





# 3<sup>rd</sup> Assessment of Dissemination and Exploitation Activities

# V. Ferraiuolo (DBL), B. Ribeiro (CEiiA)

Short abstract: Future Sky Safety 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 the Project P2 "Dissemination, exploitation and communication". The main objective is to report on the dissemination and exploitation activities carried out by the Future Sky Safety (FSS) Programme in its third phase of activity (January 2018 – June 2019).

Programme Manager	M. Piers , NLR
<b>Operations Manager</b>	L. Speijker, NLR
Project Manager (P2)	M. Amato, CIRA
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# Contributing partners

Company	Name
DBL	V. Ferraiuolo
CEIIA	B. Ribeiro

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Prepared by: (name)	Company	Role	Date
V. Ferraiuolo	DBL	Main Author	28-06-2019
Checked by: (name)	Company	Role	Date
M. Everdij	NLR	Quality assurance	28-06-2019
Approved by: (name)	Company	Role	Date
M. Amato	CIRA	Project Manager (P2)	28-06-2019
L.J.P. Speijker	NLR	Operations Manager	28-06-2019

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#### Acronyms

Acronym	Definition
ACARE	Advisory Council for Aviation Research in Europe
ANSP	Air Navigation Service Provider
АТМ	Air Traffic Management
CA	Consortium Agreement
EASA	European Aviation Safety Agency
EREA	European Research Establishment Association
EC	European Commission
EU	European Union
FAA	Federal Aviation Administration
FDM	Flight Data Monitoring
FSS	Future Sky Safety
H2020	Horizon 2020
НМІ	Human-Machine Interface
ΙΑΤΑ	International Air Transportation Association
INEA	Innovation and Networks Executive Agency
JU	Joint Undertaking
KPIs	Key Performance Indicators
LTN	Luton Airport
Μ	Month
NASA	National Aeronautics and Space Administration
P3-P7	Project 3-7
РМС	Programme Management Committee
R&D	Research and Development
R&I	Research and Innovation
SPS	Safe Performance System
SRIA	Strategic Research and Innovation Agenda

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# EXECUTIVE SUMMARY

#### Problem Area

This document aims at assessing the dissemination, communication & exploitation activities for the FSS programme in the third period of activities (M36-M54, from January 2018 to June 2019). The goal is to check if the dissemination goals set in the dissemination plan for the third period have been achieved, as well as to verify if the exploitation activities are in line with the exploitation measures defined for each technical project.

# Description of Work

Key Performance Indicators (KPIs) are the measurements to identify the success of the dissemination process and the achievement of the communication objectives. The KPIs have been identified and described in the D2.5 "Criteria for Dissemination Assessment" [1] and lately have been updated in the D2.8 "1<sup>st</sup> Assessment of Dissemination and Exploitation Activities" [2].

The assessment of the dissemination activities has been performed based on the identified KPIs to measure progress towards the goals established in the D2.2 "1st release of Communication Strategies and Dissemination Plan" [3], while the exploitation assessment followed the measures reported in the D2.4 "1st Release of Exploitation measures" [4].

# Results & Conclusions

Overall, the performance of the Programme in its final phase was highly satisfactory.

The quantitative KPIs' achievement rate highlights that FSS accomplished most of the activities as planned, and in some cases, even exceeded expectations. Where this is not the case, the Programme achieved the expected results almost entirely. In addition, it has to be noted that it is expected that Future Sky Safety will continue having an impact with regard with dissemination in the next weeks and months (see, e.g., the FSS Foreseen Scientific Outputs).

The Google Analytics shows that the website is in very good health. The project reached its objectives and the publication of news is in line with expectations.

With regard to external events, FSS took part in a number of them, meeting and exceeding the ambitious goal set. In addition, some of these events were attended by more than one FSS project, thus multiplying the effectiveness of participation.

The 2<sup>nd</sup> FSS Public Workshop raised stakeholders' interest, with more than 100 people registering. Although final external participants were less than expected, it has to be considered that the workshop, taking place on the 6-7<sup>th</sup> of November 2018 in Brussels, unfortunately was paralleled by the EASA's Annual Safety Conference, taking place in Vienna in the same two days, an occurrence that for sure shifted some possible participants towards the EASA conference. Nevertheless, the 2<sup>nd</sup>



Public Workshop was much appreciated by a majority of attendees. In addition to this event, Future Sky Safety opened its Final Workshop to the public, attracting additional participants.

On invitation of the European Commission (EC), Future Sky Safety contributed to its EC exhibition areas in both the Aerodays 2019, in Bucharest, Romania, and the Le Bourget Airshow 2019, in Paris, France. The Aerodays 2019 was attended by about 800 professionals from the aviation industry. The Le Bourget Airshow was attended by 2,453 exhibitors and 316,470 unique visitors, of which 139,840 professionals representing 185 countries and 176,630 visitors of the General Public.

As for the qualitative criteria, they were met as well. The analysis of the communication activities shows that key messages conveyed by the Programme did evolve in time, just as it was expected. In the third phase, the technical projects started communicating more specific information than before, focusing on promoting the results of their research. Overall, the desired messages were disseminated for the programme and for each of its projects.

The distribution of the target audience evolved as well in time, shifting more and more from the general audience towards specialised experts and decision makers.

Finally, an evolution in the targeted audience's reactions was also expected, and reached, as a sign of the effectiveness of the different dissemination activities. Stakeholders' engagement at a personal or even political level was achieved; therefore, the desired changes were accomplished for all the three qualitative KPIs established to monitor the effectiveness of FSS dissemination.

#### Applicability

This deliverable applies to the whole FSS dissemination and exploitation.

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# 1 INTRODUCTION

# 1.1. The Programme

FUTURE SKY SAFETY is an EU-funded transport research programme in the field of European aviation safety, with an estimated initial budget of about € 30 million, which brings together 33 European partners to develop new tools and new approaches to aviation safety, initially over a four-year period starting in January 2015. The two main objectives of Future Sky Safety Programme are:

- Coordination of institutional safety research programmes, funded by the EREA institutes;
- **Collaborative safety research** on safety risk priority areas (co-funded by the EC).

The Programme research focuses on four main topics:

- Building ultra-resilient vehicles and improving the cabin safety;
- Reducing risk of accidents;
- Improving processes and technologies to achieve near-total control over the safety risks;
- Improving safety performance under unexpected circumstances.

EU is funding specific **Collaborative Safety Research** projects:

- Perform breakthrough safety research to enable a significant reduction of runway excursion risk in the medium term.
- Develop a prototype risk observatory to assess and monitor safety risks throughout the Total Aviation System and allow frequent update of the assessment of risks.
- Reduce the likelihood of organisational accidents in aviation via development and implementation of a Safe Performance System (SPS).
- Define and apply the Human Performance Envelope for cockpit operations and design, and determine methods to recover crew's performance to the centre of the envelope, and consequently to augment this envelope, through HMI principles, procedures or training.
- Develop solutions to mitigate the risk of fire, smoke and fumes related (fatal) accidents.

**Coordination/cooperation of institutional safety research programmes** connects and drives the complementary in-house Safety R&D in the European aeronautical research establishments. This achieves significant leverage of the invested EU funding through a more efficient and effective use of resources.

The Programme will also help to coordinate the research and innovation agendas of several countries and institutions, as well as to create synergies with other EU initiatives in the field (e.g. <u>SESAR JU, Clean Sky 2</u>).

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Future Sky Safety contributes to the EC Work Programme Topic MG.1.4-2014 Coordinated research and innovation actions targeting the highest levels of safety for European aviation in Call/Area Mobility for Growth – Aviation of Horizon 2020 Societal Challenge Smart, Green and Integrated Transport. Future Sky Safety addresses Safety challenges of the ACARE Strategic Research and Innovation Agenda (SRIA).

# 1.2. Project Context

Dissemination, exploitation and communication of knowledge are a key ingredient for any successful research project. Future Sky Safety Project P2 is specifically dedicated to Dissemination, Exploitation and Communication; its goals are to:

- Develop a dissemination plan and communication strategies;
- Disseminate safety research findings to relevant target audience;
- Develop a plan for exploitation of results;
- Develop a knowledge and data management policy and approach;
- Assess dissemination activities.

Project P2 ensures that all aspects of dissemination are efficiently and effectively managed over the entire duration of the project, aiming at communicating in a consistent and distinctive way, while engaging and involving different categories of audiences. In this context, an appropriate strategy for the dissemination assessment, with specific quantifiable targets needs to be developed and implemented.

# 1.3. Research Objectives

This document aims at monitoring dissemination and exploitation actions for FSS's third period of activities, to check if the information sharing is proceeding in the right direction and is achieving the expected targets.

# 1.4. Approach

In order to perform the assessment of FSS's dissemination and exploitation activities, P2 used Key Performance Indicators (KPIs) to measure to which extent the communication objectives (established in the D2.2 "1st release of Communication Strategies and Dissemination Plan" [3] and in the D2.4 "1st Release of Exploitation measures" [4]) were achieved.

P2 asked for and collected information from the whole Consortium to keep track of the dissemination and exploitation activities performed by each project, then used this information to

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ascertain whether expectations towards the identified KPIs had been met or not. In order to verify this, P2 used both quantitative and qualitative parameters; a mere number count of the communication actions was performed along with a qualitative analysis to ensure their usefulness and effectiveness.

# 1.5. Structure of the Document

The first part of the document (Section 1) introduces Future Sky Safety and the scope of this document.

Section 2 constitutes the core of the document, detailing all the quantitative and qualitative criteria previously set as dissemination goals and showing how the programme performed with respect to them. This section also provides a short description of the different activities implemented by Future Sky Safety and of the events attended or organised by the Programme. Finally, this section also lists the KPIs previously identified to measure the success of the communication and assesses FSS's compliance to each one of them.

Section 3 details the exploitation assessment for each of the technical projects within Future Sky Safety. The assessment is performed with respect to the set of measures identified and illustrated in the first release of the Exploitation Plan [4][1].

Conclusions and recommendations are highlighted in detail in Section 4.

Appendix A shows a table with updated KPIs and compliance to those KPIs for the third programme period. Appendix B lists the next papers to be produced by the Future Sky Safety programme.

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# 2 DISSEMINATION ASSESSMENT

The communication strategy of the entire Future Sky Safety Programme was defined in D2.2 "1st release of Communication Strategies and Dissemination Plan" [3]. The dissemination plan ensures that all aspects of dissemination are efficiently and effectively managed over the entire duration of the project, aiming at communicating dynamically, in a consistent and distinctive way, while engaging and involving different categories of audiences. To ensure that, it detailed all the aspects of the dissemination and communication strategy, including:

- the approach;
- the goals;
- the target audience;
- the dissemination package, which includes:
  - the project logo and graphical identity;
  - the web site;
  - o deliverable and presentation templates;
  - o official disclaimer statements;
  - brochure and flyers;
  - presentations;
  - posters;
  - o fact sheets;
- the tailoring to the technical projects.

Based on the activities described in the dissemination plan, on the European guidelines for dissemination and on the review of other research projects dissemination actions, a set of criteria for the assessment of the dissemination activities performed by Future Sky Safety has been defined in D2.5 [1]. In this document, a set of quantitative and qualitative criteria has been identified to assess the dissemination activities and answer to the following questions:

- Are the dissemination activities performing as planned?
- Are the dissemination activities performing effectively?

While for the first one the track of the dissemination actions is sufficient, the second one is more difficult to assess, as it requires to measure success of communication: effective dissemination of results means that the right people get the right information in a timely manner and in the right format. Although no standardised criterion exists to monitor this, a set of criteria to be used to assess the dissemination performance was identified in advance, also defining the actions to monitor them and the targets to be achieved. Several consistent quantitative criteria emerged as indicators of effective dissemination, such as the number of visits to the website, the website visits duration, the number of persons attending FSS presentations in external events and so on,

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representing people's interest in the project subject and their reception of project information. In addition, a set of qualitative criteria was also included, in order to support the comprehension of the impact of the communication actions on the target audience and thus perform an accurate assessment of the dissemination performance.

All these criteria have been transformed in KPIs, with specific targets defined for each assessment timeframe (M18 – M36 – M54) according to the different dissemination goals per each period (Raise Awareness – Disseminate knowledge and results – Involve stakeholders – Support impact). Periodical assessments of dissemination activities are not only necessary to measure progress towards the achievement of targets established in the dissemination plan, but also useful to spot criticalities, collect lessons learnt and identify aspects of the communication that can be improved in the subsequent period, in order to facilitate the goals achievement. An update of the KPIs was issued in the D2.8 "1st Assessment of Dissemination and Exploitation Activities" [2].

