

# Engage – the SESAR Knowledge Transfer Network

## Welcome

**Efficient provision and use of meteorological information in ATM**

**09 September 2021**

Tatjana Bolić – University of Westminster

Luca Crecco – SESAR JU

UNIVERSITY OF  
WESTMINSTER



FREQUENTIS



[engagektn.com](http://engagektn.com)  
[wikiengagektn.com](http://wikiengagektn.com)

 [twitter.com/EngageKTN](https://twitter.com/EngageKTN)




# Industry partners – our doors are still open



Advanced Logistics Group (ALG)  
 AGIFORS - Airline Group of the International Federation of Operational Research Societies  
 Air Traffic Controllers European Unions Coordination (ATCEUC)  
 airBaltic  
 Airport Gurus  
 Airport Regions Conference (ARC)  
 American Airlines  
 ANS CR  
 Aslogic  
 Association for the Scientific Development of ATM in Europe (ASDA)  
 Autoridade Nacional da Aviação Civil (ANAC)  
 Barcelona Supercomputing Center (BSC)  
 Boeing Research and Technology Europe (BR&T-Europe)  
 Bundesaufsichtsamt für Flugsicherung (BAF)  
 Cirium  
 Civil Aviation Authority (CAA)  
 COOPANS Consortium  
 Department for Transport (UK)  
 Direction des Services de la Navigation Aérienne (DSNA)  
 Direktorat civilnog vazduhoplovstva Republike Srbije (DCV)  
 Egis  
 European Meteorological Services Network (EUMETNET)  
 European Passengers' Federation (EPF)  
 Executive Airlines  
 Ferrovial Agroman  
 Finnair  
 Flughafen München / Munich Airport  
 Gestair SL  
 Heathrow Airport Limited  
 HEMAV - High Endurance Multipurpose Aerial Vehicles  
 Honeywell Aerospace  
 HungaroControl  
 Icelandair  
 IFSTTAR - Institut Français des Sciences et Technologies des Transports, de l'Aménagement et des Réseaux  
 INFORM - Institut für Operations Research und Management GmbH  
 International Air Transport Passenger Association (IATPA)  
 International Federation of Air Traffic Controllers' Associations (IFATCA)  
 International Federation of Air Traffic Safety Electronics Associations (IFATSEA)  
 Irish Aviation Authority (IAA)  
 LFV - Luftfartsverket  
 London Luton Airport  
 Lufthansa Systems  
 MAG  
 Institut français des sciences et technologies des transports, de l'aménagement et des réseaux  
 Air Navigation Services of the Czech Republic  
 PACE  
 Civil Aviation Directorate of the Republic of Serbia  
 Heathrow  
 flypgs.com  
 egis  
 ferrovial  
 skeyes  
 HEMAV  
 PEGASUS  
 Department for Transport  
 TUBITAK  
 executive airlines  
 AirportGurus  
 Bundesaufsichtsamt für Flugsicherung  
 Flughafen München

[engagektn.com](http://engagektn.com)

# Core activities: 2018 – 2021

- 
- Thematic challenges
- ‘One-stop’ European knowledge hub, concepts roadmap, research repository
  - 4 series of SESAR Innovation Days (non-disruptive; industry)
  - 4 series of thematic challenge workshops (plus *ad hoc*)
  - 3 European summer schools (Belgrade ‘19, virtual event ‘20, virtual event ‘21)
  - 10 PhDs (interdisciplinary); 18 catalyst fund projects (TRL pipeline)
  - Future ATM skilled work-force; student mobility
    - under-/post-graduate teaching & training initiatives
    - internships & employer links
    - journal publication grants; travel grants

35% of €4m as  
consortium effort

SESAR Digital Academy



Integrate IR and ER



EngageWiki ▾

Tools ▾

Log in

Request account

Search EngageWiki



# Welcome to the EngageWiki

**The one-stop European knowledge hub**

A repository and interactive research map for exploratory and industrial research in ATM, also compiling European events and learning opportunities, and hosting discussion fora.

