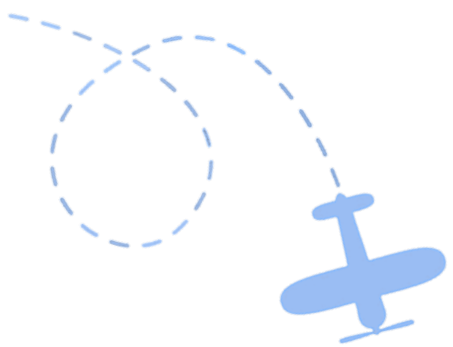# SOFTACUS
IBM BASED SOLUTIONS

HCL OneTest Embedded

ADVANCING AVIONICS VERIFICATION AND VALIDATION

HCL OneTest

Avionics validation and verification requires significant engineering effort to comply with regulatory requirements DO-178B or DO-178C software standards, and teams are always looking for ways to reduce this effort through automation to achieve time-to-market goals.

CHALLENGE

Reducing delays in avionics software engineering projects is extremely difficult due to the risk of failure in the software, where an error could result in fatal loss. More than 90% of their software verification and validation projects are delivered late due to one or more of the following reasons:

A. Project planning and tracking are inaccurate and incomplete

B. Requirements are missing, unclear and changing

C. Infrastructure delays in creating and configuring the development and test environments

D. Third-party tool integrations cause delays due to unstable test frameworks

E. Finding software issues late

Specific challenges addressed by OneTest Embedded include:

- Significant manual effort involved in low level and hardware-software integration testing, code review and analysis

- Manual errors and rework efforts and costs

- Test environments available for hardware-software integration testing during the early stages of testing strategy

- Control schedule and control variances while achieving time-to-market needs
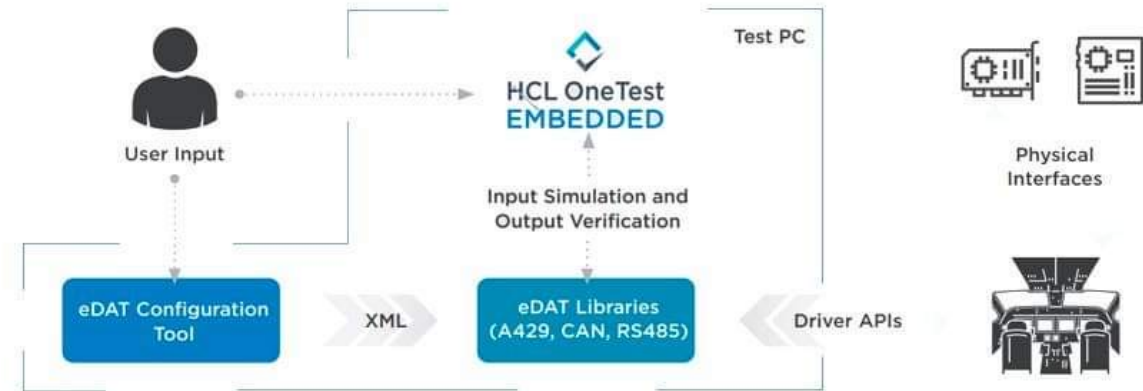
SOLUTION

The solution (called eDAT) put in place by HCL ERS relies on a workbench that interfaces the system under test with a machine dedicated to the test through a C/C++ library (supporting discrete I/O, ARINC bus…), and targets the top 5 categories in avionics software testing / verification and validation:

1. code review

2. low level testing

3. software-software integration testing

4. hardware-software integration testing

5. analysis

based on the use of OneTest Embedded.

SOLUTION COMPONENTS SUPPORTING THE HARDWARE–SOFTWARE INTEGRATION TESTING:

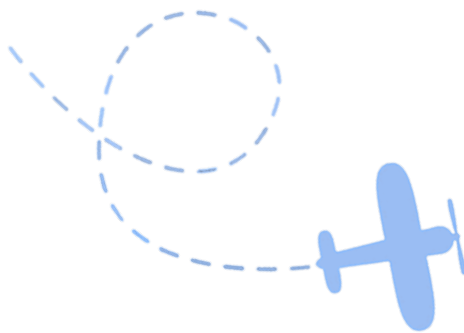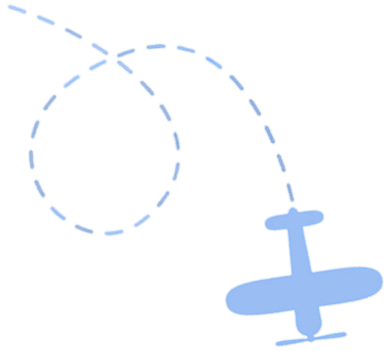This solution offers the following **ADVANTAGES**

