



# Remote tower SESAR R&D activities

Mara Dame

Regulatory Affairs Expert, SESAR Joint Undertaking

Remote Tower Workshop, 28 May 2019

EAS



Founding Members



EUROPEAN UNION



EUROCONTROL

# Agenda



- Introduction to SESAR
- SESAR remote tower solutions ready for deployment
- Ongoing SESAR remote tower R&D
- Future activities?

# Agenda



- Introduction to SESAR
- SESAR remote tower solutions ready for deployment
- Ongoing SESAR remote tower R&D
- Future activities?

# SESAR – SES technological pillar optimising ATM performance



# SESAR's 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



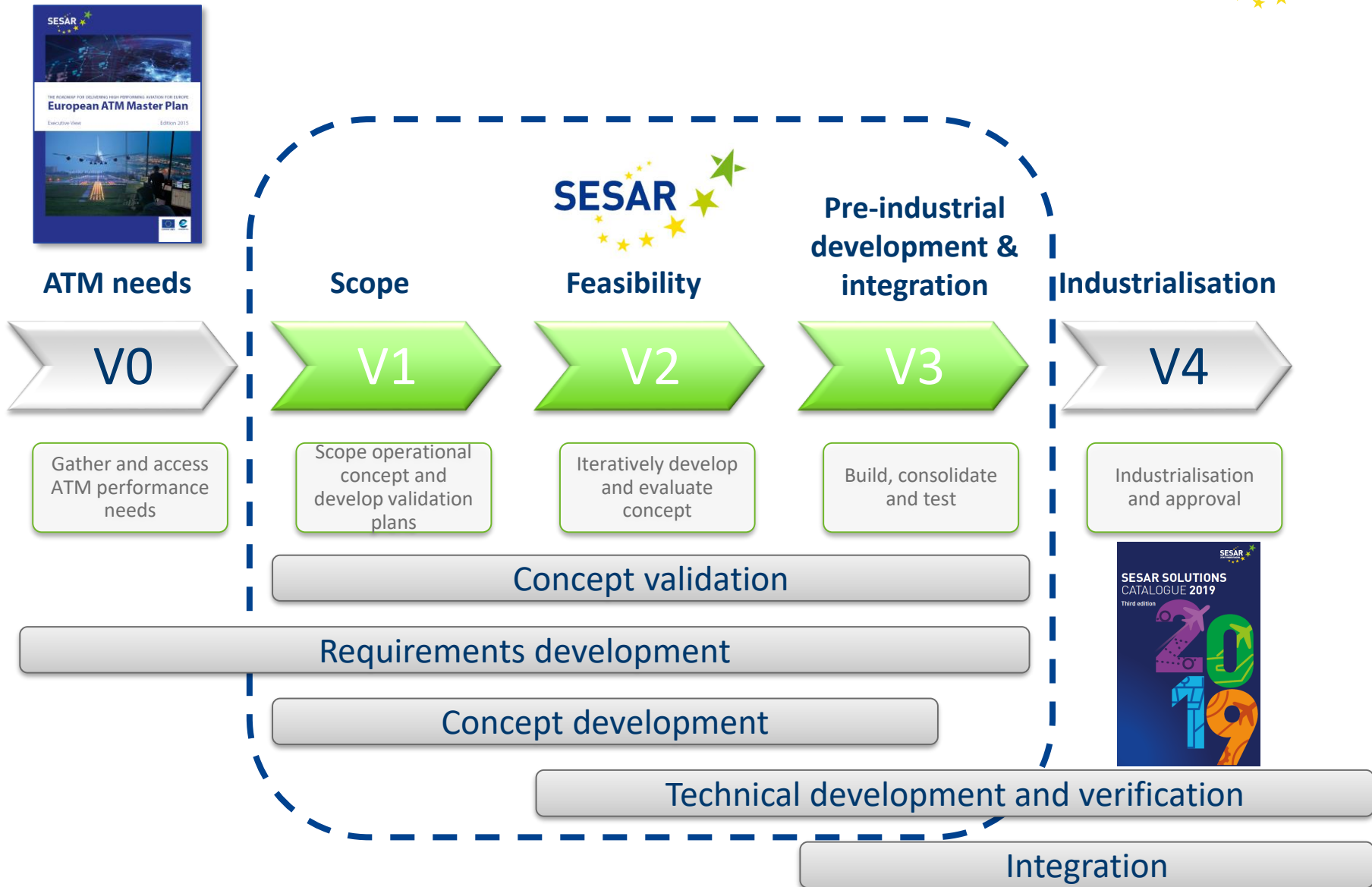
Optimised  
capacity



Reduced cost



# The SESAR Solutions factory



# The SESAR digital transformation

## SESAR Innovations

S1&S2020

## Coming Next

### Virtualisation

#### Virtual & Augmented Reality



Approach & landing aids for the cockpit



Visual aids for tower control

#### Virtual Centres



Rationalisation



Contingency



Dynamic cross border



Delegation of airspace

#### Remote Tower



Single airport



Multi-source surveillance data fusion



Multiple & Large airports

### Connectivity

#### Cockpit evolution



Multilink Management



Broadband Satellite comm. (ESA-Iris)



Broadband Airport comm. (Aeromacs)



Broadband Ground Comm. (LDACS)



Cellular link for GA/RC

#### U-Space



Command & Control



Tracking & telemetry



Vehicle to Vehicle



Vehicle to Infrastructure

### Data sharing

Collaborative Airport and Network



Digital Aeronautical Information (AIM-MET)



Flight object sharing (IOP)



Cloud based drone information management



#### System-Wide Information Management (SWIM)

Yellow profile for Web Services



Blue profile for Flight Data



Purple profile for Air/Ground Advisory Information Sharing



Defragmented European Sky

Pan European service provision capability



All weather operations



CNS as a service



Fully Dynamic Airspace



Resilient operations



Pan European Mobility of staff



Hyper Connectivity for High Automation

