



Program Overview

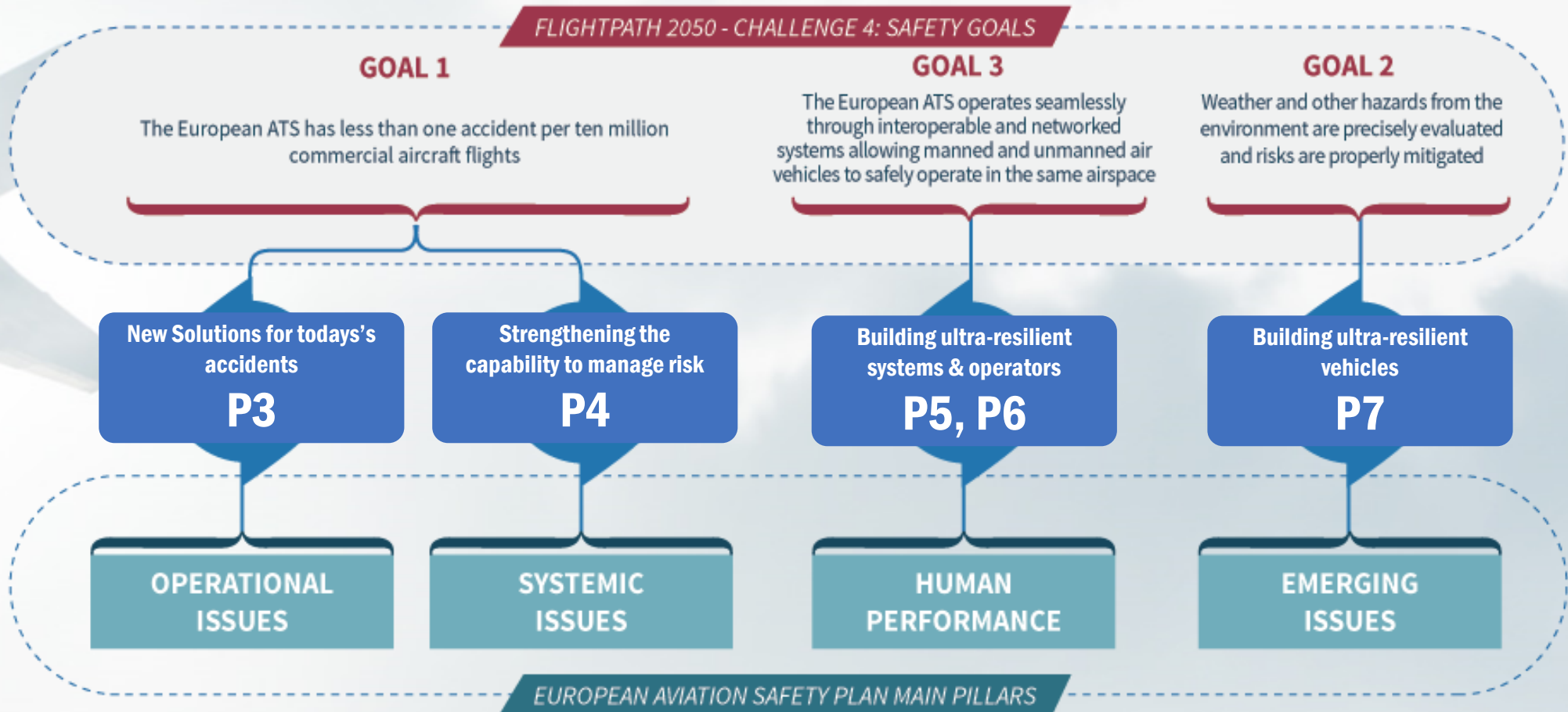
Michel Piers, NLR



Future Sky Safety in a nutshell

- H2020 –Coordinated research & innovation for aviation safety
- EREA Future Sky Initiative
- Two main activities:
 1. *Research into specific safety topics*
 2. *Research coordination*
- 33 partners – research, industry & academia
- Duration: 48 months
- Budget: 25M€ budget (15 M€ EU)

Connecting to European Safety Strategies



Consortium

Research	Industry	Academia	and more
NLR - Netherlands	NavBlue SAS	INP Bordeaux	CAA-UK
CEIIA - Portugal	AIRBUS Operations	LSE London	Deep Blue
CIRA - Italy	AIRBUS Defense	Cranfield	DGAC-STAC
CSEM - Switzerland	Leonardo Finmecc.	Trinity College	ENAV – Italy
DLR – Germany	BOEING RT&E	TU Munchen	EUROCONTROL
FOI - Sweden	EMBRAER		KLM
INCAS – Romania	SITA		Lufthansa
INTA – Spain	THALES Airsystems		
VZLU – Czech Republic	THALES Avionics		
ONERA - France	ZODIAC		
TsAGI - Russia			

