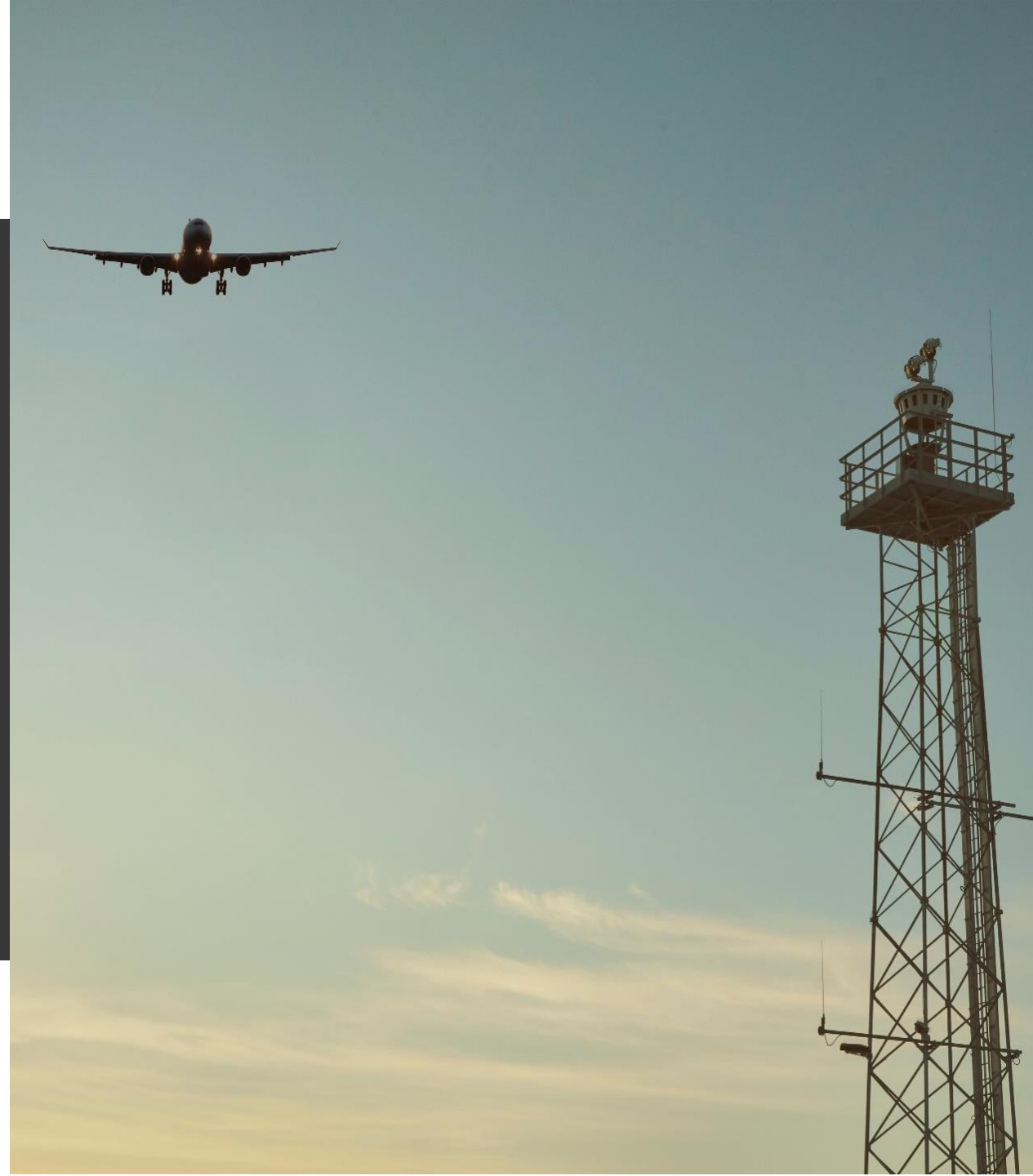
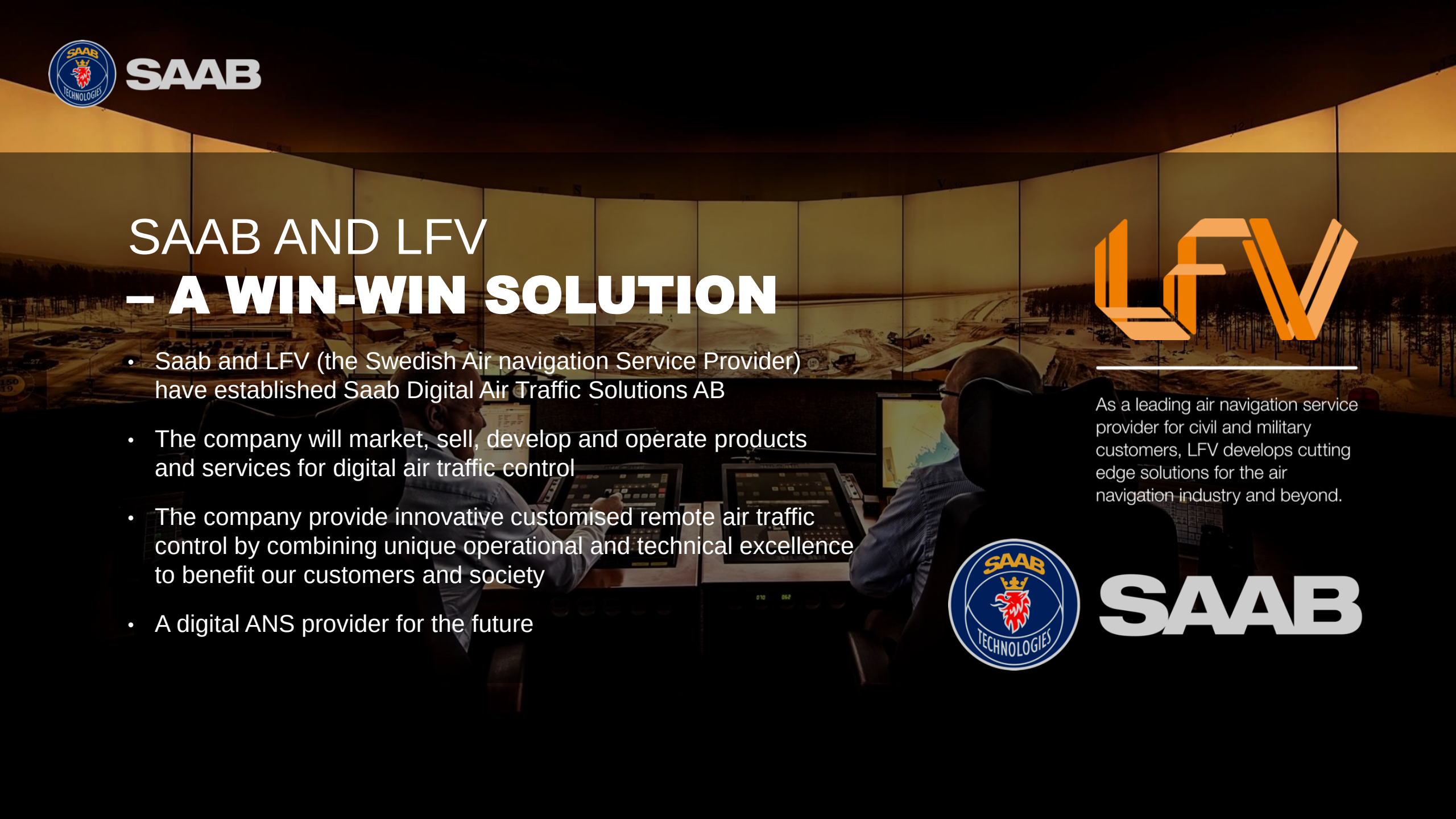
Saab Digital Towers

