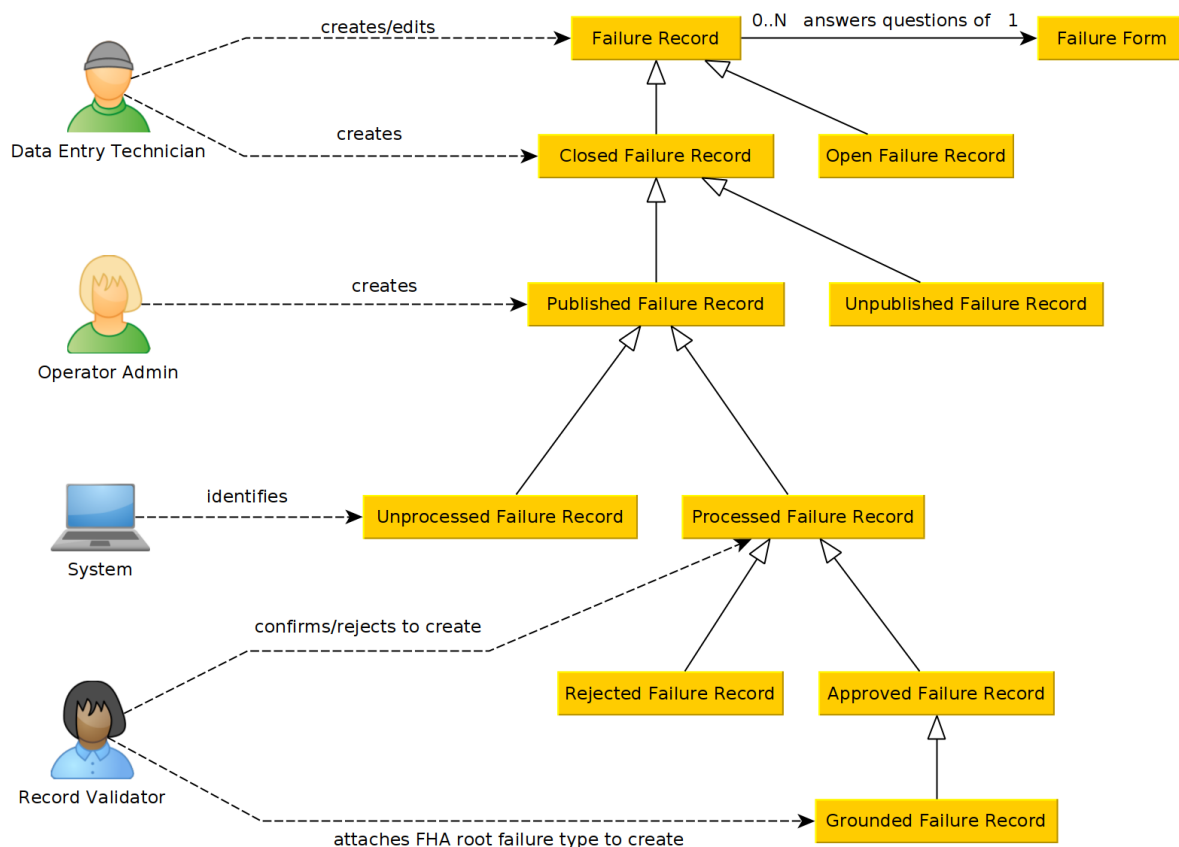


# Requirements Specification

This document contains software requirements that must fit into a concrete system architecture specified in the last section.

## Conceptual Model



## Roles

- Operator's Role
  - Data Entry Technician (**DET**)
    - create and edit failure records
  - Operator Admin (**OA**)
    - upload failure records
    - upload new forms (partonomy of new aircraft)
- Supplier's Role (Aero)
  - Reliability Modeler (**RM**)

- import root failure types
- model root failure type
- watch overall records statistics
- create report of failure records
- Record Validator (**RV**)
  - validate record
  - choose root failure type of a record
- Supplier Admin (**SA**)
  - manages operators
  - manages Operator Admins

## MoSCoW prioritisation method for requirements

MoSCoW prioritisation technique divides the requirements into four categories:

- Must Have (**M**) - A critical requirement, there is no point in implementing the solution without this requirement, because the application would not be viable, legal or safe use.
- Should Have (**S**) - An important requirement, without it, it is possible to use the application with some eventual workaround.
- Could Have (**C**) - A wanted or desirable requirement, it is less important than Should Have and has less impact on the overall solution. If a problem occurs or a deadline is at risk, those requirements are the first one to be removed from a plan.
- Won't Have this time (**W**) - For this requirement, it was agreed that it would not be implemented. It is better to focus on more important requirements in this version

## Requirements

Specifies Functional Requirements (**FR**) and Non-functional Requirements (**NR**).