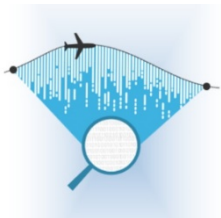
[wikiengagektn.com](http://wikiengagektn.com)

# Thematic challenge workshops 2021



**#1. CNS vulnerability and security** *Paula López, Innaxis*  
**15 September 2021**

Everything on  
website!



**#2. Data-driven trajectory prediction** *Dirk Schaefer, ECTL*  
“AI, ML and Automation”  
**03 September 2021**



**#3. Efficient use of MET data** *Tatjana Bolić, Uni. Westminster*  
**09 September 2021**



**#4. Novel market mechanisms in ATM** *Andrew Cook, Uni. Westminster*  
“Economic incentives for future ATM implementation”  
**21 June 2021**

[engagektn.com](https://engagektn.com)

All 2021 workshops will explore  
new research ideas, e.g. for SESAR 3

- This is a Zoom meeting, i.e. all participants have the same privileges
- Session chair will introduce speaker and manage Q&A
- Use the chat for questions and comments
- Presentations will be available for download on Engage website
- Video-recording is just for internal purposes, recordings will not be made public

# Objective

- This edition will explore the MET&ENV topics requiring future research, development or community collaboration. The workshop will start with the panel discussing the **MET&ENV topics requiring future developments** from the scientific or technical point of view, intertwining suggestions from the audience. The following panel will discuss the **paths and time needed to cross from the basic research to implementation**, and how these can be improved. We conclude the workshop with the participants being invited to help us identify the elements needed in the future to **facilitate the research** (e.g data sharing, common platform, etc.), collaboration and shortening the time of the innovation pipeline for MET and ENV topics. The discussion will draw on a poll taken in advance of the workshop - ***what research infrastructure and future research can we already propose for SESAR 3, for example?***

## Programme

1030-1045 Welcome by SESAR Joint Undertaking and Engage KTN  
Welcome by SJU and the introduction to the SESAR KTN, Engage, and the day's programme  
Dr Tatjana Bolic (University of Westminster), Luca Crecco (SESAR JU)

### SESSION 1 MET&ENV research topics

1045-1100 **Overview of MET and ENV topics being researched in SESAR 2020**  
Dr Tatjana Bolic (University of Westminster)

1100-1145 **Panel 1: Future MET&ENV research**  
Moderator: Dr Tatjana Bolic (University of Westminster)

#### Panellists:

- Alexander Baklanov – World Meteorological Organisation
- Sigrun Matthes – DLR (TBC)
- Rosalind Lapsley – EUROCONTROL
- Damian Rivas – University of Seville
- Lauren Donohue – EUMETNET
- Emmanuel Sunil – NLR

1145-1200 **Coffee break**

### SESSION 2 From research to implementation

1200-1245 **Panel 2: Paths and time to MET&ENV products deployment**  
Moderator: Luca Crecco (SESAR JU)

#### Panellists:

- Kamel Rebai – METSAFE
- Andre Weipert – Leonardo Germany
- Anton Muscat – metoffice London VAAC
- Philippe Lenne – SESAR JU
- Chris Peregrine – NMOC
- Manuel Soler – UC3M

1245-1345 **Lunch break**

### SESSION 3 Enabling fast innovation cycles

1345-1430 **Discussion: research, development and deployment “infrastructure” needed in the future**  
Moderators: Dr Tatjana Bolic (University of Westminster), Luca Crecco (SESAR JU)

1430-1445 **Wrap-up**  
Dr Tatjana Bolic (University of Westminster)

# Session 1



Overview of MET and ENV topics being researched in SESAR 2020  
Dr Tatjana Bolić (University of Westminster)

Panel 1: Future MET&ENV research

Moderator: Dr Tatjana Bolić (University of Westminster)

# Overview of MET and ENV topics being researched in SESAR

**Dr. Tatjana Bolić (University of Westminster)**

**09 September 2021**

# Overview

- SESAR1
- SESAR2020:
  - ER1
  - Engage KTN:
    - Thematic challenges
    - Catalyst funding
  - ER4
- Future SESAR SRIA

