



# Open Day

## Multiple Remote Tower Module

PJ-05 EXE-05.02-V3-2.4 (HungaroControl, FREQUENTIS, DLR)

Jörn Jakobi (AT-One/DLR PJ05 Project Coordinator)

DLR, Braunschweig

23/11/2018



Founding Members



# Agenda



10:00 Welcome & Introduction  
10:15 Validation Set-up  
10:30 Validation Plan & Objectives  
10:50 Multiple Remote Assistance functions  
11:10 ANSP's Multiple Remote perspective  
11:30 Live-Demo at DLR Remote Tower Lab  
13:30 Q&A Session  
15:00 End of Meeting

Jörn Jakobi (DLR)  
Jörn Jakobi (DLR)  
Anneke Hamann (DLR)  
Michael Ellinger (FRQ)  
Csaba Gergely (HC)  
2 groups -Demo/Lunch  
All

\*all times UTC+1

# German Aerospace Center (DLR)

Institute of Flight Guidance

Introduction to the Institute and Remote Tower Research

23 November 2018



Knowledge for Tomorrow

# DLR – German Aerospace Center

National aeronautics and space research centre of Germany



- Research Institution
- Space Agency
- Project Management Agency

## Research Areas

- Aeronautics
- Space Research and Technology
- Transport
- Energy
- Defence and Security



# Locations and Employees

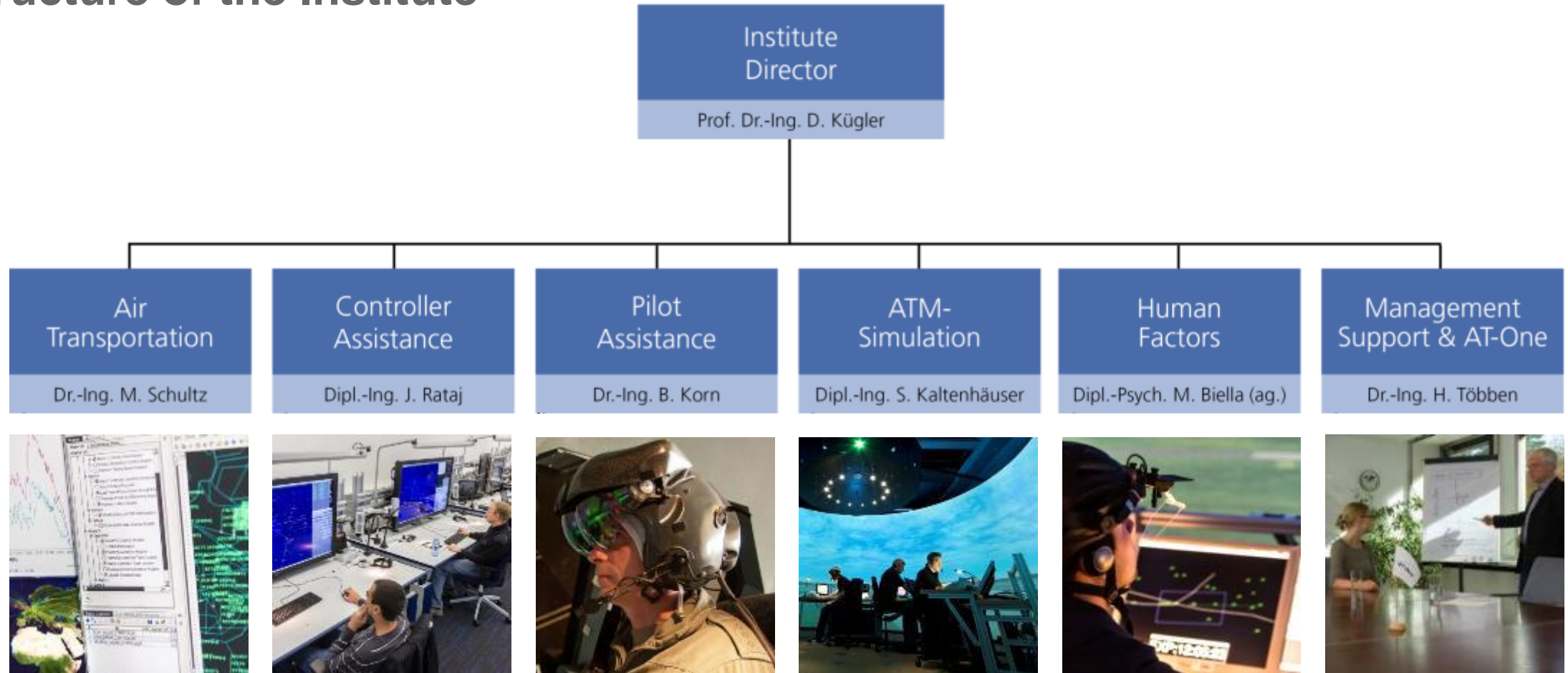
Approx. 8000 employees across  
33 institutes and facilities at 20 sites.