Vision 2030

LFV/LiU, DATS workshop 2020-02-06

Niclas Gustavsson, VP Business Development, SDATS



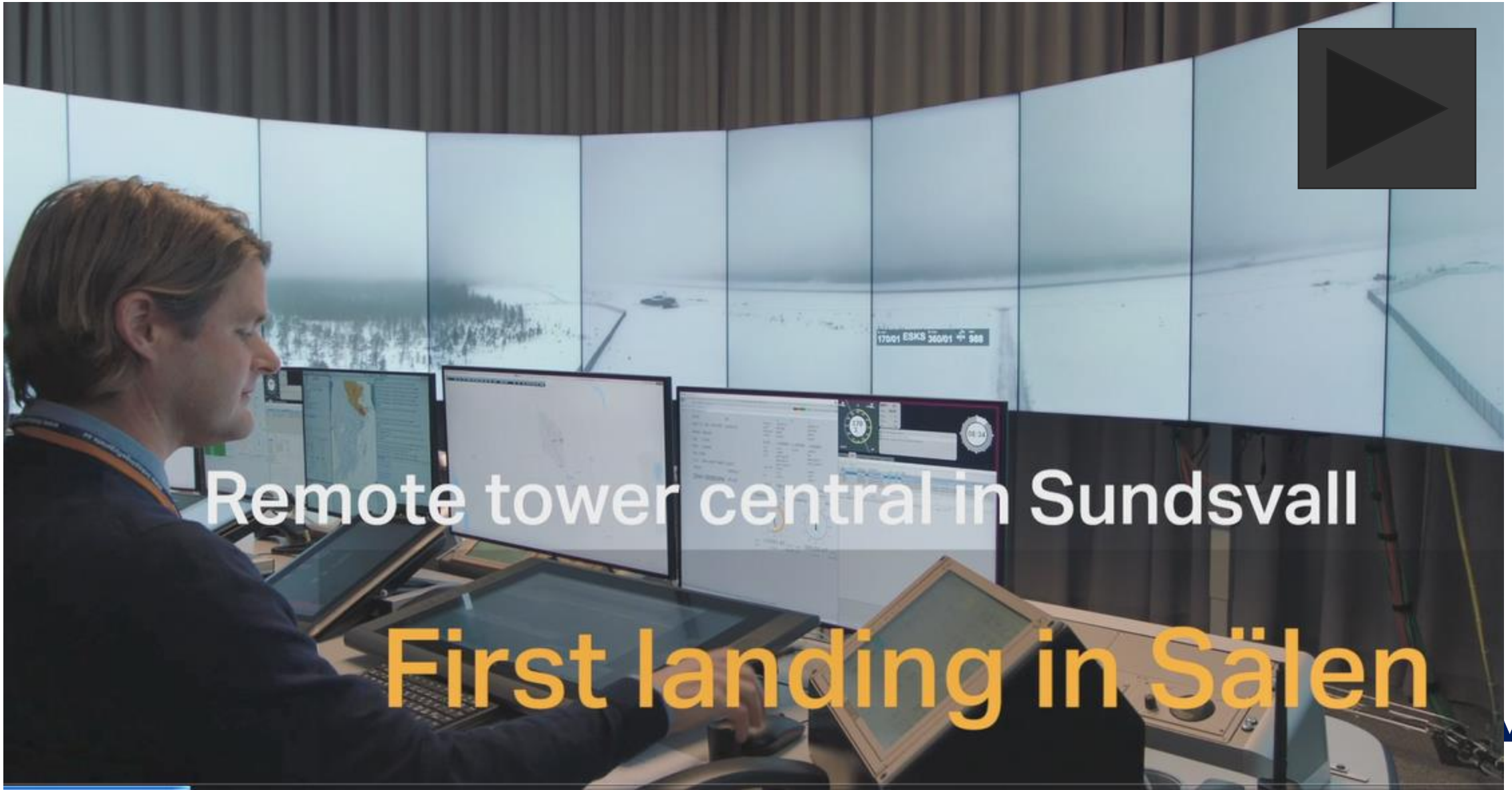


SAAB AND LFV
– A WIN-WIN SOLUTION

- Saab and LFV (the Swedish Air navigation Service Provider) have established 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 navigation service provider for civil and military customers, LFV develops cutting edge solutions for the air navigation industry and beyond.

Digital and Remote towers - our passion



Looking back – Thinking forward

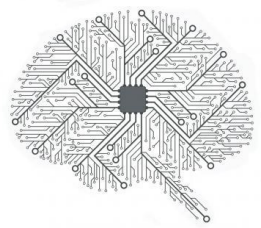
In 2006 Saab and LFV tested the first Digital tower prototype

In 2006 Iphone was new!

In 2019 Saab Digital Towers are in operational use at a number airports in several states

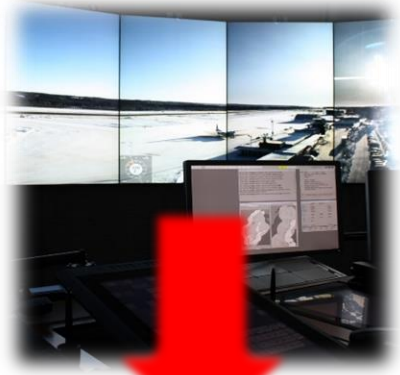
In 2019 FAA predicts 3 Million civil drones to be in use in US only

In 2030 Saab Digital Towers centres will provide a range of ATM/ UTM services globally…



???????

We passed the test! Moving towards vision 2030 !



