Experience Sharing on Digital Towers

…digitalization of ATM

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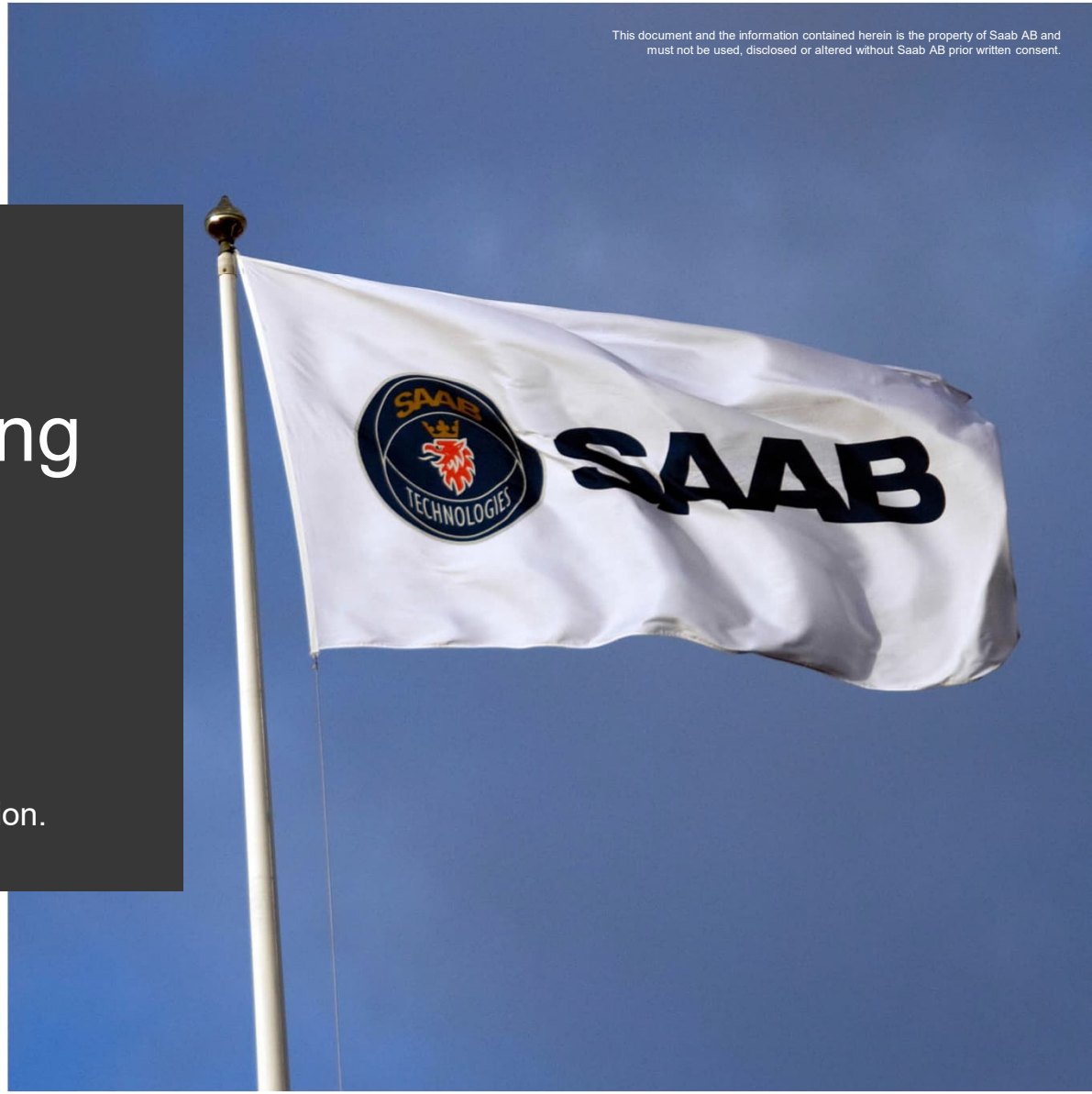


Towards **Digitalized ATM & Airports**

DIGITAL TRANSFORMATION
...do more, from anywhere!

