

How to improve aviation efficiency through remote and digital tower

Part three – Case Studies and Key Learning

Moderator



Conor Mullan

Managing Director

Think Research Limited



Erik Bäckman

Head of unit RTC Sundsvall,
SAAB AB



Jacob Edholm,

Head of unit RTC Stockholm,
LFV



Holger van de Sand,
Head of Regulatory Affairs
Remote/Virtual Tower Operations
DFS



Csaba Gergely

Senior ATM ADVISOR / Remote
TWR Expert,
HungaroControl



Torbjørn Henriksen

Manager – Operational
Solution Remote Services,
Avinor ANS



AnnMarie Taggio,
Air Traffic Control Specialist,
Standards & Procedures,
FAA



Mitchell Bernstein,
NextGen Technology Development
& Prototyping Division,
FAA



Carole Dupre,
Project manager,
Egis



Filip Meert
Strategic Program Manager
Digital Towers,
skeyes



Sophia Healy,
Head of Service Delivery Towers,
Airways NZ

Speaker



Jacob Edholm,
Head of unit RTC Stockholm,
LFV



AIR NAVIGATION SERVICES OF SWEDEN



Case studies and key learning RTC OPERATIONS IN SWEDEN

16th of February 2021

History of RTC in Sweden – from idea to operations

First RTC in Sundvall >

- ✓ Project start 2010
- ✓ Regulatory framework not published
- ✓ Is it a new service?
- ✓ Is it even possible?
- ✓ System design – acceptance from ATCO
- ✓ System design – must meet demands
- ✓ System design – all functions needed