### Requirements for operator (1)

Operator's Role can see only Failure Records and Failure Forms related to their organisation, so in most of the requirements "within its organisation" will be omitted although it can be assumed.

#### Authentication (1.1)

- **M** [NFR1.1.3](#) Only authenticated users are able to access supplier's system

## Forms update (1.4)

### Manual (1.4.2)

- **M FR1.4.2.1** *Operator Admin* can download file with updated Failure Forms from supplier's system

### Publishing (1.5)

- **M FR1.5.3** *Operator Admin* can upload file with Closed Records to supplier's system

## Requirements for supplier (2)

### Authentication (2.1)

- **M FR2.1.1** *Supplier's Role* can login to the supplier's system
- **M NFR2.1.3** Only authenticated users are able to access supplier's system

### Internal user management (2.2)

- **M FR2.2.1** *Supplier Admin* can add new user of its organisation
- **M FR2.2.2** *Supplier Admin* can disable user of its organisation (prevent from logging into the system)
- **M FR2.2.3** *Supplier Role* can edit their own user profile
- **S FR2.2.4** *Supplier Role* can recover their password using email link

### Management of operators' customizations (2.3)

- **M FR2.3.1** *Supplier Admin* can add new operator organization
- **M FR2.3.2** *Supplier Admin* can add *Operator Admin* to existing operator's organization
- **M FR2.3.3** *Supplier Admin* can see list of all operator organizations
- **M FR2.3.4** *Supplier Admin* can attach new form to operator's organization based on selection of imported aircraft type partonomy
  - *The form is created automatically from imported aircraft type taxonomy*
- **M FR2.3.5** System provides endpoint for *Operator Admin* to download updated Failure Forms of his organization
- **M FR2.3.6** System provides endpoint for *Operator Admin* to upload Unpublished Failure Records

### Management of value lists (2.4)

#### Aircraft type partonomies (2.4.1)

- **M FR2.4.1.1** *Reliability Modeler* can import aircraft type partonomy with association to aircraft type and operator from Excel file
- **C FR2.4.1.2** *Reliability Modeler* can manage delete/replace aircraft type partonomy if consistent with existing Failure Records

#### Aircraft type FHA values (2.4.2)

- **M** FR2.4.2.1 *Reliability Modeler* can import FHA table with association to aircraft type from Excel file
- **C** FR2.4.2.2 *Reliability Modeler* can delete/replace aircraft type with associated FHA table if consistent with existing records

#### Record management (2.5)

- **M** FR2.5.1 *Record Validator* can see list of Published Failure Records of all operators
- **M** FR2.5.2 *Record Validator* can view any Published Failure Record
- **S** FR2.5.3 *Record Validator* can export Processed Failure Records into excel
- **C** FR2.5.4 *Record Validator* can export Approved Failure Records into excel
- **S** FR2.5.5 *Record Validator* can see metadata of Published Failure Record (incl. author and date of publication)

#### Record approval/reject (2.6)

- **M** FR2.6.1 *Record Validator* can see list of Unprocessed Failure Records
- **M** FR2.6.2 *Record Validator* can approve/reject any Published Failure Record
- **S** FR2.6.4 *Record Validator* can add textual reason for rejection of Published Failure Record

#### Record classification by FHA (2.7)

- **M** FR2.7.1 *Reliability Validator* can view Approved Failure records to be classified by FHA root failure type
- **M** FR2.7.2 *Record Validator* can attach one FHA root failure type to any Approved Failure Record
  - *List of possible values will show only relevant values related to the aircraft type and SNS of a component*

#### Statistics (2.8)

##### Filtering (2.8.1)

- **M** FR2.8.1.1 *Reliability Modeler* can filter statistics where applicable per the following criteria (selected criteria may narrow down options in other criteria - e.g., provide filtered list of Aircraft types after setting an Operator):
  - Operator
  - Aircraft type
  - Individual aircraft
  - System type
  - Component type
  - Time period
    - Static time interval: from-to (date 1 to date 2)
    - Variable interval: user selects *total flight time* to filter data about individual aircrafts operated more than the selected *total flight time* and shows only data up to the selected *total flight time*

