REMOTE TOWER

PJ05 Summary

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Founding Members
EUROPEAN UNION EUROCONTROL

DLR

SESAR JOINT UNDERTAKING

S2020 IR Work Programme

Industrial Research and Validation

Transversal for Wave 1 and 2

- Content Integration — **PJ19** PL: ECTL
- Master Plan Maintenance — **PJ20** PL: ECTL
- Val and Demo. Engineering — **PJ22** PL: ENAV

High Perf. APT

- Increased Rwy & Airport Throughput — **PJ02** PL: ECTL
- Integrated Surf. Mgt — **PJ03a** PL: ENAV
- APT Safety Nets — **PJ03b** PL: DSNA
- Total Airport Mgt — **PJ04** PL: SEAC

PJ05 Remote Tower
DLR (AT-One)

Optimised Network Man.

- Advanced Airspace Mgt — **PJ08** PL: ECTL
- Advanced DCB — **PJ09** PL: ECTL
- Optimised AU Operations (UDPP) — **PJ07** PL: ECTL

Advanced ATS

- Enhanced ARR & DEP Mgt — **PJ01** PL: NATS
- Separation Mgt En-route & *TMA* — **PJ10** PL: DFS
- Enhanced A &G Safety nets — **PJ11** PL: ECTL
- Trajectory based Free Route — **PJ06** PL: DSNA

Enabling av. Infrastructure

- CNS — **PJ14** PL: Leonardo
- SWIM Infrastructure — **PJ17** PL: THALES
- 4D Trajectory Management — **PJ18** PL: Indra
- Common Services — **PJ15** PL: Indra
- CWP/HMI — **PJ16** PL: THALES
- Air vehicles systems — **PJ13** PL: Leonardo

Past ‘Multiple’ Research

First DLR Multiple trials (2010)

SESAR P06.09.03 & P06.08.04 (2014)

PJ05 Project objectives and scope

PJ05 addressed remotely provided Air Traffic Services for **multiple aerodromes** and the **flexible allocation of aerodromes within an RTC**. By improved HMI of the remote tower modules, planning tools and split/merge procedures, air traffic controllers and supervisors will be able to:

- handle **two or more airports** simultaneously by **increased situational awareness**,
- to coordinate **complex traffic patterns** and workload peaks by **flexibly allocating** aerodromes,
- to **increase the overall efficiency** of aerodromes connected to an RTC.
- **remote met observations** for all possible airports

Project objectives and scope

PJ05
Remote Tower for Multiple Airports
DLR (AT-One)

WP1 Project Management

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WP2 Sol 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_a&b
EXE-05.02-V3-2.5_ENAV

WP3 Sol 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

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WP5 Solution PJ.05-05

Advanced Automated MET System

LPS (B4)

Validation Perspective (oper. solutions)

PJ.05.02 – Solution 2 (V2)

- To design and validate the provision of ATS on a RTM for two or more aerodromes simultaneously.

- **PJ.05.02 – Solution 2 & V2**
- ON / FRQ / DLR (AT-One)
- COOPANS / NATMIG / NLR (AT-One)
- INDRA / AVINOR
- HC / FRQ / DLR (AT-One)

