

A case study to obtain CA approval for rTWR

Zoltán Molnár

ATM Safety and Risk Management
Specialist

COLOGNE
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CONTENTS

1. Remote Tower solution of Budapest
2. Safety assessment & CA approval
3. How can ED 2015/014/R support safety assessment and CA approval?
4. ED 2019/004/R and the way forward

REMOTE TOWER

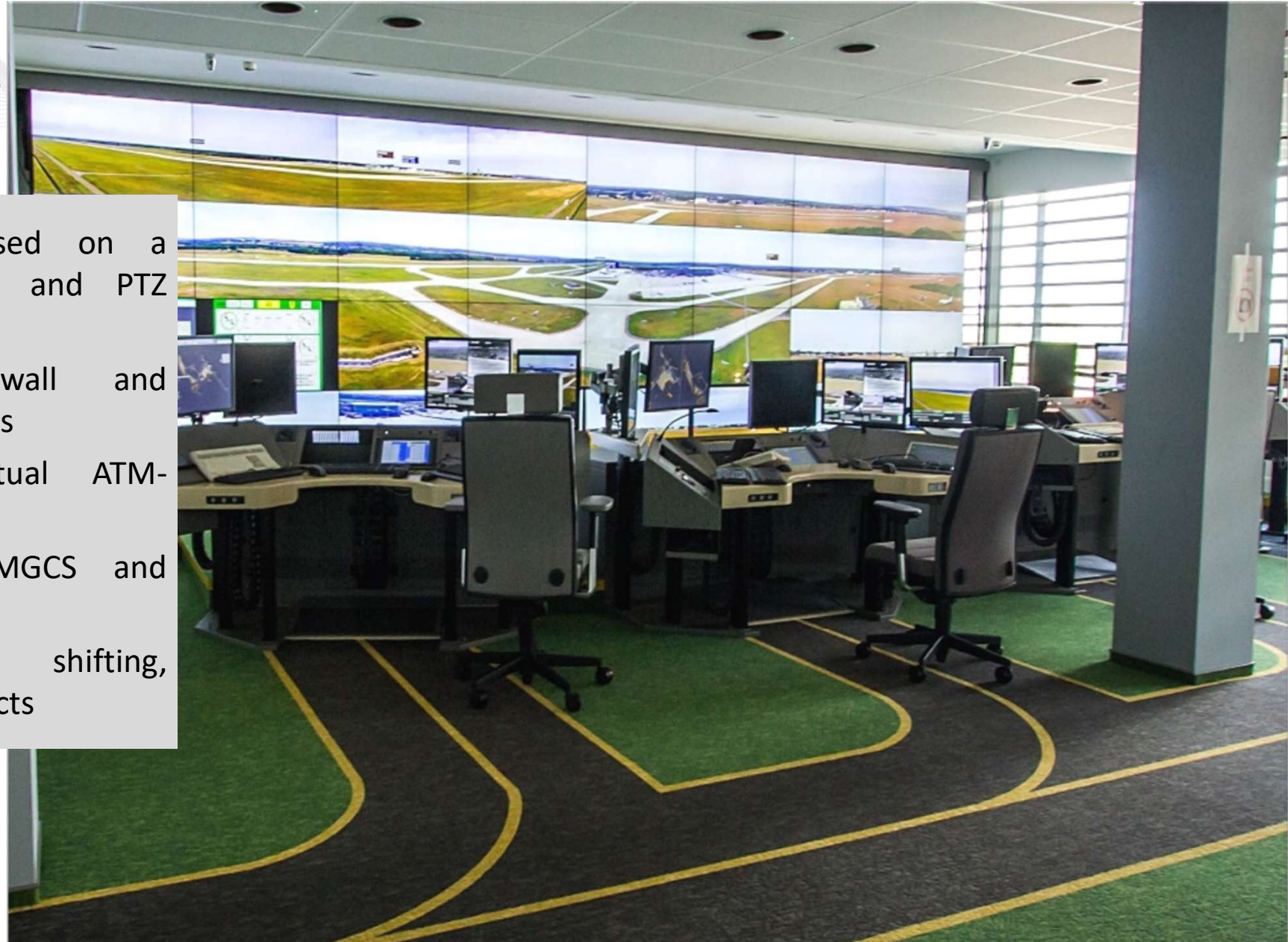
Triggers of the change



- More than 30 years old concrete tower building, facing enormous maintenance costs
- The tower building belongs to the airport, rented by HungaroControl with common responsibilities