- **M** FR2.8.1.2 *Reliability Modeler* can filter statistics with multiple criteria at the same time, but each of them with one selected value only

#### Basic parameters (2.8.2)

- **M** FR2.8.2.1 *Reliability Modeler* can view statistics of Approved Failure Records
  - $N_C$  - total number of occurrences
  - $N_L$  - total number of occurrences *in-flight only*
  - $T_C$  - mean time between occurrences ( $T_C=LH/N_C$ )
  - $T_L$  - mean time between occurrences ( $T_L=LH/N_L$ ) *in-flight only*
  - $N_{OC}$  - total number of reported failures
  - $N_{OL}$  - total number of reported failures *in-flight only*
  - $T_{OC}$  - mean time between reported failures ( $T_{OC}=LH/N_{OC}$ )
  - $T_{OL}$  - mean time between reported failures ( $T_{OL}=LH/N_{OL}$ ) *in-flight only*
  - $N_{OC}^*$  - total number of approved failures
  - $N_{OL}^*$  - total number of approved failures *in-flight only*
  - $T_{OC}^*$  - mean time between approved failures ( $T_{OC}^*=LH/N_{OC}^*$ )
  - $T_{OL}^*$  - mean time between approved failures ( $T_{OL}^*=LH/N_{OL}^*$ ) *in-flight only*
  - LH - total flight time *for aircraft-level only*
  - LHC - total cumulative flight time *for aircraft-level only*

#### Component failure chart (2.8.2)

- **M** FR2.8.2.1 *Reliability Modeler* can view component failure chart: histogram, x-axis shows failures imported from FHA for selected component type, y-axis shows failure counts
- **C** FR2.8.2.2 *Reliability Modeler* can switch between absolute/relative (percentage of all failures displayed in the chart) count view of the component failure chart
- **C** FR2.8.2.3 *Reliability Modeler* can download displayed component failure chart as image

#### Pareto chart (2.8.3)

- **M** FR2.8.3.1 *Reliability Modeler* can view Pareto chart: histogram + line chart, x-axis shows failures imported from FHA for selected component/system/aircraft type or operator, y-axis shows failure counts, line chart represents cumulative count
- **M** FR2.8.3.2 *Reliability Modeler* can switch between absolute and relative (percentage of all failures displayed in the chart) count view of the Pareto chart
- **C** FR2.8.3.3 *Reliability Modeler* can enable/disable line chart
- **C** FR2.8.3. *Reliability Modeler* can download displayed Pareto chart as image

#### Probability distribution chart (2.8.4)

- **S** FR2.8.4.1 *Reliability Modeler* can view probability distribution diagram of FHA root failure type: line chart, x-axis shows time-to-failure (t), y-axis the probability density function f(t), on x-axis mean value is highlighted
- **C** FR2.8.4.2 *Reliability Modeler* can download displayed probability distribution diagram as image

#### FHA count table (2.8.5)

- **C** FR2.8.5.1 *Reliability Modeler* can view FHA table statistics, i.e., table with two columns: 1) FHA root failure types, 2) absolute counts from approved failure records
- **C** FR2.8.5.2 *Reliability Modeler* can download displayed FHA count table as CSV file

#### Reliability Growth diagram (2.8.6)

- **W** FR2.8.6.1 *Reliability Modeler* can view Reliability Growth diagram: line chart, x-axis shows time since commissioning (t), y-axis shows MTBF(t)
- **W** FR2.8.6.2 *Reliability Modeler* can download displayed Reliability Growth diagram to PNG

#### Availability parameter (2.8.7)

- **C** FR2.8.7.1 *Reliability Modeler* can view Availability computation: computed value only, no chart

#### Backup (2.10)

- **M** FR2.7.1 *System* automatically creates backup of all suppliers's data with configured backup period
  - backups restore is described in System Administration Manual

#### Localisation (2.11)

- **M** NFR2.11.1 Operator's application is provided in English

#### Documentation (2.12)

- **M** NFR2.12.1 Supplier's system is documented in the User Manual
- **M** NFR2.12.3 Supplier's system backup and restore is described in System Administration Manual (for IT experts only)
- **M** NFR2.12.4 All documentation is in English

#### Characteristics of data (2.13)

- **M** NFR2.13.1 System can handle at least 10 operators, 20 different forms, 50000 failure records, 10000 imported FHA states

# System Architecture

