INTRODUCTION

Sara Bagassi
University of Bologna

UNIBO & ENAV OPEN DAY PJ05-W2 – DTT, Forlì (Italy), 25-26 October 2022

EUROPEAN PARTNERSHIP

Co-funded by the European Union

Polo Aeronautico Forlì



Agenda Day 1 – Room 3.1

14:00 - *Welcome coffee*

14.30 - Opening Remarks

- UNIBO – Luca Fontanesi (Rector's Delegate for European projects, University of Bologna)
- ENAV – Daniele Teotino (Head of Research Activities, ENAV)

14.40 – SESAR Overview – Olivier Mongenie (Programme Manager, SJU)

14.50 - ENAV Training Centre – Fabio Olivetti (Head of Training Centre, ENAV)

15.00 - PJ05-W2 "Digital Technologies for Tower" Project Overview – Jörn Jakobi (PJ05-W2 Coordinator, DLR)

15.10 - Solution 35: Multiple Remote Tower and Remote Tower Centre

- Validation Overview – Francesco Nacchia (Exercise Coordinator, Techno Sky)
- Operational Focus & Validation Infrastructure Description – Luna Babusci (Operational Leader, ENAV)
- Validation Outcomes – Laura Moens (Validation Expert, Deep Blue)

15.50

- *Networking break*
- Sol.35 Validation Tour



17.30 - *End*

15.50 – 16.10

16.10 – 16.30

16.30 – 16.50

16.50 – 17.10

17.10 – 17.30

Agenda Day 2 – Room 1-A
meeting point: via Fontanelle 40

09.30 - *Welcome coffee*

10.00 - Solution 97.1: Virtual/Augmented Reality Applications for Tower

- Solution Overview – Ramona Santarelli (Sol.97.1 Leader, ENAV)
- Validation & Infrastructure Description – Sara Bagassi (Exercise Coordinator, University of Bologna)
- Operational Focus – Alfredo Persiani (Operational Leader, ENAV)
- Validation Outcomes – Laura Moens (Validation Expert, Deep Blue)

10.50

- *Networking break*
- Sol. 97.1 Interactive Validation Tour



- 10.50 – 11.10
- 11.10 – 11.30
- 11.30 – 11.50
- 11.50 – 12.10
- 12.10 – 12.30

12.30 - *End*

PJ05-W2 Digital Technologies for Tower University of Bologna & ENAV open day Introduction to SESAR

Olivier Mongénie, SESAR 3 JU Airports Programme Manager

Frolì, 25/10/2022

Co-funded by the European Union

What is SESAR?

Co-funded by
the European Union

SESAR – SES technological pillar optimising ATM performance and supporting EU policy









SESAR lifecycle



sesar
JOINT UNDERTAKING

SESAR 2020

EUROPEAN PARTNERSHIP

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SESAR 2020 performance driven innovation pipeline

SESAR Key Features

High-performing airport operations

Advanced air traffic services

Optimised ATM network services

Enabling aviation infrastructure

EXPLORATORY RESEARCH

Explores new concepts beyond those identified in the European ATM Master Plan or emerging technologies and methods. The knowledge acquired can be transferred into the SESAR industrial and demonstration activities.

INDUSTRIAL RESEARCH & VALIDATION

Assesses and validates technical and operational concepts in simulated and real operational environments according to a set of key performance areas. This process transforms concepts into SESAR Solutions.

VERY LARGE SCALE DEMONSTRATIONS

Tests SESAR Solutions on a much larger scale and in real operations to prove their applicability and encourage the early take-up of solutions.

Improved predictability

Reduced fuel consumption & emissions

Optimised capacity

Reduced cost



The digital airport in SESAR 2020

- **Automated runway and surface operations**
  - Decision support tools for ATCOs, pilots that anticipate operational situations, analyse their consequences and propose remedial actions
  - Algorithms fed with accurate and up-to-date data that optimise aircraft flows on the runway and on the surface
- **Data-driven airport operations management**
  - Connected, data-based, intelligent toolbox supporting all the airport stakeholders in steering, monitoring and managing the operations for a highly resilient and efficient airport
- **Digital or remote tower**
  - High-definition, infrared & pan-tilt-zoom cameras augmented by available radar and flight data and meteorological information to deliver cost efficient and safe air traffic services remotely
  - Augmented reality and automatic speech recognition supporting tower air traffic controllers
- **Enhanced vision technologies**
  - On-board augmented and virtual reality devices helping the pilots navigate on and around the airport whatever the weather conditions or the equipage level of the airfield
- **Satellite based technologies**
  - Use of satellite-based navigation as a cost efficient solution to enhance runway and surface operations performance, facilitate more efficient and greener arrival procedures and support accessibility of secondary airports







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PJ.05-W2-35 ‘Multiple Remote Tower and Remote Tower Centre’ & PJ.05-W2-97.1 ‘Virtual/Augmented Reality applications for tower’

The SESAR 3 JU & the SESAR 3 programme

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SESAR 3 JU: a new partnership to deliver the Digital European Sky

Accelerate through research & innovation the delivery of an inclusive, resilient & sustainable Digital European Sky

50+ founding members representing entire aviation value chain (incl. new entrants)

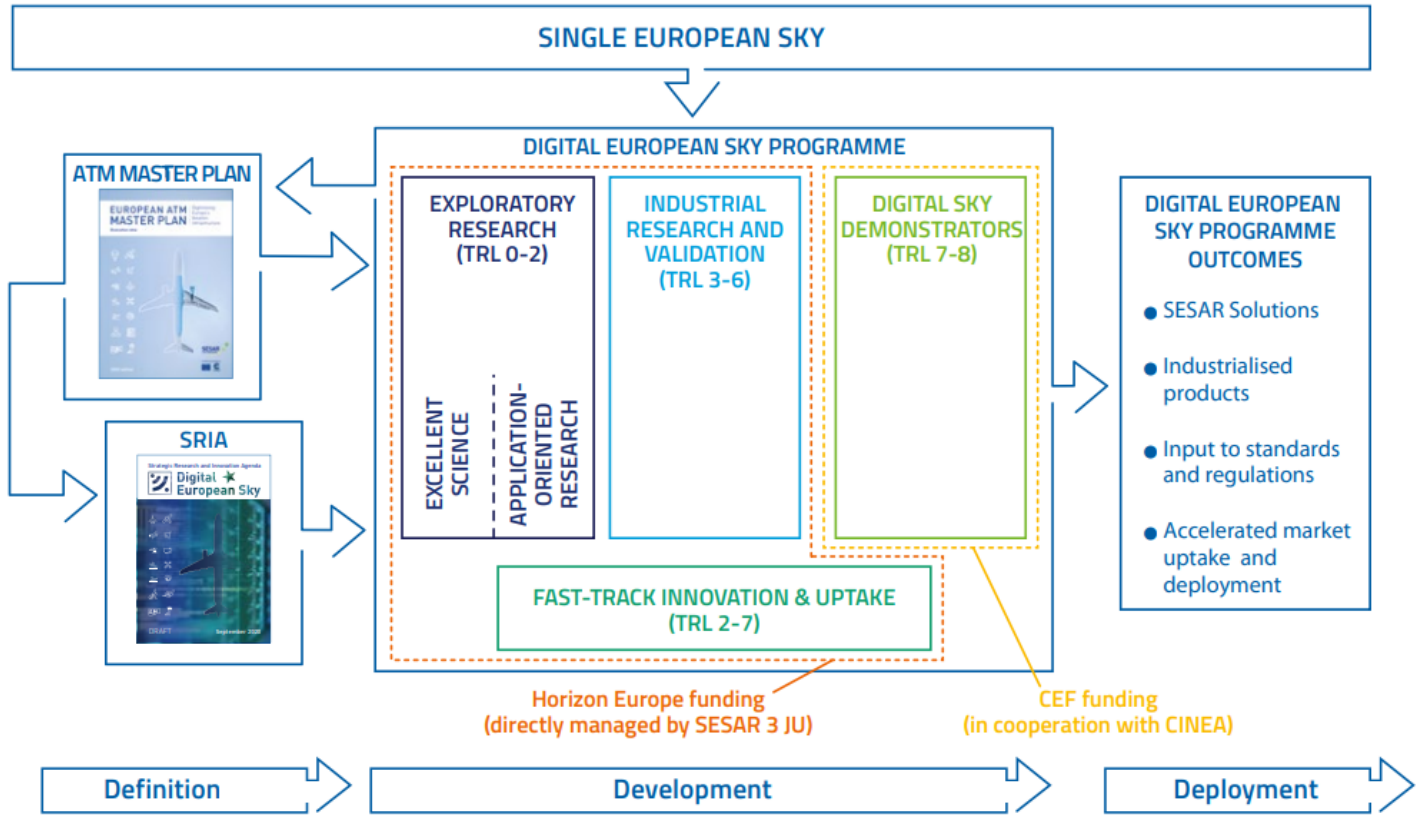
- Horizon Europe: EUR 600 million
- EUROCONTROL: up to EUR 500 million (in-kind & financial contributions)
- Industry: EUR 500 million minimum (in-kind & financial contributions)

Additional funds via Connecting Europe Facility (in coordination with CINEA) to the value of at least EUR 200 million



SESAR 3 objectives and structure

- **Strengthen and integrate the Union's research and innovation capacity** in the ATM sector, making it more resilient and scalable to fluctuations in traffic while enabling the seamless operation of all aircraft
- **Strengthen, through innovation, the competitiveness of manned and unmanned air transport in the Union**, and ATM services' markets to support economic growth in the Union
- **Develop and accelerate the market uptake of innovative solutions** to establish the Single European Sky airspace as the most efficient and environmentally friendly sky to fly in the world



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Thank you for your attention!