# SESAR1

- Within WP11
- WP11.2 Enhanced MET services to aviation
  - 4D Weather cube

## Exploratory research call 1

- Environment and meteorology for ATM

Project name	Abstract	Website
ATM4E	Minimising the environmental impact of aviation	<a href="https://www.atm4e.eu/">https://www.atm4e.eu/</a>
PNOWWA	Weathering the weather at airports	<a href="http://fmispace.fmi.fi/">http://fmispace.fmi.fi/</a>
TBO-MET	Mastering meteorological uncertainty in aviation	<a href="https://tbomet-h2020.com/">https://tbomet-h2020.com/</a>

- Challenges:
  - Four challenges identified by the community
  - Workshops organised to elaborate and prepare for the catalyst funding calls
- **Barriers to the progress of MET and MET/ATM identified:**
- Inadequacy of research funding available to the MET offices (only partial funding), and fragmented provision of MET products for aviation (coupled with regulatory and sovereignty matters).
- Trust the ATM users have in available MET products, and not particularly high usage in operational decision-making. This points to the two underlying issues:
  - Fitness of purpose of MET products (e.g. medium-range, limited-area forecasts are of little practical use to airport tower supervisors, while the very high-resolution, very short-range forecasts would be more easily included in this decision-making process);
  - ATM stakeholder knowledge of the available MET products, especially on the characteristics and meaning of MET products being developed.

## Engage KTN

- First MET workshop identified example ideas for potential further exploration:
  - Very high-resolution, very short-range forecasts using numerical weather prediction models and observational data assimilation;
  - Quantifying the sensitivity of operational processes to MET uncertainty, comparing these with other sources of uncertainty;
  - Incorporation of ensemble weather information into decision-support tools, adapted for different ATM stakeholders;
  - Accurate prediction of weather conditions (e.g. visibility, glide-path wind) influencing airport arrival and departure operations;
  - Consolidation of climate risk assessment methodologies for airports;
  - Creating a climate forecast 'baseline' for aviation from the IPCC UN panel report.

## Engage KTN

- Workshops further detailed challenge descriptions which were used in the catalyst funding calls:
  - 12 months, up to 60 000 €

Call	Project	Description
1	PSA-Met	Probabilistic weather avoidance routes for medium-term storm avoidance
	CARGO	airport-sCAle seveRe weather nowcastinG project
	OPAS	Operational alert Products for ATM via SWIM
	MET enhanced ATFCM	
2	METSIS	Meteo Sensors In the Sky
	WIPA	Weather impact prediction for ATFCM

## Exploratory research call 4

**ALARM** – aims to develop a prototype global multi-hazard monitoring and Early Warning System for a number of hazards (e.g. severe weather, aerosols/gases from natural hazard, space weather, etc). <https://alarm-project.eu/>

**CREATE** - aims to achieve innovative procedures in ATM to reduce climate and environmental impact, while becoming more resilient to weather phenomena <https://create-project.eu/>

**DYNCAT** - aims at enabling more environmentally friendly and more predictable flight profiles in the airport vicinity, namely on approach, by supporting the pilots in configuration management. <https://www.dlr.de/ft/en/desktopdefault.aspx/tabid-17217/>

**FlyATM4E** – aims to expand approved climate-assessment methods and optimization of aircraft trajectories in order to identify promising mitigation options suitable to solve the task of reducing overall climate impact of aircraft operations. <https://flyatm4e.eu/>

**FMP Met** – aims to develop a multi-sector, multi-source convective weather information application for flow management position (FMP). <https://fmp-met.com/>

**SINOPTICA** - aims to exploit the data obtained from remote sensing, both satellite and ground-based, from the Global Navigation Satellite System (GNSS) and in situ weather stations, to support ATM. <http://sinoptica-project.eu/>

**ISOBAR** - aims to provide a service- and AI-based Network Operations Plan, by integrating enhanced convective weather forecasts for predicting imbalances between capacity and demand, and exploiting AI to select mitigation measures at local and network level. <https://isobar-project.eu/>

# Future SESAR SRIA

- 9 SRIA flagships:
  - Aviation Green Deal an environmental flagship
- The MET research is not explicitly mentioned in any of the SRIA flagships

# Future SESAR SRIA

- Atmospheric science, meteorology and satellite-based monitoring and observations are constantly improving, which should not be forgotten in the air traffic management
- World Meteorological Organisation's Long-term Plan for Aeronautical Meteorology lists the following:
  - The foundational elements – that are those underpinning authoritative aeronautical meteorological services and include a rigorous quality management system.
  - Improved observations including aircraft-based observations.
  - Improved forecasts including impact-based forecasts to support risk-based decision-making.
  - Improved gate-to-gate services, where scientific and technological advancement will be needed across the entire service delivery chain to fully meet emerging aviation needs from gate to gate.
  - Seamless information delivery, collaborative decision making and impact-based services
  - Increased efficiency including partnership and collaboration, adding value where most appropriate.

