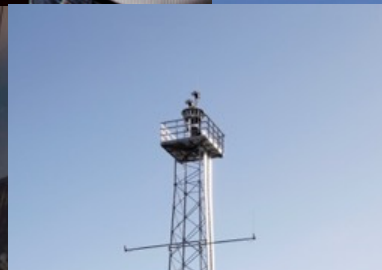
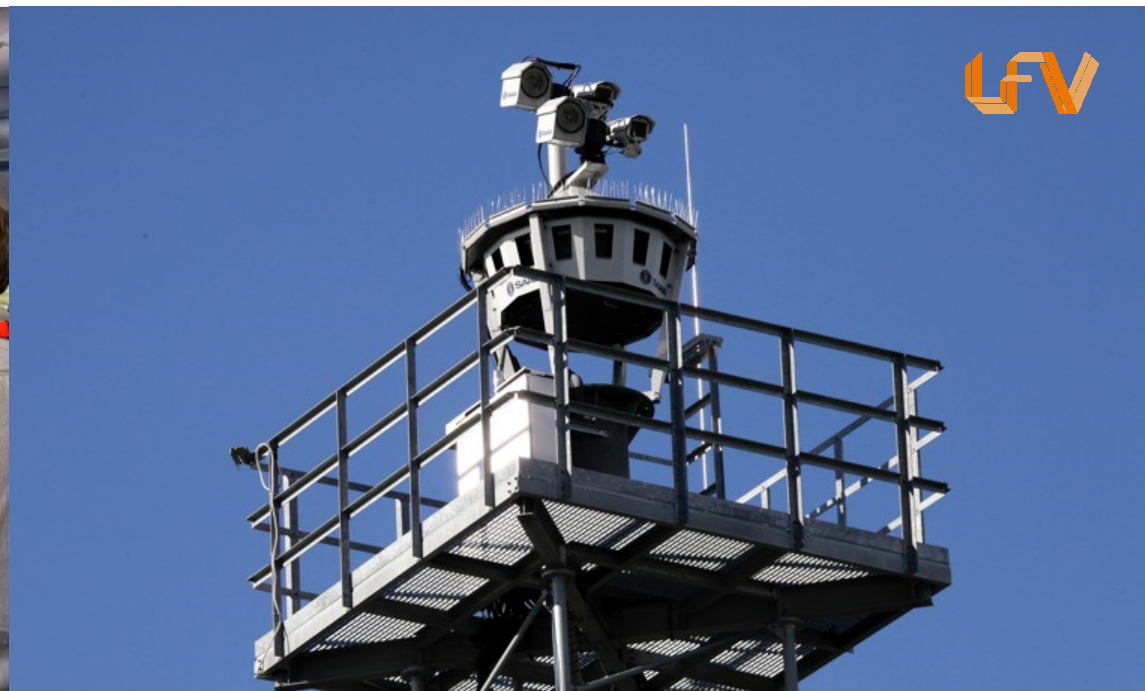


Pontus Bengtsson, Senior ATM Expert, LFV

REMOTE/DIGITAL AERODROME ATS

The Swedish Experience

20 February 2019



Remote aerodrome ATS
First in the world, April 21th, 2015!



Over 25,000 hours of operational experience.



Working Together Creates Synergies!

ANSP Challenges

INCREASED CAPACITY

- ✓ Lack of ATCOs
- ✓ Low utilization of ATC staff
- ✓ Limited flexibility

INCREASED SAFETY

- ✓ Airport & RWY extensions
- ✓ RWY incursion, Airspace infringement, Drones
- ✓ Low vis and darkness

