



Welcome



Vulnerabilities and global security of the CNS/ATM system

2nd edition

Engage KTN workshop, webinar, 10NOV20



Founding Members





– the SESAR Knowledge Transfer Network

UNIVERSITY OF
WESTMINSTER



FREQUENTIS



engagektn.com
 twitter.com/EngageKTN

Industry partners

Our doors are still open

ASDA
Association for the Scientific
Development of ATM in Europe

(+ ...)

NEXTOR II



Advanced Logistics Group (ALG)
AGIFORS - Airline Group of the International Federation of Operational Research Societies
Air Traffic Controllers European Unions Coordination (ATCEUC)
airBaltic
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)
European Meteorological Services Network (EUMETNET)
European Passengers' Federation (EPF)
Executive Airlines
Ferrovia Agroman
Finnair
Flughafen München / Munich Airport
Gestair SL
Heathrow Airport Limited
Helios
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
skyes
SWISS - Swiss International Air Lines
TÜBİTAK - The Scientific and Technological Research Council of Turkey
Turkish Airlines

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Core activities: 2018 – 2021

Thematic challenges

- ‘One-stop’ European knowledge hub, concepts roadmap, research repository
- 4x SESAR Innovation Days (non-disruptive; industry)
- Series of thematic challenge workshops
- 3 European summer schools (Belgrade ‘19, virtual event ‘20, Trieste ‘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

Engage catalyst fund projects, wave 2

New projects awarded, listed by thematic challenge



Internal ID	Title	TC	Project coordinator	Partner(s)	Start - end
204	Proof-of-concept: practical, flexible, affordable pentesting platform for ATM/avionics cybersecurity	1	University of Jyväskylä, Finland	—	JUL20-JUN21
208	Safe drone flight - assuring telemetry data integrity in U-Space scenarios	1	NATS, UK	Open University, UK	JUL20-JUN21
215	Collaborative cybersecurity management framework	1	Winsland, UK	Movable-type, UK; MSDK, Bulgaria; BULATSA, Bulgaria	JUN20-MAY21
214	Probabilistic information integration in uncertain data processing for TP	2	CIRA, Italy	—	JUL20-JUN21
212	Meteo sensors in the sky	3	NLR, The Netherlands	AirHub B.V., NL	JUL20-JUN21
220	Weather impact prediction for ATM	3	FRACS, France	MetSafe, France	JUL20-JUN21
218	Role of markets in AAS deployment	4	Think Research, UK	—	JUN20-MAY21
209	Flight centric ATC with airstreams	(2)	NEOMETSYS, France	ENAC, France	JUL20-JUN21

¹ Centro Italiano Ricerche Aerospaziali

² France Aviation Civile Services

Overview of thematic challenge status

Overall status of the four challenges

	Open	TC1	TC2	TC3	TC4	Σ
		cyber	TP	MET	market	
PhDs	2	-	5	2	2	10
CF Wave 1	-	2	3	4	1	10
CF Wave 2	1	3	1	2	1	8
Σ	3	5	9	8	4	28

Key focus today: identify actionable research needs

(Next steps, Engage KTN, at the end)

Now over to Pablo Hernandez ...

Agenda

09:50-10:00 Opening & Welcome by the EngageKTN consortium

10:00-11:30 State of the Art in CNS/ATM security and future perspectives

10:00-10:20

Ruben Flohr (SESAR JU, Architecture & Systems Engineering)

10:20-10:40

Robert Westerberg (NATS, Strategic Threat and Risk Lead),
"Future concerns of an ANSP"

10:40-11:00

Davide Martini (EASA, Senior Expert) "EASA cybersecurity activities and research"

11:00-11:30

Q&As session moderated by Pablo Hernández (Innaxis)

11:30-11:45 Intermission/Coffee Break

11:45 -13:15 Research for future secure CNS/ATM systems

11:45-12:05

Matthias Schäfer [(Co-)Founder of SeRo Systems and OpenSky Network],
"Authentication and integrity for ADS-B"

12:05-12:25

Yijun Yu (Senior Lecturer in Computing at The Open University),
"The drone identity - investigating forensic-readiness of U-Space services"

12:25-12:45

- Kanaan Abdo (Project manager—Chief Technology Officer at ALTys)

Topic: General introduction of the SINAPSE Project

- Fun Hu (Professor of Wireless Communications at University of Bradford)

Topic: SINAPSE Security Architecture

- Muhammad Ali (Post-Doctoral Research Fellow at University of Bradford)