- 25000 hours
- SE/ UK/ NATO approval
- IFR/VFR operations

Third generation of Digital Tower

Initial research

Pilot operations

Initial operations

Sustainable operations

System development

Innovative ideas

Innovative ideas

SESAR JU

Change mangement

Integration of new functionality

Saab Digital Towers - Vision 2030

Expanded operations

Prototypes and demonstrations

Regulatory approvals

Second generation of Digital Tower

System development

Adapted standards

- ICAO Doc 4444
- EUROCAE
- EASA regulations
- SESAR Validations

Potential Digital Tower change agents……

Industrial investments

Drones and the need for drone protection

Autonomous vehicles

Traffic growth – global acess

New generation of professionals – digital from birth!

Flying cars

Cyber security threats

The one's we have not seen yet!

Introduction of 5G networks

Electrical aircraft

Environment and the climate change

Artificial intelligence and automation in society

Air Traffic Digitilisation - industry challenge

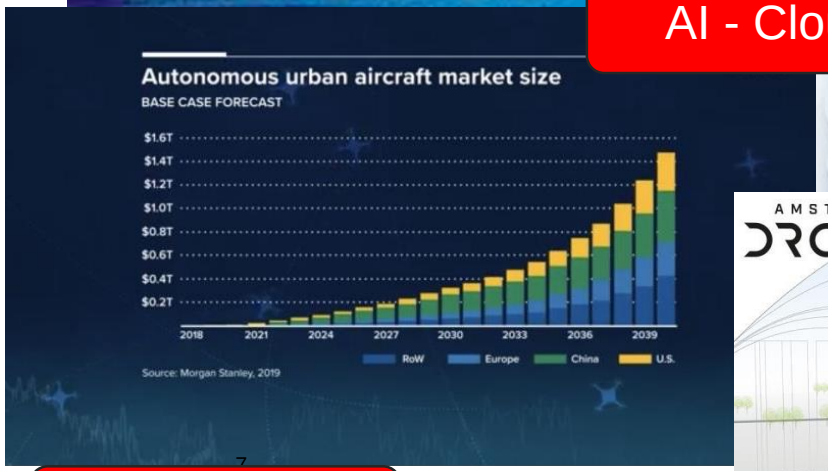
UAM

ATM research

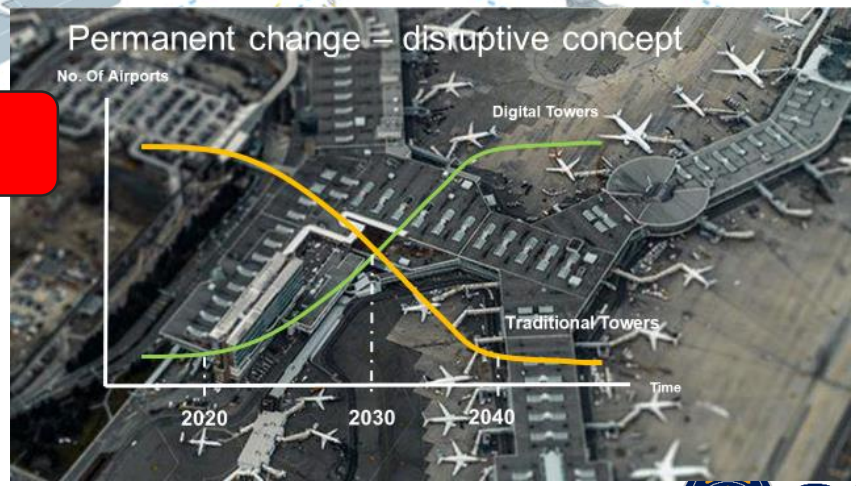
Digital Towers

Digital ANSP

AI - Cloud



UTM



Virtualisation

Security & Networks

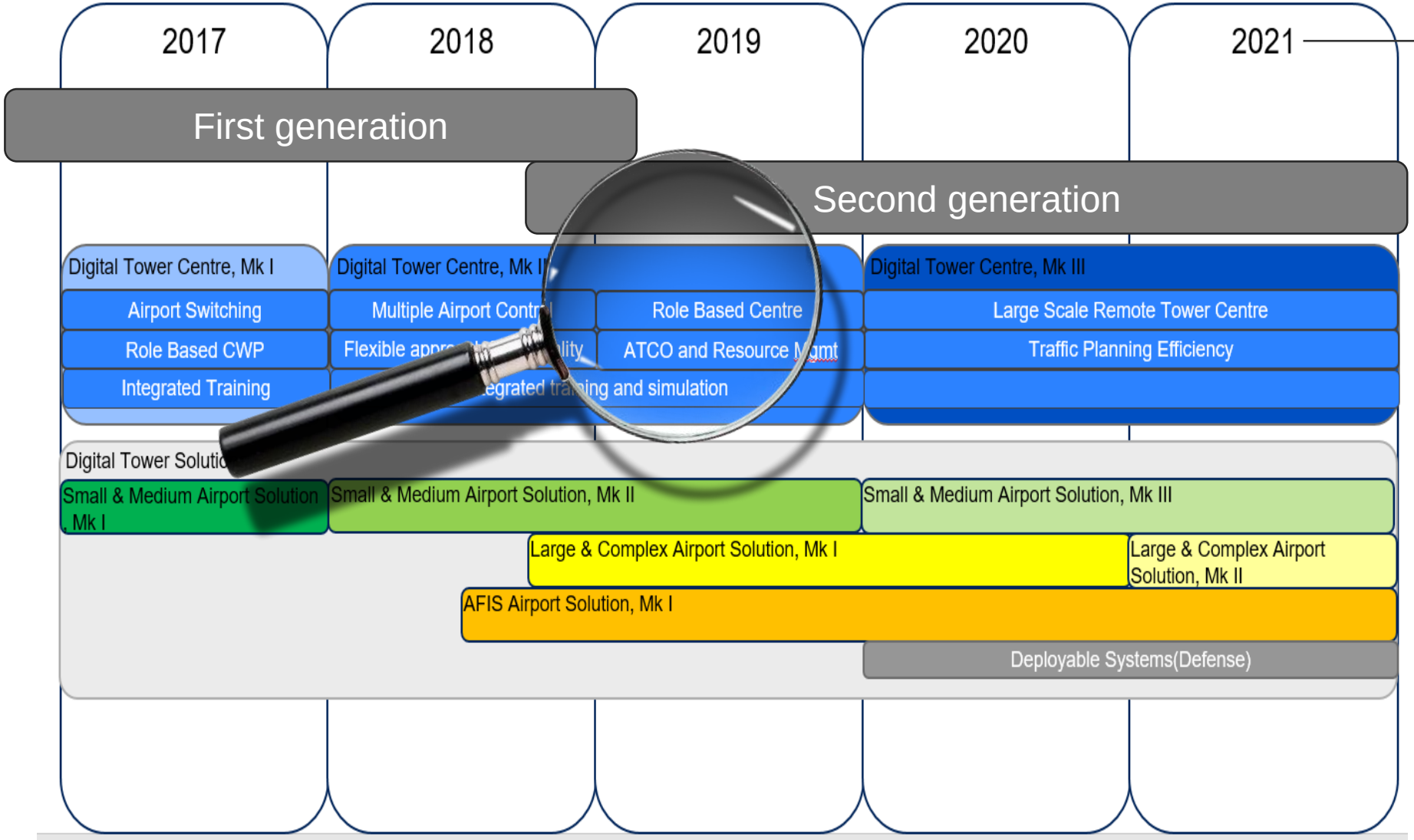
SAAB

What we learnt so far and fed into the product !