REDUCED COSTS

- ✓ LFV – Competitive markets
- ✓ New or equipment upgrades
- ✓ EU and customers

AIRPORT

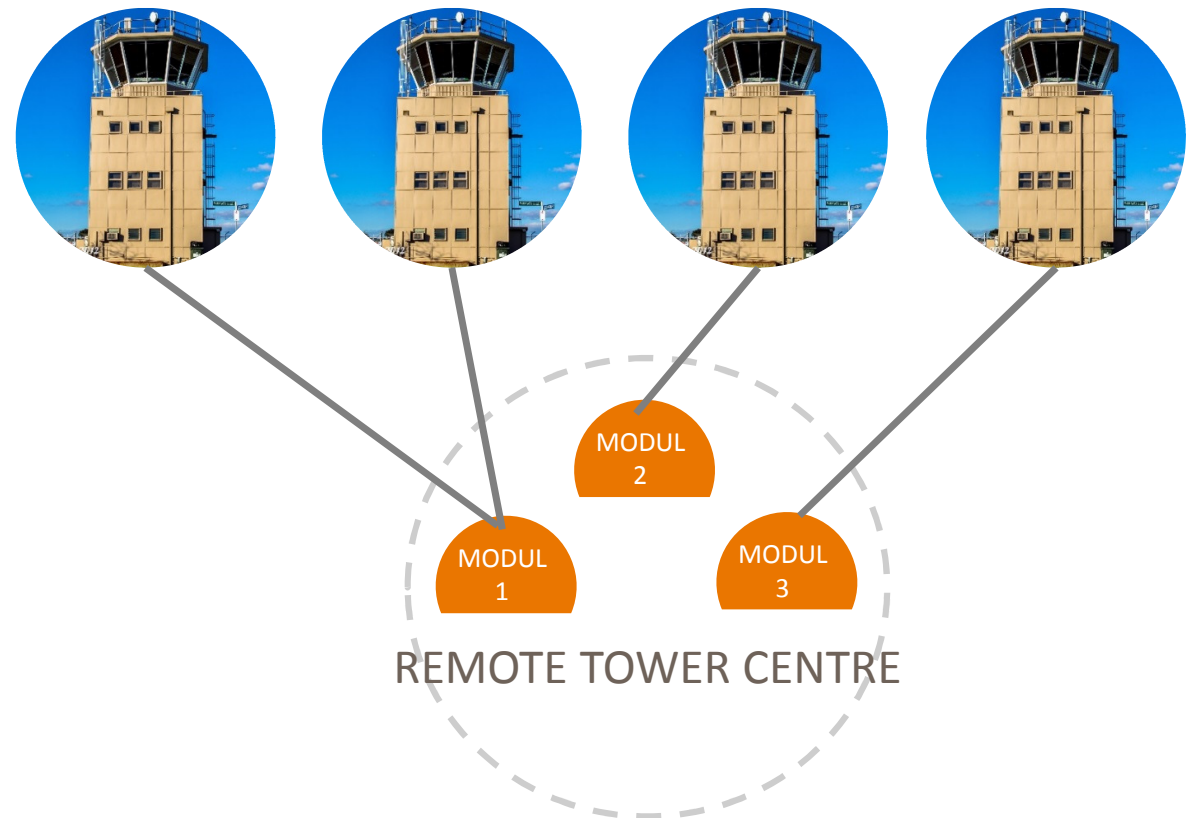
- ✓ New or upgraded Tower building
- ✓ New business models open on demand (Save the Airport)

OPTIMIZATION TODAY



OPTIMIZATION
TODAY

NEW
OPTIMIZATION



A new type of tower at the airport

LFV for ATC

- ✓ 14 cameras
- ✓ 2 zoom cameras
- ✓ 2 signal lights
- ✓ 2 microphones



LFV for AFIS

- ✓ Other Technical Specification



The System Components



Minimum 2 routes
(IP Multicast)