EUROPEAN PARTNERSHIP

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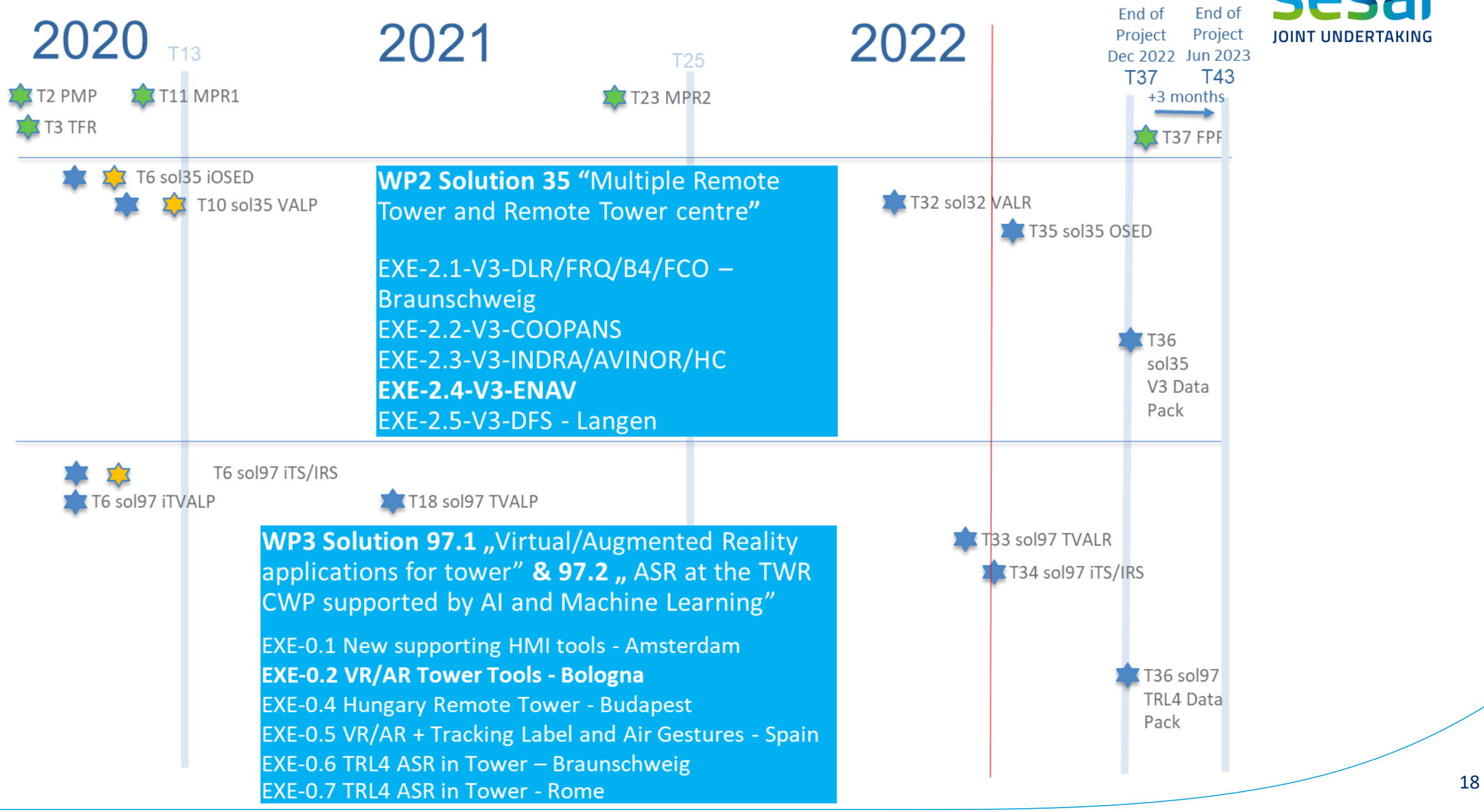
PJ05-W2 “Digital Technologies for Tower” Project Overview

Jörn Jakobi
Project Coordinator PJ05-W2 DTT

UNIBO & ENAV OPEN DAY PJ05-W2 – DTT, Forlì (Italy), 25-26 October 2022

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Project Overview



What is PJ.05-W2 DTT about?

- Two Examples -

1. Flexible Allocation

	15 airports														
	A01	A02	A03	A04	A05	A06	A07	A08	A09	A10	A11	A12	A13	A14	A15
ATCO-01															
ATCO-02															
ATCO-03															
ATCO-04															
ATCO-05															
ATCO-06															
ATCO-07															
ATCO-08															
ATCO-09															
ATCO-10															
ATCO-11															
ATCO-12															
ATCO-13															
ATCO-14															
ATCO-15															

ATCO – Airport Matrix

	15 airports														
	A01	A02	A03	A04	A05	A06	A07	A08	A09	A10	A11	A12	A13	A14	A15
ATCO-R01	E	E	E												
ATCO-R02		E	E	E											
ATCO-V03			E	E	E										
ATCO-V04				E	E	E									
ATCO-V05					E	E	E								
ATCO-V06						E	E	E							
ATCO-V07							E	E	E						
ATCO-V08								E	E	E					
ATCO-V09									E	E	E				
ATCO-V10										E	E	E			
ATCO-V11											E	E	E		
ATCO-V12												E	E	E	
ATCO-V13													E	E	E
ATCO-V14	E													E	E
ATCO-V15	E	E													E

ATCO – Airport Matrix [1:1]

	6 simulated airports						9 virtual airports									
	A01	**A02**	**A03**	**A04**	**A05**	**A06**	A07	A08	A09	A10	A11	A12	A13	A14	A15	
ATCO-R01	✓	E	E		E											**1**
ATCO-R02		✓	E	E		E										**1**
ATCO-V03			✓	E	E											**1**
ATCO-V04				✓	E	E										**1**
ATCO-V05					✓	E	E									**1**
ATCO-V06						✓	E	E								**1**
ATCO-V07							✓	E	E							**1**
ATCO-V08								✓	E	E						**1**
ATCO-V09									✓	E	E					**1**
ATCO-V10										✓	E	E				**1**
ATCO-V11											✓	E	E			**1**
ATCO-V12												✓	E	E		**1**
ATCO-V13													✓	E	E	**1**
ATCO-V14	E													✓	E	**1**
ATCO-V15	E	E													✓	**1**
	1	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	

ATCO – Airport Matrix [1:3]

	6 simulated airports						9 virtual airports									
	A01	**A02**	**A03**	**A04**	**A05**	**A06**	A07	A08	A09	A10	A11	A12	A13	A14	A15	
ATCO-R01	✓	✓	E		✓											**3**
ATCO-R02		E	✓	✓		✓										**3**
ATCO-V03			E	E	E											**0**
ATCO-V04				E	E	E										**0**
ATCO-V05					E	E	E									**0**
ATCO-V06						E	E	E								**0**
ATCO-V07							✓	✓	✓							**3**
ATCO-V08								E	E	E						**0**
ATCO-V09									E	E	E					**0**
ATCO-V10										✓	✓	✓				**3**
ATCO-V11											E	E	E			**0**
ATCO-V12												E	E	E		**0**
ATCO-V13													✓	✓	✓	**3**
ATCO-V14	E													E	E	**0**
ATCO-V15	E	E													E	**0**
	1	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	

ATCO – Airport Matrix

[example 1a: 6 Airports & 4 ATCOs]

