EREA
Association of
European Research Establishments in Aeronautics

The Future Sky Safety program
… And Collaboration in Aviation Safety Research

nlr
Dedicated to innovation in aerospace

European
Commission

Past and Present

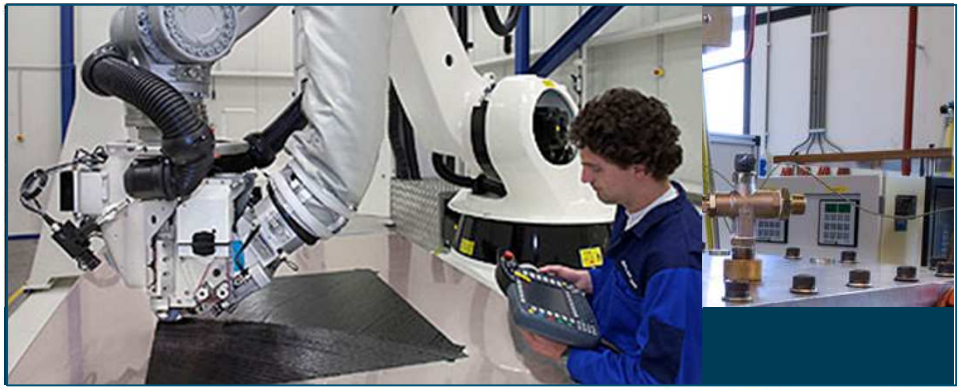
Past:

- Established as the National Department of Aviation in 1919
- In 1937, this became an independent, non-profit organization

Today ...

Laboratory aircraft

Testing facilities



Simulators

Wind tunnels

Research infrastructure

Area Control Sim

Research Aircraft

Flight Simulator

Tower Simulator

External ATC + flight simulators or ops. systems

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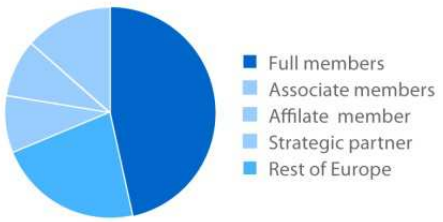


Full members:

CEIJA · CIRA · DLR · FOI · INCAS · INTA · NLR · ONERA · VKI · csem

Associate members, Affilate member & Strategic partner

AIT · CIAM

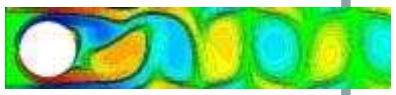
The Role of EREA

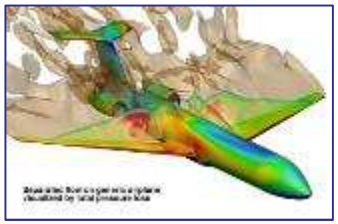
Development & Integration of technologies