Next generation links

Internet of Things for aviation



Future Data services and applications



Interconnected Network



Passenger centric ATM



Advanced analytics for decision making



Open Data



Multimodality



Baseline

New standards for safety and security

# Agenda



- Introduction to SESAR
- SESAR remote tower solutions ready for deployment
- Ongoing SESAR remote tower R&D
- Future activities?



# ATC And AFIS Service In A Single Low-Density Aerodrome From A Remote CWP



ANSP

AO

AU

NM

STAKEHOLDERS



Small or local airports are a life-line for a local economy, however they cannot always afford to operate a control tower around the clock. SESAR's remote tower services offer the means to provide air traffic services in a cost-efficient way to such airports, as well as non-towered ones.

## BENEFITS

- Increased cost efficiency
- Increased accessibility to and support for regional economies



In 2014, the world's first remotely-operated tower was opened at Örnsköldsvik, controlled remotely from Sundsvall centre over 150 km away

Operational standards for remote tower services currently match those for real operations and approval is based on the same service delivery requirements as existing ICAO rules

# Remote Tower For Two Low-Density Aerodromes



ANSP

AO

AU

NM

STAKEHOLDERS



Having proved controllers can provide air traffic control services to an airport remotely, SESAR validated the feasibility of providing simultaneous services to two airports from a single location.

## BENEFITS

- Operational and technology-related cost efficiency

Multiple remotely controlled airports contribute to SESAR cost-efficiency performance targets



SJU references:  
#52 / Release 4

# Remotely-Provided Air Traffic Services For Contingency Situations At Aerodromes



ANSP

AO

AU

NM

STAKEHOLDERS



Security alerts can shut down control towers. How does the airport ensure minimum disruption in an emergency? This question has been addressed by SESAR looking at contingency situations for airports.

