



MARCUS FILIPP

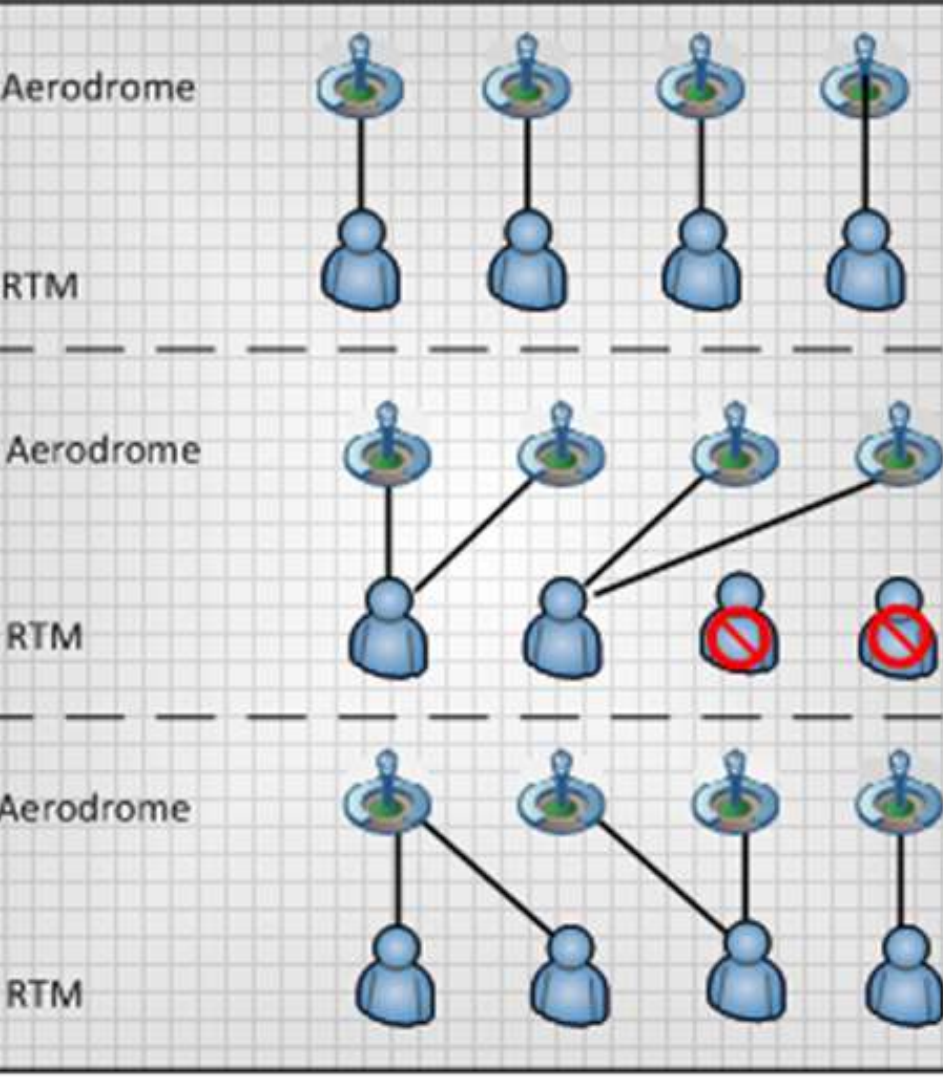
SENIOR RESEARCH MANAGER REMOTE TECHNOLOGY

REMOTE TOWERS – THE FUTURE RESEARCH AND INNOVATION WITH REMOTE TOWER TECHNOLOGY

28 May 2019



- ✓ Rational – Marcus Filipp
 - Research goals – economy, infrastructure
- ✓ Change management – Jan-Olof Ehk
 - Education
 - New technology
- ✓ Secure systems – Jan-Olof Ehk
 - Security assessment
 - Safety for ATM
- ✓ Multiple Remote Tower – Marcus Filipp
 - 2013 to 2016
 - Next generation – 3.0
 - Future generation – 4.0
- ✓ Questions and Answers – Marcus & Jan-Olof



Cost efficiency

✓ Technology

- Several of Europe's smaller aerodromes has an old infrastructure
- Concrete tower vs. camera mast
- Old instruments

