

# DFS Open Day SESAR 2020 – PJ05 Multiple Remote Tower (MRTC)

29th March 2019



**DFS** Deutsche Flugsicherung

**FREQUENTIS**

# Agenda

Time	Topic
09:00	Coffee available
09:45	Welcome
10:00	DFS Remote Tower Project
10:30	MRTC Project Overview
11:00	MRTC Prototype
11:30	MRTC Validation Method
12:00	Simulator demonstration, lunch and additional presentation in groups
14:00	Discussion
15:00	End

# Demonstration - Groups

	12:00	12:40	13:20
Group Red (Benjamin Weiß)	MRTC Demonstration	Lunch	RTC Presentation
Group Green (Stephen Straub)	RTC Presentation	MRTC Demonstration	Lunch
Group Yellow (Patrick von Paris)	Lunch	RTC Presentation	MRTC Demonstration

# PJ05 – Multiple Remote Tower

## ❖ Solutions

- Solution 02  
Remotely Provided Air Traffic Service for Multiple Aerodromes
- Solution 03  
Remotely Provided Air Traffic Services from a Remote Tower Centre with a flexible allocation of aerodromes to Remote Tower Modules

## ❖ Timeframe

- 11/2016 – 10/2019

# PJ05 - Partners

## ❖ Partner

- Project Lead: DLR
- Lead Solution 02: LFV
- Lead Solution 03: DFS

SESAR2020 PJ05 "Remote Tower for Multiple Airports" Project Partners

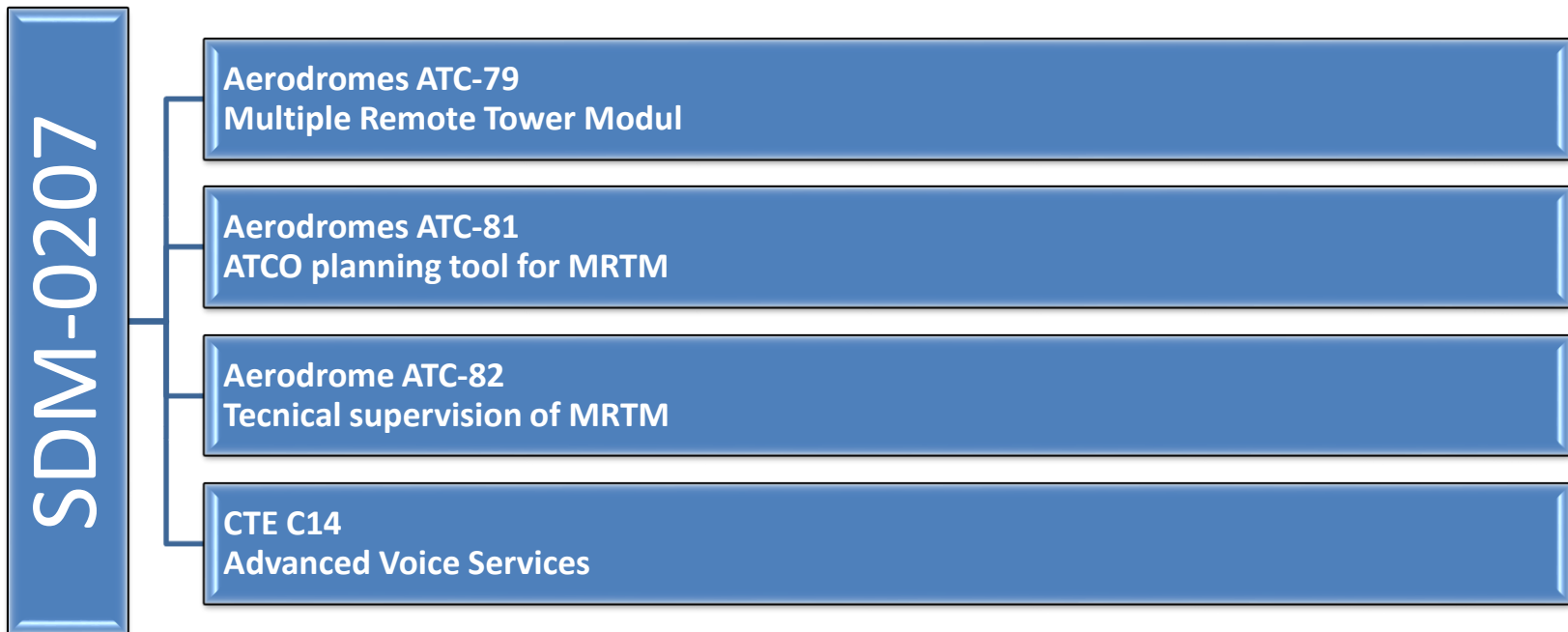


This project has received funding from the SESAR Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 730195.



