



Open Day

Flexible Allocation of Aerodromes to Multiple Remote Tower Moduls (V2)

PJ-05 EXE-05.02-V3-2.4 (Oro Navigacija, DLR, FRQ)

Jörn Jakobi (DLR (AT-One) PJ05 Project Coordinator)
DLR-Braunschweig, 12/12/2018



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)
Peter Gridling (FRQ)
Egidijus Zaremba(ON)
2 groups -Demo/Lunch
All

*all times UTC+1

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

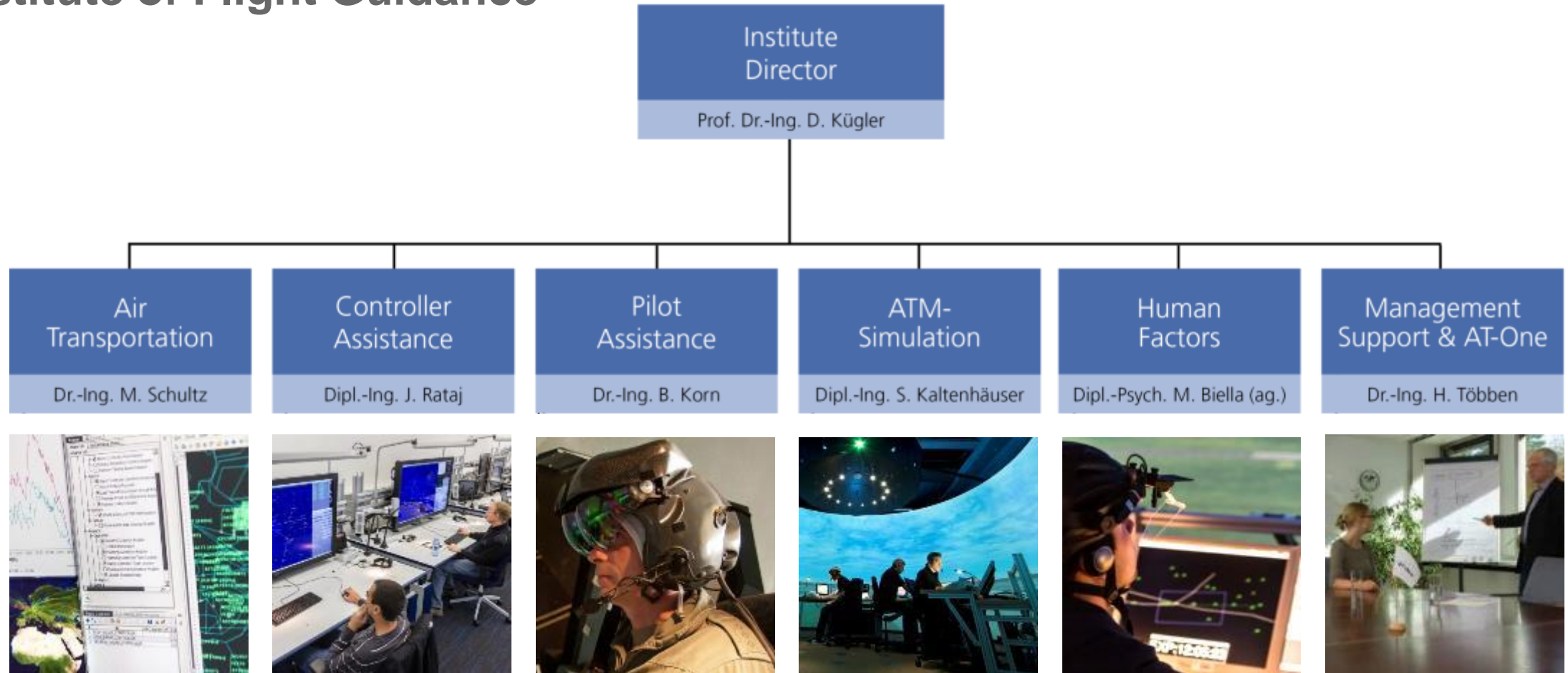
Approx. 8000 employees across
33 institutes and facilities at 20 sites.

Offices in Brussels, Paris,
Tokyo and Washington.

Institute of Flight Guidance



Institute of Flight Guidance



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
...



Technical Tests

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

First Prototype @DLR 2005



2018

Standardisation
EUROCAE WG100
ED-240A (2018)