At each timeframe, the dissemination performance is evaluated to check if the different targets are achieved and, if not, put in place corrective actions. The Criteria for Assessment of Dissemination Activities [1], define the final period communication as follow: "alongside the stakeholder involvement, the programme dissemination should support impact of the FSS research on future R&I activities by bringing key messages and information to key decision makers (e.g. funding organisations, regulatory agencies, industry, etc.)". This indicates a significant change in the dissemination means adopted and actions performed, shifting towards the use of workshops, face-to-face meetings and events to ensure the proper transmission and comprehension of the communication message, in order to rise the probability that the FSS findings are taken up and have an impact on future policies or practices in the safety domain.

Period	Programme phase		Dissemination objectives			Dissemination activities
M36 – M54	Final resul conclusions	ts &	Involve Support	stakeholders impact	&	Internal and external workshops, seminars, presentations, follow up actions toward stakeholders

#### Table 1: Dissemination strategy for the third programme phase (M36-M54)

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# 2.1. Quantitative Criteria

The quantitative criteria could be seen as the core of the dissemination assessment as they provide measurable targets that can be used to determine the trend of communication activities. The main criteria identified and used by Future Sky Safety are:

- 1. Third parties events/conferences attended;
- 2. Events organised by Future Sky Safety;
- 3. Academic publications;
- 4. Articles on magazines & press releases;
- 5. Website statistics, including:
  - $\circ$  N° of visits to the website;
  - Countries' visitors;
  - Visitors' behaviour;
  - Search channels;
  - Time spent on the website;
  - Search engine position;
  - N° of periodical news on the website;
  - N° of downloads of public documents.

Each criterion is presented in detail in the sections below.

# 2.1.1. Third parties events/conferences attended

Future Sky Safety partners are expected to attend third parties events to present the programme or a specific technical project and to create a network of contacts. Due to their strategic role, P1 and/or P2 are asked to attend the large networking and brokerage events, while the technical projects mainly attend the events connected with their field of research.

In the third period (M47-M54), Future Sky Safety attended at least 24 external events, some of which saw the participation of more than one FSS project:

- 1. SciTech (8-12<sup>th</sup> of January 2018 in Florida, USA)
- 2. TRA 2018 (16-17<sup>th</sup> of April 2018 in Vienna, Austria)
- 3. 2MAE 2018 (10-13<sup>th</sup> of May 2018, in Wuhan, China)
- 4. AOA meeting (18-19<sup>th</sup> of June 2018 in Newcastle, UK)
- 5. ECCM18 (24-28<sup>th</sup> of June 2018 in Athens, Greece)
- 6. 8th ICRAT (26-29<sup>th</sup> of June 2018 in Castelldefels, Spain)
- 7. IMSC 2018 (26-31<sup>st</sup> of August 2018 in Florence, Italy)
- 8. HYDROAVIASALON 2018 (6-9<sup>th</sup> of September 2018 in Gelendzhik, Russia)
- 9. 33rd EAAP meeting (24-28<sup>th</sup> of September 2018, in Dubrovnik, Croatia)

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- 10. GAPS 2018 (3<sup>rd</sup> of October 2018 in Athens, Greece)
- 11. 21st Lambda Mu Symposium (16-18<sup>th</sup> of October 2018 in Reims, France)
- 12. EUROCONTROL Safety Team (17-18<sup>th</sup> of October 2018 in Brussels, Belgium)
- 13. ICSC 2018 (31<sup>st</sup> of October-2<sup>nd</sup> of November 2018 in Amsterdam, Netherlands)
- 14. Human Factors in Aviation Safety (12-13<sup>th</sup> of November 2018 in London, UK)
- 15. 61st MIPT Scientific Conference (19-25th of November 2018 in Zhukovsky, Russia)
- 16. SGEM 2018 (3-6<sup>th</sup> of December 2018 in Vienna, Austria)
- 17. EASA 1st Ground Handling Safety Conference (7<sup>th</sup> of March 2019 in Cologne, Germany)
- 18. Annual Human Factors & Ergonomics Conference (29<sup>th</sup> of April 2019 in Stratford upon Avon, UK)
- 19. 20<sup>th</sup> IASP (7-10<sup>th</sup> of May 2019 in Dayton, USA)
- 20. SAFE EASA Safety in Aviation Forum for Europe (13-15<sup>th</sup> of May 2019 in Brussels, Belgium)
- 21. Aerodays 2019 (27-30th of May 2019 in Bucharest, Romania)
- 22. IES Annual Conference 2019 (6<sup>th</sup> of June 2019 in Dublin, Ireland)
- 23. Paris International Airshow (17-23<sup>rd</sup> of June 2019 in Paris, France)
- 24. 8<sup>th</sup> REA Symposium (24-27<sup>th</sup> of June 2019 in Kalmar, Sweden)

In the third phase of the Programme, the events attended were predominantly domain conferences. Also, FSS contributed to 2 large exhibitions: Aerodays 2019 and Paris Airshow 2019.

Other events that are planned to be attended in the near future are:

Location and date	Event	Project	Activity
<b>London, UK</b> 1-3 July 2019	INTERFLAM2019 15 <sup>th</sup> International Conference and Exhibition on Fire Science and Engineering	Ρ7	Presentation: Time-resolved 3D temperature/displacement measurements for investigating the fire behaviour of composite materials (Leplat, G., Le Sant, Y., Reulet, P., Batmalle, T.)
Bordeaux, France	<b>JNC21</b> Comptes Rendus des JNC21 Presented at the Journées Nationales sur les Composites 2019	P7	Caractérisation en température de la ténacité en mode II des interfaces des CMO en utilisant l'effet Joule (Huchette, C., Lapeyronnie, P., Márquez Costa, J. P., Rannou, J., Leplat, G.)

#### Table 2: Next events planned

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Washington DC, USA 24-28 July 2019	AHFE Applied Human Factors & Ergonomics Conference	Р5	Presentation on the Safety Culture Stack approach to Human Factors professionals from a range of industrial domains.
The Hague, TheNetherlands1-62019	<b>ISASI 2019</b> 50 <sup>th</sup> International Society of Air Safety Investigators annual seminar	Ρ3	Paper on spin-off results obtained in WP3.3
Fall 2019	EASA - Data4Safety project workshop	P4	Presentation/demonstration session
Malta October 2019	EUROCONTROL Safety Team	P5	Presentation of Safety Dashboard White Paper

#### 2.1.1.1. SciTech

On the 8-12<sup>th</sup> of January 2018, P3 took part in the AIAA Science and Technology Forum (SciTech) in Kissimmee, Florida, USA. The project presented a paper on modelling the aircraft landing behaviour for runway excursion and abnormal runway contact analysis.

#### 2.1.1.2. TRA 2018

On the 16-17<sup>th</sup> of April 2018, P4 took part in the "Transport Research Arena" conference in Vienna, Austria to present the paper "Quantification of Accident Probabilities for a Risk Observatory". In addition, P5 participated to illustrate the work performed within the project, receiving positive feedback and several requests for more information. Representatives of the aviation industry mainly composed the audience.

#### 2.1.1.3. 2MAE 2018

On the 10-13<sup>th</sup> of May 2018, P7 attended the "2<sup>nd</sup> International Conference on Mechanical, Material and Aerospace Engineering" in Wuhan, China to present the paper *Compressive Properties of Geopolymer Matrix Composites*.

#### 2.1.1.4. AOA meeting

P5 attended the Association of Airports Regional Meeting in Newcastle, UK on the 18-19<sup>th</sup> of June 2018. The project provided a presentation of the LTN Stack to around 30 UK airports, raising interest in several of them, including LHR.

#### 2.1.1.5. ECCM18

P7 presented a poster at the "18<sup>th</sup> European Conference on Composite Materials", held in Athens, Greece on the 24-28<sup>th</sup> of June 2018.

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The poster based on the paper on "Compression after impact of carbon geopolymer sandwich panels" was presented to the specialised audience attending the conference.

#### 2.1.1.6. 8<sup>th</sup> ICRAT

On the 26-29<sup>th</sup> of June 2018, P4 attended the "8<sup>th</sup> ICRAT – International Conference for Research in Air Transportation" in Castelldefels, Spain. The conference was the occasion to present the paper on "Quantitative Assessments of Runway Excursion Precursors using Mode S data".

#### 2.1.1.7. IMSC 2018

P7 attended the "XXII International Mass Spectrometry Conference" held in Florence, Italy on the 26-31<sup>st</sup> of August 2018. The project presented a paper on the "Methodology for qualitative and quantitative analysis of volatile compounds from composite materials at elevated temperatures".

The specialised audience attending the presentation was composed of around 150 academic and industrial representatives.

#### 2.1.1.8. HYDROAVIASALON 2018

On the 6-9<sup>th</sup> of September 2018, project partner TSAGI attended HYDROAVIASALON 2018, the 12<sup>th</sup> International Exhibition and Scientific Conference on Hydroaviation held in Gelendzhik, Russia.

HYDROAVIASALON is an international airshow drawing special attention to amphibious aircraft and seaplanes. TSAGI mentioned the work performed by P3 within FSS in a presentation on the identification and description of aircraft trajectory at landing and rollout with discrete code.

#### 2.1.1.9. 33<sup>rd</sup> EAAP meeting

On the 24-28<sup>th</sup> of September 2018, P5 participated into the "33<sup>rd</sup> European Association for Aviation Psychologist's meeting" in Dubrovnik, Croatia. Representatives of the project took the occasion to present not only the project itself and the Luton Safety Stack, but also WP5.3 and its approach to Safety Culture.

The presentation was made at the presence of a specialised audience, consisting of around 100 pilots, aviation psychologists, aviation industry representatives and academic researchers, receiving a good general feedback.

#### 2.1.1.10. GAPS 2018

On the 3<sup>rd</sup> of October 2018, IATA awarded P5 with recognition to the London Luton Airport for the Luton Safety Stack, as the first airport globally to harmonize its ground handling procedures in line with the IGOM (IATA Ground Operations Manual) - collaboration and effective partnership in action. The award was given in Athens, Greece in the context of the "Global Airport and Passenger Symposium" organised by IATA.

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#### 2.1.1.11. 21<sup>st</sup> Lambda Mu Symposium

P4 took part into the "21<sup>st</sup> Lambda Mu Symposium on Risk Management, System Dependability & Safety" held in Reims, France on the 16-18<sup>th</sup> of October 2018. The conference provided the occasion to present the paper "A Backbone model for the Safety Assessment of the Air Transport System" to an audience of more than 500 attendants comprising industrial, scientific, academic or consultant.

#### 2.1.1.12. EUROCONTROL Safety Team

P5 met the EUROCONTROL Safety Team on the 17-18<sup>th</sup> of October 2018 in Brussels, Belgium. The project presented the Safety Dashboard to 25 ANSPs, receiving general support for the work and interest in the final White Paper. The EUROCONTROL Safety Team requested a follow-up presentation in Malta at their next meeting in October 2019.

#### 2.1.1.13. ICSC 2018

On the 31<sup>st</sup> of October-2<sup>nd</sup> of November 2018, P5 participated into the 3<sup>rd</sup> International Cross-Industry Safety Conference in Amsterdam, Netherlands. The project presented the paper "Advancing Safety in Organisations: Application via the Luton Safety Stack" on the integration of P5 products into an SMS (Safety management System) framework. Overall, the audience, composed of safety practitioners and researchers from many industries, found the integration of the P5 products into the SMS Standard of Excellence model to be innovative.

#### 2.1.1.14. Human Factors in Aviation Safety

P5 attended the Human Factors in Aviation Safety Conference on the 12-13<sup>th</sup> of November 2018, at London Gatwick, UK. The project presented both the Safety Blueprint and the LTN Stack to an audience of around 80 Human Factors specialists in European aviation (civil & military).

#### 2.1.1.15. 61st MIPT Scientific Conference

On the 23<sup>rd</sup> of November 2018, project partner TSAGI attended the 61<sup>st</sup> Scientific Conference of the Moscow Institute of Physics and Technology taking place on the 19-25<sup>th</sup> of November in Zhukovsky, Russia.

The MIPT Conference is a traditional multiday gathering of researchers, students, and professors, who are seeking to keep abreast of the newest developments in their fields. In the framework of the session dedicated to aerospace technology, TSAGI illustrated the work performed by P3 within FSS in a presentation on the statistical analysis application for assessment of some factors impact on runway excursion risks.

#### 2.1.1.16. SGEM 2018

P7 attended the 18<sup>th</sup> International Multidisciplinary Scientific GeoConference (SGEM 2018) held in Vienna, Austria on the 3-6<sup>th</sup> of December 2018. The project presented the work performed within WP 7.2, and specifically the paper "Construction Node from Geopolymer Matrix".

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#### 2.1.1.17. EASA 1st Ground Handling Safety Conference

On the 7<sup>th</sup> of March 2019, P5 attended the EASA 1<sup>st</sup> Ground Handling Safety Conference in Cologne, Germany. The project presented the LTN Safety Stack to around 200 attendees from ground handling services, airports, airlines and regulators. EASA & delegates considered the Stack as good practice, and several airports were interested in the process.

