



SESAR PJ.03b-05 V3 COST BENEFITS ANALYSIS (CBA)

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SAFE

SAFER AIRPORTS AND FLIGHTS FOR EUROPE

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Abstract

This document provides, along with the attached CBA Model spreadsheet, the Cost Benefit Analysis (CBA) for SESAR Project PJ03b - Solution 05 – Traffic Alerts for Pilots for Airport Operations. The CBA forms part of the data pack supporting the V3 maturity gate session. The document defines first the objective and the scope of the CBA according to the main concepts defined previously in SPR/OSED. Next chapters are dedicated to costs of implementing the Solution and benefits.

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1 Executive Summary

This document provides the Cost Benefit Analysis (CBA) related to a SESAR Solution PJ03b-05 that has been validated during validation activities at a V3 level and forms part of the data pack supporting the V3 maturity gate session. Its objective is to provide information on the costs and benefits of deploying Solution PJ03b-05 in an ECAC-level CBA Scenario to show the interest of the solution developed in PJ03b-05 in order to improve safety by reducing risks of collision between aircraft on airports.

Both runway and taxiway topics are concerned, covered respectively by the following Operational Improvement (OI) steps:

- AUO-0605 “Traffic Alerts for Pilots during Runway Operations”
- AUO-0615 “Traffic Alerts for Pilots during Taxiway Operations”

This CBA does not provide an NPV or a payback year, as it is not possible to precisely quantify safety benefits for extremely rare events.

2 Introduction

2.1 Purpose of the document

This document provides the Cost Benefit Analysis (CBA) for SESAR Solution PJ03b-05, “Traffic Alerts for Pilots for Airport Operations” at V3 level. The analysis provides only qualitative elements apart from reference to incidents/accidents.

2.2 Scope

- **Solution scope:**

As a result of increasingly busy airports, safe runway operation is one of the highest challenges for aviation safety. All main aviation bodies (e.g. IATA, ICAO, CANSO, ACI, EASA, FAA & EUROCONTROL) identify runway incursion as a major safety threat.

Safety has been improved thanks to airport surface management systems: A-SMGCS is available on many major airports and ground safety nets (e.g. RWSL) start to be deployed. However, these systems are not expected to fully resolve the runway incursion risk and are not envisaged to be deployed at smaller airports. Incursion rate remains steady (~3/100.000 operations – IATA STEADES database) and events continue to occur (28 near collisions last 5 years – EASA European Plan for Aviation Safety 2018).

As stated above with increasing traffic on airports there is also an intent to improve the safety on taxiways.

The solution 03b-05 “Traffic Alerts for Pilots for Airport Operations” addresses a safety threat, i.e. the risk of collision between aircraft on the surface.

- **CBA scope:**

CBA results will be presented at the aggregated overall level and individually from the viewpoint of the impacted stakeholder groups, i.e. the stakeholders that will have to invest and will mainly benefit from the solution:

- ✓ Airport operators;
- ✓ ANSPs;
- ✓ Airspace users (Airline);
- ✓ Airspace users (Flight crew);
- ✓ Aircraft manufacturer;
- ✓ Airspace users (Crew attendants)
- ✓ Passengers

This CBA does not provide CBA results for specific local deployments or individual entities or companies.

- **General approach for CBA:**

The purpose of this CBA is to demonstrate that compared with dramatic consequences of accidents caused by collisions on runway (taxiway), the implementation of PJ03b-05 is relatively simple.

Cost: The airborne industry will not share the development costs (non-recurring costs), the production costs (recurring costs) or option prices of the systems, because it is neither defined nor sharable across stakeholders. Hence, in this CBA a high-level qualitative approach is proposed for the costing part (easy retrofitting, software update...)

Benefits: costs linked to a major runway collision are huge (hulls' losses, passenger insurances costs, closing of airport for long period...). It can be hundreds of millions of €.

Benefits following from addressing taxiway collisions can includes impacts as aircraft damages, delays, jammed traffic flow management, airport and taxiway system throughput, missed time slots, reputation, insurance and other.

The Safety Assessment Report (D4.1.190 - SESAR PJ03b-05 V3 OSED-SPR-INTEROP part II) explains the contribution of PJ03B05 to the reduction of taxiway/runway collision risk (e.g. 17% for runway). Multiplying this 17% risk reduction with the number & cost of collisions will not be done, because it is fortunately impossible to draw robust statistics on runway collisions (3 major collision in the aviation history).

