



Risk Observatory User Manual

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Short abstract: Future Sky Safety (FSS) is a Joint Research Programme (JRP) on Safety, initiated by EREA, the association of European Research Establishments in Aeronautics. The Programme contains two streams of activities: 1) coordination of the safety research programmes of the EREA institutes and 2) collaborative research projects on European safety priorities.

This deliverable is produced by Project P4 'Total System Risk Assessment' of Future Sky Safety. The main objectives of the work documented in this report are to present the Risk Observatory prototype, to describe the main software functionalities available and to explore the available options from a user perspective.

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Acronyms

Acronym	Definition
ANSP	Air Navigation Service Provider
ATCO	Air Traffic Controller
CF	Contributing Factors
EASA	European Aviation Safety Agency
EC	European Commission
EREA	Association of European Research Establishments in Aeronautics
FDM	Flight Data Monitoring
FSS	Future Sky Safety
GUI	Graphic User Interface
IF	Influencing Factors
JRP	Joint Research Program
MAC	Mid Air Collision
RE	Runway Excursion
RO	Risk Observatory
SPI	Safety Performance Indicators
SW	Software
UI	User Interface
WP	Work Package

EXECUTIVE SUMMARY

Problem Area

The Risk Observatory (RO) is described in the Future Sky Safety (FSS) Project P4 Total system risk assessment as a support tool for safety management. There is a continuous orientation to make the software as user-friendly and usable as possible. Part of this effort builds on the user manual (D4.5) related to the release 1 of the RO software, see Ref. [5] where the main functionalities are explained to the end user, providing a guide on to how to use the RO as a support tool for safety management.

Description of Work

The Risk Observatory is a Software (SW) platform that serves as a tool for safety management. Based on the requirements raised from the most relevant stakeholders and following the architecture and functional designs, the most important functionalities were selected to be developed and implemented into a prototype that is able to illustrate the full potential and benefits of such a SW platform for safety management. This document was produced in order to illustrate to the users all the available features, functionalities and options of the RO prototype and to explain, in detail, how to navigate and use these.

Based on RO-requirements and business model requirements, see Ref. [1-2], an early RO prototype was developed and assessed with stakeholders, as described in Ref. [3]. This was followed by modelling and development of a longitudinal Runway Excursion (RE) and two Mid Air Collision (MAC) risk models, see Ref.[4], followed by modelling an integrated risk framework, see Ref. [5]. A first software version of the RO and its user manual was issued, see Ref. [6]. Subsequently further risk model enhancements and framework development improvements took place. This report and the RO prototype software also incorporates some results that came out of the RO feedback assessment on an intermediate RO- software version and feedback sessions held with two important and different stakeholders, as reported in Ref. [10]. This all resulted into the RO software (release of) Version 2.

Results & conclusions

This document produces a clear guide on how to use the RO software prototype. The navigation logic tries to remain simple and homogeneous throughout all the features in the platform, while providing all the required options and functionalities. The document explains, step by step, the major features and options, decreasing the learning curve for any user to analyse and explore the available safety information. The document reflects the latest version, i.e. version 2 of the RO prototype. As the SW platform may evolve further (outside Future Sky Safety), new versions of the User Manual should be created, in order to reflect new options and functionalities introduced.

Applicability

This report is applicable to Project P4 “Total system risk assessment” of Future Sky Safety. It depicts the RO prototype user manual, illustrating how to interact with the interfaces in order to explore the main functionalities available to the end user. This is Version 2 of the User Manual accompanying the Release 2 of the Risk Observatory software. It is the intention to maintain the access to the RO web-link (<https://fss-p4-ro.ceiia.com/pentaho>) and the RO software for 1 year after project end.

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TABLE OF CONTENTS

Contributing partners	3
Document Change Log	3
Approval status	3
Executive Summary	5
Problem Area	5
Description of Work	5
Results & conclusions	5
Applicability	6
Table of Contents	8
List of Figures	10
1 Introduction	11
1.1. The Programme	11
1.2. Project context	11
1.3. Research objectives	11
1.4. Approach	11
1.5. Document structure	12
2 Overview	13
2.1. RO functionalities	13
2.2. Login Page	13
2.3. Main Menu	14
2.4. Home Page	15
3 Risk Dashboards	17
3.1. Risk Dashboards inside the RO	17
3.2. Timeline Charts	17
3.3. Detailed View	18
3.4. Options Menu	19
4 What if Scenario	23
4.1. What If functionality inside the RO	23
4.2. Options menu	23
4.3. Main area	29
5 Settings Menu functions	30
5.1. Account	30

5.2. Updated Risk Model	30
5.3. RO administration	31
5.4. Manage Risk Scenarios	32
5.5. Set Local Reference	33
5.6. Occurrence Dashboard	34
6 Conclusions	35
7 References	36
<u>Appendix A – Create new Risk Scenario Step-by-Step</u>	<u>37</u>

LIST OF FIGURES

FIGURE 1 - LOGIN PAGE	14
FIGURE 2 - MAIN MENU	14
FIGURE 3 - HOME PAGE	16
FIGURE 4 - RISK SUBMENU	17
FIGURE 5 - RISK DASHBOARD OVERVIEW	18
FIGURE 6 - RISK TIMELINE CHART SERIES	18
FIGURE 7 - DETAILED VIEW	19
FIGURE 8 - THE OPTIONS MENU ICON	19
FIGURE 9 - OPTIONS MENU	20
FIGURE 10 - PICKING A DATE FROM THE CALENDAR	21
FIGURE 11 - SHOW/HIDE ELEMENTS IN THE RISK DASHBOARD	21
FIGURE 12 - WHAT IF DASHBOARD	23
FIGURE 13 - "WHAT IF?" OPTIONS MENU	24
FIGURE 14 - MODEL SELECTION FOR THE "WHAT IF?" SCENARIO	24
FIGURE 15 - SET INFLUENCING FACTORS BUTTON	25
FIGURE 16 - AREA FOR SETTING THE IF VALUES	26
FIGURE 17 - IF FULL DESCRIPTION	27
FIGURE 18 - SET CONTRIBUTING FACTORS	27
FIGURE 19 - AREA FOR SETTING CONTRIBUTING FACTORS VALUES	28
FIGURE 20 - SHOW/HIDE ELEMENTS IN THE WHAT IF? PAGE	29
FIGURE 21 - WHAT IF? CHART SERIES	29
FIGURE 22 - FUNCTIONALITIES PRESENT UNDER SETTING	30
FIGURE 23 - UPDATE RISK MODEL PAGE	31
FIGURE 24 - MANAGE RISK SCENARIO - AFTER OPENING	32
FIGURE 25 - CREATE LOCAL REFERENCE	33
FIGURE 26 - OCCURRENCE DASH BOARD (SPI EXAMPLE)	34
FIGURE 27 - CREATE NEW RISK SCENARIO - STEP 1	37
FIGURE 28 - CREATE NEW RISK SCENARIO - STEP 2	37
FIGURE 29 - CREATE NEW RISK SCENARIO - STEP 3	38
FIGURE 30 - CREATE NEW RISK SCENARIO - STEP 4	39
FIGURE 31 - CREATE NEW RISK SCENARIO - STEP 5	39
FIGURE 32 - CREATE NEW RISK SCENARIO - STEP 6	40
FIGURE 33 - CREATE NEW RISK SCENARIO - STEP 7	41

1 INTRODUCTION

1.1. The Programme

The European Commission's (EC) Flight Path 2050 vision aims to achieve the highest level of safety to ensure that passengers and freight as well as the air transport system and its infrastructure are protected. However, trends in safety performance over the last decade indicate that the ACARE Vision 2020 safety goal of an 80 % reduction of the accident rate is not being achieved. A stronger focus on safety is required. Therefore a Joint Research Programme (JRP) on Aviation Safety - Future Sky Safety (FSS) - is started at the beginning of 2015, aiming for Coordinated Safety Research as well as Safety Research Coordination. Future Sky Safety has the goals to coordinate safety research of the involved EREA research establishments and perform safety research and innovation actions targeting the highest levels of safety for European aviation.

1.2. Project context

In the FSS project P4 "Total System Risk Assessment", a prototype Risk Observatory (RO) is developed as an enabling tool for safety management. The risk observatory will acquire, fuse and structure safety data and translate it into actionable safety information: output that helps the user to distil safety intelligence to allow the implementation of appropriate measures to positively influence safety - i.e. reducing the serious incident and accident probability. The core of the risk observatory is formed by a risk assessment framework that integrates risk assessment models specifically developed to represent a certain domain. The framework is fed by different safety data inputs: e.g. normal operation data from the aircraft operator domain (e.g. originating from Flight Data Monitoring (FDM)) and Air Navigation Service Provider domain, but also occurrence and incident data. The risk observatory will offer important insights in safety performance to safety analysts, which can be used in the risk assessment of new aircraft and systems and in safety assurance by identifying safety trends, key risk areas, and efficient mitigation measures. Project P4 has as main objective to develop a working and practical Risk Observatory prototype to assess and monitor safety risks throughout the Total Aviation System and allow frequent update of the assessment of risks.

1.3. Research objectives

The main objectives of this study are to present release 2 of the Risk Observatory prototype, to describe the main software functionalities available and how to explore the available options.

1.4. Approach

The main objectives of the RO are translated into software features built in the RO prototype. There is a continuous orientation to make the software as user-friendly and usable as possible. Part of this effort builds on this document, where the main functionalities are explained to the end user, providing a guide on to how to use the RO as a safety analysis tool.

