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Migration From PSS-05 to ECSS

Abstract

Many of those who begin using the ECSS standards for space software development projects will already be familiar with the PSS series of software development standards. To facilitate migration from PSS to ECSS, this module illustrates how the processes, reviews, and documents defined in the PSS series can be mapped into those defined in the ECSS series.

PSS-05 to E40B Part 1 June 2003.

Differences in PSS & ECSS Software Standards (1)

❑ Software Engineering Roles

- ✧ **ECSS**: Customer/Supplier relationship – does not enter into organizational issues
- ✧ **PSS**: identification of software engineering roles (e.g. software configuration engineer) – gives requirements within the organization

❑ Life cycle phases versus processes

- ✧ **ECSS**: identifies processes and activities (logical view)
- ✧ **PSS**: provide for identification of phases of the life cycle (time-oriented view)

Differences in PSS & ECSS Software Standards (2)

□ Documents

- ✧ **ECSS:** Expected Outputs of process activities, organized in Files
- ✧ **PSS:** identifies documents to be produced

□ Correlation to System Engineering

- ✧ **ECSS:** Strict relationship with System Engineering (software is a system engineering discipline)
- ✧ **PSS:** Software is not correlated to the overall System Engineering context

□ Adaptation to specific project context

- ✧ **ECSS:** The tailoring concept is an underlying principle of the ECSS
- ✧ **PSS:** specific adaptations were done (e.g. *PSS-light* for small projects), but it is not a foundation concept in the standard

Processes & Phases to E-40B Lifecycle Processes (1)

PSS-05 Processes and Phases	E-40B Lifecycle Processes
User Requirements Definition Phase (UR) <i>PSS-05, Part 1 Chapter 2</i>	System Engineering Processes Related to Software – E40B, Chapter 5.2
SW Requirements Definition Phase (SR) <i>PSS-05, Part 1 Chapter 4</i>	Software Requirements & Architecture Engineering Process – E40B Chapter 5.4.2 <i>“Software Requirements Analysis”</i>
Architectural Design Phase (AD) <i>PSS-05, Part 1 Chapter 4</i>	Software Requirements & Architecture Engineering Process – E40B Chapter 5.4.3 <i>“Software Architectural Design”</i>
Detailed Design and Production Phase (DD) <i>PSS-05 Part 1 Chapter 6</i>	Software Design & Implementation Engineering Process – E40B Chapter 5.5 Software Validation Process – E40B Chapter 5.6 (validation wrt TS)

Processes & Phases to E-40B Lifecycle Processes (2)

PSS-05 Processes and Phases	E-40B Lifecycle Processes
<p>Transfer Phase (TR) <i>PSS-05, Part 1 Chapter 6</i></p>	<p>Support to Acceptance – <i>E40B Chapter 5.7.2 “SW Delivery & Installation”, E40B Chapter 5.7.3 “SW Acceptance”</i></p> <p>Software Validation Process – <i>E40B Chapter 5.6 (validation wrt RB)</i></p> <p>Software delivery and acceptance (5.7)</p>
<p>Operations and Maintenance Phase (OM) <i>PSS-05, Part 1 Chapter 7</i></p>	<p>Software Operation Process – <i>E40B Chapter 5.9</i></p> <p>SW Maintenance Process – <i>E40B Chapter 5.10</i></p>

Mapping of PSS Supporting Processes

PSS Supporting Processes	ECSS Counterparts
Software Project Management <i>PSS-05, Part 2, Chapter 2</i>	<ul style="list-style-type: none"> ▪ Software Management Process, <i>E40B Chapter 5.3</i>, and parts of Chapter 5.2 on System Engineering Processes Related to Software ▪ ECSS M-Series
Software Configuration Management <i>PSS-05, Part 2, Chapter 3</i>	<ul style="list-style-type: none"> ▪ ECSS-M-40 on Configuration Management ▪ ECSS-M-50 on Information & Documentation Management
Software Verification and Validation <i>PSS-05, Part 2, Chapter 4</i>	<ul style="list-style-type: none"> ▪ Software Verification Process – <i>E40B Chapter 5.8</i> ▪ Software Validation Process – <i>E40B Chapter 5.6</i>
Software Quality Assurance <i>PSS-05, Part 2, Chapter 5 or PSS-01 series and PSS-01-21</i>	<ul style="list-style-type: none"> ▪ ECSS-Q-80B on Software Product Assurance