✓ Staff

- Clustering benefits

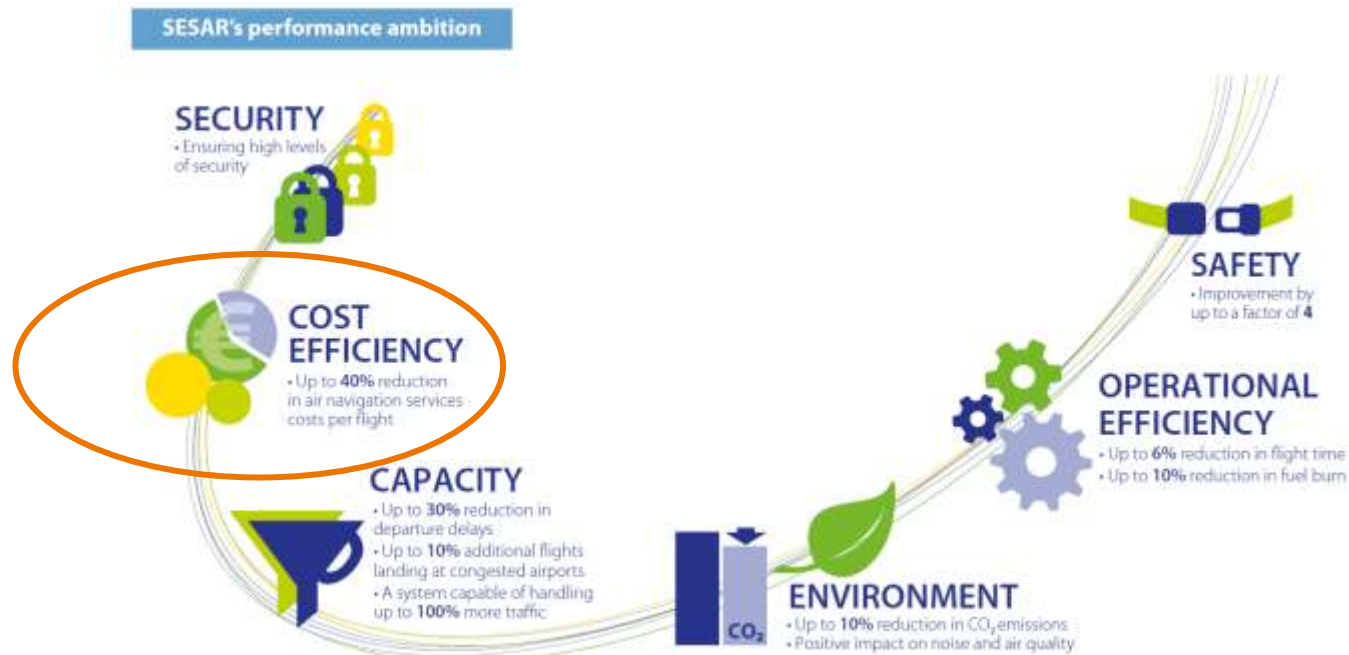
✓ Multiple Remote Tower

- Air Traffic Controller focused on ATM

✓ Technology and Staff

- The entire picture

SESAR performance goals



- digitalised flexible on demand air traffic service



From analogue to digital



CHANGE MANAGEMENT

HMI – change management

- ✓ Screens instead of windows
 - 240 degree angle
- ✓ Digital information
 - Flight information on screen
- ✓ Remote aerodrome control
 - Steer lights, approach systems
- ✓ Alarm / Alert
 - Remotely activated



Similarities

- ✓ Radar
- ✓ Weather data
 - Digital overlays
- ✓ Voice Com System
- ✓ Aerodrome control
 - All systems in one place – digital presented
- ✓ Outside view
 - Screens instead of windows
- ✓ Binocular
 - Digital presented – zoom camera



Education

- ✓ Critical changes – mitigations
 - 360 degrees presented on a 240 degrees – “banana effect”
 - New technology
 - “Hot spots” – critical areas
- ✓ Shorter transition training
 - All controller working positions are similar – ONE CWP
 - Clustering staff – ONE RTC



