
SAAB
TECHNOLOGIES
SAAB

REMOTE TOWERS

SPARA 2020

Niclas Gustavsson
Vice President
Business Development & Governmental Affairs

Saab Digital Air Traffic Solutions AB

Northern Periphery and Arctic Programme 2014–2020

EUROPEAN UNION
Investing in your future
European Regional Development Fund

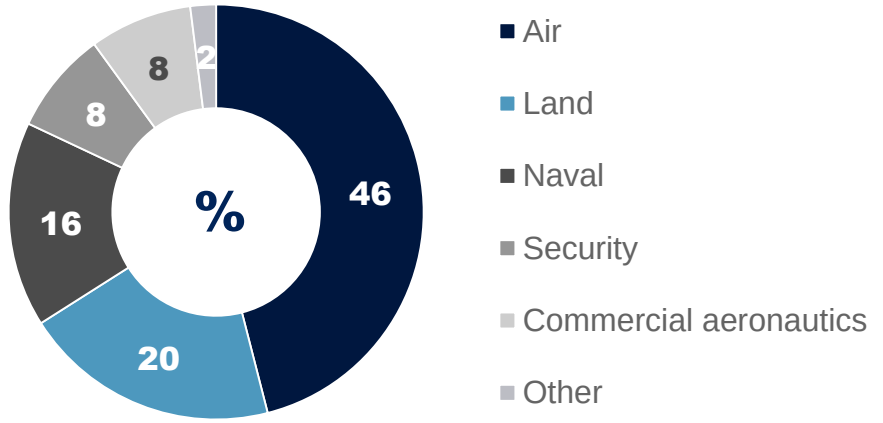
Smart Peripheral And Remote Airports
SPARA 2020