Production & commercialisation

Research

Transfer to industry





Universities

EREA

Industrial partners, Spin-offs, Start-ups

FUTURE SKY SAFETY

EREA in numbers

180

Number of PhD Thesis

5.000

Employees in aeronautics

6.000

Number of Publications

€ 0,5 Bln

Annual research budget

European Commission

European Commission

FUTURE SKY SAFETY

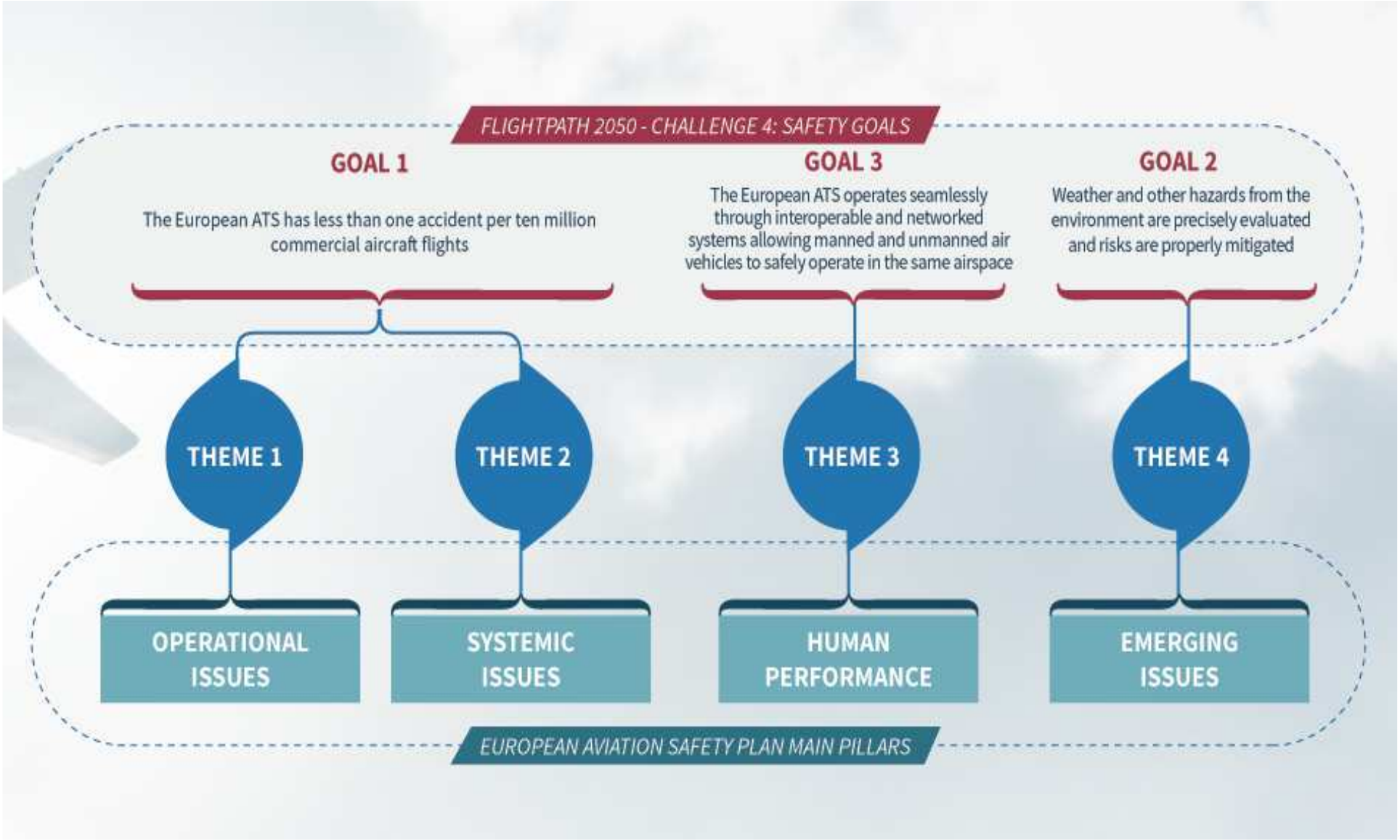
Future Sky Safety program overview

and perspectives on cooperation in safety R&D

Future Sky Safety Pogram

- EU MG1.4 Coordinated Research & Innovation Action Safety
- Two main activities:
  1. Research coordination
  2. Research into specific safety priorities
- Scope:
  - Not Security
  - Not Military.
  - Lower TRL's
- One program, 7 year roadmap, two calls
- First Call: 15 M€ EU funding, 25M€ budget

Connecting to European Safety Strategies



Nine technical projects

Theme 1 - New protections against todays accidents

P3 Specific solutions for runway excursion accidents
P5 Resolving the organizational accident
P8 Advanced flight envelope protection

Theme 2 - Strengthening the capability to manage risk

P4 Total system risk assessment
P9 Getting ahead of the curve; emergence detection and big data

Theme 3 - Building ultra-resilient systems and operators

P6 Human Performance Envelope
P10 More resilient crew – flight deck automation cooperation

Theme 4 - Building ultra-resilient vehicles

P11 Reducing the effect of environmental hazards
P7 Mitigating the risk of fire, smoke & fumes