A new type of tower at your airport – the RTWR

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

Developed in cooperation



SAFETY AND SECURITY

Swedish approval process

- ✓ All validations, passive and advanced finished 2013.
- ✓ 2014 was more or less study of material by Swedish Transport agency, giving them confidence and understanding about the functional system.
- ✓ Operational approval received 31th October 2014.
- ✓ Acceptance to perform MET, January 2015
- ✓ Operations from April 2015
- ✓ No restrictions

Cyber security

- ✓ Redundancy
 - Back up
- ✓ Bullet proof
 - Hacking events
- ✓ Our daily work
 - Detection capability





Flight security

- ✓ Same demands
 - Conventional tower
- ✓ Safe mitigations
 - Each issue / Several issues
- ✓ Our daily work
 - Procedures

MULTIPLE REMOTE TOWER

Multiple Remote Tower – 1 ATCO 2 Aerodromes

- ✓ 3 aerodromes simultaneously
- ✓ Simulations > find the technical need
- ✓ Live trials > find the “must have”





Multiple Remote Towers – 2016

- ✓ Deployment initiated
 - Sundsvall and Örnsköldsvik
- ✓ Set the standard
 - "Nice to have vs. Must have"
- ✓ Operational concept
 - Simultaneous capacity
 - Controller in charge

Multiple deployment – 2018

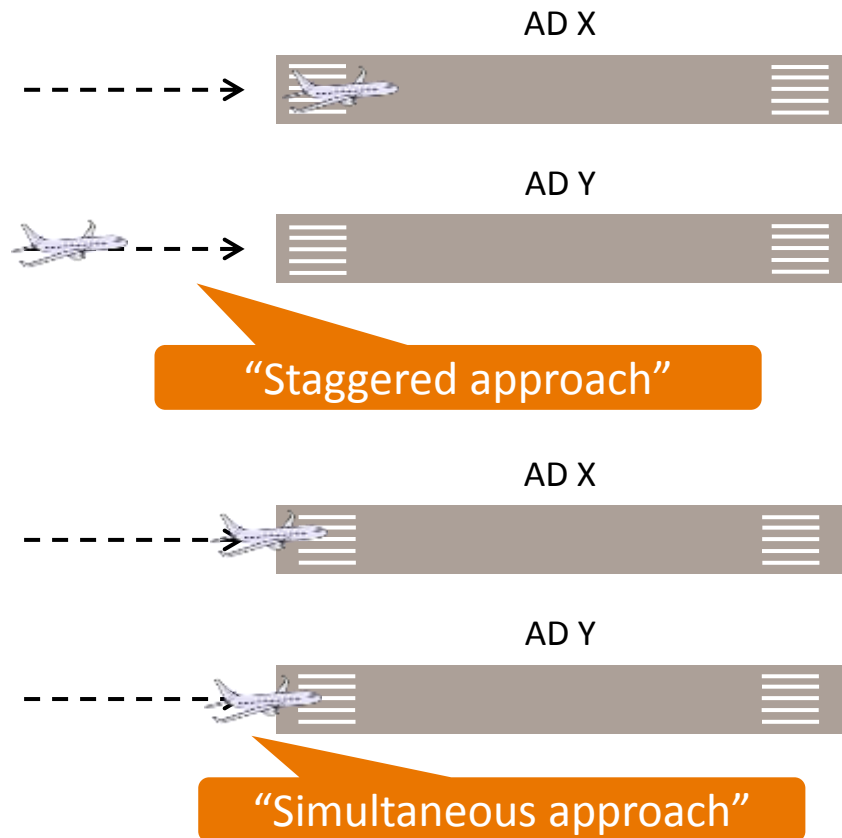
- ✓ Strategy towards deployment
 - Safety, Changes, Similarities
- ✓ Positive results
 - Objective data
- ✓ Next step
 - Methods and guidance
- ✓ Multiple Remote Tower
 - Soon a reality



2 simultaneous Aerodromes

$0 > 15.000$ mov/year

- ✓ Operational concept
- ✓ Traffic amount – up to 10 / hour
- ✓ Simultaneous / Staggered
- ✓ 2 simultaneous activities