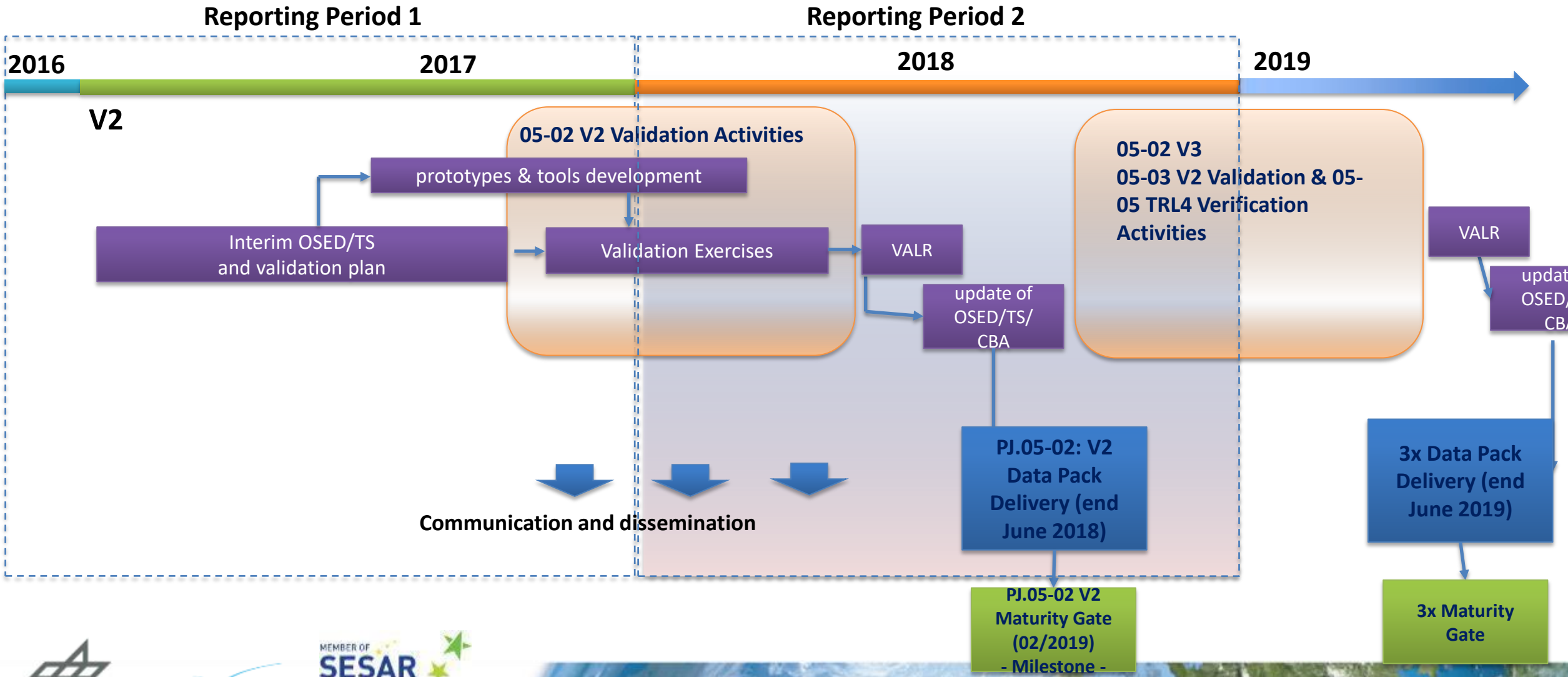
- **PJ.05.02 – Solution 2 & V3**
- COOPANS / NATMIG / NLR (AT-One)
- INDRA / AVINOR
- HC / FRQ / DLR (AT-One)
- ENAV

PJ.05.03 – Solution 3 (V2)

- To design and validate the flexible use of the human resource and connected aerodromes flexible and dynamic in a RTC.

- **PJ.05.02 – Solution 2 & V2**
- ON / ~~THALES AS~~ / FRQ / DLR (AT-One)
- COOPANS / NATMIG / NLR (AT-One)
- INDRA / AVINOR
- ~~HC / Thales AS~~
- DFS / FRQ /DLR (AT-One)

PJ.05 high level life cycle



A typical Validation setup

Mid - Run
- ISA – Scale

Post – Run
- NASA-TLX
- SASHA
- AIM
- Safety
- Tailored questions
- Etc…

Debriefing
- open questions to:
  - acceptance and
  - recommendations for improvement

Safety Assessment

Can the situation be solved without major impairment?