Nine Technical Projects
Two coordination Projects

P1 Coordination of Institutionally Funded Safety Research

P2 Dissemination, exploitation and communication

Call 1

P3 Specific solutions for runway excursion accidents

P4 Total system risk assessment

P5 Resolving the organizational accident

P6 Human Performance Envelope

P7 Mitigating the risk of fire, smoke & fumes

Call 2

P8 Advanced flight envelope protection

P9 Getting ahead of the curve; emergence detection and big data

P10 More resilient crew – flight deck automation cooperation

P11 Reducing the effect of environmental hazards

Consortium

Research	Industry	Universities	Others
NLR - Netherlands	AIRBUS	TU Delft	EUROCONTROL
DLR - Germany	ALENIA	TU Munich	KLM
ONERA - France	EADS CASA	Cranfield	Lufthansa
CEIIA - Portugal	BOEING RT&E	LSE - London	Innaxis
CIRA - Italy	EMBRAER	Linkoping University	BdC
CSEM - Switzerland	THALES	ENSC	UK-CAA
INCAS - Romania	ZODIAC		DGAC-FR
INTA - Spain			ENAV
VZLU - Czech Republic			Deep Blue
FOI - Sweden			
TSAGi - Russia			

Effort distribution:

- Research: 53%
- Industry & others: 32%
- Universities: 15%

Advisory Board

- ICAO
- SESAR Joint Undertaking
- EUROCAE
- FAA
- IMG
- Scientific Advisors *(3)*
- EASA *(expected)*

Theme 1 projects

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



Theme 1 projects

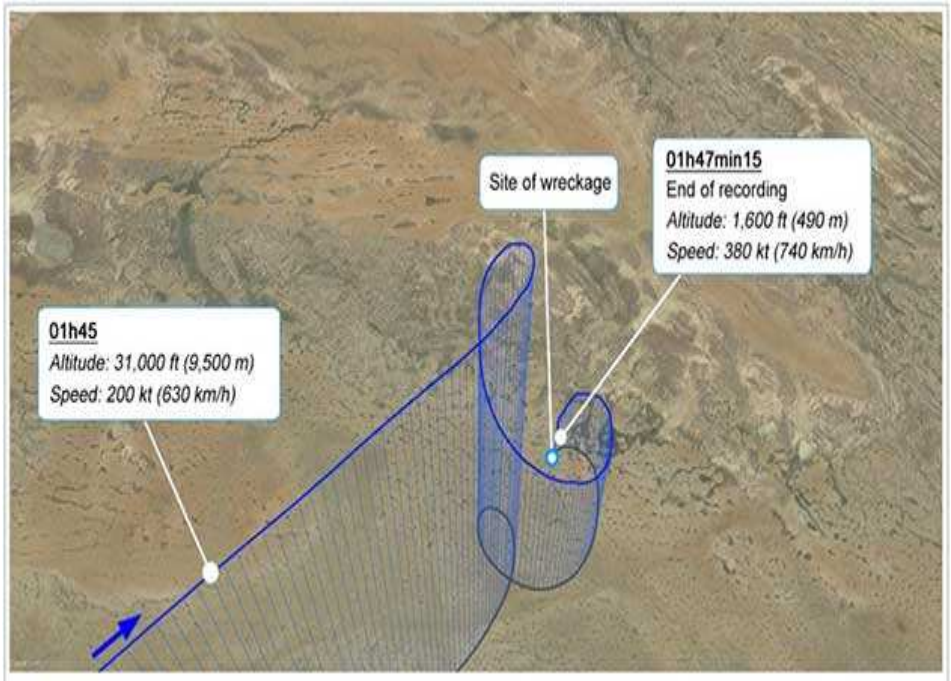
P5 Resolving the organizational accident

- 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 will address the effects of organizational structures, processes and cultural phenomena on safety performance in aviation organizations.
- The findings will address both fundamental scientific obstacles and connection between the scientific theories and their practical use in safety performance management.