## BENEFITS

- Increased cost efficiency
- Improved resilience in degraded situations

Contingency towers deliver increased operational resilience for medium-sized airports

Building infrastructure off-site is more cost-efficient, and easier to maintain

# Single Remote Tower Operations For Medium Traffic Volumes



ANSP

AO

AU

NM

STAKEHOLDERS



Conventional control towers are expensive to operate and maintain, and even at a medium-sized airport can become too costly if the number of flights is insufficient to cover the running costs. SESAR's remote tower services offer the possibility to enhance safety and efficiency at airports where it is too expensive to build, maintain and staff conventional tower facilities and services. The solution is already deployed at small airports, and is under test at medium-sized airports.

## BENEFITS

### ■ Increased cost efficiency



Single remote towers offer an efficient way to deploy operational staff resources by means of a remote tower centre providing single tower services to a number of airports

# Agenda



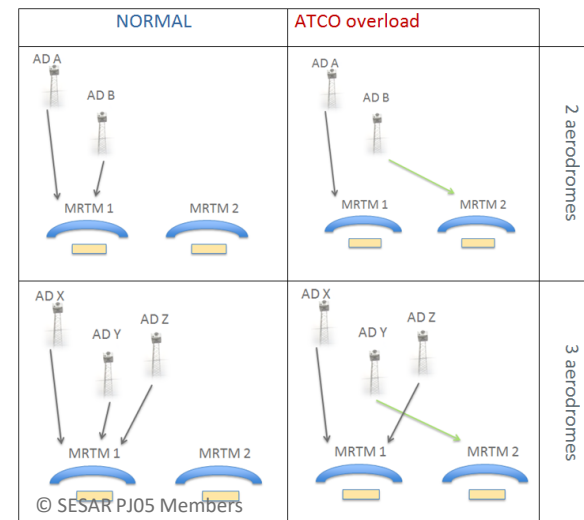
- Introduction to SESAR
- SESAR remote tower solutions ready for deployment
- Ongoing SESAR remote tower R&D
- Future activities?

# SESAR 2020 PJ05 – Remote Tower Beneficiaries



# SESAR Solution PJ05-02 – Multiple Remote Tower Module

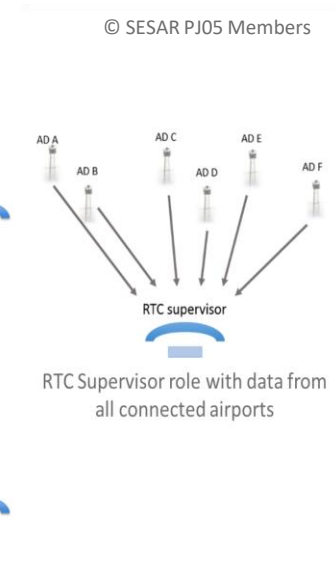
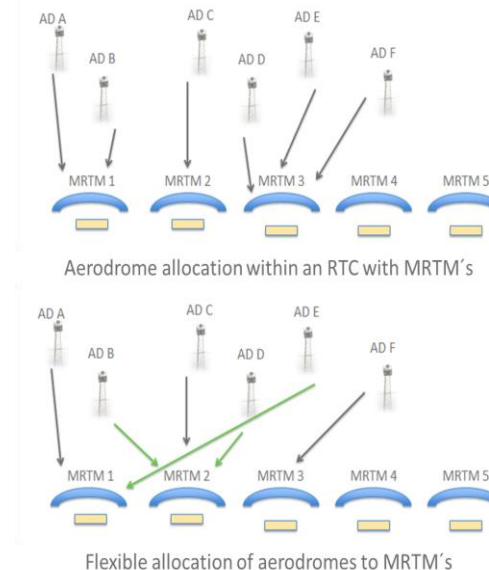
- Based on SESAR 1 results, increasing traffic volume and complexity or the number of aerodromes
- Indicative traffic characteristics (IFR / VFR mix):
  - 2 small airports with 6 simultaneous movements in total
  - 3 very small airports with 4 simultaneous movements in total
  - 10 to 20 mvts (ground and air) / hr in total
- Planning tool allowing the ATCO to foresee traffic peaks and split/merge accordingly
- Voice com features in the panoramic view for increased heads up time
- Harmonised operational methods, procedures and phraseology
- Cost efficiency benefits, maintaining safety and capacity
- Target 'ready for deployment' date: 2019





