Issue #2
November 2024

IMPACT MONITOR

NEWSLETTER

Dear Reader,

We are glad to share the **2nd Issue** of the Impact Monitor Newsletter. The project, commenced on the 1st of February 2023, is implemented by a highly competent and complementary consortium. With a system of systems approach for aviation, the project's first high level objective is to deliver a coherent, collaborative and holistic framework and toolbox for technology and policy assessment of the environmental, economic and societal impacts of European aviation Research and Innovation (R&I).

Focus of Impact Monitor is to demonstrate with example use cases the collaborative assessment of future technologies, aircraft, operations, and policies. The aircraft agnostic demonstrative assessment is carried out at aircraft, airport, and air transport system level.

The Impact Monitor framework and toolbox for collaborative workflows across all three levels rests on and advances the approaches of EC's Better Regulation and EU projects TEAM_Play, Clean Sky TE, and AGILE/AGILE 4.0.

The vision of a holistic system of systems assessment in aviation R&I is implemented by the following work packages: interfaces, toolbox, framework, dashboard application, and demonstration use cases.

Enjoy the read and stay connected with Impact Monitor via our communication channels!

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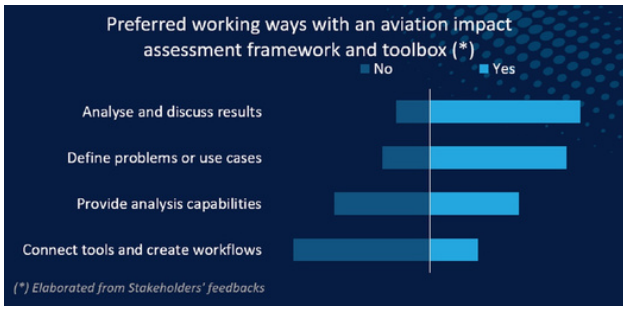
DLR Coordinated by the German Aerospace Center

Interfaces

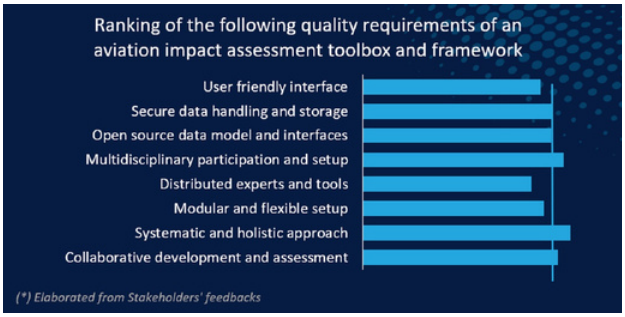
In order to identify the stakeholders' **KPIs and needs**, a list of relevant stakeholders and other R&I actors has been created. The identified stakeholders include EC, industry, research centres, universities, and airport associations. Simultaneously, research frameworks and related programmes like Horizon Europe (HE)/ Collaborative Research, Clean Aviation (CA), SESAR (Single European Sky ATM Research), ACARE (Advisory Council for Aviation Research and Innovation in Europe), Clean Hydrogen/ EU Battery Research, R&I projects and other on-going initiatives have been investigated to identify R&I activities related to Impact Monitor (IM) topics.

To identify the stakeholders' needs, two parallel approaches have been adopted. The Top-Down approach involved gathering direct feedback through a questionnaire on the IM project website and through bilateral interactions. The Bottom-Up approach analyzed publicly available data from R&I projects related to CA, HE, Horizon2020, and SESAR to uncover additional requirements.

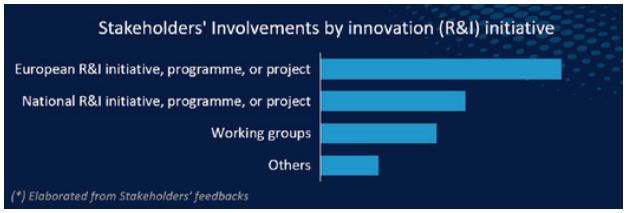
Ultimately, these survey results are crucial for tailoring the project to stakeholders' needs, ensuring relevance and impact in advancing our objectives. The validation process will further enhance the reliability of our findings.