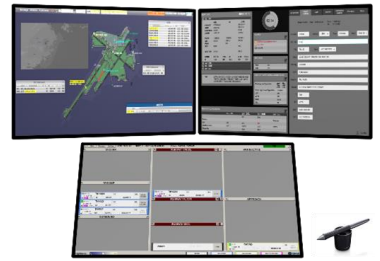
- Validation of every technical/ functional part if its needed. **Nice to have isn´t always need to have.**
- Bring in operators (ATCO) early in the process to have impact on the industrial design and create thrust.
- Use a **step by step** implementation and add features in the future. Start BASIC and have an operational concept.
- Don’t mix a lot of different systems. Let the interaction be handled by one system for all system parts. Reduce workload by system integration
- It takes time and build up a good cooperation with regulator and bring them onboard on the journey
- CWP HMI design is most important.
- Start with existing rules and regulations
- Bring in your **HF experts** from the start – it will pay off
- Pick your champions!


SAAB
TECHNOLOGIES
THE BIGGEST EXPERIENCE IS NOT ABOUT TECHNOLOGY
IT`S ABOUT CHANGE MANAGEMENT

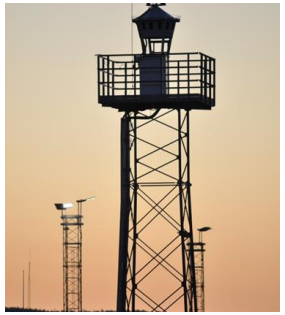
Saab digital tower road map today ...and then..



Centre development



Sensor development



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Saab Digital Tower Common Core product family

Functionality

Certification

Software

Hardware

Maintanabiity

R&D

Off-Shore – special adaptations

AFIS – light versions

Business continuity

Large Complex Airports

Digital TWR Single RWY

Building on a Swedish, EU, US, UK Certifications – standard product

Military adaptations

Airport Ramp towers

Mobile/ tactical deployement

SMART Airport integration

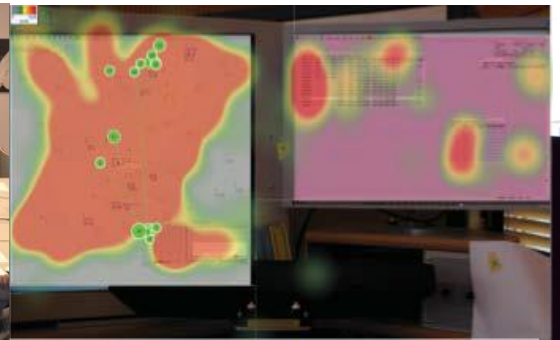
Houston ramp – tower…or…..

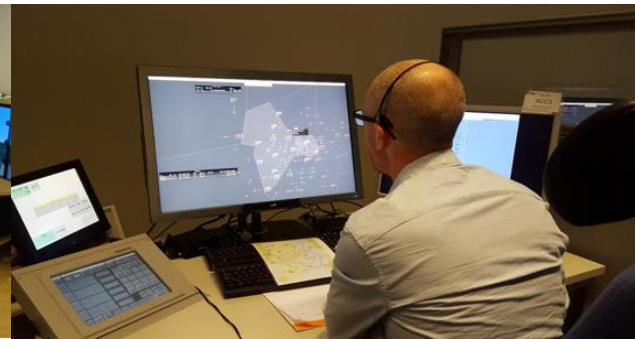
We keép on researching…. towards 2030

Industrialisation of our products – increase capacity to deliver

Too see is to believe – get into to operations - worlds first digital tower an centre

Continued research and development - towards next generation





Saab web of research….

Cranfield – UTM/ Drones/ Sensors

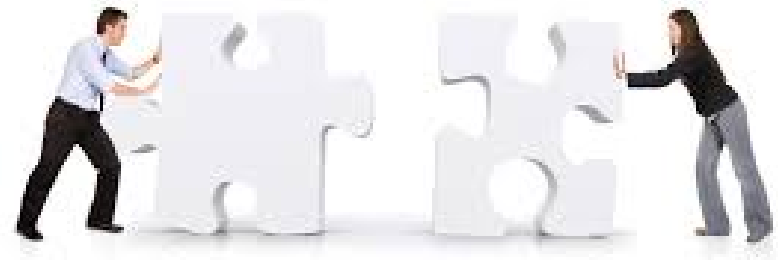
LFV/ LiU – HF, AI, ATM applications

NTU – Singapore – Video Analytics/ AI

MiU – Mitt –Un. - Camera/ Sensors

Industrial partners – Strategic technologies

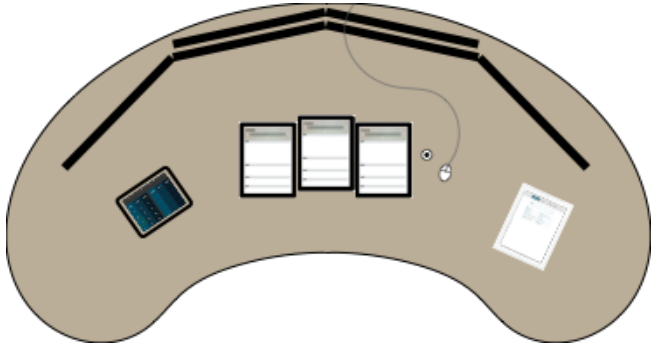
Saab portfolio from Safe to Radars



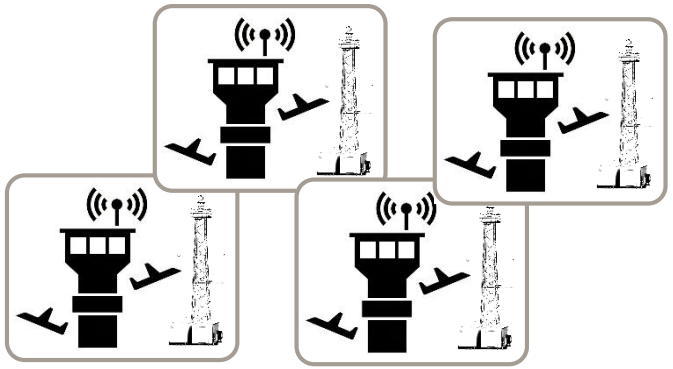
Combined knowledge supporting our Digital Tower/ ATM Road map