However, some statistics of runway incursion increase and impact of SURF-A/ITA, TWY-ITA are provided throughout the document.

2.3 Intended readership

This document is mainly intended to be read by project PJ03b-05 partners concerned by “Traffic alerts for pilots for airport operations” and its validation. It is also of interest at the level of PJ03b “Safer Airports and Flights for Europe” as well as at the level of PJ03a “Integrated Surface Management”.

- a) Internal to PJ03b-05 “Traffic alerts for pilots for airport operations”
- b) Internal to SESAR 2020 and external to Solution PJ03b-05:
 - a. The project members concerned by future function development and standardization,
 - b. Involved PCIT and EPMB members
 - c. PJ03a , PJ19 and PJ22 projects
- c) External to SESAR
 - a. Avionics systems and subsystems designers
 - b. Avionics equipment suppliers
 - c. Airlines, Business Aviation, Flight Crew
 - d. Air Traffic Centre, ATM designers and controllers

2.4 Structure of the document

The structure of this CBA is as follows:

- **Section 1 contains a brief Executive Summary, by providing the main context and content of the solution document,**
- **Section 2** (the present section) provides general information on the document.

- **Section 3** describes the scope and objectives of the CBA.
- **Sections 4 and 5** detail, respectively, the benefits and the costs.
- **Sections 6** provides with the main references sources with the document has built up.

2.5 Background

The project PJ03b-05 is subsequent to the SESAR1 project 09.14 for mainline and business aircraft. No prior CBA have been conducted during SESAR 1 project 09.14 for mainline and business aircraft.

The solution is targeting a V3 maturity in wave 1.

Surface Alert concepts have been validated. Within PJ03B05, real prototypes have been used to demonstrate the airborne architecture works well. Human performance aspects including human-machine-interface have also been confirmed during evaluation and flight tests. In addition, large amount of ADS-B data were collected on revenue flights within PJ28-WP3 and allowed a pre-validation in real airline operational conditions.

2.6 Glossary of terms

Term	Definition	Source of the definition
Net Present Value	Net Present Value (NPV) is the sum of all discounted cash inflows and outflows during the time horizon period.	<i>Investopedia</i>
Cost Benefit Analysis	A Cost Benefit Analysis is a process of quantifying in economic terms the costs and benefits of a project or a program over a certain period, and those of its alternatives (within the same period), in order to have a single scale of comparison for unbiased evaluation.	<i>SESAR 1</i>
Business Case	A Business Case is a neutral financial tool that helps decision makers to compare an investment with other possible investments and/or to make a choice between different options / scenarios and to select the one that offers the best value for money while considering all the key criteria for the decision.	<i>SESAR 1</i>
Time Horizon	Time horizon refers to a definite time period during which all cost and benefits related to a given project occur.	<i>SESAR 1 - ATM CBA for Beginners</i>
Stakeholder	Stakeholders are organizations and entities who will have to pay for or will be impacted by the project directly or indirectly.	<i>SESAR 1 - ATM CBA for Beginners</i>
Discount Rate	Discount Rate is a way to capture the time value of money. This is a percentage that represents the increase in the amount of money needed or estimated to keep the same value as one year ago.	<i>SESAR 1 - ATM CBA for Beginners</i>

Cost mechanisms	Cost mechanisms are a description of the potential costs of the project broken down into relevant cost categories (e.g. investment, operating).	<i>SESAR 1 - ATM CBA for Beginners</i>
Benefit mechanisms	Benefit mechanisms are a cause effect description of the improvement proposed by the project. They show how benefits are delivered.	<i>SESAR 1 - ATM CBA for Beginners</i>
Benefit	Benefit is a positive impact of monetary value to stakeholders.	<i>SESAR 1 - ATM CBA for Beginners</i>
Mobile	A mobile is either an aircraft, aircraft being towed or a vehicle	<i>SESAR 1</i>
Runway Status Light	Runway Status Light is a surveillance driven system that manages automatically new airfield lights set to indicate to Flight Crews and Vehicle Drivers when it is unsafe to enter, use or cross a runway. Those new airfield lights can be composed of Runway Entrance Lights (REL), Take-off Hold Lights (THL) and Runway Intersection Lights (RIL).	<i>SESAR 1</i>

