

## **ARINC Project Initiation/Modification (APIM)**

**1.0 Name of Proposed Project** **APIM 16-001**  
**Airplane Software Quality Metric and Reporting Interface Definition**

**Name of Originator and/or Organization**

Reinhard Andreae, Lufthansa Airlines

**2.0 Subcommittee Assignment and Project Support**

**Suggested AEEC Group and Chairman**

Software Quality Working Group of SAI Subcommittee

Reinhard Andreae, Lufthansa

**Support for the activity (as verified)**

**Airlines:** Alaska, American, Delta, FedEx, KLM, Lufthansa, TAP Portugal, United, UPS

**Airframe Manufacturers:** Airbus, Boeing

**Suppliers:** Honeywell, Panasonic, Rockwell Collins, Thales Avionics

**Commitment for Drafting and Meeting Participation (as verified)**

**Airlines:** FedEx, Lufthansa, FedEx, + TBD

**Airframe Manufacturers:** Boeing, + TBD

**Suppliers:** Esterline, Rockwell Collins, + TBD

**Others:**

**Recommended Coordination with other groups**

SAI Subcommittee

Avionics Maintenance Conference (AMC)

**3.0 Project Scope**

**Description**

Software functions are replacing hardware more and more in new aircraft projects. In addition, more and increasingly complex and integrated functions are included, most of which are realized in software. Because of this, the ability of software to reliably perform its function is a dominant factor in an airlines ability to operate and maintain an airplane in an efficient and effective manner.

For hardware parts technical performance measures clearly exist (e.g., MTBF or MTBUR). For software those measures are not defined, standardized or monitored. Hardware performance measures take advantage of the inherent property that hardware obeys the laws of physics, and can be reliably modeled statistically. Software functions do not necessarily obey the laws of physics, therefore standard and accepted quality and performance measures are hard to define.

For enabling a type of quality control loop for airplane systems with software functionality the first step is to define categories of software failures,



## Issues to be worked

Phase 1: Define the problem space.

- a) Research existing standards and review applicability to airline industry.
- b) Define types of in-service issues that should be measured against software-related quality.
- c) Define the criteria for classification of software-related errors, such as:
  1. Criticality of a function (safety)
  2. Availability of a specified function
  3. Operational Impact
  4. Impact to economic aircraft operation
  5. Possible effect of combinations of failures
  6. Impact to maintenance
- d) Determine if additional operational/contextual information is required to be reported through the review of actual in-service issues.
- e) Propose the measurement technique (airline reporting processes or data collection features in onboard software).

Phase 2: Proposal for standard technical measures

- a) Define software-related quality metrics.
- b) Propose standard operational / contextual information to assist in root cause determination of in-service issues.

## 4.0

### Benefits

#### Basic benefits

Operational enhancements yes  no

For equipment standards:

- a. Is this a hardware characteristic? yes  no
- b. Is this a software characteristic? yes  no
- c. Interchangeable interface definition? yes  no
- d. Interchangeable function definition? yes  no

If not fully interchangeable, please explain: \_\_\_\_\_

Is this a software interface and protocol standard? yes  no

Specify:

Product offered by more than one supplier yes  no

Identify: Any airborne software product

#### Specific project benefits (Describe overall project benefits.)

### 4.1.1

#### Benefits for Airlines

Airlines have parameters to measure the actual performance of software against committed values. Consequently, airlines have a foundation to claim functional

corrections of identified non-conforming software parts. The goal is to have software updates available to the airlines on an agreed timely basis.

**4.1.2 Benefits for Airframe Manufacturers**

Outcome of this proposal has the potential to provide more relevant and focused information to assist in prioritization and investigation of software-related in-service problems.

**4.1.3 Benefits for Avionics Equipment Suppliers**

Suppliers get a framework of technical measures and software quality definitions that would enable internal targets for compliance and external predictability of quality efforts.

**5.0 Documents to be Produced and Date of Expected Result**

- ARINC Report – Guidance (Dec 2019)

**Meetings and Expected Document Completion**

The following table identifies the number of meetings and proposed meeting days needed to produce the documents described above.

<b>Product/Activity</b>	<b>Mtgs</b>	<b>Mtg-Days (Total)</b>	<b>Expected Start Date</b>	<b>Expected Completion Date</b>
Phase 1 kickoff / work plan	Three 2-day meetings	6	Jan 2017	Dec 2017
Phase 2 (TBD) as determined by Phase 1	TBD			
<b>Activity Summary</b>	TBD			

**6.0 Comments**

This APIM will be updated to describe Phase 2 scope and schedule.

**6.1 Expiration Date for this APIM**

December 2018

*Submit completed form to the AEEC Executive Secretary.*