Future RTC or Digital Tower Centre

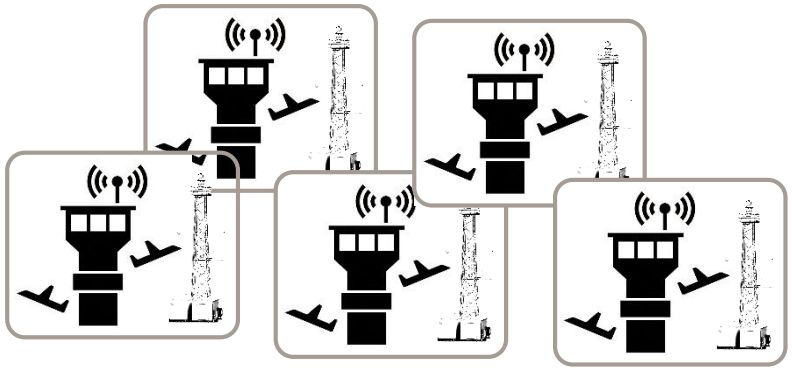
- ✓ Effectiveness
  - – Flexible allocation of aerodromes to any controller and Module
- ✓ Harmonisation
  - – Methodology and equipment
- ✓ Artificial Intelligence support
  - – Self learning - monitoring



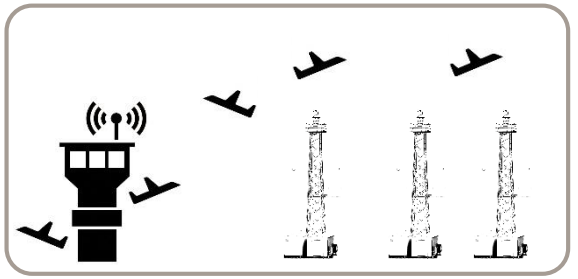
Future RTC or Digital Tower Centre..cont.



Cluster 1

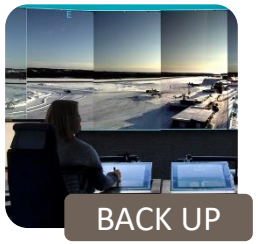


Cluster 2



ATCO 1

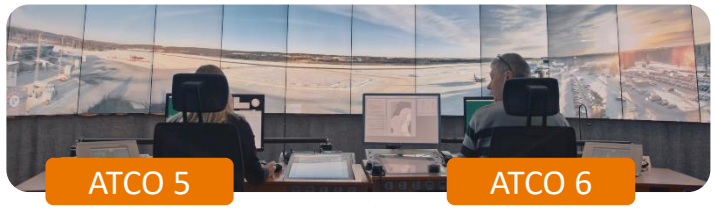
ATCO 2



BACK UP

ATCO 3

ATCO 4



ATCO 5

ATCO 6

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

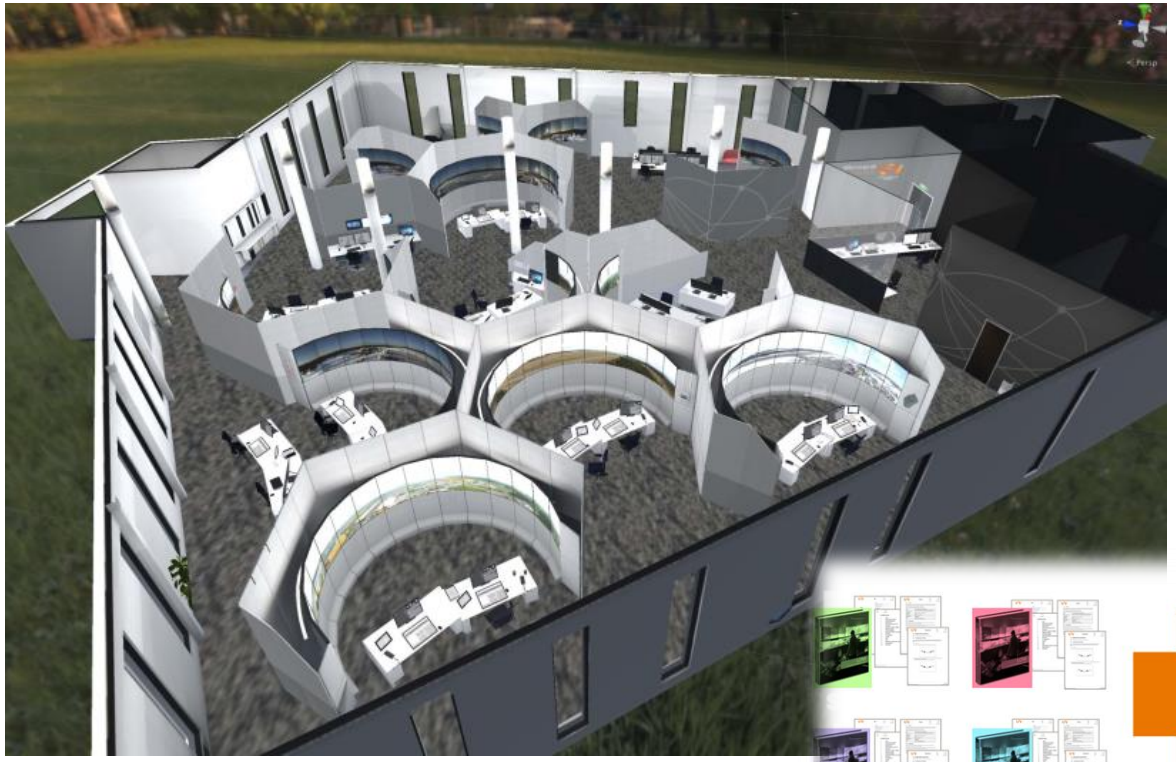
Flexible staff allocation
45.000 > 200.000 movements/year