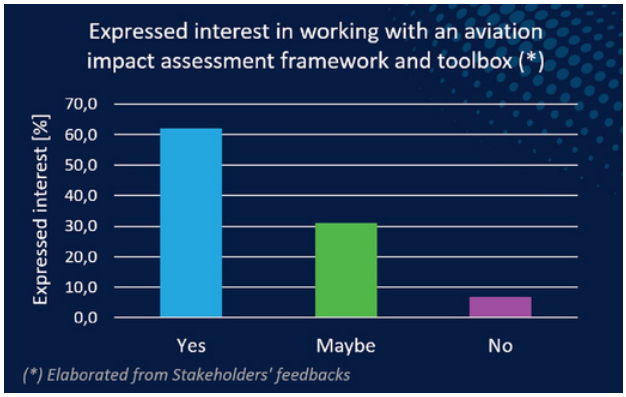
Stakeholders' primary interest in the impact assessment framework and toolbox was focused on the stages of defining use cases and of analysing results



The most prominent quality requirements include a systematic and holistic approach, multidisciplinary participation and setup, and collaborative development and assessment.



The majority of the stakeholders are involved in European and National R&I initiatives, programmes, or projects.



Most stakeholders (>60%) conformed their interest in working with an aviation impact assessment framework and toolbox, while less than 10% recorded no interest.

The collaborative framework is aimed to enable the formulation and execution of impact assessment studies. The "tools" of the toolbox refer to basic principles and processes rather than actual simulation models / software tools that are used in the framework.

Toolbox

The core objectives for the toolbox development include the specification of **requirements** and the provision of **practical guidance** for the key steps in the assessment cycle. The first version of the toolbox has been formalized, comprising of five main steps:

Fundamentals & Principles

Tool #1: What is impact assessment
Tool #2: What is impact monitoring
Tool #3: Fundamental of impact assessment or monitoring
Tool #4: Principles in impact assessment or monitoring
Tool #5: Organisational bodies in impact assessment or monitoring

Specification

Assessment and monitoring

Tool #6: Understanding impact assessment or impact monitoring request
Tool #7: Specifying impact assessment or monitoring
Tool #8: Identifying stakeholders
Tool #9: Identifying impacts
Tool #10: Linking with SDGs
Tool #11: Quantifying impact
Tool #12: Proportionality
Tool #13: Decision on conducting impact assessment or monitoring
Tool #14: Evidence mapping

Set-up

Assessment and monitoring

Tool #15: Planning impact assessment or monitoring
Tool #16: Specifying methods
Tool #17: Specifying Baseline Scenario
Tool #18: Specifying Reference Scenario
Tool #19: Specifying R&I Scenario

Execution

Assessment and monitoring

Tool #20: Modelling
Tool #21: Collecting data
Tool #22: Applying framework

Analysis

Assessment and monitoring

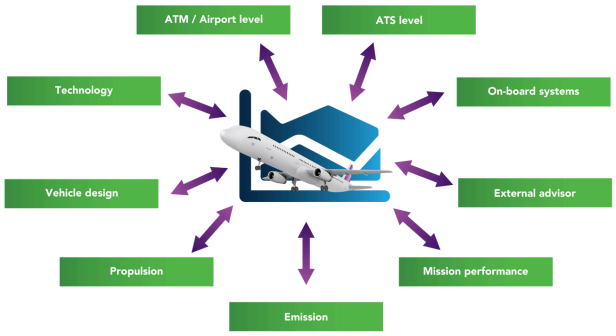
Tool #23: Analysing evidence
Tool #24: Interpreting evidence
Tool #25: Presenting evidence
Tool #26: Format of impact assessment or monitoring report

Framework

*The collaborative assessment framework is tightly connected with the implementation of the **use cases** to provide the proof of concept, and the web-based **Dashboard Application** for the visualization of results of the application cases.*

Connection of models to CPACS

All models have been connected to the open-source schema for the air transport system, **CPACS**, and most of them are locally integrated into RCE (Remote Component Environment). In addition, UPLINK and BRICS services are installed and initially tested.



Modification & extension of CPACS

A schema based on CPACS v3.4 has been defined. The CPACS schema has been extended to include <schedules>, <flights>, <missions>, <airports>, <studies>. Lastly, the MDAx workflows have been refined.

Central data repository

The project partners have decided to utilize NextCloud as the central data repository, which demonstrates high safety and privacy standards and runs via WebDAV protocol.

Demonstration Use Cases

Once the collaborative framework and toolbox are created, aircraft agnostic use cases are derived to demonstrate the capability of the framework. The project focuses on demonstrating a framework which is capable of assessing (in future) the technology, vehicles and operations researched in EU R&I initiatives. Thus for demonstrative purposes, three multilevel (aircraft, airport, air transport system) use cases are envisioned.