AN **OVERVIEW** OF OUR COMPANY

SALES

27,186

MSEK

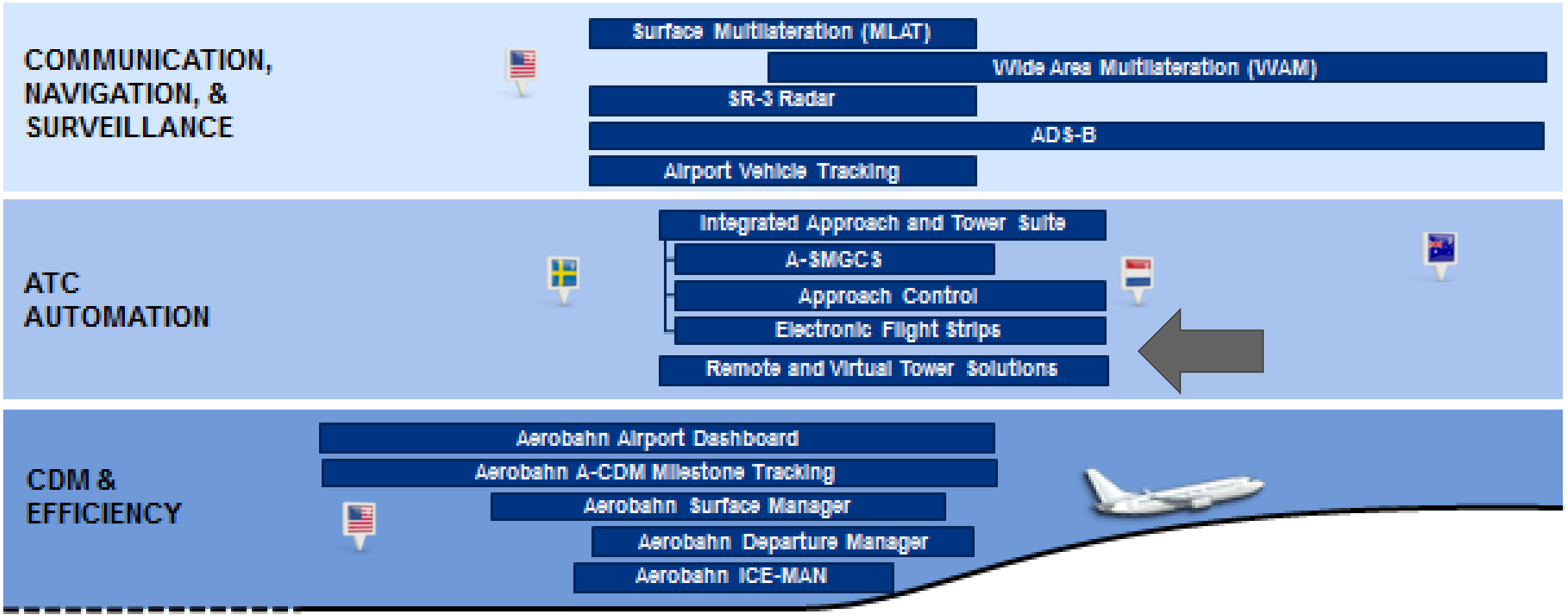


14,700

EMPLOYEES

OUR BROAD **OFFERING**

SAAB ATM PRODUCT PORTFOLIO



AIR TRAFFIC CONTROL CHALLENGES…

- ✓ **ATC costs are increasing**
- ✓ **Aviation is vital for rural regions/ towns**
- ✓ **Need to be more flexible – new airports/ needs**
- ✓ **Each and one tower differently equipped**
- ✓ Long opening hours, low utilization of staff ATC personal
- ✓ **Limited flexibility** (vacations, sick leave, overtime)
- ✓ Digitalization as such…
- ✓ Drones!