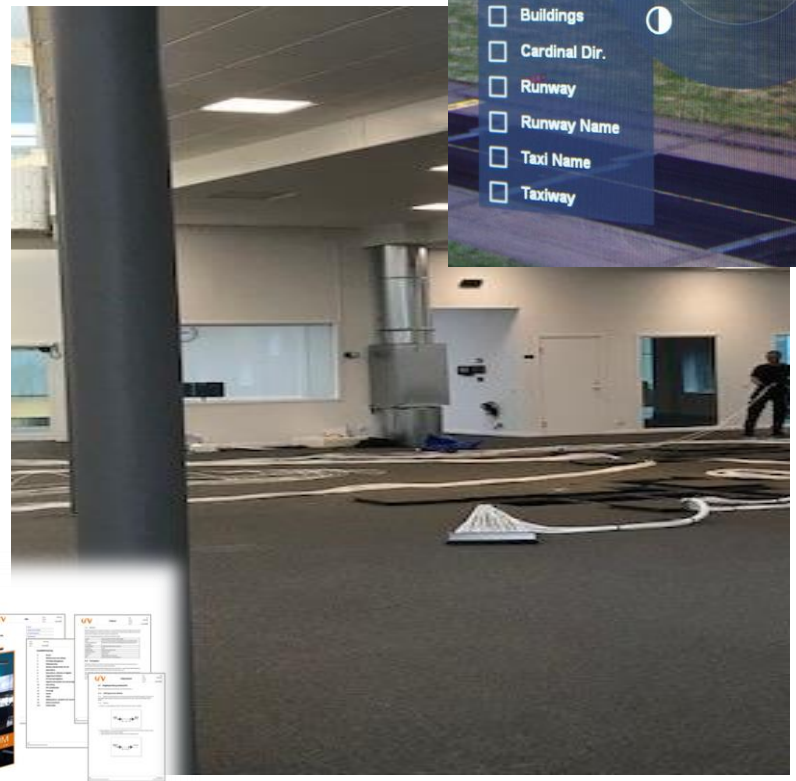
Future Digital Tower Centre functions

- ✓ AI supported features
  - – Self learning system for traffic monitoring
- ✓ Autonomous vehicles
  - – Geo-fenced routes

RTC Stockholm – second generation digital tower centre

- From showing that it works to efficient day to day operations- 24/7
- Installations are on-going