First
operational
Installation
@LFV 2015



First RTC trials
@DLR 2010

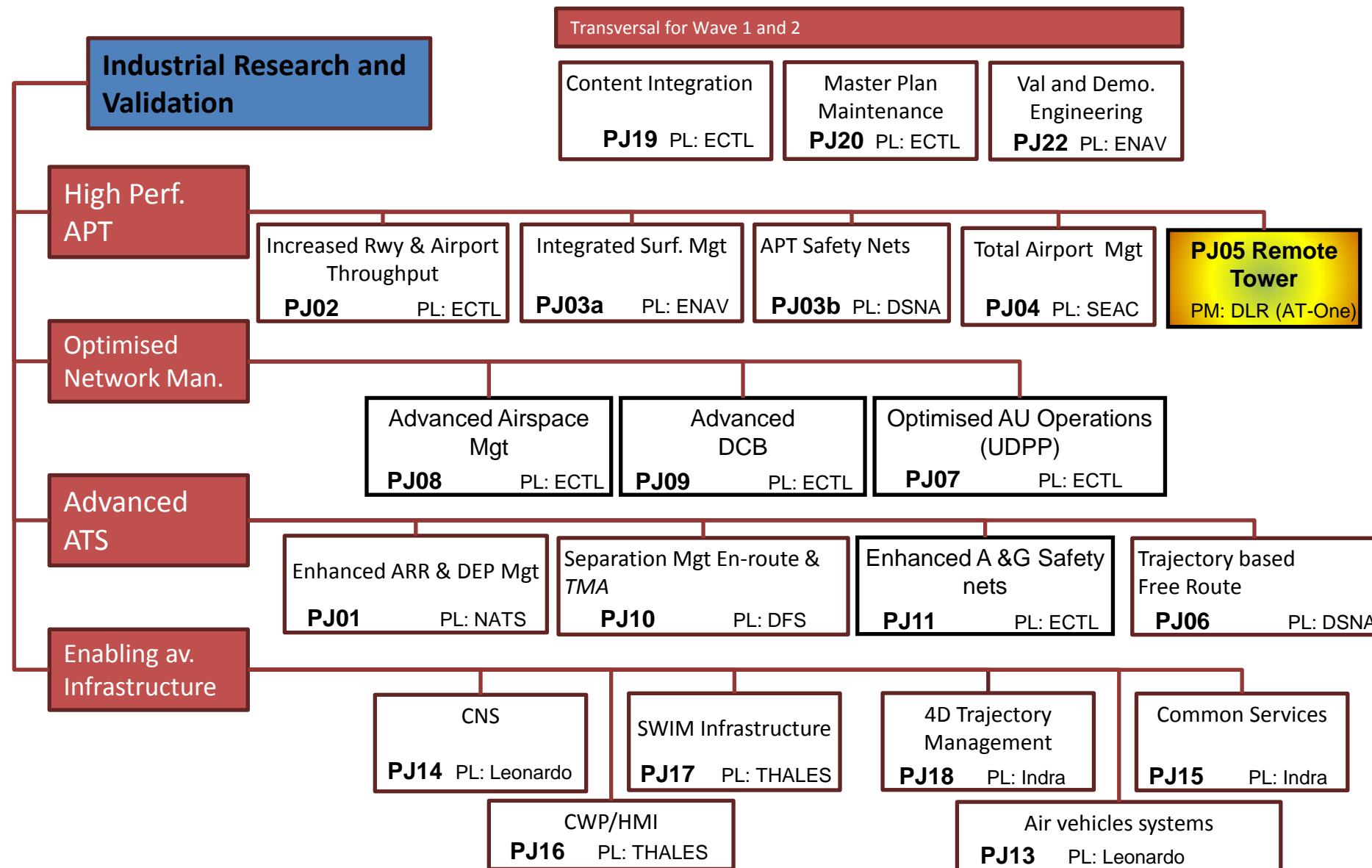


The Vision Virtual Tower 2002-2004



2002

SESAR2020 Work Programme & PJ05 [2016 – 2019]



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

EXE-05.03-V2-3.1_ON

EXE-05.03-V2-3.2_COOPANS

EXE-05.03-V2-3.3_INDRA

EXE-05.03-V2-3.5_DFS

WP4 Ethics Requirements

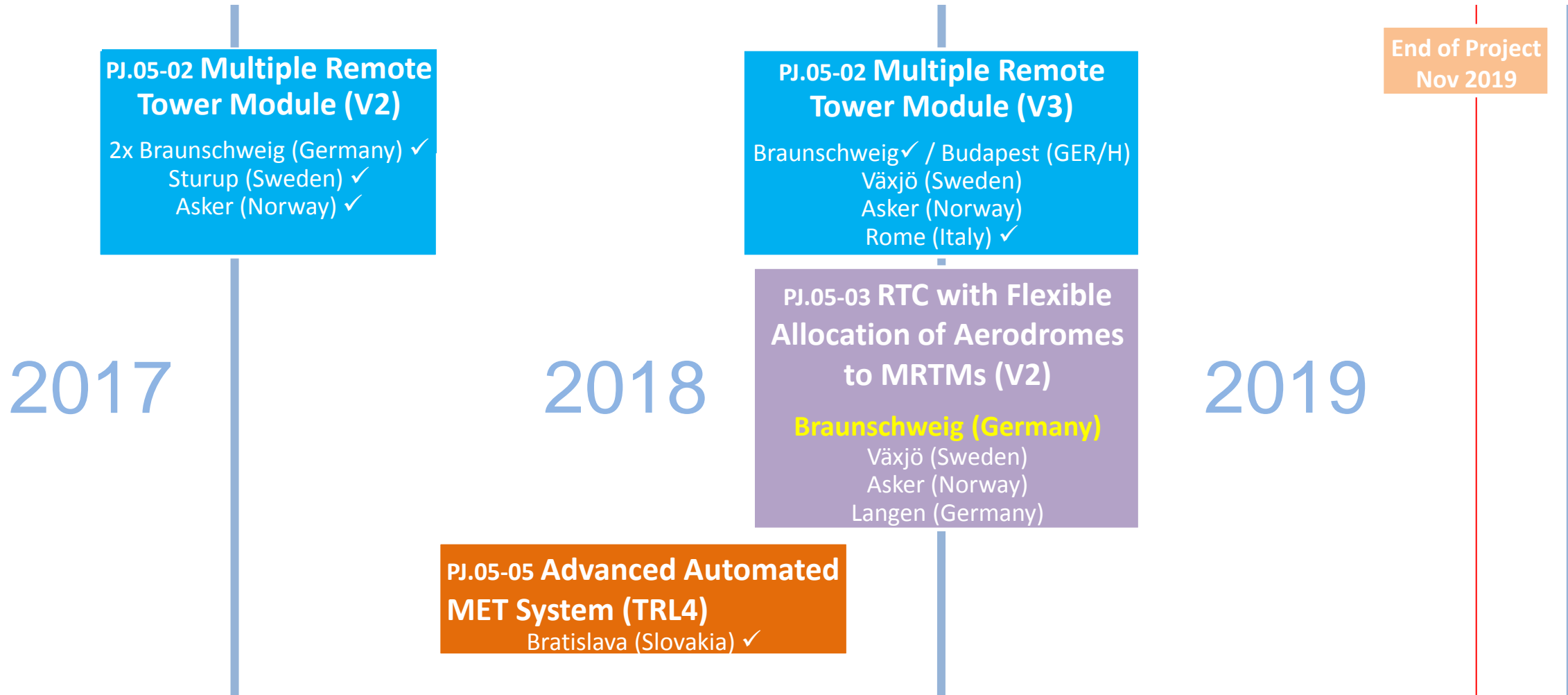
DLR (AT-One)