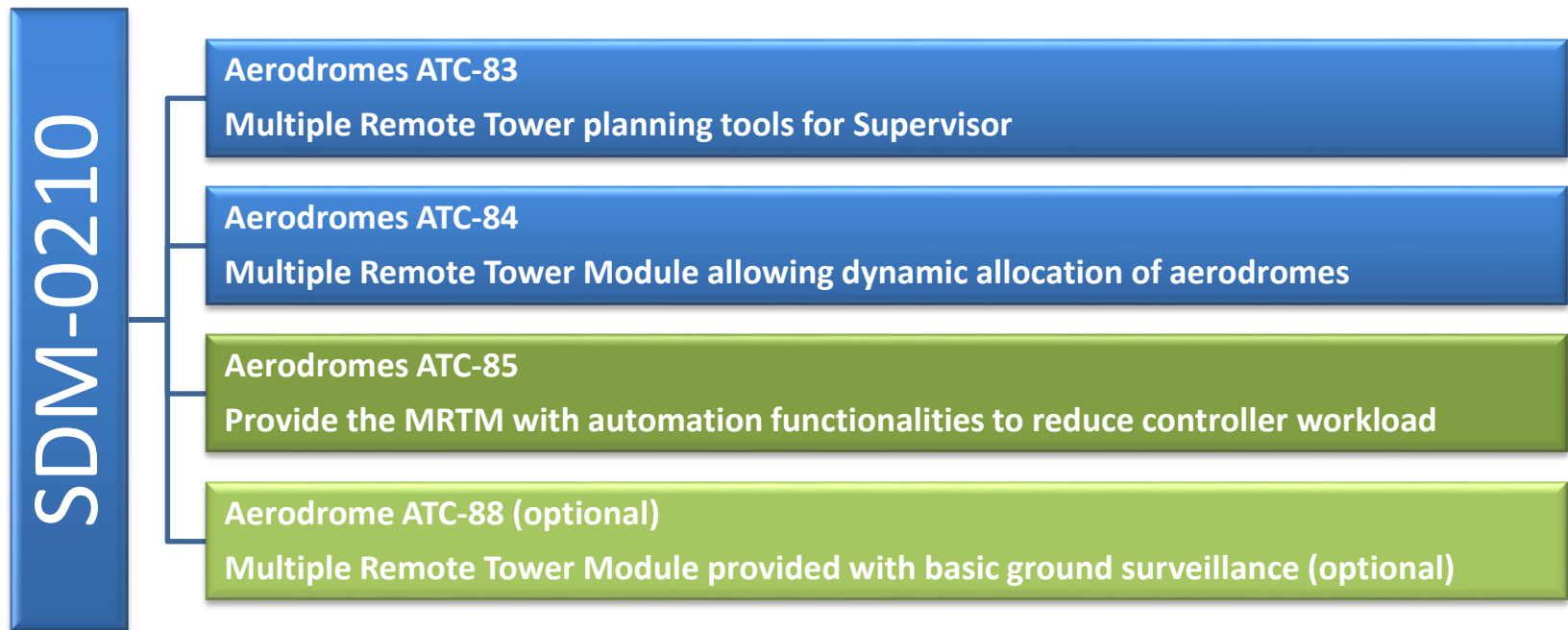
# PJ05 – Solution 02

## ❖ SDM-0207: Multiple Remote Tower Module (for up to 3 airports)

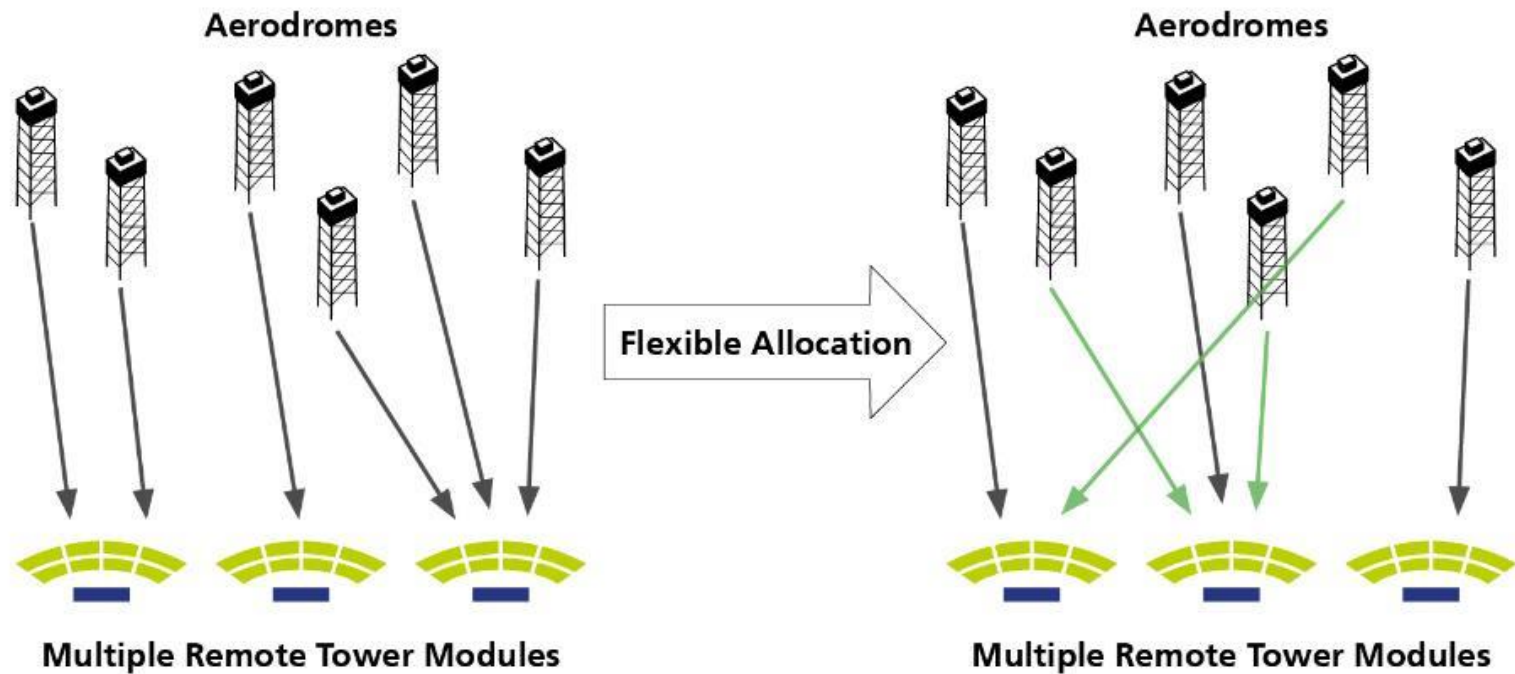


# PJ05 – Solution 03

## ❖ SDM-0210: Highly Flexible Allocation of Aerodromes to Remote Tower Modules



# PJ05 – Solution 02 and 03





# PJ05 – Overview Solution 02 and 03

	Solution PJ.05-02	Solution PJ.05-03
Number of Airports controlled by one ATCO at a time	2-3 airports	3 airports
Simultaneous Movements	4	6
Movements per hour	5 - 15	15 - 25
Allocation of Airports to MRTMs	Static allocation	Dynamic allocation
Planning tool	ATCO	ATCO and Supervisor
Automation Support	Basic	Advanced

# PJ05 – Solution 3 Exercises

## ❖ EXE-05.03-V2-3.1 – B4 (ON)

- based on Frequentis prototype and DLR platform - (RTS)
- Focus on Transfer of aerodromes

## ❖ EXE-05.03-V2-3.2 – COOPANS

- platforms developed by Saab (NATMIG) - (RTS and FTS)
- Focus on Flexible Allocation of aerodromes

## ❖ EXE-05.03-V2-3.3 – INDRA

- platform developed by INDRA (Avinor ANS Linked Third Party)
- Focus on Supervisor Role