Progress of the program



1st Workshop

T13



2nd Workshop

T27



Period 1 (T0 – T18)

Period 2 (T18 – T36)

Period 3 (T36 – T48)

MTR1

MTR2

View
**FUTURE
SKY
SAFETY**
projects



Project #1

**COORDINATION OF
INSTITUTIONALLY
FUNDED SAFETY
RESEARCH**



Project #2

**DISSEMINATION
EXPLOITATION AND
COMMUNICATION**



Project #3

**SPECIFIC SOLUTIONS
FOR RUNWAY
EXCURSION ACCIDENTS**



Project #4

**TOTAL SYSTEM RISK
ASSESSMENT**



Project #5

**RESOLVING THE
ORGANISATIONAL
ACCIDENT**



Project #6

**HUMAN PERFORMANCE
ENVELOPE**



Project #7

**MITIGATING THE RISK OF
FIRE, SMOKE & FUMES**



P1 – Research Coordination



180

Number of PhD Thesis

5.000

Employees in aeronautics

6.000

Number of Publications

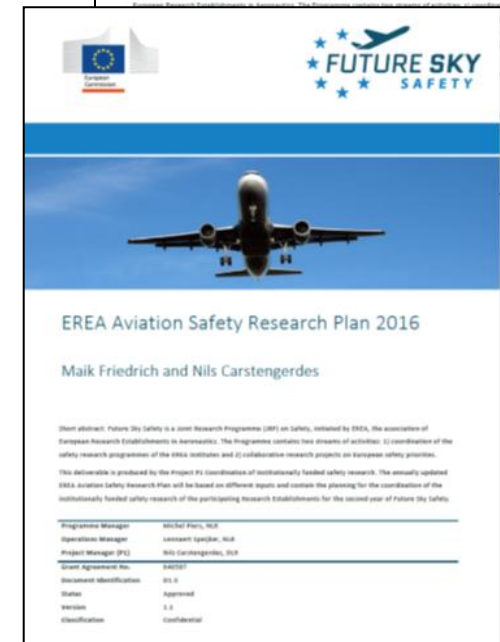
€ 0,5 Bln

Annual research budget



P1 – Research Coordination

- Develop and share **Awareness** of the content, results and ambitions of the institutional RE programmes in safety (*Document & platform*)
- **Coordination** of institutionally funded research of the participating Research Establishments in field of safety (*Aviation Safety Research Plan*)
- **Cooperation** in newly initiated institutionally funded projects (*incl. cooperation agreement*)





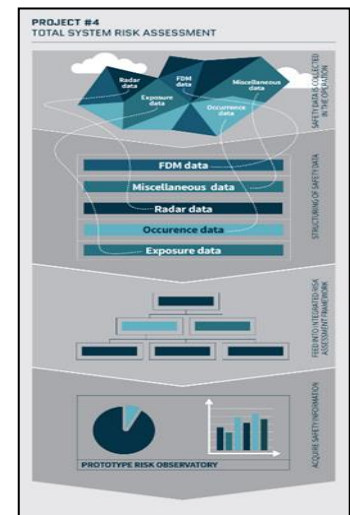
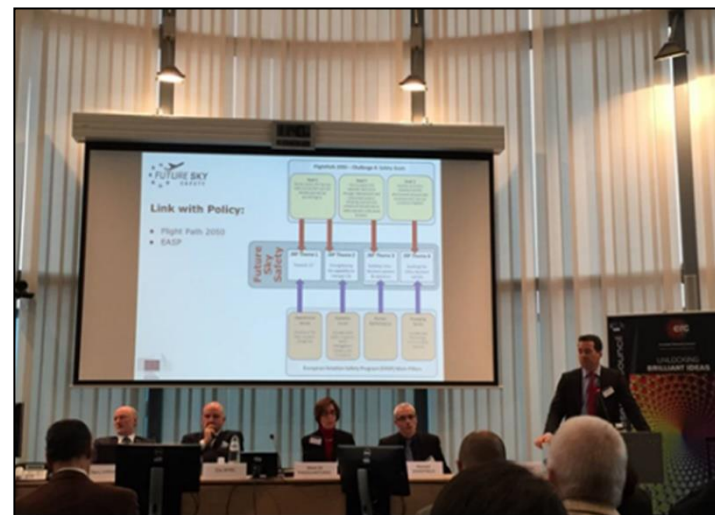
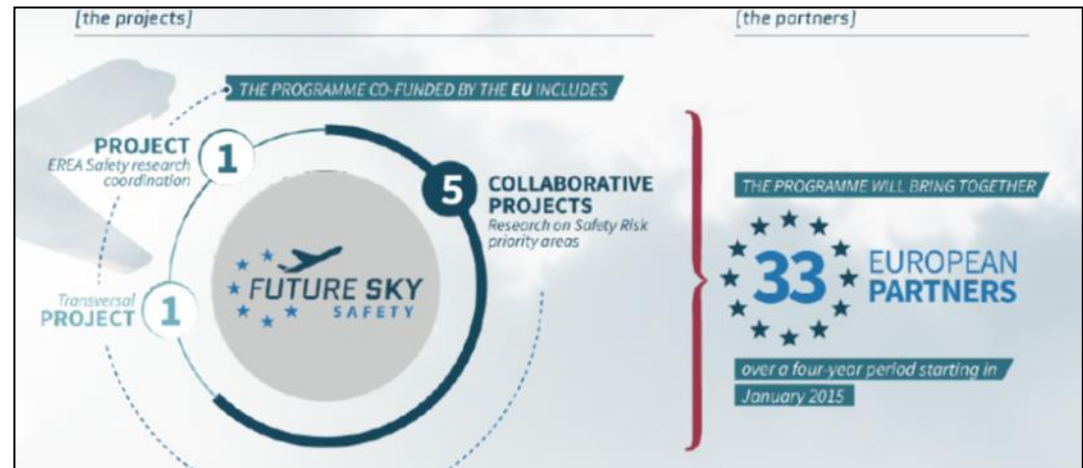
New Future Sky R&D Cooperations