Topic: Artificial Intelligence Techniques for SINAPSE Security

12:45-13:15

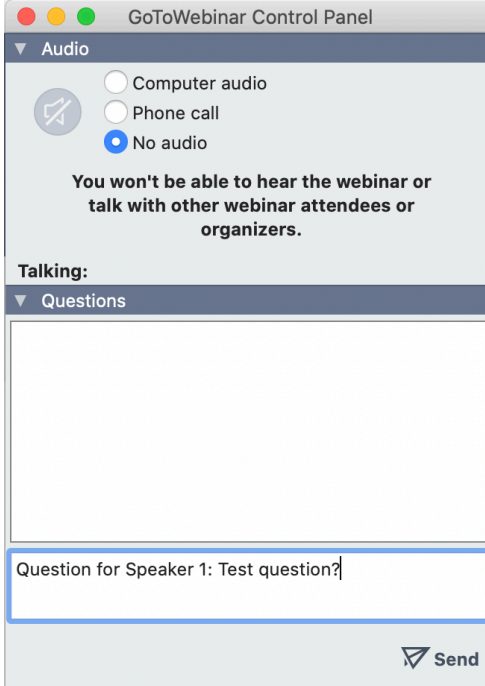
Q&As session moderated by Georg Trausmuth (Frequentis)

13:15 -13:45 Future needs cyber-security research

Questions

1

2



GoToWebinar Control Panel

▼ Audio

☐ Computer audio
☐ Phone call
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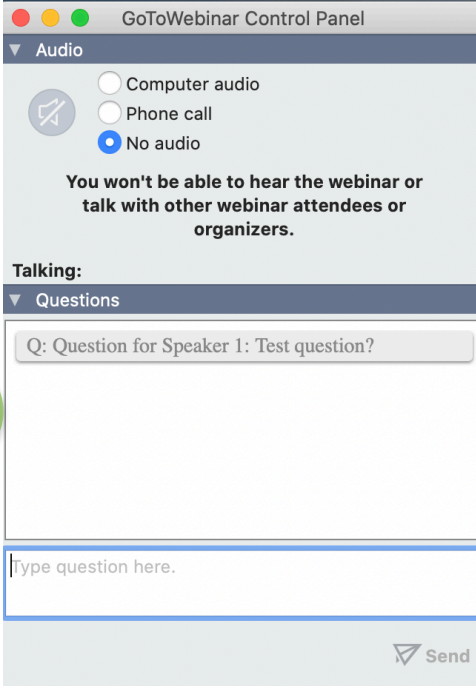
Talking:

▼ Questions

Question for Speaker 1: Test question?

Send

3



GoToWebinar Control Panel

▼ Audio

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Talking:

▼ Questions

Q: Question for Speaker 1: Test question?

Type question here.

Send



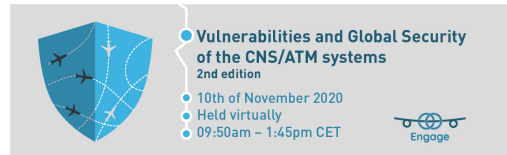
Vulnerabilities and Global Security of the CNS/ATM systems

2nd edition

- 10th of November 2020
- Held virtually
- 09:50am – 1:45pm CET



Workshop headlines



Workshop objective: find challenges ahead and research needs on Vulnerabilities and global security of the ATM/CNS system

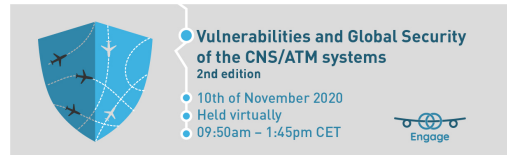
Setting the scene:

Risks evolve together with the evolution of aviation (EASA), e.g. cyber threat actors do not have a physical barrier, easy access, inexpensive, ...

- Aviation needs to adapt to these evolving threats. cybersecurity requirements for both products and organizations
- Evolutionary cyber-resilient system

History of cybersecurity initiatives within the SJU: from the 2014 study to ESCP in 2020 on Information sharing.

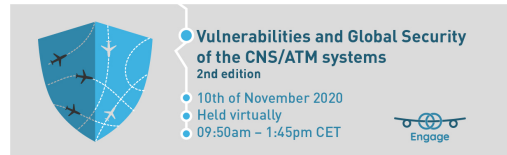
Workshop headlines



Future challenges:

- How to overcome the **challenges and barriers** on an **increasing information sharing** needs (security info, transnational, trans-organisational...)
- The aviation industry such take advantage of **Commercial Off-The-Shelf (COTS)** solutions as well as look to **other sectors** (e.g. banking, nuclear) and rely less in tailored solutions that can be more costly and less effective
- Increasing / delegated data services (**AAS concept**) being conceived, together with the digitalization of the sector, a new data market opens but current levels of security needs to be maintained. This requires further regulation and certification
- **Signal spoofing, e.g. ADS-B data.**
 - Protection of the electromagnetic spectrum too, whereas research is on-going into this (more of an immediate technical challenge, e.g. re. directional receivers)
 - Broadcast authentication and integrity - use available capacity to increase capacity.