Remote Tower Module – RTM



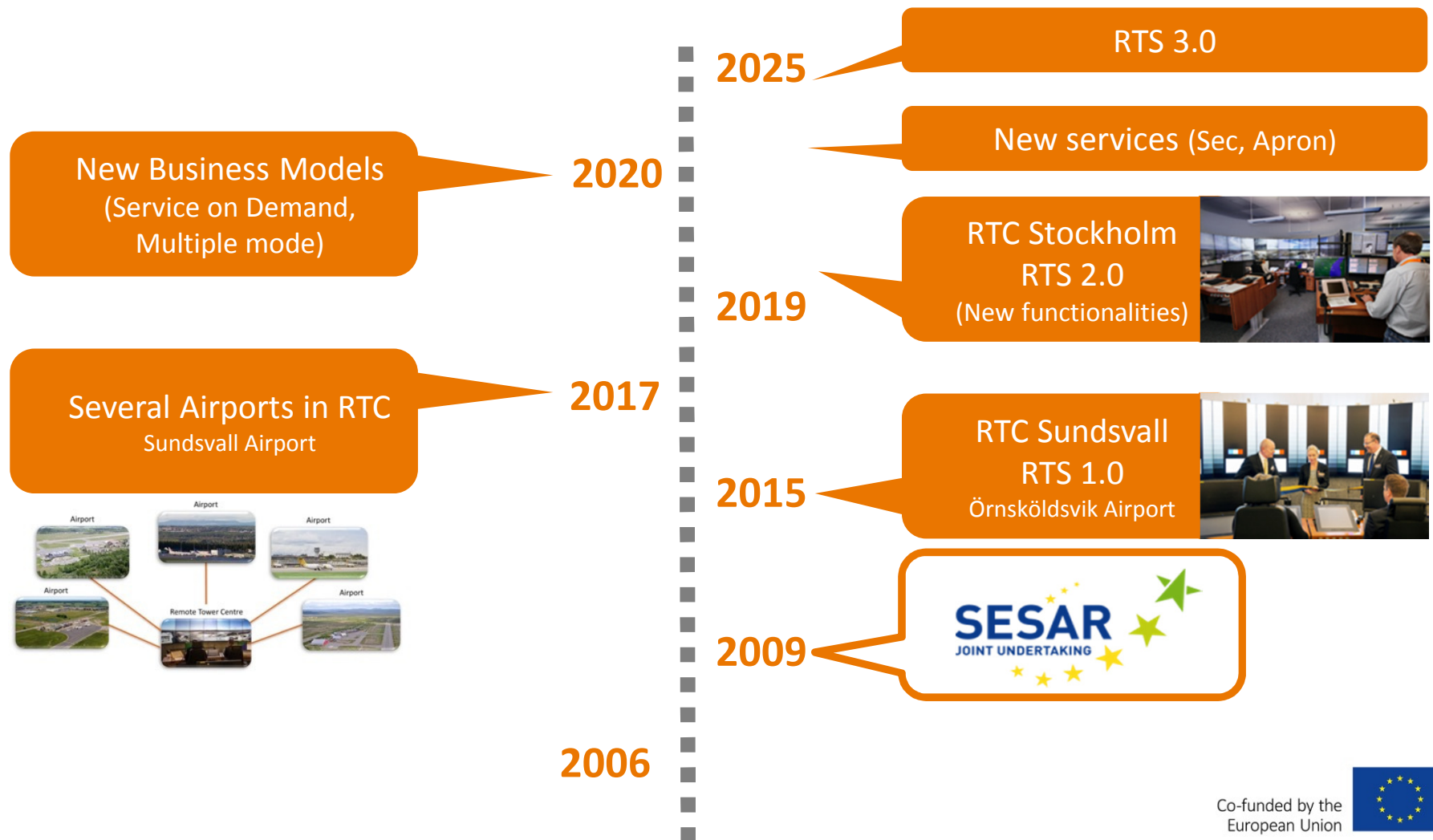
Visual Presentation - VP



Controller Working Position – CWP



Remote Tower Services – the LFV plan



Strategies for realisation

- ✓ Replication a conventional tower
- ✓ Functions non-replicable replaced with similar
- ✓ No extra functionality added

Keep it simple!