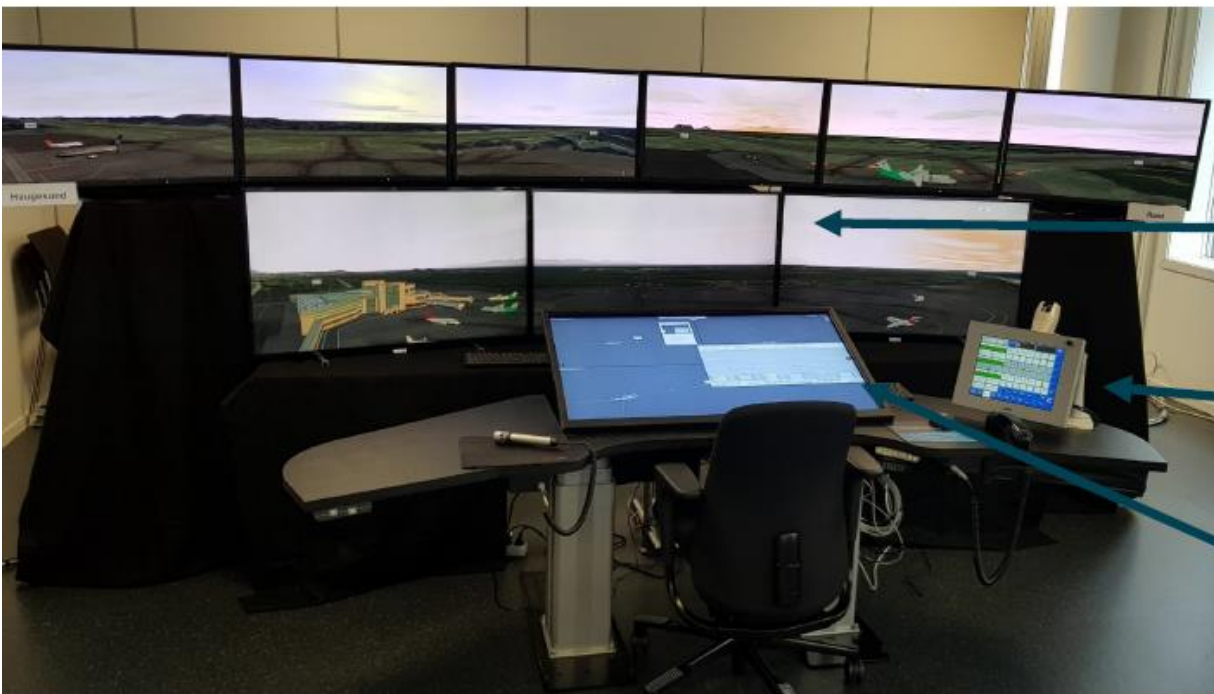
## ❖ EXE-05.03-V2-3.5 - DFS

- Prototype developed by Frequentis/DFS integrated in DFS platform
- Real Time Simulation (DFS)
- Focus on automation support tools

# PJ05 – Remote Tower Module Indra

REMOTE  
TOWER

## Multiple Remote Tower Module



Heads-Up Display (HUD)

*Indra 3D TWR Simulator*

VCS

*Indra GAREX 230 VCS*

Heads-Down Display (HDD)

*Indra InNOVA AIR*

# PJ05 – Remote Tower Module DLR

## Simulation Setup in Braunschweig (3 Airports)

Panorama Views with augmentation

Situation Display for each airport

Planning Tool

Flight Strips



PTZ View for each airport

Support Information & Control Functions

Voice Communication

# PJ05 – Remote Tower Module LfV





# PJ05 – www.remote-tower.eu



# MRTC Concept – Considerations DFS

## ❖ Design Considerations

### ➤ Airports

- Scalability for n airports
- Provision of ATS with high traffic numbers

### ➤ Human Machine Interface

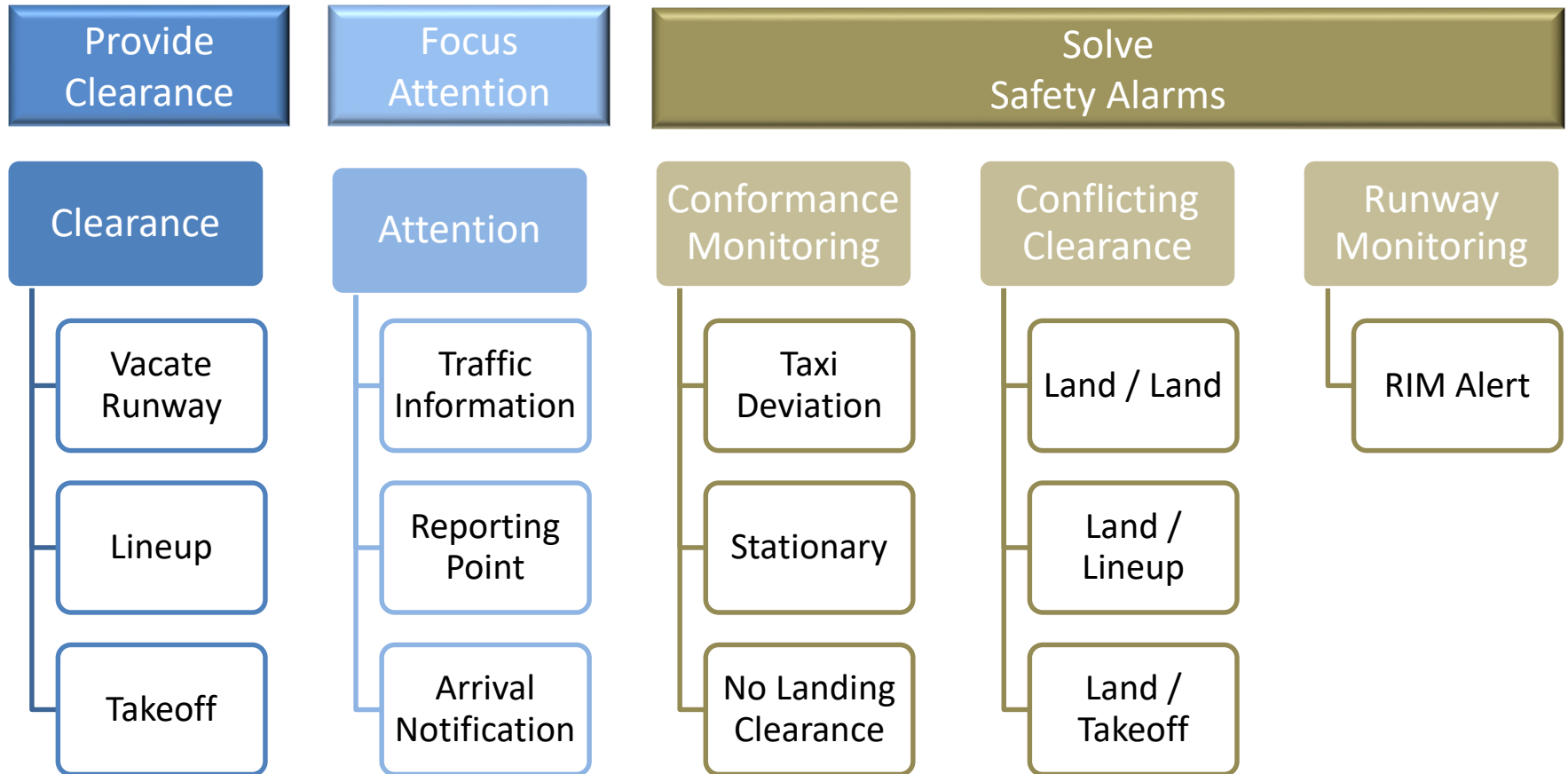
- Reduction of displayed Information to ‚need to know‘
- Information is preprocessed according to specific situation

