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# Roadmap for a European open science alliance for ATM research

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OPENSKY NETWORK

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# Agenda

- Background
- Barriers and opportunities
- Roadmap towards an ‘open science alliance’

Background

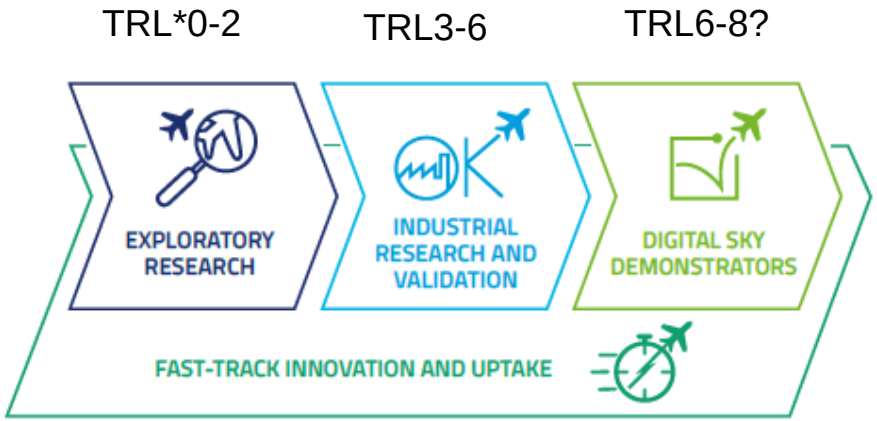
# Open science

- Open science practices involve:
  - open access (to publications)
  - open data (sharing research data)
  - open source/code (sharing software)
  - open methodology (sharing models, methods, etc.)
  - open peer review and
  - open educational resources
- Why?
  - **greater efficiency** in research through increased collaboration
  - higher levels of verification/validation
  - reduced duplication
  - collaborations broaden the user community
  - improve methods and code testing, and enable more **reproducible research**

Background

# Open science in the EU ATM research

- Majority of EU ATM research under SESAR
  - Exploratory
  - Industrial
  - Demonstrators
- Covid-19 impact “shows that we need an ATM system that is sustainable, scalable, and resilient, which does call for the envisioned transformation” and **faster innovation cycles**
- The openness, transparency and reproducibility of research under open science practices **can enable faster innovation cycles**
  - Especially within current shape of innovation pipeline




Source: SESAR Innovation pipeline, 2022 highlights

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* Technology readiness level

Background

# Reproducibility in the EU ATM research

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Background

# Data needs

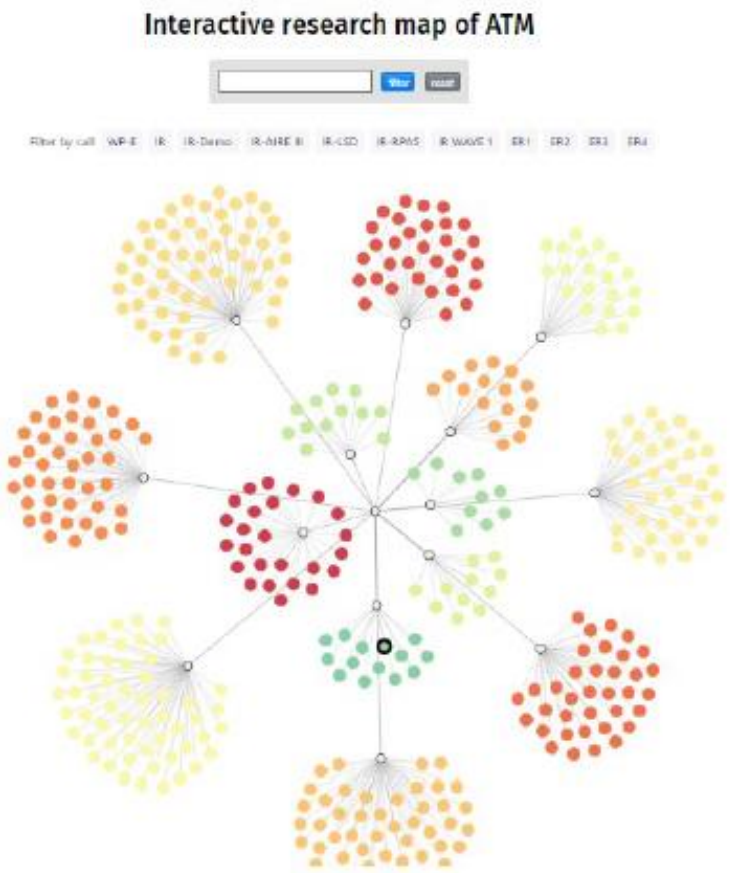
- To reach TRL8, need to complete regulatory and standardisation requirements
  - SESAR Solutions
- The need for open access to data for faster turnaround of ideas
  - ER often hampered
  - Engage KTN
- An example of open data (and code) community
  - OpenSky Network