	15 airports															
	A01	A02	A03	A04	A05	A06	A07	A08	A09	A10	A11	A12	A13	A14	A15	
ATCO-R01	E	✓	E		E											**1**
ATCO-R02		E	✓	E		E										**1**
ATCO-V03			E	E	E											**0**
ATCO-V04				E	E	E										**0**
ATCO-V05					E	E	E									**0**
ATCO-V06						E	E	E								**0**
ATCO-V07							E	E	E							**0**
ATCO-V08								✓	✓	✓						**3**
ATCO-V09									E	E	E					**0**
ATCO-V10										E	E	E				**0**
ATCO-V11											E	E	E			**0**
ATCO-V12												✓	E	E		**1**
ATCO-V13													E	E	E	**0**
ATCO-V14	E													E	E	**0**
ATCO-V15	E	E													E	**0**
	0	**1**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**0**	**1**	**0**	**0**	**0**	

ATCO – Airport Matrix

[example 1b: 6 Airports & 4 ATCOs]

	15 airports															
	A01	A02	A03	A04	A05	A06	A07	A08	A09	A10	A11	A12	A13	A14	A15	
ATCO-R01	E	✓	E		E											**1**
ATCO-R02		E	✓	E		E										**1**
ATCO-V03			E	E	E											**0**
ATCO-V04				E	E	E										**0**
ATCO-V05					E	E	E									**0**
ATCO-V06						E	E	E								**0**
ATCO-V07							E	E	E							**0**
ATCO-V08								✓	✓	E						**2**
ATCO-V09									E	E	E					**0**
ATCO-V10										✓	E	✓				**2**
ATCO-V11											E	E	E			**0**
ATCO-V12												E	E	E		**0**
ATCO-V13													E	E	E	**0**
ATCO-V14	E													E	E	**0**
ATCO-V15	E	E													E	**0**
	0	**1**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**0**	**1**	**0**	**0**	**0**	

ATCO – Airport Matrix

[example 1c: 6 Airports & 5 ATCOs]

	15 airports															
	A01	A02	A03	A04	A05	A06	A07	A08	A09	A10	A11	A12	A13	A14	A15	
ATCO-R01	E	✓	E		E											**1**
ATCO-R02		✓	E	E		E										**1**
ATCO-V03			✓	E	E											**1**
ATCO-V04				E	E	E										**0**
ATCO-V05					E	E	E									**0**
ATCO-V06						E	E	E								**0**
ATCO-V07							E	E	E							**0**
ATCO-V08								✓	✓	E						**2**
ATCO-V09									E	E	E					**0**
ATCO-V10										✓	E	✓				**2**
ATCO-V11											E	E	E			**0**
ATCO-V12												E	E	E		**0**
ATCO-V13													E	E	E	**0**
ATCO-V14	E													E	E	**0**
ATCO-V15	E	E													E	**0**
	0	**2**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**0**	**1**	**0**	**0**	**0**	

Augmented Reality in Tower Environment



https://www.remote-tower.eu/wp/

Remote Tower



Home

www.remote-tower.eu

The modernisation of air traffic management is one of the main challenges of current aeronautics research.The Single European Sky ATM Research (SESAR) project defines, develops and deploys what is needed to increase ATM performance and build Europe's intelligent air transport system.

Part of SESAR are the projects **PJ05 "Remote Tower for Multiple Airports"** and **PJ05-W2 "Digital Technologies for Tower"**, which focus on the safe and efficient airport of the future. By bringing the concept of remotely controlling multiple airports as well as HMI interaction modes for airport towers to higher maturity levels, the SESAR projects aim at providing small and medium sized airports with more cost-efficient and service tailored air traffic services.

The current programme is SESAR 2020 supports projects to deliver solutions in four key areas, namely airport

Recent News



SESAR PJ05-W2-35 Multi Remote Tower Online Open Day on 6 December

15. November 2021



EUROCAE WG-100

Questions?

joern.jakobi@dlr.de

PJ.05-W2-35 EXE2.4-V3 ENAV RTC
Validation overview

FRANCESCO NACCHIA
Exercise Coordinator

UNIBO & ENAV OPEN DAY PJ05-W2 – DTT, Forlì (Italy), 25-26 October 2022

EUROPEAN PARTNERSHIP

Co-funded by the European Union

Partnership for the ENAV validation











Context of the ENAV Validation

Within the scope of PJ.05-W2-35/Multiple Remote Tower & Remote Tower Centre

Remotely provision of Air Traffic Services (ATS) from a Remote Tower Centre (RTC) to more than 1 airport simultaneously from a remote tower position/module

Flexible and dynamic allocation of airports to different Multiple Remote Tower Modules (MRTMs)

Maximum three airports allocated to each MRTM

RTC Supervisor can dynamically allocate any airport to another MRTM within the Remote Tower Centre (RTC) in order to balance traffic volumes and ATCOs workload between the different MRTMs

RTC Supervisor supported by a planning tool

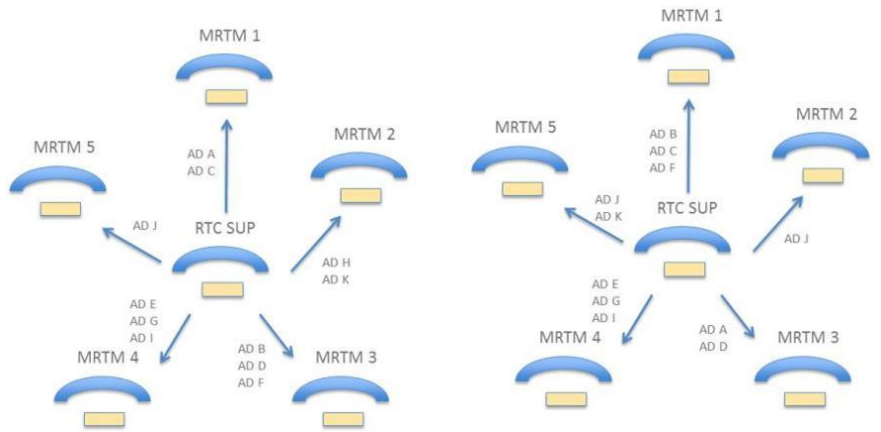
Additional automation functionalities for the ATCO (e.g., conformance monitoring, task planning and prioritization)

Target aerodromes

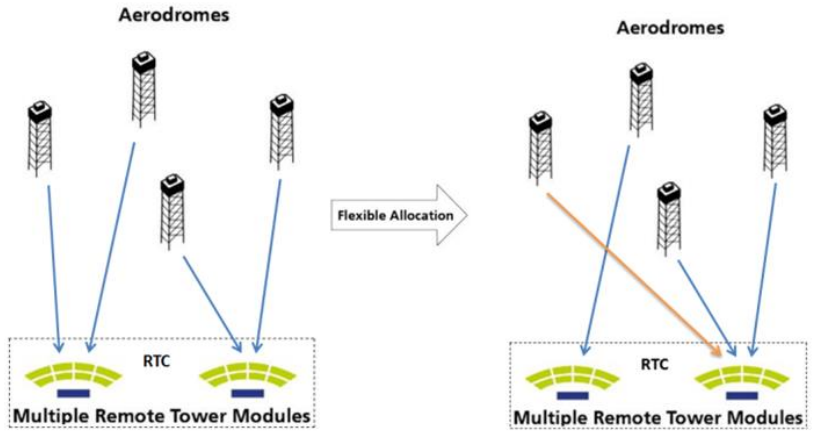
'Small environment' airports (15 000 to 40 000 annual IFR movements)

Limited technology

Simple Layout, commonly staffed by a single ATCO



Operational Improvement SDM-0210 ''Highly Flexible Allocation of Aerodromes to Remote Tower Modules''



High level validation scope

Simulated operational environment

- 3 airports allocated to the RTC
- Traffic characteristics: mix of IFR, VFR and vehicles
- RTC with 2 MRTMs with a single ATCO per each Module
- Single ATCO roles per each Module: Clearance Delivery, Ground Controller and Tower Controller
- RTC Supervisor position with another ATCO designated to cover the Supervisor role supported by a planning tool for dynamic allocation of the airports
- Dynamic allocation of the 3 airports between two MRTMs with capability to allocate and to manage up to 3 airports simultaneously

Validation technique

- Real Time Simulation

RTS schedule

- 3 days training on 04-05-06/04/2022
- 7 days of 'measured' runs on 07-15/04/2022

Validation platform & site

- ENAV RTC Test Bed located at ENAV Training Centre in Forlì
- Integrating IDS AIRNAV and TECHNO SKY systems

Key Performance Areas addressed

- Human Performance, Safety, Cost-efficiency analysis to evaluate the ATCOs ability to provide simultaneous ATS in a safe and efficient manner



High level experimental conditions (1/2)

Common conditions to all scenarios:

- Daytime
- Max 30 movements/hour and up to 6 simultaneous movements, total of all airports in one Module
- Vehicles included
- Air surveillance data available for LICA & LIPH only, no for LIBR

High level exeperimental conditions per scenario (2/2)

Comparative assessment

Reference1

- Normal operations
- two aerodromes with majority of traffic
- Mainly IFR traffic (>75%)
- Low visibility for LIPH (fog) decreasing up to 500 m