WP5 Solution PJ.05-05

Advanced Automated MET System

LPS (B4)

Validation Phases



Schedule PJ.05 FREQUENTIS / DLR Validation 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 ✓

PJ.05-02 V3 Simulation in Braunschweig

(HC, DLR, FRQ, SELEX)

Nov 2018 ✓

PJ.05-03 V2 Simulation in Braunschweig

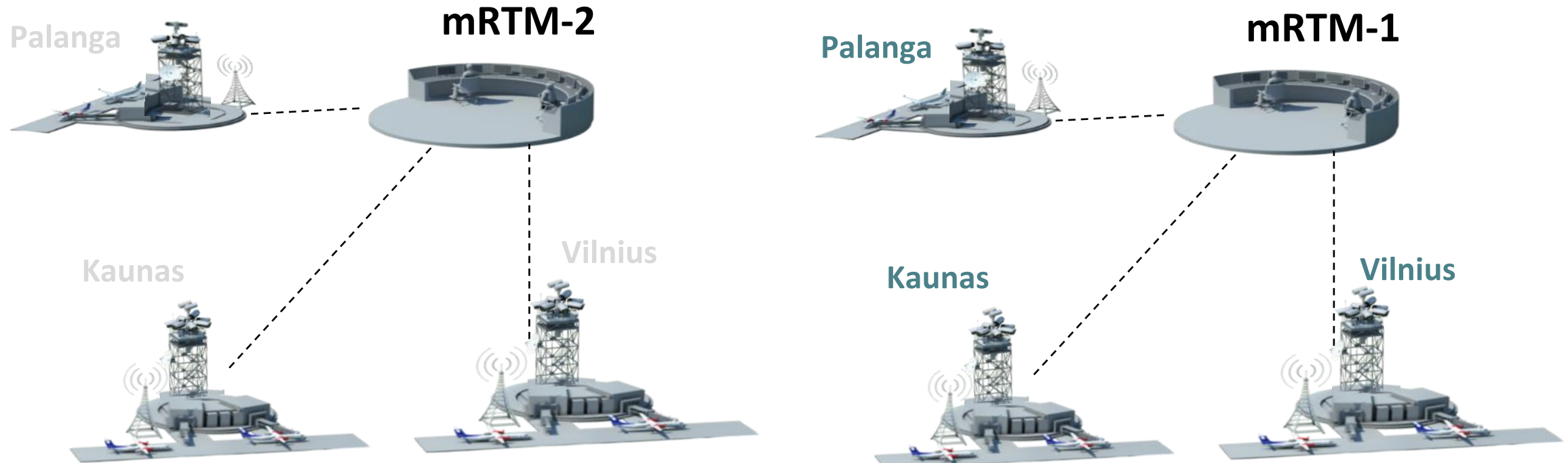
(ON, DLR, FRQ)

