What is the State-of-the-Art of European R&I on data science for aviation safety?

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OPTICS2 Consortium

[Logos of participating organizations]
Improvements to the Methodology

» Prioritisation of the enablers: not all the enablers are equally important

» Strategic assessment of the "big picture", to ease comparison with International state-of-the-art
Main Goals

“Is Europe performing the right safety and security research?”

» Review of the state-of-the-art of safety and security aviation research

» Assessing current progress against the goals set out by Flightpath 2050 and ACARE Strategic Research Agenda

» Identify gaps and bottlenecks

» Provide recommendations to the Commission

» Interact with ACARE to update/refine the Research Agenda
Main Results

Main Results - Examples

Blocking points:

» Some of the promising research does not seem to **be picked up by industry**

» Some research seems to get ‘**stuck in the middle**’: medium contribution, medium maturity level

» **Data sharing**: sharing and analyzing truly useful data without affecting the reputations and competitiveness of individual organisations
Welcome to OPTICS2

OPTICS2 is a Coordination and Support Action of the European Commission, follow-up of the OPTICS Project. It works in close collaboration with ACARE on the topic of safety and security. OPTICS2 provides a comprehensive evaluation of relevant safety and security research and innovation in aviation and air transport. Answering the question "Is Europe performing the right safety and security research?" is the goal pursued, with a view to providing recommendations to steer EU Aviation Safety and Security research.
The OPTICS2 goal & approach

Are we doing the right SAFETY and SECURITY RESEARCH?
The OPTICS2 goal & approach

Are we doing the right SAFETY and SECURITY RESEARCH?

... How do projects contribute to the Aviation Research Roadmap?
The OPTICS2 Team searching and assessing Research Projects

BOTTOM-UP APPROACH
The OPTICS2 goal & approach

Are we doing the right SAFETY and SECURITY RESEARCH?

TOP-DOWN APPROACH...

... Expert contributing through workshops and consultations.

... How do projects contribute to the Aviation Research Roadmap? The OPTICS2 Team searching and assessing Research Projects.

BOTTOM-UP APPROACH

#04 SYNTHESIS OF ASSESSMENT RESULTS
#03 INTERNAL AND EXTERNAL REVIEW
#02 PROJECT ASSESSMENT
#01 PROJECT SELECTION
OPTICS2 does not judge quality of the projects, but only the coverage of the SRIA2

Selection of projects

Assessment of projects

• Mapping of projects and preliminary assessment,
• Moderation,
• Project coordinator review

Synthesis of results
Main criteria to judge the state of an Action Area

• **Coverage**: degree to which research is addressing the Action Area

• **Maturity**: how close to commercial uptake are the results

• **Ease of adoption**: what are the legal, economical and technical barriers to implementation

• Other elements of the assessment include:
  • Coverage of top safety and security risks
  • Socio-economic impact
Year 1 project assessment

237 total safety projects
25 new projects and 212 projects already assessed against first version of the SRIA
19 projects contributed to Action Area 3
SRIA2: Strategic Research and Innovation Agenda
### Action area 3: Harnessing Safety Intelligence

<table>
<thead>
<tr>
<th>3.1. Safety Intelligence Tools, Processes and Methods</th>
<th>3.2. Safety Intelligence Management</th>
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<tbody>
<tr>
<td>3.1.1. Tools, methodologies and processes aiming at automating the data capture, streaming, fusion and storage of aviation-related data</td>
<td>3.2.1. Methods, processes and technology for the visualisation and distribution of information to organisations and actors across the ATS</td>
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<tr>
<td>3.1.2. Data mining algorithms that support the analysis of past safety events. Tools detecting correlation, causalities and new patterns in the data.</td>
<td>3.2.2. Multidisciplinary solutions, including all aviation stakeholders that enable facing the legal, technical and security challenges in data sharing</td>
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<td>3.1.3. A proactive safety analysis approach that enables predicting future hazards and that moves beyond descriptive and forensic analysis</td>
<td>3.1.4. Efficient automated look-up procedures and mechanisms across heterogeneous data sources including: aviation and multimodal datasets, weather data, voice&amp;video data etc</td>
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Number of projects mapped on Action Area 3 ‘Safety Intelligence’: 19
Total number of projects assessed by OPTICS2: 200+
Safety Intelligence, Tools and Processes

• 5 projects on **data capture**, in wide variety of areas. Many types of data not covered

• Research into **data mining**, limited to 5 projects. Many fields of aviation not covered

• On **pro-active safety analysis**, 9 projects cover a very fragmented field of topics

• No projects on **efficient use of heterogeneous data sources**
Safety Intelligence management

• 5 projects target **visualisation and distribution of information across the ATS**
• No projects address the **legal, technical and security challenges in data sharing**
Areas for improvement

• Start work to resolve barriers:
  • Technical, organisational, economical, regulatory

• Increase research efforts in:
  • efficient use of heterogeneous data sources
  • the technical, legal, security issues of data sharing

• Expand applications to all areas of aviation
On the positive side:

- data acquisition, data mining, pro-active safety and sharing safety information are addressed by research

However:

- Exploitation of other data sources and broadening the scope to all elements of the ATS is needed
- There are still barriers to operational use
Thanks for your attention!

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