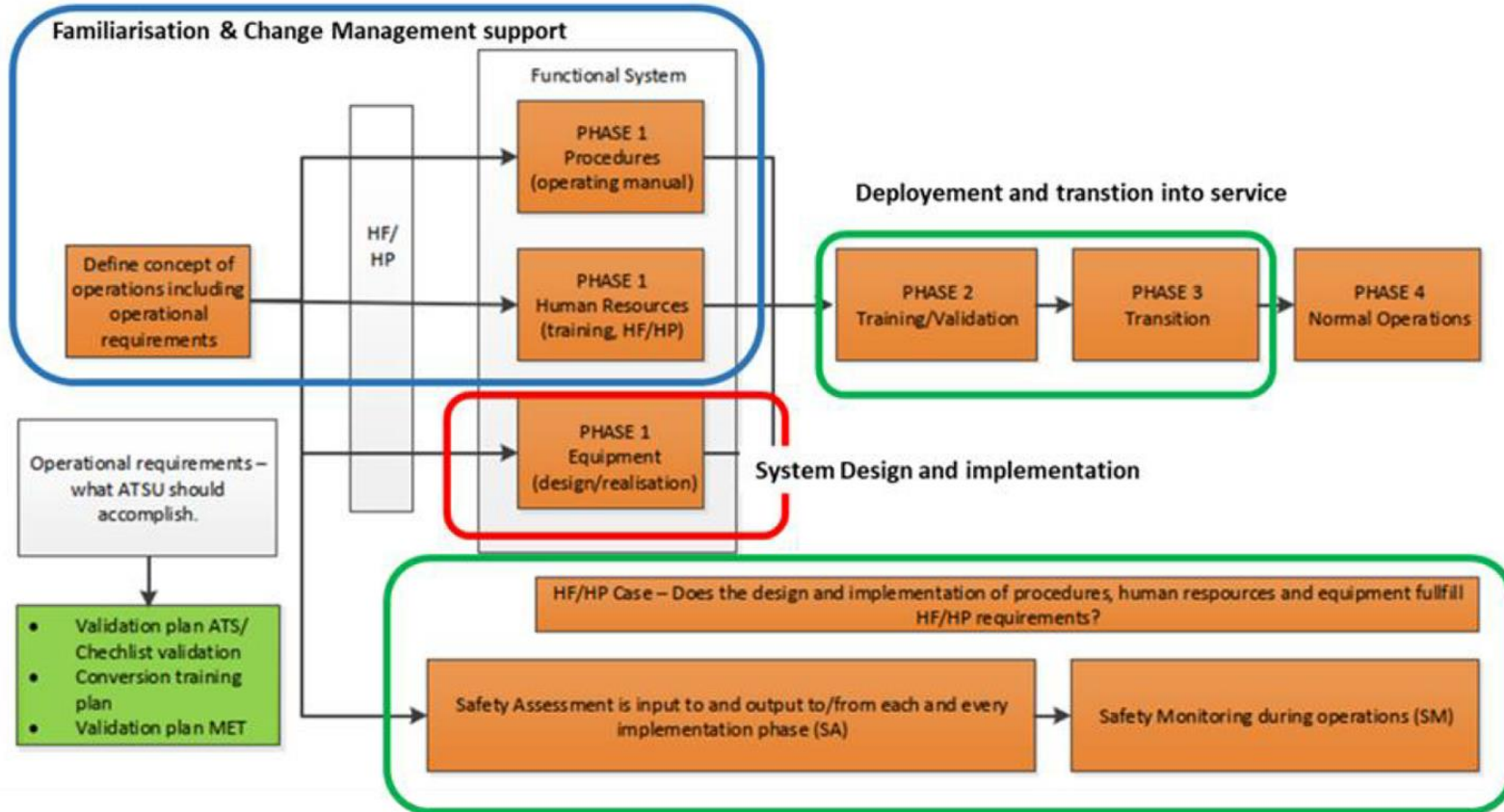
> Second generation of RTC in Stockholm



Things to know – things to do

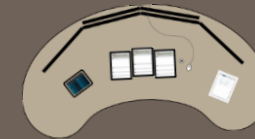
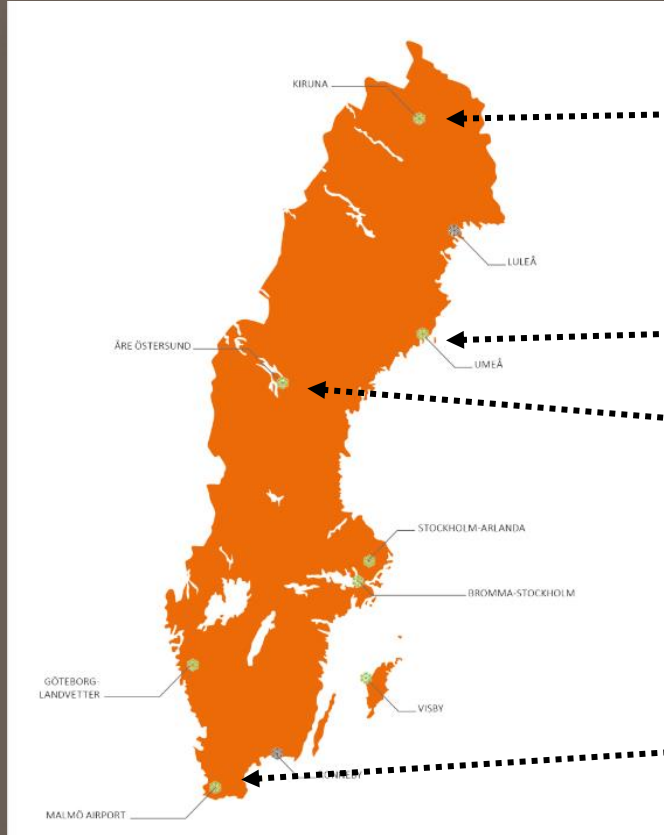
- ✓ Important mindset; Provision of the same service from an center with new technical tools.
- ✓ Presenting 360 in 225 RTM opening, several workshops with trials around other setups performed. ATCO adapted 360 in 225 easily and saw benefits.
- ✓ New modern integrated alarm systems needed to be developed. Technical alarms shall be presented from an operational point of view.
- ✓ Existing operational manuals must be used.