2.7 List of Acronyms

Acronym	Definition
ACC	Area Control Centre
ACI	Airport Council International
ADD	Architecture Definition Document
ADS-B	Automatic Dependent Surveillance - Broadcast
AMAN	Arrival Manager
AN	Availability Note
ANSP	Air Navigation Service Provider
A-SMGCS	Airport Surface Movement Guidance & Control System
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATM	Air Traffic Manager
ATSA-SURF	Air Traffic Situation Awareness SURFace
BIM	Benefit and Impact Mechanism
CANSO	Civil Air Navigation Services Organisation
CBA	Cost Benefit Analysis
EASA	European Aviation Safety Agency
EATMA	European ATM Architecture
ECAC	European Civil Aviation Conference

EIX	Electronic Information Display
EPMB	Extended Project Management Board
EU	European Union
EXE	Exercise
FAA	Federal Aviation Administration
FOC	Final Operating Capability
FT	Flight Trials / Flight Tests
HC	High complexity (airport)
HP	Human Performance
LC	Low complexity (airport)
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IOC	Initial Operating Capability
KPA	Key Performance Area
KPI	Key Performance Indicator
LVC	Low Visibility Conditions
MTOW	Maximum Take-Off Weight
N/A	Not Applicable
NPV	Net Present Value
NRC	Non-recurring costs
OE	Operating Environment
OI	Operational Improvement
OSD	Operational Service and Environment Definition
PAR	Performance Assessment Report
PCIT	Project Content Integration Team
PI	Performance Indicator
PJ	Project
RC	Recurring Costs
RWSL	Runway Status Light
RWY	Runway
SAR	Safety Assessment Report
SESAR	Single European Sky ATM Research Programme

SJU	SESAR Joint Undertaking
SURF-A	Runway Surface Alerts
SURF-ITA	Runway Surface Indications and Traffic Alerts
STEADES	Safety Trends Evaluation, Analysis and Data Exchange System
TAWS	Terrain Awareness and Warning System
TCAS	Traffic alert and Collision Avoidance System
TS	Technical Specification
TWY-ITA	Taxiway Indications and Traffic Alerts
VALP	Validation Plan
VALR	Validation Report

3 Objectives and scope of the CBA

3.1 Problem addressed by the solution

In the airport environment, there can be instances today where conflicting ATC clearances are given to aircraft or where flight crews do not comply with ATC clearances. These situations are generally identified and resolved but can result in last minute and urgent actions for the controllers and/or pilots. This Solution aims to provide the pilots with alerts detecting the risk of collision with another aircraft operating on the same area (runway or taxiway). It deals with a pure safety net for pilots involving a reaction from pilots.

According to 2018 IATA Safety Report, runway incursions are identified as a major threat. Indeed, about one runway incursion event per day is reported worldwide.

3.2 SESAR Solution description

Environment of the solution is described in D4.1.190 - SESAR PJ03b-05 V3 OSED-SPR-INTEROP part I.

The table below reminds the 2 OI & associated enablers:

SESAR Solution ID	SESAR Solution Description	Contribution to the SESAR Solution short description	OI Steps ref. (from EATMA)	Enablers ref.(from EATMA)	Enabler definition
PJ03b-05 Traffic Alerts for pilots for airports operations	Traffic Alerts for pilots for airports operations refer to enhancing on-board systems in order to detect potential and actual risks of collision with other traffic during runway and taxiway operations. In all cases the flight crew are provided with	Runway part	AUO-0605: Traffic Alerts for Pilots during Runway Operations	A/C-43a1	Traffic Alerts for Pilots during Runway Operations
				A/C-48a	Air broadcast of aircraft position/vector (ADS-B OUT) compliant with DO260B
				A/C-67	ADS-B IN
				A/C-24 Optional	Airport moving map and own aircraft position display in cockpit.
				A/C-25 Optional	Airborne Traffic Situational Awareness to support surface operations (ATSA-SURF), including reception (ADS-B in), processing and display
	In all cases the flight crew are provided with	Taxiway part	AUO-0615: Traffic Alerts for Pilots during	A/C-43a2	Traffic Alerts for Pilots during Taxiway Operations
				A/C-48a	Air broadcast of aircraft position/vector (ADS-B OUT) compliant with DO260B

appropriate alerts.	Taxiway Operations	A/C-67	ADS-B IN
		A/C-24 Optional	Airport moving map and own aircraft position display in cockpit.
		A/C-25 Optional	Airborne Traffic Situational Awareness to support surface operations (ATSA-SURF), including reception (ADS-B in), processing and display