# Future SESAR SRIA

- Need your input!

# Panel 1 Future MET&ENV research

1100-1145 ***Panel 1: Future MET&ENV research***

*Moderator:* Dr Tatjana Bolic (University of Westminster)

*Panellists:*

- *Alexander Baklanov – World Meteorological Organisation*
- *Sigrun Matthes – DLR*
- *Rosalind Lapsley – EUROCONTROL*
- *Damian Rivas – University of Seville*
- *Lauren Donohue – EUMETNET*
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## Session 2



Panel 2: Paths and time to MET&ENV products deployment

# Panel 2 Paths and time to MET&ENV products deployment

1200-1245 ***Panel 2: Paths and time to MET&ENV products deployment***

*Moderator:* Luca Crecco (SESAR JU)

*Panellists:*

- *Kamel Rebai – METSAFE*
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- *Chris Peregrine – NMOC*
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Lunch break  
Back at 13:45

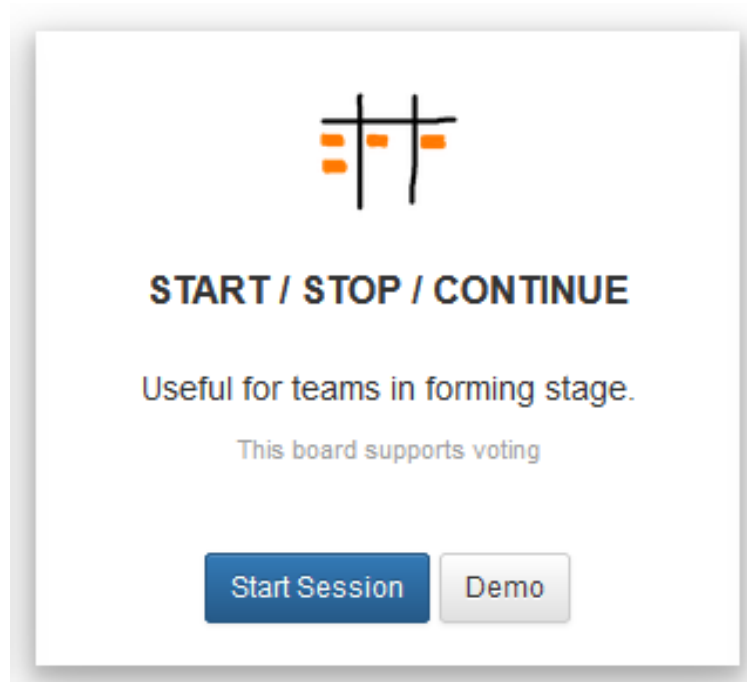
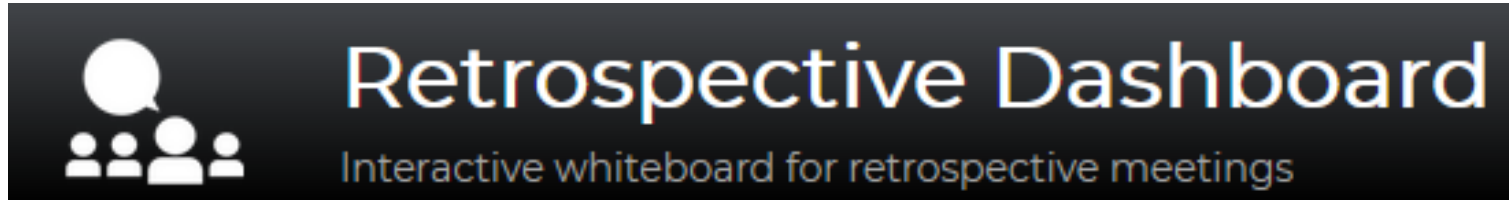
# Discussion