Challenge to approval – functional system all included



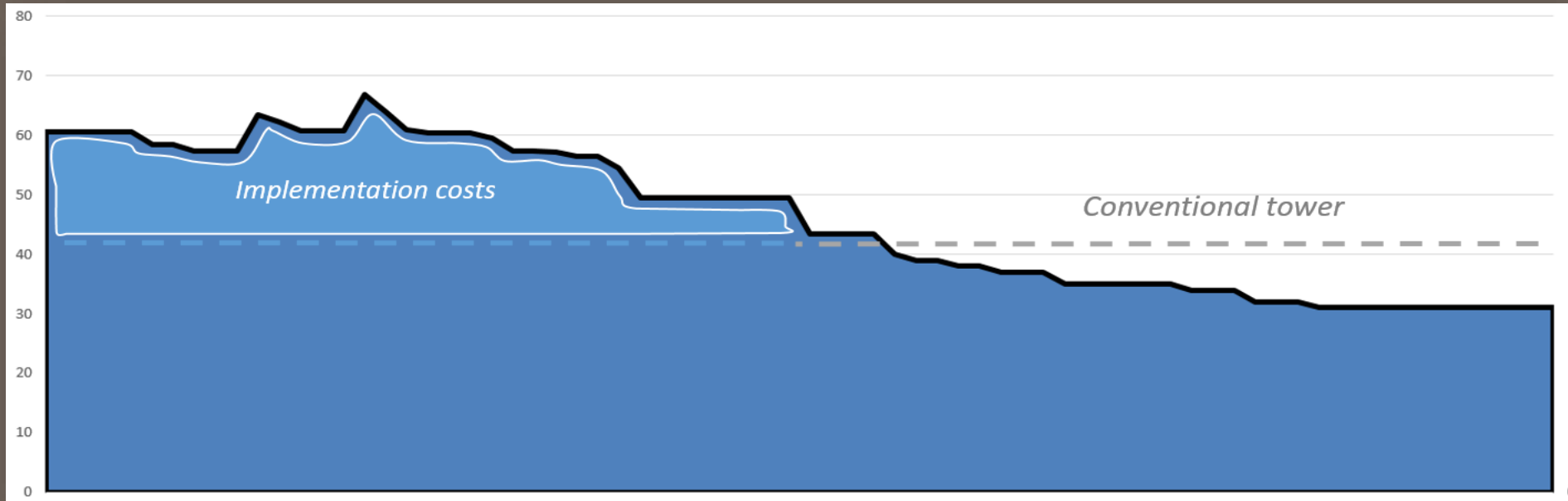
Technology is only
Half of it!

Remote Tower Centre



- ✓ All CWP are the same
- ✓ Harmonization
- ✓ Operators can move between RTM's
- ✓ Operators have several unit endorsements
- ✓ Expanding unit endorsements
- ✓ Education in simulator
- ✓ Proficiency checks in simulator
- ✓ Efficiency in rostering
- ✓ Capabilities to expand if needed

Experiences from implementation of RTC Stockholm



Costs and workload of converting to remote towers are more prominent during the adaption period, mainly due to work-force changes, training, consultants and specialists required for the adaptation. Long term cost and resource efficiency is expected after commissioning and start of operations.

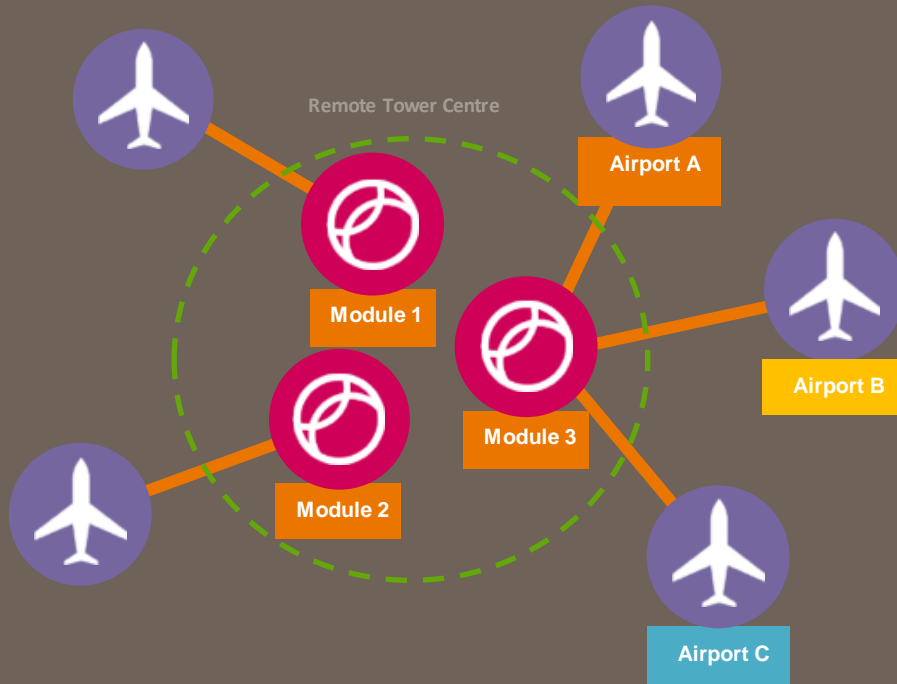
Experiences from implementation of RTC Stockholm