Realisation Change of a Functional System

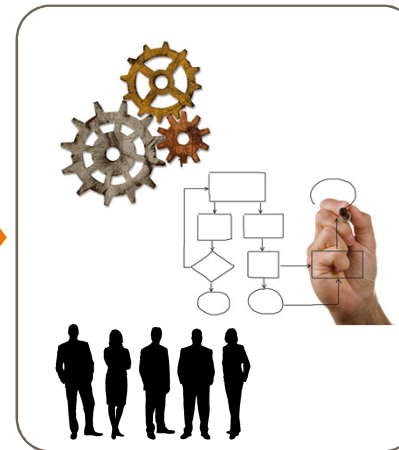
REGULATIONS & DOCUMENTS



SAFETY-RELATED CHANGE TO A FUNCTIONAL SYSTEM



1. TECHNOLOGY 2. PROCEDURES 3. HR



APPROVAL

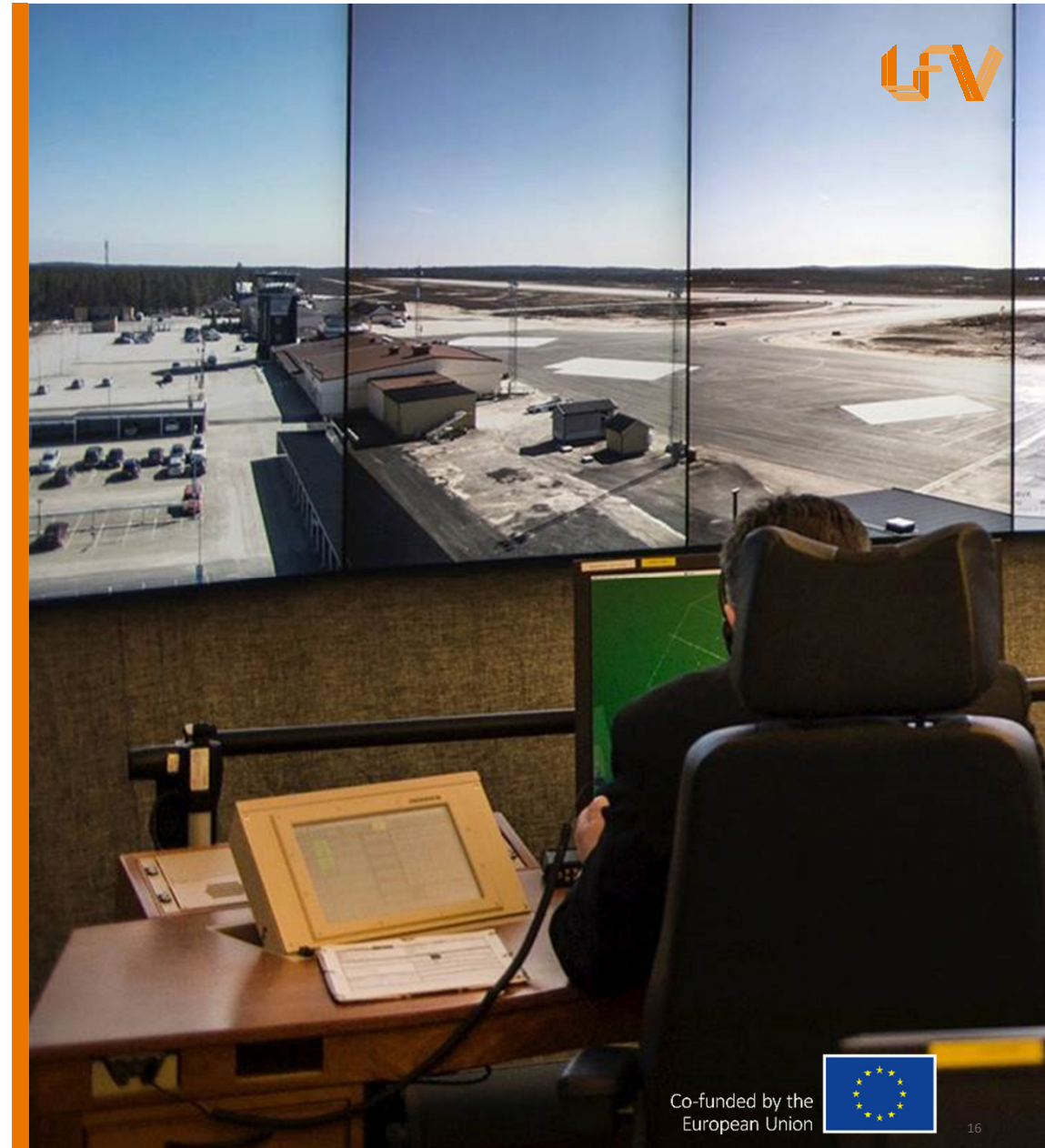


RTC Operational Experiences

- ✓ IMPORTANT MINDSET:

*We shall provide the same service
from a center with new technical tools.*

- ✓ ATCOs can move easily
between airports



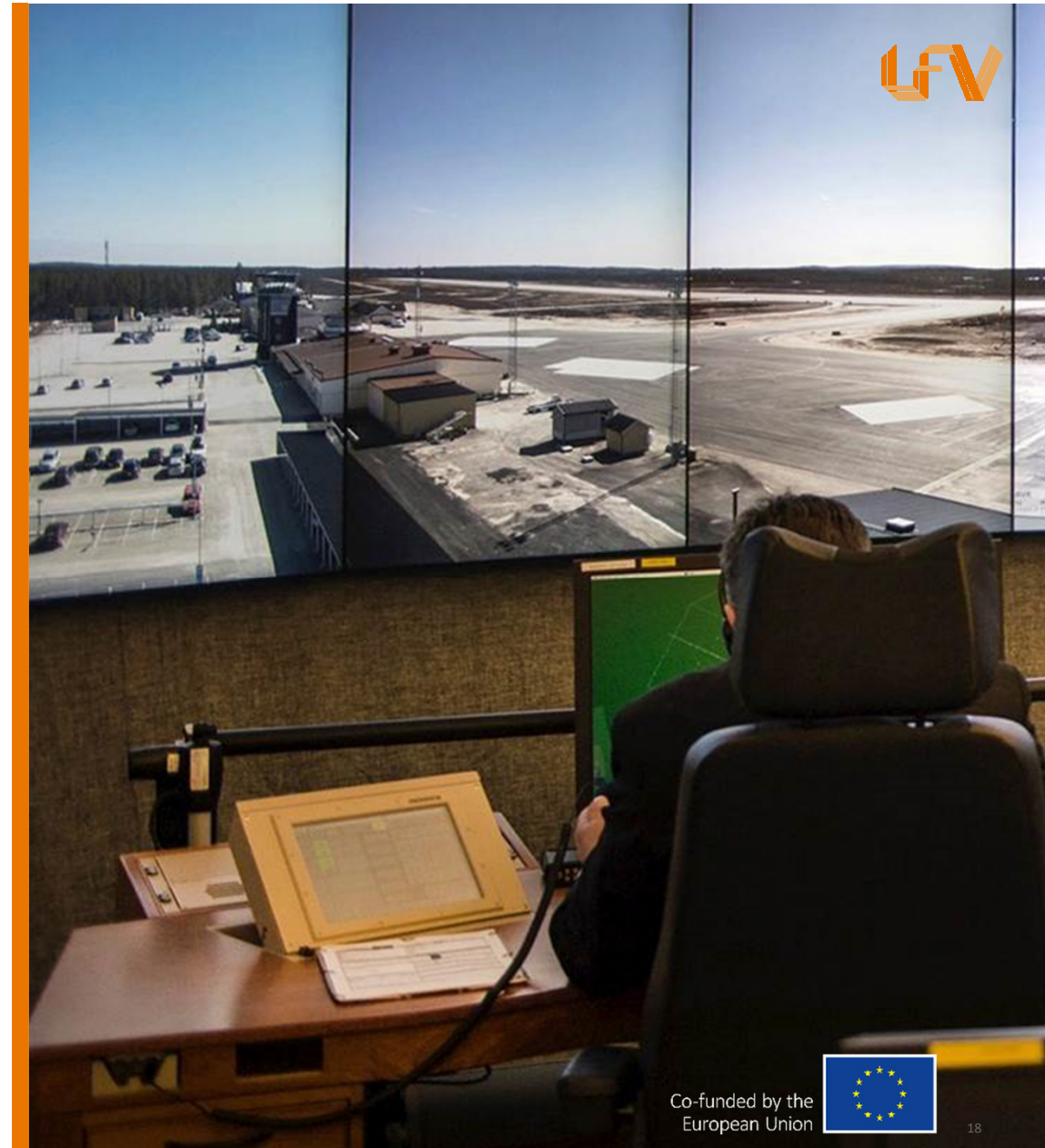


RTC Operational Experiences

- ✓ **Depth sight**, is a mental process that ATCO's learn in the new operational environment.
- ✓ **Reduction of separation minima** can be used according to doc 4444

RTC Operational Experiences

- ✓ We can use most of our operational manuals.
- ✓ New modern integrated alarm system