YES →

No impairment Good	ATCO workload is low to easily achieve the desired performance.	1
No impairment Good	ATCO workload is adequate to achieve the desired performance.	2
Minor impairment Fair	ATCO requires a minor increased workload to achieve the desired performance.	3

NO ↓

Can the situation be solved by measures reducing capacity?

YES →

ATC influences capacity

Impairment of efficiency

Minor Unpleasant delays	ATCO responds with delay to pilot's requests.	4
Moderate Disturbing delays	Situation leads to moderate delays in the traffic management.	5
High Very disturbing delays	Situation leads to strongly delays in the traffic management.	6

NO ↓

Can the situation be solved by measures reducing safety?

YES →

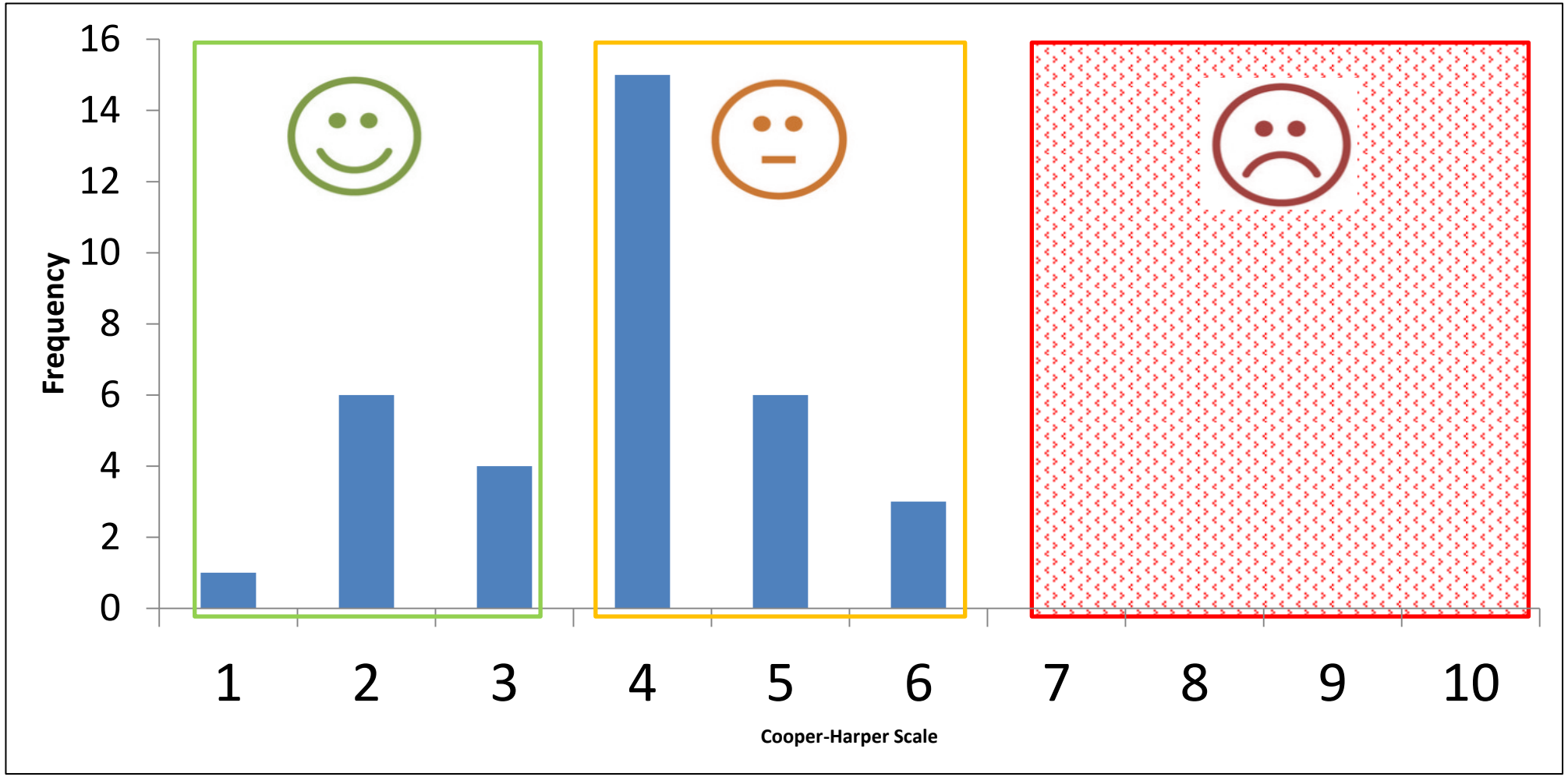
ATCO workload is too high and should be reduced