Generic Remote/Digital Tower setup

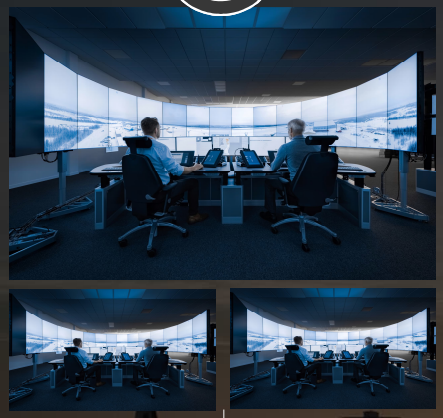
- Required automation systems
- MET
- AGL/ NAVAIDS control

Integration

- Required sensors
- (airport dependent)

SUR | NAV | ILS | Incident | AGL

Integration



- Main Remote Tower Module (RTM)
- Backup RTM
- Training/Simulator RTM

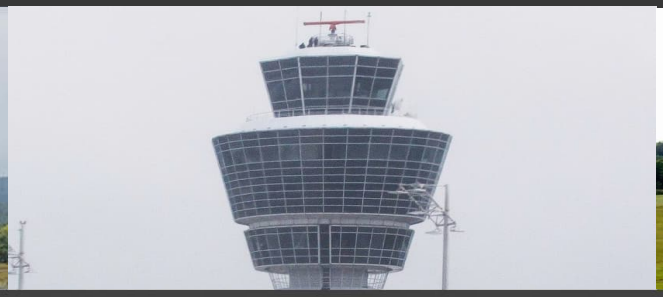
- Camera tower(s) and
- Gap fillers as needed

- Redundant Fiber Network
- Cyber Security

A Solution to meet **multiple Use Cases**

SINGLE RUNWAY AIRPORTS

- Air Traffic Services On demand
- Multiple airport control



COMPLEX AIRPORTS

- Remote or hidden runways
- SMART Airport & Ramp Control

DEFENCE & MOBILE

- Rapid/Emergency deployment
- Secure operator environment

- Remote Control & Remote Tower Center (RTC)
- Contingency operation

Hardware | Software Functionality | Standards & Certification | Business Case & User Needs | "Organizational Readiness"

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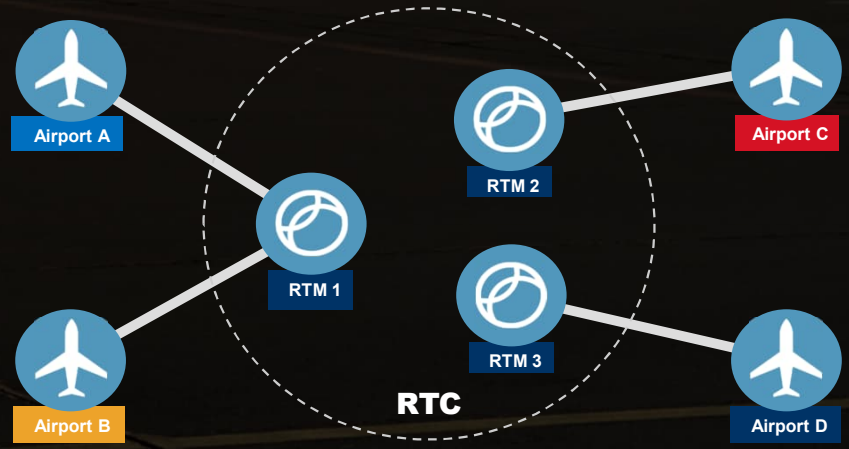
Air Traffic Services On Demand

- **Sälen Airport**
  - Green Field airport
  - Ski-resort in the Swedish ”alps”
  - Tourists during the winter season from Dec-April
- **No “traditional” TWR was built**
  - Going direct to Digital TWR
  - Controlled from Remote TWR Center 380 km away
  - Serviced since 2020
- Digital TWR allowing for **ATS ON-DEMAND when ATS is needed**
  - Saving costs for airport and ANSP
  - Improving service