- Multiple airport closures due to infrastructural malfunctions in 2012 and 2015
- Staff separated from HQ, inconvenient access (SRA procedures)
- Complete reconstruction of the tower building is not expected in the near future

rTWR at LHBP

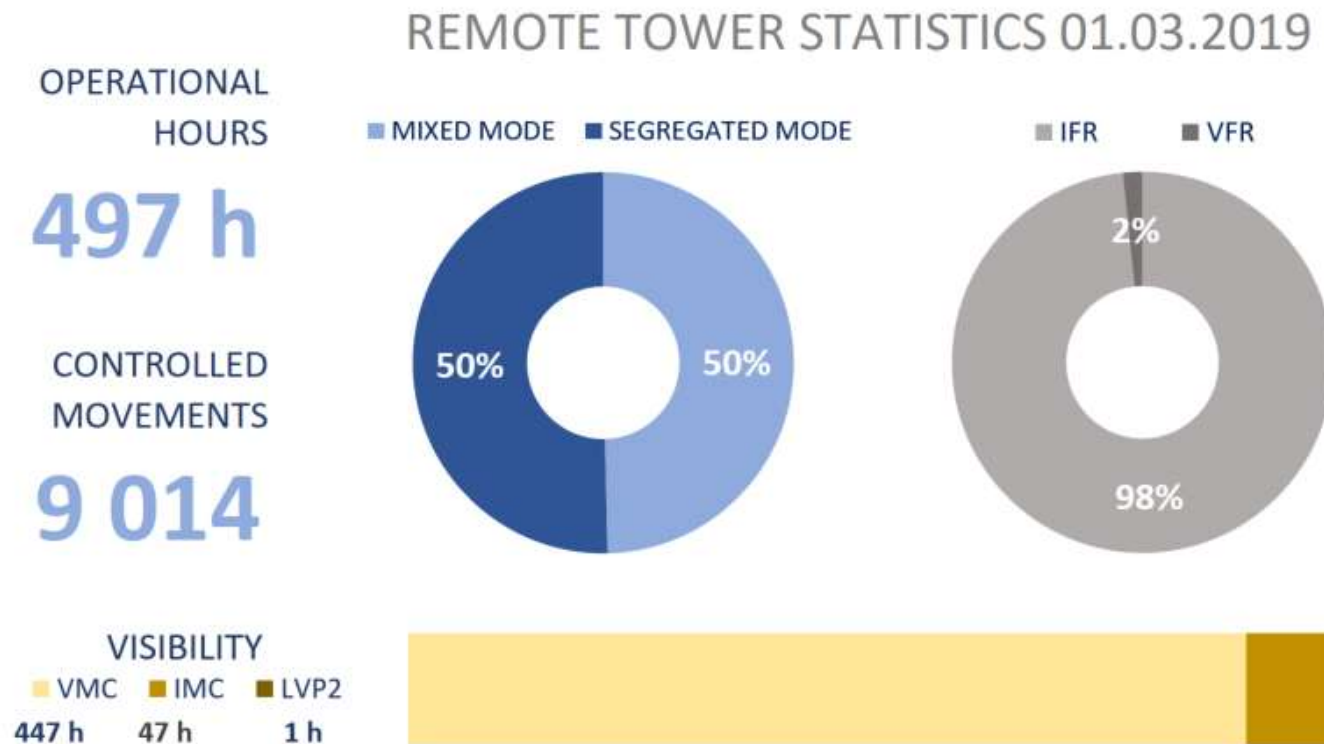
- Visualization is based on a camera system (fix and PTZ cameras)
- Configurable videowall and individual CWP screens
- Duplication of actual ATM-systems
- Integration of A-SMGCS and cameras
- ATCO paradigm shifting, awareness of HP aspects