#### 2.1.1.18. AHFE – Annual Human Factors & Ergonomics Conference

On the 29<sup>th</sup> of April 2019, P5 attended the Annual Human Factors & Ergonomics Conference in Stratford upon Avon, UK. The project held a Safety Culture Master Class, based on WP5.3 & WP5.1. Registration included 30 attendees from a range of industries including defence, oil & gas, pharmaceutical, medical, nuclear and aviation, including accident investigation branch.

#### 2.1.1.19. 20<sup>th</sup> ISAP

On the 7-10<sup>th</sup> of May 2019, P6 joined the 20<sup>th</sup> International Symposium on Aviation Psychology in Dayton, Ohio, USA. The symposium was the occasion to present a paper on the "Application of an HMI evaluation method (MERIA) based on the cratering of mental representations of operators in dynamic situations".

#### 2.1.1.20. SAFE

On the 13-15<sup>th</sup> of May 2019, P3 attended the Safety in Aviation Forum for Europe (SAFE) in Brussels, Belgium. The project gave three presentations:

- Bayes techniques to quantifying risks using flight data;
- Machine learning applications for veer-off prediction during landing;
- Landing trajectory determination from FDM parameters.

More than 250 people from the aviation industry attended, including airlines flight safety specialists, Flight Data Monitoring specialists, accident investigators, safety specialists from aircraft manufacturers and regulatory bodies. Numerous feedback was received from different organisations for additional information.

#### 2.1.1.21. Aerodays 2019

Future Sky Safety has attended the 8<sup>th</sup> European Aeronautics Days (Aerodays) in Bucharest, Romania on the 27-30<sup>th</sup> of May 2019.

Aerodays is the leading event in aviation research and innovation, mirroring the priorities and strategies set within the European Union Research Framework Programmes. Building on the achievements of Horizon 2020, Aerodays 2019 provided a solid platform to share and review the latest developments in aeronautics and air transport across the European Union.

Future Sky Safety was showcased at a booth in the exhibition area of the European Commission at the Aerodays 2019. We displayed various videos illustrating the Programme and its achievements,

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and distributed our flyers, brochures and handouts presenting the work we have done and the resulting outcomes.

In addition, we showed the SAFEORG tools for Organisational Safety developed in P5, the Smart vest for real-time measurement of physiological data developed within P6, and the full-scale demonstrator of emergency exit door panel made of fibre reinforced geopolymer composite tested in the framework of P7.

A session dedicated to Operation Safety and Security involved three presentations about Future Sky Safety, with contributions from Michel Piers, Barry Kirwan and Marcus Biella.

Globally, over 800 participants from more than 40 countries attended the 8<sup>th</sup> edition of the European Aeronautics Days (Aerodays). Academic, research and industrial representatives from the European and international aeronautic community.

#### 2.1.1.22. IES Annual Conference 2019

On the 6<sup>th</sup> of June 2019, P5 attended the Irish Ergonomics Society Annual Conference. The theme of the conference was "Human Factors and Ergonomics: Lessons to be learned across domains; healthcare, manufacturing and transport". A presentation on governance of risk was made, citing Future Sky Safety outcomes.

#### 2.1.1.23. Paris International Airshow

Future Sky Safety has attended the 53<sup>rd</sup> International Paris Airshow taking place on the 17-23<sup>rd</sup> of June 2019 in Le Bourget, Paris (France).

The Paris Le Bourget Airshow is one of the oldest and largest air shows in the world, where the newest technologies of the aerospace industry are presented.

Future Sky Safety was again showcased at the European Commission booth, in Hall 2a B276 of the exhibition area. Michel Piers, Lennaert Speijker and Marcello Amato hosted the booth, distributing flyers, brochures and handouts, showing videos, and showcasing the aviation safety solutions also displayed during Aerodays.

The International Paris Airshow hosted almost 2.500 exhibitors from 48 countries. More than 150.000 general public visitors and almost 140.000 professionals, representing 185 countries, attended the event. In addition, 2.700 accredited journalists from 87 countries covered the event.

#### 2.1.1.24. 8th REA Symposium

On the 24-27<sup>th</sup> of June, 2019 P5 attended the 8<sup>th</sup> REA Symposium "Embracing Resilience: Scaling up and Speeding up" in Kalmar, Sweden. The Resilience Engineering Association's Symposium engaged participants in what it means to embrace resilience in a turbulent world and explore how to scale up and speed up the adoption of the ideas of resilience engineering.

P5 attended the event presenting a poster on "Governance, Complexity and Deep System Threats".

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#### 2.1.2. Events organised by Future Sky Safety

Throughout the programme duration, FSS has planned four different events (two public, two internal) to maximise the impact of its results and facilitate the exchange of information and networking among projects and towards the external audience. In addition, the programme has also organised other events, which are reported below.

#### 2.1.2.1. 3<sup>rd</sup> EREA Coordination Workshop

P1 organised the 3<sup>rd</sup> EREA Coordination Workshop on the 14-15<sup>th</sup> of February 2018. The event was held at NLR premises in Amsterdam, The Netherlands with the scope of providing further coordination between the EREA institutions.

#### 2.1.2.2. High performance thermoanalysis day

On the 17<sup>th</sup> of April 2018, P7 organised the "High performance thermoanalysis – new measurement methods and scientific application in aviation and space" day in Braunschweig, Germany. The event addressed 25 people, mixed from industry and research institutions, with the scope of receiving feedback on the information shown and networking with professionals and experts in the field.

P7 delivered a presentation on "Temperature dependent material characteristics for structure simulation of thermo-mechanical coupled applications".

#### 2.1.2.3. 2<sup>nd</sup> FSS Public Workshop

The 2<sup>nd</sup> FSS Public Workshop "Future Sky Safety on Final Approach" was held on the 6-7<sup>th</sup> of November 2018 in Brussels, Belgium at EUROCONTROL Headquarters.

This workshop was the opportunity to present and discuss the final results reached by all the projects within the Future Sky Safety programme during the last four years.

More than 100 people registered to the event; 75 attended: 41 from the Consortium, and 34 external guest (of which 53% were decision makers, 47% experts from a specialised audience).

The workshop opened with an introduction by Daniele Violato (INEA). Laurent Leylekian (EREA Future Sky Board) presented the Future Sky programme and Michel Piers (NLR) introduced the Future Sky Safety Programme.

Then, five sessions explored key topics related to the technical projects studied by the programme. Future Sky Safety's Project Managers chaired the discussion, while renowned external speakers gave presentations on each topic. Speakers included members of the industry and SMEs (Safe-Runway GmbH, Luton Airport, KLM, Lufthansa, EasyJet, ONERA, Embraer, VZLU, Deep Blue), research centres (CSEM, DLR, NLR), and institutions (EASA, Eurocontrol, INEA, NASA, FAA).

The workshop was complemented by a poster session around these topics, hosting posters by P1, P3, P4, P5, P6 and P7. On this occasion, Future Sky Safety prepared and printed a handout

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describing the work performed by P1 and the technical projects, highlighting the results they achieved and the contribution they brought to the aviation safety research. The handout is now available on the programme website. The D2.14 "Dissemination material from second Future Sky Safety Public Workshop" [5] details the dissemination materials prepared for the event; these materials, and the presentations made during the workshop, are available on the <u>programme</u> <u>website</u><sup>1</sup>.

#### 2.1.2.4. Final FSS Event

Future Sky Safety held a Final FSS Event on the 19-20<sup>th</sup> of June 2019 in Paris, France. EUROCAE (European Organisation for Civil Aviation Equipment) hosted the event. This final event was not directly open to the public, but instead it targeted selected participants with the scope of presenting the main achievements of the Programme and, in particular, the exploitation possibilities.

During Day 1, P1 and all the technical projects provided an overview of their activities and achievements. P3, P4, P5, P6 and P7 focused on the solutions they developed in the respective projects.

Day 2 was dedicated to highlighting the dissemination activities performed and the possibilities for future exploitation.

- Lennaert Speijker (NLR) provided an overview of plans for exploitation of results.
- Each of the technical projects presented exploitable main results:
  - Sara Lagunas (Airbus) and Peter van der Geest (NLR) illustrated the tools and algorithms for Flight Data Monitoring developed within P3.
  - Sylvain Metge (Airbus) and A. Dijkstra (KLM) presented the results of trials with the Risk Observatory that P4 worked onto.
  - Carlo Valbonesi (DBL) showed a prototype safety dashboard for ANSPs produced by P5.
  - F. Braun (CSEM) demonstrated the smart Vest for real-time measurements of physiological data, while P. ten Hove (NLR) showcased the Inter-Rater Reliability tool for Evidence Based Training (EBT), both created by P6.
  - František Martaus (VZLU) presented the composite material solutions to mitigate fire, smoke, fumes developed within P7.
- A session followed to discuss the safety research challenges for the next decade:
  - Michel Piers (EREA) presented the perspective of the research institutes on safety challenges.
  - Bertrand de Courville provided the perspectives of the airline industry on research needs.

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<sup>&</sup>lt;sup>1</sup> https://www.futuresky-safety.eu/2nd-fss-public-workshop/

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• EASA discussed the regulatory perspective on research for safety & oversight.

52 people attended to the event: 36 from the Consortium, and 16 external guest.

#### 2.1.3. Other dissemination actions towards key aviation stakeholders

#### 2.1.3.1. ESDU aircraft performance committee meetings

During the third period of the Programme, P3 held regular meetings of aircraft performance specialists on different aircraft performance topics. During these meeting, FSS shared and discussed results from WP3.2 with aircraft performance specialists from industry and universities, receiving generally positive feedback. The results of P3 will be used to develop runway friction models.

#### 2.1.3.2. FAA runway friction specialists meeting

P3 had a meeting with FAA runway friction specialists, focused on runway friction issues, where it shared and discussed the results from WP3.2. The feedback was positive and the meeting led to the FAA wanting to cooperate on wet runway performance analysis.

#### 2.1.3.3. EREA Aviation Safety Research Plan 2018

In February 2018, P1 delivered the publicly available EREA Aviation Safety Research Plan 2018. The document mainly serves to steer safety research topics and its coordination within EREA.

#### 2.1.3.4. Netherlands National Advisory Group on Cabin Air

In spring 2018, P7 met the Netherlands National Advisory Group on Cabin Air, providing general information on the Programme and specific information on cabin air results. The audience, comprising the Advisory Group of the Ministry of Infrastructure and Environment, consisted of decision makers.

#### 2.1.3.5. FAA-ECTL Human Factors Meeting

On the 11-12<sup>th</sup> of July 2018, P5 attended the FAA-Eurocontrol Human Factors Meeting in Bretigny, France. The work performed within P5 was presented to the FAA and information on advances in Human Factors research was shared as part of an exchange meeting on safety research.

#### 2.1.3.6. ICAO's 1<sup>st</sup> iSTARS iUG/01 Meeting

On the 17-19<sup>th</sup> of December 2018, ICAO held the 1<sup>st</sup> iSTARS User Group (iUG/01) Meeting at its headquarters in Montreal, Canada. NLR attended the meeting to present the Risk Observatory, developed within P4, focusing on the results of a validation/use case addressing Unmanned Aircraft Systems (UAS). The presentation addressed suitability of data sets, incentives for sharing data, safety performance indicators, data visualisation, and methods and tools used.

#### 2.1.4. Scientific publications

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Number of publications and submission to scientific journals and specialised conferences is the most relevant indicator of the scientific dissemination of FSS. The technical Projects (i.e. P3, P4, P5, P6 and P7) are in charge of the scientific dissemination. With a final 13 papers, Future Sky Safety is almost in line with expectations with regard to the number of papers presented by technical projects.