As pointed before, this document is aimed to the final user (safety analysts) and describes the main features accessible to them through the web-based graphical user interfaces (GUI) developed for the prototype. In addition, a dedicated section explaining the available backend functions was added to this final version of the User Manual. These backend functions will allow the customization of the RO to a specific organization by introducing specific datasets and calibrating processes and frameworks to better suit specific needs.

This deliverable is a technical communication document that is a guide to the main functions of version 2 of the RO prototype. These functions are described in a user oriented perspective, explaining the user how to access each feature provided by the RO and how to interact with each specific option.

The aim of this document is to provide a clear understanding of the main functionalities for the User in the Risk Observatory. This document is divided by chapters, where each chapter consists in a page of the Risk Observatory. Inside each section, detailed descriptions of each option will be made.

1.5. Document structure

The structure of this document reflects the main areas available in the Risk Observatory prototype, in order to provide a friendly guidance towards the clear use of the tool. Thus,

- Section 2 will provide an overview of the platform, illustrating how to navigate to the main features, and how to do essential action such as the login, logout.
- Section 3 provides a full explanation of all the features and options available in the Risk Dashboard, while
- Section 4 describes the ‘What if?’ analysis.
- Section 5 describes a few additional functionalities.
- Section 6 closes the document with some concluding considerations about the navigation logic followed.
- Section 7 provides the references used.
- Appendix A shows how to create a new risk scenario, step-by-step.

2 OVERVIEW

2.1. RO functionalities

At this stage, the RO prototype provides two major functionalities, namely: Risk based SPI (Safety Performance Indicators) analysis and “What if” analysis. Besides these functionalities, a set of generic functionalities are put in place to allow, for instance, user authentication and personalization of the RO.

All the major functionalities are accessible through a specific section available in the main menu. The main menu is fixed bar, positioned at the top of each page, see Figure 2, allowing the navigation between major functionalities throughout the entire application.

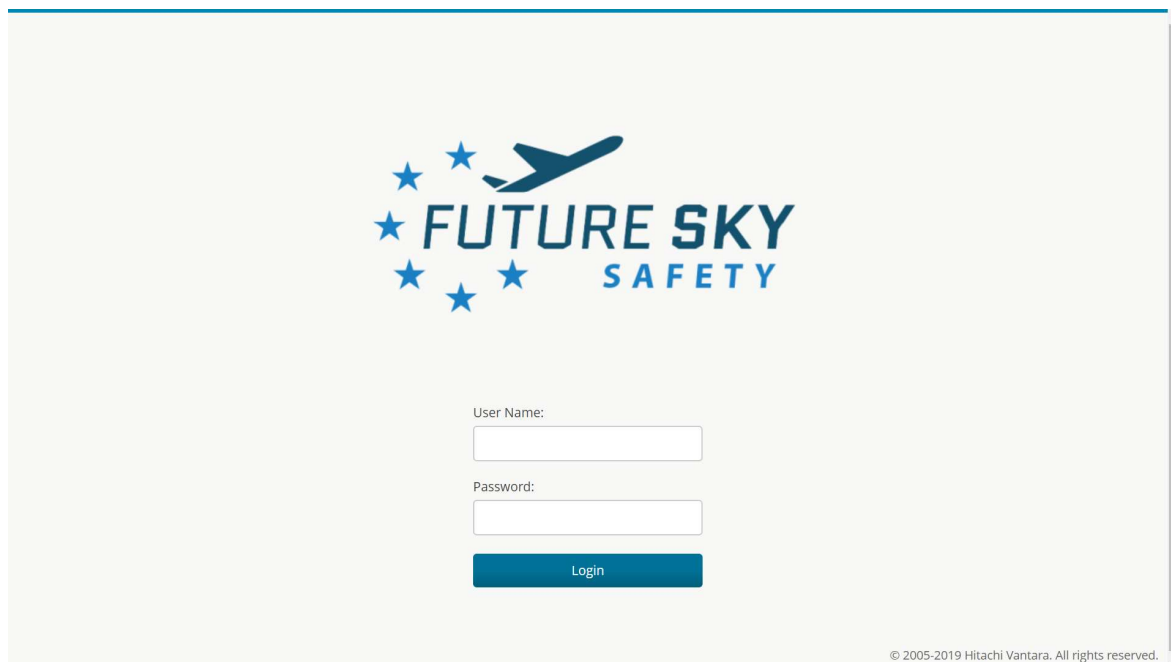
Within each functionality context, a specific auxiliary menu, the options menu, is available, if needed. This menu is visible as an expandable column positioned in the left side of the page. This menu allows filtering, criteria setting, and loading or saving of previously defined scenarios. For each function, the specific options available in this menu will be described in the following chapters.

Following, a description of global pages and functionalities is provided.

2.2. Login Page

The login page, as shown in Figure 1, is the first page shown in the RO. It functions as a gatekeeper for the platform, presenting the user with a simple form to insert his/hers access credentials. These credentials, a set of email and password, shall be manually attributed to the user by the RO administration to authorized individuals.

Upon validated request the system will redirect the user to the home page, otherwise, if the credentials are not correct the “Login page” will be presented again, with an error message alerting the user that “The email or password are not correct, or the user does not exist. Please try again or contact the administration.”



The screenshot shows the login page of the Future Sky Safety platform. At the top center is the Future Sky Safety logo, which consists of a stylized airplane flying upwards and to the right, surrounded by seven stars. Below the logo, there are two input fields: 'User Name:' and 'Password:'. Below these fields is a blue 'Login' button. At the bottom right of the page, there is a small copyright notice: '© 2005-2019 Hitachi Vantara. All rights reserved.'

Figure 1 - Login Page

2.3. Main Menu

The navigation through the RO functionalities is assured by the main menu. The main menu is a horizontal bar, fixed at the top of each page, and it is present in every page of the platform thus allowing the user to choose between the available major functionalities at all times. Figure 2 illustrates the main menu.



Figure 2 - Main menu

The main menu is composed of five items:

- “Future Sky Safety” will redirect the user to the home page, whenever at a lower menu level.
- “Risk” will present a submenu showing the available risk models. When clicking in any item of this submenu the user will be redirected to a dashboard analysing that specific SPI as detailed in section 5.6 of this document;

- “What if” will load a page where the user will be able to set specific conditions to any of the available risk models and compare the results against results stored within the RO. This functionality is described in details in the section 4 of the present document;
- “Settings”. This item has a submenu showing the available setting options to the user. The options available will depend on the user’s role. A regular user is only able to edit his Account information. The Administrator role can edit his own “Account” information and to access the system back office from this menu;
- “Logout” will end the user’s session.

2.4. Home Page

The home page is the main page of the RO, and it is the first page the user will be redirected to, after a successful login.

The main goal of this page is to provide an overview of the system and to provide interaction and navigation means to further explore each result in detail, or to show any specific, but important, dashboard.

For instance, the homepage can be set to provide an overview showing a trend line or historic perspective of the most important risk and occurrence based SPIs. These views can also provide a simple comparison between the generic scenario and a saved user scenario, and have click-through actions targeting to a dedicated page of the selected SPI.

Currently, by default, the home page is showing the Total Aviation System Risk Picture. It was initiated with the risk pictures of 2016 and 2017, see Ref.[7]–Ref.[8], but has been made as current as possible with the 2018 risk pictures. See Ref.[9]. The Home Page content space is configurable, meaning that any adaption if what is described in this section is possible. Users can specify or couple own content to this home page, via the Pentaho tool suit, see paragraph 5.3. However, the main objective of this page should remain the same. Figure 3 shows an example of the Home page.

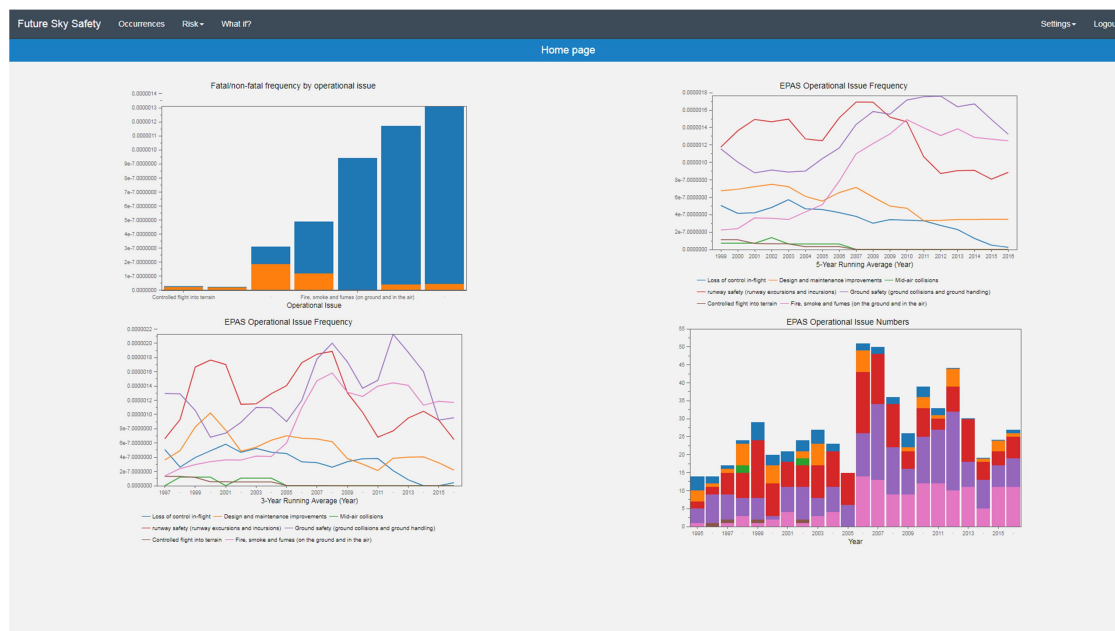


Figure 3 - Home Page

3 RISK DASHBOARDS

3.1. Risk Dashboards inside the RO

One of the fundamentals of the RO is to integrate a complex integrated risk framework, see Ref.[5] for more details, that can integrate domain specific models and inputs into a cross-domain, and by application of a risk-specific engine, providing a model based risk analysis to the user. The risks dashboards provide, for each of the available risk, an overview of the risk analysis over time. The user can access these dashboards by accessing the “Risk” button on the menu. As shown in Figure 4, a sub menu will drop-down, presenting to the user all the available risk models. When selecting one of the risks the corresponding risk dashboards will load.