## Background

# Engage KTN

- Open data most-cited issue
- 6-12 months to obtain data
- Licensing and non-disclosure agreements prevent data sharing

- Creation and application of non-disclosure agreements regarding the acceptable form of sharing of confidential (or subject to GDPR) information by the data owners
- Creation of a framework to share ATM-relevant data (including MET and multimodal data), to afford easier access without having multiple agreements in place




(a) Research clusters


(b) Project details

https://wikiengagektn.com/EngageWiki

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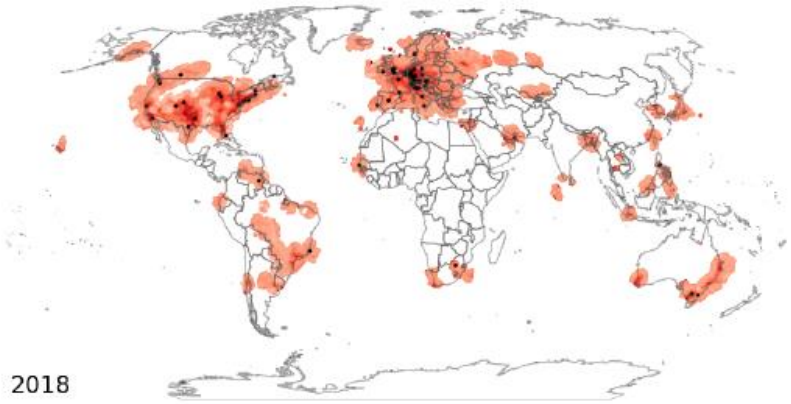
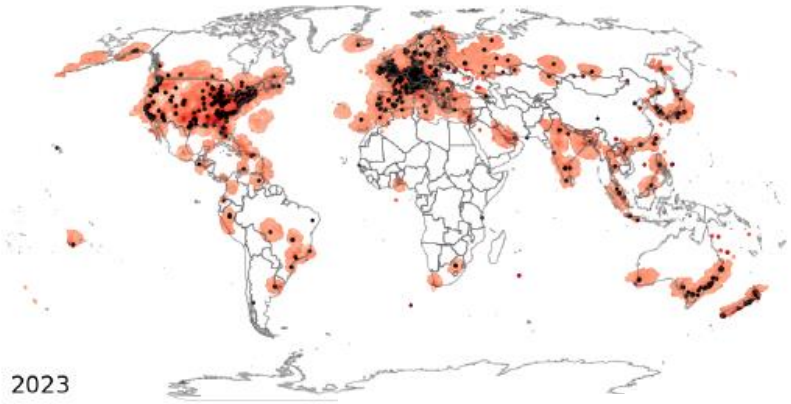
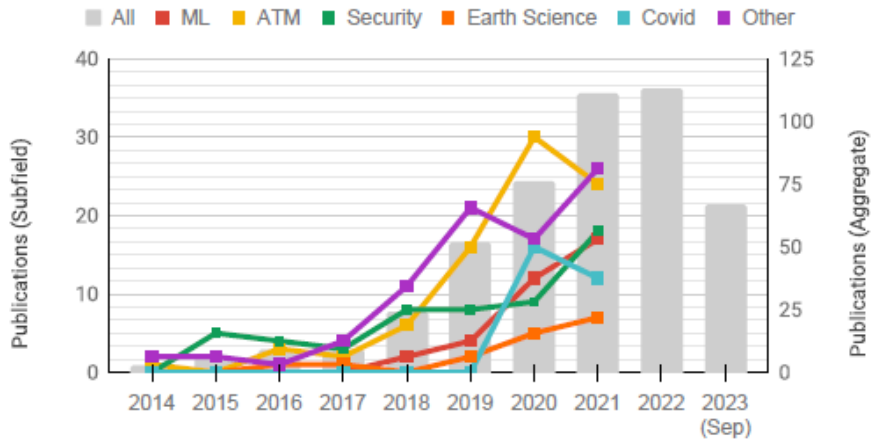
## Background