Theme 1 projects

P8 Advanced flight envelope protection

- Research into higher levels of fixed and rotary wing flight operations integrity in nominal and off nominal conditions.
  - Flight envelope extensions through development of improved models to predict aircraft behaviour in off-nominal conditions.
  - Improved envelope protections
  - Improve envelope awareness
- Methods to retain adequate performance and controllability in case of system failures or "exogenous" events.

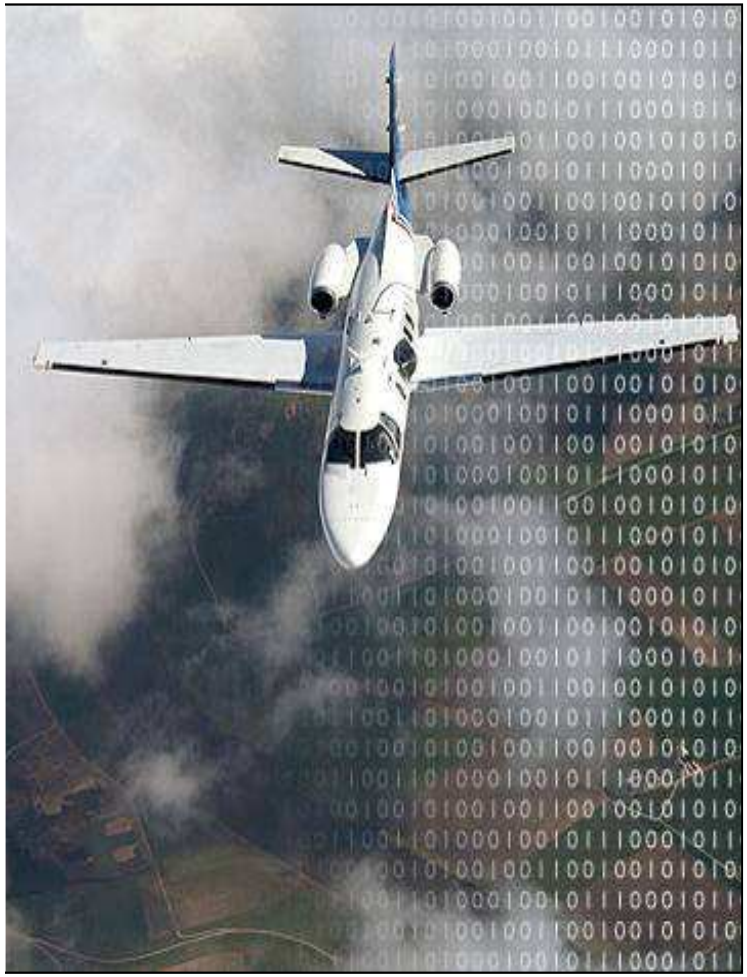


Theme 2 projects

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.
- Explicit representation of latent factors in risk assessment and data, processes and techniques for continuous updating of the risk picture must be developed.
- Project will build on progress made in several programs (ASCOS, EUROCONTROL IRP/AIP, **FAA-ISAM**, CATS-NL)
- Project will contribute to the development of a next generation of safety assessment techniques.
- Study the possibility of establishing a European risk observatory to monitor safety risk on a continuous basis using flight ops data (incl. FDM)

Theme 2 projects



P9 Getting ahead of the curve; emergence detection and big data

- Current diagnostic approaches, use occurrence reports or ‘exceedances’ (these are pre-defined “knowns”.)
- This project will develop methods to:
  - Develop data-traps to monitor approach to risk criticality
  - Analyze big data to find evidence of the emergence of new risks
  - Mitigate the identified emerging safety risks before realization
- Methods to allow concurrent (daily) analysis enabling identification of emergent safety risks profiles.