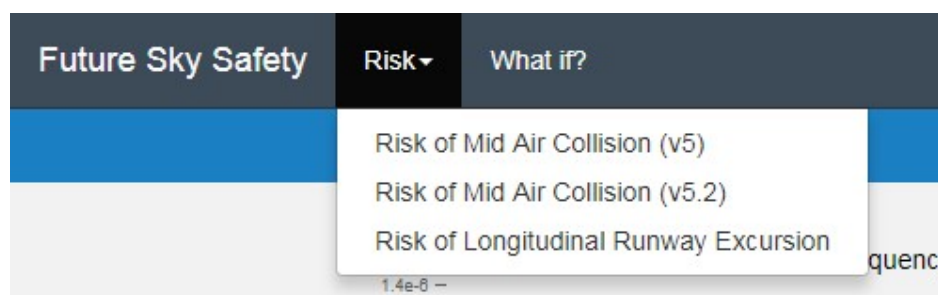


Figure 4 - Risk submenu

3.2. Timeline Charts

Each of the available risk dash boards, will present a set of timeline charts, showing the evolution of the risk analysis overtime. On the top of the page, the chart presenting the overall risk is presented, using a default set of data, while below, the corresponding set of precursors will also be presented in the form of timeline charts, providing the user with a complete vision over the evolution of the risk of occurrence of the event in analysis and its precursors. Figure 5 shows an example of a risk dashboard.

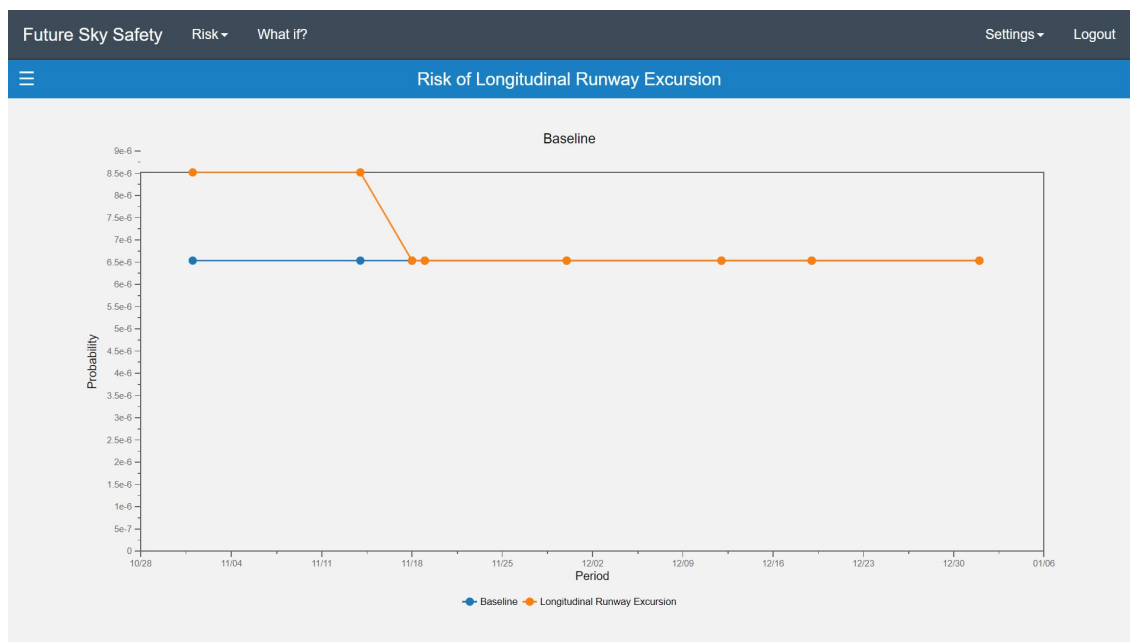


Figure 5 - Risk dashboard overview

Each chart will have, depending on the options selected, two series coloured as illustrated in Figure 6: risk probability and baseline.

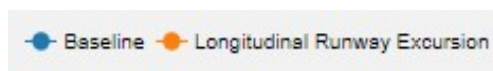


Figure 6 - Risk timeline chart series

Below this main risk picture multiple *pre-cursor* risk pictures of the Runway Excursion (RE) risk may be shown, depending on the selected view options, see paragraph 4.2.4 and Figure 9.

3.3. Detailed View

Besides providing an overview of the evolution of a specific risk over time, the risk dashboard allows the user to see, in detail, the result of each data point in the charts. When the user clicks on the data point, represented by a coloured circle in top of the line, the detailed view will load as pictured in Figure 7.

Future Sky Safety

Risk ▾

What If?

Settings ▾

Logout

Risk Dashboard Detail

Gates Detail

Show10 ▾ entries

Search:

EVENT	DESCRIPTION	PROBABILITY	PERIOD
BB000f	Unstable approach	0.31253	2018-11-30
BB000e	Non-corrected Unstable Approach	0.031253	2018-11-30
BB000d	Incorrect Touchdown	0.217253	2018-11-30
BB000c	Non-rejected incorrect touchdown	0.000217253	2018-11-30
BB000b	Non-decelerated incorrect touchdown	6.52202e-06	2018-11-30
BB000a	Longitudinal Runway Excursion	6.53403e-06	2018-11-30

Showing 1 to 6 of 6 entries

Previous

1

Next

Influencing Factors Detail

Show10 ▾ entries

Search:

REFERENCE	DESCRIPTION	WEIGHT	RETIFIED_WEIGHT	GROUP_DESCRIPTION
-----------	-------------	--------	-----------------	-------------------

Figure 7 - Detailed view

The detailed view presents, in form of tables, the result of the risk model computation for the selected data point. Two tables will be presented to the user. The first one will show the probability for the event in analysis and the corresponding precursors. The second table will show the influencing factors characterizing the selected period. For each table, the user can select how many entries to show by page, and, by using the Search field on top of each table, it is possible to search for specific values within the corresponding table.

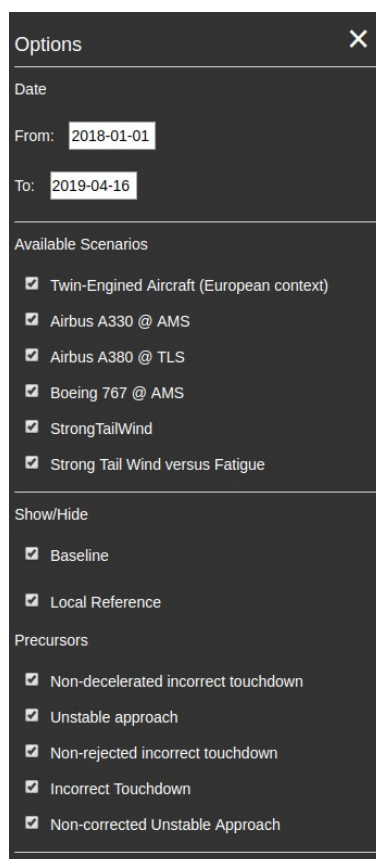
3.4. Options Menu

When seeing a Risk Dashboard, the user can edit some aspects of the results being displayed. All the available options are part of the Options menu. To access this menu the user has to click the three-line icon (also known as the “hamburger menu” icon), in the title bar, as presented in Figure 8 below.



Figure 8 - The Options menu icon

When clicking on this button it is presented the Option menu area show on the left side of the window.
The option menu is displayed as in Figure 9 .



The screenshot shows a dark-themed 'Options' dialog box with a close button (X) in the top right corner. The dialog is organized into several sections, each with a title and a list of items, many of which are preceded by a checked checkbox. The sections are: 'Date' with 'From: 2018-01-01' and 'To: 2019-04-16'; 'Available Scenarios' with six items: 'Twin-Engined Aircraft (European context)', 'Airbus A330 @ AMS', 'Airbus A380 @ TLS', 'Boeing 767 @ AMS', 'StrongTailWind', and 'Strong Tail Wind versus Fatigue'; 'Show/Hide' with two items: 'Baseline' and 'Local Reference'; and 'Precursors' with five items: 'Non-decelerated incorrect touchdown', 'Unstable approach', 'Non-rejected incorrect touchdown', 'Incorrect Touchdown', and 'Non-corrected Unstable Approach'.

Figure 9 - Options menu

3.4.1. Date

The first option available is the Date option. By selecting the Date “From” and Date “To”, the user can select the date range for which to show the saved results.

The user can select each of these dates by manually typing the new value or, as shown in Figure 10, picking the desired date from the calendar.