Reference2

- Normal operations
- one aerodrome with majority of traffic
- Mainly VFR traffic (>75%)

Reference3

- Normal operations
- two aerodromes with majority of traffic
- IFR-VFR balanced

Solution1

- In addition to Reference1 conditions:
  - Supervisor position and flexible allocation
  - tasks prioritization functionality for ATCO

Solution2

- In addition to Reference2 conditions:
  - Supervisor position and flexible allocation
  - tasks prioritization functionality for ATCO

Solution3

- In addition to Reference3 conditions:
  - Supervisor position and flexible allocation
  - tasks prioritization functionality for ATCO

Solution4 – Abnormal/Emergency

- Solution1 with abnormal case and no fog at LIPH:
  - Aircraft declaring emergency to LIPH

Solution5 – Degraded/Failure

- Solution1 in degraded mode with no fog at LIPH
  - OTW failure in one Module

Solution6 - Degraded/Failure

- Solution1 in degraded mode:
  - OTW failure in one Module recovered after few minutes but with 1 screen lost

THANK YOU FOR YOUR ATTENTION

PJ.05-W2-35 EXE2.4-V3 ENAV RTC

Operational Focus & Validation Infrastructure Description

Luna Babusci
Operational Leader

UNIBO & ENAV OPEN DAY PJ05-W2 – DTT, Forlì (Italy), 25-26 October 2022

EUROPEAN PARTNERSHIP

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ENAV path to remotisation

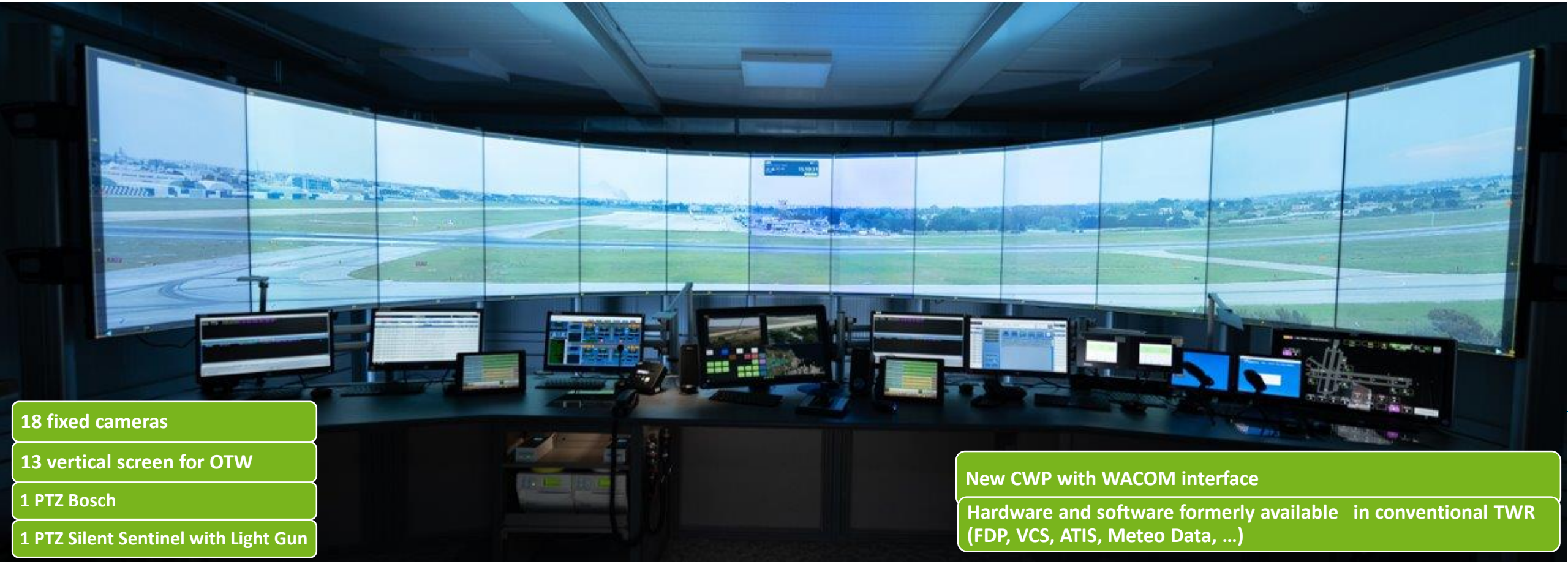
ENAV started his **Remote TWR** activity participating at the SESAR project **RACOON in 2016**, in which the initial operational feedback on the **concept feasibility** was assessed in a scenario involving Milano Malpensa and Linate airports.

Then, after the regulatory revision of **8 November 2018**, through which Amendment 8 to **Doc 4444** Ed. 15 allowed **the provision of airport control service by indirect observation,** ENAV considered that the remotisation of airport ATM services (both for Controlled and AFIS airports) should become one of the pillars of **ENAV's business plan** for both local digitalization and Remote Tower Control Centres.



Brindisi Remote Tower: ENAV goal

Introduction of a deep technological and operational change at low and medium density traffic airports by providing air traffic services from a remote location.



- 18 fixed cameras
- 13 vertical screen for OTW
- 1 PTZ Bosch
- 1 PTZ Silent Sentinel with Light Gun

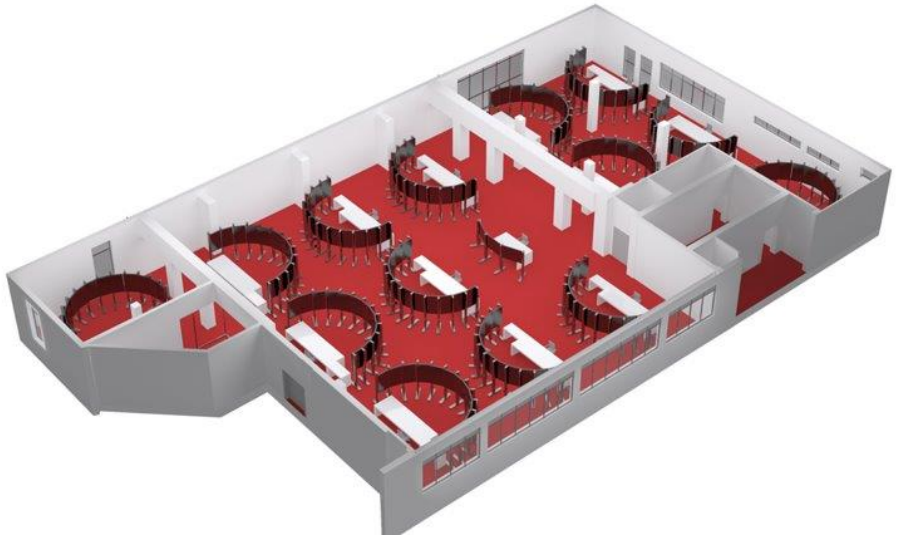
- New CWP with WACOM interface
- Hardware and software formerly available in conventional TWR (FDP, VCS, ATIS, Meteo Data, …)

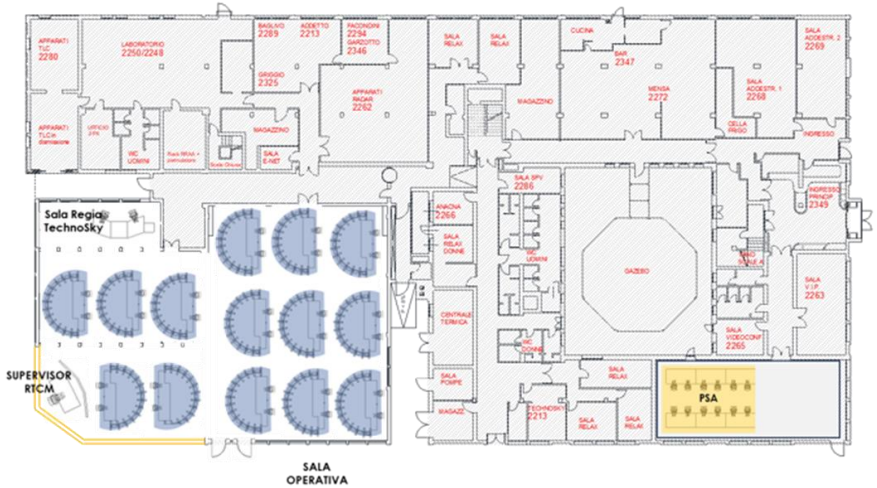
ENAV next steps

RTCC Brindisi (13 RTMs) fully operative (2026)

RTCC Padova (13 RTMs) fully operative (2029)

- N° 13 Remote Tower Modules (RTM) + 1 RTM spare
- N° 1 supervisor position
- N° 1 Ops Room duty manager
- Flexible use of RTM