Theme 3 projects

P10 More resilient crew – flight deck automation cooperation

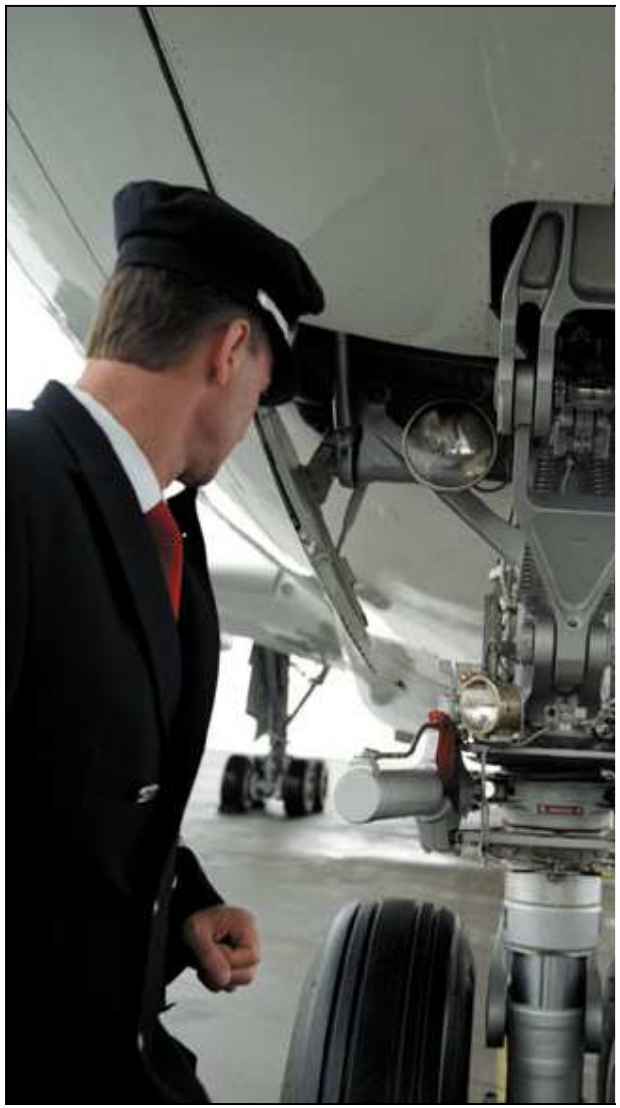
- Research into startle, surprise and cognitive lock-up in the crew interaction with non-nominal automation behaviour and unanticipated flight conditions.
- Development of training to increase crew resilience in case of non-nominal flight deck automation behaviour.
- Development of automation strategies to support continued flight crew performance in case of automation degradation.
- Building on ACROSS, Man4Gen, other.

* Project is not about loss of control, but findings could also help reduce LoC risk.

Theme 3 projects

P6 Human Performance Envelope

- HPE is new paradigm in Human Factors
- Instead of focus on one or two 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.