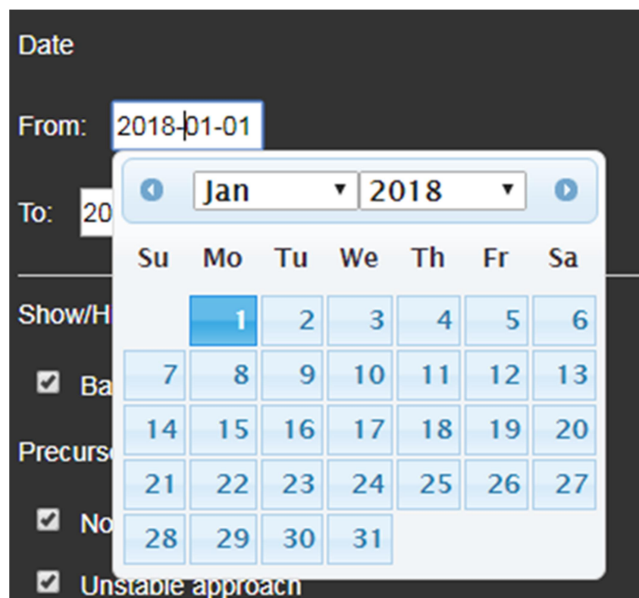


Figure 10 - Picking a date from the calendar

3.4.2. Show/Hide

The Show/Hide elements in the option area, as depicted in Figure 11, allows the user to select which graphical elements to be drawn in the chart area.

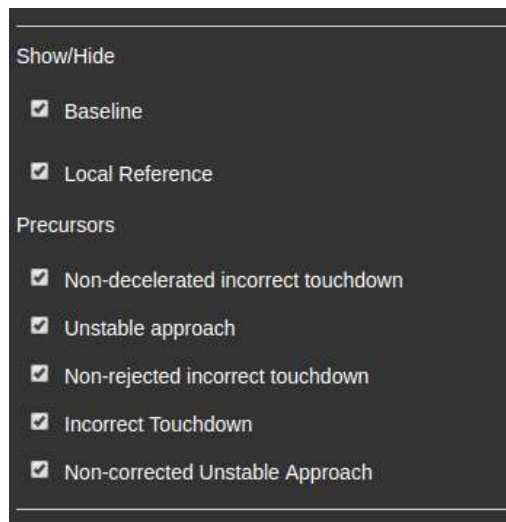


Figure 11 - Show/hide elements in the Risk Dashboard

The user can decide to show or hide the:

- **Baseline:** The baseline is a line drawn in every chart, showing the default result for the event in analysis. It gives a quick visual understanding of how the results in analysis compare to the default values.
- **Precursors:** Precursors are hazardous situations such as the exposure to a barrier or the lack of barrier efficiency. For each model, there are a set of Precursors. The user can select which he wants to be drawn in the main area of the dashboard.

4 WHAT IF SCENARIO

4.1. What If functionality inside the RO

The “What if?” functionality allows the user to set specific conditions for all the available variables for each risk model. The objective is to simulate new scenarios and to be able to compare the result against the baseline and previously saved results. This functionality is available through the “What if?” button present in the main menu. After accessing this item on the main menu, the user will be driven to a dedicated page, as shown in Figure 12.

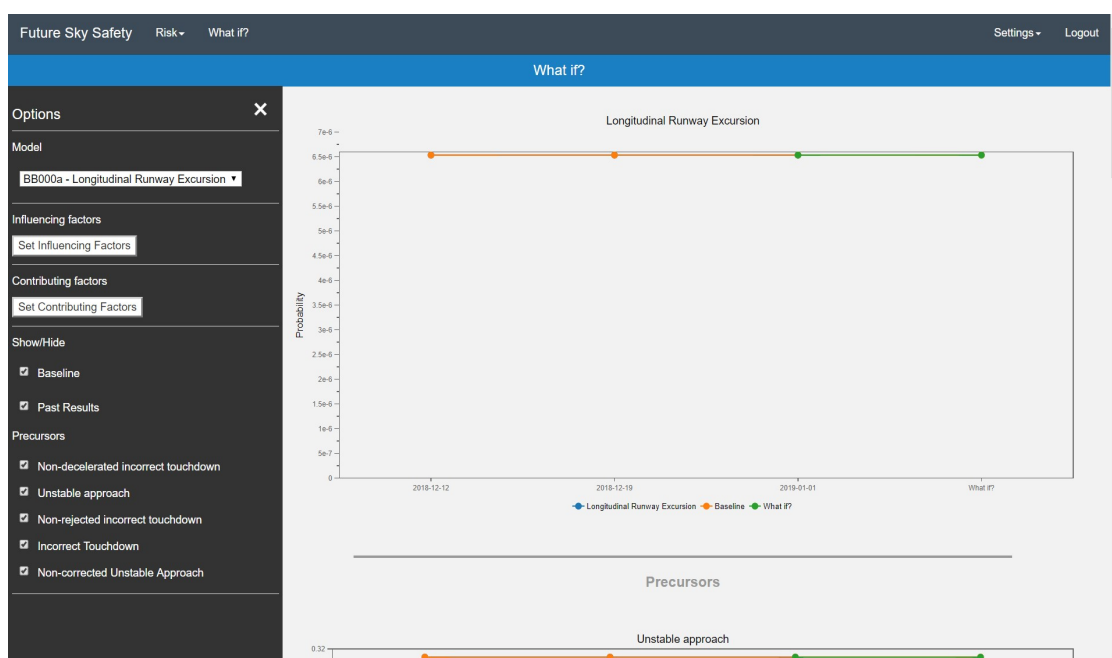


Figure 12 - What If dashboard

As in the other dashboards, the “What if?” page is divided in two vertical spaces: the larger area on the right side is the main area, in which the results of the configurations set by the user will be shown and the smaller section on the left side of the window is the Options menu.

4.2. Options menu

The “Options” menu is where the configurable options are presented to the user. Figure 13 shows the menu and the following points will describe in detail each option.

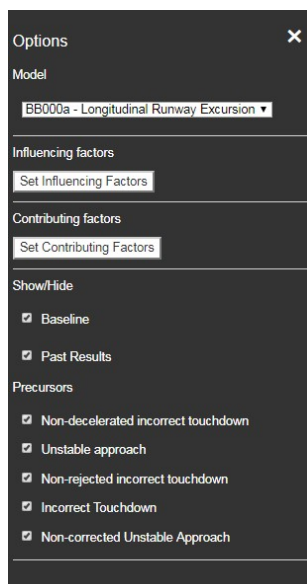


Figure 13 - "What if?" options menu

4.2.1. Model

Using the drop-down menu, the user can select amongst the models available, the one that better fits the risk the user wants to test and analyse. Figure 14 illustrates how to select a different model.

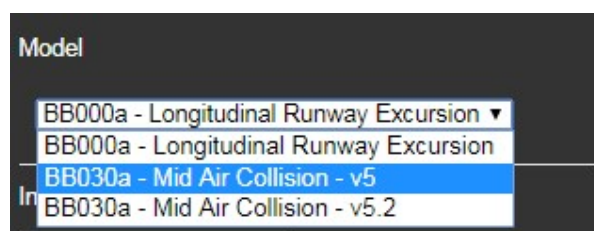


Figure 14 - Model selection for the "What if?" scenario

After selecting a different model from the one previously selected, the remainder options will be adjusted to the new model. Any unsaved data will be lost.

4.2.2. Set Influencing Factors

An Influencing Factor (IF) is an element that may affect the frequency of occurrence of one or several contributor factors or precursors involved in a given risk.

By accessing the “Set Influencing Factors” button, as shown in Figure 15, present in the option menu, the user can set the particular conditions for each influencing factor relevant for the selected risk model.

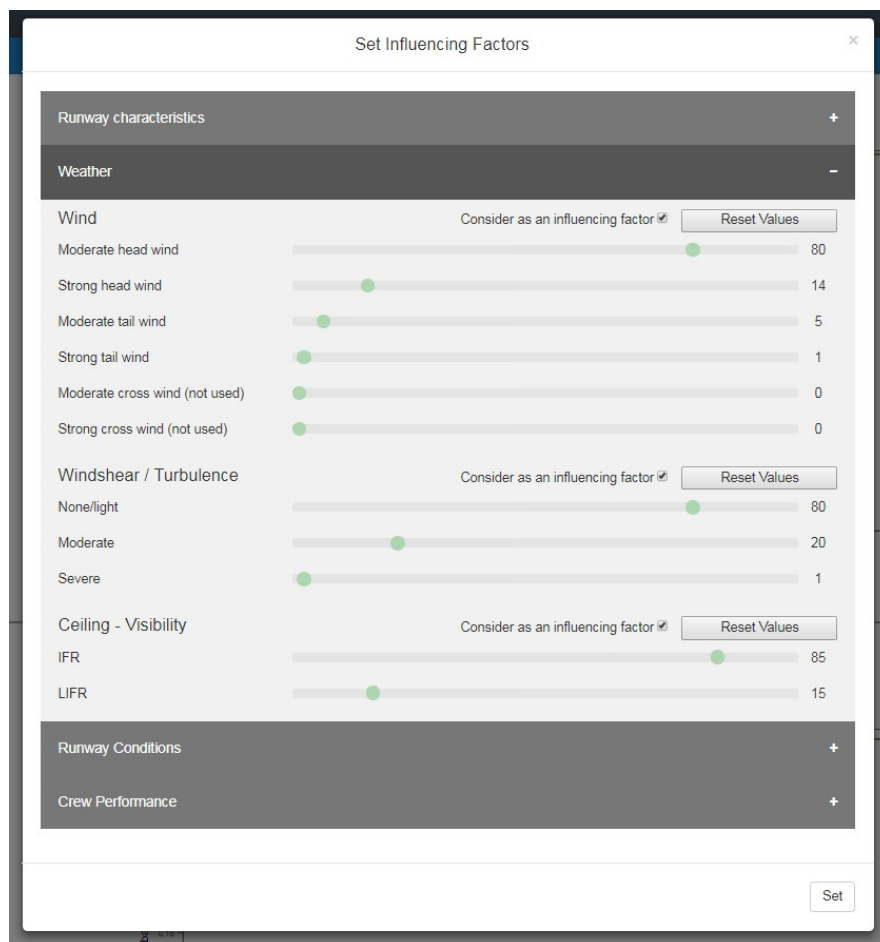


Figure 15 - Set influencing factors button

Within the “What if?” functionality, the user is able to change the rate of occurrence for each IF value or to discard the influence of the selected factor for the calculation of the risk scenario. Figure 16 shows the pop-up area where the user can interact with the IF.