SESAR: The Way Forward

SESAR activities are complementary to our operational activities enlarging our views

As instance, with solution 35 it was evaluated the extension of the same operational concept of Remote Tower to more airports

Develop and validate concepts and systems covering the scope and objectives of "Multiple Remote Tower and Remote Tower Centre”

Up to 3 Italian airports simultaneously controlled and dynamically allocated

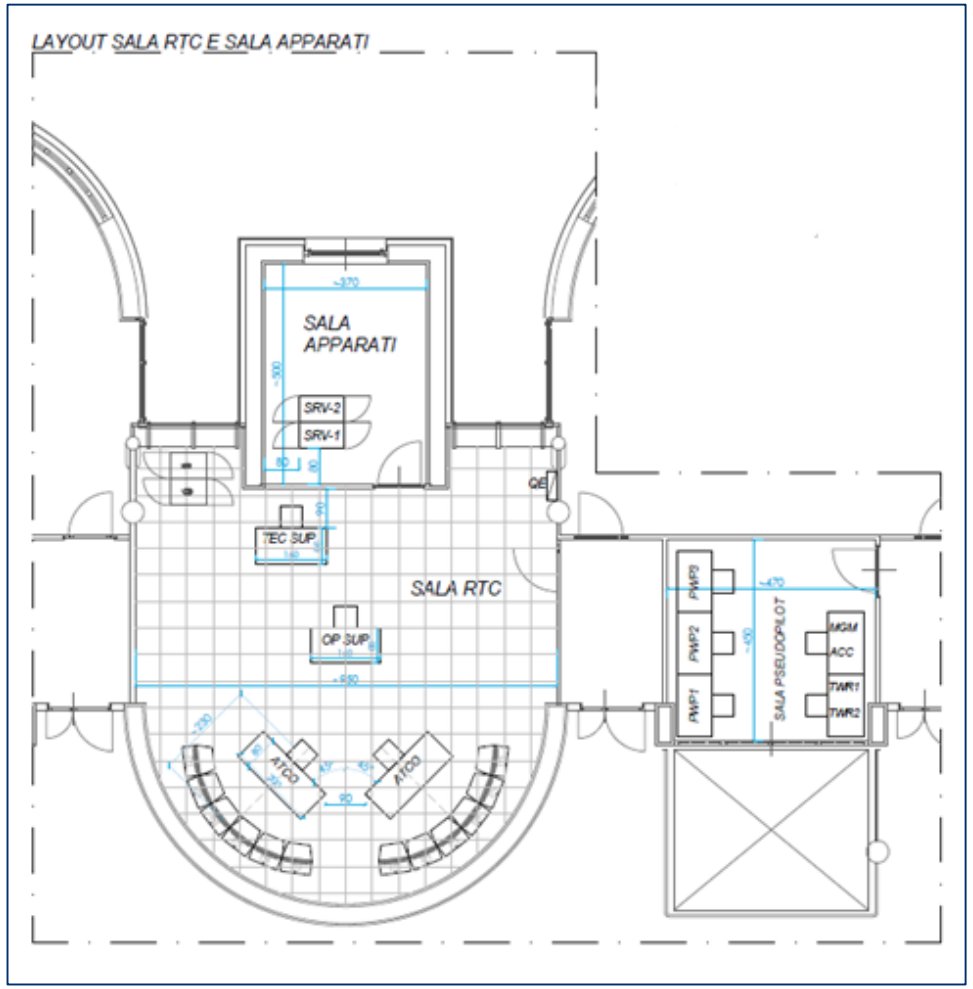
SESAR Wave 2 Solution 35

WHO	• ENAV, TECHNO SKY, IDS AIRNAV, DEEP BLUE and NAIS
WHERE	• ENAV Training Centre, Forlì
WHEN	• 4th to 15th April 2022
•WHAT	• 3 Reference scenarios • 6 Solution scenarios (3 nominal mode + 3 abnormal/degraded modes)



Validation Infrastructure Description

RTC Ops Room Layout





Involved personnel

- N. 2 ACC Operational Supervisors
- N. 3 TWR ATCOs
- N. 3 Pseudo Pilots (1 per each airport)
- Technical personnel

SESAR Solution 35: OTW/Visual Presentation





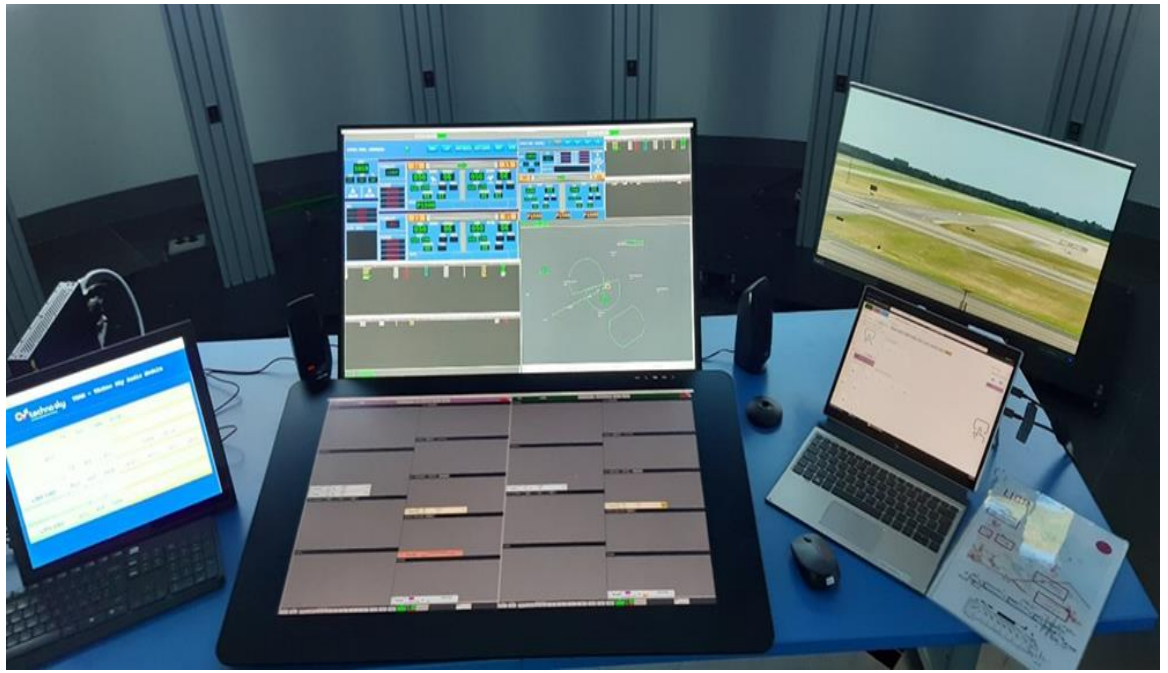
Out-the-Window view is realized through n.6 55'' 4K monitors for a seamless view of the airport(s)

Video-mixer: used to manage video channels among monitors and MRTMs

OTW/PTZ controller allows ATCO to identify traffic and airport's surface hotspot and to use a binocular function – tracking function enabled both for aircrafts and vehicles

SESAR Solution 35: CWP

- EFPS
- Radar view
- FDP
- AWOS
- VCS (TEAM, VoIP system developed by Technosky)



SESAR Solution 35: EFPS – ATCO Planning Tool (TSKY)



An ad-hoc developed tool, responsible for suggesting the STRIP to be given priority, among all the airports controlled by the same module.

SESAR Solution 35: the Supervisor position

Consultation of flights DEP / ARR of the involved airports

MRTM manager: change of airports allocation

VCS to interact with ATCOs

Supervisor planning tool for strategical assessment of traffic, weather and ATCOs workload and consequent dynamic allocation of airports to MRTMs