	Use Case 1	Use Case 2	Use Case 3
USE CASE			
OBJECTIVE	Investigate the viability and competitiveness of future aircraft concepts	Investigate the implementation of continuous descent operations at airports	Analysis of SAF policies at the air transport system level
SCENARIO	Design Mission - Operating Mission - Payload Range analysis - Trajectory amendment for contrail avoidance of single flight event	Continuous descent operations for a reference and future scenario at an example airport	Future forecast of global fleet operations & demonstrative impact assessment of two SAF policies for time horizon until 2050
MAIN MODELS	• Narrowbody & widebody aircraft (generally aircraft agnostic) • VHBR (9-10) and UHBR 15+ engines • Jet A 1 + SAF	• Fleet and schedule forecast model • Airport & airspace simulation • Noise & emissions model • Risk assessment model	• Transport fuel market model • Fleet and schedule forecast model • Trajectory calculation model • Economic input-output model
METRICS	• Fuel burn design mission and operating mission • Emissions CO2, NOx, SOx, CO, HC, H2O and contrail formation • Sustainability, trade-off using MCDM	• Punctuality • Fuel burn • Emissions and noise • Social cost benefit analysis	• Total fuel demand & CO2 emissions over the entire life cycle • Flight schedule and fleet forecast • Fuel demand & CO2 emissions of air transport based on 4D trajectories • Gross value added & employment forecast of the aviation sector

Dashboard Application

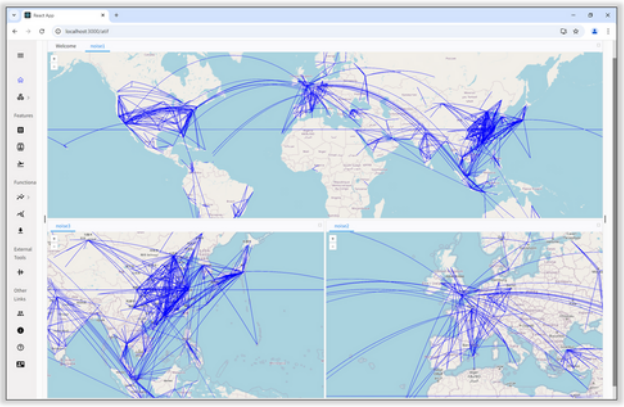
Dashboard Application (DA) Architecture

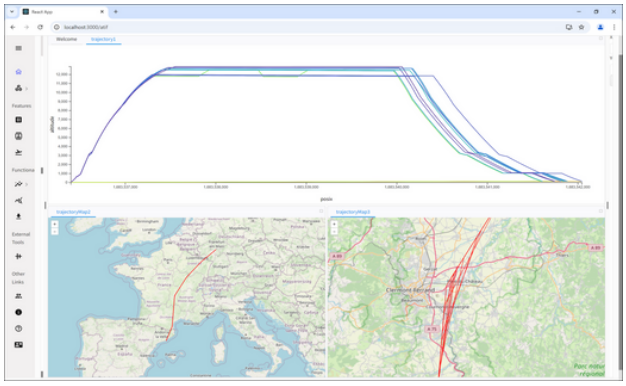
Initially, the Data Management Architecture has been defined, including:

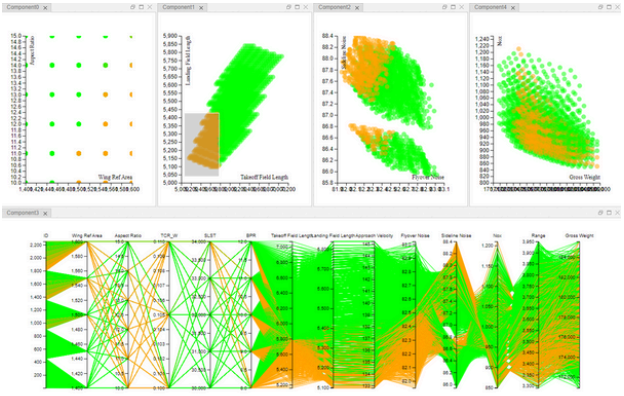
- Development of REACT component (front-end) for data management and update of CPACS files
- Selection of data storage solution (NextCloud)
- Development of Python Flask web services (back-end) for data management
- Creation of a Python client for accessing NextCloud storage using WebDav (Web Distributed Authoring and Versioning)

To support Multi-Criteria Decision Making, Holistic Assessment Tool (HAT) and other microservices on the backend support multicriteria analysis and decision-making.

The initial prototype dashboard application has been introduced, using REACT and D3.JS for front end development.







News & events

The Impact Monitor project has been actively represented at the **14th EASN Conference**, that took place on October 8-11 in Thessaloniki, Greece. Two engaging sessions were performed envisaged on October 10, covering the major technical aspects of the project.