- ✓ Limited view to runways, holding points
- ✓ **Blind Spots**
- ✓ **Low Visibility / Night View / Sunlight**
- ✓ Birds / Wildlife Detection
- ✓ **Runway / Airport Extension**


SAAB
SAAB

http://saab.com/digitalairtrafficsolutions

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 navigation service provider for civil and military customers, LFV develops cutting edge solutions for the air navigation industry and beyond.

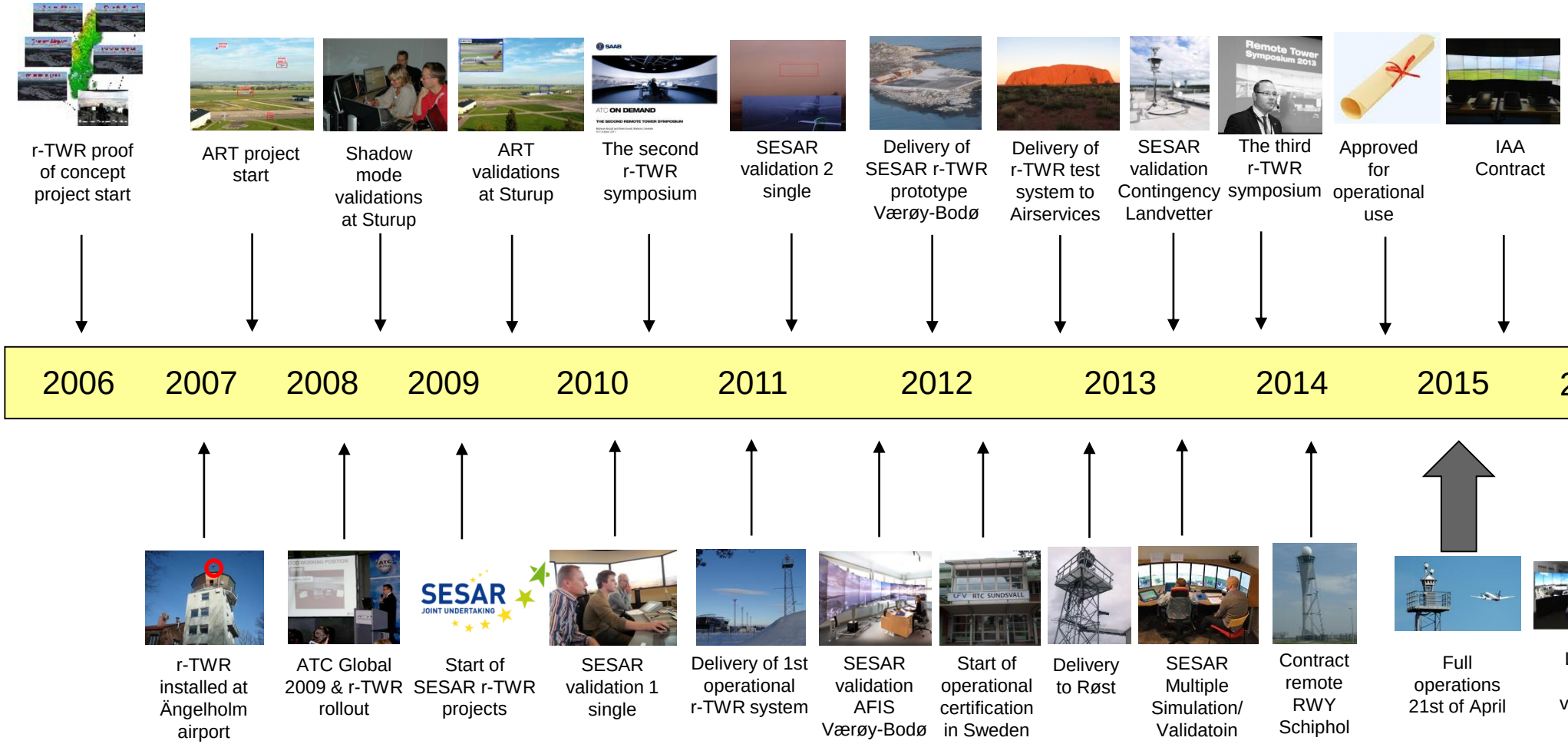
We are transforming the ATM industry
by creation of new added value for our customers