Table 1: SESAR Solution 03b-05 Scope and related OI steps

NB: only A/C-43a1 and A/C-43a2 are aircraft enablers developed by the solution. Following enablers are already deployed technologies:

- AC-48a (ADS-B OUT DO-260B)
- A/C 67 (On board receiving of ADS-B IN)
- A/C 24 : Airport Moving Map
- A/C-25: Cockpit Display Traffic Information

3.3 Objectives of the CBA

The objective of the V3 CBA is to provide qualitative information on the costs and benefits of deploying Solution PJ03b-05 worldwide. This assessment will help build the 'big picture' to explain why this Solution is worth being deployed. While the views of individual stakeholders involved in the deployment are considered, this CBA task does not provide CBA results for specific local deployments.

The purpose is to demonstrate that compared with consequences of accidents caused by collisions on runway, the implementation of Pj03b-05 is relatively simple and easy to be implemented.

3.4 Stakeholders identification

When dealing with costs and benefits of a safety function, we can consider that:

- About benefits, concerned stakeholders are airline operators, all aircraft occupants (flight crews, passengers, flight attendants), airport operators, ANSP
- About costs: main stakeholders are aircraft manufacturers, system suppliers and aircraft operators

Stakeholder	The type of stakeholder and/or applicable sub-OE	Type of Impact	Involvement in the analysis	Results available in the current CBA version
Airport Operators	At the airports where the	Airport Operators expect maintaining or increasing	Not involved	N/A

	solution will be deployed: - Main (A-SMGCS) airports (Very Large, Large) - Secondary airports (Medium and Small)	current level of safety with increasing traffic. They expect to increase safety in Low Visibility Conditions including enhanced accessibility at small airports in LVC.		
ANSP	ANSP providing ATS Aerodrome services at the deploying airports (Very Large, Large, Medium and Small Airports)	ANSPs expect to maintain or increase current level of safety with increasing traffic.	Partially involved	(runway incursion statistics provider)
Airspace Users (Airline)	CBA focuses on Scheduled Airlines (Mainline / Regional) Specific fleet depend on the airports that deploy	Airlines expect to maintain or increase current level of safety with increasing traffic especially in Low Visibility Conditions. Containment of pilot workload in critical situations where timely alerts in case of risk of collision with another aircraft on runway are provided.	Partially involved	(runway incursion statistics provider)
Aircraft Manufacturer	N/A	Development and deployment cost analysis	Involved	System development and deployment
System Supplier	Hardware and software avionics provider	Development and deployment cost analysis	Involved	System development and deployment

Table 2: SESAR Solution PJ03b-05 CBA Stakeholders and impacts

3.5 CBA Scenarios and Assumptions

This section describes the scenarios that have been compared in the CBA. The minimum is a CBA scenario that reflects the delta (difference) between the Reference scenario (where the Solution is not deployed) and the Solution scenario (reflecting the proposed deployment of the Solution at applicable locations across ECAC). The scenario is based on the common assumptions and scenarios of the programme as well as those considered in the Performance Assessment.

3.5.1 Reference Scenario

The Reference Scenario, defined by D4.1.190_OSED-SPR-INTEROP, considers the future situation but without the deployment of the Solution. The CBA takes a 'delta' between the Reference and Solution scenarios.

For the CBA it is assumed that without the Solution being deployed a number of hazardous situations will occur on runways and taxiways. This is at least due to increasing traffic. These events are not predictable or frequent but when they occur, they can significantly disrupt the airport operations and affect the network.

The reference scenario considers safety support tools for runway incursions provide controllers and/or pilots with the appropriate alerts where there is a risk of runway incursions.

3.5.2 Solution Scenario

The Solution Scenarios are the same as defined by D4.1.190_OSED-SPR-INTEROP part 1. They consider the future situation with the deployment of the solution.

The scenarios are consistent with the RTCA DO-323, SPR SURF-IA published in 2010. They address all the possible situations on runways / taxiways:

- Any type of airport regardless of the ground equipment
- Single runway, parallel runways, intersecting runways
- Take-off, landing, crossing, taxiing

3.5.2.1 Time-horizon

Deployment timeframe is based on Solution OI steps / Enablers:

- a. Deployment Start date(s) – reflect the start of investments for the first deployment location
- b. Deployment End date(s) – reflect the end of the investments for the final deployment location
- c. Initial and Final Operating Capability (IOC/FOC dates) – reflect the ramp-up of benefits across ECAC as more locations deploy the Solution

OI step	Deployment (V5) Start date	Deployment (V5) End date	Initial Operating Capability	Final Operating Capability
AUO-0605	01/01/2022 ^(*)	Not Available ^(**)	01/01/2023	Not Available ^(**)
AUO-0615	01/01/2022 ^(*)	Not Available ^(**)	01/01/2023	Not Available ^(**)

Table 3: SESAR Solution PJ03b-05 Deployment timeframe

^(*): SURF-A/ITA solutions have a targeted deployment start date in 2022 within a wave 2.