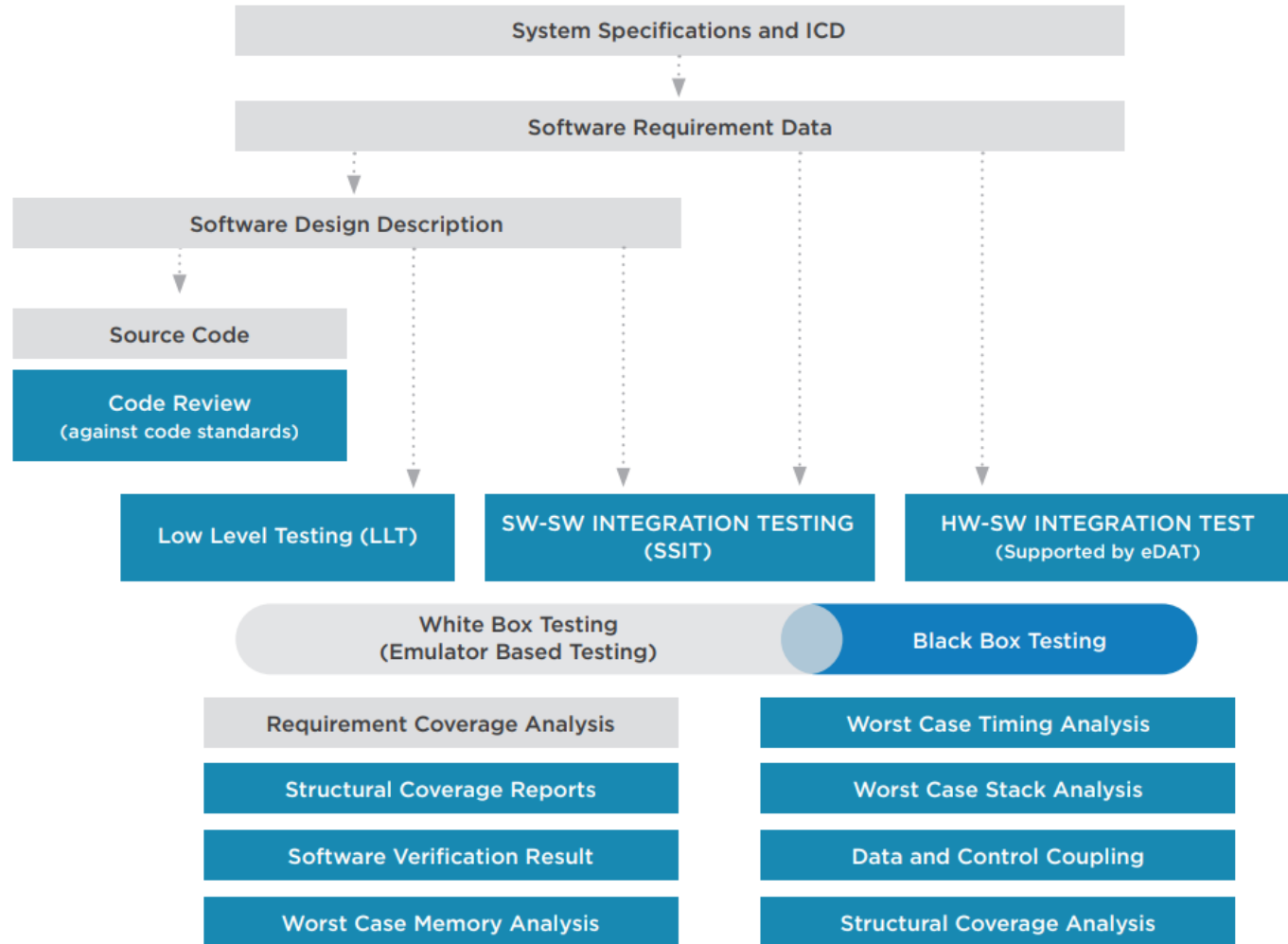- For testers, the same tool is used independent of the testing phase

- For certification, the same kind of test report is produced

- Simplifies some testing phases as the coverage objective is global

- Provides a flexible solution regardless of the system under test (only the library should be updated)

OneTest Embedded

primarily helped in automating the code review and analysis activities.