To avoid implementation cost

- ✓ Be clear about your functional demands on the system (focus on the must needs)
- ✓ Good planning and early check of compliance to relevant rules and standards
- ✓ Coordination with Airports to ensure smooth implementation and harmonization (they are part of the system)
- ✓ Priority on integrated training and simulation

To increase efficiency after implementation

- ✓ Moore use of SUR instead of fancy cameras – if available
- ✓ Implementation of Multiple Airport Operations (require harmonized methods)
- ✓ Active rostering, larger ratings (simulator helps) centre planning tools



Multiple RTC

- ✓ Experiences from RTC 1 used design of RTC 2
 - Second generation – Optimized for 24/7 operations, maintenance and reduced Life Cycle Cost (LLC)
 - Full flexibility to use the system and operational resources
- ✓ Shared operational knowledge between centers – user groups a new team
- ✓ Future interactions between centers – backup/redundancy



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Facility of the European Union

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Holger van de Sand

Head of Regulatory Affairs
Remote/Virtual Tower Operations

DFS

DFS Deutsche Flugsicherung GmbH

DFS RTC –

Experience operating Remote Tower in Germany

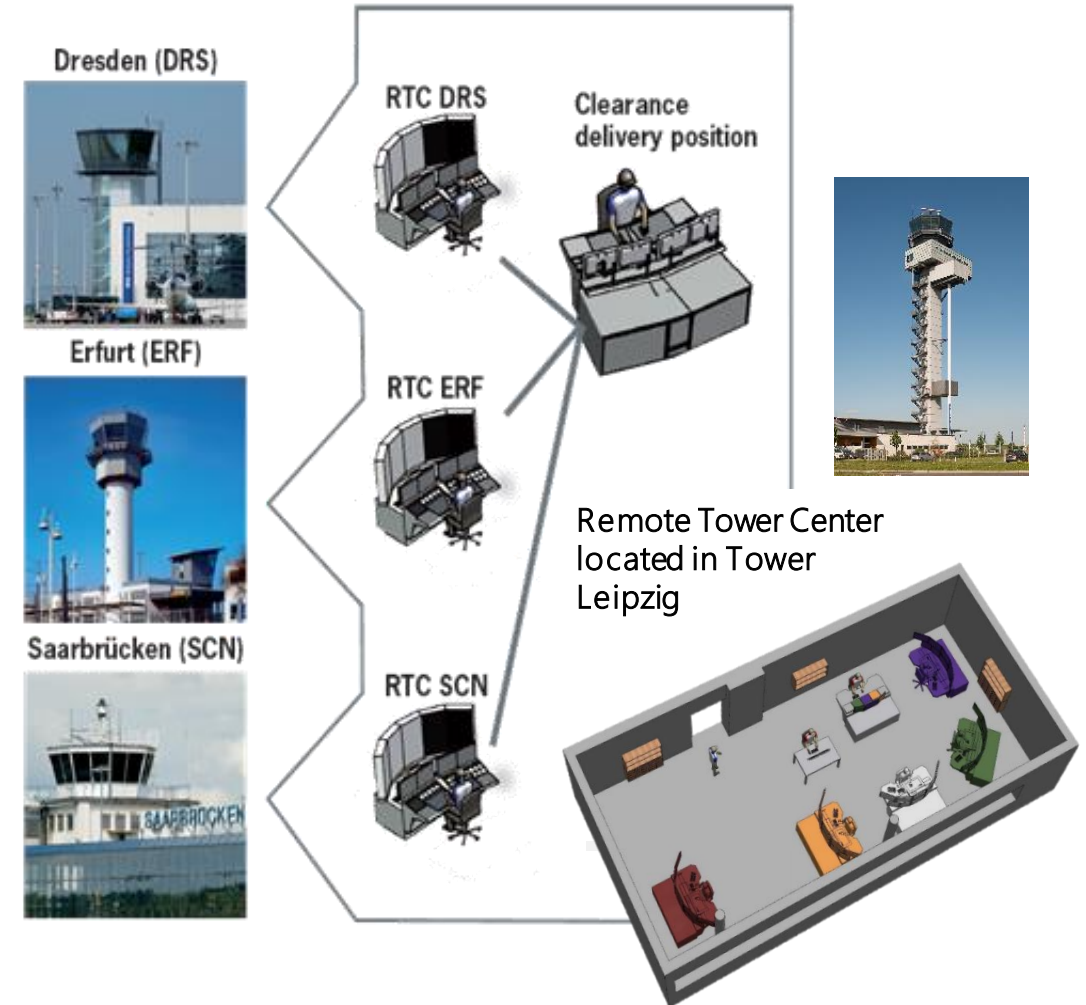


DFS Deutsche Flugsicherung



DFS RTC Project - Overview

- Location-independent provision of aerodrome control services with a camera surveillance and control system (out-of-the-window view, OTW).
- 3+ air traffic controllers (AIR+GND combined) will provide aerodrome control to 3 RTC airports (Single mode)