# SESAR Solution PJ05-03 – Remote Tower Centre with Flexible Allocation of Aerodromes to Multiple Remote Tower Modules

- Provide remote tower services to a large number of airports with a flexible and dynamic allocation of airports connected to different remote tower modules over time in a remote tower centre (RTC)
- RTC Supervisor role supported by planning tools for traffic and workload forecast and ATCO / module / airport allocation
- Up to 4 aerodromes per module
- Indicative traffic characteristics (IFR / VFR mix):
  - 3 airports with 6 simultaneous movements
  - 20 to 30 mvts (air and ground) / hr in total
- Additional automation functionalities in the remote tower module (e.g. conformance monitoring, task prioritisation)
- Target 'ready for deployment' date: 2020+





# SESAR Solution PJ05-05 – Advanced Automated MET System for Remote Airport

- Technological solution
- Enhance current automated weather observation (AUTOMETAR), in conditions where it is difficult or too expensive to implement and staff a conventional manned facility
- Include weather elements, which are simplified and/or omitted in current automated weather observation:
  - Prevailing visibility
  - Aeronautic significant weather phenomena
  - Clouds
- Target 'ready for deployment' date: 2020+



# Agenda



- Introduction to SESAR
- SESAR remote tower solutions ready for deployment
- Ongoing SESAR remote tower R&D
- Future activities?

# Future remote tower R&D activities?

- Continued R&D on remote tower centres
  - Integration with approach and flow management services
  - RTC to RTC handover
  - Contingency
  - Advanced automation functions
  - Interoperability
  - ...
- New HMI technologies in the multiple remote tower module
  - Multi-touch input devices
  - In-air gestures
  - Automatic speech recognition
  - Attention control
  - Virtual and augmented reality
  - ...