# OpenSky Network

- Collaborative sensor network, collecting surveillance data for air traffic control purposes
  - to grant the general public access to real-world air traffic control data and
  - promote advancement of ATC technologies and processes
- Open access to data for research purposes
- Extensive tooling for easy data access, processing and visualisation
- Publications numbers growing

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# Barriers and opportunities

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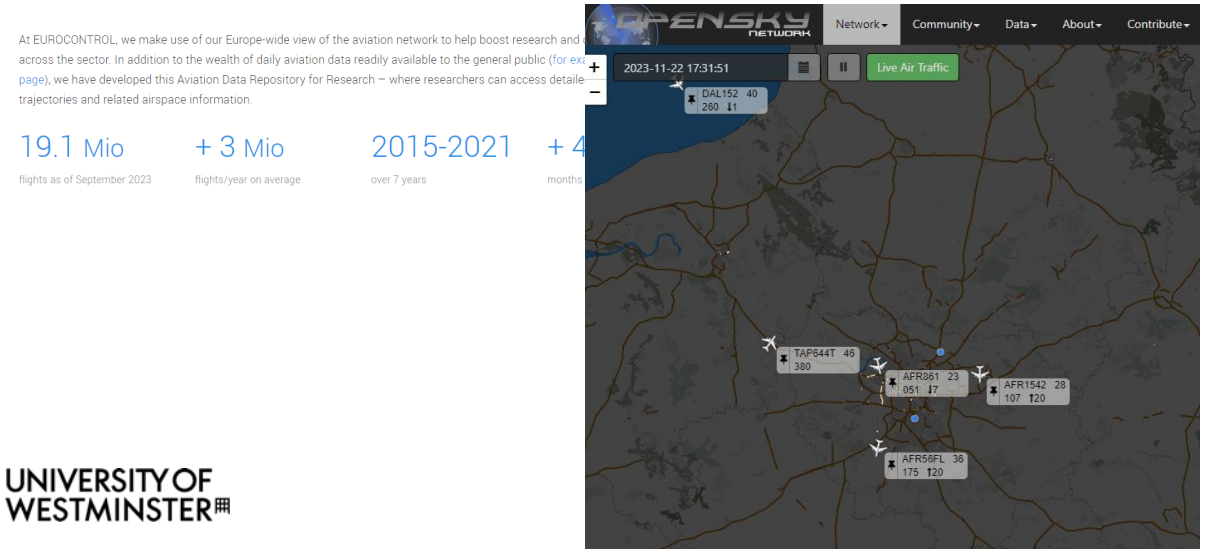
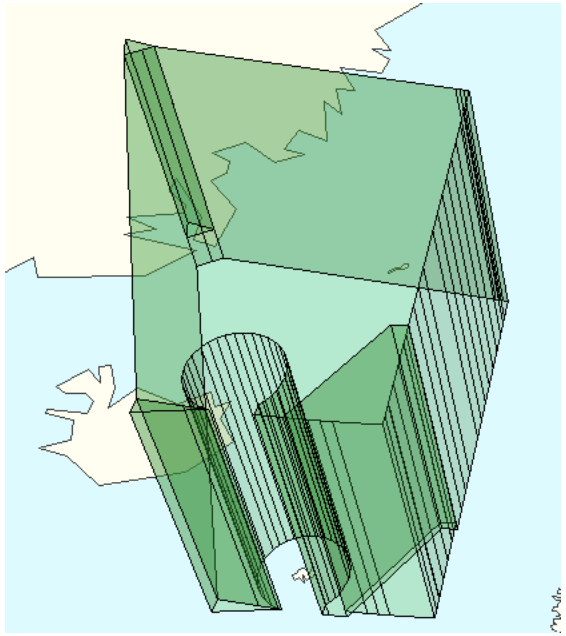
## Barriers and opportunities