Dec 2018

PJ.05-02 V3 Shadow Mode at RTC Budapest

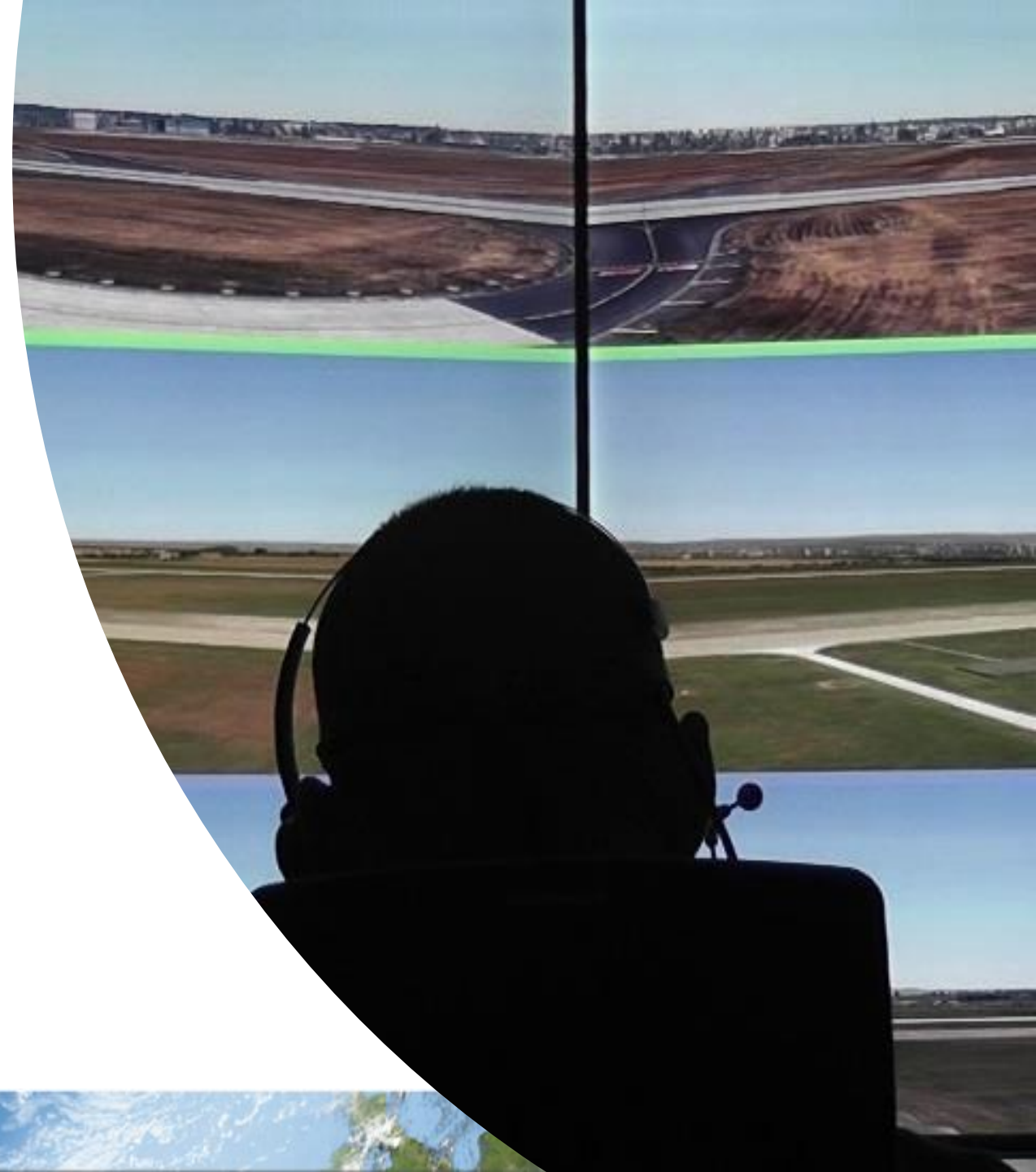
(HC, FRQ)