- All controllers will become cross-trained to provide control services for every RTC airport.
- Future integration of 1 Clearance Delivery position for all airports is planned (Multi mode)



DFS RTC - Technical Highlights



2 Pan-Tilt-Zoom (PTZ)-cameras for tracking (Video+IR)

Picture recognition & surveillance based tracking

Flexible CWP design

Mini ATM HMI to control the PTZ (PTZ-MAP)

Object detection (Bounding)

Multi layer redundancy concept

Scaleable and scrollable 360° panorama Video (Full-HD) and Infrared - synchronized
Stitched and harmonised, high dynamic range

Augmented reality (overlay information)

Remote Light Gun

DFS RTC - Infographic



Since 12/2018 providing remote tower services SCN@LEJ
without any impact on airspace users!

Distance: 450 km;
135 Mbit/s (redundant) connection

More than 1.000.000 gigabyte of data
were transferred without interruption

More than 22.000 controlled flights
(IFR/VFR)

More than 450.000 passengers
transported by airlines



Controller-Working-Position in LEJ

DFS RTC – Lessons learned

- The early involvement of ATCO and ATSEP was very important and contributed to the success of the first commissioning SCN@LEJ.
- Advanced functions were very well appreciated and are now part of the daily work. Here are some comments from ATCOs:
 - *“The zoom cameras have different zoom settings, something binoculars don’t have”*
 - *“The infrared camera and infrared panorama is very helpful. It gives you more details during darkness”*
- The safety concept developed with ATCO and ATSEP works and has proven itself.
- The project is constantly developing the system further with ATCOs in order to steadily improve the situational awareness.

Thank you for your attention!