Next step – problem statement



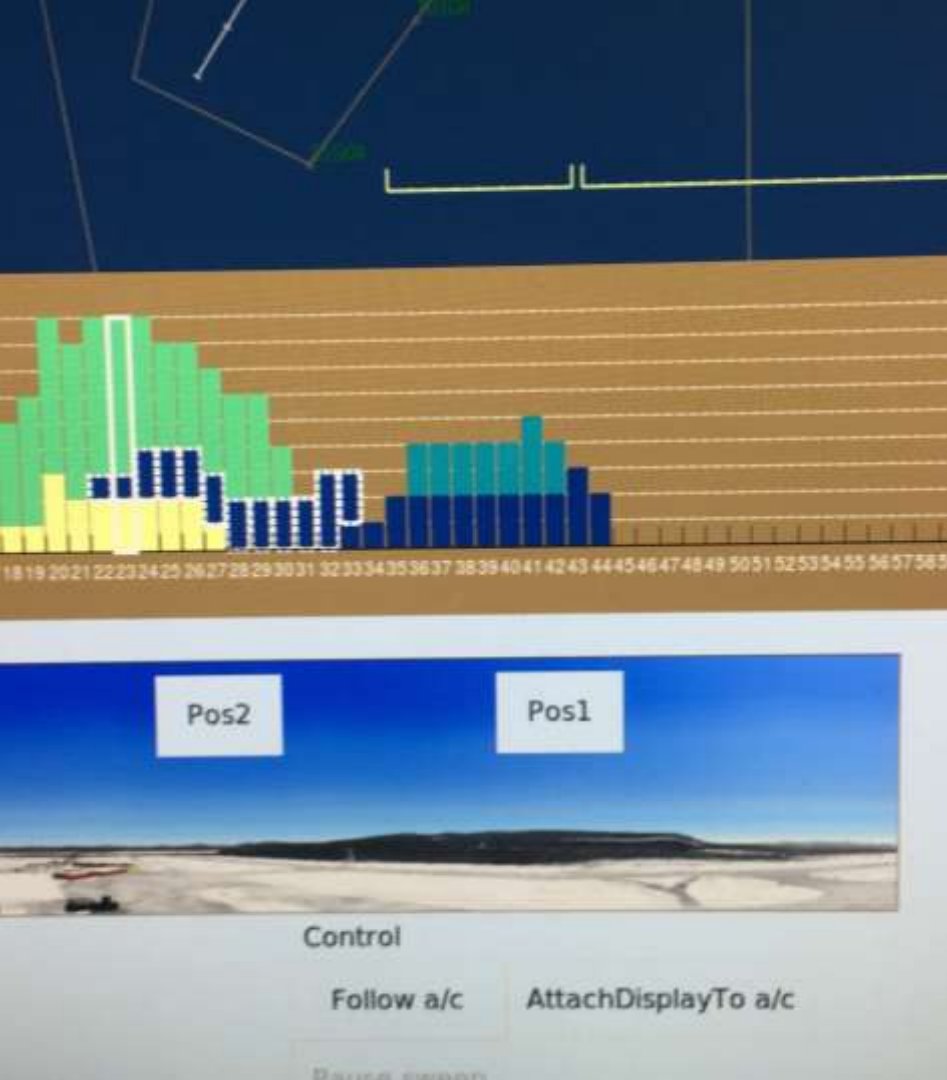
- ✓ Capacity
 - Next level of aerodromes
- ✓ Measurement
 - Objective data – test, measurement
 - Subjective data – questionnaire
- ✓ Flexibility
 - Operative harmonisation

CWP – Controller Working Position ed-3.0 – 2018

- ✓ “Side by side” presentation
 - Preferred by end users
- ✓ Automation
 - Support where efficiency is increased
- ✓ “Heads up”
 - HMI to support
 - Tools and Features



ATCO planning tool



- ✓ Workload tool
 - Departures – Taxi > Dep
 - Arrivals – Final > Stand
 - VFR ARR and DEP
- ✓ Time scale ahead
 - Support for “Split” or “Merge”
- ✓ Workload
 - Traffic list

Voice Com integration

- ✓ Compass Directions
 - Easy guidance
- ✓ Air frequency highlighted
 - Visual support to audio
- ✓ Ground frequency highlighted
 - Visual support
- ✓ Highlighted bar during a call
 - HMI to support in distinguish calls