# General ATM data availability

## Flight data


## Airspace and airport capacity



Source: visualisation with NEST

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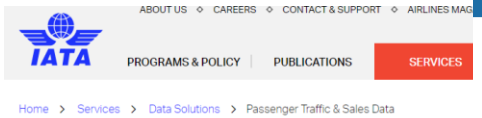
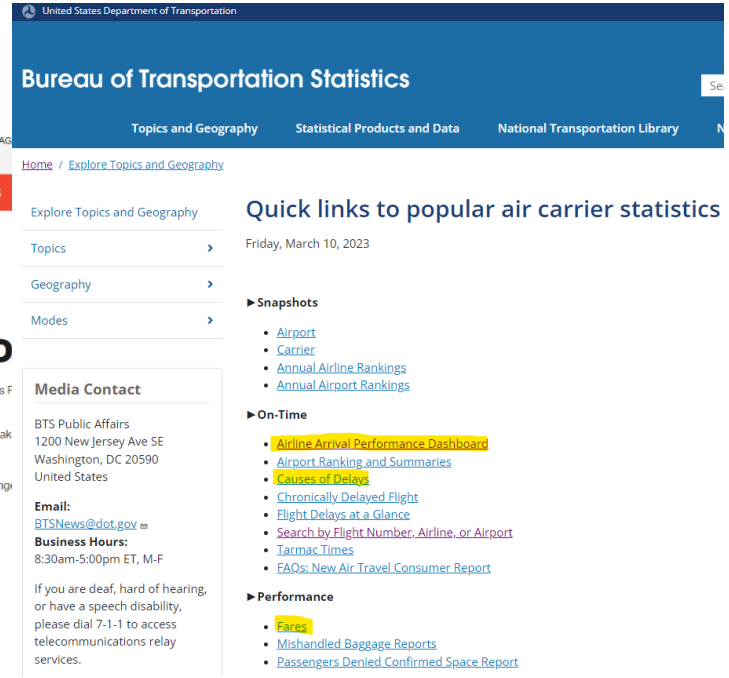
## Barriers and opportunities

# General ATM data availability

## Schedules and fares

OAG

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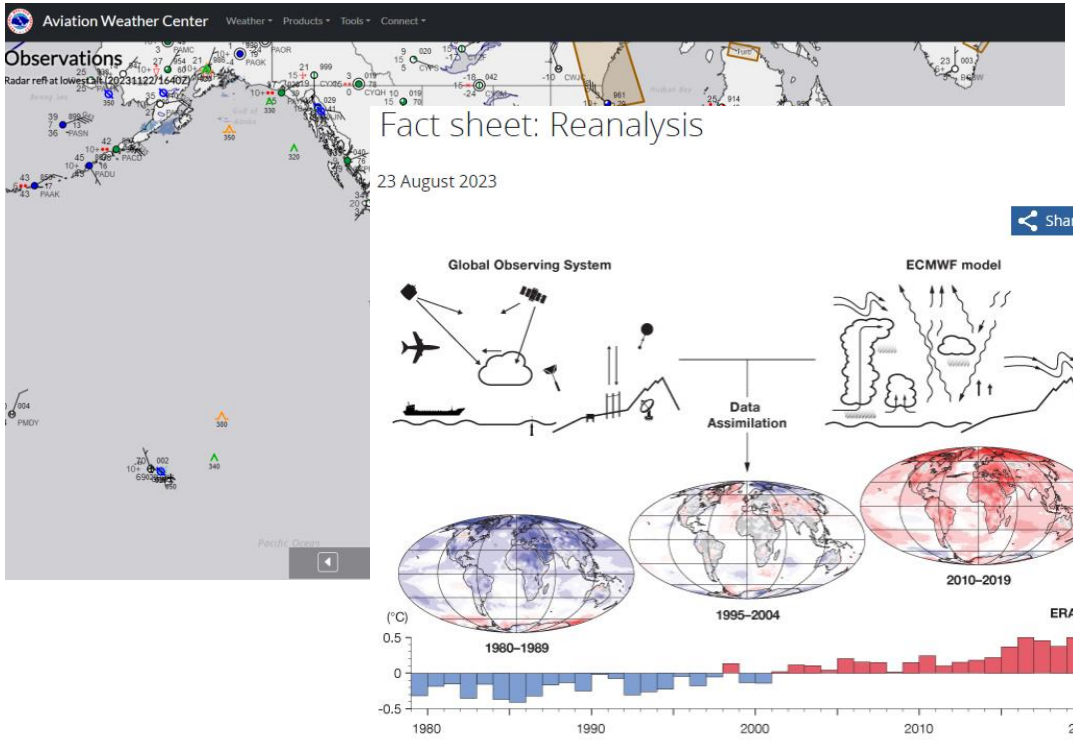
## MET data