**Table 3** illustrates the scientific publications produced during the third phase of the programme.

Event/Journal	Title	Author(s)	Project
SciTech AIAA Science and Technology Forum 8-12 January 2018	Modeling of the Aircraft Landing Behavior for Runway Excursion and Abnormal Runway Contact Analysis	Wang, C., Holzapfel, F.	Р3
<b>TRA 2018</b> <b>7<sup>th</sup> Transport Research</b> <b>Arena</b> 16-19 April 2018	Quantification of Accident Probabilities for a Risk Observatory	Wang, C., Metge, S., Holzapfel, F.	P4
2MAE 2018 2 <sup>nd</sup> International Conference on Mechanical, Material and Aerospace Engineering 10-13 May 2018	Compressive Properties of Geopolymer Matrix Composites	Hron, R., Martaus, F., Kadlec, M.,	Ρ7
ECCM 18 18th European Conference on Composite Materials 24-28 June 2018	Compression after impact of carbon geopolymer sandwich panels	Kadlec, M., Martaus, F., Hron, R.	P7
8th ICRAT International Conference for Research in Air Transportation 26-29 June 2018	Quantitative Assessments of Runway Excursion Precursors using Mode S data	Olive, X., Bieber, P.	P4
IMSC 2018 XXII International Mass Spectrometry Conference 26-31 August 2018	Methodology for qualitative and quantitative analysis of volatile compounds from composite materials at elevated temperatures	Lourenço, C., Bergin, S., Francis, D., Staines, S., Hodgkinson, J., Walton, C., Saffell, J., Tatam, R. P.	Ρ7

#### **Table 3: Scientific publications**

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Applied Ergonomics, 74	Measuring mental workload using physiological	Charles, R., Nixon, J.	P6
August 2018	measures: a systematic review		
21 <sup>st</sup> Lambda-Mu	A Backbone model for the	Bieber, P., Morio, J., Kakkai,	P4
16-18 October 2018	Transport System	LLobet, M., Carbo, L.	
3 <sup>rd</sup> International Cross- industry Safety Conference 31 October-2 November 2018	Advancing Safety in Organisations: Application via the Luton Safety Stack	Smeltink, J., Stroeve, S., Kirwan, B.	Ρ5
SGEM 2018 18th International Multidisciplinary Scientific GeoConference 3-6 December 2018	Construction Node from Geopolymer Matrix	Hron, R., Martaus, F., Kadlec, M., Růžek, R.	Ρ7
<b>Safety and Reliability</b> February 2019	The safety culture stack – the next evolution of safety culture?	Kirwan, B., Reader, T., Parand, A.	P5
Safety Science March 2019	What is it like for a middle manager to take safety into account? Practices and challenges	Callari, T., Bieder, C., Kirwan, B.	P5
<b>ISAP 2019</b> 7-10 May, 2019	Application of an HMI evaluation method (MERIA) based on the cratering of mental representations of operators in dynamic situations	Letouze, T., Creno, L., Diaz, J., Hourlier, S., Andre J.M.	P6

#### 2.1.5. Articles on magazines & press releases

Along with the scientific publications, FSS is expected to produce news, articles and press releases for the general national press, magazines and media, focusing on the benefits of FSS research for the general/non specialised public.

#### 2.1.5.1. "HindSight" article on "The Luton Safety Stack"

A four-page article by Barry Kirwan (EUROCONTROL), Siân Blanchard (EasyJet) and Sarah Flaherty (Lux Consulting) appeared on EUROCONTROL's magazine *HindSight* 26<sup>th</sup> issue in December 2017.

As stated in the introduction to the online issue, *HindSight* 26 "explores safety at the interfaces between functions, departments, professions, organisations, even countries. None of these does anything of value alone; it is the interaction between them that produces something of value. This

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requires collaboration, between individuals, between people and machines, and between groups, organisations, and States. But how do we collaborate? What gets in the way of collaboration? How might we collaborate?

To answer these questions, the authors considered collaboration at six main interfaces: the controller-controller interface, the controller-pilot interface, the colleague-colleague interface, the operations-safety management interface, the controller-management interface and organisational and international interfaces. As well as the safety of air traffic services – the raison d'être of *HindSight* – we have articles to help learn from elsewhere, concerning collaboration in healthcare, web operations and engineering, and community development".

The <u>article</u> outlines the approach at London Luton Airport, moving from the consideration that organisations such as ANSPs, airports and airlines are part of a wider system, and so are affected by safety issues in other organisations or at the interfaces between organisations, thus needing to work together on safety.

#### 2.1.5.2. "Bulletin of the Council of European Aerospace Societies" (CEAS) article on FSS

In October 2018, the *Bulletin of the Council of European Aerospace Societies* (CEAS) published an <u>interview with Catalin Nae</u>, Chairman of the Association of European Research Establishments in Aeronautics (EREA) for 2018-2019. The *Bulletin* dedicates half a page to Future Sky Safety, describing its objective and the preliminary results and impacts of the work already undertaken. In addition to providing a general overview of the Future Sky Safety achievements in terms of exploitation and dissemination, the interview refers in details to the important results emanating from the project, both for P1 and for the technical projects (P3-P7).

Below follows an exact transcript of the interview.

**Jean-Pierre Sanfourche, Editor-in-Chief**: Since the beginning of 2015, EREA is leading the EU-funded project 'FUTURE SKY SAFETY' which aims to define new tools and new approaches to aeronautics safety. What are the results and impacts of the work already undertaken within the Future Sky Safety research programme?

**Catalin Nae, Chairman of the Association of European Research Establishments in Aeronautics (EREA) for 2018-2019**: In a nutshell, the Future Sky Safety (FSS) EU-funded research project focuses on four main topics: building ultra-resilient vehicles and improving the cabin safety, reducing risk of accidents, improving processes and technologies to achieve near-total control over the safety risks and improving safety performance under unexpected circumstances. The Future Sky Safety programme helps to coordinate research and innovation agendas of several countries and institutions, as well as create synergies with other EU initiatives in the field (e.g. SESAR, Clean Sky 2). Among the most important results that have emanated from the project, one can firstly highlight that the project has fully achieved its main purpose to get the research coordination in the field of aviation safety

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Project:



between the different European research institutes (in EREA). A wide range of new cooperative safety research projects on own funding have already materialized. The second point to highlight is the dissemination, exploitation and communication of the project results. For this purpose four main dissemination workshops have been organized with more hundred participants each. FSS disseminated results at 40 to 50 than conferences/workshops and has received worldwide media coverage. As far as "Solutions for runway excursions" are concerned, three successful flight tests were performed within FSS project. Data collected have been used to develop algorithms and monitoring techniques to reduce the risk of runway veer-offs. This result can be used by airlines and Flight Data Monitoring software developers. The FSS project also provides effective input to EUs Aviation Safety policy, in particular the Risk Observatory, which has policy relevance. Validation of the prototype risk observatory, expected early 2019, is of interest to EASA and Europe's Big Data Programme for Aviation Safety (Data4Safety). FSS project results to "Resolve the organizational accident" have impacted, via a pan-European safety culture survey of European pilots, recent EASA guidance on hazard identification with new business models. FSS results developed guidance on how to advance safety management of organizations. As regards "Human Performance Envelope (HPE)" the Future Sky Safety project has brought a concept for cockpit operations and design to the experimental phase. Through flight simulations, it was shown how the HPE approach will contribute to safeguarding human performance in flight upset conditions. Finally the activities performed on fire, smoke and fumes consisted in testing fire resistance of advanced compo-site materials in aircraft, and have shown that geo-polymers are promising. The work undertaken within the Future Sky Safety project enabled to develop an important innovative concept to improve cabin air quality through continuous air quality sensing. In order to disseminate the key results of the project the FSS consortium has established and maintains a dedicated website (at http://ww.futuresky-safety.eu), published articles on a regular basis and made available public deliverables. Within the Future Sky Safety (FSS) research project numerous dedicated dissemination and exploitation actions have been organised. One of the key highlight of the Future Sky Safety research Programme is the organization of the 2nd Future Sky Safety public workshop that will be held in November 2018 in Brussels.

2.1.5.3. European Cockpit Association (ECA) article on the LSE Study on Safety Culture in Aviation On the 3<sup>rd</sup> of January 2019, the European Cockpit Association (ECA), the representative body of European pilots at EU level representing over 38,000 European pilots, launched a campaign dedicated to atypical employment in aviation. Their campaign thoroughly and explicitly refers to the LSE Study on Safety Culture in Aviation [8] performed within P5 and to the Future Sky Safety programme.

#### "Aerosafety World" article on the Safety Culture Stack approach 2.1.5.4.

On the 24<sup>th</sup> of January 2019, the Flight Safety Foundation, an independent, non-profit organisation invested in aviation safety, published an article on P5 on its Aerosafety World magazine. Barry

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Kirwan, Tom Reader, Anam Parand, Richard Kennedy, Corinne Bieder, Sybert Stroeve and Arjen Balk wrote the article. Under the title of "<u>The Learning Curve. Interpreting the results of four years</u> <u>of safety culture surveys</u>", the article examines the output of four years of research of safety culture performed by P5 within Future Sky Safety, and in particular, its safety culture surveys.

Safety culture is a pillar of aviation safety and a cornerstone in safety management system (SMS) models; but what does this mean in the everyday working practice?

The article describes different scenarios of application of safety culture principles, explores the scenarios, and illustrates how the safety culture survey approach, pioneered in ATM, can be translated effectively for other aviation segments.

#### 2.1.5.5. "Flight Safety Australia" article on the LSE Study on Safety Culture in Aviation

On the 9<sup>th</sup> of May 2019, "Flight Safety Australia", a bi-monthly online magazine providing the Australian aviation community aviation safety information since the early 1950s, referred to the P5 study in an article by Kreisha Ballantyne, "<u>It's all in the mind!</u>". The article explores whether there is a place for mindfulness in today's aviation culture. It explicitly refers to the Future Sky Safety programme and its 2016 case study on the Safety Mindfulness Methodology.

#### 2.1.5.6. CORDIS press release – Future Sky Safety - Final public event

In June 2018, the Future Sky Safety 2<sup>nd</sup> public event has been publicised on CORDIS, the Community Research and Development Information Service. CORDIS is the European Commission's primary source of results from the projects funded by the EU's framework programmes for research and innovation (FP1 to Horizon 2020). A "<u>Save the date</u>" article was published in order to promote the event to a specialised community of researchers.

#### 2.1.5.7. CORDIS press release – Coordinating air safety research happening across the EU

In November 2018, CORDIS dedicated an article to Future Sky Safety. With the title "<u>Coordinating</u> <u>air safety research happening across the EU</u>", the news is available in six languages (German, English, Spanish, French, Italian and Polish). The article presents FSS, its effort to coordinate the air safety research and innovation happening across Europe, and its aim to provide the aviation industry with an even stronger focus on safety.

# 2.1.5.8. CORDIS press release – Making EU skies the safest through innovative EU-funded research

In May 2019, CORDIS included Future Sky Safety in a "Results Pack" press release on the topic of "<u>Making EU skies the safest through innovative EU-funded research</u>". The news is available in six languages (German, English, Spanish, French, Italian and Polish). Following the first six FP7 projects featured in the first edition "Results Pack" on aviation safety, this new edition introduces another six projects, this time all Horizon 2020-funded: EPICEA, VISION, SafeClouds.eu, EUNADICS-AV, SARAH and Future Sky Safety. In particular, FSS is presented as "[the project that] has been bringing together the vast amount of air-transport safety research and innovation across the EU to

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develop new tools and new approaches in areas such as fire-resistant materials, runway excursion, piloting skills and safety management".

#### 2.1.6. Promotional materials produced

Different kinds of promotional material were produced to support the transmission of dissemination messages. The type and amount of promotional material were considered in the dissemination assessment process.

Promotional materials illustrate either the full programme or the single projects, and vary according to the type of event they are produced for and the objective of the communication action.

#### 2.1.6.1. FSS flyer and brochure (3rd version)

A third version of both the flyer and the brochure has been released in 2018 in order to account for changes within the Consortium.



#### Figure 1: Front and back cover of the flyer (left) and brochure (right), 2018

#### 2.1.6.2. P6 flyer

P6 produced a flyer to demonstrate the emergency exit door panel made of fiber-reinforced geopolymer composite.

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Dissemination, exploitation and communication FSS\_P2\_DBL\_D2.15 Public





#### Figure 2: P6 flyer demonstrating the emergency exit door panel made of fiber-reinforced geopolymer composite

#### 2.1.6.3. Videos

Project:

Reference ID: Classification:

During the third Programme period, Future Sky Safety produced two videos.

• The "LTN Safety Stack" video, released in December 2018, and realised by Pure Brand Media. P5 worked to adapt the EUROCONTROL safety culture approach to the airline and airport side of the aviation operation as a strategy to improve safety. This led to the establishment at the London Luton Airport (LLA) of what has become known as the "LTN Safety Stack", a group of 15 organisations, all based at the airport, collaborating to discuss safety issues and opportunities. Since January 2017, the LTN Safety Stack has been meeting periodically to develop harmonised procedures for all operators at LTN, and a

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common safety dashboard, where each organisation will contribute its main current and upcoming concerns, with the final aim of making each operation safe. The video shows what an aircraft turnaround at London Luton Airport looks like today.



Figure 3: Preview of the LTN safety stack video

• CAA UK produced and released in May 2019 a new **general FSS video**. The video, displayed during Aerodays2019, presents the Future Sky Safety programme, summarises its context, objectives and research topics, provides details on the single projects and offers an overview of the results reached globally by the Programme.

#### 2.1.6.4. Handout

A dedicated handout was prepared in view of the Final Conference, to present the results achieved by the Programme.