### ➤ Information Processing

- Focussing attention via Events
- High degree of automation,  
supported by low cost surveillance (optional Element)

# MRTC Concept - Event Types (examples)

Events indicate the ATCO that an action is required





# MRTC Concept – Principles DFS

## ❖ Airports are equipped with

- Electronic Flightstrip System
- Visual Representation
- Low cost surveillance (air and ground) - optional

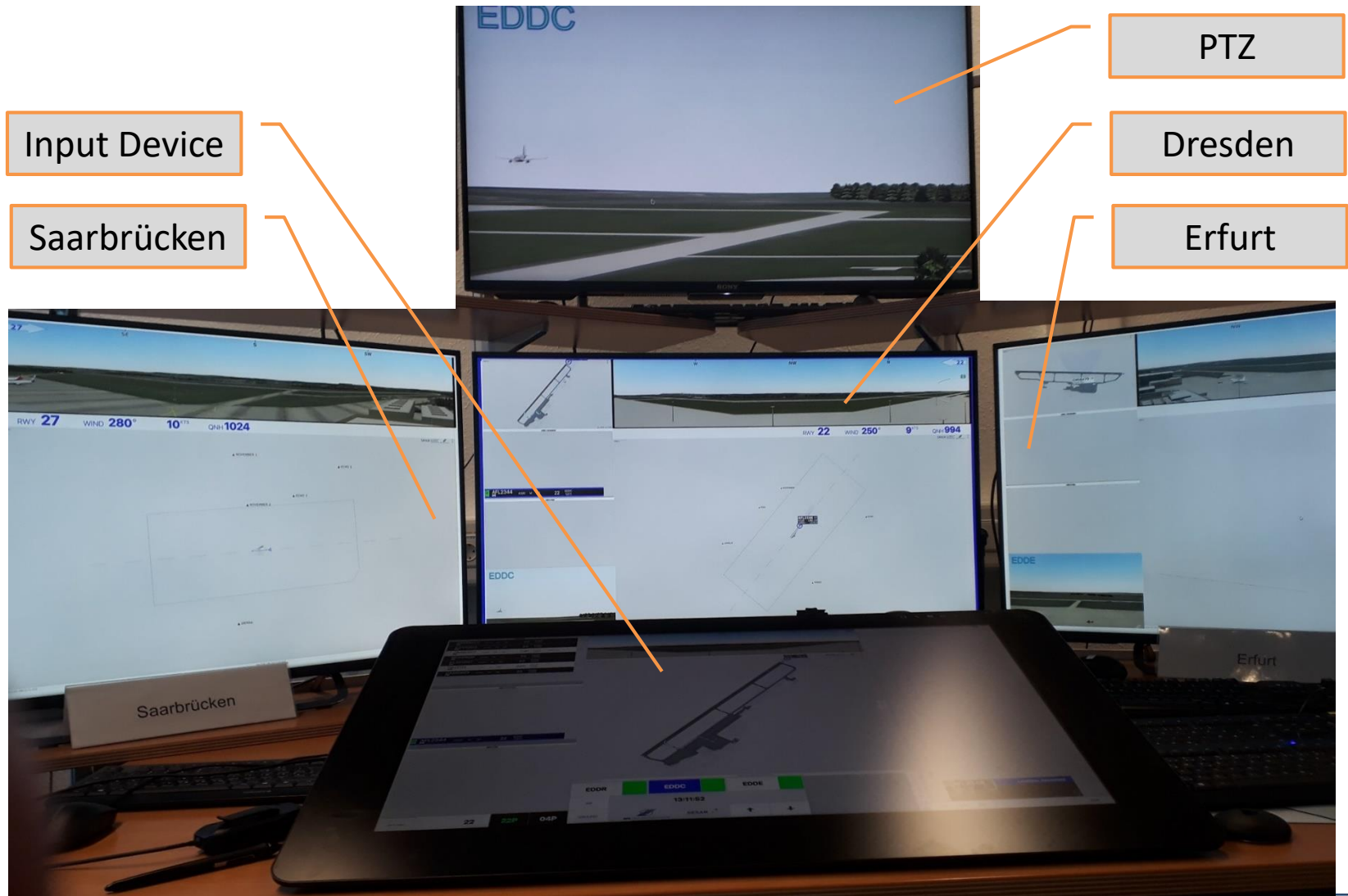
## ❖ Automation Level

- Supportsystem -> ATCO remains responsible
  - Automation Support based on Events for Standard Procedures using conservative Separations
- ATCO works manually – i.e. independently of Events
  - Increase capacity (i.e. avoid delay)
  - Provide non-standard procedures