LONG JOURNEY & EXPERIENCE

Saab's Digital Tower Sites

- ✓ **Örnsköldsvik** 365/24/7 - over 11250 hours in operation
- ✓ **Sundsvall** 365/24/7 - over 2000 hours in operation
- ✓ London City Airport
- ✓ Gothenburg (validation)
- ✓ Norway (validation)
- ✓ Ireland (Shannon, Cork & Dublin)
- ✓ Schiphol
- ✓ Leesburg, Virginia (validation)
- ✓ Australia (validation)
- ✓ …more to come!!

SAAB & LFV - LONG TIME R-TWR EXPERIENCE

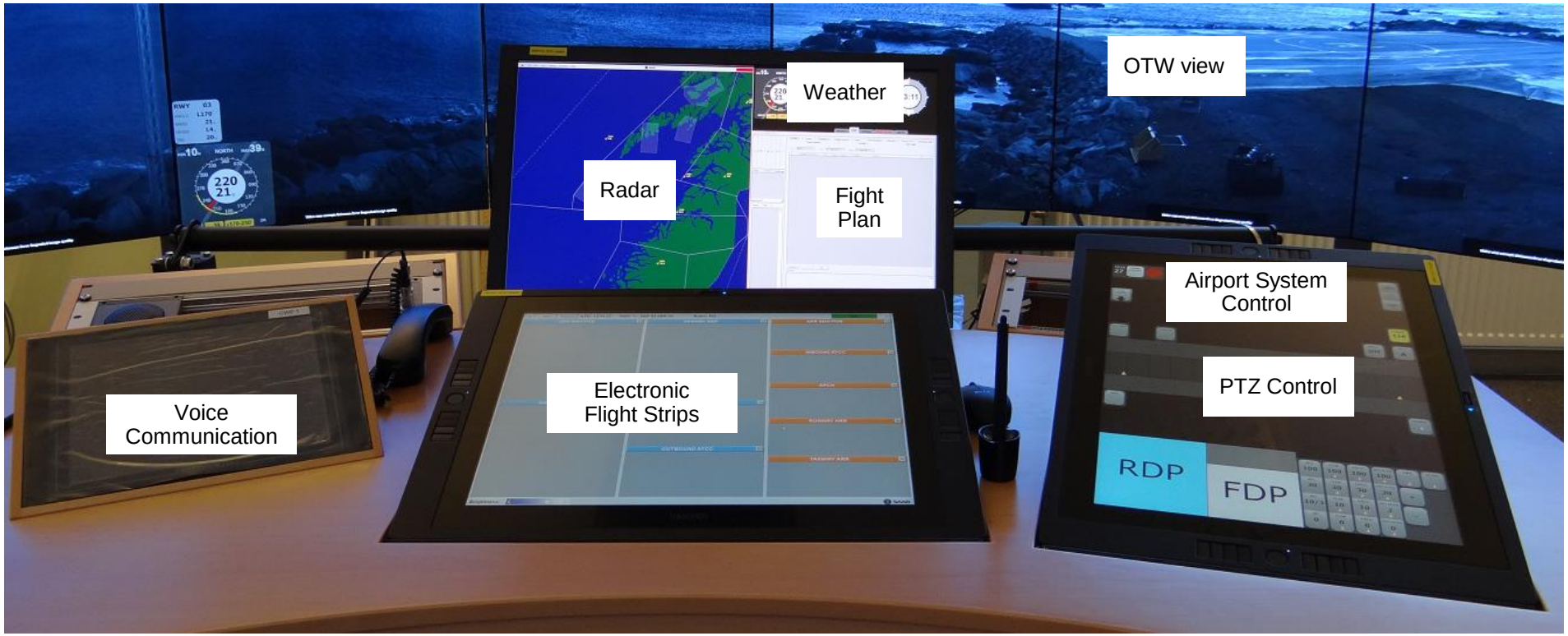


TECHNOLOGY - **REMOTE CAMERA**

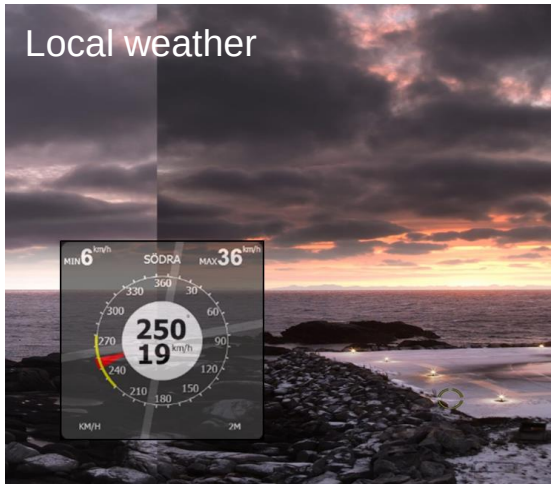
- **Up to 14 Ultra HD cameras**
  - 360 degress coverage horizontal
  - +/- 23 degrees vertical view as in the ordinary tower
  - 30 fps., 100 Mpbs, H.264, max end-to-end delay < 1 sec
- **Integrated weather protected camera housing**
- **PAN/TILT/ZOOM CAMERA(S)**
  - 1-2 HD cameras
  - 1-2 IR cameras
- **Gap Filler Cameras**
  - Hot spot areas
  - Blind spots, covered by a building
  - Far away observations
- **Redundant network and power supply to ensure undisrupted service**