The handout briefly introduces the Future Sky Safety programme and its context before presenting the coordination and research projects (P1, P3, P4, P5, P6, and P7). Each project is presented in two pages, focusing on the safety issue the project addresses, the achievements it reached and the possible next step for research.

The handout is proposed in a "factsheet inspired" style, meant to be brief, graphically captivating and providing key information in a visual manner.

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Figure 4: Front cover (left) and sample internal pages of the handout (right), 2018

In view of the Final FSS Event, details of the handout, regarding both the content and the graphical aspect, have been updated to reflect progress of the projects.

#### 2.1.6.5. Posters

Thirteen posters have been produced by the Future Sky Safety Projects to be presented at the FSS  $2^{nd}$  Public conference. In addition, 2 posters have been produced for external events.

Table 4 illustrates the number count of material produced during the third period of the programme.

Material	Versions	Printed copies	Means of distribution
Brochure	1	100 + digitally distributed	FSS website, Public conference, Third parties events
Flyers	2	500 + digitally distributed	FSS website, Public conference, Third parties events
Hand-out	1	120 + digitally	FSS website, Public conference, Third parties events

#### Table 4: Number count of dissemination material produced

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		distributed	
White papers	3	300 + digitally distributed	FSS website, Public conference, Third parties events, Face to face meetings
Posters	15	15 + digitally distributed	FSS website, Public conference, Third parties events
Videos	1 on FSS 1 on "LTN Safety Stack"	Not applicable	FSS website, YouTube, Third parties events
Presentations	30 at internal events	Not applicable	FSS website, FSS events
	24 at external events		Third parties events

#### 2.1.6.6. White paper "Aviation safety dashboards. Safety intelligence"

In June 2019, P5 produced a white paper dedicated to the safety intelligence research within FSS.

Safety Intelligence does not only refer to information about safety, but also implies smart presentation of such data, tailored to the decision-makers, and user-centred. In order to support the decision-making process, managers need to make the right decisions based on clear information.

The safety intelligence research performed by P5 started at the top, examining "safety wisdom", namely how chief executives understand and manage safety. Then, P5 visited ANSPs already engaged in safety intelligence and using safety dashboards to present information to their executive boards. Finally, P5 worked with a single large European ANSP to develop a bespoke safety dashboard, which was unveiled in early 2019, receiving strong positive feedback.

This white paper shows lessons learnt and the best visualisations that appear to map well onto the executive-level mind-set. Although the context of this White Paper is ANSPs and air traffic management, the insights it present should be relevant and adaptable to other aviation organisations, and perhaps even other industries.

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P5 printed 150 hard copies of the white paper, to distribute during the FSS Final Event.



Figure 5: White paper "Aviation safety dashboards. Safety intelligence": cover (left) and sample internal pages (centre, right)

#### 2.1.6.7. White paper on Cabin Air Quality

In June 2019, P7.3 has prepared a white paper dedicated to the Cabin Air Quality research done within Future Sky Safety.

The white paper proposes the concept, developed within P7, of an "Industrial cabin air quality Framework based on Continuous Air quality Sensing (IFCAS)". The document includes the IFCAS and related WP7.3 results, as well as their exploitation routes. In addition, it presents the main state of the art, including EASA studies, on cabin air quality.

The White Paper has been sent for review/alignment to EASA at the end of June.

#### 2.1.7. Website statistics

FSS website (<u>www.futuresky-safety.eu</u>) has been online since April 2015. Statistics on the number of visits to the Programme webpage and surfing behaviour help track and monitor external interest in the project. Website statistics were generated using Google Analytics, which is able to provide the following data:

- N° of visits to the website;
- Countries' visitors;
- Visitors' behaviour;
- Search channels;
- Time spent on the website.

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Other website parameters that were assessed are:

- Search engine position for specific keywords;
- N° of periodical news on the website;
- N° of downloads of public documents;
- Number of views of project video.

### 2.1.7.1. Overview of visits

Below is provided an overview of the visits to the Future Sky Safety website for the third Programme period.

Parameter	Jan 2018 – June 2019	Monthly Average
Sessions	7096	546
Users	4214	222
Page views	16853	887
Pages/session	2.45	2.45
Avg. Session duration	2:16 minutes	2:16 minutes
Bounce rate	48.93%	48.93%
% New sessions	60.18%	60.18%

#### Table 5: Visits overview

- <u>Sessions</u> is the number of visits to the website.
- <u>Users</u> is the number of unduplicated (counted only once) visitors over the course of a specified period
- <u>Page views</u> is the total number of pages viewed. Repeated views of a single page are counted.
- <u>Pages/Session</u> is the average number of pages viewed during a visit. Repeated views of a single page are counted.
- <u>Avg. Session Duration</u> is the average duration of a visit. The objective set for the second period of Future Sky Safety is 1 minute.
- <u>Bounce Rate</u> is the percentage of single-page visits (i.e. visits in which the person left the website from the entrance page without interacting with the page). The average bounce rate for a content website is around 50-60%.
- <u>% New Sessions</u> is the percentage of first-time visits (from people who had never visited the website before).

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The number of visits to the website largely exceeds the defined goal of 1500 visits. In addition, the goal of having at least the 20% of new sessions was reached.

#### 2.1.7.2. Geo-location of visits

The website received visits from 99 different countries (the defined goal was 20). Figure 6 shows the first ten countries for number of visits.



Country ?	Sessions 🕐 🤟
Italy	<b>410</b> (12.59%)
United Kingdom	<b>312</b> (9.58%)
France	<b>290</b> (8.90%)
United States	<b>250</b> (7.68%)
Netherlands	<b>234</b> (7.18%)
Germany	<b>224</b> (6.88%)
Belgium	<b>163</b> (5.00%)
🐼 Brazil	<b>150</b> (4.61%)
Portugal	<b>120</b> (3.68%)
🚾 Spain	106 (3.25%)

#### Figure 6: Users geo-location

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### 2.1.7.3. Keywords

The position of the website on Google when looking for "Future Sky Safety" was checked with a specific tool, the "Google Ranking Check - Ajax Release 3.1". The position is in line with expectations, showing FSS as first result.

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## 2.2. Global Dissemination and Communication Activities

The **Table 6** shows the global number of dissemination and communication activities that Future Sky Safety performed in its entire duration (January 2015 – June 2019). Details on the activities referring to previous periods can be found in the D2.8 "1st Assessment of Dissemination and Exploitation Activities" [2] and in the D2.12 "2nd Assessment of dissemination and exploitation activities" [6].

Categories		Jan 2015 – June 2019	Short description
Organisation Conference	of a	3	<ul> <li>Future Sky Safety: a Joint Programme for Aviation safety</li> <li>Future Sky Safety on Final Approach</li> <li>Final Event</li> </ul>
Organisation Workshop	of a	6	<ul> <li>1<sup>st</sup> Internal workshop</li> <li>2<sup>nd</sup> Internal workshop</li> <li>FSS/EREA Wake Vortex Workshop 2016</li> <li>1<sup>st</sup> EREA Coordination Workshop</li> <li>2<sup>nd</sup> EREA Coordination Workshop</li> <li>3<sup>rd</sup> EREA Coordination Workshop</li> </ul>
Press release		14	<ul> <li>Article on ENAV's internal magazine "Resolving the organisational accident - entrare nella testa del vertice!"</li> <li>Coverage of the "<u>European pilots'</u> perceptions of safety culture in <u>European Aviation</u>" survey</li> <li><i>HindSight</i> article on <u>"The Luton Safety</u> <u>Stack"</u></li> <li><i>Bulletin of the Council of European</i> <i>Aerospace Societies</i> (CEAS) <u>article on FSS</u></li> <li><u>European Cockpit Association (ECA)</u> <u>article</u> on the LSE Study on Safety Culture in Aviation</li> <li><i>Aerosafety World</i> article on the <u>Safety</u> <u>Culture Stack approach</u></li> <li><i>Flight Safety Australia</i> article on the LSE</li> </ul>

#### Table 6: Overall number of dissemination and communication activities

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**Project:** 



		Study on <u>Safety Culture in Aviation</u>
		CORDIS press release – <u>EU researchers</u>
		<u>raise concerns over pilot fatigue</u>
		(December 2016)
		• CORDIS press release – <u>FUTURE SKY</u>
		SAFETY public workshop (January 2017)
		• TRIMIS press release – <u>SAVE THE DATE!</u>
		<u>1st FUTURE SKY SAFETY Public</u>
		Workshop (January 2017)
		• CORDIS press release - Lifting off for
		safer aviation in Europe (June 2017)
		• CORDIS press release – <u>Future Sky Safety</u>
		- Final public event (June 2018)
		• CORDIS press release – <u>Coordinating air</u>
		safety research happening across the EU
		(November 2018)
		• CORDIS press release – <u>Making EU skies</u>
		the safest through innovative EU-funded
		research (May 2019)
Non scientific and non	2	• White paper "Keeping the aviation
non-scientific and non-	5	• White paper Reeping the aviation
(nonularised publication)	300 hard copies	Safety Wisdom"
		• White paper "Aviation safety
		dashboards Safety intelligence"
		White paper on Cabin Air Quality
Exhibition	6	Aerodays 2015
		HYDROAVIASALON 2016
		• EBACE 2017
		HYDROAVIASALON 2018
		Aerodays 2019
		Paris Airshow 2019
Flyer, brochure	11	• Flyer: 2015, 2016 and 2018 edition
	2000 hand	• Brochure: 2015, 2016 and 2018 edition
	2000 hard copies	• Handout: 2016, 2017, 2018 and 2019
		edition
		P6 flyer
Training	2	P5 training for Maastricht Upper
	<u> </u>	F.J. training for Maastricht Upper     Airspace Contro ("Safety Pluonsint")
		Anspace centre ( Salety Blueprint ),

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		December 2018
		• P5 outputs to be incorporate in a revised
		curriculum of the Trinity College Dublin
		on-line Masters in "Managing Risk and
		System Change , September 2019
Social Media	0	
Website	2	<u>https://www.futuresky-safety.eu/</u> (main)
	The main website	<u>http://safeorg.eu/</u>
	had 10.535 unique	
	visitors	
Communication Campaign	0	
(e.g. Radio, TV)		
Participation to a	45	Ergonomics & Human Factors 2016
Conference		• ECCM17
		REA Symposium 2015
		Runway Surface Conditions Assessment
		and Reporting Symposium
		INTERFLAM2016
		SAPOE Conference 2016
		EASN Conference 2016
		• Fire and Cabin Safety Conference 2016
		• ICSC 2016
		Human Factors in Aviation Safety 2016
		AIAA Flight Testing Conference 2017
		EASA FDM Conference 2017
		ECRM conference 2017
		REA Symposium 2017
		20ème journées nationales sur les
		composites 2017
		AHFE Conference 2017
		SFIE European Chapter Symposium     2017
		International Aircraft Cabin Air
		conterence 2017
		EASN Conference 2017
		Rail Human Factors Conference 2017
		IASS Summit 2017

Project:	Dissemination, exploitation and communication
Reference ID:	FSS_P2_DBL_D2.15
Classification:	Public



		<ul> <li>Human Factors in Aviation Safety 2017</li> <li>Modelling and Simulation in Air Traffic Management conference 2017</li> <li>SGEM 2017</li> <li>ICISM 2017</li> <li>Safety in Health Systems 2017</li> <li>SciTech</li> <li>TRA 2018</li> <li>2MAE 2018</li> <li>ECCM18</li> <li>8th ICRAT</li> <li>IMSC 2018</li> <li>HYDROAVIASALON 2018</li> <li>33rd EAAP meeting</li> <li>GAPS 2018</li> <li>21st Lambda Mu Symposium</li> <li>ICSC 2018</li> <li>Human Factors in Aviation Safety</li> <li>SGEM 2018</li> <li>EASA 1st Ground Handling Safety Conference</li> <li>AHFE – Annual Human Factors &amp; Ergonomics Conference</li> <li>ISAP 2019</li> <li>SAFE 2019</li> <li>IES Annual Conference 2019</li> </ul>
		<ul> <li>REA Symposium 2019</li> </ul>
Participation to a Workshop	8	<ul> <li>FAA/EUROCONTROL Action Plan 15 on Safety Research</li> <li>CRA Risk Forum 2016</li> <li>Workshop on runway safety organised by the Russian Federal Air Transport Agency (FATA)</li> <li>NetWork Workshop "Exploring Resilience"</li> <li>FRMP17</li> <li>CRA Risk Forum 2017</li> <li>AOA meeting</li> <li>High performance thermoanalysis day</li> </ul>