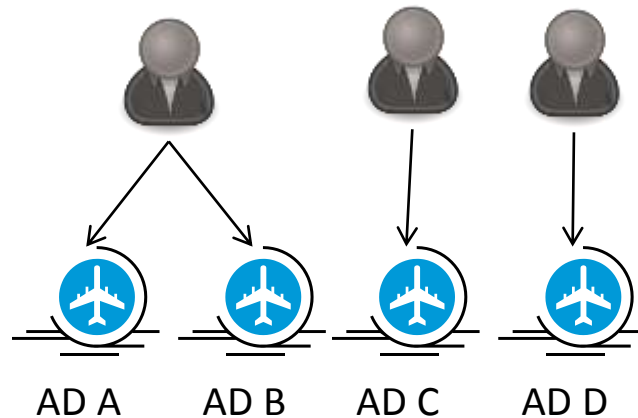
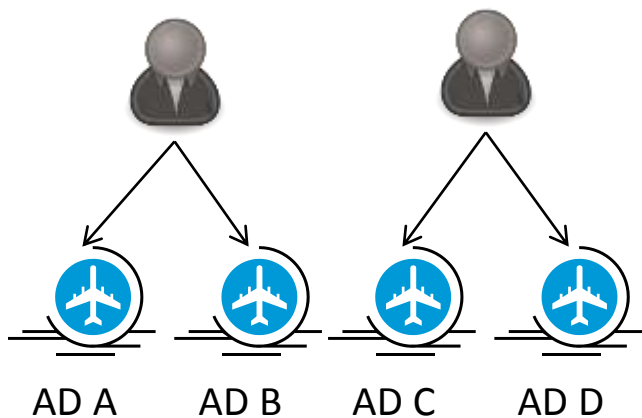


CWP – Controller Working Position ed-3.0 – 2019



- ✓ New “zoom and pan” functionality for the panorama/OTW view
- ✓ Mouse and pen, only input devices
- ✓ Overlays – cluttering risk