OPTIMIZATION
TODAY

FUTURE
OPTIMIZATION

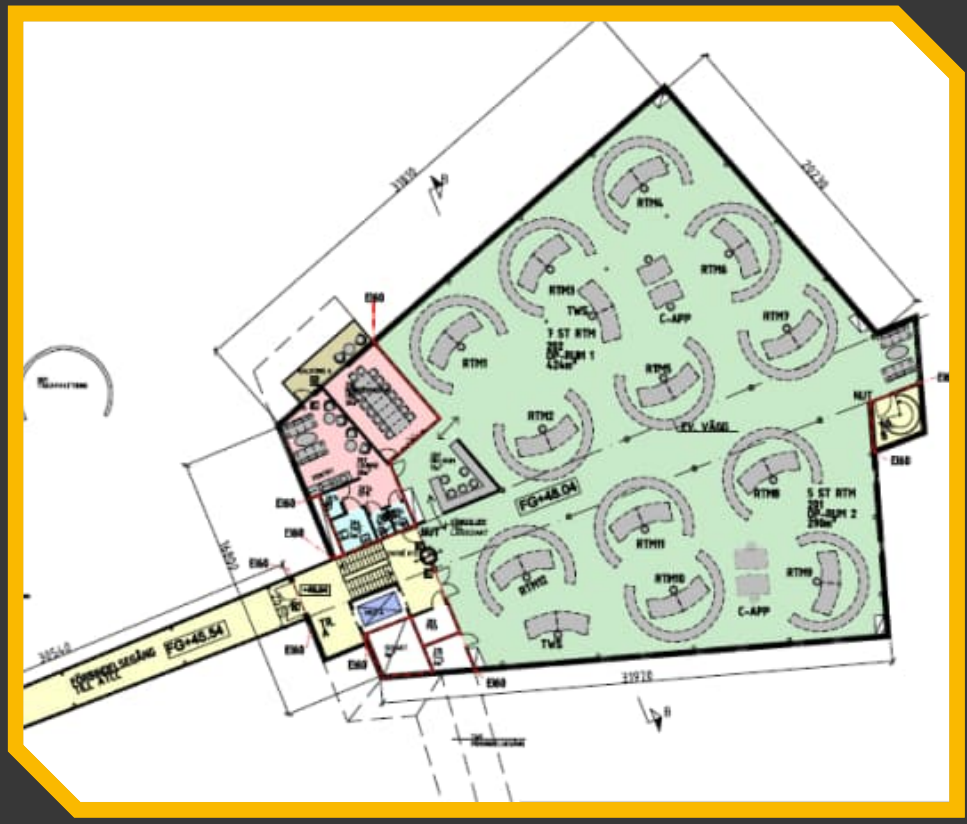


RTC – flexible and resilient

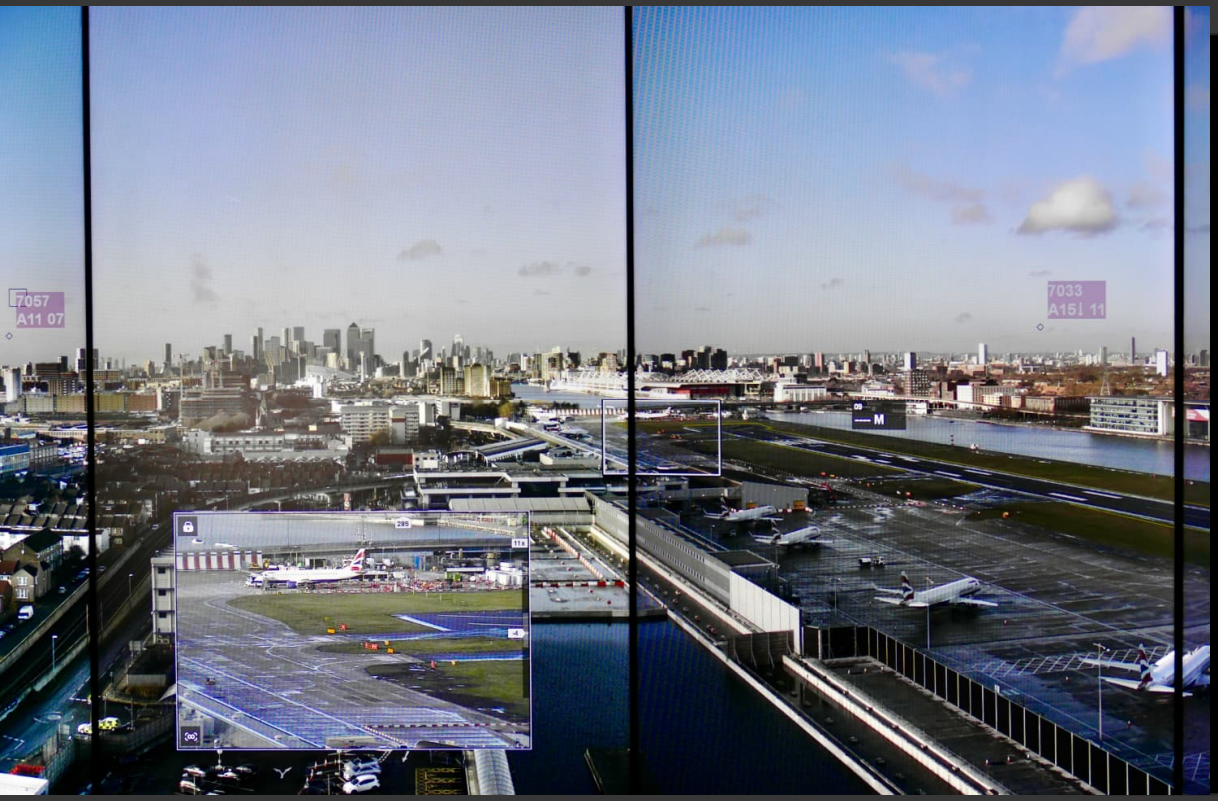
- ✓ Same systems and CWP for different airports
- ✓ Flexibility to open an close
- ✓ Fully role-based setup
- ✓ Integrated training
- ✓ Multiple Airport Control

RTC Stockholm

- Remote Tower Center with capacity of up to 12 airports, including Stockholm Arlanda for contingency (3 rwy, 220.000 Movements/year)
- Went live in June 2021 with 4 airports operates from the RTC
- SWEDAVIA runs the RTC, LFV delivers the ATS



London City Airport



- Remote TWR driven by airport infrastructure modernization
- In operation since December 2020
- Remotely Controlled 15km away at NATS' Control Centre in Swanwick, UK
- 3 ATCO Positions, Ground & Air Controller and Coordinator

London City Airport

London City Digital Tower

The Camera

How many?

14 'Out the Window' cameras. These are fixed in a position and provide a 360 degree view.

2 Pan-Tilt-Zoom' PTZ cameras

Any that move?

The 2 PTZs are able to move and zoom into anywhere on the airfield, including directly over head.

How are they cleaned?

Compressors in the base building provide air that is blown in front of the camera lenses to keep them clean. Periodic maintenance, including physically cleaning the lenses, is also carried out by the local engineering team.

What if a camera fails?

If the camera is contributing to a critical part of the view one of the two PTZ cameras can be used to 'fill in' the gap while the local engineering team replace the camera. Dual communications links between the mast building and Swanwick provide resilience in the case of an interruption on one communications route.

Do they have wipers?

The 'Out the Window' cameras have air compressors which keep away spiders, rain, dirt and in the case of London City, fine dust from the local sugar factory. Only the PTZ's have wipers.

London City Digital Tower

The Mast

Height

4th highest ATC tower in the UK.

Steps

206 steps (not including in the base of the tower)

Cabling

4km of signal cabling between the equipment rooms and the camera platform.