Holger van de Sand

Head of Regulatory Affairs Remote/Virtual Tower Operations

Deutsche Flugsicherung GmbH

Business Unit Leipzig

Towerstraße 2

04435 Leipzig

Phone: +49 173 3018847

E-Mail: holger.van.de.sand@dfs.de



DFS Deutsche Flugsicherung

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Speaker



Csaba Gergely

Senior ATM ADVISOR / Remote TWR Expert

HungaroControl

Managing a medium-sized airport from a remote TWR

Csaba GERGELY
Senior ATM Adviser

BUDAPEST
February 2021



SPECIAL FEATURES OF TWR AND AIRPORT



Two parallel runways, and two aprons with more than 6 km between the farthest thresholds



A-SMGCS – ability to control traffic without any visual information, based only on radar view



Medium size airport: 110.000 movements in a year



The tower building belongs to the airport, rented by HungaroControl with common responsibilities



More than 35 years old concrete tower building, facing enormous maintenance costs



Airport closing due to irregularities of the infrastructure in 2012 and 2015



Complete reconstruction of the tower building is not expected in the close future



Periodic refurbishment is forecasted to last for 6-8 months

Business continuity, full tower control capability

Implementing remote TWR at LHBP

- Actual ATM-systems duplicated
- Matrix videowall, no OTW-view
- Integrated A-SMGCS and cameras
- 4 ATCO + 1 SV
- ATCO paradigm shifting
- Human aspects awareness



- Distributed camera system
- PTZ and fix cameras
- Dual sensor PTZ
- Automatic tracking
- Manual handling
- Preset for hot-spots



Strategic program results so far



During 2021 **336 live operational hours** completed, **half of them with no real TWR available!**

- More than **2500 hours** of live operations
- More than **12 000 movements** handled
- 90% of the time in good visibility – using cameras
- 60% of the time dual runway operations
- 90% of the traffic was IFR flights

Special events:

- Emergencies
- Training flights
- Airspace and airport restrictions

THANK YOU FOR YOUR ATTENTION

**MORE
THAN
AN
ANSP**

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Speaker



Torbjørn Henriksen

Manager – Operational Solution
Remote Services,

AvinorANS



REMOTE TOWER IMPLEMENTATION – SOME KEY LEARNING POINTS

Torbjørn Henriksen, Operational Solution Manager, Remote Services, Avinor ANS

Getting from here...

- Small facilities
- Locally based work-force
- Low traffic demand
- Service continuity and availability of vital importance
- Numerous systems



...to here

Relocation of workforce – High job satisfaction scores among staff

New local aerodrome endorsements – New systems

Social implications (family, work, housing) – Individual follow up

New tasks - better collaboration – Improved knowledge sharing – standardization and optimization

New technology attracts attention

Career opportunities

Putting people first...

- Formal consultation processes - Reference Group
- Individual approach - incentives
- Onboarding
- Update of information
- Flexibility when circumstances require





REMOTE TOWER CENTRE – BODØ

4 airports currently in operation

15 airports rolled out by the end of 2022

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Mitchell Bernstein,
NextGen Technology Development &
Prototyping Division,
FAA



CANSO SDT TF Webinar: *FAA Remote Tower Status*

AnnMarie Taggio (FAA AJV-P, Air Traffic Policy)

Mitchell Bernstein (FAA ANG-C, NextGen
Technology Development and Prototyping)

February 16, 2021



FAA Remote Towers

- FAA is evaluating viability of Remote Tower (RT) systems at up to six separate locations in succession, building on knowledge gained from each previous test site
 - Operations will be transparent to the pilot, while providing an equivalent level of service of a traditional tower
 - RT systems may be more cost beneficial for many airports
 - Systems that meet FAA standards will be put on a qualified vendor system list (QVSL). Candidate airports will then be able procure a system from the QVSL to provide ATCT services
- Concurrent to evaluations, the standards and processes for certifying systems will be documented in an FAA Advisory Circular
- Initial evaluations are focused on providing RT operations at Class D, Visual Flight Rule (VFR) Airport Traffic Control Tower operations
 - Site #1: **Leesburg Executive Airport (KJYO)** using Saab Remote Tower system
 - Site #2: **Northern Colorado Regional Airport (KFNL)** using Searidge Technologies Remote Tower system





Next**GEN**

KJYO Remote Towers Overview



Site #1: KJYO Remote Tower System Installation

KJYO (Leesburg Executive Airport)