This example shows the clusters related with the risk of Longitudinal Runway Excursion, the cluster “Weather conditions” is highlighted. This cluster gathers several IFs that reflect the influence of various possible bad weather conditions. Within this option, the user can set the rate of occurrence for each IF value, by dragging the green circle, or to toggle the checkbox whether he wants to consider the IF in the scenario. The button “Reset Values” available in each IF restores the rate of occurrence of each value to the default.

When the setting of the IF values is complete, the “Set” button on the bottom of the pop up area needs to be pressed to make the results reflect the new values. When clicked, the button will close the pop-up area, and the main area of the dashboard will reload the charts, reflecting the new conditions.



The screenshot shows a web interface titled "Set Influencing Factors". It contains several sections for adjusting values:

- Runway characteristics** (collapsed, indicated by a '+' icon)
- Weather** (expanded, indicated by a '-' icon)
 - Wind**
 - Consider as an influencing factor: ☒ Reset Values
 - Moderate head wind: slider at 80
 - Strong head wind: slider at 14
 - Moderate tail wind: slider at 5
 - Strong tail wind: slider at 1
 - Moderate cross wind (not used): slider at 0
 - Strong cross wind (not used): slider at 0
 - Windshear / Turbulence**
 - Consider as an influencing factor: ☒ Reset Values
 - None/light: slider at 80
 - Moderate: slider at 20
 - Severe: slider at 1
 - Ceiling - Visibility**
 - Consider as an influencing factor: ☒ Reset Values
 - IFR: slider at 85
 - LIFR: slider at 15
- Runway Conditions** (collapsed, indicated by a '+' icon)
- Crew Performance** (collapsed, indicated by a '+' icon)

A "Set" button is located at the bottom right of the interface.

Figure 16 - Area for setting the IF values

At the left of each IF, there is an info button – “i”, that when clicked, presents the user the full description of that specific parameter, as presented in Figure 17.

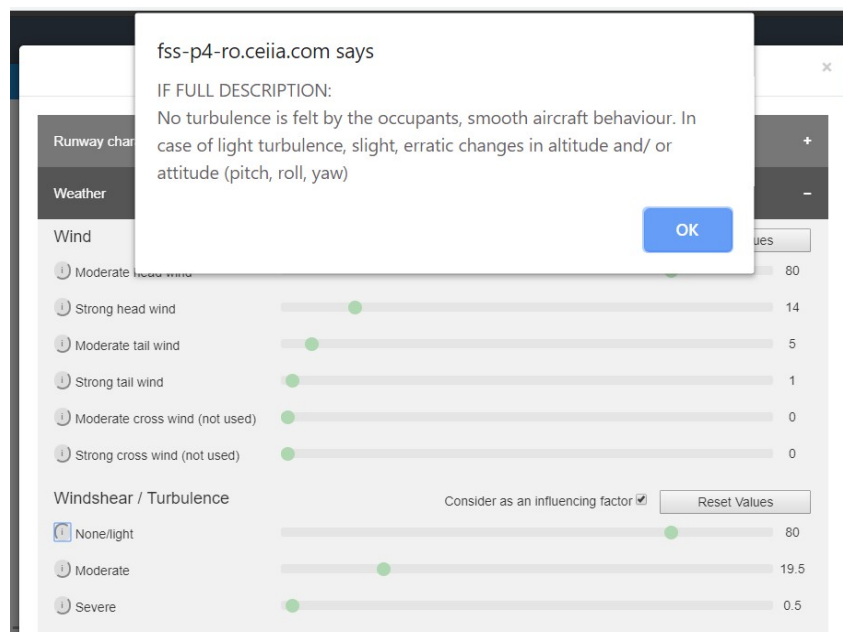


Figure 17 – IF Full Description

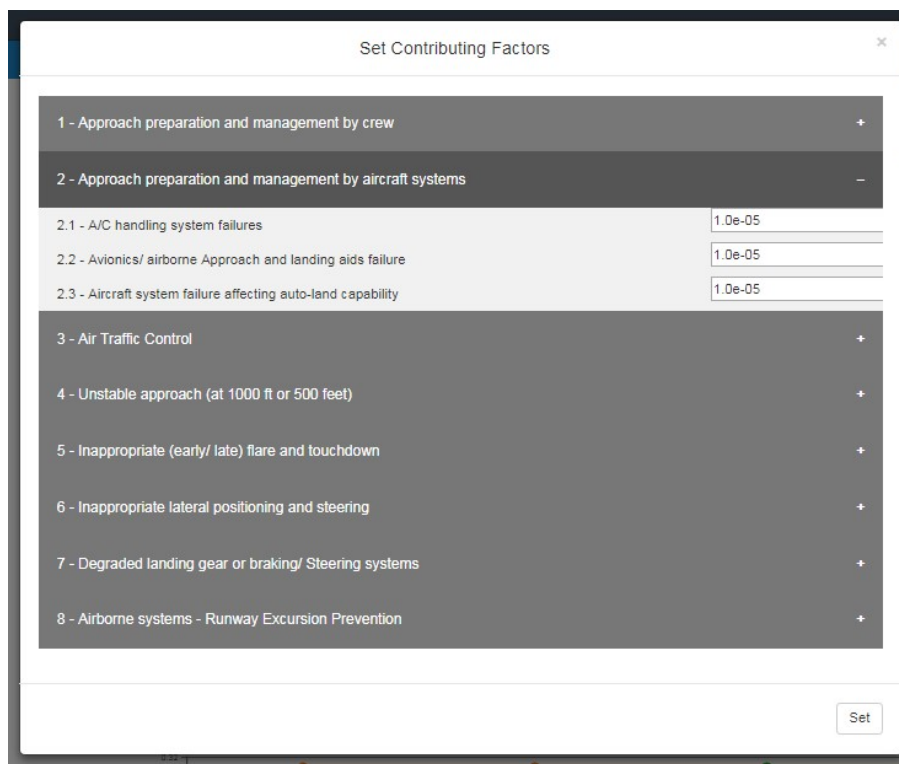
When the setting of the IF values is complete, the “Set” button at the bottom of the pop up area needs to be pressed to make the results reflect the new values. When clicked, the button will close the pop-up area, and the main area of the dashboard will reload the charts, reflecting the new conditions.

4.2.3. Set Contributing Factors

Contributing Factors are elements contributing to the occurrence of a specific (safety) event. A contributing factor can be a technical causing factor or human errors (flight crew, ATCOs). The “What if?” functionality offers the user the possibility to set different default rates of occurrences for each contributing factor for the model in analysis. The user can access the button “Set Contributing Factors”, as pictured in Figure 18, to modify these values.



Figure 18 - Set contributing factors



Contributing Factor	Value
1 - Approach preparation and management by crew	+
2 - Approach preparation and management by aircraft systems	-
2.1 - A/C handling system failures	1.0e-05
2.2 - Avionics/ airborne Approach and landing aids failure	1.0e-05
2.3 - Aircraft system failure affecting auto-land capability	1.0e-05
3 - Air Traffic Control	+
4 - Unstable approach (at 1000 ft or 500 feet)	+
5 - Inappropriate (early/ late) flare and touchdown	+
6 - Inappropriate lateral positioning and steering	+
7 - Degraded landing gear or braking/ Steering systems	+
8 - Airborne systems - Runway Excursion Prevention	+

Figure 19 - Area for setting contributing factors values

After clicking on the “Set Contributing Factors” button, a central area, as shown in Figure 19, pops-up allowing the user to modify the default rate of occurrence established for each CF affecting the risk in analysis. The CFs are grouped in clusters and can be edited by expanding the corresponding cluster and manually modifying the value present in the respective text box.

4.2.4. Show/ Hide

The Show/Hide elements in the options area, as depicted in Figure 20, allows the user to select which graphical elements he wants to be drawn in the chart area.

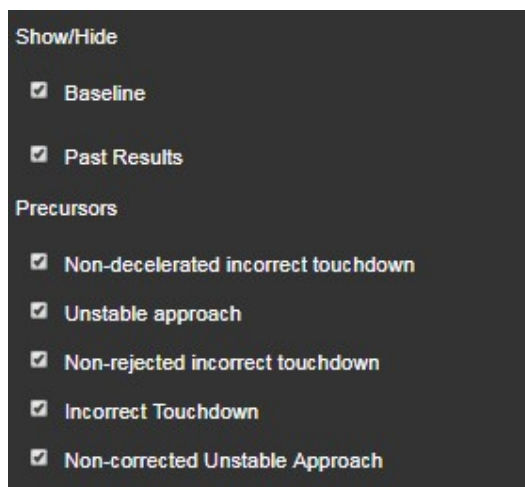


Figure 20 - Show/Hide elements in the What if? page

The user can decide to show or hide the:

- **Baseline:** The baseline is a line drawn in every chart, showing the default result for the event in analysis. It gives a quick visual understanding of how the results in analysis compare to the default values.
- **Precursors:** Precursors are hazardous situations such as the exposure to a barrier or the lack of barrier efficiency. For each model, there are a set of Precursors. The user can select which precursor view to be drawn in the main area of the dashboard.