NO →

Impairment of safety

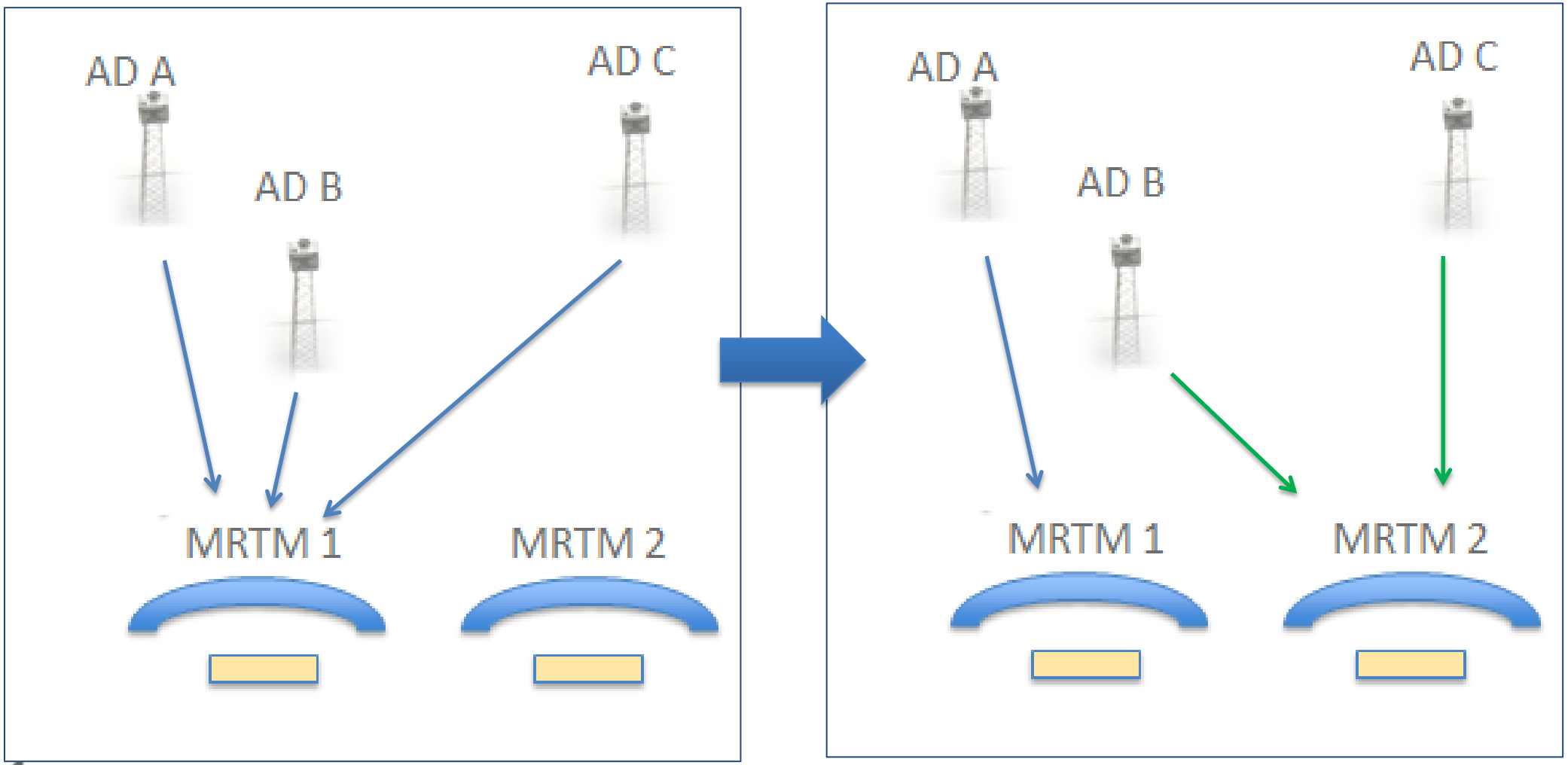
Impairments in prediction of traffic development	ATCO directs traffic sporadically, abruptly and does no longer plans ahead.	7
Impairments due to information processing	ATCO cannot build a complete picture of the traffic situation, confuses information and corrects himself/herself often.	8
Impairments due to information gathering	ATCO must neglect areas/information while monitoring and therefore misses aircraft.	9
Major Impairment	ATCO cannot longer control the traffic situation.	10