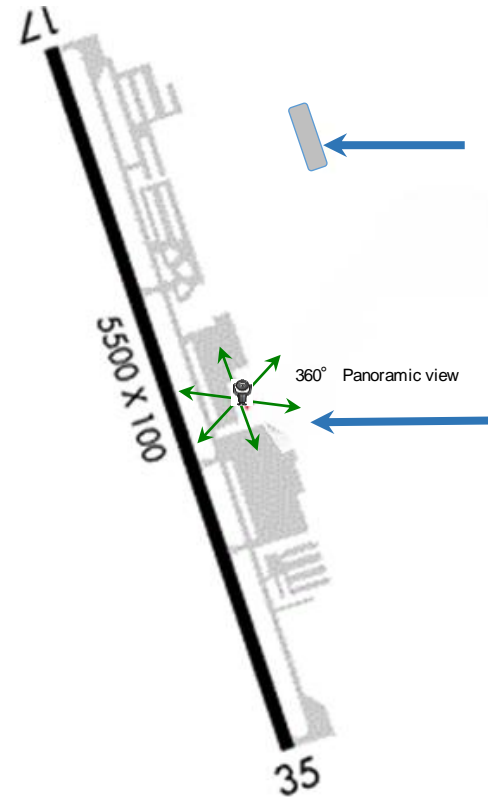
- Final evaluation from new location planned for 2021 (pending COVID travel restrictions)
- JYO Remote Tower system type certification activities began February 2019 and continue

Runway 17/35

Dimensions: 5500 x 100 ft. /
1676 x 30 m

Aircraft Operations*	Avg. 292 ops/day
Local General Aviation	85%
Transient General Aviation	11%
Air Taxi	2%
Military	1%

* Based on 12-month period ending 31 December 2017



Remote Tower Module off airport property



Single Camera Mast on KJYO Terminal



Next**GEN**

KFNL Remote Towers Overview



Site #2: KFNL Airport Remote Tower Installation

KJYO (Northern Colorado Regional Airport)

- Since airport was previously non-towered, Mobile ATCT deployed at airport on March 16, 2020 in preparation for upcoming RT passive evaluations
- Passive Evaluations (Phase 1) planned for 2021 when COVID travel restrictions will allow

Runway 15/33

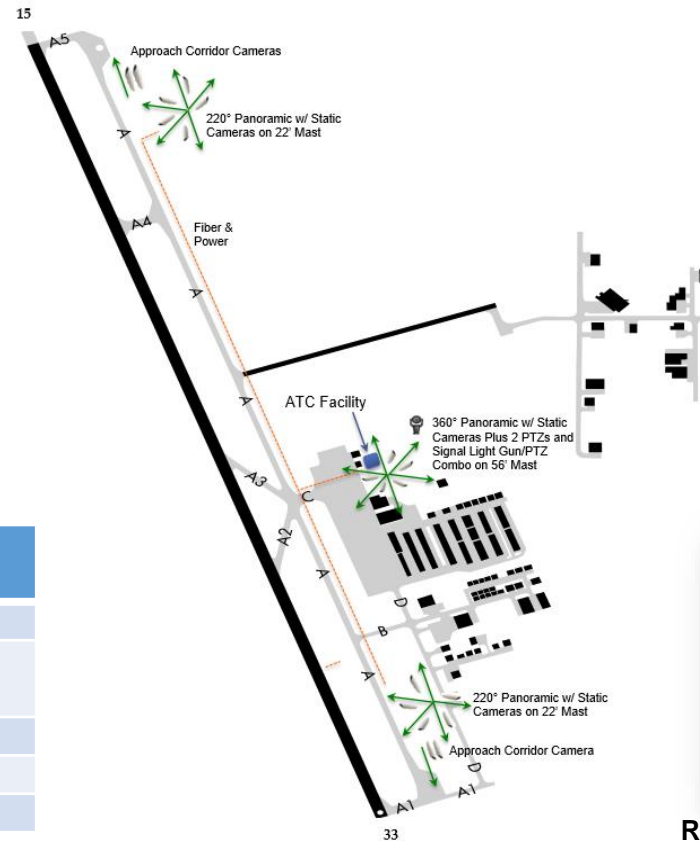
Dimensions: 8500 x 100 ft. /
2591 x 30 m