^(**): If SURF-A/ITA show in service efficiency, it is likely that an avionics upgrade mandate will be issued in some world regions. However, it is difficult to commit on a deployment end date, as this regulatory requirement lead-time is very unpredictable.

3.5.2.2 Traffic evolution

Worldwide traffic growth is robustly between 4/5% per year, meaning it doubles every 15 years.

In Europe, annual growth is expected to be 1.9% on 2020-2040 period (source Eurocontrol long-term forecast), i.e. a 53% increase on 2017-2040 period.

The paragraph 4.3 provides some statistics of runway incursions and taxiway collisions.

3.5.2.3 Other assumptions

- ADS-B OUT Mandates:

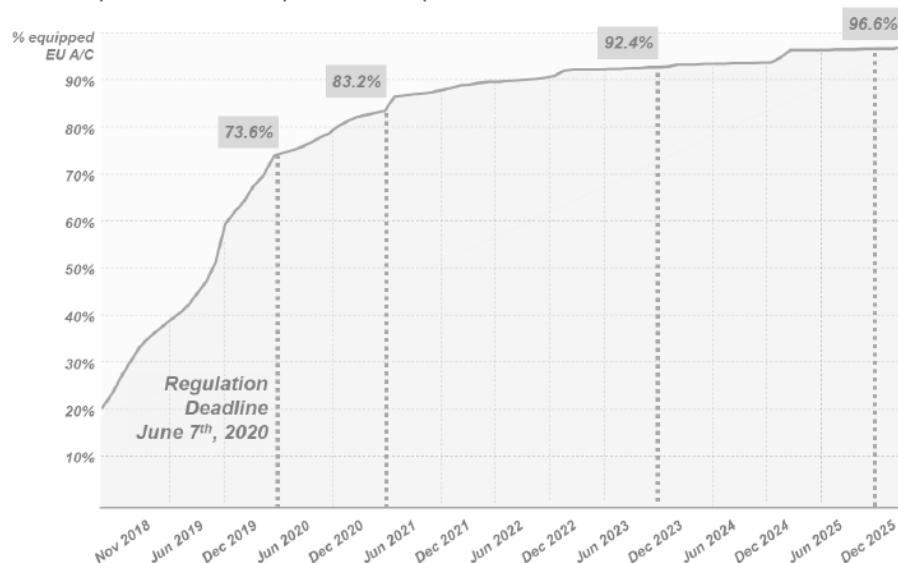
SURF-A/ITA & TWY-ITA systems rely on the processing of ADS-B data.

ADS-B OUT mandates for aircraft with MTOW > 5.700kg :

- US: DO-260B early 2020
- EU: DO-260B mid-2020
- China: DO-260 mid-2019 & DO-260B mid-2022

Other world regions will probably follow according to benefits shown.

It is acknowledged that compliance to DO-260B will not be 100% at the date of mandates. For instance, the chart below represents the expected compliance evolution in E.U.



Forecasted compliance to ADS-B E.U. mandate – SDM ADS-B implementation plan

For the entry-into-service of SURF-A, expected end of 2021, the ADS-B OUT DO-260B compliance rate is expected to be nearly 90% in European airspace.

In the U.S airspace, the compliance rate is expected to be higher sooner

- Airport

SURF-A/ITA or TWY-ITA will be active on any airport operated by the equipped aircraft. Indeed, the runway database hosted by TAWS is encompassing all the runways operated by commercial/business jets.

On large airports, this airborne safety net might come in complement of ground safety net (e.g. runway status light, controller clearance conformance monitoring). The coexistence of these types of safety barriers was addressed in the PJ03B05 solution and no risk is foreseen. On contrary, these are complementary barriers, not acting under the same conditions and horizon of time.

On medium / small airports, SURF-A/ITA or TWY-ITA will be still active, where presence of A-SMGCS or ground safety net is more unlikely. It shall be acknowledged that the small size traffics (MTOW<5.7t) on these airports is higher, with potentially no ADS-B OUT. It makes the detection rate of SURF-A/ITA or TWY-ITA likely smaller.