# Logistics

- Divide in two break-out rooms
- 30 minutes in the rooms
- 15 minutes exchange and further discussion
- Rooms:
  - Room 1: Moderator Tatjana Bolic
  - Topic: Data and data infrastructure
  - Room 2: Moderator Luca Crecco
  - Topic: Research collaboration for faster deployment

# Brainstorming

## Introduction to the dashboard

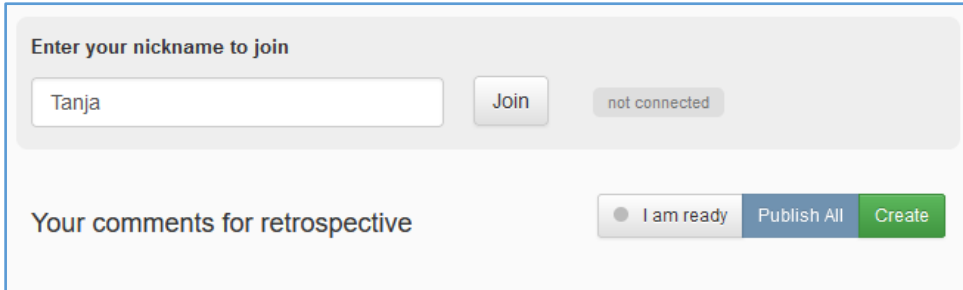


- Start
  - new element we need to start
- Stop
  - enough already / going nowhere!
- Continue
  - we need to build on this

# Brainstorming

## Introduction to the dashboard

1.

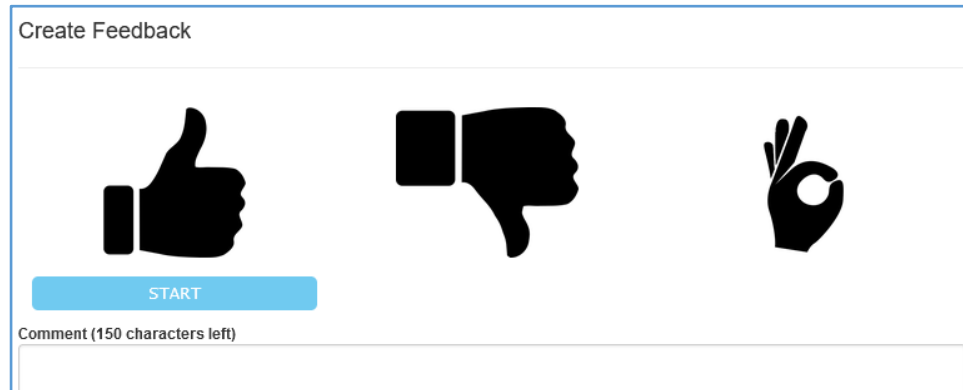


Enter your nickname to join




Tanja  not connected

Your comments for retrospective ☐ I am ready

2.




Create Feedback

Comment (150 characters left)

3.



 **Announce Voting**






(We'll consolidate and anonymise afterwards)

- Link is in the Zoom chat
- The task is to
  - Room 1 Data and data infrastructure
  - Room 2 Research collaboration for faster deployment

# Brainstorming

## Introduction to the dashboard

- Your comments will appear in the main dashboard
- Will be shown in main Zoom screen

Start Doing 	Stop Doing 	Continue Doing 

☆ Announce Voting

# Wrap up

# Next steps

# EngageWiki – launched at the SIDs 2020



[wikiengagektn.com](https://wikiengagektn.com)

- Active features
  - interactive research map
  - ATM concepts roadmap
  - European university programmes
  - PhD funding opportunities
  - jobs and internships
  - *discussion fora*
- Coming soon
  - teaching resources
  - projects repository

SESAR 3



The screenshot shows the EngageWiki homepage with a light blue background and a circular radar-like pattern. The main heading is 'Welcome to the EngageWiki' followed by 'The one-stop European knowledge hub'. Below this is a descriptive sentence: 'A repository and interactive research map for exploratory and industrial research in ATM, also compiling European events and learning opportunities, and hosting discussion fora.' A section titled 'Check out the main wiki features' displays four icons: 'Interactive research map of ATM' (a cluster of dots), 'European university programmes' (a magnifying glass over a globe), 'ATM concepts roadmap' (a circular flow diagram), and 'Discussion fora' (speech bubbles). At the bottom, an 'Education and learning' section features five white boxes with counts: 'European university programmes' (103), 'SESAR Digital Academy' (no count), 'PhD funding opportunities' (5), 'Jobs and internships' (11), and 'Teaching resources' (3).