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Participation to an Event other than a Conference or a Workshop	0	
Video/Film	9 3000 views	<ul> <li>FSS Aerodays2015 video</li> <li>P3 A400M Water Pond Test</li> <li>P3 Citation Flight Tests</li> <li>P3 Citation Water Pond Twente</li> <li>P4 Early Risk Observatory</li> <li>P5 LTN Safety stack video (2018)</li> <li>P5 LTN Safety stack video short (2018)</li> <li>P7 Fire Test Bench</li> <li>FSS Aerodays2019 video</li> </ul>
Brokerage Event	0	
Pitch Event	0	
Trade Fair	0	
Participation in activities organized jointly with other EU project(s)	4	<ul> <li>1<sup>st</sup> OPTICS Dissemination Event</li> <li>ACROSS Public Forum</li> <li>3<sup>rd</sup> OPTICS Dissemination event</li> <li>4<sup>th</sup> OPTICS Dissemination Event</li> </ul>
Other	25	<ul> <li>P4 interaction with EASA</li> <li>P5 interaction with EASA</li> <li>P6 interaction with NASA</li> <li>P7 Advisory group on cabin air in The Netherlands</li> <li>LISA summer school</li> <li>SM-ICG Industry Day</li> <li>Socio-technical System Engineering course</li> <li>Clinical Audit meeting</li> <li>Netherlands National Advisory Group on Cabin Air</li> <li>Presentation to key aviation stakeholders</li> <li>Webex with EASA and CANSO</li> <li>10th International Center for Applied Computational Mechanics (ICACM)</li> <li>Participation in the ICAO EUR Regional</li> </ul>

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Project:	Dissemination, exploitation and communication
Reference ID:	FSS_P2_DBL_D2.15
Classification:	Public

**Project:** 



Safety Team 9 <sup>th</sup> meeting (IE-REST 9),
Runway Safety Group
• Presentation to the EUROCONTROL
Safety Team
• ESDU aircraft performance committee
meeting
• 1st meeting with EASA
2nd meeting with EASA
3rd meeting with EASA
EUROCONTROL Safety Team
• ESDU aircraft performance committee
meetings
• FAA runway friction specialists meeting
Netherlands National Advisory Group on
Cabin Air
FAA-ECTL Human Factors Meeting
ICAO's 1st iSTARS iUG/01 Meeting
• Paper on Aviation Safety R&D in Europe
presented at SETI, the annual Embraer
Engineering Technology Symposium:
FSS was shown as use case.

The Table 7 shows the estimated number of persons reached, in the context of all dissemination and communication activities that Future Sky Safety performed in its entire duration, in each of the following categories. Details on the activities referring to previous periods can be found in the D2.8 "1st Assessment of Dissemination and Exploitation Activities" [2] and in the D2.12 "2nd Assessment of dissemination and exploitation activities" [6].

#### Table 7: Overall number of persons reached

Categories	Jan 2015 – June 2019
Scientific Community (Higher Education, Research)	8500
Industry	9000
Civil Society	2500
General Public	20000

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Policy Makers	1000
Media	100
Investors	0
Customers	0
Other	0

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## 2.3. Qualitative Criteria

Three qualitative criteria were selected to support the quantitative ones for the dissemination assessment:

- 1. Evolution of key messages to be disseminated per project;
- 2. Target audience distribution;
- 3. Expected audience reaction.

The assessment of the qualitative criteria must be performed via a comparison between the different programme periods, as the objective is achieved if there is an evolution throughout time.

With respect to the first criterion, P2 periodically performs a qualitative review of the material produced per programme or per project to monitor the progress – in terms of contents transmitted - in the projects' key messages. Analysing the communication activities (both the kind of events attended and the products created to be brought at those events), it appears that the key messages did evolve. As expected, the projects engaged in a process to communicate more specific and technical information than before, focusing on promoting their consolidated results instead of just publicising their research (see, for example, one of the FSS most representative products, the Handout). Overall, the expected key messages have been disseminated for the programme and for each of the technical projects.

The distribution of the target audience was expected to change during time as well, following the evolution of the communication goal towards supporting the short- and long-term impact of the programme. P2 monitored this evolution by keeping track of the audience attending the events where FSS was presented and the events organised by the programme itself. Again, the target audience evolved as expected, shifting more and more towards the specialised audience and decision makers.

Finally, an evolution in the target audience's reactions to FSS communication was also desirable. The achievement of the different dissemination goals reflects in different actions undertaken by the audience after the first contact. Emails exchange, follow up actions/discussions, invitations to third parties events, invited speeches and re-use or exploitation of FSS results into personal or political research agendas indicate a progressive interest and involvement of stakeholders into the Programme activities. Examples of this engagement are given in the section dedicated to Other dissemination actions towards key aviation stakeholders. These include the ESDU aircraft performance committee meetings (results of P3 will be used to develop runway friction models); the FAA runway friction specialists meeting (which led to the FAA wanting to cooperate on wet runway performance analysis); and additional meetings with the Netherlands National Advisory Group on Cabin Air.

Overall, the desired changes were achieved for all the three qualitative criteria, as defined by D2.5.

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## 2.4. KPIs Achievement Rate

Key Performance Indicators are the measurements to identify the success of the dissemination plan and the achievement of the communication objectives. The KPIs have been identified based on the qualitative and quantitative criteria described in the previous section.

For each indicator, standards to be achieved have been set, the means of monitoring have been identified and the main responsible(s) for the target achievement have been specified. These parameters were first set in the Criteria for Assessment of Dissemination Activities [1] and then revised in the 1<sup>st</sup> Dissemination Assessment [2].

The section below thoroughly illustrates the KPIs and their targets, stating whether they were reached or not and, in this case, why and which corrective actions will be performed in the future to improve these results.

Regarding the external activities:

- The number of relevant third parties events attended by the projects (24/20+) and the number of presentations given to third parties relevant events were both met and exceeded (27/20+). The number of contacts interacting and asking for information about FSS during events was satisfactory and in line with expectations. Several questions, clarification requests, networking activity and contact exchanges followed each presentation.
- The number of posters presented to third parties events (2/6) did not meet expectations, as other communication means were preferred. However, 13 posters by the different projects have been displayed at the FSS on Final Approach conference.
- The distribution of printed materials (i.e. the latest FSS flyer, brochure and handout, and the FSS white papers) met expectations (500/500+).
- The number of articles submitted to relevant conferences/events was almost reached (13/15+); among these scientific articles, three are academic publications on a journal. In addition to these, the technical projects are currently working on many papers to submit in the next months (see Appendix B).
- The number of articles on sector magazines was reached (5/5+).
- As for the numbers of press releases, it was met (3/3). Many dedicated articles appeared on CORDIS, the Community Research and Development Information Service, which is the European Commission's primary source of results from the projects funded by the EU's framework programmes for research and innovation (FP1 to Horizon 2020). In addition, a



wide press coverage of the white papers by P5 and P7, published during summer 2019, may be expected in the near future as happened with the previous FSS white paper.

• FSS has a mailing list of over 200 contacts, thus reaching its goal.

As for the internal activities:

- The number of FSS PMC (4/4) was reached. Concerning the focused internal seminars, the goal was also largely met and exceeded (30/10).
- About the participation of the Consortium to the FSS internal events, the goals were to have every partner attending at least <sup>3</sup>/<sub>4</sub> of the events, and to have at least <sup>3</sup>/<sub>4</sub> of the partners to each event. The first objective was not met: while 21 partners attended both the public events held in the third period, 6 of them only attended one and 9 of them attended none. On the other hand, the second objective was almost met as, on average, representatives of 65% of the Consortium took part in the internal events.
- The number of invitations sent out for the FSS external events was largely exceeded (200/70+). The number of external participants at the FSS internal events was met (50/50+); also, the objectives regarding the qualitative feedback received about the FSS on Final Approach conference were met.
- The objective on the audience distribution at internal events was to have 60% of specialized audience & 40% of decision makers and it was met. The FSS on Final Approach conference saw the presence of a 55% of specialised audience and 45% of decision makers respectively, while the Final FSS Event had a 70% of specialised audience and a 30% of decision makers.
- The number of presentations given by the technical projects at internal and external events were largely exceeded (11/5 and 30/5 respectively). This is true also for the number of presentations from external parties to the FSS external events (7/4).
- On the other hand, the number of printed materials brought and submitted to the FSS public events from third parties was not met. This was done by choice, as P2 opted not to open the workshop to third parties materials in order to avoid distraction from the presentation of the Programme results.

About the website:

• The goals regarding the number of visits to the website (1500+; 20% exclusive visitors), the search engine position (2<sup>nd</sup> results for Future Sky Safety) and the geo-distribution of

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visitors were largely met; so was the objective set for visitors' behaviour, with an average time spent on the website of more than 2 minutes (against an objective of 1.5 minutes).

- As for downloads of public documents (30+), the number of visits to the download page is over 1000. This is not the number of times contents have been downloaded, but the number of visits received by the page, which serves as a yardstick of the interest raised by downloadable contents.
- The first Programme video was displayed during the Aerodays2015, which were attended by 1000 delegates; website statistics (combined with views on Youtube) indicate that it received the number of views expected (200+). A new Programme video was displayed during the Aerodays2019 and the Paris Airshow 2019, which were attended by not less than 100.000 delegates.
- The goal of publishing at least 1 news item every two weeks (36/36) on average was reached, with a fairly homogeneous distribution of news throughout the year.

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## **3 EXPLOITATION ASSESSMENT**

The assessment of the Exploitation activities is performed comparing the activities developed by the technical projects with the set of measures identified and illustrated in the second release of the Exploitation Plan [7]. The document was based upon each Technical Project plan. It identified the major markets, impacted users and stakeholders, showing the range of applicability and importance of the FSS Programme.

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### Table 8: Exploitation assessment for P3

Project	3 - Solutions for runway excursions
Exploitation action title	Workshop/trial with airlines & FDM Flight Data Monitoring
Objective(s)	The objective of the workshop was that aircraft operators, Flight Data Monitoring (FDM) software developers and other interested parties would learn from the results of the project and look for implementation into their FDM programmes. This workshop aimed at bringing together a variety of participants from the aviation safety industry, including aircraft operators, Flight Data Monitoring software developers, aircraft manufacturers and regulators.
Description of	P3 held a Flight Data Monitoring Workshop at NLR head office, Amsterdam (the
performed	Netherlands) on the 26 <sup>th</sup> of September 2018. This workshop discussed and
action	presented the results from the Future Sky Safety project on Runway Veeroff Risk
Start date	tested against flight data from major operators in Europe. The general topics
26/09/2018	monitoring of applied crosswind techniques, accurate computation of
End date	touchdown point and vertical speed at touchdown, monitoring of lateral
26/09/2018	organisations that participated in the P3 work: NLR, Airbus space and defence,
Place	workshop:
NLR,	<ul> <li>General introduction to runway yearoff rick and monitoring – (Gerard)</li> </ul>
Amsterdam the	van Fs. NI R).
Netherianas	<ul> <li>Algorithms for calculating crosswind during the landing (Peter van der Geest, NLR).</li> </ul>
	• Algorithms for vertical speed calculation (Peter van der Geest, NLR).
	<ul> <li>Algorithms for landing trajectory calculation (Peter van der Geest, NLR).</li> <li>Assessing the relative risk of wear off assessing with a given set of</li> </ul>
	<ul> <li>Assessing the relative risk of veer-off associated with a given set of conditions (David Barry, Cranfield University)</li> </ul>
	<ul> <li>Advanced techniques for analysing flight data for runway veeroff risk</li> </ul>
	(Sara Lagunas Caballero, Airbus)
	• Use of machine learning tools for runway excursion risk monitoring
	(Gerard van Es and Vincent de Vries, NLR).
	Connecting the dots: How can airlines monitor runway veeroff risk

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	(Gerard van Es, NLR).
Involved stakeholders	Aircraft operators (both airlines as well as business jet operators), regulators (e.g. EASA), FDM software developers, aircraft manufacturers and aircraft accident investigation organisations.
Involved FSS partners	NLR, Cranfield University, and Airbus Space & Defence
Action evaluation (effectiveness, feed-back, etc.)	The workshop participants had the opportunity to discuss the new algorithms and techniques first hand with the developers and users. This opportunity was clearly taken, as there were many fruitful discussions during the workshop. All participants were extremely pleased with the presented work and found it very relevant to future developments in flight data monitoring. After the workshop, all participants were provided with copies of the presentations
	After the workshops, participants and also people that did not attend the meeting asked for additional information. Airline operators asked for more details on the implementation of some of the presented algorithms. All requested were handled and the organisations were provided with feedback and assistance.
Further exploitation potential /	At the request of EASA, results from WP3.3 were presented at the EASA's Safety in Aviation Forum for Europe – SAFE 360° organised in May 2019. Three presentations were given at this meeting with positive feedback.
Possible future actions	A final FSS report with all results and presentations was written. The tools and techniques developed and explored within the WP3.3 activity can be of great use to the aviation community in improving flight safety. To make these tools ready for exploitation a number of steps need to be taken. Currently, aircraft operators use commercial software to conduct flight data analysis. Some of the larger companies have resources and knowledge to conduct analysis beyond the standard features of the software using in-house tools. However, most will simply use the software as is with only minor modifications to its settings. The tools and techniques developed in WP3.3 should be incorporated into the standard FDM software by the vendors to exploit their benefits to flight safety. Some of the tools developed In WP3.3 are easy to implement, like the algorithms for touchdown analyses and wind reconstruction. These algorithms are also beneficial for the analysis of other safety events and are not limited to veeroffs only. FDM software providers should be able to incorporate these algorithms within 2-3 years. However, this depends partly on the requests made for it by the customers. The more

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advanced tools using machine learning algorithms will take more time to be exploited. This can be done without the standard FDM software. The main problem for the airline operators is the lack of knowledge on machine learning. Although the larger airline companies have been investing into machine learning, this has mainly been in ticket pricing, maintenance forecast and other non-safety related areas. It has proven to be difficult to focus in safety related machine learning topics. To the smaller operators, machine learning techniques are much more difficult to exploit, also because their data volumes are generally much smaller. This makes it harder to use machine learning in a useful way. The main question is where this technology is likely to be in five years. As significant progress is made in the field of machine learning, it is more than likely that flight data analysis will benefit from these developments in this period. However, it is believed that the classical way of the flight data analysis will still be needed. Machine learning will be an additional feature to the safety analysis.