- **3 cooperations kicked-off in first year (2016):**
 - Human Performance Envelope in the ATC Context
 - Aircraft Wake Turbulence
 - Modeling of operator's behavior
- **4 cooperations starting up in 2017:**
 - Helicopter safety
 - Remotely Piloted Aircraft Systems (RPAS) safety (excl. ATM)
 - Icing
 - Safety embedded in aircraft design and operations
- **3 new cooperations under development:**
 - Health monitoring
 - Volcanic ash
 - Small aircraft safety



P2 Dissemination & communication

- Develop communication strategies and detailed planning
- Develop a plan for exploitation of results
- Develop a knowledge and data management policy and approach
- Dissemination and exploitation of safety research findings to relevant target audience
- Develop a methodology for the assessment of communication, dissemination and exploitation



P3

Specific solutions for runway excursion accidents



- The European Action Plan for the Prevention of Runway Excursions (EAPRRE) has identified research needs to further reduce risk:
 - 1) Flight mechanics of slippery runway ops in crosswind,
 - 2) Impact of fluid contaminants on stopping performance,
 - 3) Advanced methods to monitor risk factors in flight data.
- A fourth workpackage will look into new technologies* (e.g. gear technologies, pavement technologies, onboard guidance, etc.) to prevent excursions or the consequences of excursions.

* Other than ROPS



P3 Objectives

- Improve methods for analysing aircraft ground control on slippery runways under crosswind;
- Quantify impact of water/slush covered runways on braking performance for modern tires and anti-skid systems;
- Develop new methods to identify veer-off risk using operational flight data;
- Explore new concepts for prevention of excursions and reduction of consequences of runway excursions.



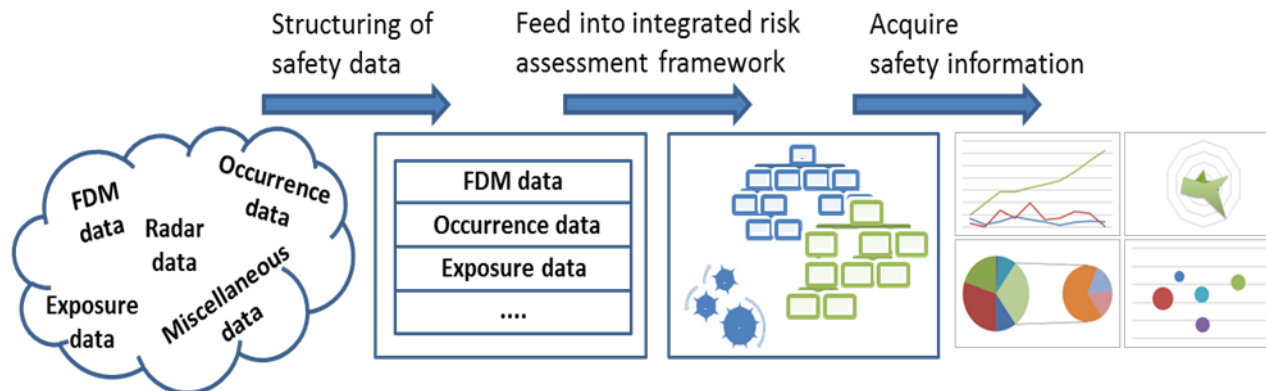
Future Sky Safety P3: flooded runway trials