Multiple remote towers – 2 simultaneous AD

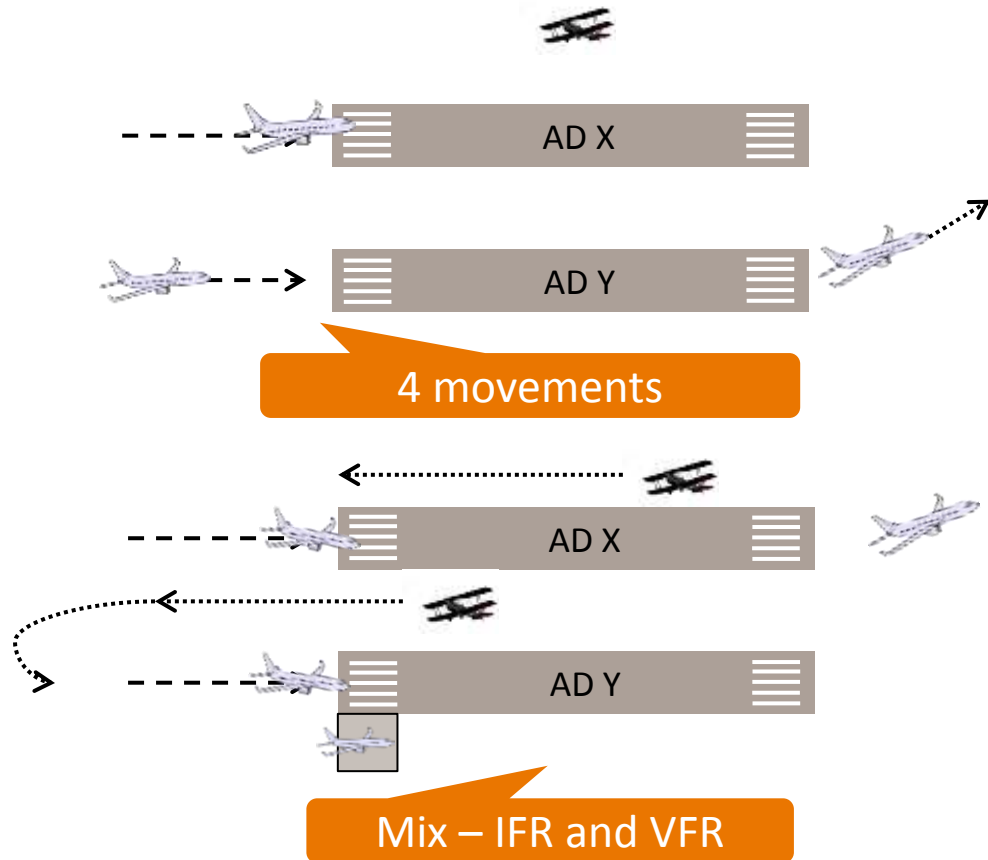


More traffic – Multiple mode

Next level

15.000 <> 45.000 mov/year

- ✓ 20 movements / hour
- ✓ Simultaneous traffic
- ✓ Increased complexity

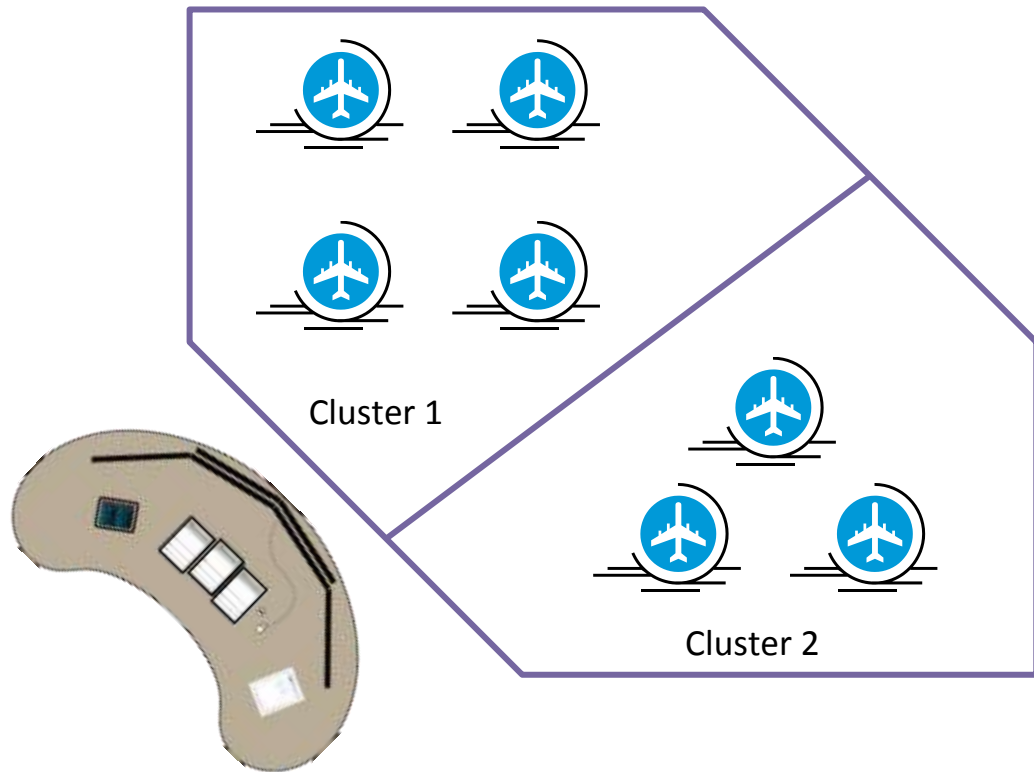


Controller Working Position ed. – 4.0

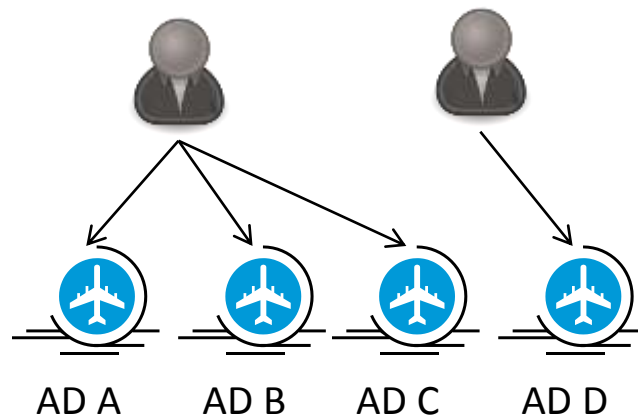
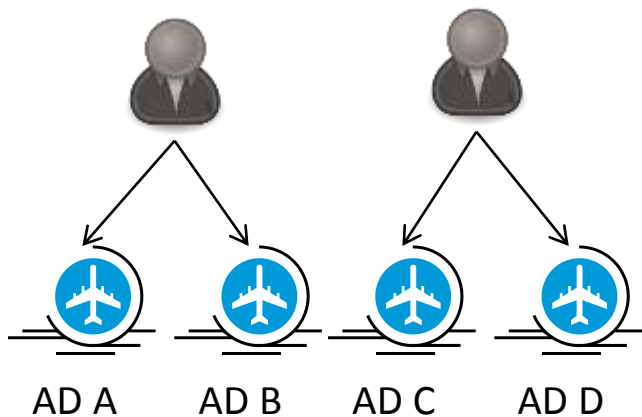