Overview, Key Results and Academy

- **Impact assessment of aviation**
  Björn Nagel (DLR)
- **Project overview and vision**
  Prajwal Shiva Prakasha (DLR)
- **Toolbox: Practical guidance for complete cycle of holistic impact assessments of European aviation R&I**
  Michel van Eenige (NLR)
- **Demonstration use cases and key results: Assessing the impact of aviation at multiple levels**
  Thierry Lefebvre et al. (ONERA)
- **Academy: An educational initiative to broaden the horizon of young talents**
  Prajwal Shiva Prakasha et al. (DLR)

Technical Details & Demonstration Results

- **Technical development: Overview & approach**
  Prajwal Shiva Prakasha (DLR) & Thierry Lefebvre (ONERA)
- **Framework: Development & implementation of a collaborative framework for aviation impact assessment**
  Marko Alder et al. (DLR)
- **Use Case 1: Assessing advanced propulsion systems using the Impact Monitor Framework**
  Atif Riaz et al. (CU)
- **Use Case 2: Assessing continuous descent operations using the Impact Monitor Framework**
  Jordi Pons-Prats et al. (UPC)
- **Use Case 3: Assessing policies for the uptake of sustainable aviation fuels using the Impact Monitor Framework**
  Inge Mayeres et al. (TML)

Two additional studies were presented:

- **A pre-processing methodology for the identification of relevant and innovative R&I initiatives and stakeholders' needs in the aviation domain supporting the Impact Monitor Framework**", Mario Antonio Solazzo et al. (CIRA) | Oral Presentation
- **Iterative Aircraft and Engine Sizing Using SUAVE and TurboMatch in Remote Component Environment (RCE),** Felix Brenner et al. (USTUTT) | Poster presentation

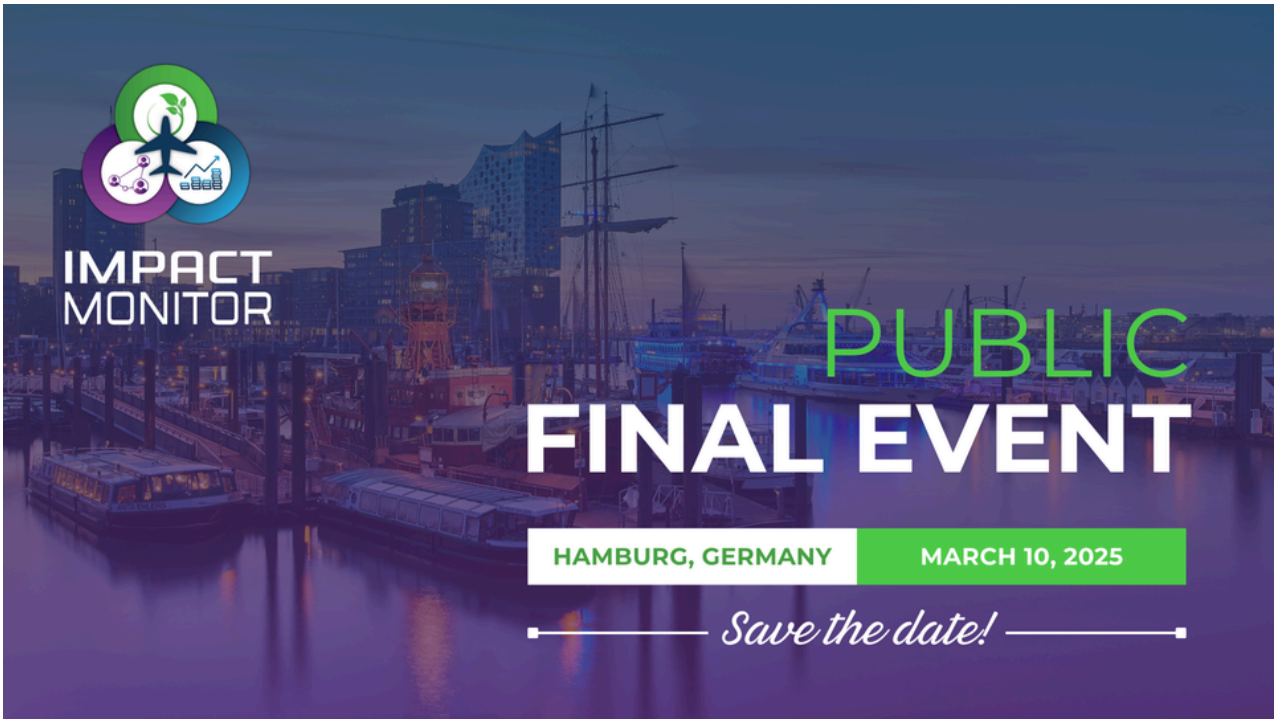
Save the Date: Impact Monitor Final Event

We are excited to announce the public final event for the Impact Monitor project, proudly hosted by DLR, the German Aerospace Center!