Theme 4 projects

P11 Reducing the effect of environmental hazards

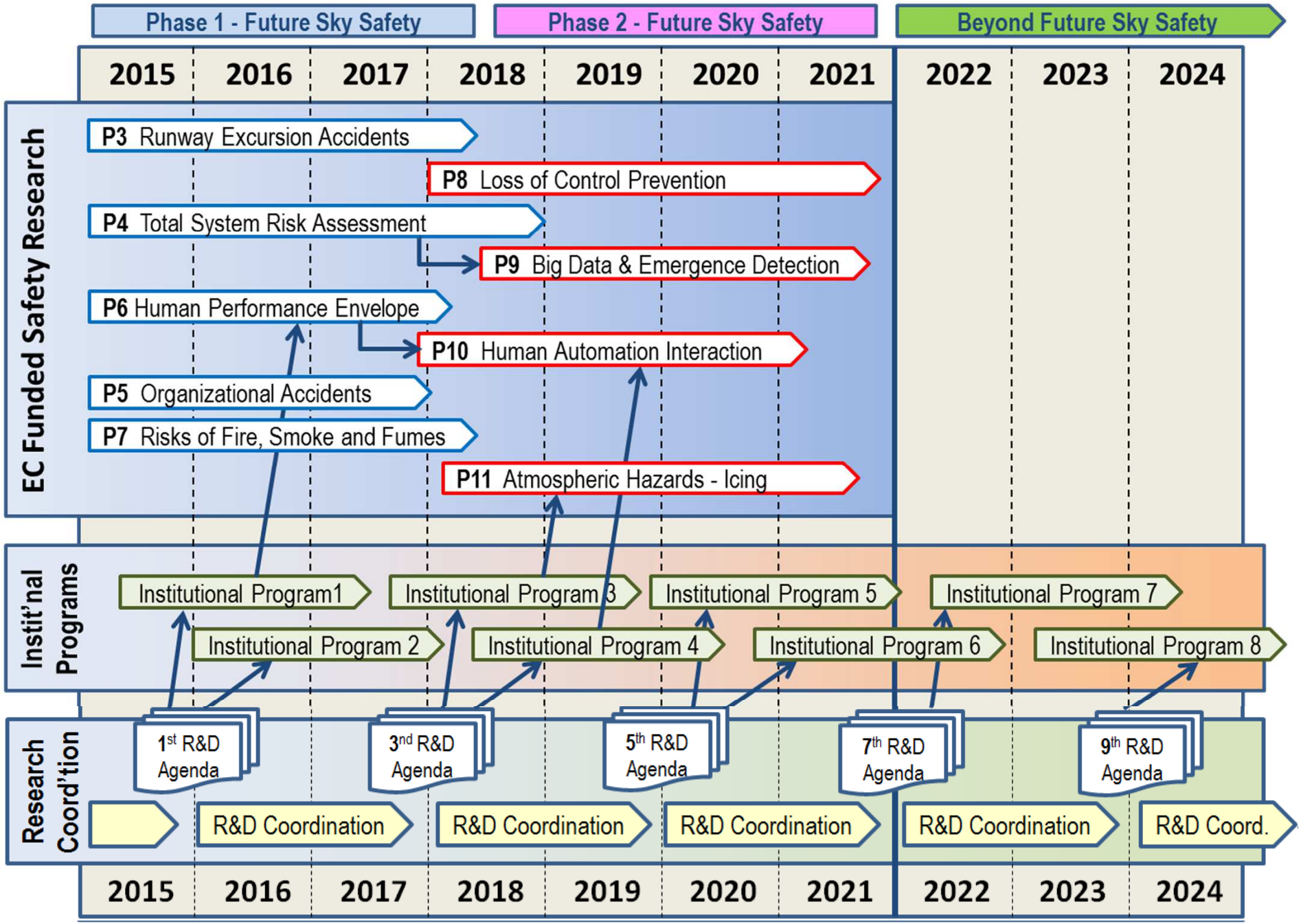
- The physics of icing clouds containing of Supercooled Large Droplets & high altitude ice crystals not sufficiently understood.
- Building on FP7 WEZARD and HAIC, this project will:
  - Improve SLD models
  - Further develop 3D ice accretion numerical tools
  - Improve 3D numerical tools for aero performance degradation

Theme 4 projects

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 in the modern cabin environment

- Project will study the fire behavior of CFRP composite structures:
  - Develop better methods to assess thermo-mechanical properties
  - Analyse composite decomposition under various flame and mechanical load conditions and develop better numerical methods
- Improve understanding of risks of fire, smoke & fumes in the modern cabin and explore new mitigating technologies
- Risks associated with Cabin Air Quality will be studied to improve understanding and propose mitigatons.