P4 Total system risk assessment

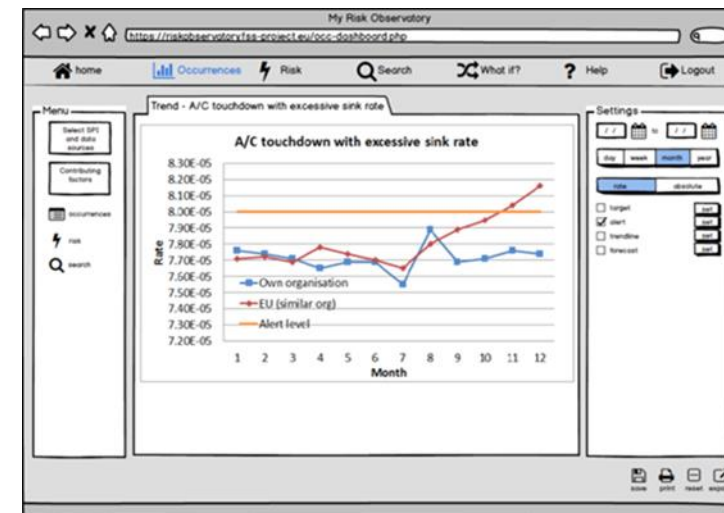


- Adequate means for safety risk assessment and safety performance monitoring of large, complex and dynamic systems of sufficient accuracy and depth not yet available.
- Project will build on progress made in several programs (ASCOS, EUROCONTROL IRP/AIP, FAA-ISAM, ASIAs, CATS-NL) and provide knowledge in support of Data4Safety initiative.



P4 Objectives

- Develop a risk assessment framework that integrates risk assessment models from different domains.
- Develop a prototype risk observatory as an enabling tool for safety management:
 - Identify business requirements
 - Define user, functional and system requirements
 - Develop preliminary architecture
 - Develop early “look-and-feel” prototype
 - Stakeholder review of early prototype
 - Deliver first total aviation system risk picture