Security

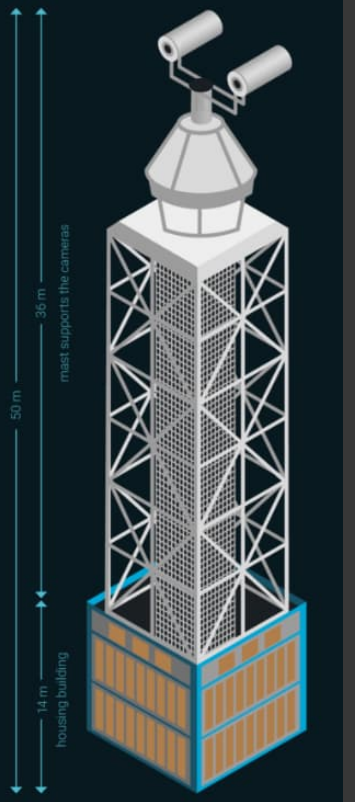
The mast base is protected by bollards to create a security stand-off area. Access is through card swipe and airlocks prevent tailgating.

The base

The base is a concrete structure over 2 floors housing the electrical distribution equipment, ATC equipment and compressed air systems.

Why not just put a cab on top?

A conventional tower is a more complex and costly construction. Many more facilities and equipment (such as rest areas, toilets, a kitchen, and suitable heating and ventilation) would be required to accommodate a traditional VCR cab at the top that would require an entirely different design. Additional safeguarding approvals would also be required from the regulator for a much more substantial construction in that location at that height.



Source: https://www.nats.aero/news/london-city-is-first-major-airport-controlled-by-remote-digital-tower/

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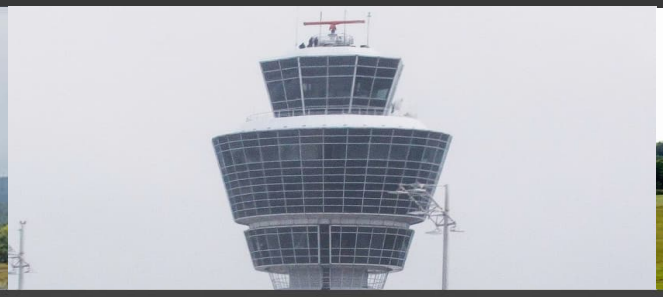

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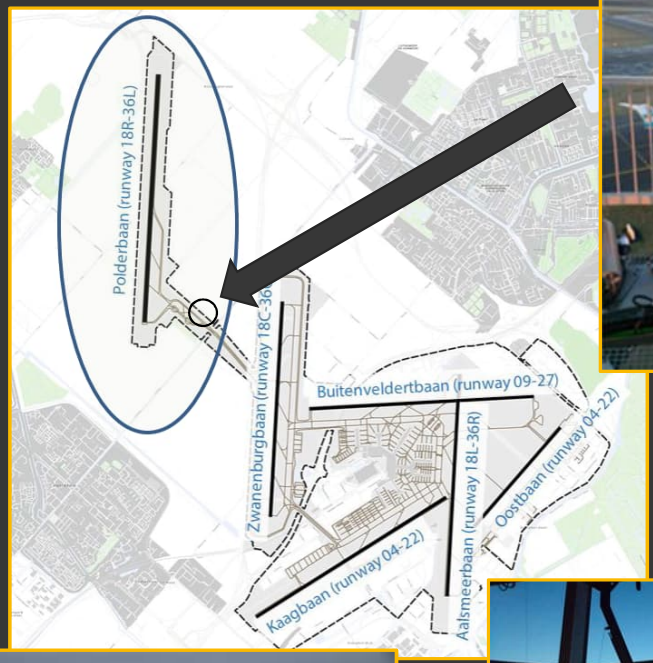
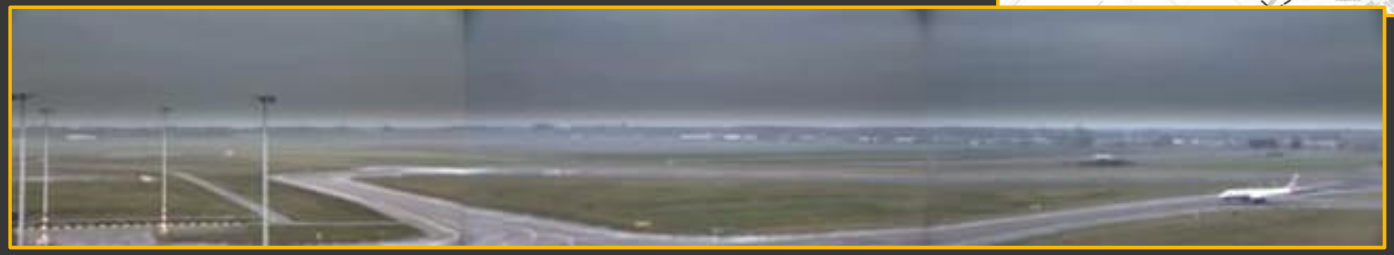
Remote or hidden runways

