

# Engage – the SESAR Knowledge Transfer Network

## Welcome

### AI, ML and Automation

**03 September 2021**

Dirk Schaefer – EUROCONTROL

Tatjana Bolić, Andrew Cook – University of Westminster

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  
 Manchester Airport  
 NATS  
 Naviair  
 Network Manager - nominated by the European Commission  
 NEXTOR II Consortium - University of California, Berkeley and University of Maryland  
 PACE Aerospace Engineering & Information Technology  
 Pegasus Airlines  
 QinetiQ Ltd  
 Raytheon UK  
 Sabre Airline Solutions  
 skeyes  
 SWISS - Swiss International Air Lines  
 TÜBİTAK - The Scientific and Technological Research Council of Turkey  
 Turkish Airlines

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

# Core activities: 2018 – 2021

- 
- ‘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



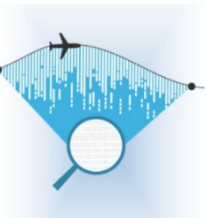
Integrate IR and ER

# 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

- Data-driven Trajectory Prediction defined as one of the Engage Thematic Challenges (TC2)
- This is the third workshop
  - 1<sup>st</sup> workshop on 6 November 2018 at UPC Barcelona, Castelldefels
  - 2<sup>nd</sup> workshop 2 December 2019 at National Centre of Scientific Research 'Demokritos' Athens
  - 3<sup>rd</sup> workshop 25 January 2021 – virtual event
  - **BONUS: 4<sup>th</sup> workshop 3<sup>rd</sup> September 2021** with a slightly enlarged scope on request of the SJU to cover **“AI, ML and Automation”** – virtual event

- 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 will not be published without the speaker's consent – we will not publish the brainstorming sessions or panel discussions



# Agenda – morning

- 1000-1015 **Welcome and overview from the Engage KTN; overview of TC2 and previous workshops** – *Dirk Schaefer (EUROCONTROL), Tatjana Bolic (University of Westminster) and Andrew Cook (University of Westminster)*
- 1015-1030 **Evolution of Automation, AI and ML research through the SESAR programme** – *Luca Crecco (SESAR JU)*
- 1030-1145 SESSION 1** (chair: Andrew Cook)
- 1030-1055 **Machine learning to improve tactical flight decision making: the case of Pilot3** – *Luis Delgado (University of Westminster)*
- 1055-1120 **ARTIMATION** – *Mobyen Uddin Ahmed (MDH)*
- 1120-1145 **Using machine learning to predict the evolution and propagation of delays: main results and lessons learnt** – *Ramon Dalmau Codina (EUROCONTROL)*
- 1145-1230 TECHNICAL PANEL: “What is hot and what is broken in ML research?”** (panellists: Gérald Gurtner (University of Westminster), Jose Manuel Cordero (CRIDA), Brian Hilburn (CHPR), Xavier Olive (ONERA), Ramon Dalmau Codina (EUROCONTROL); moderator: Dirk Schaefer)



# Agenda – afternoon

## 1330-1510 SESSION 2 (chair: Tatjana Bolic)

- 1330-1355 **MAHALO: AI-based conflict detection and resolution tools: Conformity vs. Transparency** – *Brian Hilburn (Center for Human Performance Research) and Tiago Monteiro Nunes (TU Delft)*
- 1355-1420 **NOSTROMO: Next-generation Open-Source Tools for ATM performance Modelling and Optimisation** – *Maria Teresa Cano Rincon (CRIDA)*
- 1420-1445 **AISA** – *Tomislav Radisic (University of Zagreb)*
- 1445-1510 **TAPAS: Unravelling the AI/ML “black box” in ATM** – *Jose Manuel Cordero Garcia (CRIDA)*

## 1510-1525 *Coffee break*

## 1525-1645 PANEL & BRAINSTORMING “Future directions for ML research in ATM” (moderator: Dirk Schaefer, Tatjana Bolic, Andrew Cook)

- **Brainstorming**
- **Panel** (panellists: Olivia Nunez (SESAR JU), Henk Blom (TU Delft), Benjamin Cramet (EUROCONTROL), Daniel Stecher (IBS Software))

## 1645-1700 **Wrap-up and close-out**

## Panel session

“What is hot and what is broken in ML research”

Moderator: Dirk Schaefer (EUROCONTROL)

# Brainstorming and panel

## “Future directions for ML research in ATM”

Moderators: Dirk Schaefer (EUROCONTROL),  
Andrew Cook, Tatjana Bolic (University of Westminster)

# Wrap-up and close-out

Dirk Schaefer

Andrew Cook

# 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 blue text and circular counters: 'European university programmes' (103), 'SESAR Digital Academy', '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**