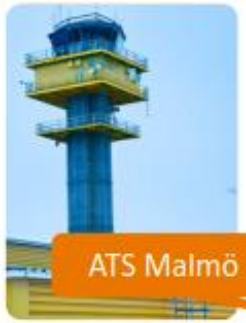




Second generation Digital Towers

ATS Kiruna

ATS Åre Östersund



ATS Malmö

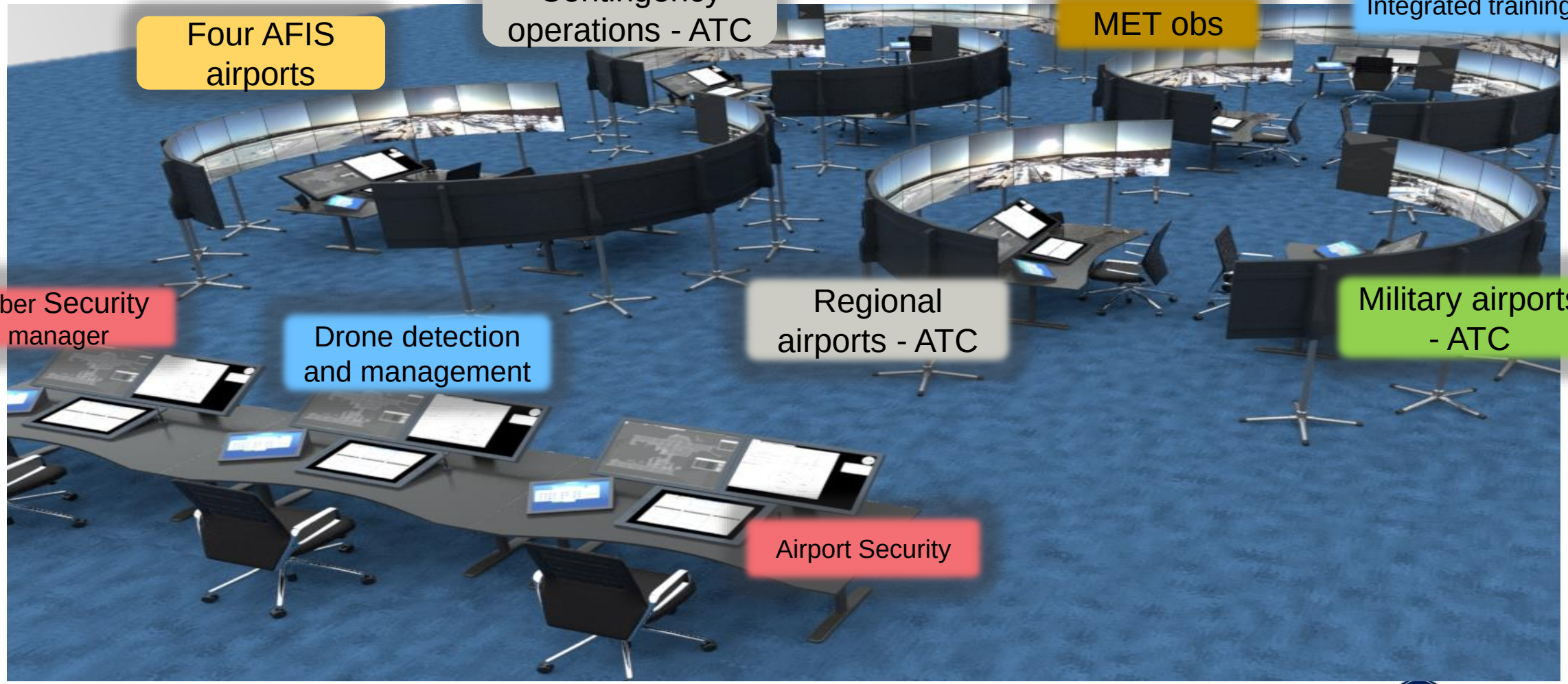
ATS Umeå

RTC Stockholm

Installations are on-going

Co-financed by the Connecting Europe Facility of the European Union

Saab digital tower centre in 2030 – an information centre



Last 12 months…a change in interest

An INDUSTRY LOOKING FOR SOLUTIONS AND INITIATIVES

Heathrow

19.20th Feb

Amsterdam Airport Schiphol

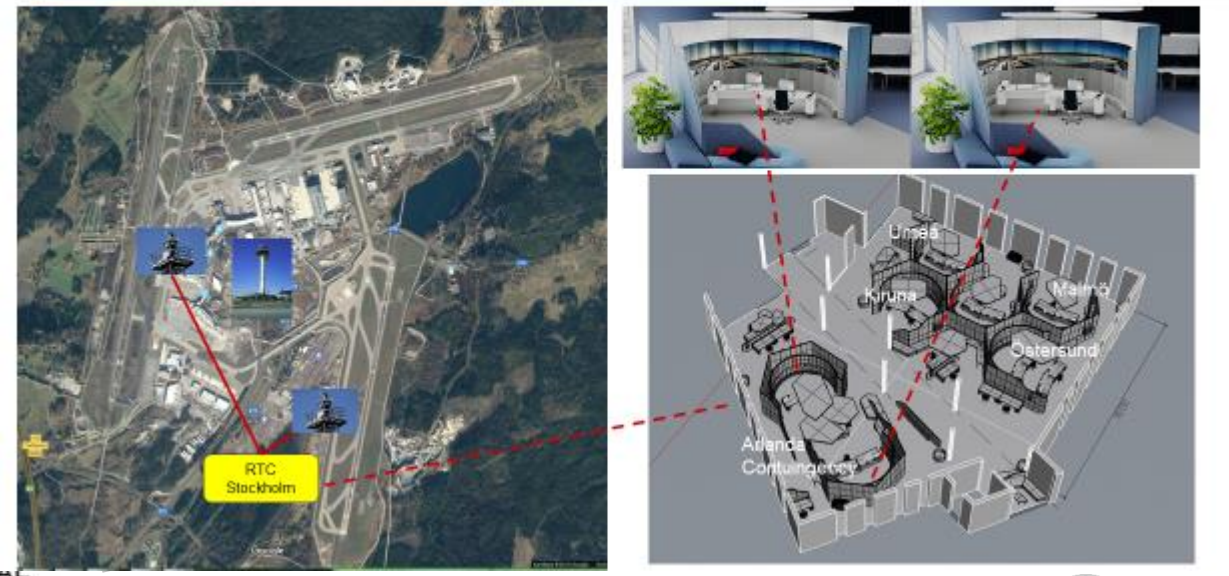
10th of March

- 3rd RUNW
- Contienge
- Apron/ gat
- Tower in th
- Security
- SMART Ai

March IBG

香港 國際機場 HONG KONG INTERNATIONAL AIRPORT

15-1th of March

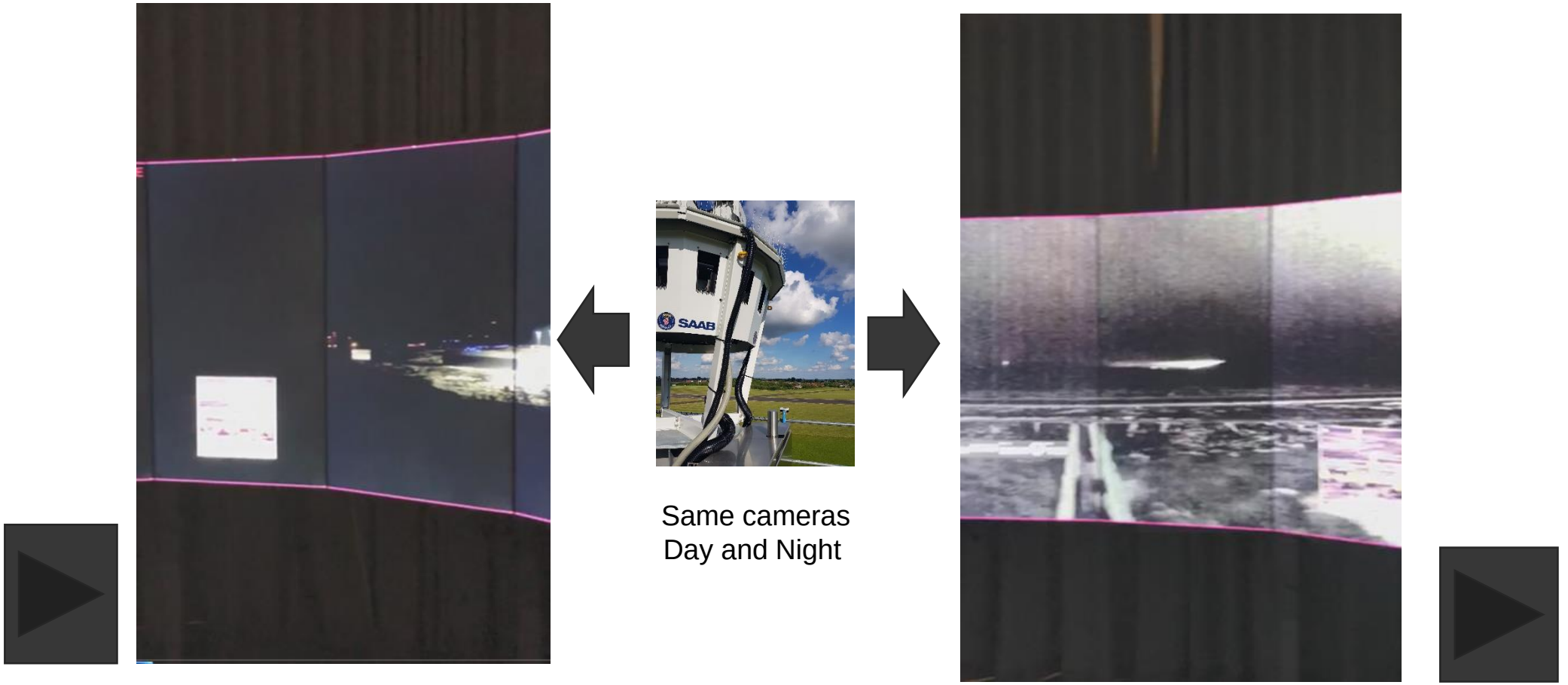


SAAB TECHNOLOGIES SAAB

Every second counts…AI enablers ..research challenge #1

1 less landing per hour
when Tower is in the cloud
Costs KEUROS

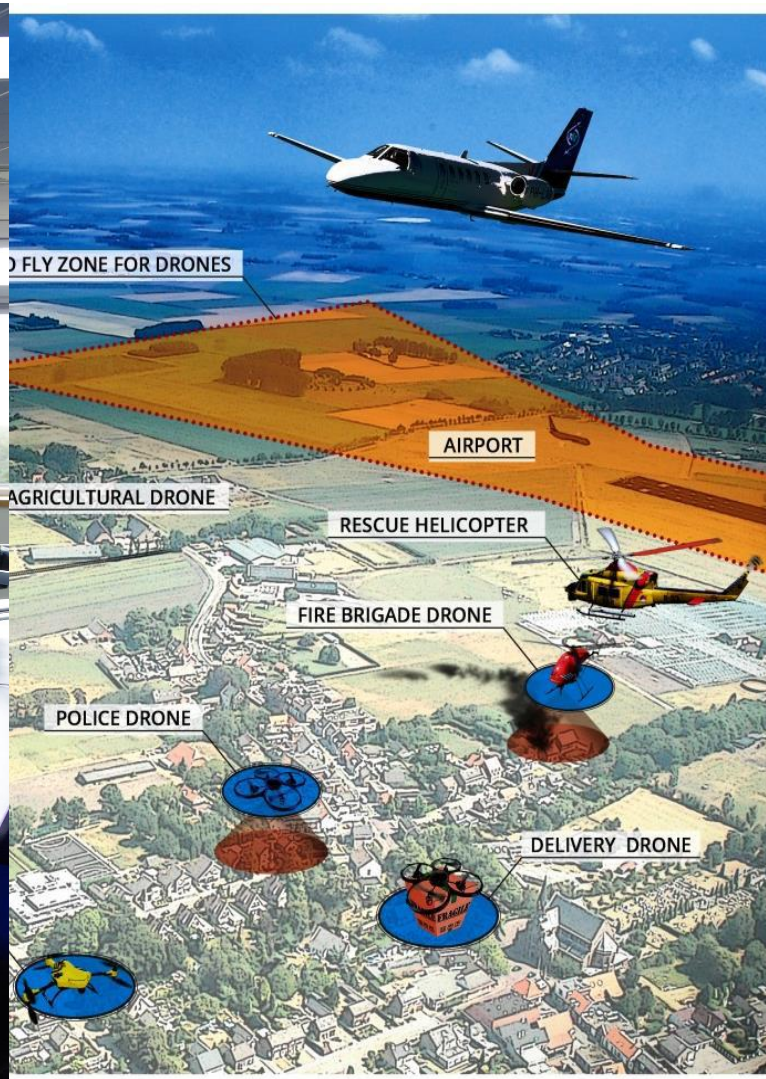
Enhancing Camera Day/ Night modes …research challenge #2



Same cameras
Day and Night

ATCO pressing the Night mode for additional awareness- Limited impact in certification/ regulatory approval

Integrate UTM in the Digital Tower Centre – research challenge #3



Possible steps towards 2030..

2019

Saab Second generation of digital towers

2020

First Multiple airport control is approved and put into operation for two airports at the same time

2022

The last traditional tower is built!

2023

The first Digital cross-border border service

2024

The first digital tower centre with more than 10 airports

2025

First Large complex airport using only digital tower(s)

ATM/ UTM integration in Digital Tower Centre

2025

Initial use of digital towers for tactial military operations

2028

First Multiple airport control is approved and put into operation for tthree airports at the same time

2028

ICAO , EASA and othe. standards updated to fully embrace digital possibilities

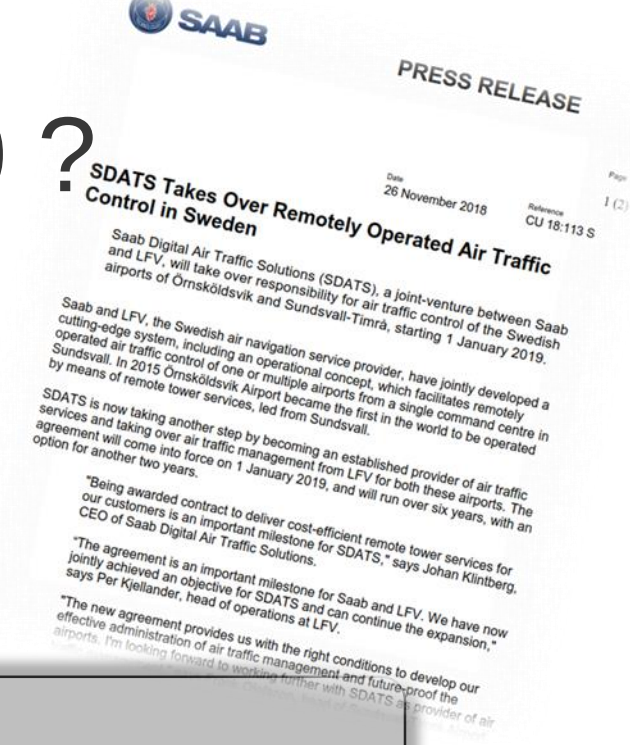
2030

Commercial Digital Tower Service – Globally!

My work as an ATCO in a Saab Digital tower centre in 2030 ?

- I work in a centre of towers, approach and other functions
- I will be licensed for four different airports
- I will work with similar equipment for all towers
- I will control two or maybe three airport simultaneously on a regular basis
- Training will be an integrated part of the centre
- I will rotate between ATM and UTM tasks
- I will have access to experts and support if and when needed