4.3. Main area

In the main area of the 'What if?' dashboard, the user may find the results of the calculations based on the selected options. This area will be updated whenever an option or input value is changed. This area is composed of several line charts: one on the top, reflecting the risk calculation for the risk scenario in analysis, and, separated by a horizontal line, a set of other charts will reflect the precursors that are selected to be shown, as described in 4.2.4. Each chart will have, depending on the options selected, three series colored as illustrated in Figure 21: baseline, past results and 'What if?'.

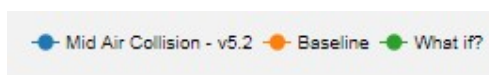


Figure 21 - What if? chart series

5 SETTINGS MENU FUNCTIONS

When clicked on the main “Settings” function, the menu as shown in Figure 22 is presented. The functions presented there will be explained next.

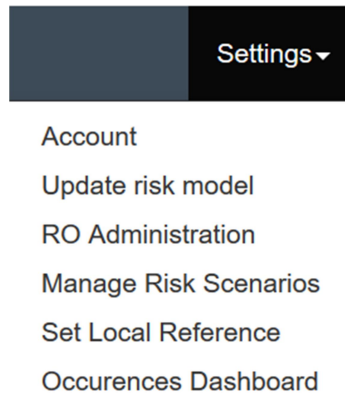


Figure 22 – Functionalities present under Setting

5.1. Account

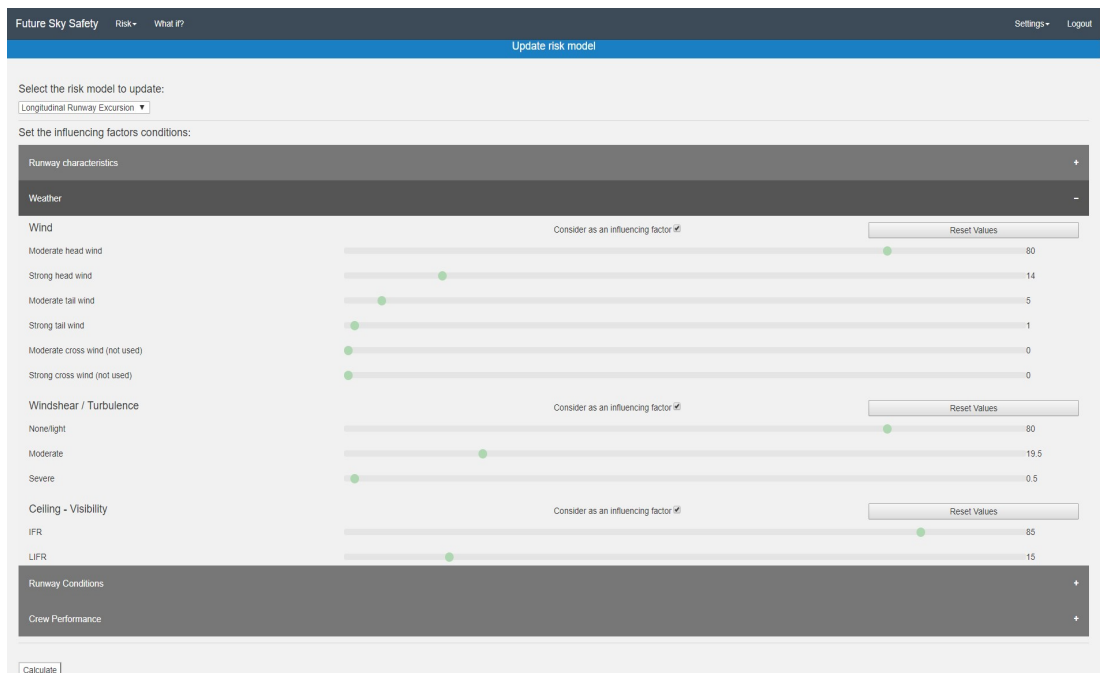
When clicked on the functions that relate to the “Account” where the master user has access and can arrange the user access. Users can be added or deleted from RO access and (local) user access rights can be arranged.

5.2. Updated Risk Model

The users with the role of “Administrator” can update the available risk models. The user may need to update the risk model to better reflect the overall conditions in analysis in a given period. It is also intended to have regular updates, in order to be possible to reflect an historical perspective over the evolution of a specific risk in the risk dashboard.

The option may be accessed through the “Settings” item, as pictured in Figure 22.

To update a model, the screen shown in Figure 23 will be presented. Here, the user must select the model to update, and it will be possible to edit the influencing factor conditions, so that it can reflect the context in analysis.



Future Sky Safety Risk What if? Update risk model Settings Logout

Select the risk model to update:
Longitudinal Runway Excursion

Set the influencing factors conditions:

Runway characteristics

Weather

Wind

Moderate head wind 80

Strong head wind 14

Moderate tail wind 5

Strong tail wind 1

Moderate cross wind (not used) 0

Strong cross wind (not used) 0

Windshear / Turbulence

None/light 80

Moderate 19.5

Severe 0.5

Ceiling - Visibility

IFR 85

LIFR 15

Runway Conditions

Crew Performance

Calculate

Figure 23 - Update risk model page

After completing the setting of the relevant IF conditions, the user may select the Calculate button, so that the computation may be triggered. When completed, a table previewing the results from the computation is shown as displayed in Figure 23. If the user finds the results acceptable, they can be saved and related to a specified date and time for future reference and display in the risk dashboard, as also shown in the same Figure 23. However, if the user is not happy with the results obtained, the process described in this section can be repeated.

5.3. RO administration

When selecting “RO administration” access will be provided to the (light) Pentaho work environment.

Pentaho is a business intelligence software environment that provides data integration tools. It is a business analytics platform. Thus here data sources can be managed and databases can be created, renewed, deleted etc., also templates for viewing and for creating reporting documents can be set up. As well as graphical aspects can be set up for the home page, etc. However it requires in-depth knowledge of the Pentaho environment and ways of coding for it, see ref. [11].

As a result from stakeholder consultations and stakeholder’s feedback, see Ref.[10], a few additional functionalities were incorporated into the prototype under the main “Settings” menu, see Figure 22.

This relates to :

- Manage Risk Scenarios
- Set Local Reference
- Occurrence Dashboard

Details on these functionalities will be provided next.

5.4. Manage Risk Scenarios

Accessible from the Settings menu, the “Manage Risk Scenarios” area opens, allows the user to

- view a list of risk scenarios already defined for the selected model;
- update the existing scenarios;
- create new scenarios. (a step-by-step description can be found in Appendix A).

Figure 24 shows an example of the Manage Risk Scenarios page. Already created scenarios shown can be re-used via the option “update risk scenario” on the right side of the scenario.

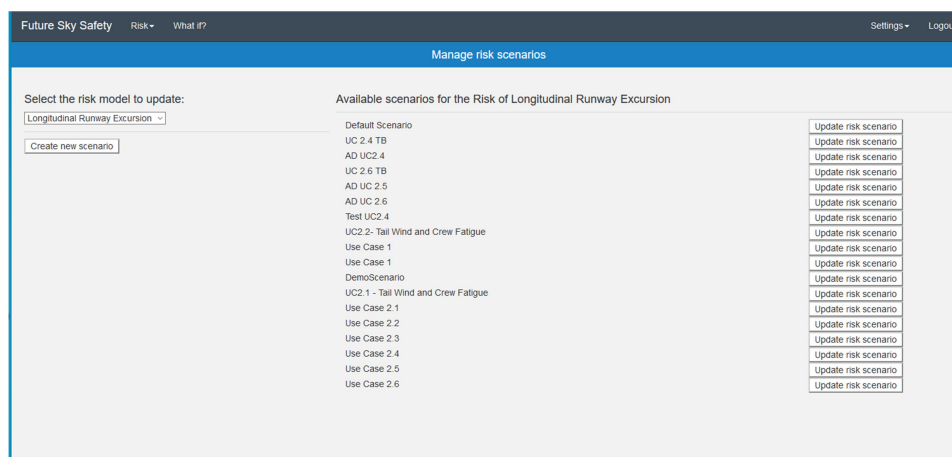


Figure 24 – Manage Risk Scenario – after opening

Or, alternatively this gives the opportunity to select the risk model of interest (I.e. RE or MAC) and to create a fully new scenario dedicated to the interest of the user (see menu options at left upper part).