Support functions



Current rTWR experience



Stages of implementation



2016 – SESAR Very Large Scale Demonstration



2017 – rTWR certified as a contingency site
(TWR is the main system)



rTWR as main system
(TWR as contingency)

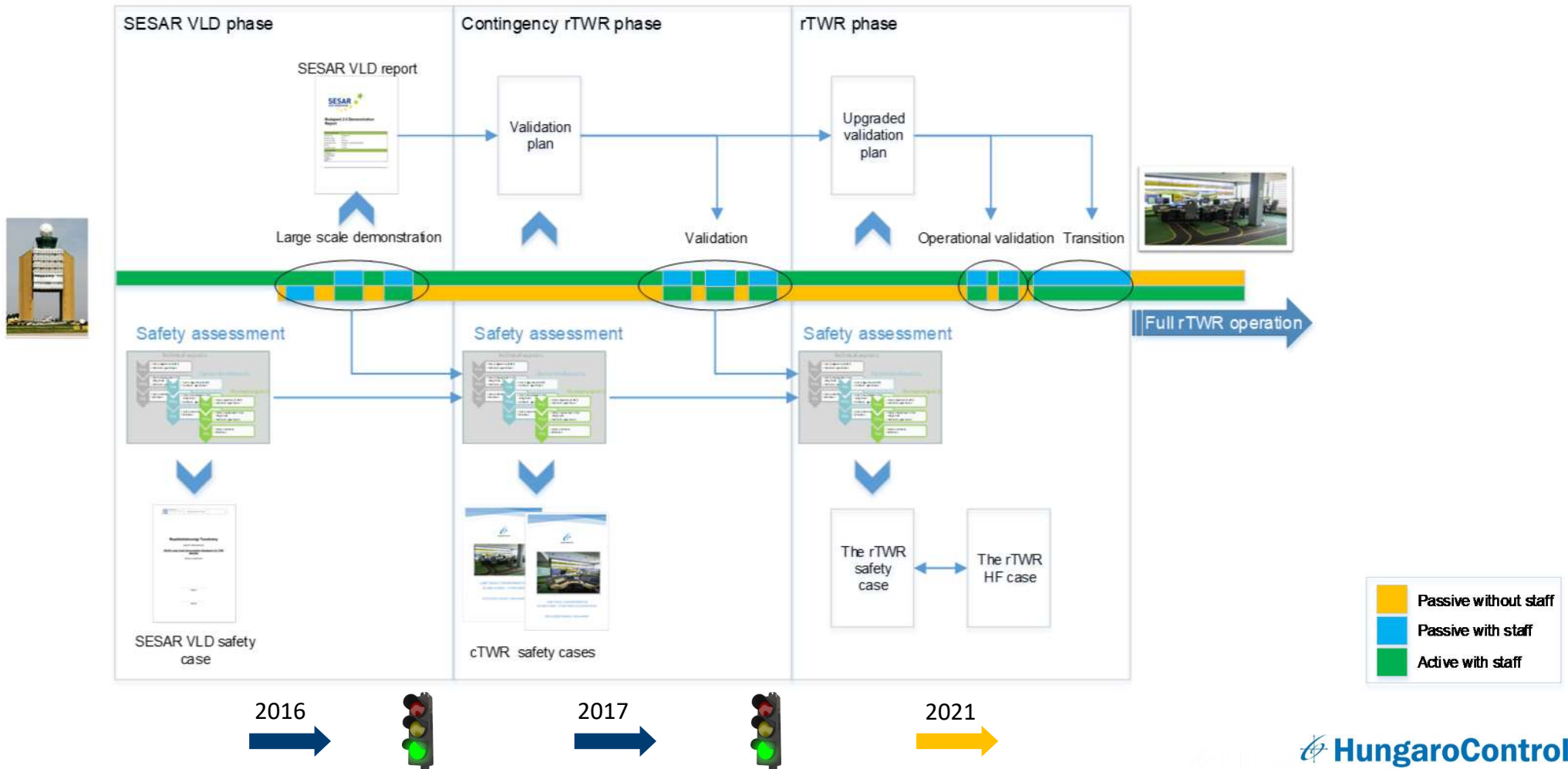


Multifunctional rTWR center
(main and contingency systems are rTWR)

Safety assessment & CA approval

A blue-tinted photograph of an airplane in flight, viewed from below, with airport lights visible in the background. The airplane is centered in the frame, flying towards the viewer. The background shows a city skyline and airport infrastructure under a clear sky.