Multiple remote towers – RTC research

- ✓ Next steps
 - Flexible allocation
- ✓ Harmonisation
 - One system
 - Similar methodology
- ✓ Clustering aerodromes
 - Staff flexibility

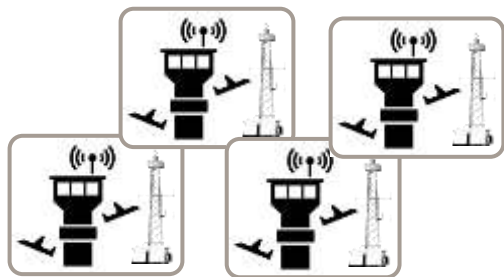


PJ.05.03 – Multiple remote towers – RTC research

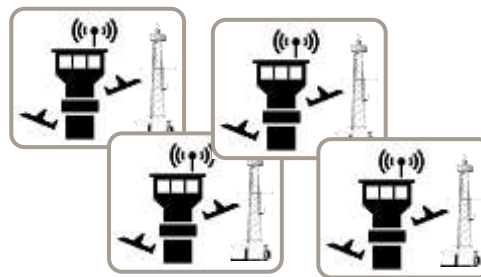


Flexible allocation of aerodromes

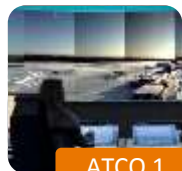
Future RTC



Cluster 1



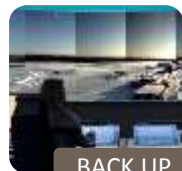
Cluster 2



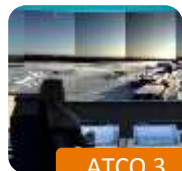
ATCO 1



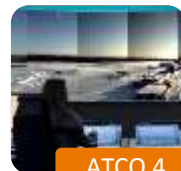
ATCO 2



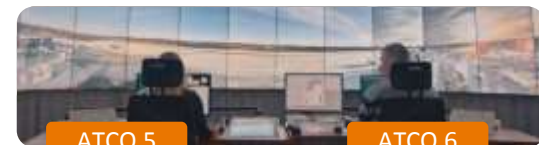
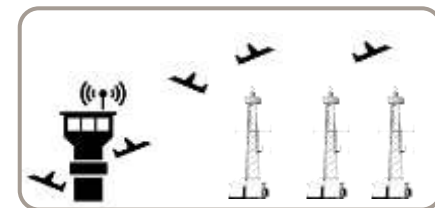
BACK UP



