ARINC Project Initiation/Modification (APIM)

# Name of Proposed ProjectAPIM 16-001

**Airplane Software Quality Parameter Definition, Reporting Interface Definition and Guidance on Service Level Management.**

## Name of Originator and/or Organization

Reinhard Andreae, Lufthansa Airlines

# Subcommittee Assignment and Project Support

## Suggested AEEC Group and Chairman

Joined Activity between a SAI Subcommittee and AMC Subcommittee

## Support for the activity (as verified)

Airlines: Lufthansa + TBA

Airframe Manufacturers: Boeing + TBA

Suppliers: TBA

Others:

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

**Airlines:** Lufthansa + TBA

**Airframe Manufacturers:** Boeing + TBA

**Suppliers:** TBA

**Others:**

## Recommended Coordination with other groups

SAI Subcommittee

AMC Subcommittee

# Project Scope

## Description

Software Functions are replacing Hardware increasingly more and more in new A/C projects. For Hardware Parts technical performance Measures clearly exist. (e.g., MTBF or MTBUR). For Software Functions those parameters are not defined nor accessible nor standardized or monitored. Consequently making efforts to enforce a certain quality is almost impossible for all members of our industry.

For enabling a type of quality control loop for Airplane Software Parts the first step is to define and standardize clear technical quality parameters. This is the main scope of this effort here.

A second part than is taking such a quality standard definition on in the Product Support Agreements for the benefit of predictable interactions between all industry participants. This second more commercial part is out of scope for this ARINC standard, but the standard is needed to enable such contractual environment between our industry participants. Anyway guidance on how to manage service levels of Software should be given in this effort. This should be done by suggesting relevant targets for the parameters.

In order to develop good material for guidance on technical performance and quality standards a stepped approach is suggested.

## Planned usage of the envisioned specification

**Note: New airplane programs must be confirmed by manufacturer prior to completing this section.**

**Use the following symbol to check yes or no below.**

**New aircraft developments planned to use this specification** yes ⌧ no 
 **Airbus:** (TBA)

 **Boeing:** 777X

 **Other:** (TBA)

**Modification/retrofit requirement** yes  no ⌧

 **Specify:** (TBA)

**Needed for airframe manufacturer or airline project** yes ⌧ no 

 **Specify:** (TBA)

**Mandate/regulatory requirement** yes  no ⌧

 **Program and date:** (N/A)

**Is the activity defining/changing an infrastructure standard?** yes ⌧ no 

 **Specify:** (TBD)

**When is the ARINC Standard required?** Dec. 2017

**What is driving this date?**

A new Airplane Program needs to secure contractual obligations for Software Suppliers related to the user/Airline when negotiating for new supply contacts. Such supplementary Agreements should define the level of product support for a Software Function that a supplier is obliged to provide depending on the level of conformity with the here defined parameters of Software Quality.

**Are 18 months (min) available for standardization work?** yes ⌧ no 

 **If NO please specify solution:**

**Are Patent(s) involved?** yes 

 **If YES please describe, identify patent holder:**

 Not that we are aware of.

## Issues to be worked

1. Research and benchmark what is done in other industries? (e.g., automotive industry, Software industry, Space technologies, Communication Service providers etc…) most properly we find service level agreements.
2. Research existing Aircraft Software Parts for existing but for the user not accessible parameters (e.g. reset rates, failure codes, availability of a function, etc.)
3. Define parameters
	1. from the benchmark of other industries
	2. the research with contributing Aviation Software Suppliers
	3. Parameters that would be reasonable and good from the user prospective.
4. Define interfaces between a software function and a central maintenance device (CMCF) for exchanging and reporting software quality parameters.
5. Develop service level user expectations for categories of functions and expectations for corrective actions if such parameters are not met.
	1. Criticality of a function (safety)
	2. Availability of a specified function
	3. Impact to economic A/C operation
	4. Possible effect of combinations of failures
	5. Impact to maintenance cost
	6. Timely need for a fix (1 week to 1 year depending on impact)
	7. Compensation for impact if not fixed on time.
6. Provide proposed language for Product support agreements

# 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: Yes but also a guideline for service level agreements

Product offered by more than one supplier yes ⌧ no 

 Identify: all over the A/C

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

### 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 non-conforming Software Parts. Those corrections are today pushed out as much as possible to the disadvantage of the Airlines. This should change by having reliable measures.

### Benefits for Airframe Manufacturers

Airframe Manufactures will get an established process for measuring and handling unreliable and nonconforming Software Parts. Consequently reliability management is enabled as is for Hardware Parts today (e.g. MTBF or MTBUR) also for Software Parts by the suggested activity.

Responsibilities and commitments between Suppliers and Airlines are well defined and can be handled easier in support of the Airline.

Product Support agreements can be made more standardized and binding for the benefit of all Parties.

### Benefits for Avionics Equipment Suppliers

Equipment suppliers (here also pure SW Suppliers) get a framework of technical measures and quality definitions that would enable internal targets for compliance and external predictability of quality efforts. Due to the binding character if carried over in the Product Support Agreements Vendors have a clear base for an internal founding for corrections of noncompliance.

# Documents to be Produced and Date of Expected Result

* ARINC Report - Guidance (close to ARINC 674 SCEA) (12/2018)
* ARINC Specification - Definition of Parameters and Interfaces (12/2018)

## Meetings and Expected Document Completion

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Product/Activity** | **Mtgs** | **Mtg-Days****(Total)** | **Expected Start Date** | **Expected Completion Date** |
| 1. Kickoff / Work plan
 | 1 face to face | 1 | 03/2016 | 03/2016 |
| 1. benchmark
 | 1 web based1 face to face | 2 to 3 hrs 1 day | 04/2016 | 06/2016 |
| 1. excising parameters
 | 1 face to face | 1 day | 06/2016 | 08/2016 |
| 1. Define parameters and interfaces
 | 1 web based1 face to face | 2 to 3 hrs 2 days | 08/2016 | 10/2016 |
| 1. Develop service levels
 | 1 web based1 face to face | 2 to 3 hrs 1 days | 12/2016 | 04/2017 |
| 1. Propose Guidance
 | 1 face to face | 1 days | 06/2017 | 12/2017 |
| **Activity Summary** | **various** | **6 to 9 hrs** **7 days** | **03/2016** | **12/2017** |

Table shows several web conferences and 6 in-person meeting to be supported by the ARINC staff.

# Comments

## The Work Plan above follows Items in 3.3. (Issues to be worked)

**6.1** **Expiration Date for this APIM**

12/2018

***Submit completed form to the AEEC Executive Secretary.***