Safety strategy



How it all begin?



Difficulties in the 1st phase:

- New, innovative concept – limited experience in 2013
- New to the CA – hard to plan review of the change
- Limited rTWR-related regulation, or support material
- CA and ANSP opinions differ regarding the necessary documentation

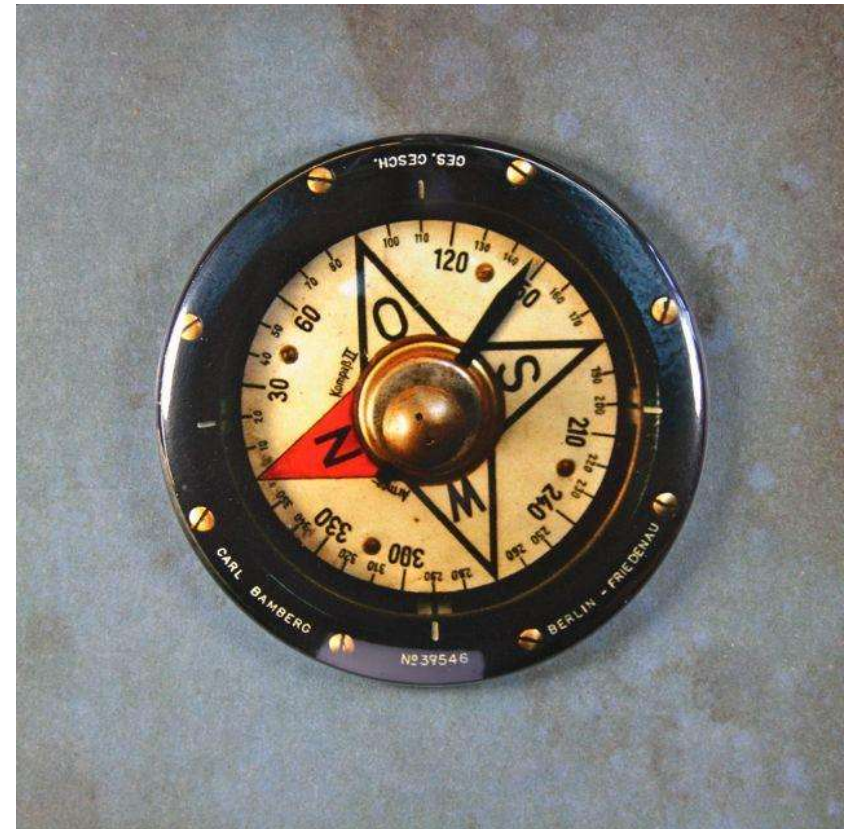
CA approval strategy

Now is the time to coordinate with the CA

- Common understanding of the requirements
- Guidance on compliance issues and expectations
- Necessary documentation structure