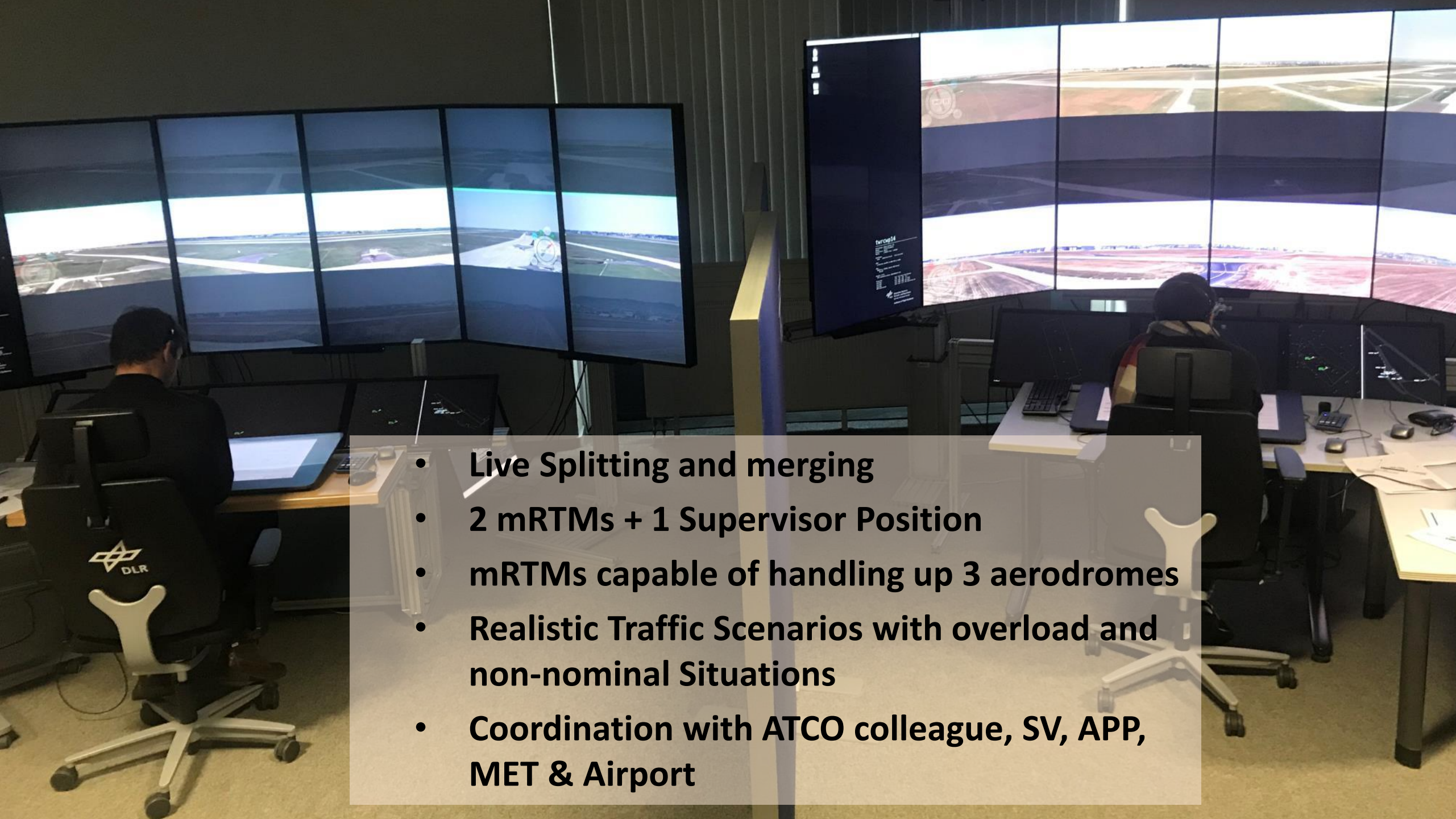
Mar 2019



Validation Scope

- V2 Maturity Level
- Concept Validation through Simulation
- Design & Proof of operational feasibility of a flexible allocation of aerodromes

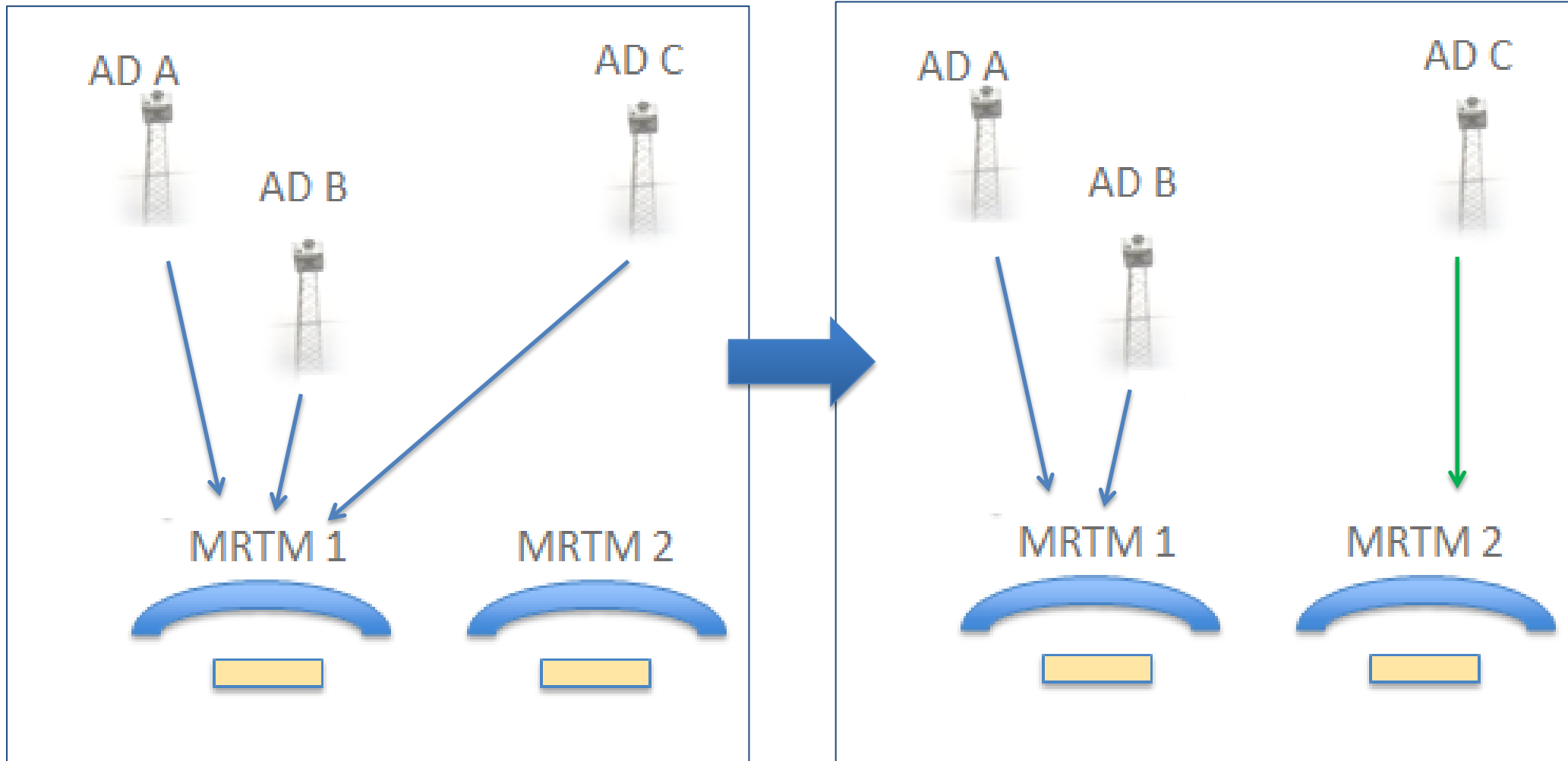




- **Live Splitting and merging**
- **2 mRTMs + 1 Supervisor Position**
- **mRTMs capable of handling up to 3 aerodromes**
- **Realistic Traffic Scenarios with overload and non-nominal Situations**
- **Coordination with ATCO colleague, SV, APP, MET & Airport**