# MRTC Prototype – Paper Prototyping



# MRTC Prototype - Setup



# MRTC Prototype – Airport Information

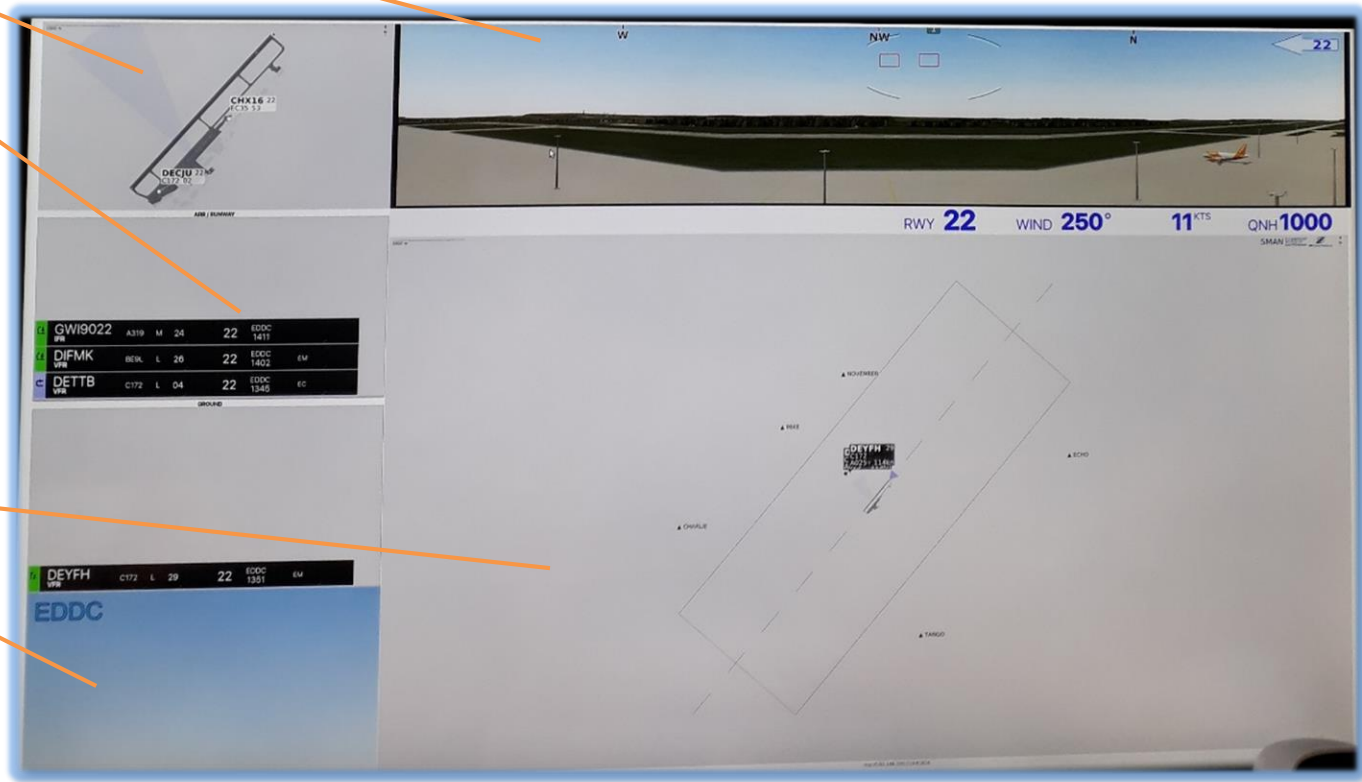
Panorama

Ground Surv.