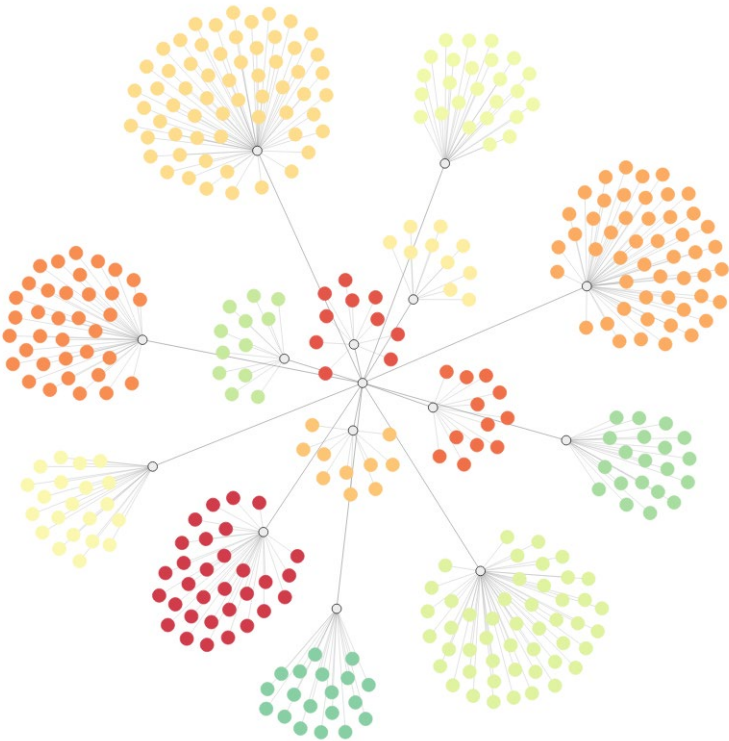
Feature	Count
European university programmes	103
SESAR Digital Academy	
PhD funding opportunities	5
Jobs and internships	11
Teaching resources	3