P5

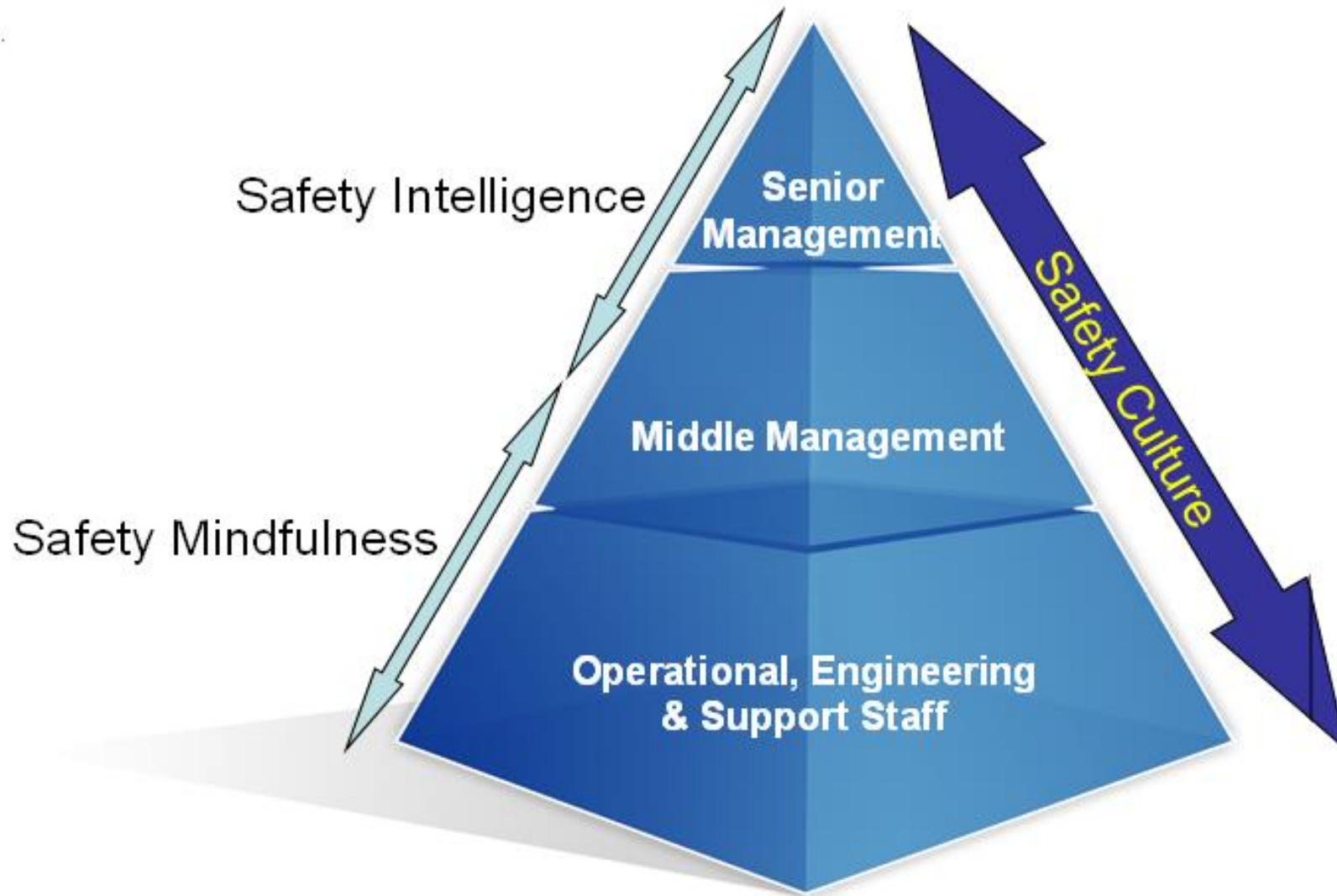
Resolving the organizational accident



- Safety focus has traditionally been on technical failures and human error as they occur in operations
- New approaches consider the overall sociotechnical system in the full operational and organizational context.
- Research does address the effects of organizational structures, processes and cultural phenomena on safety performance in aviation organizations.
- The findings will cover both the fundamental scientific obstacles and the practical use of the findings in safety performance management.



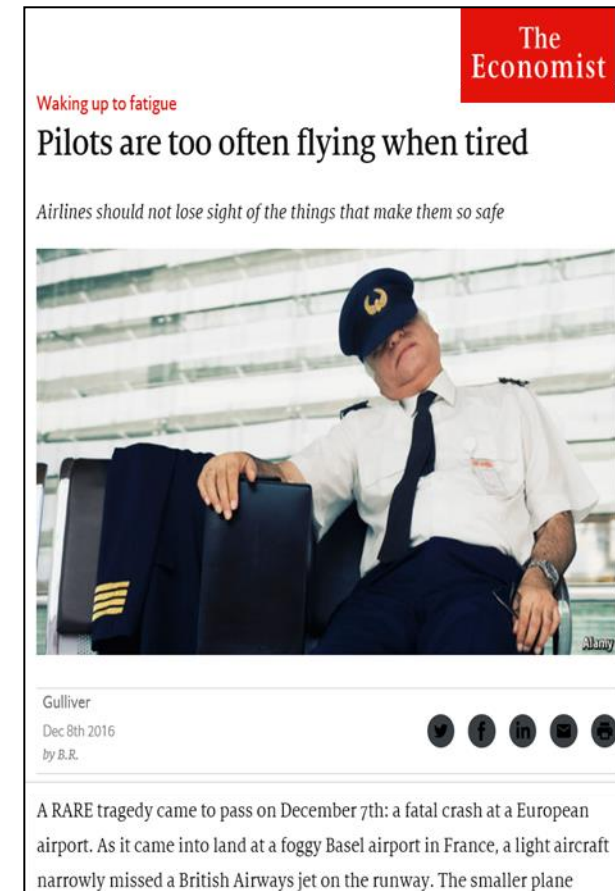
P5 Overall Architecture



P5 Objectives



- Develop Safety Intelligence at the Top
- Consider how Safety Dashboards are utilised
- Begin Safety Intelligence for Middle Managers
- Develop and test Safety Mindfulness Concept
- Conduct safety culture surveys
- Develop Agile Response approach
- Integrate these concepts into an organisational risk management capability within the SMS framework




The Economist

Waking up to fatigue

Pilots are too often flying when tired

Airlines should not lose sight of the things that make them so safe



Gulliver
Dec 8th 2016
by B.R.