*A schematic of the reanalysis process.*

Barriers and opportunities

# Barriers

- Cultural change to embrace transparency and reproducibility
- Barriers:
  - Reputational repercussions
  - Privacy considerations
  - Business considerations
  - National security and defence issues
  - Costs
- Data ownership (licensing)
- Need for opening to address environment and digitalisation

**Barriers and opportunities**

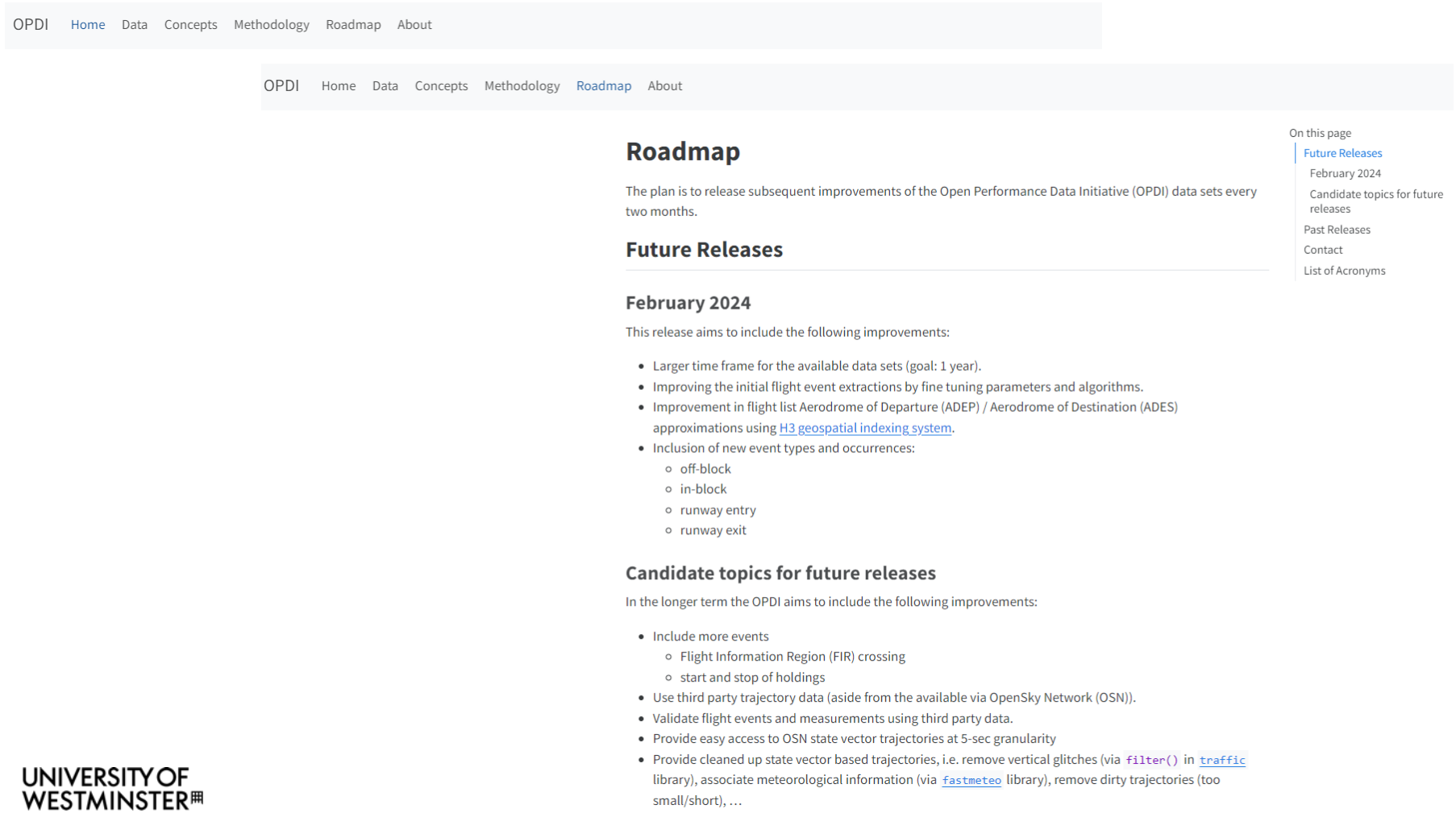
# Opportunities

- Continuously growing number of initiatives to crowd-collect/acquire data (and code) and share it
- Political goals for future of air transportation and the discussion of aviation's impact on climate change, call for higher levels of transparency
- Open data would enable:
  - Easier application of the Performance Assessment Framework within SESAR
  - Transparency and reproducibility
    - Ability to COMPARE the outcome of different solutions from a continuation of the same project or an alternative piece of research/approach
  - Higher research ranking on the global stage