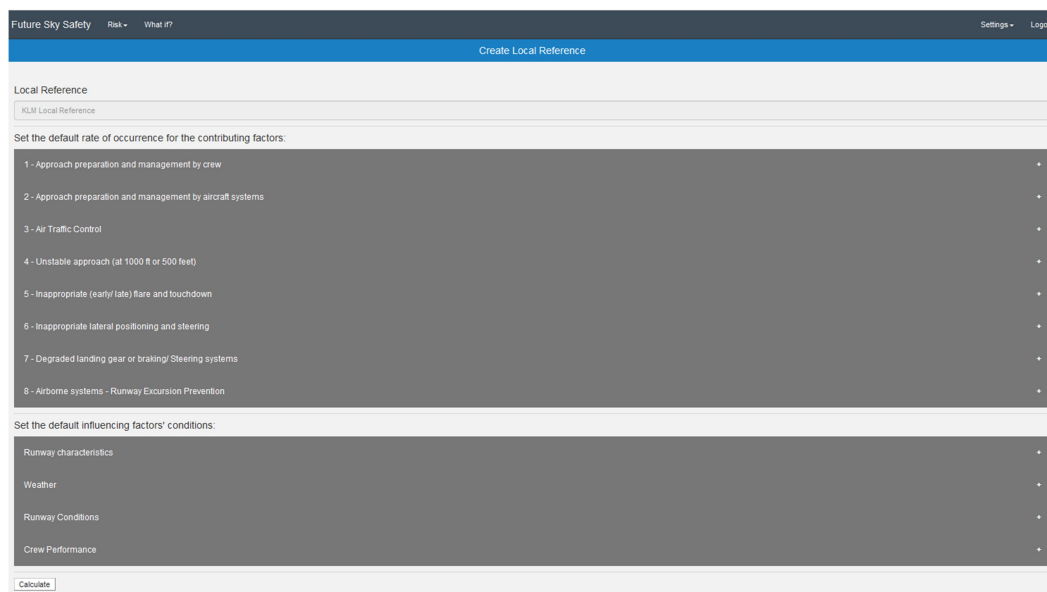
Appendix A shows step-by-step how to create a new Risk scenario.

5.5. Set Local Reference

The default values that the RO risk model uses are stored in the so-called “baseline” set up. Hence the RO uses these baseline values. However, for the RO-users it might be important to be able to deviate from these baseline (default) values used inside and with the RO models. KLM and Airbus have expressed so specifically, see Ref.[10]. Hence it was decided to add this new functionality to the RO.

Accessible from the Settings menu, the “Create Local Reference” function allows the user to modify the initial weights i.e. to set up a “Local Reference” in addition to this baseline. Hence to define the “Local Reference” the user should configure Contributing Factors and Influencing Factors.

It works in a similar way as creating a new scenario (see previous paragraph and Appendix A). Once the function is activated the screen opens as indicated below in Figure 25.



The screenshot shows a web application interface for 'Future Sky Safety'. The top navigation bar includes 'Future Sky Safety', 'Risk', 'What if?', 'Settings', and 'Logout'. The main heading is 'Create Local Reference'. Below this, there is a section for 'Local Reference' with a text input field labeled 'KLM Local Reference'. The interface is divided into two main sections: 'Set the default rate of occurrence for the contributing factors:' and 'Set the default influencing factors' conditions:'. The first section contains a list of 8 contributing factors, each with a plus icon to its right. The second section contains a list of 4 influencing factors, each with a plus icon to its right. At the bottom, there is a 'Calculate' button.

Set the default rate of occurrence for the contributing factors:	
1 - Approach preparation and management by crew	+
2 - Approach preparation and management by aircraft systems	+
3 - Air Traffic Control	+
4 - Unstable approach (at 1000 ft or 500 feet)	+
5 - Inappropriate (early/late) flare and touchdown	+
6 - Inappropriate lateral positioning and steering	+
7 - Degraded landing gear or braking/ Steering systems	+
8 - Airborne systems - Runway Excursion Prevention	+

Set the default influencing factors' conditions:	
Runway characteristics	+
Weather	+
Runway Conditions	+
Crew Performance	+

Calculate

Figure 25 – Create Local reference

The Local Reference can be provided with a self-chosen name (in upper left corner). Own values (company sets of data) for the contributing and /or influencing factors can be inserted and after pressing the “calculate function” it can be saved and re-used again like also explained in Appendix A.

5.6. Occurrence Dashboard

At the moment this function only demonstrates the occurrence viewing potential. The example presented below in Figure 26 relates to overviewing occurrence data for the SPI “short” landings. But the Pentaho database programming tools can be used to couple more data from databases and new occurrence dashboard overviews, when desired.

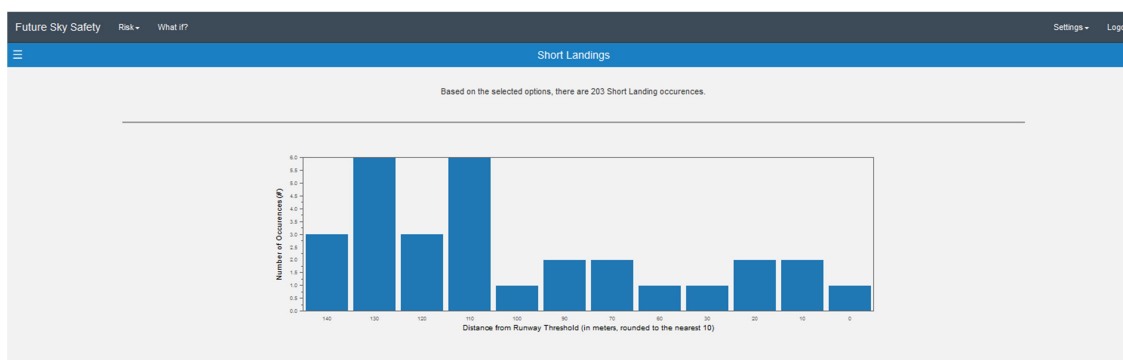


Figure 26 – Occurrence Dash board (SPI example)

6 CONCLUSIONS

This document produces a user guide on how to use the RO prototype. The navigation logic tries to remain simple and homogeneous throughout all the features in the platform, while providing all the required options and functionalities. The document explains, step by step, the major features and options, decreasing the learning curve for any user to analyse and explore the available safety information. The document reflects the latest version of the RO prototype, denoted as release 2.

7 REFERENCES

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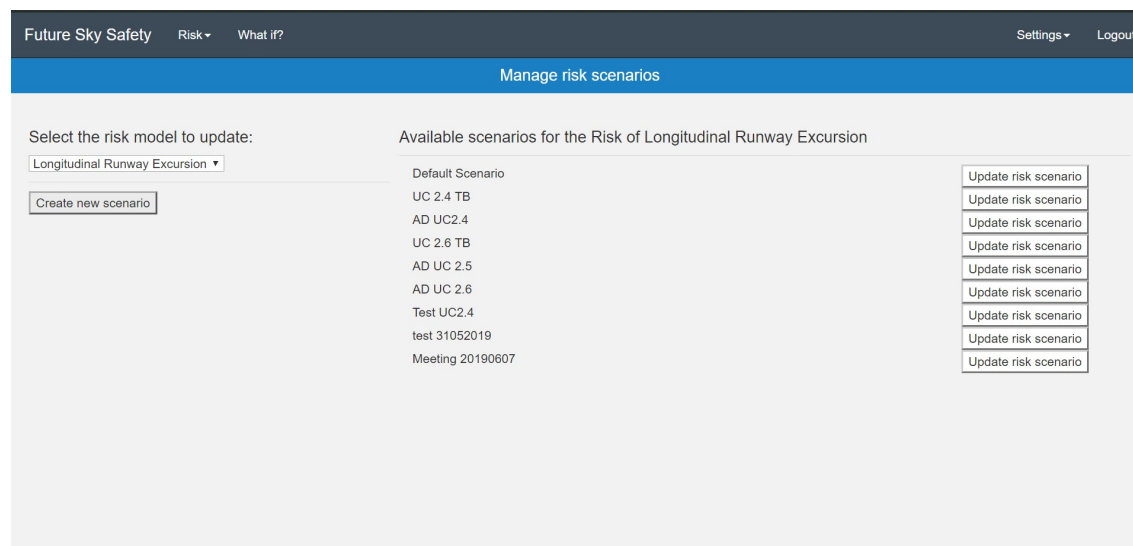
APPENDIX A – CREATE NEW RISK SCENARIO STEP-BY-STEP

1. Access the “Manage Risk Scenarios” page, by clicking: Settings -> Manage Risk Scenarios;



Figure 27 – Create new risk scenario – step 1

2. On the top left corner of the page press the button “Create new scenario”;



The screenshot shows the 'Manage risk scenarios' page. The top navigation bar includes 'Future Sky Safety', 'Risk', 'What if?', 'Settings', and 'Logout'. The main content area has a header 'Manage risk scenarios'. Below this, there is a section 'Select the risk model to update:' with a dropdown menu set to 'Longitudinal Runway Excursion' and a 'Create new scenario' button. To the right, there is a section 'Available scenarios for the Risk of Longitudinal Runway Excursion' with a list of scenarios: 'Default Scenario', 'UC 2.4 TB', 'AD UC2.4', 'UC 2.6 TB', 'AD UC 2.5', 'AD UC 2.6', 'Test UC2.4', 'test 31052019', and 'Meeting 20190607'. On the far right, there is a vertical list of 'Update risk scenario' buttons for each scenario.