A RARE tragedy came to pass on December 7th: a fatal crash at a European airport. As it came into land at a foggy Basel airport in France, a light aircraft narrowly missed a British Airways jet on the runway. The smaller plane

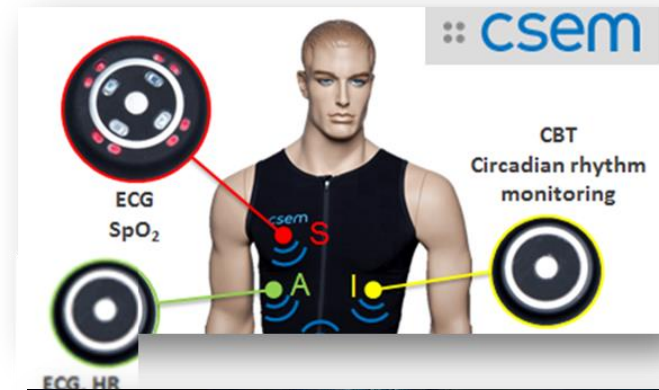


- HPE is new paradigm in Human Factors
- Instead of a focus on individual factors (e.g. fatigue, sit. awareness), it considers multiple factors and how they influence performance.
- Through studies and simulations the project will:
 - Find points where performance deteriorates
 - Determine behavioural or physiological markers and recovery measures in real-time
 - Identify ways to augment the envelope in order to increase safety and improve performance.



P6 Objectives

- Develop definition of the Human Performance Envelope
- Conduct preliminary experiments:
 - Select and assessment of physiological sensors
 - Fine-tuning of simulation scenario's
- Conduct flight simulator experiments:
 - To validate the HPE
 - To validate physiological measurements
 - To identify performance decrement limits
- Determination of recovery measures
- Evaluation of solutions for augmenting the envelope
 - Development and implementation of (design) improvements
 - Validation of improvements in simulator experiments

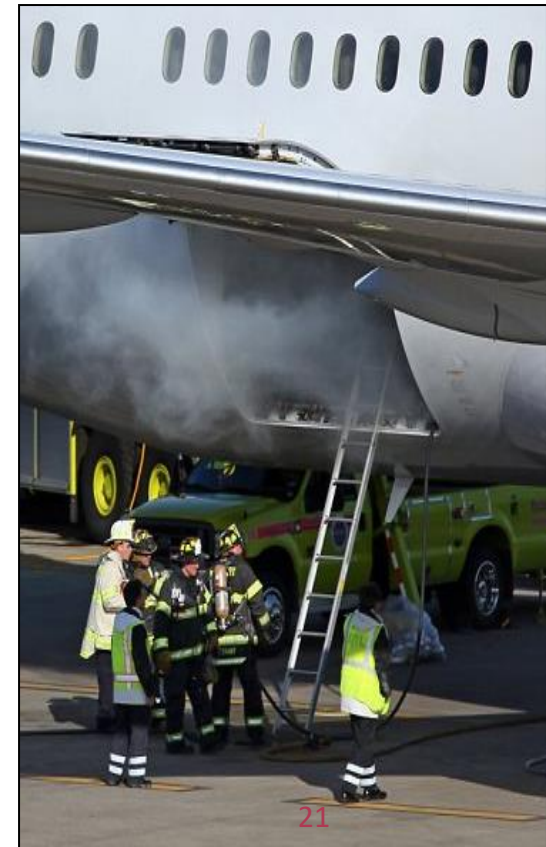


P7

Mitigating the risk of fire, smoke & fumes



- Important knowledge gaps exist around fire behavior of CFRP materials for primary structures, and the risks of fire and smoke in the modern cabin environment
- Study fire behavior of CFRP composite structures to:
 - Develop better methods to assess thermo-mechanical properties
 - Analyse composite decomposition under various flame and load conditions and develop better numerical methods
- Improve understanding of risks of fire, smoke & fumes in modern cabin and explore new mitigating technologies
- Risks associated with Cabin Air Quality will be studied to improve understanding and propose mitigations



P7 Objectives

- Understanding and characterising the fire behaviour of primary structure composite materials.
- Improving material solutions to mitigate fire, smoke and fumes in the cabin environment.
- Study the effects of new materials, technology and fuel systems on the on-board air quality



Glass/Phenolic



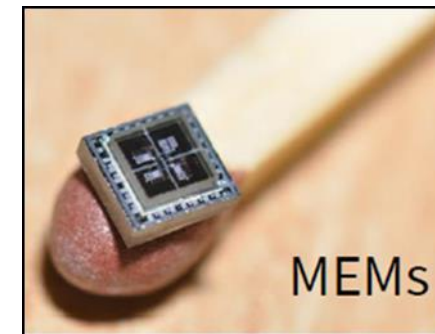
Carbon/Polysialate

P7 Main expected results


- Contribution to test standards and new test protocols
- Sharing of experimental data and scientific results for future modelling purposes (expensive tests)
- Establishing/giving design recommendations
- Methodological guidelines to deal with onboard air quality issues
- Possible patent application(s)



DLR test facility for
mechanical load under fire



Why will Future Sky improve Safety ?