**Welcome to the EngageWiki**

**The one-stop European knowledge hub**

A repository and interactive research map for exploratory and industrial research in ATM, also compiling European events and learning opportunities, and hosting discussion fora.

**Check out the main wiki features**

- Interactive research map of ATM
- European university programmes
- ATM concepts roadmap
- Discussion fora

**Education and learning**

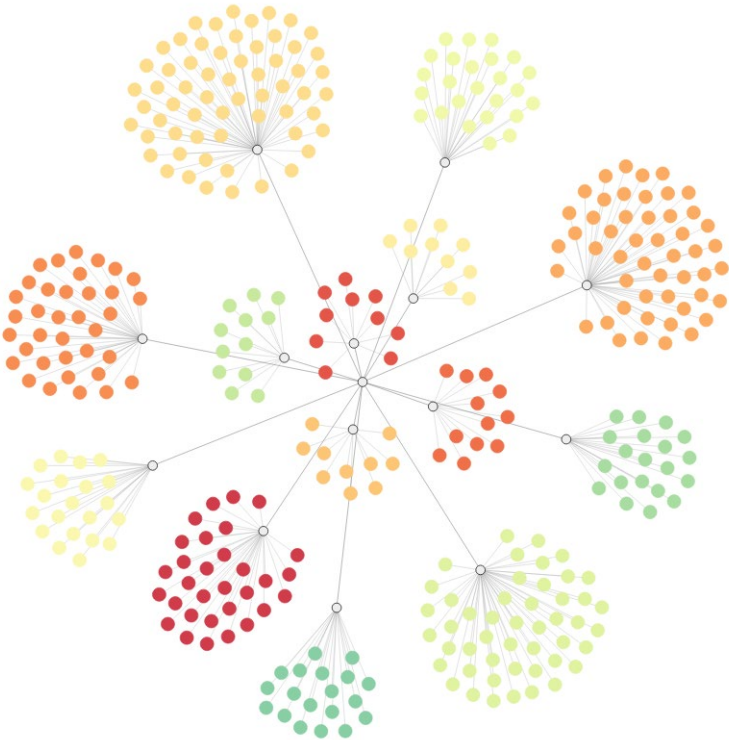
Feature	Count
European university programmes	103
SESAR Digital Academy	
PhD funding opportunities	5
Jobs and internships	11
Teaching resources	3

Interactive research map of ATM



all projects, one tree  
14 bottom-up clusters  
NLP & machine learning  
(descriptive text in wiki)

one-stop  
hub



filter

reset



[734161] [PJ18 4DTM] 4D Trajectory Management

Website Reports Web search

Call: IR Wave 1

Call ID: H2020-SESAR-2015-2

Partners: Indra Sistemas, Airbus, Atos Belgium, Austro Control, Croatia Control, Dassault Aviation, DLR, DFS, DSNA, ENAIRE, ENAV, EUROCONTROL, Frequentis, Honeywell Aerospace, HungaroControl, Leonardo, LPS SR, LFV, NATS, Navair, PANS, ANS CR, Skyguide, NLR, Thales AVS France, Thales LAS France, IAA, Oro navigacija