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### Table 9: Exploitation assessment for P4

Project	4 - Total System Risk Assessment
Exploitation action title	Risk Observatory (RO) Trials: A Risk Observatory "Getting Started"
Objective(s)	<ol> <li>To present the RO prototype aspects to KLM and AIRBUS, including a life Risk Observatory demonstration.</li> <li>To present, discuss and settle on the use-cases, needed for the Risk Observatory prototype assessment at KLM and AIRBUS.</li> <li>To set the Risk Observatory prototype evaluations days.</li> <li>To execute the Risk Observatory assessments and collect user feedback.</li> <li>To report on the Risk Observatory assessments executed.</li> </ol>
Description of	The Risk Observatory - s/w adaptations were first worked on in January 2019
performed	and February 2019 to get it at the appropriate level needed for this task.
action	As of 7 <sup>th</sup> of March, a kick-off and Risk Observatory assessment use-case
Start date	The Netherlands, to start defining their use-cases need in the Risk Observatory
02/01/2019/	assessment. As of 10 <sup>th</sup> of April, a similar kick-off session was held at AIRBUS S.A.S. offices,
End date	Toulouse, France.
30/06/2019	Both kick-off sessions were used to explain, promote and disseminate the Risk Observatory approach to the Safety specialist within these companies, and to
Places	initiate the use-case definition discussions with these stakeholders, as well as to settle on the Risk Observatory developments and the way of performing these
Amsterdam-	assessments.
Schiphol and Toulouse	As of the 21 <sup>st</sup> of May, the Risk Observatory assessments took place at KLM offices. For practical reasons two separate Risk Observatory feedback sessions, i.e. on the 10 <sup>th</sup> and on the 14 <sup>th</sup> of June respectively, took place internally at Airbus.
	Reporting is to be done asap afterwards.
Involved stakeholders	KLM Airlines, AIRBUS
Involved FSS partners	NLR, AIRBUS, CAA-UK, CEIIA, CIRA, EUROCONTROL, KLM Airlines, NavBlue ONERA
Action	The kick-off meetings were purposely set up to give a P4 overview and Risk

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evaluation	Observatory introduction to the Safety departments inside KLM and AIRBUS,
(effectiveness,	and to involve them in the preparations of the Risk Observatory assessments
feed-back, etc.)	from the start. First Risk Observatory feedback has been provided and collected
	already.
Further	There is the idea to promote the P4 Risk Observatory work to data4safety /EASA
exploitation	in June/July period.
potential /	
Possible future	
actions	

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### Table 10: Exploitation assessment for P5

Project	5 - Resolving the organizational accident
Exploitation action title	Safety Dashboard Configurable Platform for ANSPs
Objective(s)	To develop a configurable platform to enable ANSPs to customize a safety dashboard using the guidance from P5.1 (Safety Intelligence), so that they can manage safety at the Executive Board level.
Description of	A safety dashboard prototype was realised by using a Python platform (Plotly),
performed	which is dedicated to dashboard design and development. The starting point for
action	the design was the current ENAIRE safety dashboard, shown on PPT to the
Start date	needs (safety officers and the Board members) and an iterative process to check
30/08/2018	that the various versions progressively released were actually matching requirements derived from those needs. A number of fine-tuning actions were
End date	carried out between these iteration points (i.e. face-to-face meetings in Madrid
31/01/2019	and WebEx) to adjust the design and adequately address the requirements. A final version of the dashboard exists online, hosted on a DBL server. Data fed
Place	into the dashboard are provided by ENAIRE. The dashboard was used in the context of an ENAIRE Board meeting at the end of January 2019, to present the
Rome/Madrid	latest safety data and indicators.
Involved	DBL, ECTL, ENAIRE
stakeholders	
Involved FSS	DBL, ECTL
partners	
Action	The dashboard, fed with actual data provided by ENAIRE, was used by the
evaluation	ENAIRE Safety & Security Manager as the tool for presenting safety data and
(effectiveness,	indicators to the Board on the $30^{th}$ of January 2019. DBL and ECTL received a
feed-back, etc.)	very positive written feedback from ENAIRE (email to DBL and ECTL received on
	31/01/2019), with ENAIRE Board appreciating the interactivity and the
	information visualisations used.
	The dashboard is considered by ENAIRE to be a solid starting point for
	developing an interactive dashboard internally to the organisation.
Further	The methodology used to develop the dashboard, together with the lessons
exploitation	learnt in relation to user needs and information visualisation pros and cons, are

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potential /	elements that can be re-used for future projects related to dashboard design
Possible future	and development.
actions	A possible future direction for exploiting the dashboard requires the change of software platform, by switching to Microsoft Power BI, which has the advantage of being a software provided by default with MS Office 365.

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### Table 11: Exploitation assessment for P6

Project	6 - Human performance envelope
Exploitation action title	Smart vest for real-time measurement of physiological data
Objective	To develop a smart vest for the real-time measurement of physiological data to monitor the Human Performance Envelope.
Description of	• Smart vest firmware for the real-time transmission of physiological data
performed action	<ul> <li>Smart-vest software for the analysis of real-time physiological data developed</li> </ul>
Start date	<ul><li>System tested</li><li>System demonstrated</li></ul>
01/07/2018	
End date	
01/06/2019	
Place	
Neuchatel	
Involved stakeholders	-
Involved FSS partners	CSEM
Action evaluation (effectiveness, feed-back, etc.)	All planned actions successfully completed.
Further exploitation potential / Possible future	Integration of the smart-vest into a pilot monitoring system (PMS) which includes various physiological sensors for the monitoring of the pilot state.
uctions	

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### Table 12: Exploitation assessment for P7

Project	7 - Mitigating Risk of Fire, Smoke and Fumes			
Exploitation	7.2 Full-scale demonstrator based on geopolymer composite material solution			
action title				
Objective(s)	Design, manufacturing and testing of a fire resistant, lightweight, cost effective, with improved impact resistibility, full-scale demonstrator of a secondary aircraft structure, using geopolymer-based material solution that have been successfully developed in ESS WP7.2.			
Description of	An actual interior panel of the CS 23 certified, Czech made regional turboprop			
performed	was selected to be the FSS WP7.2 structural demonstrator. More specifically, the			
action	emergency exit door panel was identified as the optimal choice: it was a			
Start date	relatively complex part, featuring window cut-out and dimple of the opening			
02/01/2019	lever. Originally, the part was made by autoclaving of qualified glass-phenolic			
End date	prepreg. The demonstrator was not thought to be an exact copy of the original			
15/06/2019	part and certain level of design freedom was accepted.			
Place				
VZLU (CZ)	Figure 7: The demonstrator before and after the flame penetration test per CS25, App. F, part III For manufacturing the demonstrator, a serial mold was leased from the original part manufacturer. Total four moldings of the demonstrator were manufacturing process, the second one to perform the flame penetration test, the third one to demonstrate weight improvement applying hybrid material solution, and the last one as a referential made of standard glass-phenolic material.			
Involved	-			
stakeholders				
Involved FSS	VZLU			
partners				
Action	<ul> <li>Manufacturing feasibility of geopolymer material solution was validated.</li> <li>FST performance of geopolymer based composite was demonstrated.</li> </ul>			

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evaluation (effectiveness, feed-back,	• Weight and cost reduction were obtained compared to the referential part.
etc.)	
Further	• Geopolymer based solutions (matrix resin for fiber reinforced composites,
exploitation	foams, honeycombs, etc.) could be applied in secondary structures in the
potential /	tuture, e.g. as internal linings in cargo or cabin areas, fire bulkheads, temperature exposed pipelines, etc.
Possible future	Improve manufacturing process, certification tests.
actions	

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# 4 CONCLUSIONS

Overall, the performance of the Programme in its final phase was highly satisfactory.

The quantitative KPIs' achievement rate highlights that FSS accomplished most of the activities as planned, and in some cases, even exceeded expectations. Where this is not the case, the Programme achieved the expected results almost entirely. In addition, it has to be noted that it is expected that Future Sky Safety will continue having an impact with regard with dissemination in the next weeks and months (see, e.g., the FSS Foreseen Scientific Outputs).

The Google Analytics shows that the website is in very good health. The project reached its objectives and the publication of news is in line with expectations.

With regard to external events, FSS took part in a number of them, meeting and exceeding the ambitious goal set. In addition, some of these events were attended by more than one FSS project, thus multiplying the effectiveness of participation.

The 2<sup>nd</sup> FSS Public Workshop raised stakeholders' interest, with more than 100 people registering. Although final external participants were less than expected, it has to be considered that the workshop, taking place on the 6-7<sup>th</sup> of November 2018 in Brussels, unfortunately was paralleled by the EASA's Annual Safety Conference, taking place in Vienna in the same two days, an occurrence that for sure shifted some possible participants towards the EASA conference. Nevertheless, the 2<sup>nd</sup> Public Workshop was much appreciated by a majority of attendees. In addition to this event, Future Sky Safety opened its Final Workshop to the public, attracting additional participants.

On invitation of the European Commission (EC), Future Sky Safety contributed to its EC exhibition areas in both the Aerodays 2019, in Bucharest, Romania, and the Le Bourget Airshow 2019, in Paris, France. The Aerodays 2019 was attended by about 800 professionals from the aviation industry. The Le Bourget Airshow was attended by 2,453 exhibitors and 316,470 unique visitors, of which 139,840 professionals representing 185 countries and 176,630 visitors **•**f the General Public. As for the qualitative criteria, they were met as well. The analysis of the communication activities shows that key messages conveyed by the Programme did evolve in time, just as it was expected. In the third phase, the technical projects started communicating more specific information than before, focusing on promoting the results of their research. Overall, the desired messages were disseminated for the programme and for each of its projects.

The distribution of the target audience evolved as well in time, shifting more and more from the general audience towards specialised experts and decision makers.

Finally, an evolution in the targeted audience's reactions was also expected, and reached, as a sign of the effectiveness of the different dissemination activities. Stakeholders' engagement at a

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personal or even political level was achieved; therefore, the desired changes were accomplished for all the three qualitative KPIs established to monitor the effectiveness of FSS dissemination.