VERIFICATION ACTIVITIES

SUPPORTED BY HCL ONETEST EMBEDDED:

System Specifications and ICD

Software Requirement Data

Software Design Description

Source Code

Code Review (against code standards)

Low Level Testing (LLT)	**SW-SW INTEGRATION TESTING** **(SSIT)**	**HW-SW INTEGRATION TEST** (Supported by eDAT)

White Box Testing (Emulator Based Testing)	Black Box Testing

Requirement Coverage Analysis	Worst Case Timing Analysis
Structural Coverage Reports	Worst Case Stack Analysis
Software Verification Result	Data and Control Coupling
Worst Case Memory Analysis	Structural Coverage Analysis

Using OneTest Embedded the team

- ensured software code accuracy and consistency

- reduced test case generation effort by **20 − 25%**

- reduced code coupling analysis effort by **1/3** saving more than **700 hours** of effort

- achieved more than **14%** savings with assisted test creation from call graphs and the scriptless visual test editor
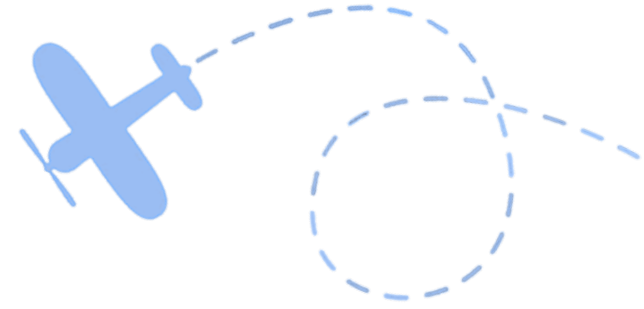
HCL ONETEST EMBEDDED FOR **AVIONICS**

HCL OneTest Embedded is a unique solution for component testing and runtime analysis (code coverage, performance, memory and stack analysis, control and data coupling) that works on targets thanks to its Target Deployment Port technology.

HCL OneTest Embedded supports the following **DO-178C test objectives**

- **VERIFICATION OF OUTPUT OF SOFTWARE CODING AND INTEGRATION PROCESS (Table A5 of DO-178C)**

  - Software code is accurate and consistent (regarding stack, memory, and timing analysis).

  - Source code conforms to coding standards.

- **TESTING OF OUTPUT OF INTEGRATION PROCESS (Table A6 of DO-178C)**

  - Executable object code complies with HLRs.

  - Executable object code is robust with HLRs.

  - Executable object code complies with LLRs.

  - Executable object code is robust with LLRs.

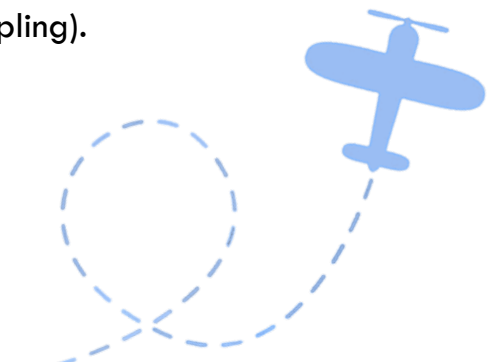 - Executable object code is compatible with the target computer.

- **VERIFICATION OF VERIFICATION PROCESS RESULTS (Table A7 of DO-178C)**

  - Test results are correct and discrepancies explained (actual vs expected).

  - Test coverage of software structure (modified condition/decision coverage).

  - Test coverage of software structure (decision coverage).

  - Test coverage of software structure (statement coverage).

  - Test coverage of software structure (data coupling and control coupling).

OneTest Embedded also provides a

QUALIFICATION KIT that verifies compliance

against the **DO-330 standard** at the most critical tool qualification level (TQL-5).

SOFTACUS

IBM BASED SOLUTIONS

For more information visit:

https://softacus.com/products/hcl-software/hcl-onetest-embedded