Our solution

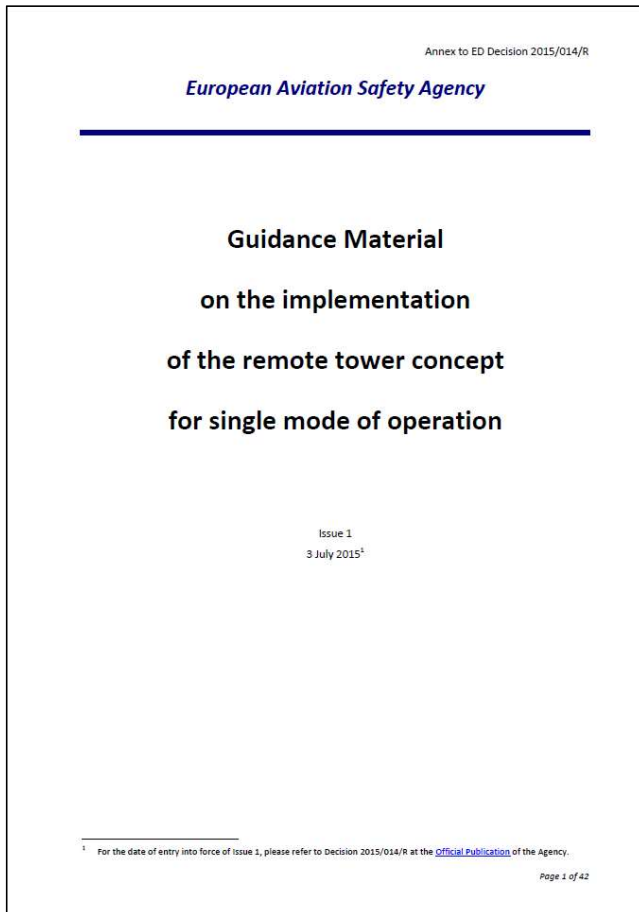
- Early involvement of the CA (kick-off meeting just after the internal decision)
- CA representatives were invited to the risk assessments
- Continuous provision of the documentation to avoid final overload



ED 2015/014/R & CA approval



Overview



- Gives a general overview on rTWR-related requirements
- Useful tool to reach a wider understanding on the affected parts of the ATM functional system
- Supports the steps of safety assessment
- Helps to reach a common understanding with the CA

- Not all of the requirements are based on a regulation
- Not a checklist – requirements gives an overview of the areas to focus
- Not an exhaustive list of requirements

Constraints in LHBP

The document is mainly gives directions for:

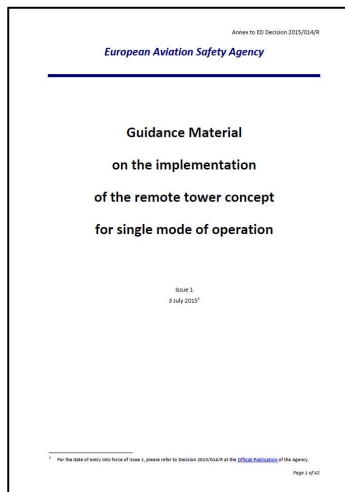
- Small aerodromes
- New ATC service
- Permanent rTWR service



Our solution:

- Medium aerodrome (general considerations)
- Existing ATC service (implementation)
- Temporary rTWR service (transition)

How to interpret?