Phase 1 - Future Sky Safety
Phase 2 - Future Sky Safety
Beyond Future Sky Safety
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
EC Funded Safety Research
P3 Runway Excursion Accidents
P8 Loss of Control Prevention
P4 Total System Risk Assessment
P9 Big Data & Emergence Detection
P6 Human Performance Envelope
P10 Human Automation Interaction
P5 Organizational Accidents
P7 Risks of Fire, Smoke and Fumes
P11 Atmospheric Hazards - Icing
Instit'nal Programs
Institutional Program1
Institutional Program 3
Institutional Program 5
Institutional Program 7
Institutional Program 2
Institutional Program 4
Institutional Program 6
Institutional Program 8
Research Coord'tion
1st R&D Agenda
3nd R&D Agenda
5th R&D Agenda
7th R&D Agenda
9th R&D Agenda
R&D Coordination
R&D Coordination
R&D Coordination
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2015
2016
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2018
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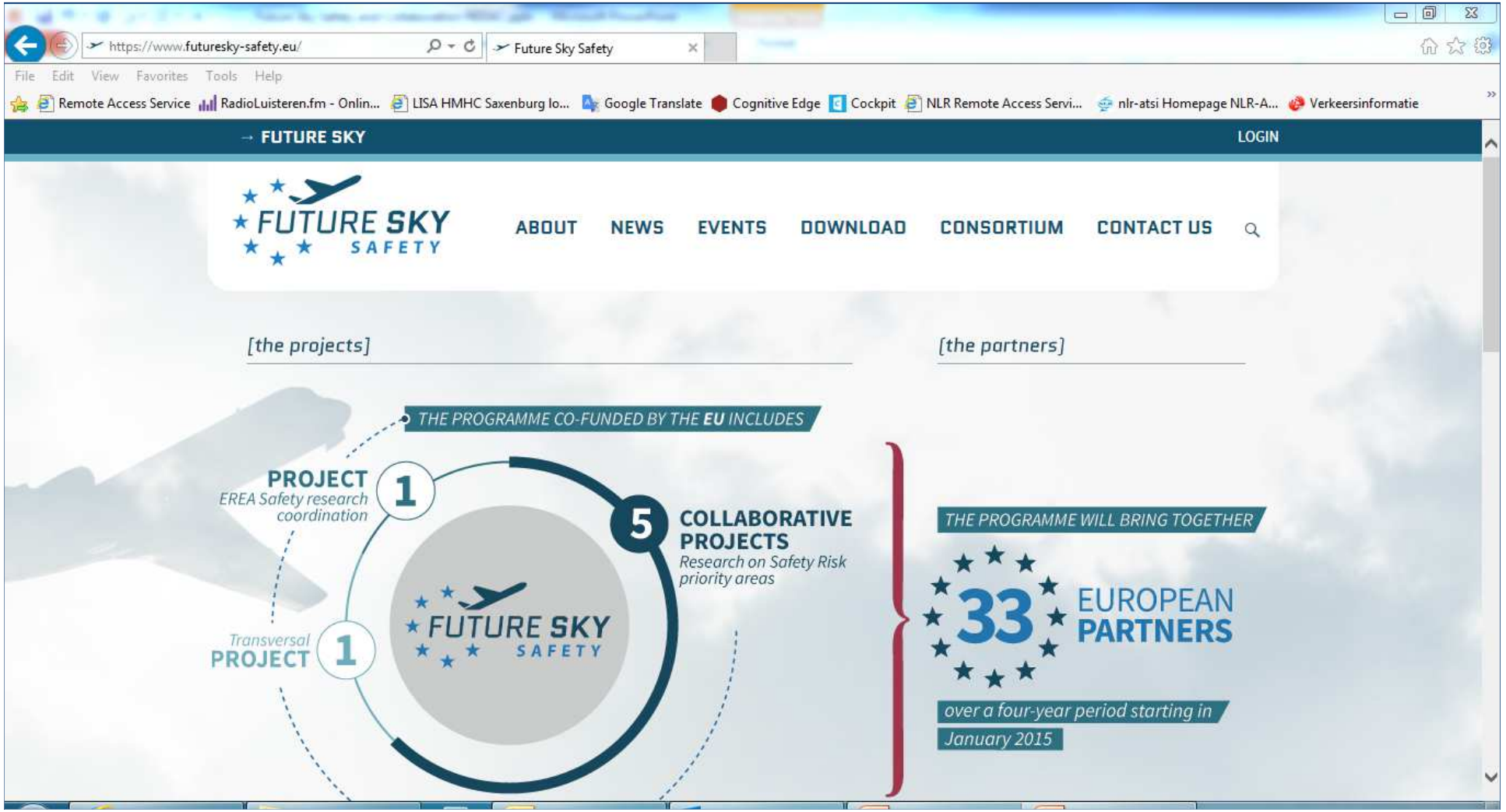
2020
2021
2022
2023
2024

For more information:

www.futuresky-safety.eu



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