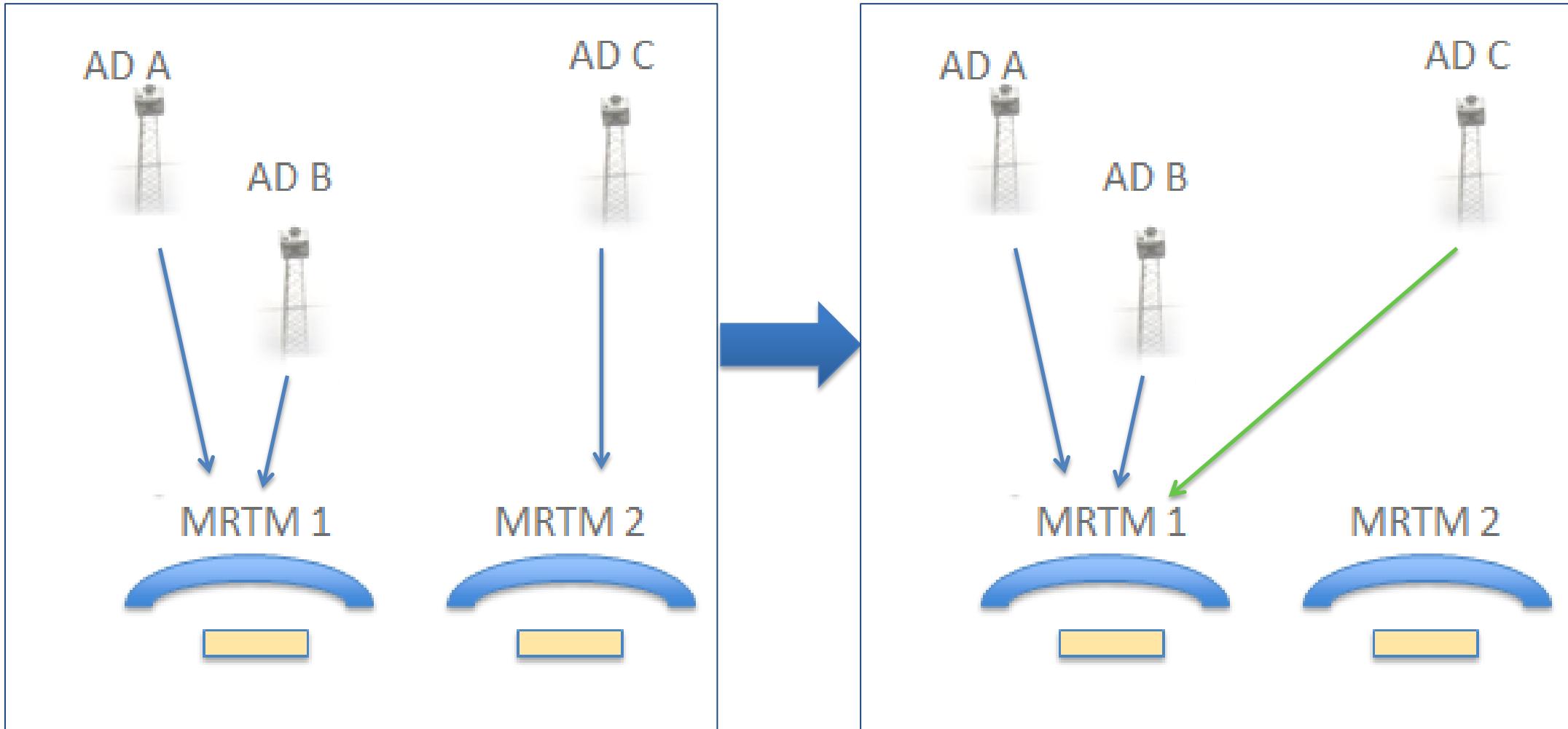
Live Splitting and Merging

Splitting one



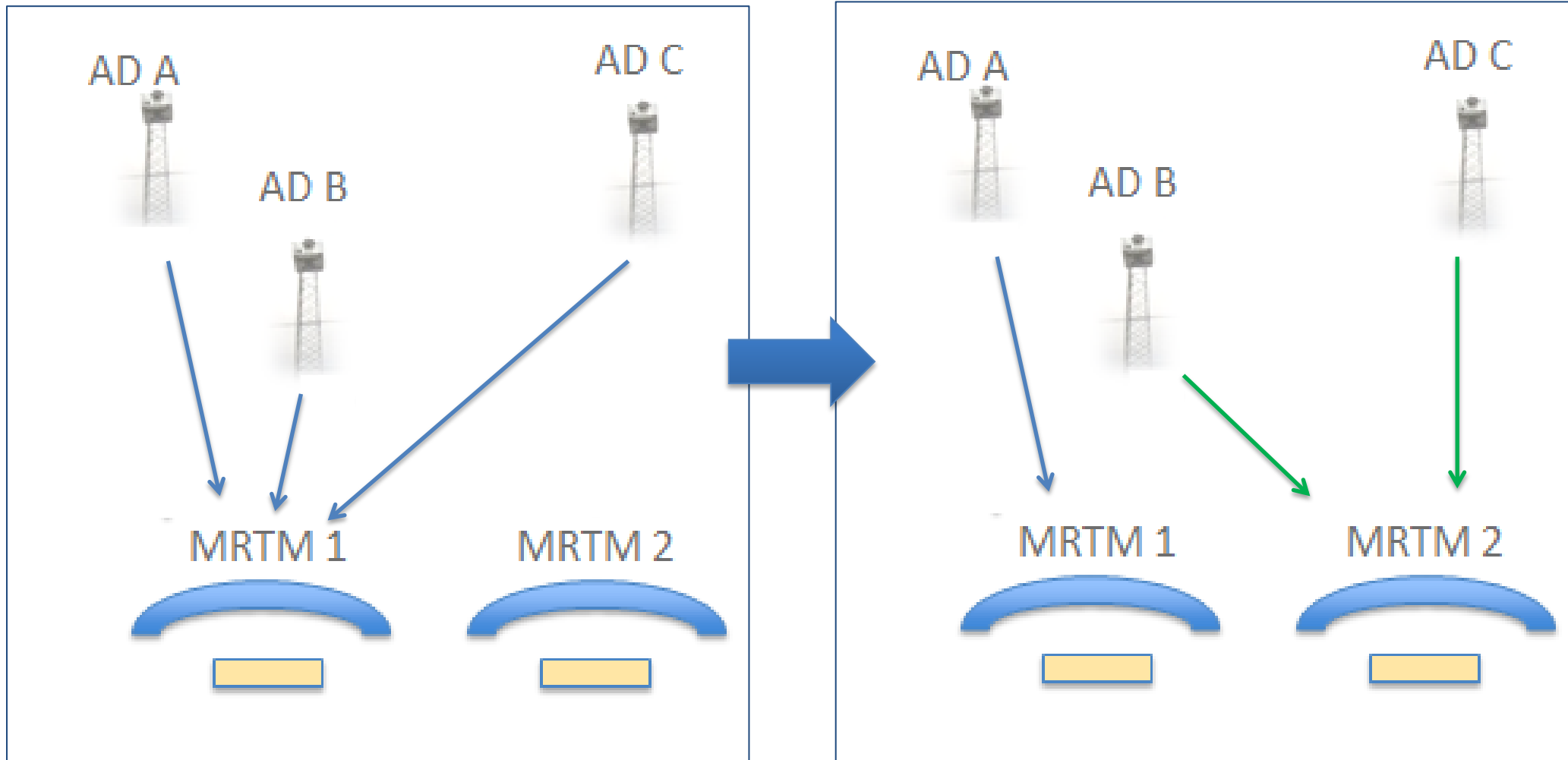
Live Splitting and Merging