📍 Location: **Hamburg-Finkenwerder, Germany**
📅 Date: **10th of March, 2025**

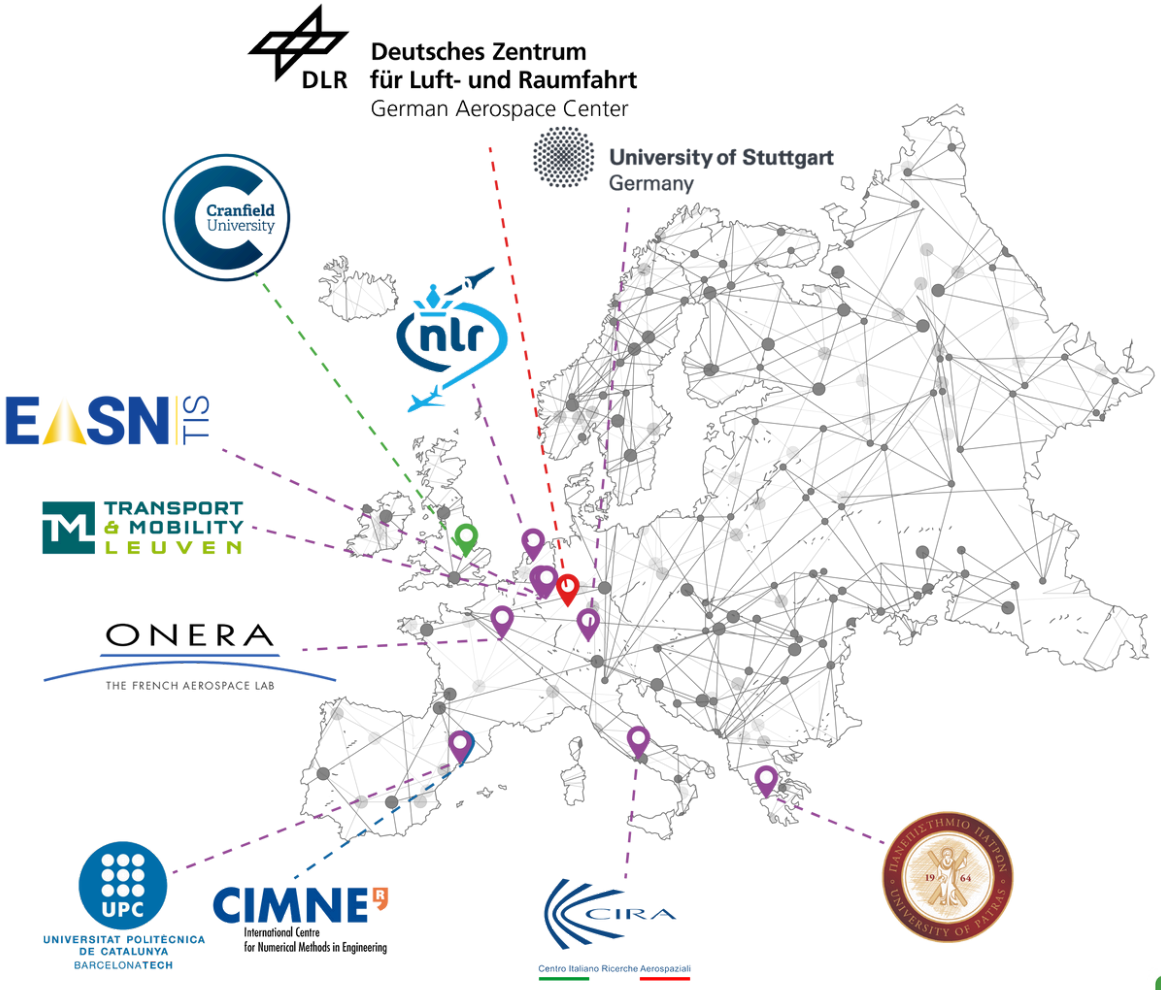
Join us to explore the key findings, innovations, and outcomes of the Impact Monitor project. This special event will bring together stakeholders, researchers, and policymakers to discuss the project's contributions and future pathways.

Stay tuned for further details, including the agenda and registration process.
Mark your calendars and don't miss this opportunity to be part of the conversation!



IMPACT MONITOR

Our Team



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