- At Schiphol the 5th RWY is far away from the actual ATC Tower.
- Before the Digital Tower solution was implemented in 2015 there was separate controller tower to manager traffic.
- With six fixed cameras providing 180 degrees view and 2 PTZ cameras the images are now presented in the main TWR.

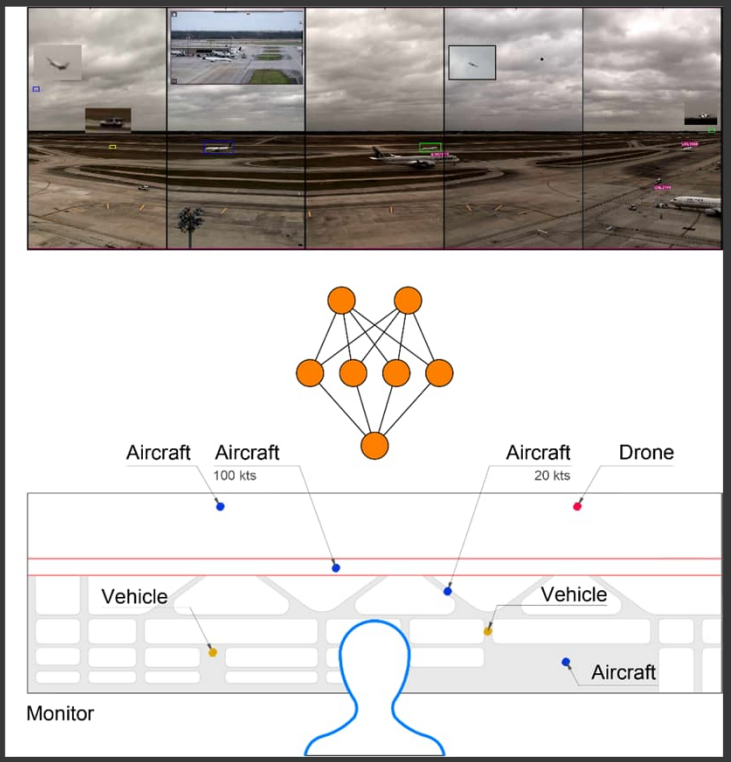




WHAT ABOUT THE FUTURE?

Multiple Airport Control & AI

Drone Detection



Will have a VDO here to show the DRONE DETECTION USING CAMERAS and AI-

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Fields of Research

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To design and develop Artificial Intelligence (AI) and Machine Learning (ML) algorithms and models for effective Airport-Airside Management and efficient Remote Tower Control (RTC) operations.

Visual Detection, Tracking and Prediction of Airfield Objects

WP 1.1

Data Driven Performance Metrics for Remote Towered Airports

WP 1.2

Automated Situation Awareness – Data Fusion

WP 1.3

AI-Supported Situation Management

WP 1.4

WP 1.5: AI-Human Hybrid RTC System

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THANK YOU FOR YOUR ATTENTION