RTC Operational Experiences



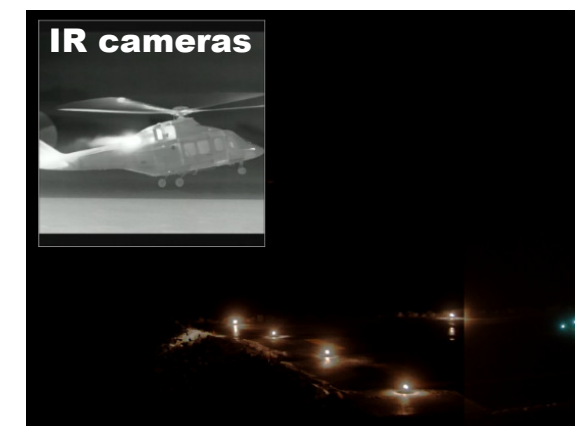
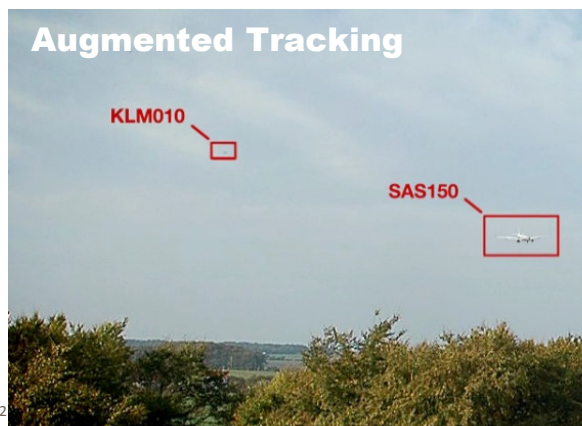
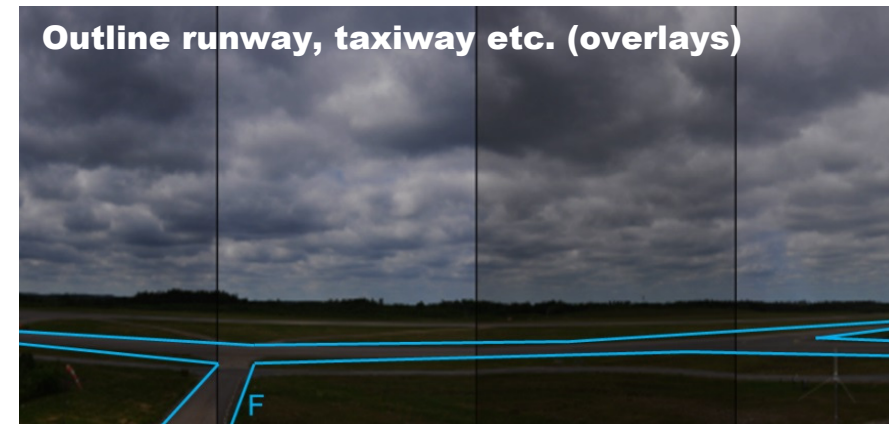
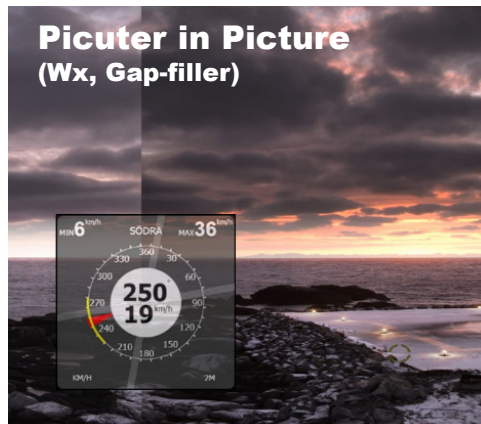
- ✓ **Every screen present an exact angle** of the visual presentation regardless line of sight
- ✓ Other **visual overlays** can be introduced to give ATCO decision support.
- ✓ **MET observations** can be adopted.