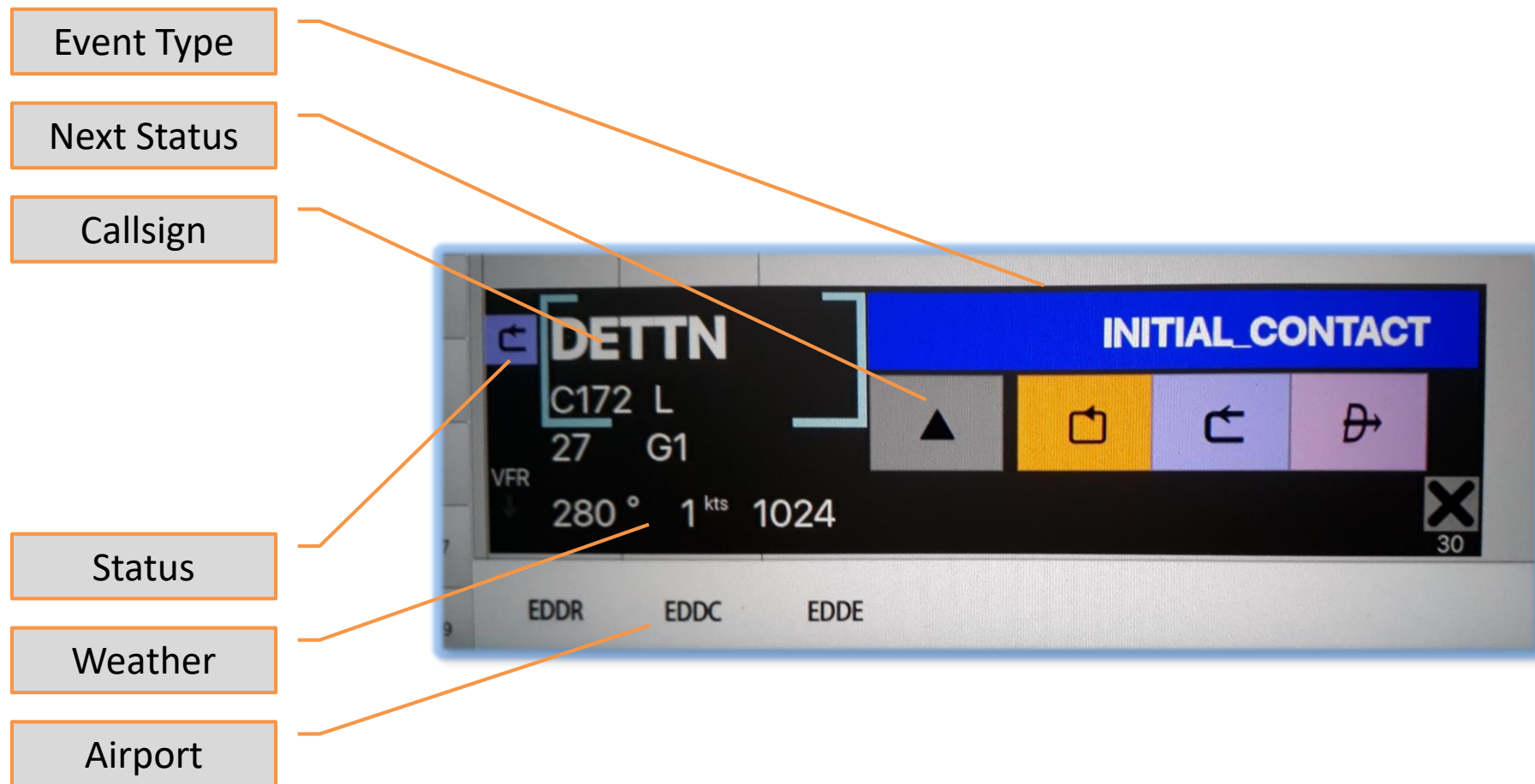
Flightstrips

Surveillance

PTZ

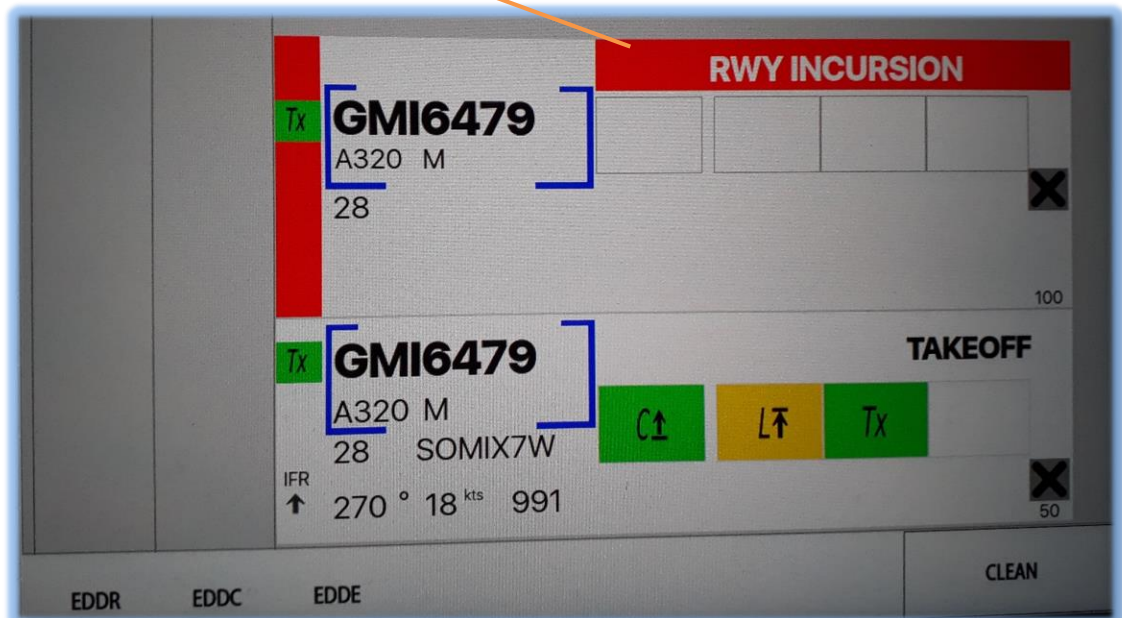


# MRTC Prototype - Events



# MRTC Prototyp – Event Safety

Priority





# MRTC - Transfer

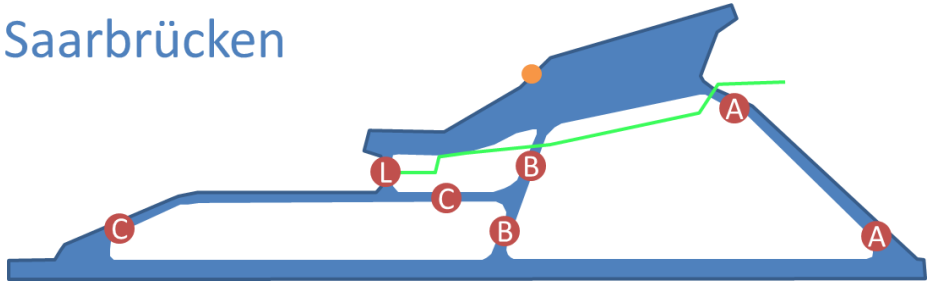