- **Impact:**

When a conflicting situation between two aircraft occur, only one aircraft needs to be equipped with SURF-A/ITA or TWY-ITA solution to solve the conflict.

As shown by the following chart, even a partial equipage with the SURF A/ITA solution results in a significant reduction of the probability of runway conflict / collision (e.g. 50% of fleet equipped solves 75% of conflicts)

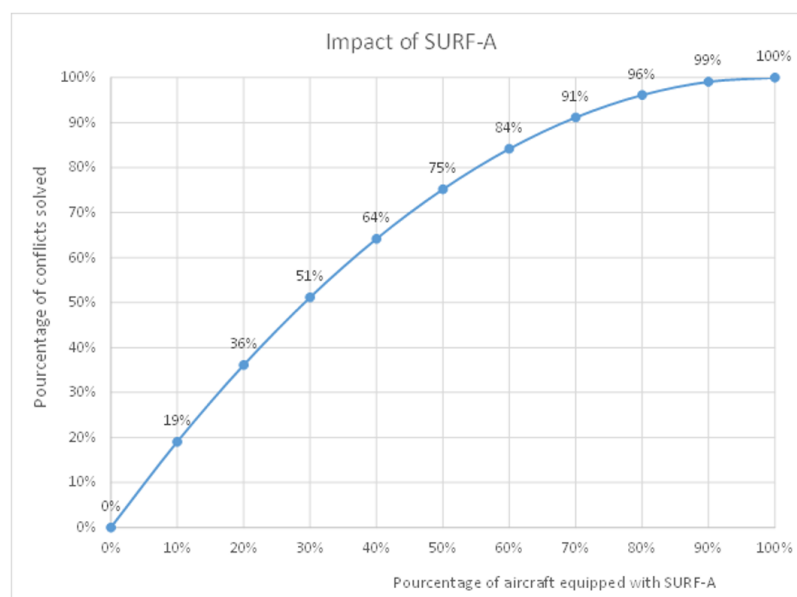


Figure 1: Impact on conflict resolution

4 Benefits

This section describes the monetised benefits deriving from the implementation of the Solution PJ03b-05, based on the CBA Scenarios illustrated in the previous section.

4.1 Expected benefits

The expected benefit is to take part of an improved contribution to surface safety.

4.2 Validated benefits

The Accident Incident Model (AIM) for the **Runway and Taxiway Collision** (see Guidance D in SESAR 16.06.06-D26_04, Guidelines for Producing Benefit and Impact Mechanisms, Edition 03.00.01 - **Reference** Error! Reference source not found.) has been used to derive the following SAFety Criteria (SAC) as described in SAR (D4.191 - PJ.03b-05 OSED SPR INTEROP [9]):

SAC#1 : The number of near Runway Collision (RF3a) should be reduced by at least 17% when a/c is supported by “Traffic Alerts for Pilots” tool.

In this safety criterion, both implementations SURF-A/ITA are considered.

SAC#2 : The number of taxiway collision (TF3a) with other traffic should be reduced by 10% supported by the taxiway function of “Traffic Alerts for Pilots” tool.

In this safety criterion, TWY-ITA implementation is considered.

The safety assessment report (SAR - D4.1.190_OSED-SPR-INTEROP part II) details the computation of these figures.

4.3 Monetizing the benefits

As explained in paragraph 2.2, this risk reduction will not be multiplied by the number or by the cost of a taxiway / runway collision, in order to compute a net value of the solution in €. Indeed, runway collision are fortunately extremely rare (3 major ones in the aviation history). Computing a net value over a period of time by extrapolation of 3 events would not make sense.

However, a single event can cost hundreds of millions of euros to the operators / insurances. In addition, some indirect costs on air traffic may appear as a social impact linked with loss of confidence – this cannot be estimated. Besides, because of airports congestion, taxiway & runway collisions are among the top safety threats.

Some statistics of runway incursions:

Runway incursion statistics vary a lot according to the scope (aircraft only, vehicles and pedestrians), the world region or the data source. But IATA, FAA, EASA & EUROCONTROL all identify runway incursion and taxiway/runway collision as a structural risk, against which industry shall act.