Runway 6/24

Dimensions: 2273 x 40 ft. /
693 x 12 m

Aircraft Operations*	Avg. 260 ops/day
Local General Aviation	37%
Transient General Aviation	59%
Air Taxi	4%
Military	<1%
Commercial	<1%

* Based on 12-month period ending 31 December 2018



Runway 15 Mast



Center Runway Mast



Runway 33 Mast



ATC Facility

Lessons Learned

- Cameras can be susceptible to vibration/deflection/weather phenomena which can affect camera alignment and/or the display image
- SSOPs may be required to coincide with information presented on RT visual display to ensure safe Class D airport traffic services (e.g. to account for limited depth perception)

Next Steps

- Finalize RT FAA Advisory Circular and associated standards for systems operating in a VFR, Class D environment
- Make operational viability and subsequent system certification decision for the Saab system at JYO
- Proceed with evaluation of Searidge system at FNL



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Speaker



Sophia Healy,
Head of Service Delivery Towers,
Airways NZ

▶ DIGITAL TOWERS

A i r w a y s C a s e
S t u d y

▶ Sophia Healey
Head of Service Delivery Towers
February 2021

making your world
possible

Digital Towers Case Study

- The concept for a Digital Towers was investigated around 2015 to offer safe, fit for purpose and innovative aerodrome services tailored to stakeholders needs.
- The business case and the benefits at the time did not weigh up against the cost and the technology was relatively new at this time.
- This was reviewed again in 2017, which then led to programs for implementation of a digital tower solution at a regional airport in New Zealand, and for a contingency tower solution at Auckland Airport.
- Longer term plan was to look at the replacement of the Auckland Tower with a digital solution, if the technology was fit for purpose.



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Digital Towers Case Study

Experiences:

- Different technology requirements for different operations. Needs to be fit for purpose for that operation
- Technology solution, a small part of the overall program (SAT =20% of the effort required) Regulatory element. OTS (tried and tested) vs tailored system
- Change management and people engagement is critical. As is stakeholder engagement including the regulator (challenge of new technology and approvals)
- Replicating a current tower environment, is this the best way forwards?
- Ensuring digital solution provides real benefits i.e. safety enhancements. Cost vs benefit – solo digital tower vs hub



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DIGITAL TOWERS

Where to now?

- Covid-19 has meant we have had to re-assess our Digital Services Strategy
- Digital Services also means the potential to integrate Digital Technology into a conventional tower to provide safety and efficiency benefits.

AIRWAYS

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Speaker



Filip Meert

Strategic Program Manager Digital Towers,
skeyes

DITO PROGRAMME FROM FEASIBILITY STUDY TO TENDERING

CANSO Webinar – 16th of February 2021



The DiTo programme



MAIN FEATURES

- Deploying failsafe **Remote Tower solutions** for the 6 Belgium airports
- For provision of **operational services**.
- Include relocalisation of **combined TWR and APP** services.
- **High complexity of the airspace and of the traffic** managed by those airports.

KEY DRIVERS

- **COST EFFICIENCY**
 - Reduced up-front costs (infrastructure)
 - Consolidating staff from several airports at one location
- **CONTINGENCY**
 - Off-site location
- **FLEXIBILITY**
 - Scalability and adaptability to airport changes
- **ENHANCED SAFETY & SECURITY**
 - Integration of IR cameras and motion tracking technology
 - Improved situational awareness in low visibility conditions

What were the steps towards implementation ?

Changement Management

Feasibility Study

- Benchmarking
- CONOPS
- Transformation trajectory

Conceptualisation

- Simplify before digitise
- High Level Requirements
- Multi-party programme

Tendering

- Innovative project
- How much flexibility?

Implementation

- *Development*
- *Implementation*

2018

2019

2020

2021+

Other key Lessons learnt

- **Change management** : You need to involve all stakeholders' from the beginning...
- **Organise your tower renewal projects before or after the transition, not during.**

THANK YOU



Thank you

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