Offices in Brussels, Paris,  
Tokyo and Washington.

**Institute of Flight Guidance**



# Structure of the Institute



# Remote Tower Operations – from Vision to Reality

Proof of Concept  
[Multiple+]  
SESAR2020  
PJ05 2016-2022

Proof of Concept  
SESAR 6.9.3 & 6.8.4 2009-2015  
RAiCe 2008-2012  
RAiCon 2010-2012  
VICTOR 2008-2012  
...



First Prototype  
@DLR 2005



## Technical Tests

RApTO 2005-2008  
RAiCon 2010-2012  
ART 2007-2009  
LFV/SAAB Project  
SESAR 2009-2015  
6.9.3 & 12.4.7  
...



2018

Standardisation  
EUROCAE WG100  
ED-240A (2018)



The Vision  
Virtual Tower 2002-2004

2002



First RTC trials  
@DLR 2010



First  
operational  
Installation  
@LFV 2015



## Current research activities...

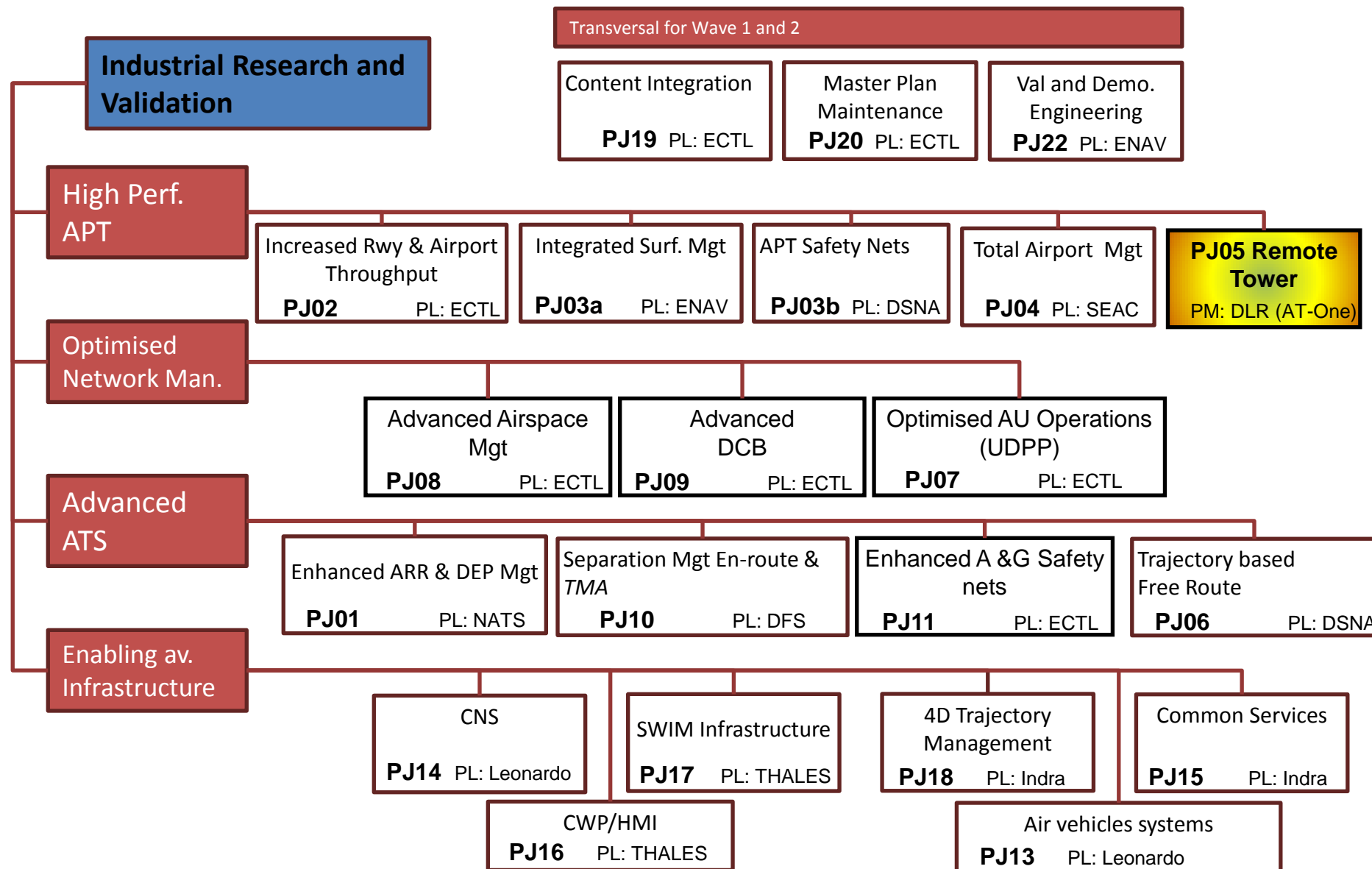


## Head-Up-Only

Concept study for a multimodal RTO interface (under development)



# SESAR2020 Work Programme & PJ05



# PJ05 Remote Tower for Multiple Airports

DLR (AT-One)

**WP1 Project  
Management**

DLR (AT-One)