What we learned

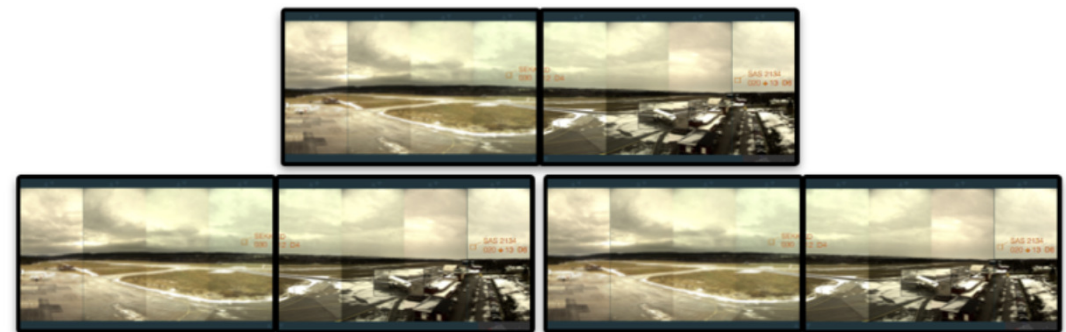
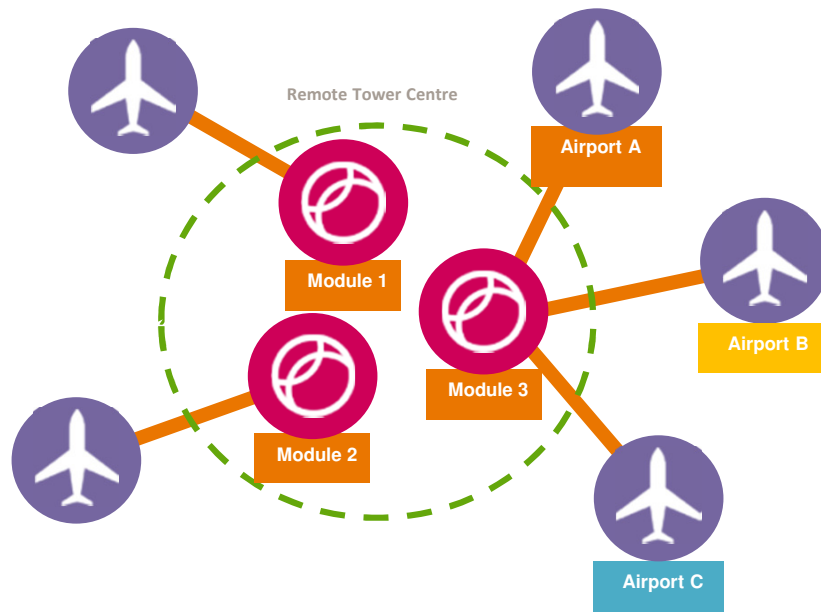
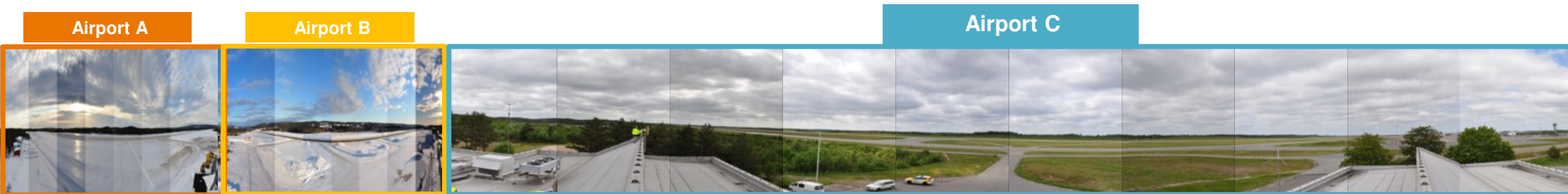
- ✓ Bring in operators (ATCOs) early in the process to have impact on the industrial design and create trust.
- ✓ Bring the Regulator onboard early.
- ✓ Use a step by step implementation and add features in the future. Start BASIC and have an operational concept.
- ✓ Do not mix a lot of different systems. An Integrated System will reduced workload.