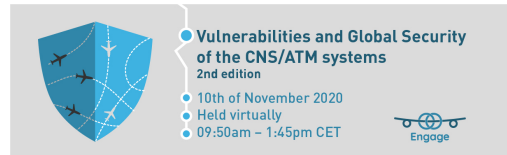
Workshop headlines



Future challenges:

- Importance of built-in security. Could it achieve some level of automation? e.g. vulnerabilities detection
- ML/AI opens promising opportunities but also entails threats, regulation/certification aspects and human factors need to be taken forward.
 - Human operators/experts need to be trained to face this challenges
 - The AI/ML exact threat is still uncertain: techniques to be used to discover vulnerabilities, AI-based anti-jaming...
- Resilience and 'graceful degradation' - discussed by Ruben and Yijun, for example: common theme at macro/system (e.g. ANSP) and micro (e.g. drone "cautious adaptation" when low battery) level
- Still need better metrics/KPIs to measure this, in particular to help us set and monitor performance standards? Who should be responsible for leading the design? ICAO? EASA? Other ...?

Workshop headlines



Drones:

- Need to secure information is accurate, cyber-secure, trustworthy. Drones telemetry, tracking and signal spoofing require further research and regulation
- Cybersecurity needs to be adopted through UTM regulations (a recurring theme in this workshop)
- Specific challenges of high-altitude drones due to its connectivity needs
- Security aspects not only in normal operations but also incidents and accidents, (see also degradation above) and its investigation. Forensic Readiness Requirements for UTM

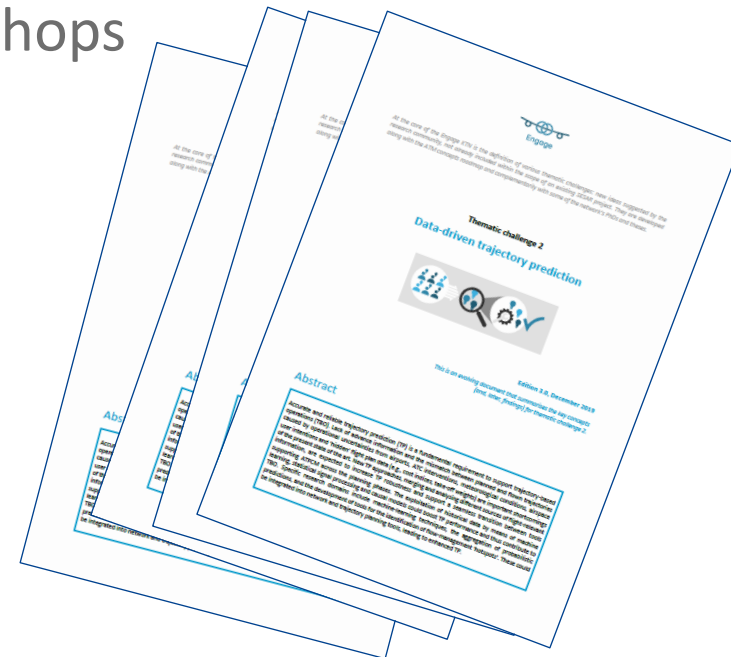
Engage KTN

Next steps & look ahead

Next steps

Today's workshop: actions are key

- Slides on Engage website
- Short survey as follow-up
- Report on 2nd round of Engage workshops
- Refresh challenges 2021
- SESAR Scientific Committee TF
 - series of workshops (details TBD)



Look ahead

Engage in 2021

- Next round of workshops:
 - TC2: Data-driven trajectory prediction – **25 January 2021**
 - TC3: Efficient provision & use of met info in ATM – **27 January 2021**



- SESAR Innovation Days
 - achievements in 2020
 - getting involved in 2021
 - launch of the Engage wiki



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Look ahead

Engage in 2021



Navigation ▾ Engage Wiki ▾

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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.

Look ahead

Engage in 2021

Check out the main wiki features

Interactive research map of ATM



Discussion fora



European university programmes



Research repository



Education and learning

European
university
programmes

SESAR
Digital
Academy

PhD
funding
calls

Internships

Interactive ATM Concepts Roadmap





Vulnerabilities and global security of the CNS/ATM system

Thank you



This network has received funding from the SESAR Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 783287.



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