**WP2 Solution PJ.05-02  
Multiple Remote  
Tower Module**

LFV/COOPANS

EXE-05.02-V3-2.2\_COOPANS

EXE-05.02-V3-2.3\_INDRA

**EXE-05.02-V3-2.4\_HC**

EXE-05.02-V3-2.5\_ENAV

**WP3 Solution PJ.05-03  
RTC with Flexible  
Allocation of  
Aerodromes to  
MRTMs**

DFS

**WP4 Ethics  
Requirments**

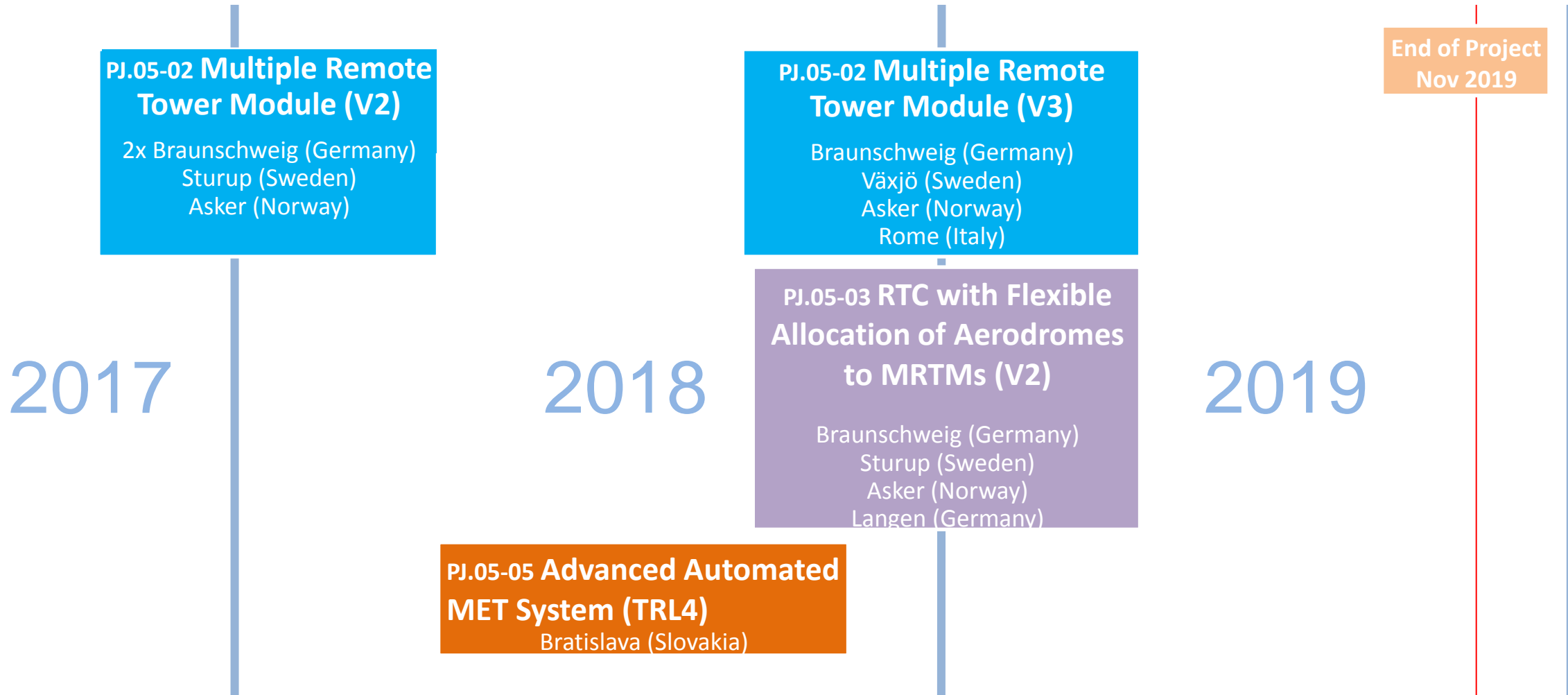
DLR (AT-One)

**WP5 Solution PJ.05-05**

Advanced Automated  
MET System

LPS (B4)