Figure 28 – Create new risk scenario – step 2

- Set the name of new scenario. It's also possible to consult scenarios tree info by pressing the button with that name;

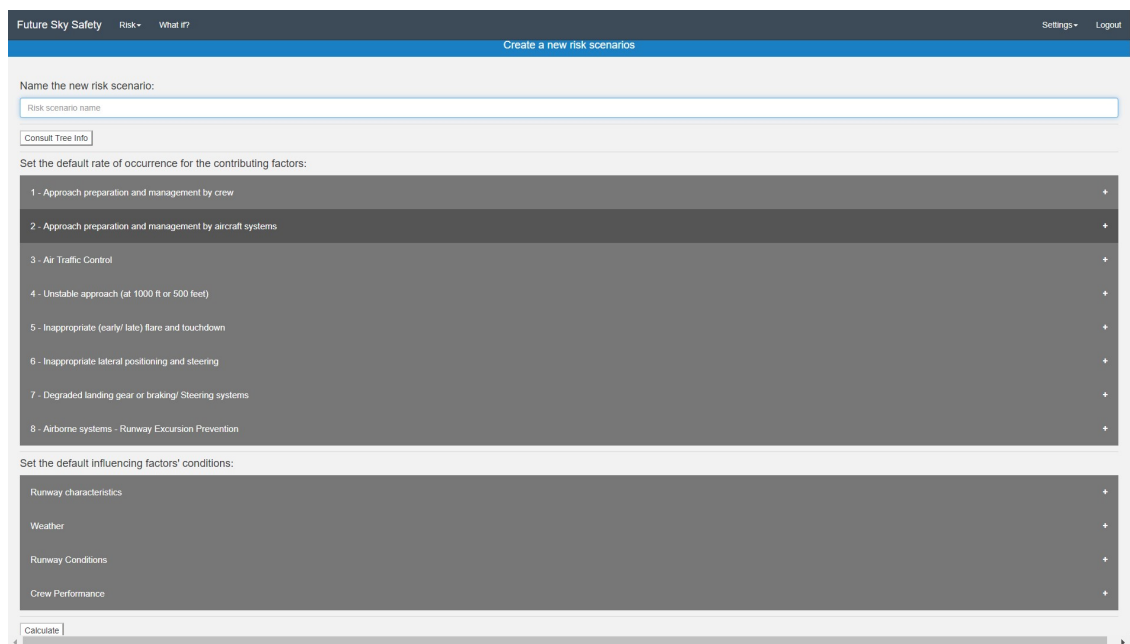
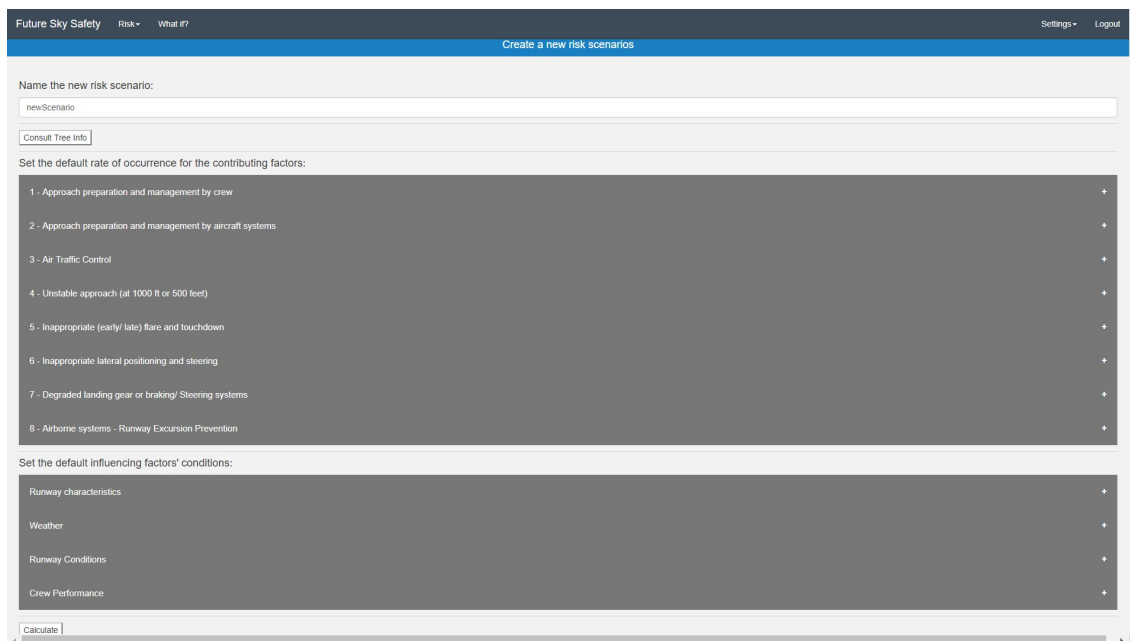


Figure 29 – Create new risk scenario – step 3

- Set up the Contributing Factors and the Influencing Factors;



Future Sky Safety Risk What if? Settings Logout

Create a new risk scenarios

Name the new risk scenario:

newScenario

Consult Tree Info

Set the default rate of occurrence for the contributing factors:

- 1 - Approach preparation and management by crew
- 2 - Approach preparation and management by aircraft systems
- 3 - Air Traffic Control
- 4 - Unstable approach (at 1000 ft or 500 feet)
- 5 - Inappropriate (early/ late) flare and touchdown
- 6 - Inappropriate lateral positioning and steering
- 7 - Degraded landing gear or braking/ Steering systems
- 8 - Airborne systems - Runway Excursion Prevention

Set the default influencing factors' conditions:

- Runway characteristics
- Weather
- Runway Conditions
- Crew Performance

Calculate

Figure 30 – Create new risk scenario – step 4

5. By clicking the “Calculate” button a table summing up the new scenario results will be presented;



Future Sky Safety Risk What if? Settings Logout

5 - Inappropriate (early/ late) flare and touchdown

6 - Inappropriate lateral positioning and steering

7 - Degraded landing gear or braking/ Steering systems

8 - Airborne systems - Runway Excursion Prevention

Set the default influencing factors' conditions:

- Runway characteristics
- Weather
- Runway Conditions
- Crew Performance

Calculate

Results

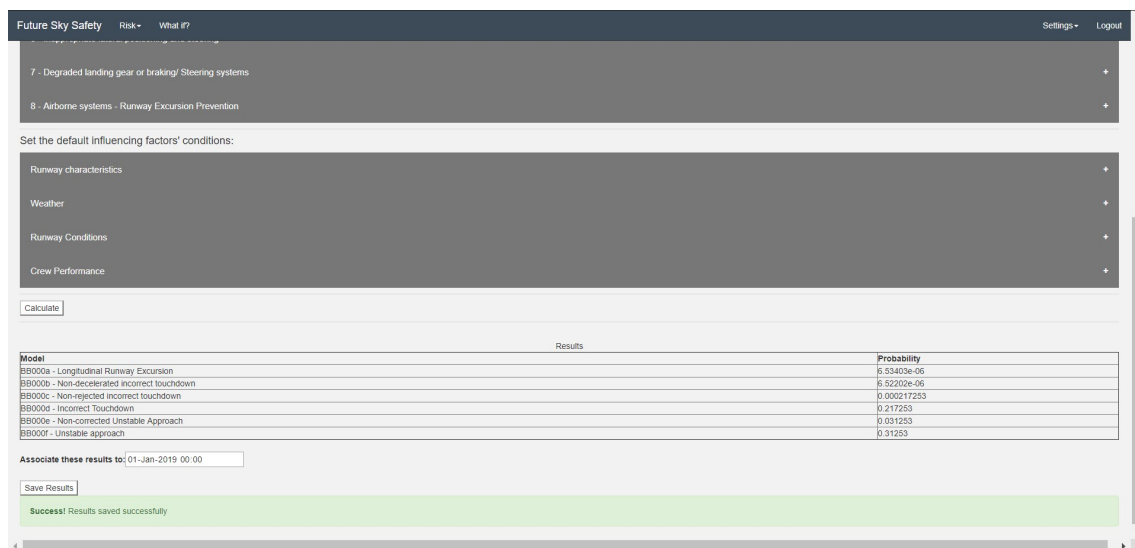
Model	Probability
BB000a - Longitudinal Runway Excursion	6.53403e-06
BB000b - Non-decelerated incorrect touchdown	6.52202e-06
BB000c - Non-rejected incorrect touchdown	0.000217253
BB000d - Incorrect Touchdown	0.217253
BB000e - Non-corrected Unstable Approach	0.031253
BB000f - Unstable approach	0.31253

Associate these results to: 01-Jan-2019 00:00

Save Results

Figure 31 – Create new risk scenario – step 5

- By associating the results to a date and pressing “Save results” button, a success message will be presented;



Future Sky Safety Risk - What if? Settings Logout

7 - Degraded landing gear or braking/ Steering systems

8 - Airborne systems - Runway Excursion Prevention

Set the default influencing factors' conditions:

Runway characteristics

Weather

Runway Conditions

Crew Performance

Calculate

Model	Results	Probability
BB000a - Longitudinal Runway Excursion		P 33403e-06
BB000b - Non-decelerated incorrect touchdown		P 52202e-06
BB000c - Non-rejected incorrect touchdown		0.000217253
BB000d - Incorrect Touchdown		0.217253
BB000e - Non-corrected Unstable Approach		0.031253
BB000f - Unstable approach		0.31253

Associate these results to: 01-Jan-2019 00:00

Save Results

Success! Results saved successfully

Figure 32 – Create new risk scenario – step 6

- The new scenario will be displayed on the correspondent model on the “Manage Risk Scenarios” page. See Figure 33.

Future Sky Safety
Risk
What if?
Settings
Logout

Manage risk scenarios

Select the risk model to update:

Longitudinal Runway Excursion

Create new scenario

Available scenarios for the Risk of Longitudinal Runway Excursion

Default Scenario
UC 2.4 TB
AD UC2.4
UC 2.6 TB
AD UC 2.5
AD UC 2.6
Test UC2.4
test 31002019
Meeting 20190607
newScenario

Update risk scenario
Update risk scenario
Update risk scenario
Update risk scenario
Update risk scenario
Update risk scenario
Update risk scenario
Update risk scenario
Update risk scenario
Update risk scenario

Figure 33 – Create new risk scenario – step 7