCI to 3.1 and IA to template B3.8

SRD Paragraph Info				Comment Info					
Number	Title	SRD Paragraph Owner	Review Type	Review Date	Created By	Criticality	Disposition	Disposition Rationale	
3.1	Required States and Modes	scott.mcgee	Internal Review	5_Jan_10	Scott McGee	Administrative		Added AFI/AFMCI to 3.1 and IA to template B3.8	
3.1	Required States and Modes	scott.mcgee	Internal Review	5_Jan_10	TThumb	Administrative	Accepted	Added AFI/AFMCI to 3.1 and IA to template B3.8	
3.1	Required States and Modes	scott.mcgee	External Review	19_Jan_10	Scott McGee	Substantial	Incorporated	not sure blah	



Accomplishments to Date

- **RTT pathfinder completed**
 - Briefed final results Jul 2010
 - Performed on GCSS-AF development server
 - Learned more about tool requirements and implementing an Enterprise solution

- **RMT funded by Tools, Training & Reengineering Council (T2RC)**
 - Market Research Request for Information (Oct/Nov 2010)
 - Requirements Working Group established across Enterprise
 - **Creating FRD, SRD, process/architecture**
 - Request for Proposal (Spring 2011)
 - **Acquisition process initiated—AFPEO EIS portfolio**



Summary

- **Planning a COTS requirements tool to mechanize consistent development of Acquisition information**
- **Conducted a 9 month pathfinder - learned more about implementing an Enterprise solution**
- **Identified gaps and attributes of good requirements management to enable:**
 - **Technical functionality**
 - **Standup of an Enterprise solution**
- **Informed industry of AF need and desire to be able to share information between domains**
- **RFI released**

Interested in industry use of RM tools and lessons learned