# Validation Phases





# PJ.05 Schedule reg. FRQ/DLR platform

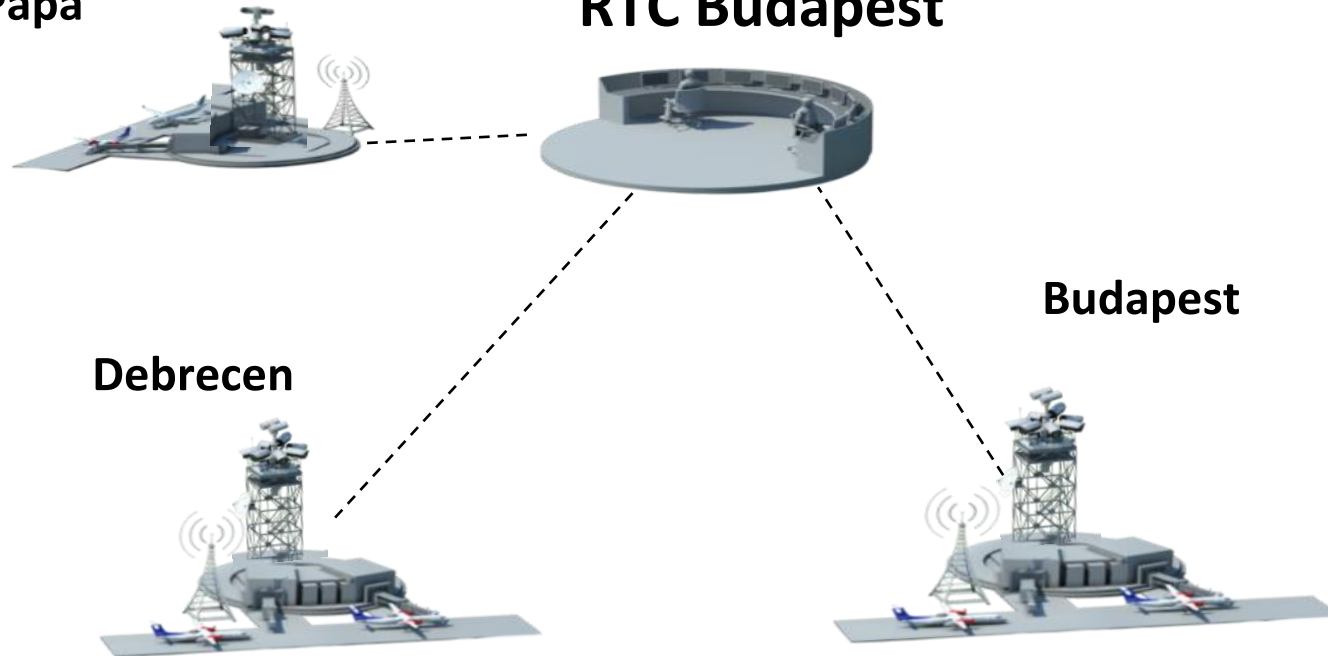
PJ.05-02 V2 Simulation in Braunschweig	(HC, DLR,FRQ, SELEX)	Nov 2017 ✓
PJ.05-02 V2 Simulation in Braunschweig	(ON, DLR, FRQ)	March 2018 ✓
<b>PJ.05-02 V3 Simulation in Braunschweig</b>	<b>(HC,DLR, FRQ, SELEX)</b>	<b>Nov 2018 ✓</b>
PJ.05-03 V2 Simulation in Braunschweig	(ON, DLR, FRQ)	Dec 2018
PJ.05-02 V3 Shadow Mode at RTC Budapest	(HC, FRQ)	Mar 2019