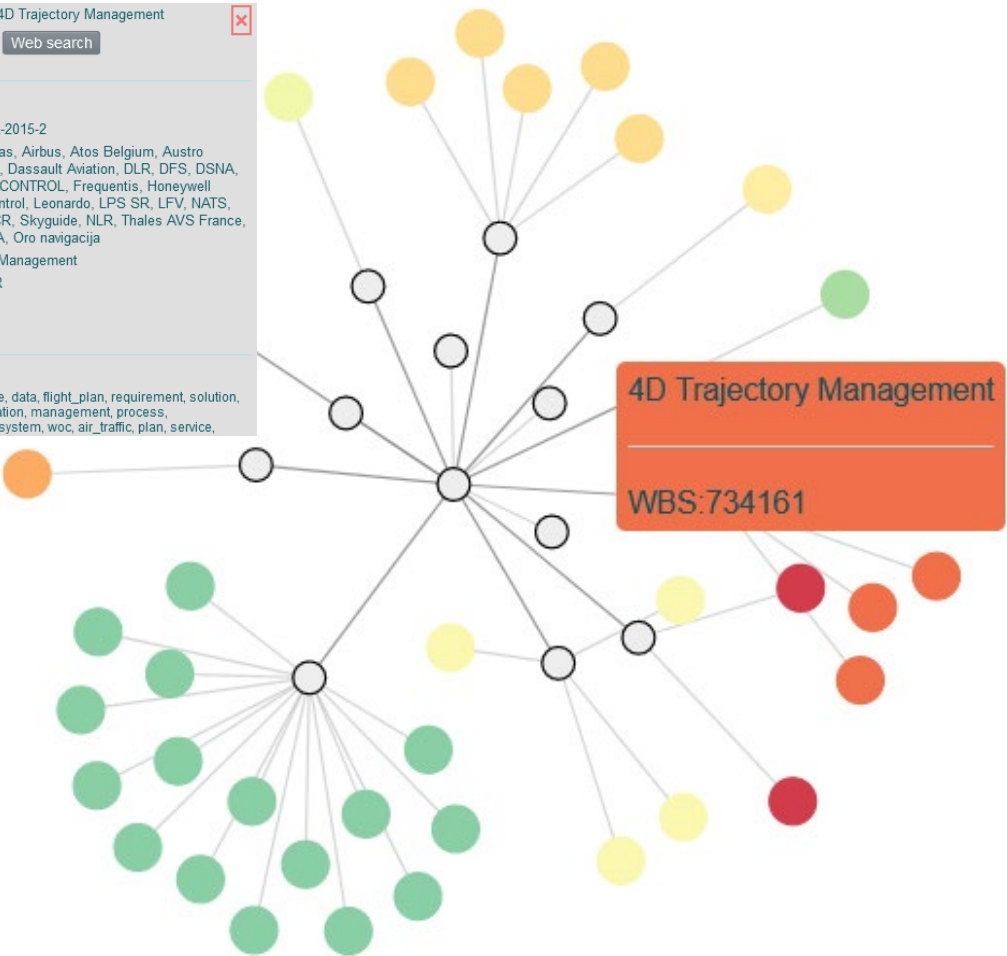
Theme: 4D Trajectory Management

Budget: 49.249 M EUR

Duration: 2016 - 2020

Deliverables:

Keywords  
system, ioat\_fpl, airspace, data, flight\_plan, requirement, solution, mission\_trajectory, validation, management, process, validation\_exercise, atc\_system, woc, air\_traffic, plan, service,