- I will service airports in different countries
- I will have intelligent automation that will increase capacity, safety and flexibility
- Being an Air Traffic Controller is one of the most wanted jobs for new generation

Digital tower business models in 2030 ?


SAAB

PRESS RELEASE

SDATS Takes Over Remotely Operated Air Traffic Control in Sweden

Date 26 November 2018 Reference CU 18:113 S Page 1 (2)

Saab Digital Air Traffic Solutions (SDATS), a joint-venture between Saab and LFV, will take over responsibility for air traffic control of the Swedish airports of Örnsköldsvik and Sundsvall-Timrå, starting 1 January 2019.

Saab and LFV, the Swedish air navigation service provider, have jointly developed a cutting-edge system, including an operational concept, which facilitates remotely operated air traffic control of one or multiple airports from a single command centre in Sundsvall. In 2015 Örnsköldsvik Airport became the first in the world to be operated by means of remote tower services, led from Sundsvall.

SDATS is now taking another step by becoming an established provider of air traffic services and taking over air traffic management from LFV for both these airports. The agreement will come into force on 1 January 2019, and will run over six years, with an option for another two years.

"Being awarded contract to deliver cost-efficient remote tower services for our customers is an important milestone for SDATS," says Johan Klintberg, CEO of Saab Digital Air Traffic Solutions.

"The agreement is an important milestone for Saab and LFV. We have now jointly achieved an objective for SDATS and can continue the expansion," says Per Kjellander, head of operations at LFV.

"The new agreement provides us with the right conditions to develop our effective administration of air traffic management and future-proof the airports. I'm looking forward to working further with SDATS as provider of air

ANSP – Industry alliances

Industry providing Managed Services for national ANSP's

Digital Tower based ATC as a Service ! New entrants

Traditional National Full Services ANSP

Increased separation of En-route and tower services

Dedicated National Digital tower service providers

ANSP Digital Tower alliances

Global Digital Tower Services

New alliances – network, security, ATM, ?

SAAB TECHNOLOGIES SAAB

Whatever…get into operations

See us at stand 305

Saab Digital Air Traffic Solutions AB