- IATA Safety report 2017: *one runway incursion reported every day in STEADES database.* STEADES = Safety Trends Evaluation, Analysis and Data Exchange System

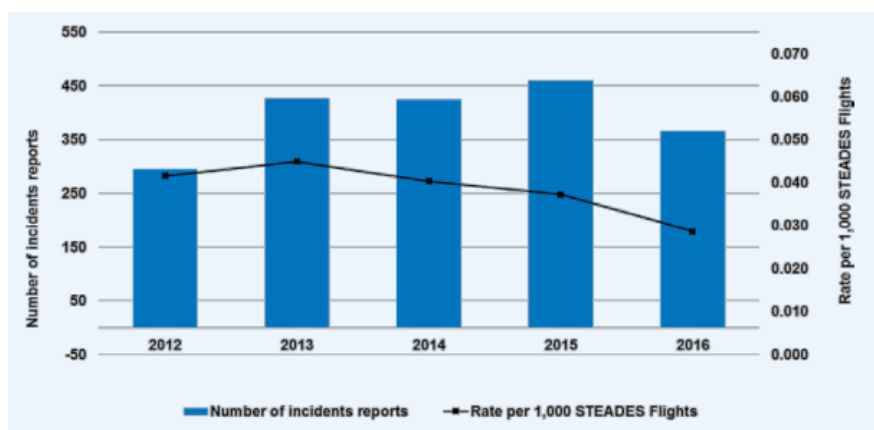


Figure 2: Runway incursion incidents yearly distribution 2012-2016 (IATA STEADES)

- EASA European Plan for Aviation Safety 2019-2023: 28 high-risk occurrences in the period 2019-2023.
- EUROCONTROL Safety report 2017:
In absolute figures, the number of serious (severity A) runway incursions slightly increased in 2016, from 11 events in 2015 to 15. An even bigger increase is observed in the number of major events (severity B) in absolute numbers, and is the highest number recorded in the last 5 years (102 in 2016) following the record of 83 achieved in 2015. This represents a 19% increase when measured against traffic movements. Taking into account the previous years, the high risk events show an overall growing tendency.

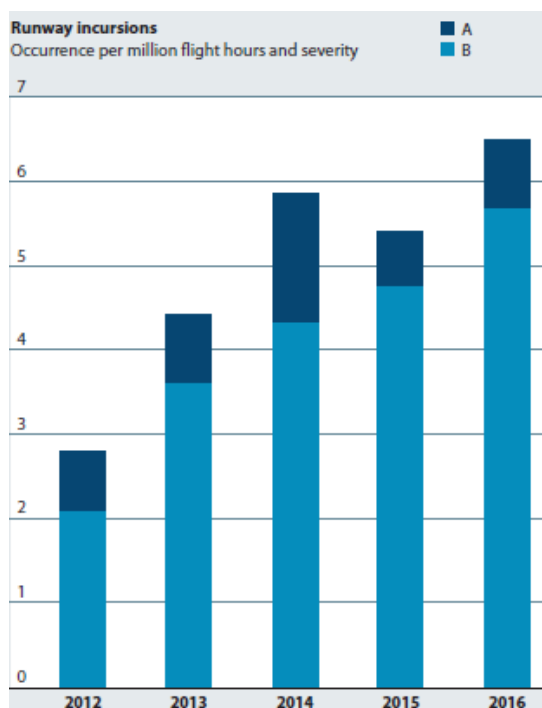


Figure 3: Runway incursion trend – Eurocontrol safety report 2017

Taxiway collisions

Based on official governmental reports these taxiway low speed incidents/accidents are issued from Eurocontrol Skybrary and FAA databases. As a reference, ASRS (Aviation Safety Reporting System) database with individual pilots' reports was also used. Approximately 50% of aircraft/aircraft collisions on taxiways could be resolved by new solution of TWY-ITA. The number of fatal accidents is very low on taxiways and in reference to SPR-Interop/OSED D4.1.190 part II.

5 Cost assessment

This section describes and analyses all the costs stemming from implementing the Solution PJ03b-05, based on the CBA Scenarios illustrated in section 3. The analysis considers PJ03b-05 as a stand-alone solution, i.e. deployed independently from any other S2020 Solution. Only the differential (or delta) value implied by the Solution Scenario over the Reference one is included in the analysis. Also, R&D and Pre-Industrialisation costs are already incurred in the SESAR Development Phase and therefore not included in the cost assessment.

This section provides sources of costs but no quantitative costs.

The intent is to show that implementation of SURF-A/ITA versions is not subject to specific issues and enters into the field of existing safety functions.