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### 5 REFERENCES

- [1] Future Sky Safety D2.5 "Criteria for Assessment of Dissemination Activities", December 2015
- [2] Future Sky Safety D2.8 "1st Assessment of Dissemination and Exploitation Activities", June 2016
- [3] Future Sky Safety D2.2 "1st release of Communication Strategies and Dissemination Plan", June 2015
- [4] Future Sky Safety D2.4 "1st Release of Exploitation measures", June 2015
- [5] Future Sky Safety D2.14 "Dissemination material from second Future Sky Safety Public Workshop", December 2018
- [6] Future Sky Safety D2.12 "2nd Assessment of dissemination and exploitation activities", December 2017
- [7] Future Sky Safety D2.10 "2nd Release of Exploitation measures", December 2016
- [8] Future Sky Safety D5.4 "European pilots' perceptions of safety culture in European Aviation", November 2016

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## Appendix A Compliance to (Updated) KPIs for the Third Period

External activities						
Indicator	N	Target per period (M37-M54)		Means of	Responsible(s	Corrective actions (P2)
	Expected Reached monitoring )	)				
Relevant third parties events attended	El	20+	24	Running total per period	P1, P2, P3, P4, P5, P6, P7	<ul> <li>Identification of relevant events to be attended</li> <li>Periodic reminders to promote dissemination actions</li> </ul>
N° of presentations E2-a given to third parties relevant E2-b events	E2-a	20+	27	Running total per P1, P2, P3, P4, period P5, P6, P7	Periodic reminders to promote dissemination actions	
	E2-b	At least 40% of participants (<50 people- event) Less than 30% of participants (>50 people- event)	Reached	Number of contacts asking for information during/after the event	•	Collect business cards of people asking for information
N° of posters presented to third	E3-a	At least 6	2	Running total per period	P1, P2, P3, P4, P5, P6, P7	• Support the identification of key messages/main achievements
parties relevant events	E3-b	30% of participants (<50 people-event) Less than 25% of participants (>50 people- event)	Reached	Number of contacts asking for information during/after the event		<ul> <li>Support posters design</li> <li>Periodic reminders to promote dissemination actions</li> <li>Collect business cards of people asking for information</li> </ul>
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N° of articles submitted to relevant conferences/event; N° of academic publications	E4-E5	At least 15	13	Running total per period	P3, P4, P5, P6, P7	<ul> <li>Support the identification of key messages/main achievements</li> <li>Periodic reminders to promote dissemination actions</li> </ul>
N° of articles on sector magazines	E6-a	At least 5	5	Running total per period	P1, P2, P3, P4, P5, P6, P7	<ul> <li>Establish contacts with the main sector magazines</li> <li>Support the identification of key</li> </ul>
	E6-b	3+	4	Targeted magazines		<ul> <li>Support the identification of key messages/main achievements according to the magazine style and target</li> <li>Ask for EC or EC communication channels support (e.g. TRIP)</li> <li>Ask for EREA communication channels support</li> </ul>
N° of printed materials	E7-a	500+	500+	Running total per period Mapping printed material/event	P2 (printing) P1, P2, P3, P4, P5, P6, P7 (distribution)	<ul> <li>Distribution of the printed material to the other projects</li> <li>Identification of the proper material according to the event type</li> </ul>
	E7-b	30% of participants (<50 people-event) Less than 25% of participants (>50 people- event)	Reached	Number of contacts asking for information during/after the event		<ul> <li>Promotion of new materials according to the event goals</li> <li>Periodic reminders to promote materials distribution</li> <li>Collect business cards/names of people asking for information</li> </ul>
N° of Press releases made	E8-a	At least 3	3	Running total per period	P1, P2, P3, P4, P5, P6, P7	<ul><li>Establish contacts with press</li><li>Support the identification of key</li></ul>
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	E8-b	2+	3	Targeted press		<ul> <li>messages/main achievements</li> <li>Ask for EC or EC communication channels support (e.g. TRIP)</li> <li>Ask for EREA communication channels support</li> </ul>
N° of stakeholders in the mailing list	E9	200+	200+	Running total	P1, P2	<ul> <li>Collects contacts from the technical projects</li> <li>Put a subscription form on FSS website to start the mailing list</li> </ul>

Internal activities	Internal activities						
Indicator	N	Target per period (M37-M54)		Means of	Responsible(s	Corrective actions (P2)	
marcator	N	Expected	Reached	monitoring		)	corrective actions (F2)
N° of Future Sky Internal workshops	11	1	1	Count Workshops	of	P2	N/A
N° of focused seminars organized by P2	12	10 focussed seminars in total, organised in strict cooperation with the Project Managers	30	Count Seminars	of	P2 + Technical projects	• Stimulate the technical projects for the identification of specific topics for the seminars
N° of FSS PMC	13	4	4	Count of PMC		P1, P2, P3, P4, P5, P6, P7	Plan in advance the PMC meeting dates
N° of participants at FSS internal events	14	Every partner will attend at least ¾ of the events	Not reached	Count participants	of	P1, P2, P3, P4, P5, P6, P7	• Promote the partners participation through direct involvement in the event activities
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N° of presentations given at internal events	15	At least one per project (5)	11	Collection of presentations	P1, P2, P3, P4, P5, P6, P7	<ul> <li>Promote the partners participation through direct involvement in the event activities</li> </ul>
N° of External workshops organised by FSS	16	1	1	Count of Workshops	P2	N/A
N° of invitations at FSS external events	17	70+	Around 200	Count of invitations per workshop	P2	• Set up a list of backup contacts
N° of participants at FSS external	18-a	At least ¾ of the partners	65% of the partners took part	Count of partners per workshop	P2	<ul><li>Set up a list of backup contacts</li><li>Mandatory participation for project</li></ul>
events	18-b	50+ external participants	34 (2 <sup>nd</sup> Public Workshop) + 16 (FSS final workshop) = 50	Count of participants per workshop		event activities
N° of presentations given at external	19-a	At least one per project (5)	30	Count of project presentations	P1, P2, P3, P4, P5, P6, P7	N/A
events	19-b	4+ from external parties	7	Count of external presentations		
N° of printed materials	l10-a	500+	500+	Running total Mapping printed material/event	P2 + P3, P4, P5, P6, P7	<ul> <li>Promote the use of dissemination material to the project partners</li> <li>Identification of the proper material according to the event</li> </ul>
	l10-b	50+	0	Printed material from third parties		type

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N° of materials submitted from third parties	111	10+	0	Running total	P2	<ul> <li>Periodic reminders to promote dissemination actions</li> </ul>		
N° of feedbacks received	l12-a	30+ on average per event	25 feedback questionnaires received	Feedback collection	P1, P2, P3, P4, P5, P6, P7	<ul> <li>Set-up interactive sessions (Q&amp;A, roundtable, comments) during the</li> </ul>		
during/after events	l12-b	At least 60% of feedback will generate an action from the project	Reached	Counting of follow up actions (documents update, email exchanges etc.)			<ul> <li>Send out on-line questionn the participants to collect feedback after the event</li> <li>Use minutes of the event</li> </ul>	<ul> <li>event to collect reedback from the participants</li> <li>Send out on-line questionnaires to the participants to collect their feedback after the event</li> <li>Use minutes of the event to keep</li> </ul>
	l12-c	40% of external audience is keen on the project	84% of external audience is keen on the project	Number of interactions and events attendance		track of the number of interactions		
External audience distribution	113	60% of specialized audience & 40% of decision makers	62% of specialized audience & 38% of decision makers	Counting of organizations attending the External Workshops	P2	• Balance the stakeholder invitations according to the main target audience to be achieved through the event		

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Website	-					
Indicator	N	Target per period (M18-M	36)	Means of	Responsible(s	Corrective actions (P2)
marcator	~	Expected	Reached	monitoring	)	
N° of visits to the website	W1	1500+ visits per period and 20% of them must be exclusive visitors	6550 visits + 60% exclusive visitors.	Google Analytics statistics	P2	<ul> <li>Promote the website link on other portals</li> <li>Increase the third parties website linking to FSS website</li> <li>Promote the website during the External Workshop and third parties events</li> <li>Website link reported on all dissemination materials</li> </ul>
Search engine position	W2	At least second result, when looking for "Future Sky Safety"	First result.	SEO tools	P2	<ul> <li>Improve website visibility through keywords analysis</li> <li>Improve website visibility through SEO activities</li> </ul>
N° of news on the website	W3	At least 1 news every two weeks (36 news)	36 news	Running total per period	P2	<ul> <li>Periodic collection of materials from the other projects</li> <li>Increase the number of news not related to events</li> </ul>
Countries' visitors	W4	At least 20 different Countries per period	99 different countries.	Google Analytics statistics	P2	<ul> <li>Promote the website link on other portals</li> <li>Promote the website during international meetings and/or with non-EU stakeholders</li> </ul>

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Visitors' behaviour	W5	Average Time on Page at least 1.5 minute	2.15 minutes.	Google Analytics statistics	P2	<ul> <li>Create links between pages to facilitate the website exploration</li> <li>Average Time on Page at least 1 minute</li> </ul>
N° of downloads of public documents	W6	30+	1000 visits to the page.	Use the number of visits to the download page as a rough measure to track downloads.	Ρ2	<ul> <li>Improve documents research through use of keywords</li> <li>Publish news when a new document is uploaded</li> </ul>
Number of views of project videos	W7	200+	235 views.	Youtube counter	Ρ2	<ul> <li>Promote the video link through the website</li> <li>Promote the video link on other portals</li> <li>Promote the video link during external events</li> <li>Promote the video link on other portals, such as Youtube, which has a counter</li> </ul>

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## Appendix B FSS Foreseen Scientific Outputs

Proj.	WP	Lead-author	Co-authors (expected)	When	Working title	Journal/conference
P3	WP 3.2	van Es, G.		2019-2020	Braking performance of aircraft on flooded runways	Journal of Aircraft
P3	WP 3.3	van Es, G		Submitted	Applied research on wrong use of performance data	ISASI 2019 symposium
P3	WP 3.3	van der Geest, P.		2019-2020	Crosswind determination from Flight Data	Journal of Aircraft
P3	WP 3.3	van der Geest, P.		In preparation	New algorithms for flight data monitoring with focus on runway excursions	TBD
Р5		Callari, T.C., McDonald, N., Kirwan, B., Cartmale, K.		In preparation	Investigating and operationalising the mindful organising construct in an Air Traffic Control organisation	Safety Science - Special Issue Mindful Organising
Р5		McDonald, N., Callari, TC, Baranzini, D., & Mattei, F.		In preparation	A mindful organising governance model for ultra-safe organisations	Safety Science - Special Issue Mindful Organising
Р5		Bieder, C., Callari, T.C.		In preparation	What does it take to enhance Middle Managers' Contribution to Safety in civil aviation?	TBD
P5		Stroeve, S.		In preparation	Integrated organizational approaches for advanced safety management in air transport	Safety Science

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Р5		Woltjer, R., Oskarsson, P.A., Johansson, B. J. E.		In preparation	Heedful interrelating in three Area Control Centers: Being mindful of operations and safety in Air Traffic Management, Cognitive Engineering & Decision Making / Cognition, Technology & Work	Safety Science
Р5		Woltjer, R., Johansson, B. J. E., Svenmarck, P., Oskarsson, P.A., Kirwan, B.		In preparation	Agile Response Capability: Method for EXercise planning and evaluation (ARC-MEX)	Reliability Engineering & System Safety / Journal of Contingency & Crisis Management / Cognition, Technology & Work
P6		Charles, R., Nixon, J.		Submitted	Using decision ladders to understand multiple, adverse inflight events	Ergonomics
P6	WP 6.4	Letouze, T.,	Creno, L., Diaz- Pineda, Dormoy, C.H., J., Hourlier, S., Anre, J.M.	Submitted	Mental Representation Impact Analysis (MERIA): A Method for Analyzing the Mental Representation for the Desing of HMI. A Case Study in Aeronautics.	Le Travail Humain
P7	WP 7.1	Leplat, G., Le Sant, Y., Reulet, P., Batmalle, T.		Accepted	Time-resolved 3D temperature/displacement measurements for investigating the fire behaviour of composite materials	INTERFLAM2019, 15th International Conference and Exhibition on Fire Science and Engineering
P7	WP 7.1	Huchette, C., Lapeyronnie, P., Márquez Costa, J. P., Rannou, J., Leplat, G.		Accepted	Caractérisation en température de la ténacité en mode II des interfaces des CMO en utilisant l'effet Joule	JNC 21, Comptes Rendus des JNC21 Presented at the Journées Nationales sur les Composites 2019

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P7	WP 7.2	Leplat, JG.	Berthe, J., Biasi, V., Portemont, G.	To be submitted	Experimental protocol for the mechanical characterisation of charred materials	Composite Part A or Journal of Composite Materials
P7	WP 7.3	Lourenço, C.	Bergin,S.,Hodgkinson,J.,Francis,D.,Staines,S.,Saffell,J.,Walton,C.,Tatam, R.P.	To be re- submitted	Novel bench top system for the quantitative analysis of volatile compounds at elevated temperatures combining gas sensors and thermal desorption GC-MS. Part 1: Design and implementation	New journal
P7	WP 7.3	Lourenço, C.	Bergin,S.,Hodgkinson,J.,Francis,D.,Staines,S.,Saffell,J.,Walton,C.,Tatam, R.P.	To be re- submitted	Novel bench top system for the quantitative analysis of volatile compounds at elevated temperatures combining gas sensors and thermal desorption GC-MS. Part 2: Thermal exposure of carbon fibre reinforced epoxy composite	New journal
P7	WP 7.1 and 7.3	Lourenço, C.	Bergin,S.,Hodgkinson,J.,Francis,D.,Staines,S.,Saffell,J.,Walton,C.,Tatam, R.P.	To be re- submitted	A comparative study of the volatile compounds released by thermal degradation in different composite matrices using off-the- shelf gas sensors and thermal desorption gas chromatography-mass spectrometry.	TBD

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