Safety Results



N = 35
M = 3.80
SD = 1.24

Splitting & Merging




DLR

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

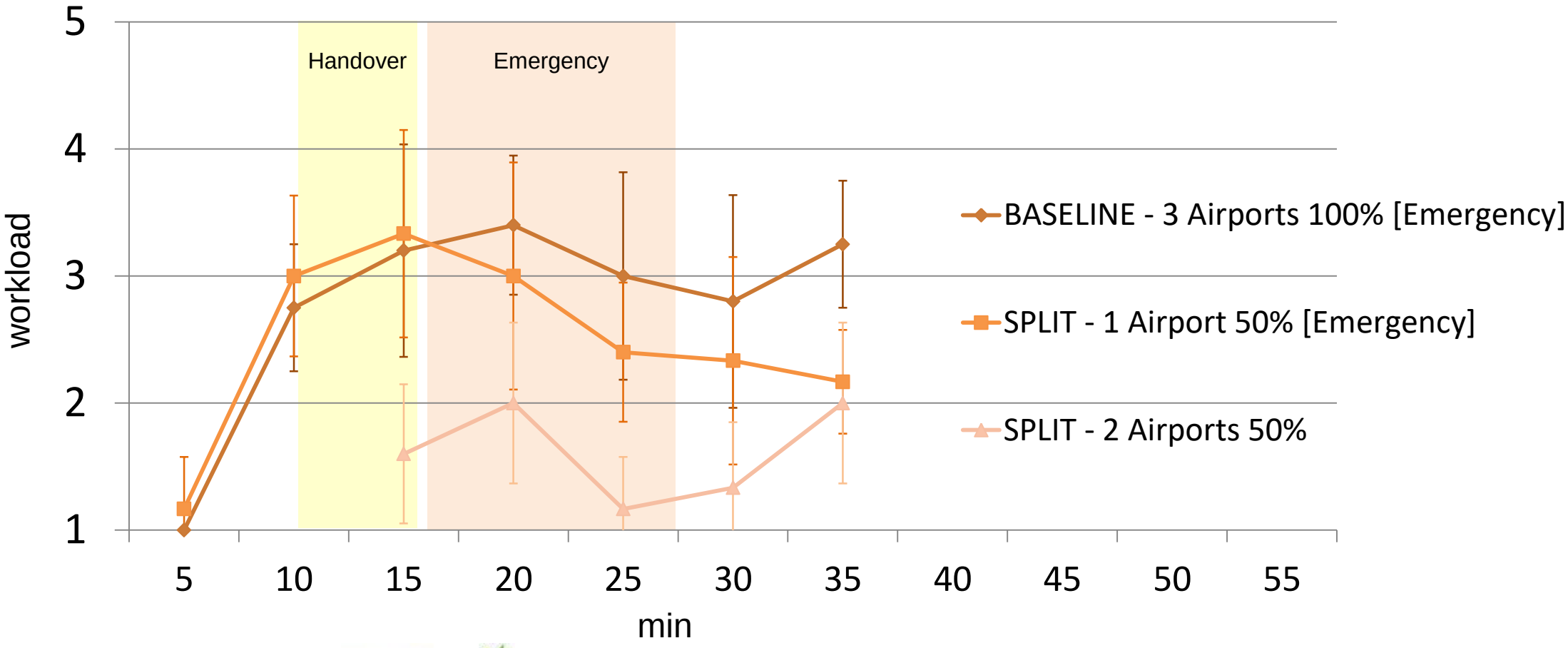
3. Actual HANDOVER

ATCO-TAKEOVER Information copied. Taking over

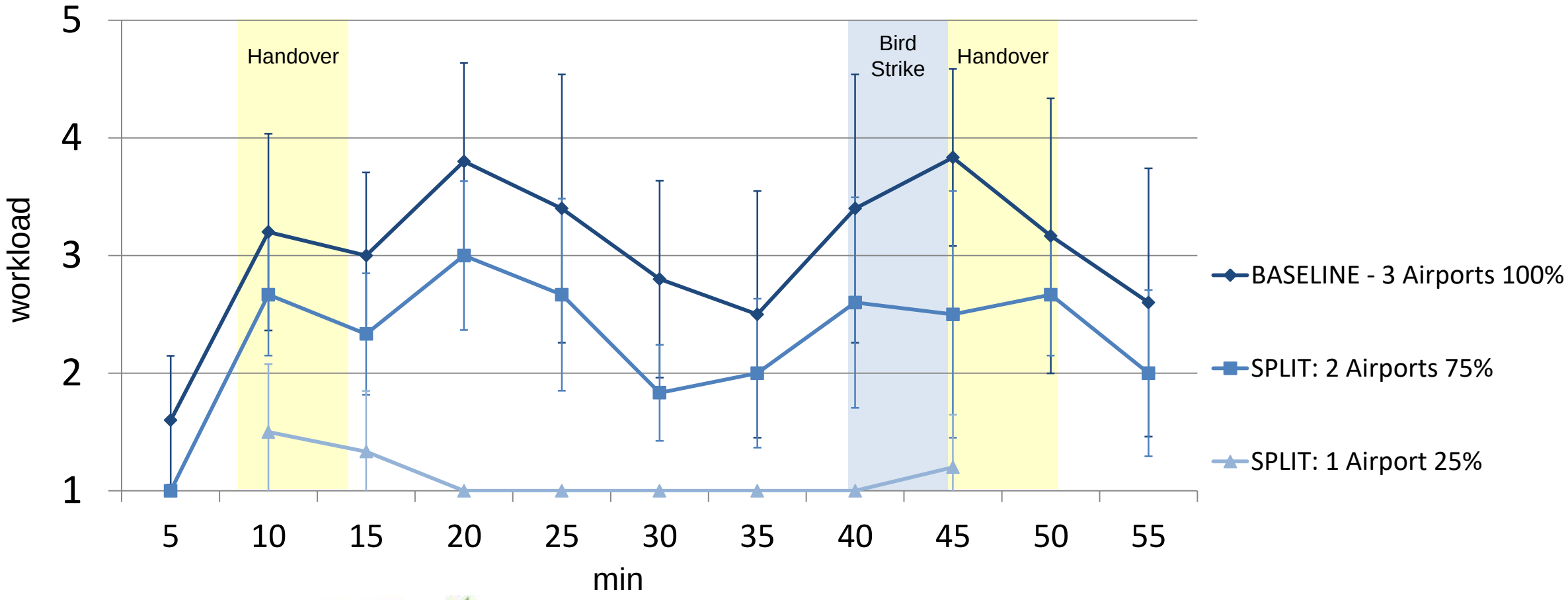
ATCO-HANDOVER Roger

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

I.S.A. Workload over the time



I.S.A. Workload over the time



Communication/Dissemination via Social Business Media

DLR Member of AT-One MEMBER OF SESAR JOINT UNDERTAKING

REMOTE TOWER

www.remote-tower.eu

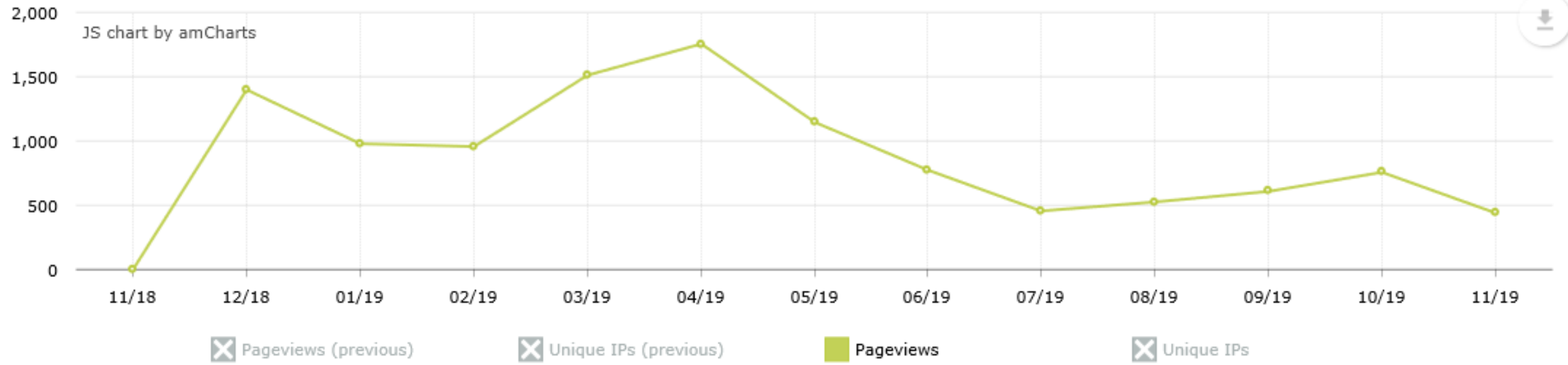
Home

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

Stats for www.remote-tower.eu

Pageviews



Traffic at a Glance

Pageviews	13.176
Days in Range	365
Average Daily Pageviews	36
From Search Results	1.852
Unique IPs	1.956

Currently Online

No data to display

Recent Search Terms

Results 1 - 20 of 78

- premisses
- remote tower eu
- raytheon
- sesar remote tower

Main Conlcusions from PM‘s view 1/2

- Thales withdrawal and PJ05-05 creation cause additional not preplanned trouble and effort but greatly solved by all
- 12 exercises conducted as planned
- No immediate barrieres in terms of operational feasibility
    - Safety not compromised
    - „Multiple“ identified as a normal contributor to complexity which is to be controlled like it is done today
    - Phraseology, degrade mode, emergencies, Panorama view design to be further tested in V3 phase
    - Split&Merging seems to be an excellent workload balance procedure (to be further tested in W2 V3!)

Main Conlcusions from PM‘s view 2/2

- Results are thoroughly reported
- Excellent com/diss of the activities and results
- Project successfully accomplished
- Ready for implementation and Wave2

Myths to Multiple Remote Tower

- An ACTO is not able to work multiple
- *Multiple* needs new procedures
- *Multiple* only works with additional ground surveillance
- ATCOs do not like working *multiple*


Be prepared for
the future !

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