## Roadmap towards an ‘open science alliance’

# Open performance data initiative

https://www.opdi.aero/

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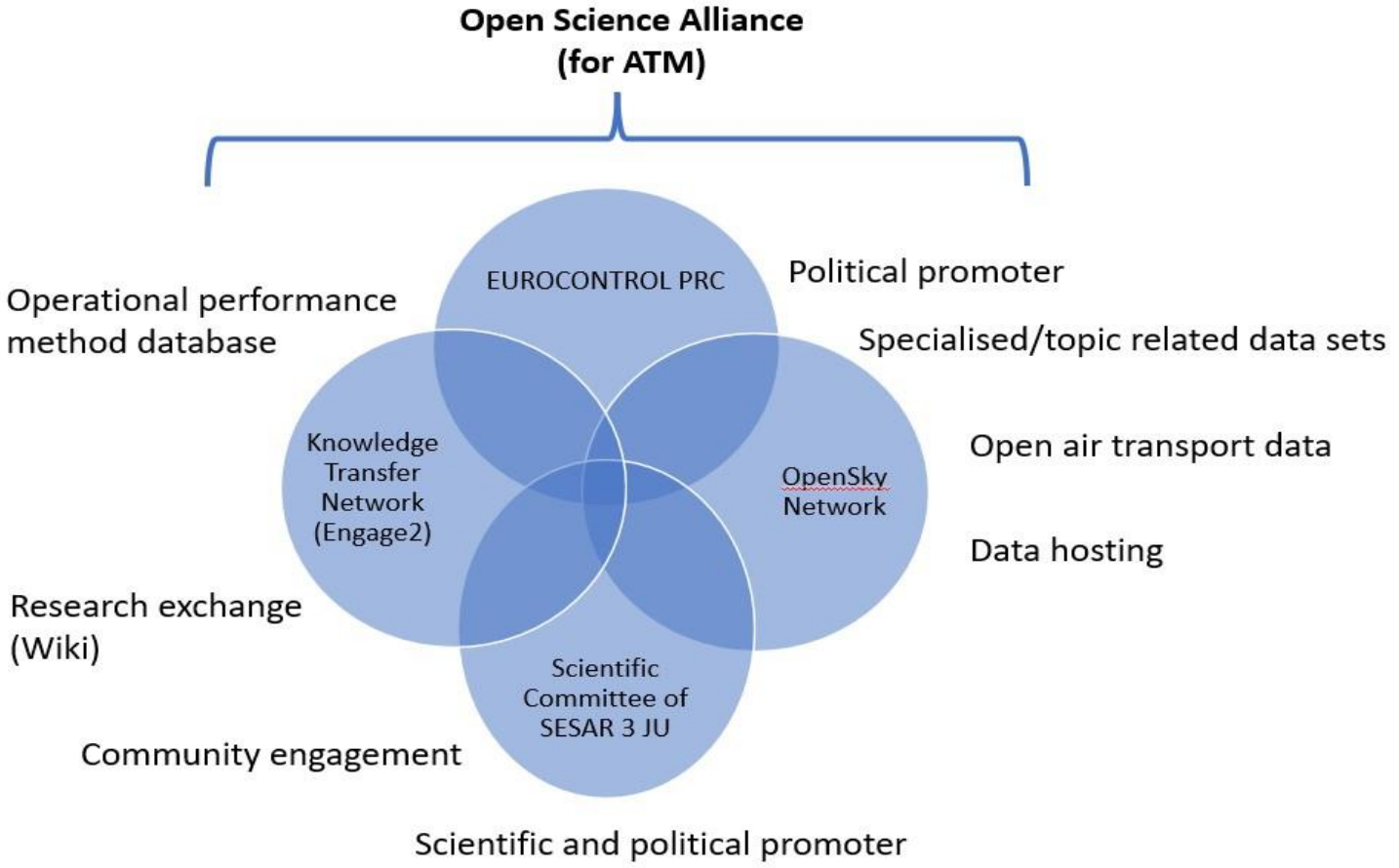
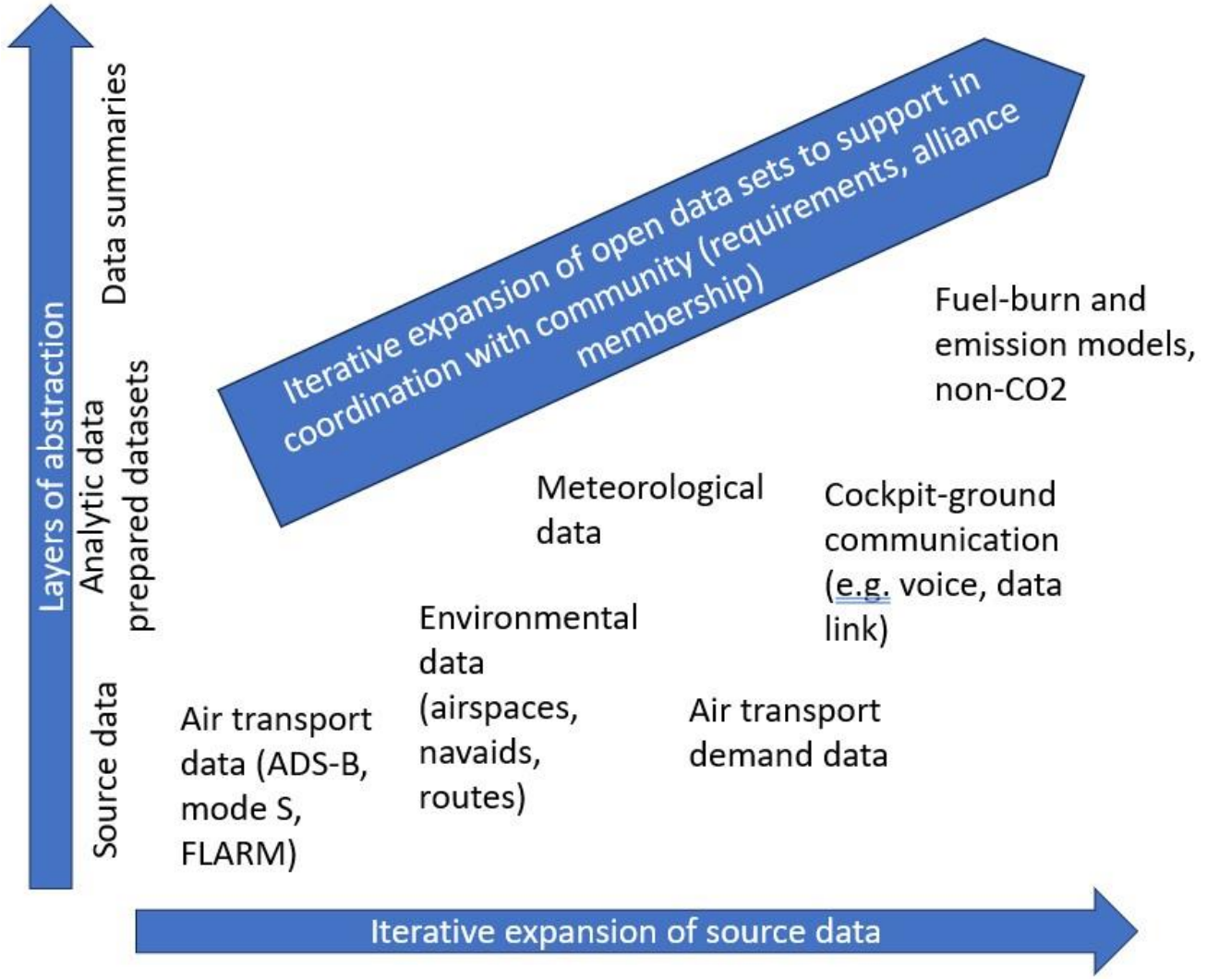
## Roadmap towards an ‘open science alliance’

# Existing collaborations



# Roadmap towards an ‘open science alliance’

## Expansion

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**Roadmap towards an ‘open science alliance’**

# Join us

- **USE** the open data (and software, and results,…) and **HIGHLIGHT** (cite) the importance of it
- **CONTRIBUTE** to the open data and open science:
  - Tell us about your open data needs
  - Join the ‘open science alliance’ collaboration

- Comprehensive survey on open data/science by Engage 2
  Coming in **March 2024**

Click for ‘Open science alliance’ survey

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# THANK YOU

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