Papa

RTC Budapest

Budapest

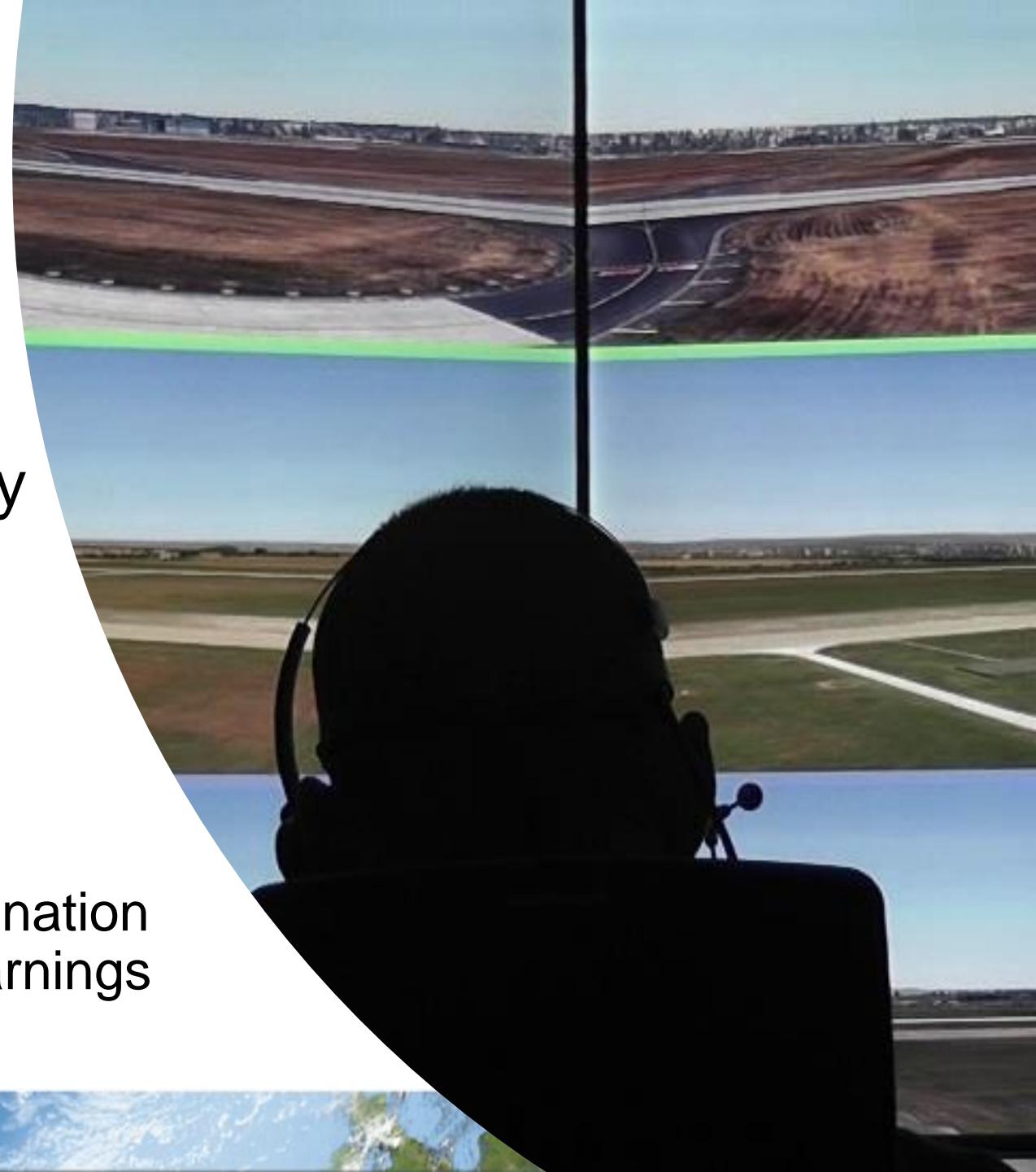
Debrecen



# Validation Scope (V3) - “Concept Validation through Simulation”

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- Proof of operational feasibility for 1:3 multiple setting
  - More sophisticated CWP
  - More realistic Traffic Scenarios
  - Emergency Situations
  - Runway changes
  - Approach, MET & Airport Coordination
  - Integration of Enhanced Met Warnings