Requirement	Action
Based on a regulation	Compliance is a must
Other requirement	It must be taken into consideration, non-compliance must be justified

- Requirements and actions should be derived from one of the above
- Result: a clear list of requirements and actions, and the place of these in the project

Not a full list, all other relevant input need to be considered too



A basic requirement list

Reference	Title / Topic	Objectives / requirements	Req. type	Status	Evidence or justification
2.5.4. Management of assets – Management of navigation aids	Safety	According to ICAO Doc 4444, the ATCO/FISO shall select the runway in use for which it could be necessary to have the capability to select the navigation aids (e.g. Instrument Landing System (ILS)) associated to the operation [...]	Obligatory	Compliant	Reference Evidence

- It can be implemented on an Excel sheet
- Helps to identify the questions and issues as soon as possible
- A good basis to have the same understanding with the CA

Operational concept/safety considerations

Main goal: to understand the change itself, and to identify the potential effects on the ATM functional system

OCD/CONOPS document

Safety considerations
templates

Logical/functional models
of the system

List of regulations to
comply with

List of relevant standards
and best practices



ED 2015/014/R helps to identify:

- The impacted parts of the ATM functional system
- The impacted interfaces
- The potential new parts of the system
- Interdependencies with other service providers
- The high level operational requirements
- The possible benefits of the change

Safety assessment

Appendix 2: List of operational hazards for ATC services

ID	Description	Operational effects
OH-01	Remote ATC incorrectly coordinates with other ATSU with respect to inbound/outbound traffic.	A potential conflict can be induced Imminent infringement
OH-02	Remote ATC incorrectly manages the entry of a flight into traffic circuit.	A potential conflict can be induced Imminent infringement
OH-03	Remote ATC incorrectly manages arriving aircraft.	A potential conflict can be induced Imminent infringement
OH-04	Remote ATC incorrectly manages departing aircraft.	A potential conflict can be induced Imminent infringement
OH-05	Remote ATC fails to provide appropriate separation to traffic in the vicinity of the aerodrome.	Imminent infringement
OH-06	Remote ATC fails to provide appropriate separation to traffic with respect to restricted areas.	Tactical conflict
OH-07	Remote ATC incorrectly manages missed approach situation.	Imminent infringement
OH-08	Remote ATC does not detect in time conflicts/potential collision between aircraft in the vicinity of the aerodrome.	Imminent collision
OH-09	Remote ATC does not detect in time restricted area infringements.	Tactical conflict
OH-10	Remote ATC fails to provide appropriate instruction to resolve a conflict between traffic in the vicinity of the aerodrome.	Imminent collision
OH-11	Remote ATC fails to provide appropriate instruction to resolve an airspace infringement.	Tactical conflict
OH-12	Remote ATC fails to provide appropriate information to departing aircraft for the start-up.	Tactical taxiway conflict generated
OH-13	Remote ATC fails to enable push-back/towing operations to appropriate aircraft.	Tactical taxiway conflict generated
OH-14	Remote ATC provides inadequate taxiing instruction to aircraft on the manoeuvring area.	Encounter with aircraft, vehicle or obstacle
OH-15	Remote ATC provides inadequate taxiing instruction to vehicle on the manoeuvring area.	Encounter with aircraft, vehicle or obstacle
OH-16	Remote ATC does not detect in time potential conflict on the manoeuvring area.	Imminent collision
OH-17	Remote ATC fails to provide appropriate instruction to resolve conflicts on the manoeuvring area.	Imminent collision



ED 2015/014/R helps to

- Identify the main steps (checklist)
- Identify hazards under normal and abnormal conditions
- Highlight the most important aspects
- Have a more complete hazard list
- Identify safety requirements and mitigation actions