Merging one



Live Splitting and Merging

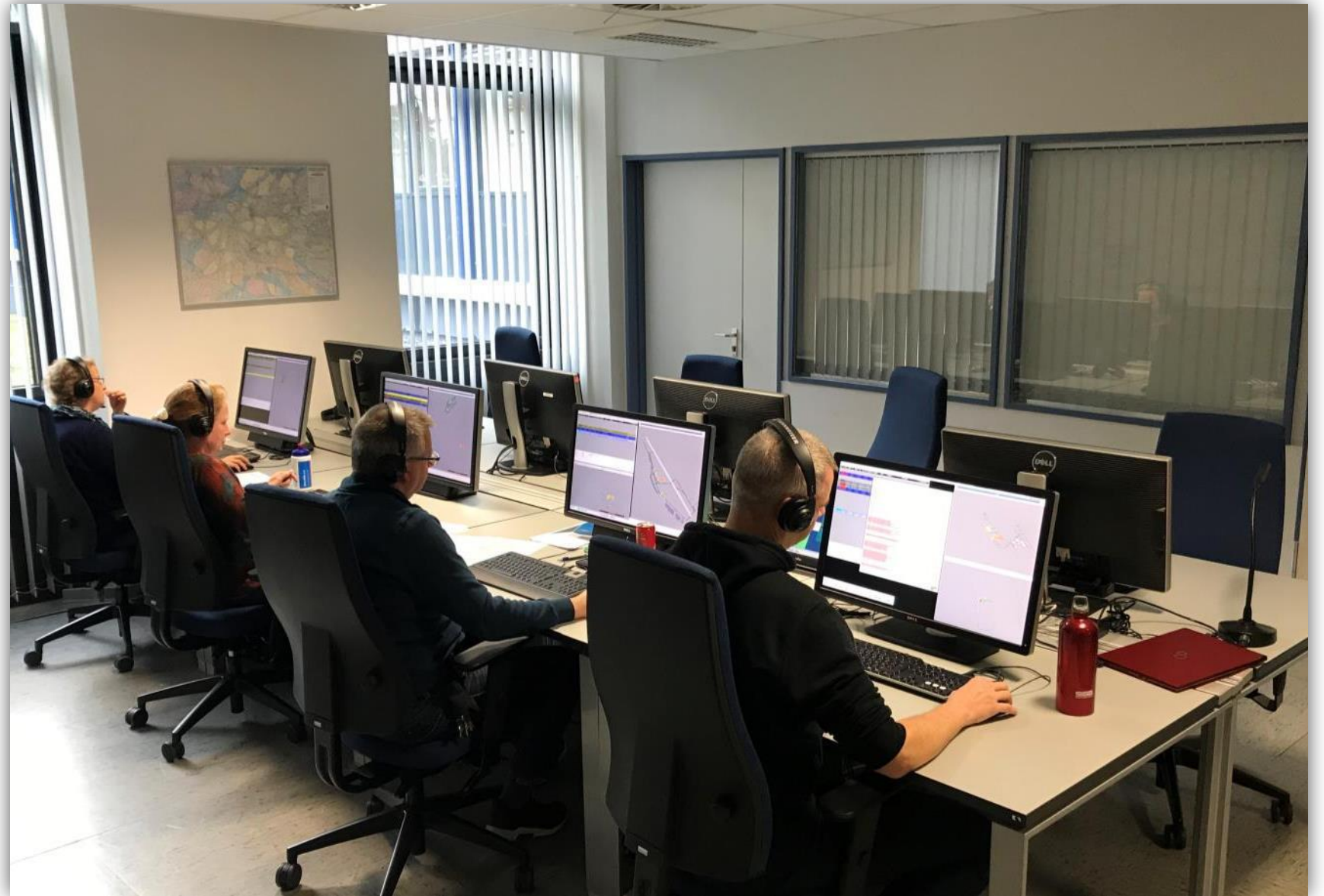
Splitting two in case of emergency on AD A