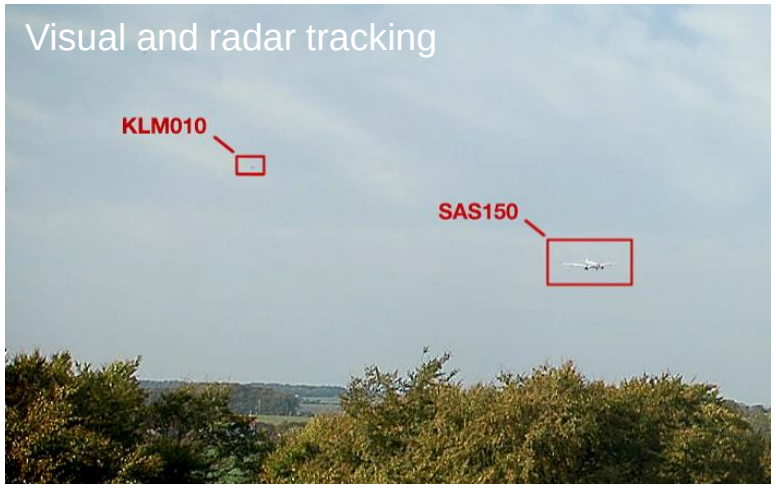

SAAB

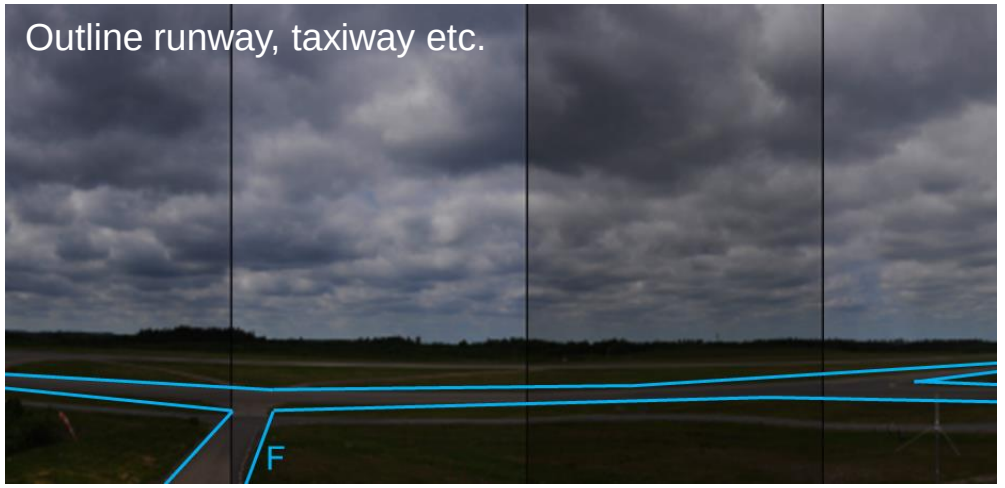
REMOTE TOWER – CWP

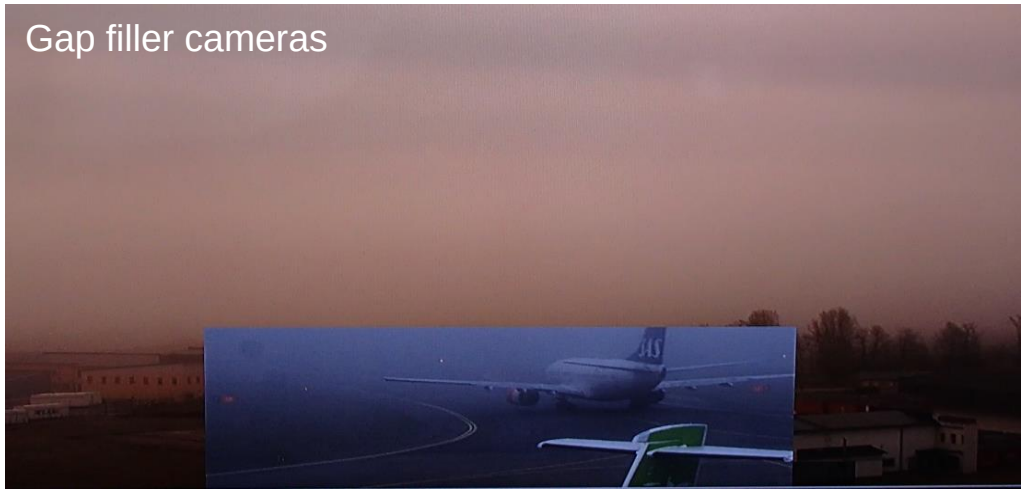


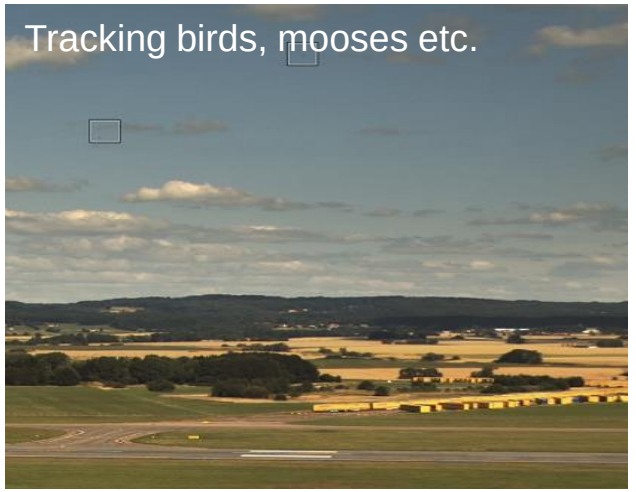
DIGITAL WINDOWS – ENDLESS POSSIBILITIES



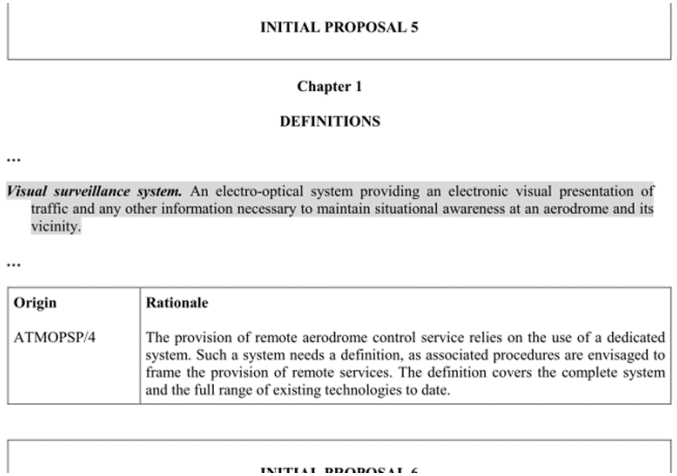








STANDARDISATION AND POLICY MAKING – SAAB COMITTMENT



INITIAL PROPOSAL 5

Chapter 1

DEFINITIONS

...

Visual surveillance system. An electro-optical system providing an electronic visual presentation of traffic and any other information necessary to maintain situational awareness at an aerodrome and its vicinity.

...

Origin	Rationale
ATMOPSP/4	The provision of remote aerodrome control service relies on the use of a dedicated system. Such a system needs a definition, as associated procedures are envisaged to frame the provision of remote services. The definition covers the complete system and the full range of existing technologies to date.

INITIAL PROPOSAL 6

All of these are valid points. However, the existence of policy that is at odds with current practice needs to have very concrete reasoning and evidence behind it, which seems to be lacking. In Ireland and Sweden, operation of multiple towers from one facility, if not by one controller (as yet) is already reality. Following trials of Cork and Shannon airports being remotely controlled from Dublin, the IAA states:

“With carefully designed procedures it will almost certainly be possible to allow one controller to simultaneously provide air traffic management services for more than one low volume aerodrome.”[1]

OUR EXPERIENCE FROM INNOVATING AND OPERATING REMOTE TOWERS

ITS A CHALLENGE TO BE FIRST !