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

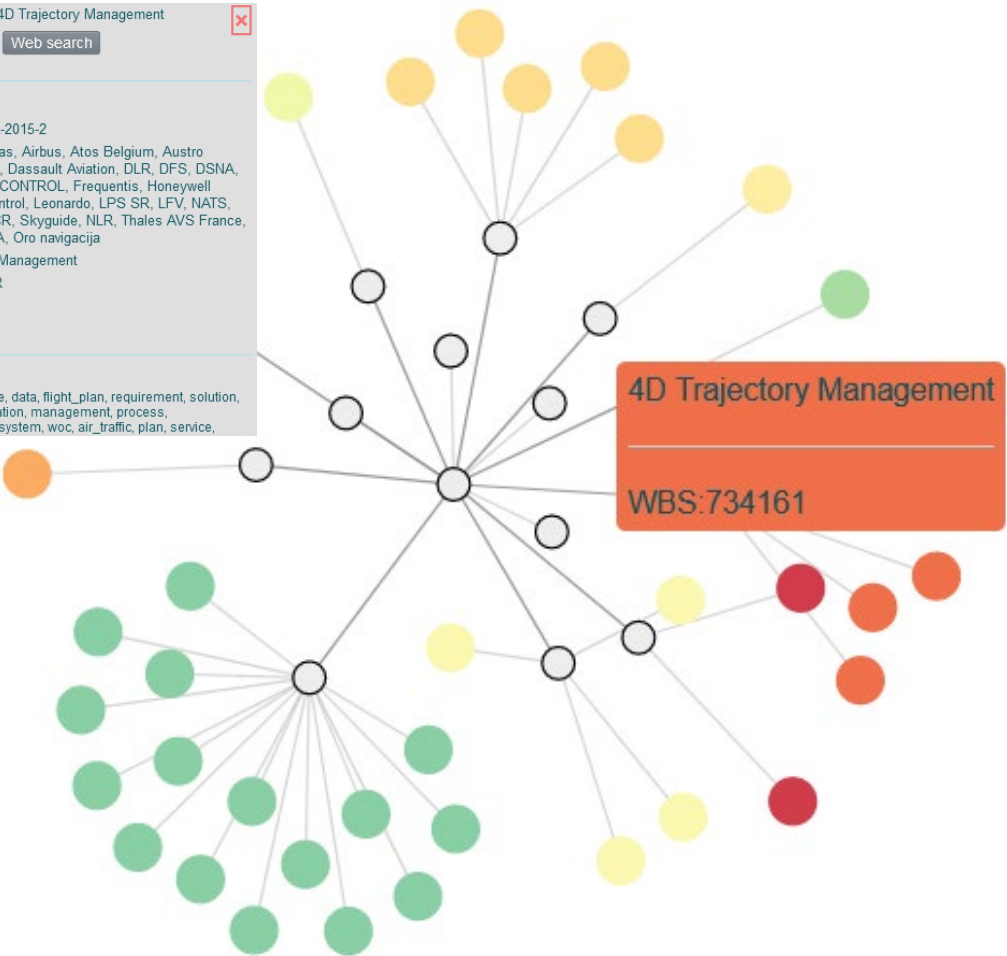
Theme: 4D Trajectory Management

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

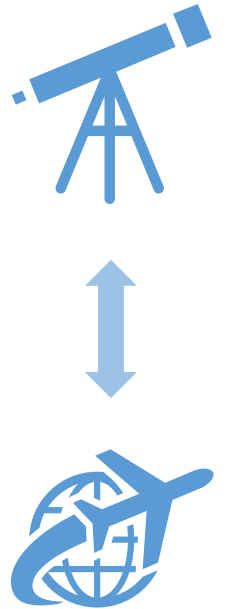
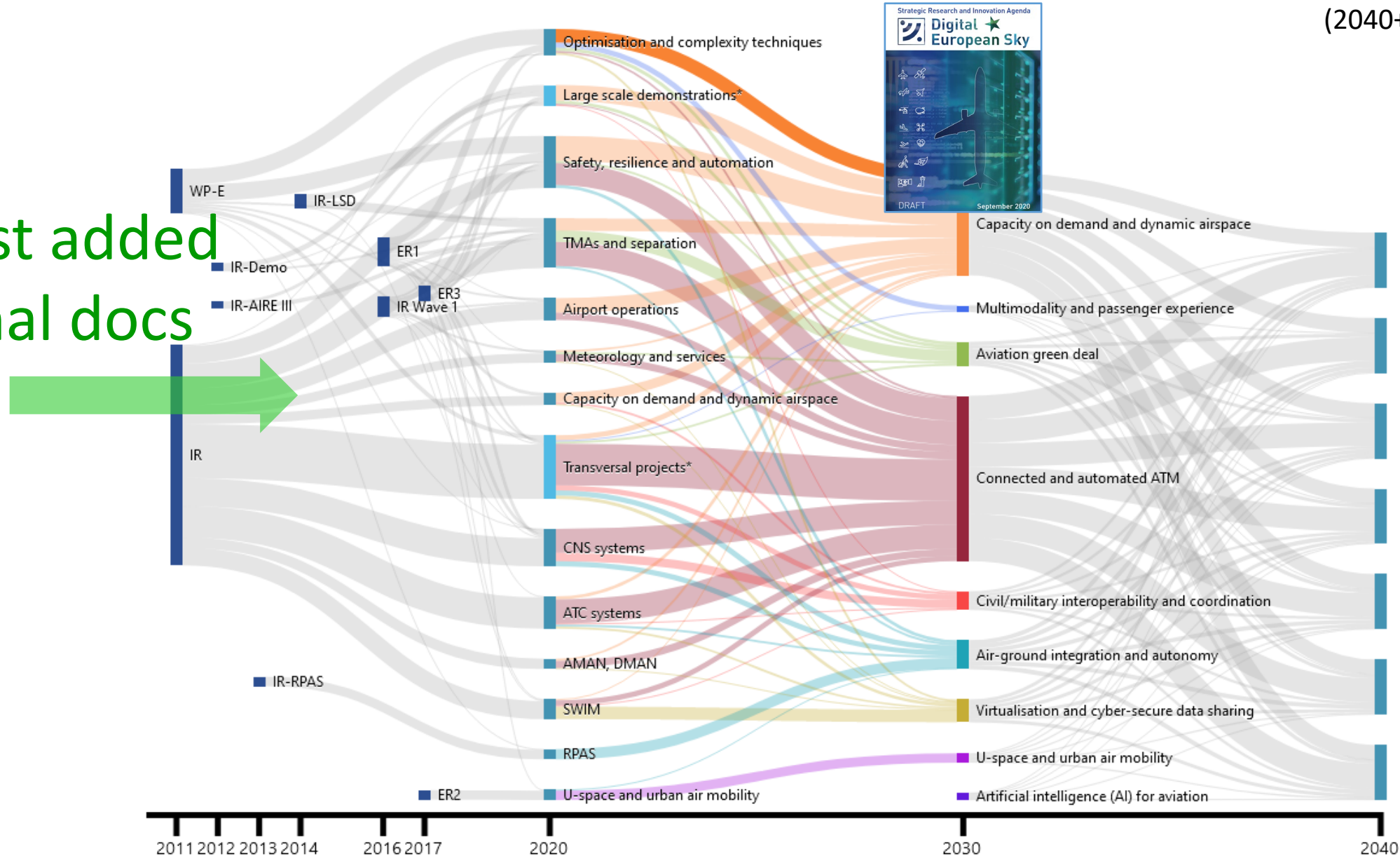
SESAR Calls

2020 Engage mapping

SRIA flagship activities

‘Horizon’ flagship activities  
(2040++)

just added  
final docs





# Coming up from Engage

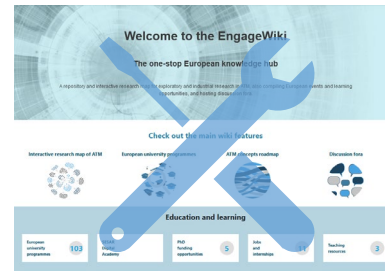
## Final two workshops

- **09SEP:** “Efficient use of MET data in ATM” workshop
  - review MET & ENV state of the art; expert panel – future research
  - industry panel – faster deployment; open discussion – innovation cycles
- **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 & community reinforcement (SC)

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

## 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 ...



# Thank you