- 
- A series of five thick, curved arrows pointing to the right, arranged vertically on the left side of the slide. The arrows transition in color from light yellow at the top to dark red at the bottom.
- It is addressing the key safety risks
 - Focussing formidable R&D resources
 - Connecting Science to Impact
 - Amplifying the European Safety Strategies
 - Striking the right Risk – Reward balance

Agenda



Five Technical Sessions

1. Runway Excursion

DAY 1

2. Total aviation system risk prevention and mitigation

3. Resolving the organisational accidents

4. Human Performance Envelope

DAY 2

5. Mitigating the Risk Of Fire Smoke & Fumes

Poster Sessions



www.future-sky-safety.eu

FUTURE SKY SAFETY IS A JOINT RESEARCH PROGRAMME

aimed at providing the short term and medium term research and validation needed in support of safety regulation and oversight and the development of standards, and in the long term to fulfill the Flightpath 2050 goals concerning safety.

33 m€URO TRANSPORT RESEARCH PROGRAMME



PROGRAMME RESEARCH FOCUS:

THEME 1: "New solutions for today's accidents" aims for breakthrough research with the purpose of enabling a direct, specific, significant risk reduction in the medium term.

THEME 2: "Strengthening the capability to manage risk" conducts research on processes and technologies to enable the aviation system actors to achieve near-total control over the safety risk in the air transport system.

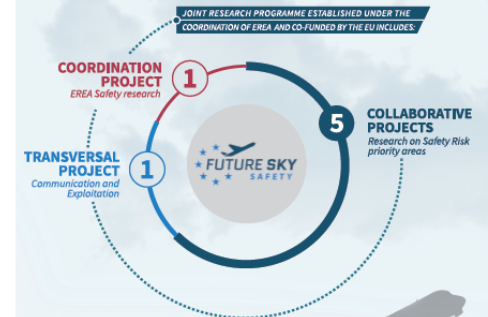
THEME 3: "Building ultra resilient systems and operators" conducts research on the improvement of systems and the Human Operator with the specific aim to improve safety performance under non-optimal circumstances.

THEME 4: "Building ultra-resilient vehicles"; aims of reducing the effect of external hazards on the overall vehicle integrity, as well as improving the safety of the cabin environment accidents.

Future Sky Safety is an EU-funded transport research programme in the field of European aviation safety.