- Acceptance from ATCOs, union, airline companys and society
- Investments need to be analysed deep
- CBA is needed
- No standardisations. It takes time. (EUROCAE/EASA)
- Open and closed – on a market with competition.
- Remote tower is 1.0 – new gadgets will be implemented. Can you see them in the begining

STRATEGY FOR RTS REALISATION

- No 1-Operational demand is the driver for standarization. Technical system shall support existing rules and regulation as much as possible
- No 2-The system shall support the present way of performing the Air Traffic Service
- No 3-Human Resources are trained to perform the service according to above and need only system training.

Operational introduction - A proven formula

PHASE 1

ANALYSIS AND TRAINING

Identification of operational and technical differences RTC vs ATS

Training RTC systems and the new CWP environment

RESULT PHASE 1 = BASELINE PHASE 2

PHASE 2

TRAINING AND FAMILIARISATION

Requires verified technical system

Commissioning Plan developed and approved

Training of controllers ATS in new operating environment

Passive shadow operation

Evaluation of phase

RESULT PHASE 2 = BASELINE PHASE 3

PHASE 3

COMMISSIONING PERIOD

ATS service moved from TWR to RTC

Operational Approval from regulator is required to conduct ATS from RTC

The service will be run from either the TWR or RTC

Handover of position is carried out according to established procedure

Double Staffing provides staff soft start in the environment

Time and resource plan is estimated by CO in consultation with CO RTC

Report of PHASE 3 documented before start of PHASE 4. Report must confirm that the controller is ready to perform the service.