Validation Set Up



3 Pseudopilots 1 Coordinator



CHECKLIST Handover

CHECKLIST Handover

1. REQUEST from ATCO-HANDOVER to ATCO-TAKEOVER to take control of Aerodrome X (& Y)

ATCO-HANDOVER Handover Aerodrome X (Y)

ATCO-TAKEOVER Go Ahead / Standby

2. ATCO-HANDOVER provides following information:

- * Relevant weather information (visibility, wind, etc.)
- * Runway in use (Runway condition)
- * Equipment failure (only if failures exist)
- * Aerodrome restrictions/closures (if any)
- * Traffic on Frequency (VFR/IFR) including
 - * position
 - * intentions
 - * clearances

3. Actual HANDOVER

ATCO-TAKEOVER Information copied. Taking over

ATCO-HANDOVER Roger

** handover of an aerodrome should happen best in a "clean configuration", that is, most probably no need to intervene for the next 30 seconds.*



Typical Traffic Scenario

TIME	CALLSIGN	AC	DESTINATION	SID	SQK	STAND	RWY	REMARKS
08:02:00	BMI77E	A321	Sofia (LB5F)	ERLOS1D	2177	3	13R	
08:10:00	TAPUP7	A320	Vilnius (EYVI)		1733	4	13R	
08:12:00	4AITT	C550	Vilnius (EYVI)		1516	R115	13R	Landing
08:08:00	TRA72Q	B737	Rotterdam (EHRD)	GILEP1D	1514	R110	13R	
08:09:00	WZZ5JO	SF34	Timișoara (LRTR)	ERLOS1D	2170	107	13R	
08:15:00	FIRE2	FIR1	Vilnius (EYVI)		2100	26		Support EIN8NM, Standby in TWY C
08:23:00	EIN8NM	A320	Vilnius (EYVI)		3772	108	13R	Engine failure
08:20:00	DLH4TN	A320	Frankfurt (EDDF)	BADOV1D	1515	2	13R	Report debris during takeoff
08:26:00	AIRSIDE1	FOL1	Vilnius (EYVI)		2101	26		FOD check on runway
08:33:00	BRU888	SF34	Timișoara (LRTR)	ERLOS1D	2174	R112	13R	
08:42:00	EWGAR2	SF34	Vilnius (EYVI)		3771	109	13R	
08:42:00	POIJP	C550	Paris (CDG) (LFPG)	GILEP1D	2203	R116	13R	
08:50:00	BMIA4B	A321	Vilnius (EYVI)		1517	5	13R	
08:47:00	SWR337U	A320	Zurich (LSZH)	GILEP1D	2172	R114	13R	

EYVI

TIME	CALLSIGN	AC	DESTINATION	SID	SQK	STAND	RWY	REMARKS
08:06:00	WZZ559	A320	Santa Cilia de Jaca (LECI)	VERIG5D	3102	2	05R	
08:15:00	FINH7Y	A319	Kaunas (EYKA)		3105	15	05R	
08:21:00	IFA7753	FA50	Kaunas (EYKA)		3107	2	05R	
08:35:00	BRU8925	CRJ2	Minsk (UMMS)	PERIT5D	3104	14	05R	
08:45:00	YELLOW4	FOL1	Kaunas (EYKA)		3106	3		RWY check
08:51:00	SASL7L	MD83	Burgas (LBBG)	NARKA5D	3110	1	05R	
08:57:00	TVL8LJ	B738	Kaunas (EYKA)		3112	14	05R	

EYKA

TIME	CALLSIGN	AC	DESTINATION	SID	SQK	STAND	RWY	REMARKS
08:21:00	RYRK8G	A320	Palanga (EYPA)		3504		34	Touch&Go
08:23:00	HB66C	BE36	Palanga (EYPA)		3512	M2	34	Landing
08:31:00	RYRK8G	B738	Palanga (EYPA)		3506		34	Touch&Go
08:35:00	ACEC8	P28A	Palanga (EYPA)		3507			Crossing
08:39:00	AZA943	A320	Palanga (EYPA)		3511	M1	34	
08:42:00	RYRK8G	A320	Palanga (EYPA)		3506		34	Touch&Go
08:40:00	GAF612	A320	Cologne (EDDK)	BELED3D	3513	M3	34	
08:52:00	RYRK8G	A320	Palanga (EYPA)		3503		34	Touch&Go

EYPA





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.