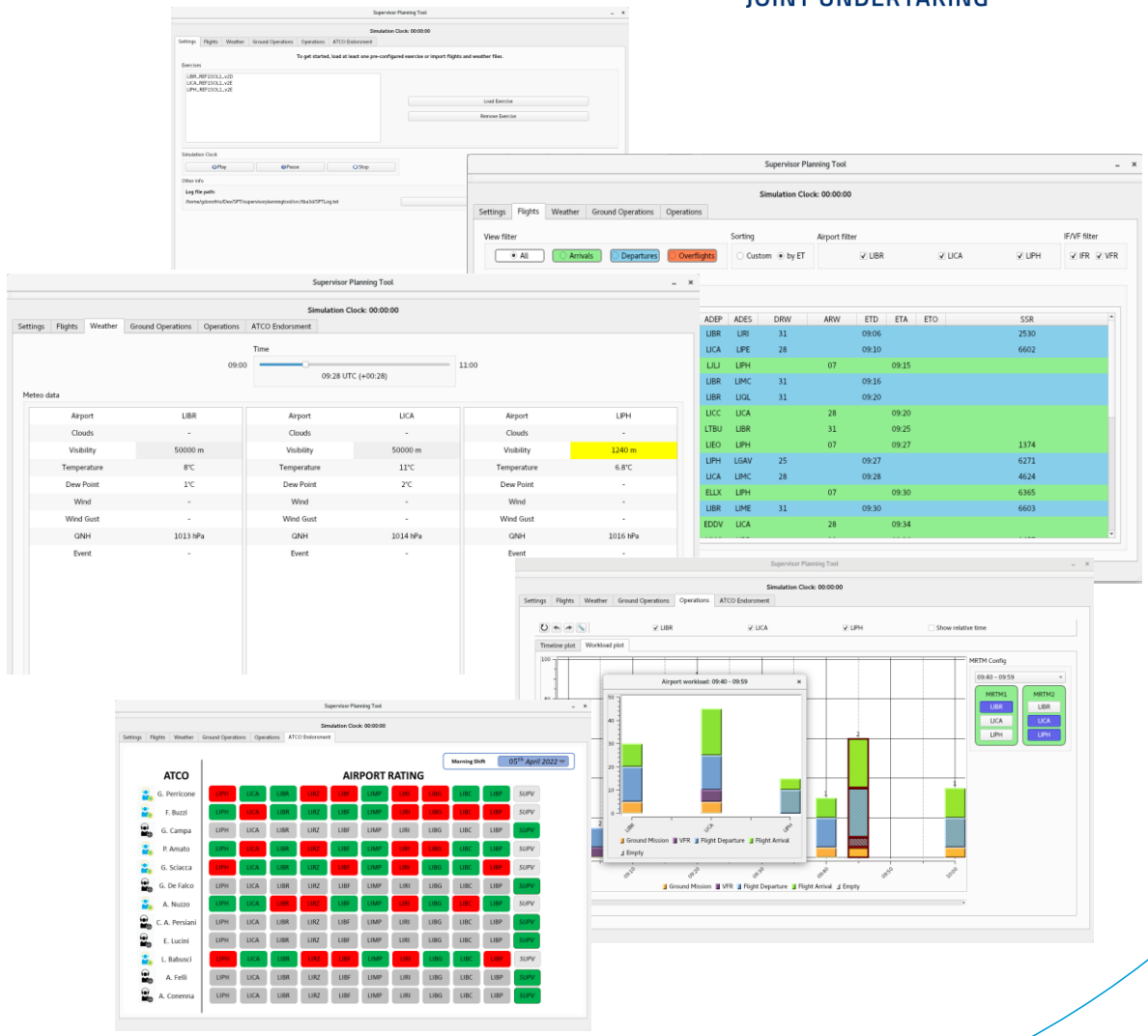
Supervisor Planning tool (IDS AirNav & NAIS)

Tools support the SPV in:

- Executing foreseen workload of ATCO
- Identifying airports with greater workload
- Assessing through what-if analysis the best configuration of both MRTM, changing dynamically the allocation of airports

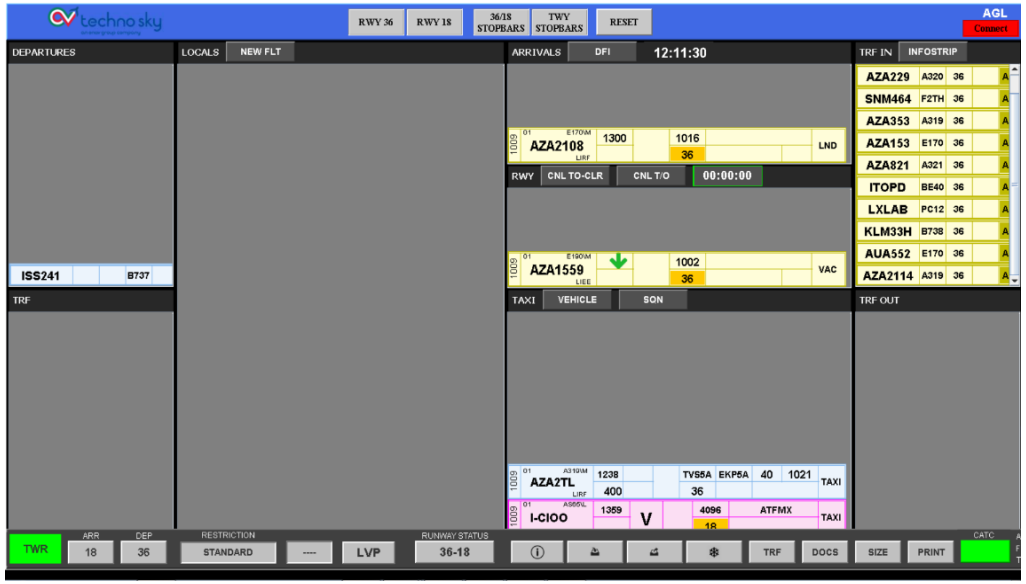
ATCO Workload contributing factors:

- Amount of traffic to be managed
- Type of traffic (IFR/VFR, ground vehicles);
- Operations (approach, circuits, etc)
- Weather conditions

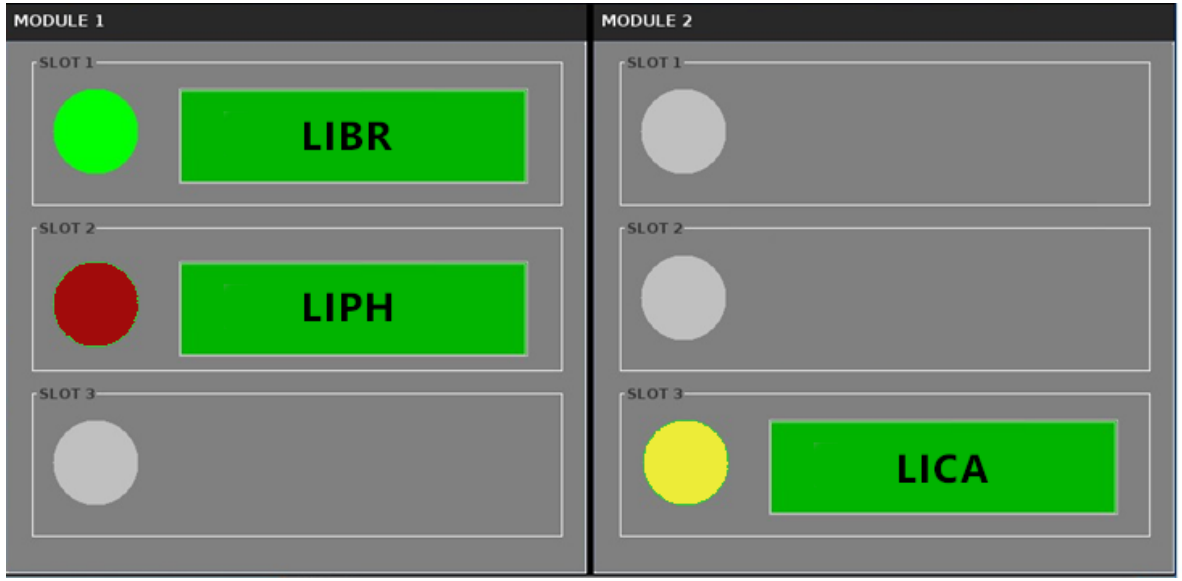


E-STRIPS and MOVES (Techno Sky)