PSS to ECSS Software Reviews (1)

PSS Reviews	ECSS Software Reviews
UR Review (UR/R) - <i>At the end of the UR Phase</i>	System Requirements Review (SRR) - <i>SRR is a Customer review</i>
SR Review (SR/R) - <i>At the end of the SR phase</i>	Preliminary Design Review (PDR) - <i>Both the technical specification and software architectural design are reviewed at the PDR</i>
AD Review (AD/R) - <i>At the end of the AD phase</i>	
<i>Critical Design Review (CDR)- Optional- At the end of detailed design</i>	<i>DDR , for flight software</i>
<i>TRR, before significant testing activities</i>	<i>TRR, before significant testing activities</i>

PSS to ECSS Software Reviews (2)

PSS Reviews	ECSS Software Reviews
DD Review (DD/R) - <i>At the end of the detailed design and production phase</i>	Critical Design Review (CDR) - <i>In some cases, such as flight software, a Detailed Design Review (DDR) is inserted before CDR</i>
-	Qualification Review (QR) - <i>The aim of the QR is to verify that the SW meets all the RB requirements in the target environment.</i>
Preliminary Acceptance Review - <i>At delivery of software to the customer</i>	Acceptance Review (AR) - <i>A Customer review (not associated with the maintenance process)</i>
Acceptance Review - <i>At the end of the contract and after maintenance</i>	

PSS to ECSS Files and Documents (1)

PSS-05 / PSS-01 Documentation	ECSS Software Standards Files
User Requirements Document	RB (Software System Specification)
Software Requirements Document	TS (Software Requirements Specification)
Interface Documentation	RB (Interface requirements Document) TS (Interface Control Document)
Architectural Design Document	DDF (Software Design Document)
Detailed Design Document	DDF (Software Design Document)
Software User's Manual	DDF (Software User's Manual)
Software Transfer Document	DDF (Software Configuration File)
Project History Document	DJF (No specific document is identified. One reasonable candidate is the Maintenance File)
Software Project Management Plan	MGT (Software Development Plan)

PSS to ECSS Files and Documents (2)

PSS-05 / PSS-01 Documentation	ECSS Software Standards Files
Software Verification & Validation Plan	DJF Software verification Plan Software Validation Plan Software Unit Test Plan + Software Unit Test Reports Software Integration Test Plan + Software Integration Test Reports Software Validation Testing Specification wrt TS- Software Validation Testing Reports Software Validation Testing Specification wrt RB- Software Validation Testing Report
Software Configuration Management Plan	MGT
Software Quality Assurance Plan	PAF (Software Product Assurance Plan)
Software Operational Plan	Operational Documentation (OP)
Software Maintenance Plan	MF (Software Maintenance Plan)

Summary

- ❑ Most if not all of the processes and products that are defined in the PSS series can be found in some form in the ECSS series
 - ✧ Generally they can be found in a more *flexible* form
- ❑ The PSS-05 primary processes map fairly directly to the lifecycle processes in the E-40B standard
 - ✧ **NOTE:** whereas PSS-05 emphasizes *phases*, E-40B emphasizes *processes*
- ❑ The PSS-05 secondary / support processes also map relatively directly to counterparts within the lifecycle processes of the E-40B standard
 - ✧ **NOTE:** some PSS-05 support processes (e.g. configuration management) map to standards in the M-series rather than E40-B
- ❑ The PSS documentation is mapped into contents of ECSS **Files**