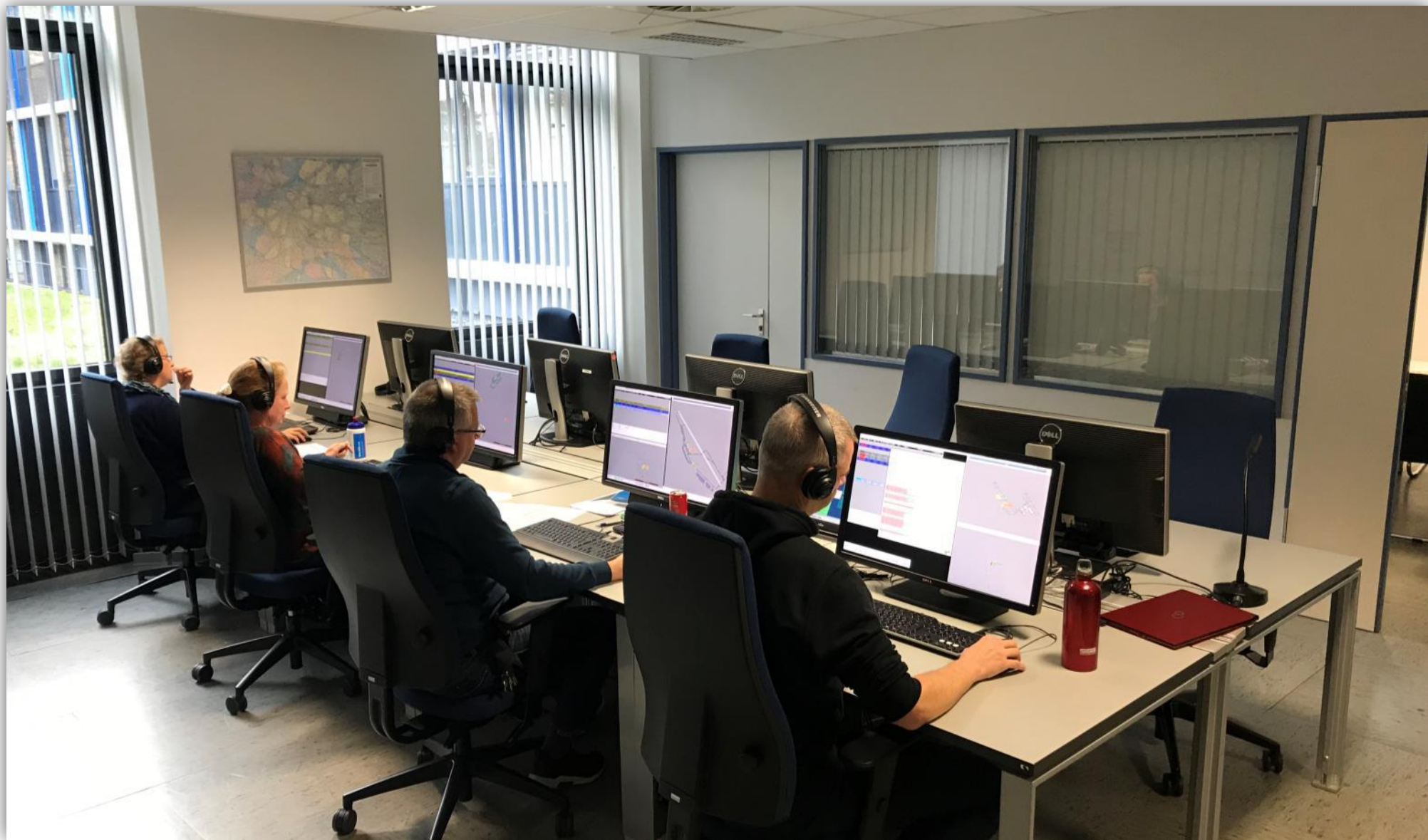


# Validation Set Up

- Human-in-the-loop simulation (7 ATCOs from HungaroControl, 5 from LHBP, 2 from LHPA)
- NARSIM Simulation Platform
- Coupled Aerodrome RTF
- 3fold Panorama, PTZ, Approach-Radar, Strip bays
- 3fold ground vehicle RTF
- Telephone coordination with Approach, MET Service and Duty Airport Manager (DAM)
- Wind and visibility information as overlay in the Video Panorama
- Augmented runway closure
- PTZ hot spots, no automatic PTZ object following
- 5 Scenarios with non-nominal situations (e.g. runway change, emergency, runway checks etc.)
- 3 Pseudopilot (1 per aerodrome) + 1 Pseudocoordinator for APP/MET/DAM









# Validation Set Up







www.remote-tower.eu



## Home

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. The current programme is [SESAR 2020](#), running from 2016 to 2024 with a budget of 1.6 billion Euro, supports projects to deliver solutions in four key areas, namely airport operations, network operations, air traffic services and technology enablers.

Part of [SESAR 2020](#) is the Project **PJ05 "Remote Tower for Multiple Airports"** with focus on the safe and efficient airport of the future. By bringing the concept of remotely controlling multiple airports to a higher maturity level, the [SESAR](#) project aims at providing small and medium sized airports with more cost-efficient and service-tailored air traffic services.