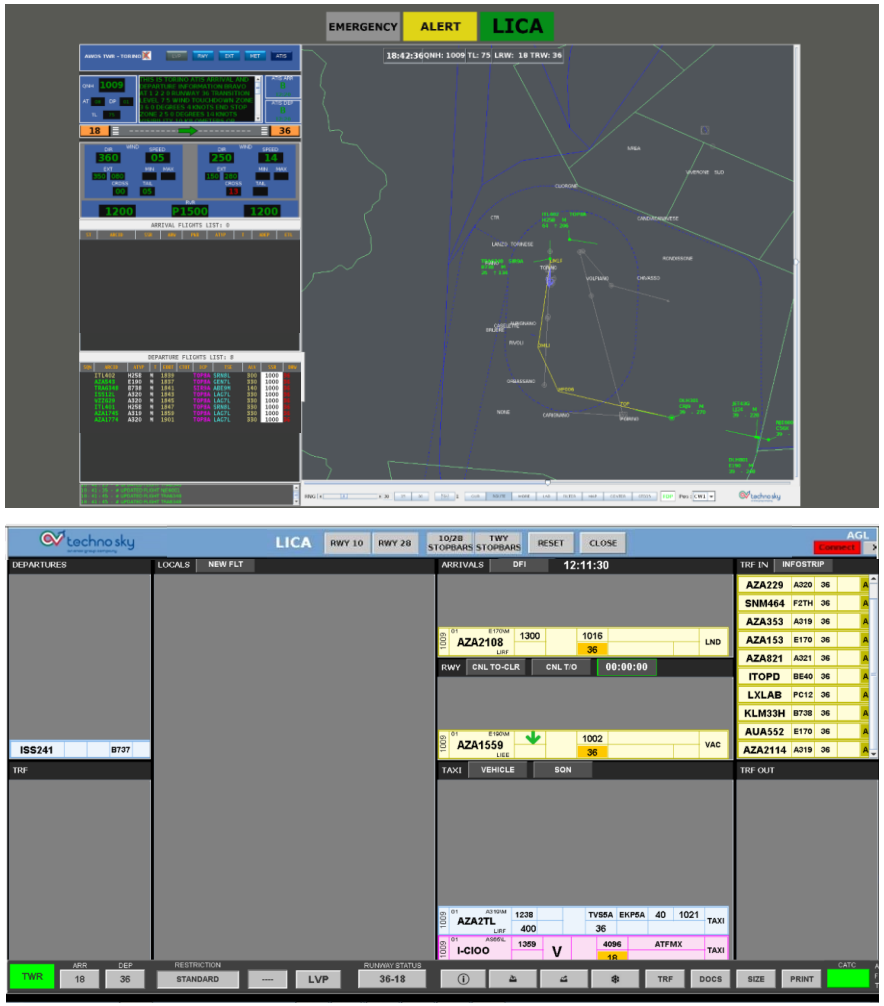
E-STRIPS

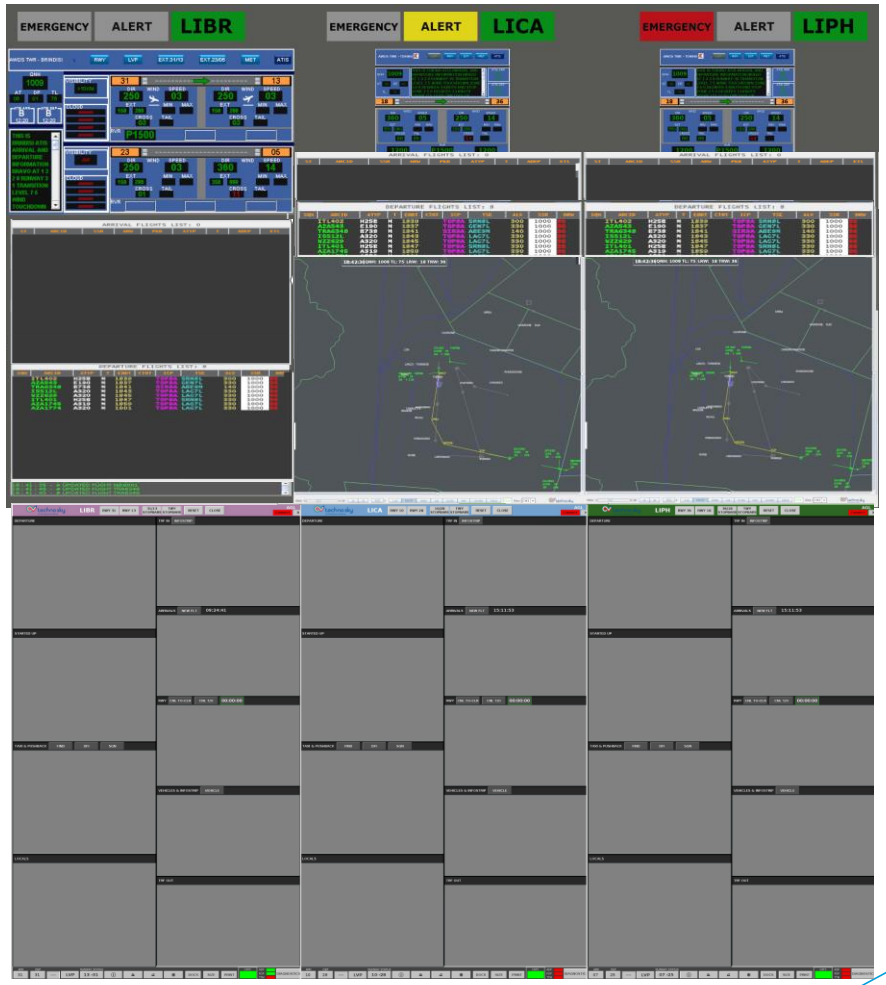


MOVES

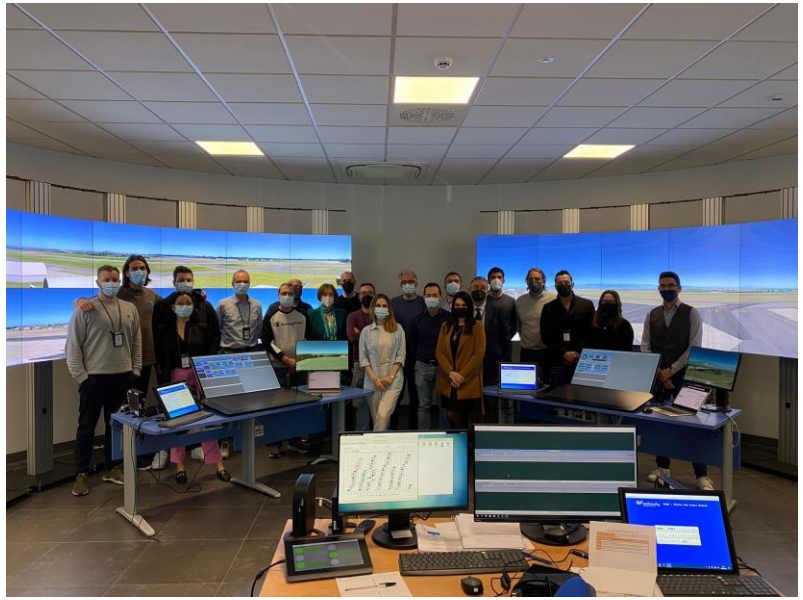


E-CWP examples from one to multiple airports





Conclusions and future perspectives



- HUMAN PERFORMANCE
- SAFETY
- COST EFFICIENCY



With reference to the tools already implemented by ENAV in Brindisi Remote Tower, is the employment of **Artificial Intelligence** in remote control the next challenge?

THANK YOU FOR YOUR ATTENTION

EUROPEAN PARTNERSHIP

Co-funded by the European Union

PJ.05-W2-35 EXE2.4-V3 ENAV RTC
Validation outcomes

LAURA MOENS
Validation Expert

UNIBO & ENAV OPEN DAY PJ05-W2 – DTT, Forlì (Italy), 25-26 October 2022

EUROPEAN PARTNERSHIP

Co-funded by the European Union

Human Performance & Safety

			REF 1	SOL 1	REF 2	SOL 2	REF 3	SOL 3	SOL 4	SOL 5	SOL 6
HUMAN PERFORMANCE	WORKLOAD	ATCO	👍	👍	👍	👍	!	👍	👍	👍	👍
		SUP	N/A	👍	N/A	👍	N/A	👍	👍	👍	👍
	ACCEPTANCE	ATCO	👍	👍	👍	👍	!	👍	👍	👍	👍
		SUP	N/A	👍	N/A	👍	N/A	👍	👍	👍	!
	USABILITY	ATCO	👍	👍	👍	!	!	👍	👍	👍	👍
		SUP	N/A	👍	N/A	👍	N/A	👍	👍	👍	👍
	TRUST	ATCO	👍	👍	👍	👍	👍	👍	👍	👍	👍
		SUP	N/A	👍	N/A	👍	N/A	👍	👍	👍	👍
HYBRID	SITUATION AWARENESS	ATCO	👍	👍	👍	👍	!	👍	👍	👍	👍
		SUP	N/A	👍	N/A	👍	N/A	👍	👍	👍	👍
SAFETY		ATCO	👍	👍	👍	👍	!	👍	👍	👍	👍

Cost Efficiency

- The ATCOs were questioned about the ability to provide ATS to 3 aerodromes at a time to assess the criteria. Not a conclusive result can be achieved from the provided responses.
- Nevertheless, the workload and the situation awareness were always maintained at acceptable level in the solution scenarios.
- Moreover, both supervisors agreed that it was feasible and acceptable to provide supervision to 3 aerodromes.

Conclusion & Recommendations

The concept is confirmed to be feasible and acceptable as situation awareness, workload, acceptance, usability and safety were above tolerable threshold for all solution scenarios (except from acceptance in safety solution scenario 6).