Programme Duration: Jan. 2015 - Dec. 2018

programme overview

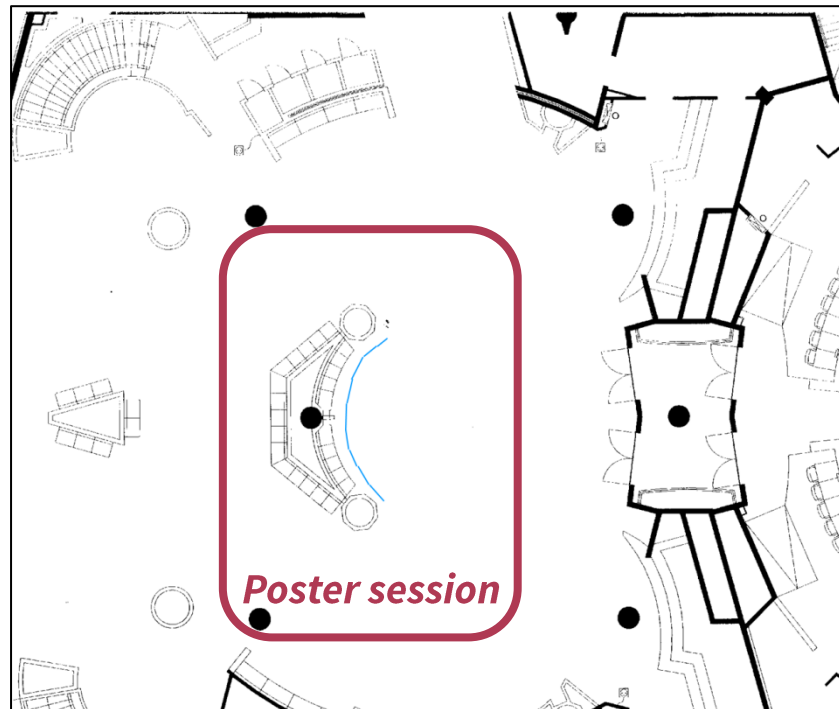


programme goals



Poster session

6 Posters exhibited in front Room EUROPA during coffee break



DAY 1

10:45 – 11:15 *Poster session and Coffee break*

15:45 – 16:15 *Poster session and Coffee break*

DAY 2

10:30:-11:00 *Poster session and Coffee break*

Poster session



Sergio Piastra from University Of Bologna presents “Augmented and Virtual Reality in the Airport Control Tower: the Retina Concept”

The RETINA Project investigates the concept of enhancing human sight capabilities and situation awareness in the control tower by means of two different Augmented Reality Technologies: Conformal Head-Up Displays (which could be made to coincide with the tower windows) and See-Through Head-Mounted Displays.

Project #5
RESOLVING THE
ORGANISATIONAL
ACCIDENT



Tom Reader from London School of Economics presents a poster about “Safety Culture”

This poster reports on the safety culture programme within P5 - it reports on two studies. The first is a survey of 7000 pilots in European Aviation. It shows safety culture in European aviation to be broadly positive, albeit with differences between airlines. The second attempts to develop a methodology for measuring safety culture across the entire aviation system.

Poster session

Project #5
RESOLVING THE
ORGANISATIONAL
ACCIDENT



Rogier Woltjer from FOI presents “Organisational Capability of Agile Response to Crises”, based on the work done in Future Sky Safety P5

The European Air Transport System Aviation is highly inter-connected, a problem in one part may rapidly cause effects in other parts. FSS WP5.4 aims to provide aviation organisations with Agile Response Capability guidance to help organisations set up and exercise more adaptive and flexible responses for handling disturbances and crises (such as a fire at a major hub or a volcanic ash)

Project #4
TOTAL SYSTEM RISK
ASSESSMENT



Chong Wang from Technical University of Munich “Physical Models for the Prediction of Incident Probabilities”, a method used in P4 of the Future Sky Safety program.

A mathematical model incorporating the flight physics of an aircraft is used to represent the flight operations of an airline. Distributions of contributing factors of a given incident type is propagated through the model in order to obtain the occurrence probability of the incident specific to a particular airline’s operations.

Poster session

Project #5
RESOLVING THE
ORGANISATIONAL
ACCIDENT



Carlo Valbonesi from Deep Blue illustrates a prototype of Safety Dashboard for ANSPs

The Safety Dashboard presented was designed starting from the results of P5 workshop run with Safety Directors / Managers from 6 ANSPs. The goal of the workshop was to understand what information Safety dashboards provide, as well as why and how such Dashboards are used. Building on the information exchanged, a prototype of Safety Dashboard for the top management of a fictitious ANSP was produced.

Project #7
MITIGATING
THE RISK OF FIRE
SMOKE & FUMES



Matej Hraska from VZLU - Aerospace Research and Test Establishment presents “Geopolymer Composites: Way To Really Fire Safe & Formaldehyde-free Aircraft Interiors”

Geopolymers are low cost anorganic materials with zero carbon content withstanding temperatures in excess of 1 000°C. When heated, geopolymers produce minimum of toxic products and keep good residual strength. Geopolymer based composites features mechanical properties & density comparable to present used glass/phenolic laminates.

Logistics

EUROCONTROL Cafeteria is in front of Room Europa

- Opening time: 10:00-11:30 & 14:30-16:00
- Coffee vouchers will be available for the 3 poster sessions (please ask Beatrice Bettignies-Thiebaut)

Lunch is at EUROCONTROL restaurant

- Opening time: 11:30-14:00

Additional shuttles to EUROCONTROL have been put in place for the workshop participants.

- On 08/03 a dedicated shuttle for downtown will leave from the lobby at 18:00
- On 09/03 a dedicated shuttle for FSS workshop participants will leave Gare Centrale at 08:10 to arrive at EUROCONTROL at 08:40



Program Overview

Michel Piers, NLR



First FSS Public Workshop



Save the date

**The 1st FUTURE SKY SAFETY
Public Workshop**

8-9 March 2017

EVENT

Date(s)

08/03/2017 to

09/03/2017

VENUE/LOCATION

EUROCONTROL Headquarters

Room Europe

Rue de la Fusée, 96

1130 Brussels (Haren)