ECSS Workflow for Automatic Code Generation - ESA Software Product Assurance Workshop

**Requirements**

**Reg. Baseline**

- Design, Source Code and Test Case traceability

**Simulink Requirements**

- Coverage Metrics
- Simulink Coverage
- Source Code Traceability

**Automatic Test Case Generation**

- requirement-based test cases

**Model Coverage Analysis**

- a. The autocode input models shall be reviewed together with the structure and traceability
- b. Each review and inspection shall be based on a written plan or procedure.

**Reusability of the Previous Test Cases**

- a. The supplier shall develop and document the test procedures and data for testing each software unit.
- b. The unit test shall exercise:
  - 1. code using boundaries at n-1, n, n+1 including looping instructions, while, for and tests that use comparisons;
  - 3. actual input settings and environmental conditions that are different from the design conditions;
  - 4. the code at the limits of its requirements (stress testing).

**Software in the Loop (SIL) Unit Testing**

- Processor and Hardware in the Loop (PIL and HIL) Unit Testing

**Execute Object Code**

- Simulator Text
- Simulink Test

**COMPLIANCE**

- Simulink + SWRS + SADD

**Tool Validation Documentation**

- Simulation in the Loop Functional Testing
- Model Conformance Checks
- Code Conformance (MISRA,...)

**Effort Distribution in Traditional Development Workflows**

1. Specifications
2. Test Design & Verification
3. Implementation
4. Code Validation
5. Testing & Validation

**ECSS Workflow for Automatic Code Generation**

- ECSS
- SW Problems & Solutions
- SW Requirements & Baseline
- SW Design Document (SDD)
- SW Requirements Specification (SRS)
- SW Behaviour
- Source Code & Test Case Traceability
- Build & Integration Plan (PIP)

**Software Development Plan (SCP)**

- Coding standards
- Test Traceability Matrix
- Subsystem Validation Documentation
- Software Unit Integration Test Plan (SUITP)

**Software Verification Report (SVR)**

- Code Generation Report
- Software Test Report
- Software Code Traceability Matrix
- Code Coverage Report
- Robustness Report
- Independent Software Validation Report
- Review and Inspection Reports

**Effort Distribution in Model-Based Development Workflows**

1. Specifications
2. Test Design & Verification
3. Implementation
4. Code Validation
5. Testing & Validation

Prepared by: Albert Ramirez Perez, MathWorks
Albert RamirezPerez@mathworks.com
+49-89-6525-0772
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