# ATM concepts roadmap – current status



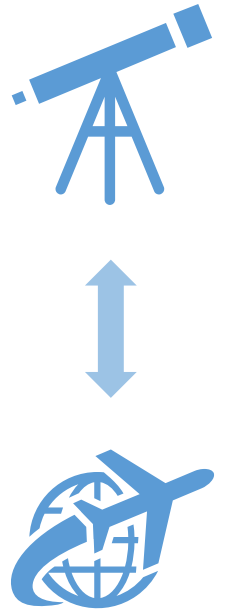
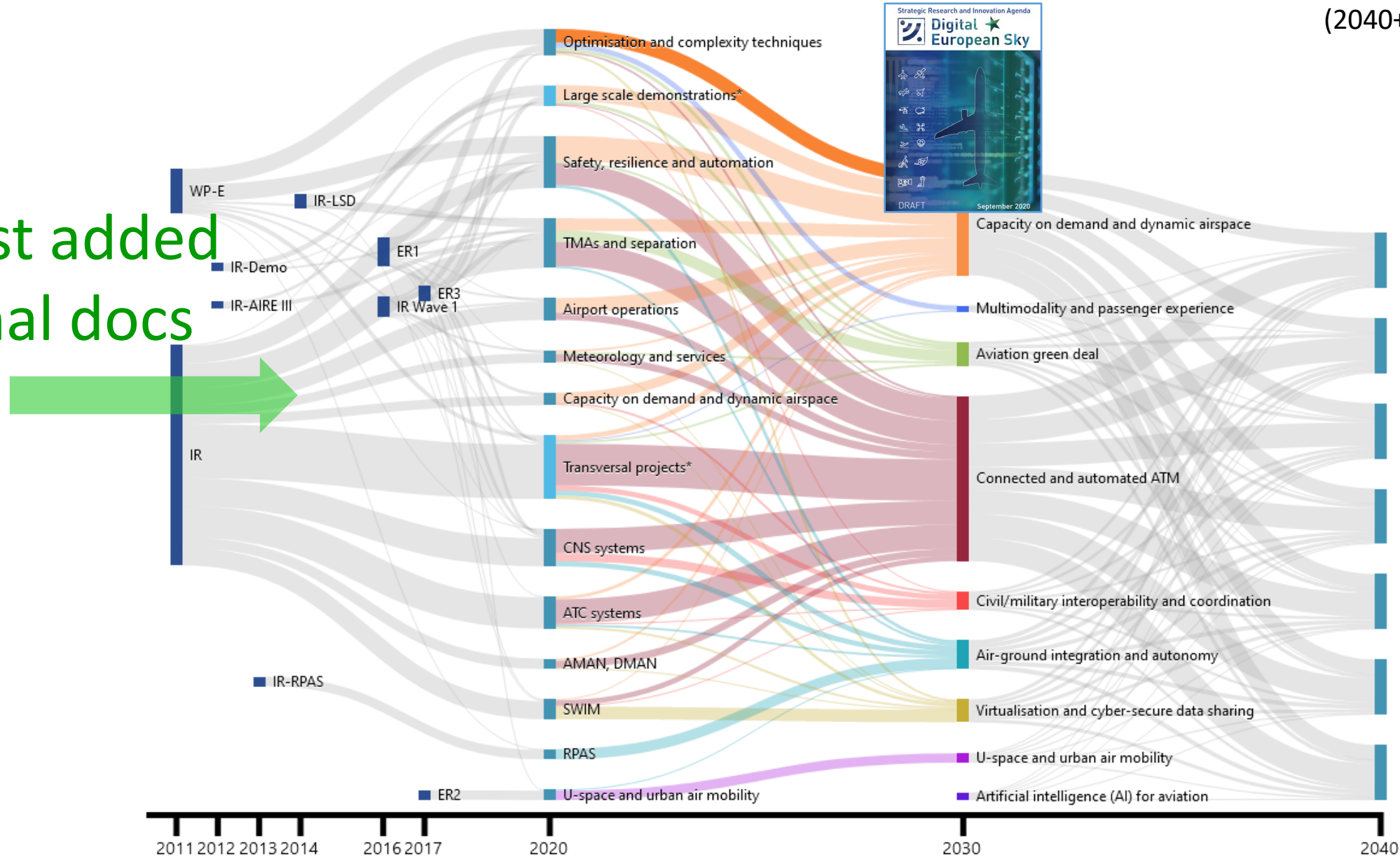
SESAR Calls

2020 Engage mapping

SRIA flagship activities

'Horizon' flagship activities  
(2040++)

just added  
final docs



# Coming up from Engage

## Final workshop

- **15SEP: “CNS vulnerability and security” (aka ‘cybersecurity’) workshop**
  - pentesting platform for ATM/avionics; assuring drone telemetry data integrity
  - cybersecurity management framework; comms architecture augmented with AI
  - future research priorities; community reinforcement (SC)
- Programme available & registration still open!

[engagektn.com](https://engagektn.com)



x4  
etc.

## Other milestones

- **30SEP: D3.9** – aka ‘The wiki’
- **31OCT: D3.6** – “Opportunities for innovative ATM research”
- **07-09DEC: 11th SESAR Innovation Days** (30SEP, papers; informal Engage closing session)
- **2022: Engage ‘PhD extension’** (in pipeline); SESAR 3 Call ...



D3.9

D3.6



# Thank you