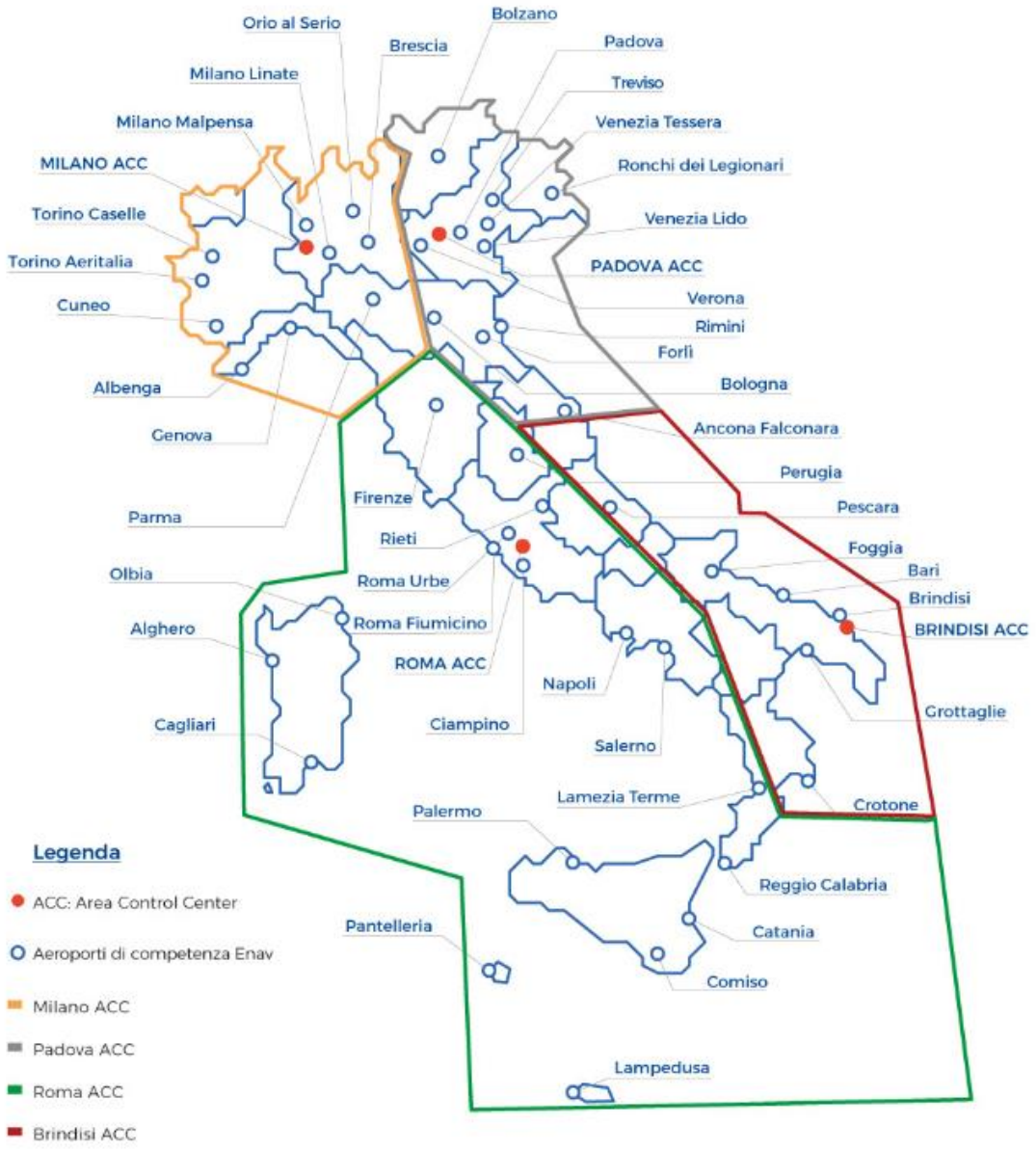
- There was even a slight reduction of the workload and increase of the SA, user acceptance and safety for the solution scenarios compared to the reference scenarios thanks to the support of the supervisor.
- SA, workload, acceptance and safety were below the acceptable level only for *reference scenario 3,* in which the ATCO had to manage 3 airports without the support of the supervisor.
- Recommendations were mostly related to local operational environment needs (e.g., position of buttons) or technical limitations (e.g., integration of live data in supervisor planning tool) rather than to the concept itself. The HMI needs to be further refined in relation to the specific operational environment needs before the deployment.

THANK YOU FOR YOUR ATTENTION

TRAINING CENTRE



National Setup



The TRAINING CENTRE



TRAINING to:

ATCO

FISO

METEO

PILOT

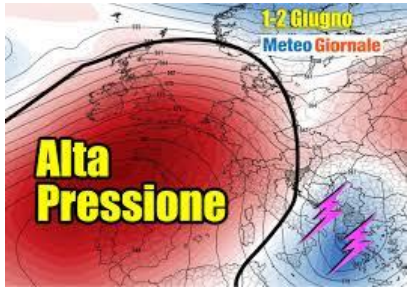
TECHNICIAN

ADMINISTRATIVE













Simulation infrastructures

- 2 radar simulation rooms (24 stations)
- 1 procedure simulation room
- 5 3D 270° control tower simulators
- 1 CRJ flight simulator
- 7 STD (Simulator Training Device) portable
- 1 Remote Center Simulator
- 7 classrooms
- Specialised library
- 1 multimedia classrooms (24 stations)





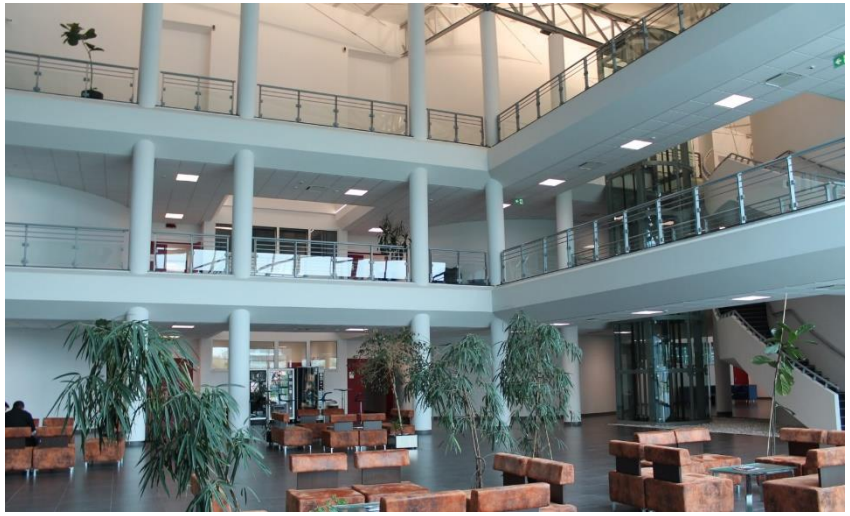


Types of Training Services

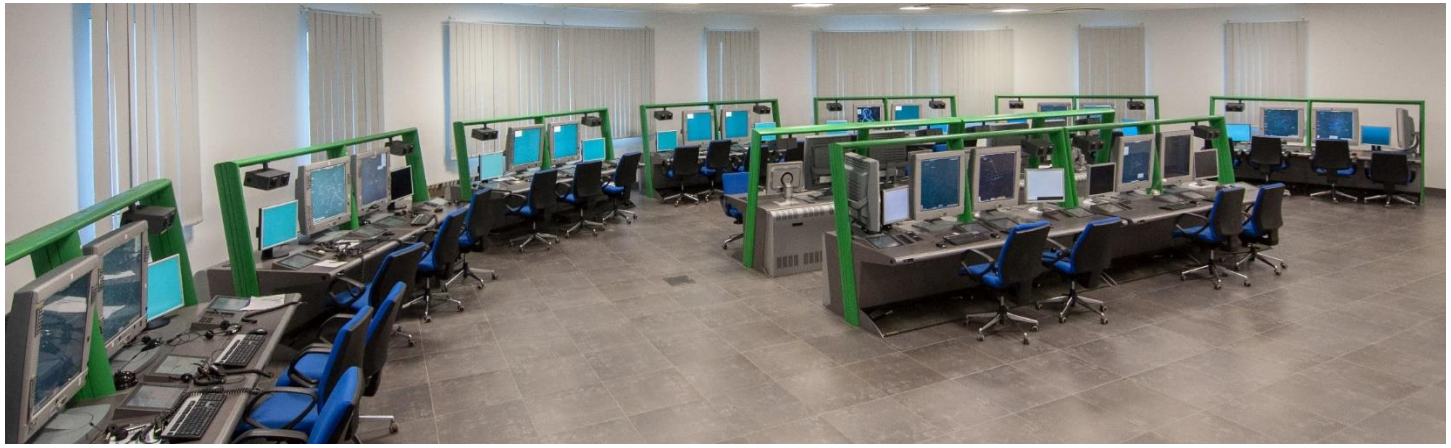
- Business Comunity
- ANSP
- Educational on Aviation culture



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