5.1 Sources of Pre-implementation costs

Costs are mostly system development and certification costs (non-recurring costs).

SURF-A/ITA is a function that does not require specific hardware development. The same it is for TWY-ITA function.

Only software development is needed. As mentioned in SAR - D4.1.190_OSED-SPR-INTEROP part II, Design Assurance Level C is considered.

SURF-A pre-implementation costs are NRC composed of:

- Avionics supplier:
 - Software development from TAWS supplier
 - Software development from TCAS supplier (usually supplier same as TAWS)
 - Software development from EIS supplier
- Aircraft manufacturer:
 - Verification & validation of softwares
 - Certification

In addition to SURF-A, SURF-ITA/TWY-ITA generates NRC composed of:

- Avionics supplier:
 - Software development from EIS supplier
- Aircraft manufacturer:
 - Solution definition & validation
 - Verification & validation of softwares
 - Certification

5.2 Sources of Implementation costs

- SURF-A:

SURF-A implementation costs on aircraft are RC (Recurring Costs) limited to software upload and limited wiring.

This can be done in parallel with other updates in order to minimize the aircraft immobilization time.

- SURF-ITA:

In addition to SURF-A RC, SURF-ITA or TWI-ITA require the operator to purchase the options of airport moving map (e.g. Onboard Airport Navigation System OANS on A320) and the Cockpit Display Traffic Information (e.g. Air Traffic Situational Awareness – ATSAW).

5.3 Sources of Operating costs

SURF-A/ITA/TWY-ITA is a safety net which does not change the current procedures or workload. Crews are not relying on it to operate and the change in cockpit HMI is completely transparent.

The expected level of training is C, meaning the reading of operational documentation (Flight crew operating manual, flight crew technique manual) and a dedicated training support (PowerPoint, video). However, no specific training in simulator is expected. In addition, the maintenance cost of SURF-A/ITA/TWY-ITA is expected to be minimal because the functions used airport database that are already updated regularly in the avionics. Hence, the costs for airlines will be minimal.

6 CBA Model

No CBA model are applicable to this solution.

7 CBA Results

As explained in paragraph 3, no quantitative results are available:

- No costs of aircraft implementation are provided,
- Benefits of the solution are presented in terms of probability of accident reduction but such occurrences are not converted into monetized benefits.

8 Sensitivity and risk analysis

Not applicable.

9 Recommendations and next steps

Main aviation bodies (ICAO, IATA, FAA, EASA, EUROCONTROL) monitor the runway incursions incidents/accidents. They are generally published in yearly safety reports. On a regular basis, paragraph 4 – benefits can be updated with these new statistics.

10 References and Applicable Documents

10.1 Applicable Documents

- [1] SESAR 2020 Project Handbook
- [2] SESAR 16.06.06-D26_04, Guidelines for Producing Benefit and Impact Mechanisms, Edition 03.00.01
- [3] SESAR 16.06.06-D26_03, Methods to Assess Costs and Monetise Benefits for CBAs, Edition 00.02.02

10.2 Reference Documents

- [4] Common assumptions for CBAs as maintained by Pj19 (provisionally the ones included in the 16.06.06- D68_Part 1, New CBA Model and Methods 2015, Edition 00.01.01 can be used)
- [5] European ATM Master Plan Portal <https://www.atmmasterplan.eu/>
- [6] SESAR C.02-D110, Updated D02 after MP Campaign, Edition 00.01.00
- [7] SESAR 2020 D108, Transition Performance Framework, Edition 00.06.00
- [8] SESAR 2020 D86, Guidance on KPIs and Data Collection – Support to SESAR2020 transition
- [9] SESAR 2020 D4.191 - PJ.03b-05 OSED SPR INTEROP
- [10] SESAR 2020 D4.201 - PJ.03b-05 TS/IRS

Project PJ.03b Beneficiaries



Project PJ.03b Active Organizations

ADP	ENAV	LPS SR
AIRBUS SAS	EUROCONTROL	MICROSTEP-MIS
AIRBUS OPS	FREQUENTIS	NLR
ANS CR	HONEYWELL SAS	PANSA
BULATSA	HONEYWELL Inc.	TECHNO SKY
DASSAULT	HONEYWELL Sro	THALES LAS
DFS	INDRA	THALES AVIONICS
DLR	INDRA NAVIA	R-SYS
DSNA	INTEGRA	UNIWARSAW
EDISOFT	LEONARDO	UNIZA

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