HZ-OPS-TS-5-1	Vizuális információk részleges kiesése	Egyre munkaterhelés növekedés új munkahelyre történő beüléskor.	A munkahelyek videokép beállításai eltérőek.	E	4 – Ritka	A videofalon fix képi megjelenítés biztosítja a folyamatos helyzetfelfogást.	E	5 – Rendkívül ritka	Az adott munkahelyek videokép használatának rugalmas alkalmazhatóságát támogatjuk a forgalmi helyzetekhez való könnyebb igazodás céljából.
HZ-OPS-TS-2-1	Felderítési információk részleges kiesése	Helyzettudatosság csökkenése, munkaterhelés növekedés.	A pult rossz beállítása miatt nincs rálátás a videofalra.	E	3 – Alkalmanként	Az rTWR indítása előtt kötelező a pultok ergonómiai beállítása. Árműközsem	E	5 – Rendkívül ritka	
HZ-OPS-TS-9-2	Új munkakörnyezet eltér a régítől	Munkaterhelés növekedés a műszaki állományról	Új rendszer (videofal) kerül üzembeállításra, a légiforgalmi irányító nincs tisztában azzal, hogy melyik kamera képet látja	C	4 – Ritka	Oktatás	E	4 – Ritka	
HZ-OPS-TS-9-3	Új munkakörnyezet eltér a régítől	Munkaterhelés növekedés az irányítónál (szemfáradtság)	Mai beületési szabályok szerint TPC nem számít monitoros munkahelynek	C	2 – Valószínű	Beületési szabályokat a teljes monitoros munkahelyhez kell igazítani, minimális szám ellenőrzése	C	5 – Rendkívül ritka	
HZ-OPS-TS-9-4	Új munkakörnyezet eltér a régítől	Munkaterhelés növekedés az irányítónál	Új rendszer (kamerarendszer, új HMI) kerül üzembeállításra	C	2 – Valószínű	Oktatás, árműközsem, kérdőíves felmérés oktatást követően, csökkentett kapacitás	C	4 – Ritka	

Other safety-related aspects

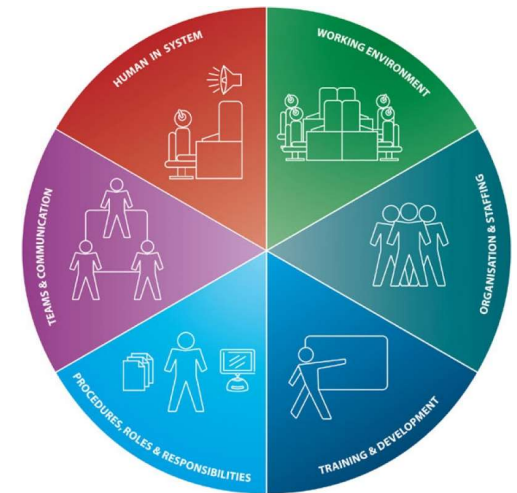
Human performance aspects – Appendix 4 gives a good overview

Training and competence requirements – ED 2015/015/R

Information and cyber security – and the effects on safety

Transition plan – contingency or full capacity rTWR

Contingency plan – Minimum Equipment List



Phases of CA approval

Agree on the main goals & CA expectations

- Clarification of main ANSP goals
- Understanding CA expectations and the level of involvement

Task	Responsible	Due Date	Status
Clarification of main ANSP goals	CA	2023-10-15	Completed
Understanding CA expectations and the level of involvement	CA	2023-10-15	Completed



Conduct Safety Assessment

- Risk assessment meetings & reports
- Human factor assessment meetings & reports
- Validation sessions



Continuous coordination with CA

- CA participation on RA meetings
- Provision of draft/already finalized documents
- Periodic coordination meetings



Provide the Safety Case to the CA for approval

- Finalize safety argument & safety case
- Provide assurance for the elements of the pre-defined table (based on documented evidences)



Safety Assessment Process

rTWR program

ED 2019/004/R and the way forward



Steps forward – ED 2019/004/R

European Union Aviation Safety Agency

Guidance Material on remote aerodrome air traffic services

Issue 2
15 February 2019¹

¹ For the date of entry into force of Issue 2, please refer to Decision 2019/004/R at the [Official Publication](#) of EASA.

"First" impressions

- More detailed and mature document
- Wider range of use cases (MRTM)
- More references to applicable regulations
- Better structure (compared to ED 2015/014/R)

Next steps

- Update the already existing compliance matrices
- Identify necessary actions, modifications
- Prepare for a 2017/373 environment



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Thank you for your attention!



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AN
ANSP**