Secondary  
MRTM

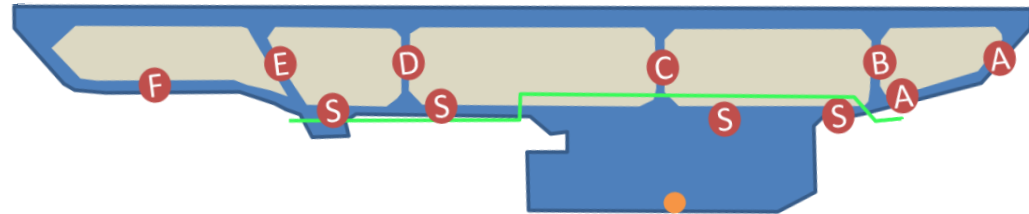
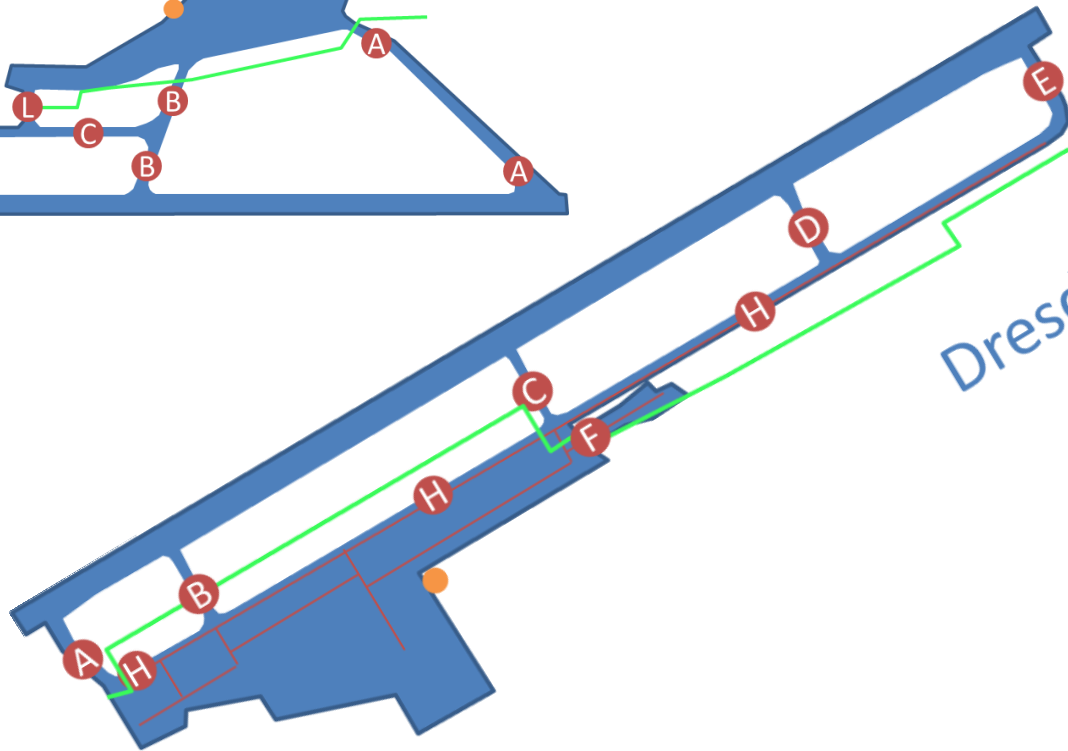
Primary  
MRTM

# DFS Exercise - Aerodrome Layout

Saarbrücken



Dresden



Erfurt



# DFS Exercise - Reporting Points