© SESAR RETINA Project Members

# SJU Open calls – petit promotion

# High Level Structure of ER4

## Work Area 1: ATM Excellent Science & Outreach (starting at TRL 0)

Sub Work Area 1.1: Automation, Robotics & Autonomy

SWA1.2: Complexity, Data Science & Information Management

SWA1.3: Environment & Meteorology for ATM

SWA1.4: Performance, Economics, Legal & Regulation

SWA1.5: ATM role in Intermodal Transport

SWA1.6: CNS for ATM

## Work Area 2: ATM Application-Oriented Research (starting at TRL 1)

Sub Work Area 2.1: High-performing Airport Operations

SWA2.2: Optimised ATM Network Management

SWA2.3: Advanced Air Traffic Services

SWA2.4: Enabling Aviation Infrastructure

SWA2.5: ATM Operations, Architecture, Performance & Validation

SWA2.6: IFR RPAS

SWA2.7: U-space

# Duration and Budget for projects



**Available Budget:** EUR 38.6 Mio

**Budget:** max EUR 700.000 funding per project in Work Area 1  
max EUR 1.100.000 funding per project in Work Area 2

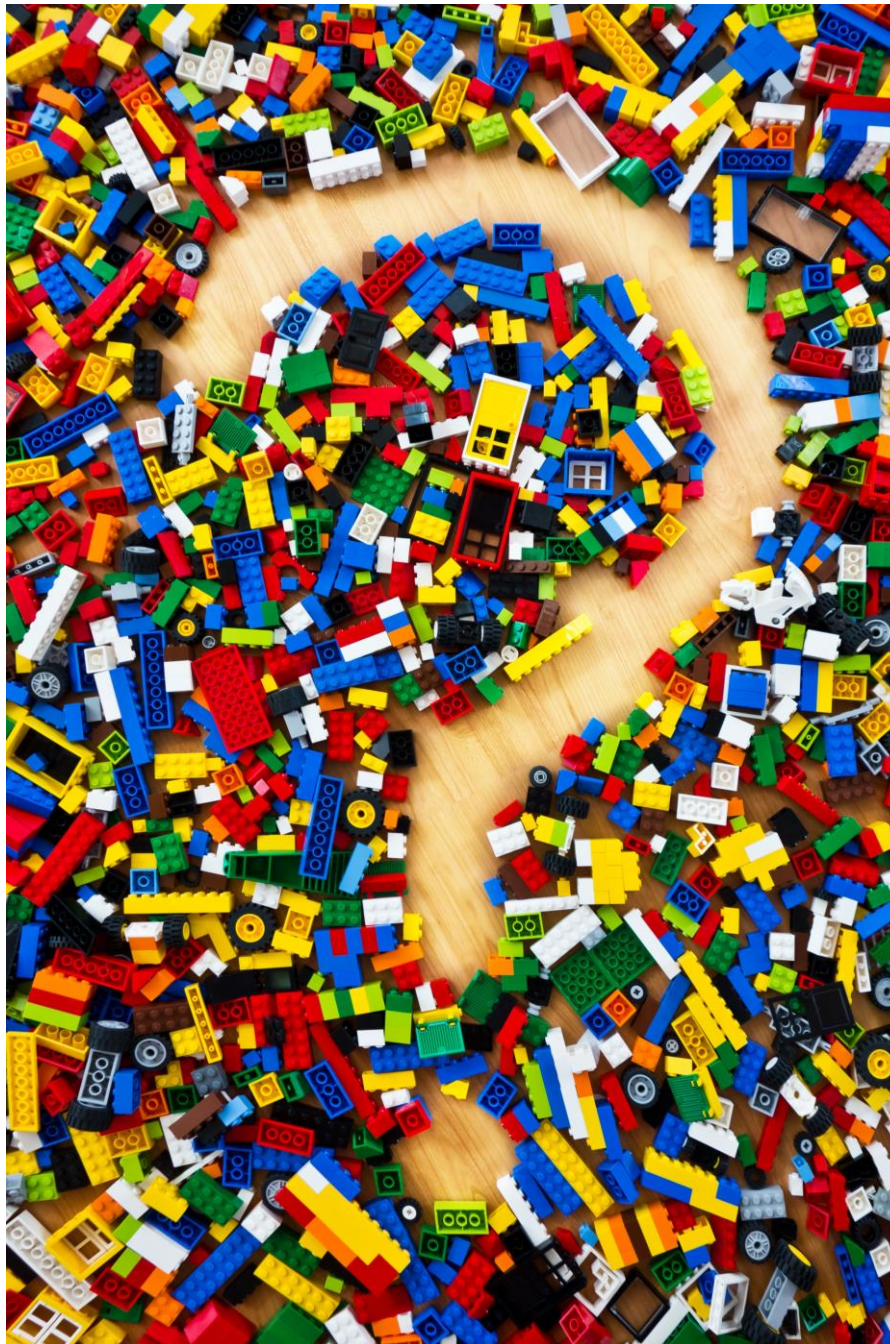
**Project Duration:** 30 month  
(24 month for research + 6 month for dissemination)

**Publish Call:** Q1 2019 (End of March)

**Deadline for submission:** 29 August 2019 at 17:00 CET

**Link:** <https://www.sesarju.eu/news/new-call-launched-sesar-exploratory-research>







Remote tower SESAR R&D activities

---

# Thank you very much for your attention!

For more information: <https://sesarju.eu/>



Founding Members



EUROPEAN UNION



EUROCONTROL