ATCO 3



ATCO 4



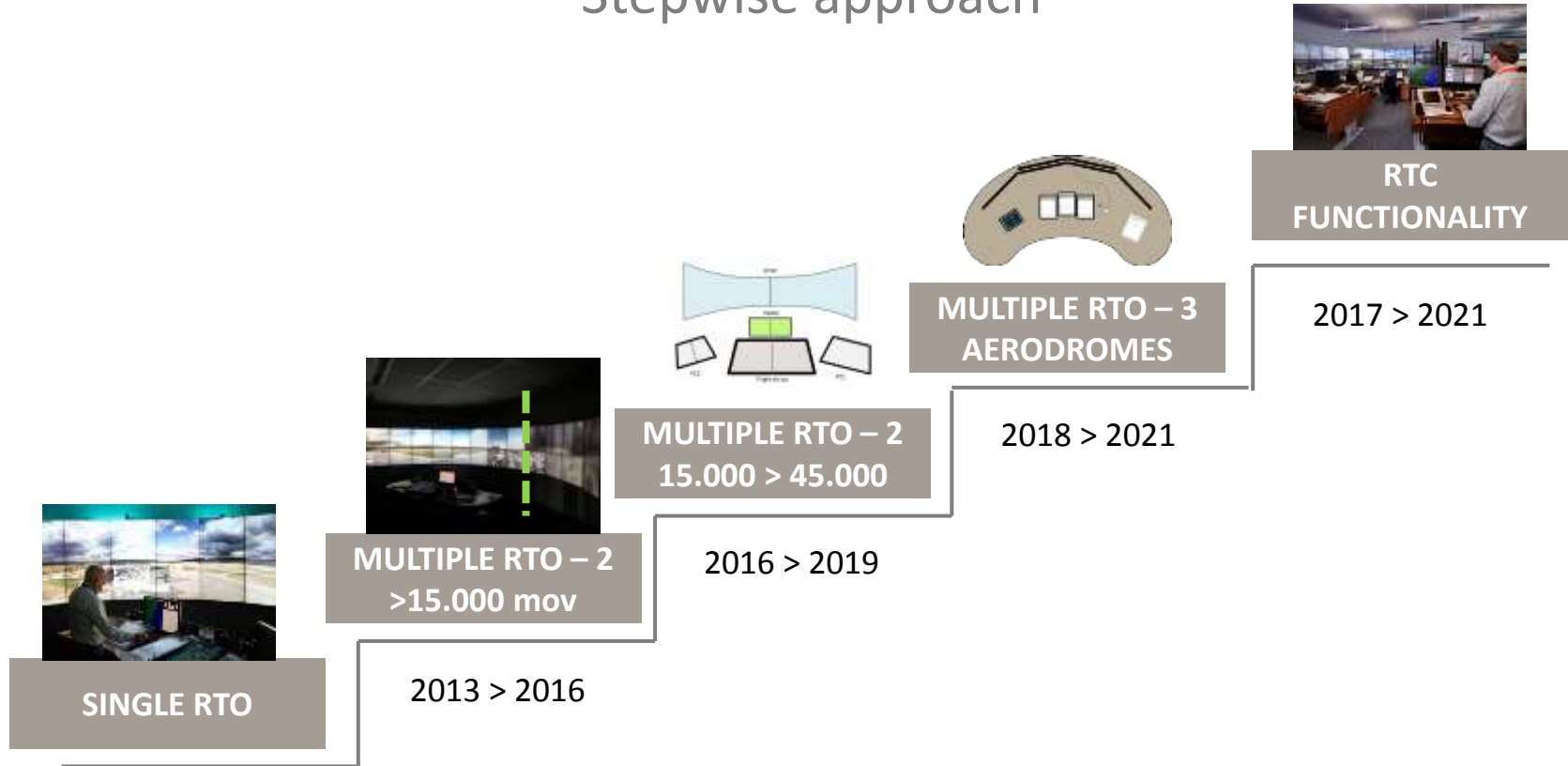
ATCO 5

ATCO 6

Flexible allocation of aerodromes
 $0 > 15.000$ and $15.000 < 45.000$ mov/y

Flexible staff allocation
 $45.000 > 200.000$ movements/year

Stepwise approach



1

task at a time

My way ahead

- ✓ Single Remote Tower
 - Low density aerodrome
 - Medium sized aerodromes
- ✓ Multiple Remote Tower
 - Two low density aerodromes
 - Two medium sized aerodromes
 - Three aerodromes
- ✓ Validation strategy
 - R&I with flexibility
 - Subjective and Objective data



International cooperation

- ✓ Shared information to reach further
 - LFV, DFS and LVNL
 - COOPANS
 - NLR
- ✓ SESAR PJ.05
 - Several partners
 - Different set ups – same solution

RTC & RTS

RTC SUNDSVALL



RTS SÄLEN

RTS ÖRNSKÖLDSVIK

RTS SUNDSVALL

RTS LINKÖPING

RTC STOCKHOLM



RTS KIRUNA

RTS UMEÅ

RTS ÖSTERSUND

RTS STURUP

RTC Stockholm Centre 2.0

- ✓ Co-located with ATCC Stockholm at Arlanda airport
- ✓ Designed and built to incorporate
 - Our experiences from the first generation
 - Possibilities for the future





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THANK YOU!



SAAB



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