New Visual Presentation – Digital Possibilities



Multiple Airport Control



Rules, standards & regulations – state of play

✓ ICAO

- Amendments to Doc 4444 (PANS-ATM), fully enabling remote aerodrome ATS, **in force since 8 November 2018.**
- The amendments include, inter alia;
 - A new **definition for ‘visual surveillance system’.**
 - A new chapter 7.1.1.2.1;
*“Visual observation shall be achieved through direct out-of-the-window observation, **or through indirect observation utilizing a visual surveillance system** which is specifically approved for the purpose by the appropriate ATS authority.”*
 - A reference to EASA Remote Tower Guidance Material, giving it global recognition.

Rules, standards & regulations – state of play

✓ EASA

- A rulemaking task was initiated 2014
- “Guidance Material on the implementation of the remote tower concept for single mode of operation” was published 2015.
- “Guidance Material on remote aerodrome ATS” – Issue 2, to be published soon (Feb/March 2019).
 - Generic guidelines covering also more complex mode of operations and applicable to all sort of remote aerodrome ATS implementations, e.g; ‘busier/larger airports’, ‘multiple mode of operation’, ‘contingency solutions’) and the use of new technical enablers.

Rules, standards & regulations – state of play

✓ EUROCAE

- WG-100 "Remote and Virtual Towers" tasked to develop technical standards
- ED-240 published September 2016:
 - First 'Minimum Aviation System Performance Specification (MASPS) for Remote Tower Optical Systems'
 - Specifying the end-to-end performance of the optical (camera) system
 - Did not consider augmentation functions or other sensors (then cameras)
- ED-240A published October 2018:
 - Extension of ED-240 to include "visual target tracking" technologies
- To be followed by a further extension, ED-240B (anticipated late 2020):
 - Inclusion of "radar tracking/labels", i.e. information from non-optical surveillance systems/sensors overlaid in the visual presentation



To Conclude – way to success

- ✓ LFV Solution, R-ATS in a Remote Centre
- ✓ Today according to existing regulations
- ✓ Early consultation with the Regulator
- ✓ Early consultation with stakeholders, unions etc.
- ✓ One Integrated Technical System

**DIGITAL PLATFORM
CREATES POSSIBILITIES**



SAAB

SAAB AND LFV – A WIN-WIN SOLUTION

- **Saab Digital Air Traffic Solutions AB**
- The company will market, sell, develop and operate products and services for digital air traffic control
- The company provide innovative customised remote air traffic control by combining unique operational and technical excellence to benefit our customers and society
- A digital ANS provider for the future



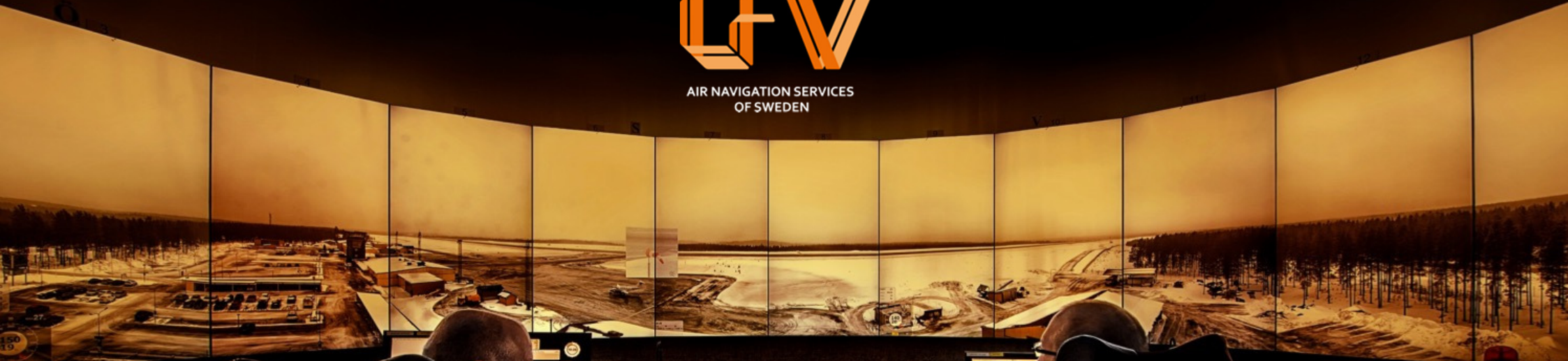
As a leading air
provider for civil
customers, LFV
edge solutions
navigation indu



SA



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