RESULT PHASE 2 = BASELINE PHASE 3

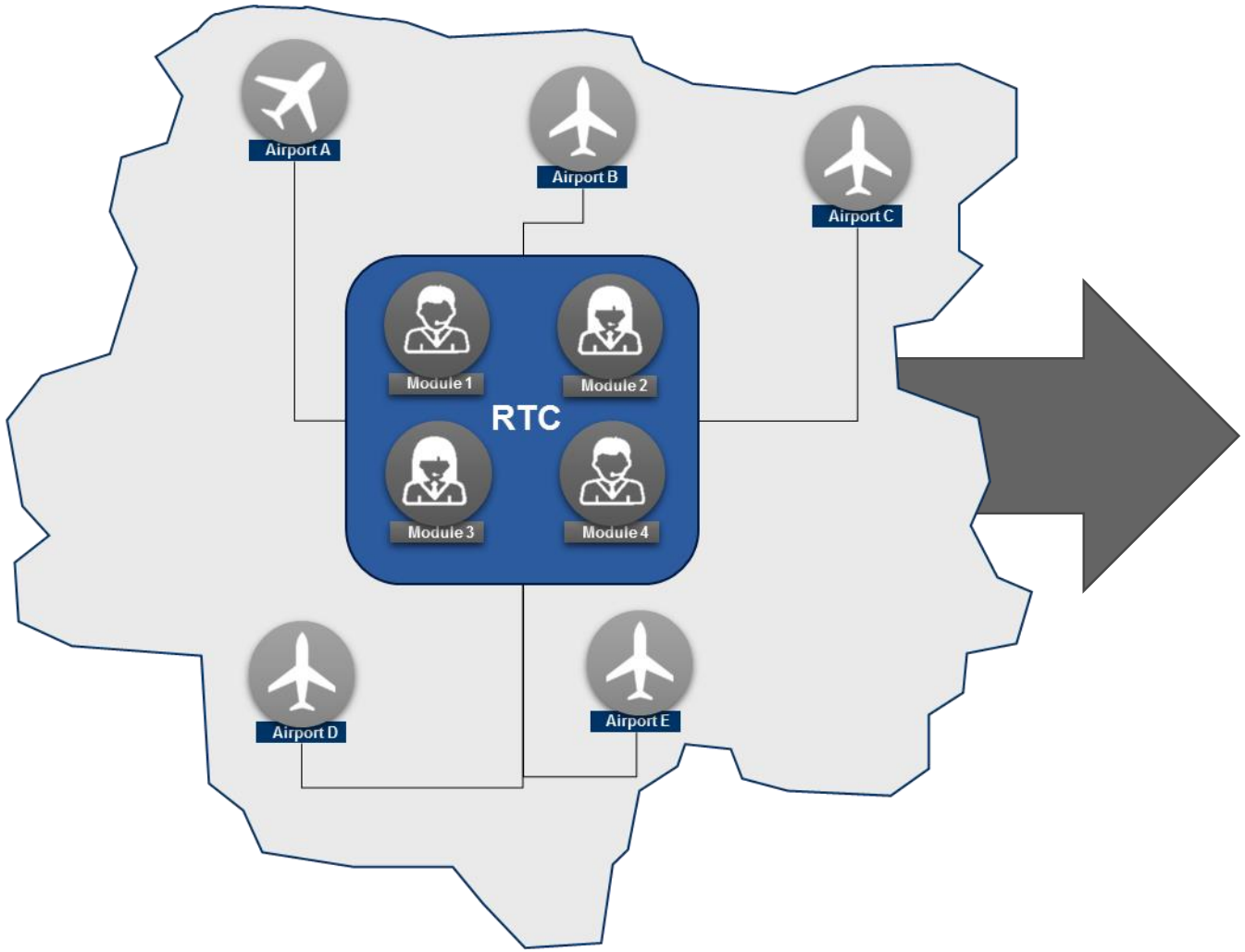
PHASE 4

ESTABLISHING

ATS unit established and put into operation in the RTC

ATS operated exclusively from RTS

THE CENTRE CREATES THE EFFICIENCY



RTC Capabilities

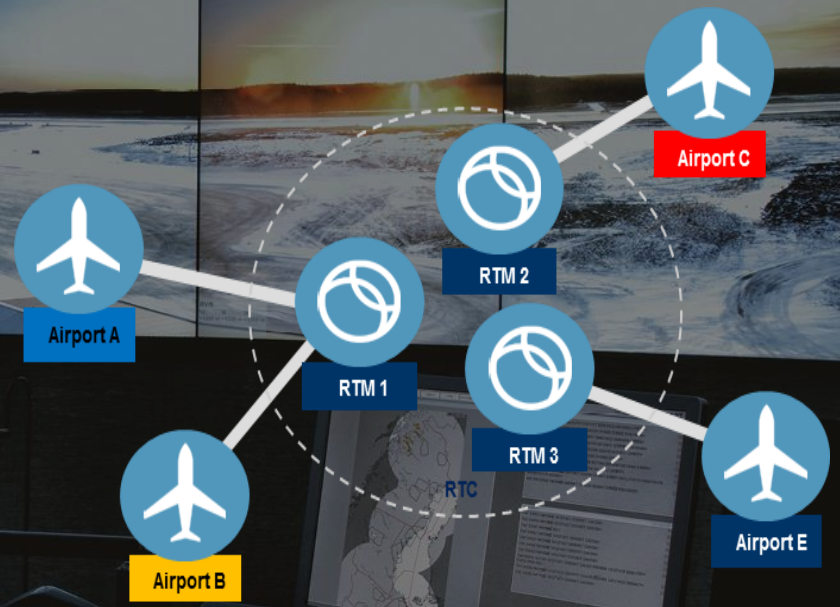
- Runway Control(TWR) ATS
- Flight Information Services(AFIS)
- Approach Services, C-APP
- MET
- Training/ Simulation
- Technical Supervision
- Rostering & Management

NEXT STEP: **MULTIPLE OPERATIONS**

Handling two airports is like handling two runways

New functions are developed for working with multiple operations

Simulation and validation starts this autumn.
Operational in 2018



SINGAPORE CASE – PUSHING THE PRODUCT

PAPI 3° (MEHT)*

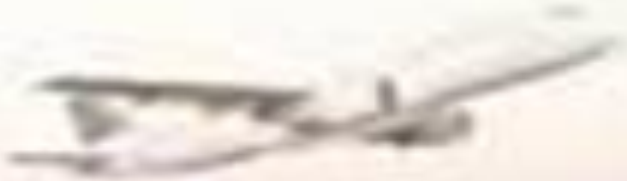
Pilot's eye height over the threshold when the following PAPI lights come into view,	RUNWAY			
	02L	20R	02C	20C
2 White lights and 2 red lights	20,6m	20,0m	19,8m	19,8m
3 White lights and 1 red light	23,1m	22,6m	23,7m	23,7m
4 White lights	25,8m	25,0m	26,2m	26,2m

* MEHT , Minimum Eye Height Over the Threshold.
Note : Aircraft with eye-to-wheel height greater than 8 metres are advised to fly with 2 white lights and 2 red lights visible so as to achieve sufficient wheel clearance.

RWY	DIRECTION	THR	GEOID UNDULATION	BEARING STRENGTH
02L	023°	01 20 56.26N 103 58 38.83E	10.29m	PCN 72/F/B/W/U
20R (DISP THR)	203°	01 22 33.95N 103 59 20.26E	10.29m	
02C	023°	01 19 43.51N 103 59 05.86E	10.28m	
20C	203°	01 21 43.37N 103 59 56.46E	10.28m	
TAXIWAYS		BEARING STRENGTH PCN 85/R/B/W/U - Taxiways W1, W9, E1, E3, E11 and E9 (between E10-E11) PCN 72/F/B/W/U - All other Taxiways		
APRONS		BEARING STRENGTH PCN 85/R/B/W/U		

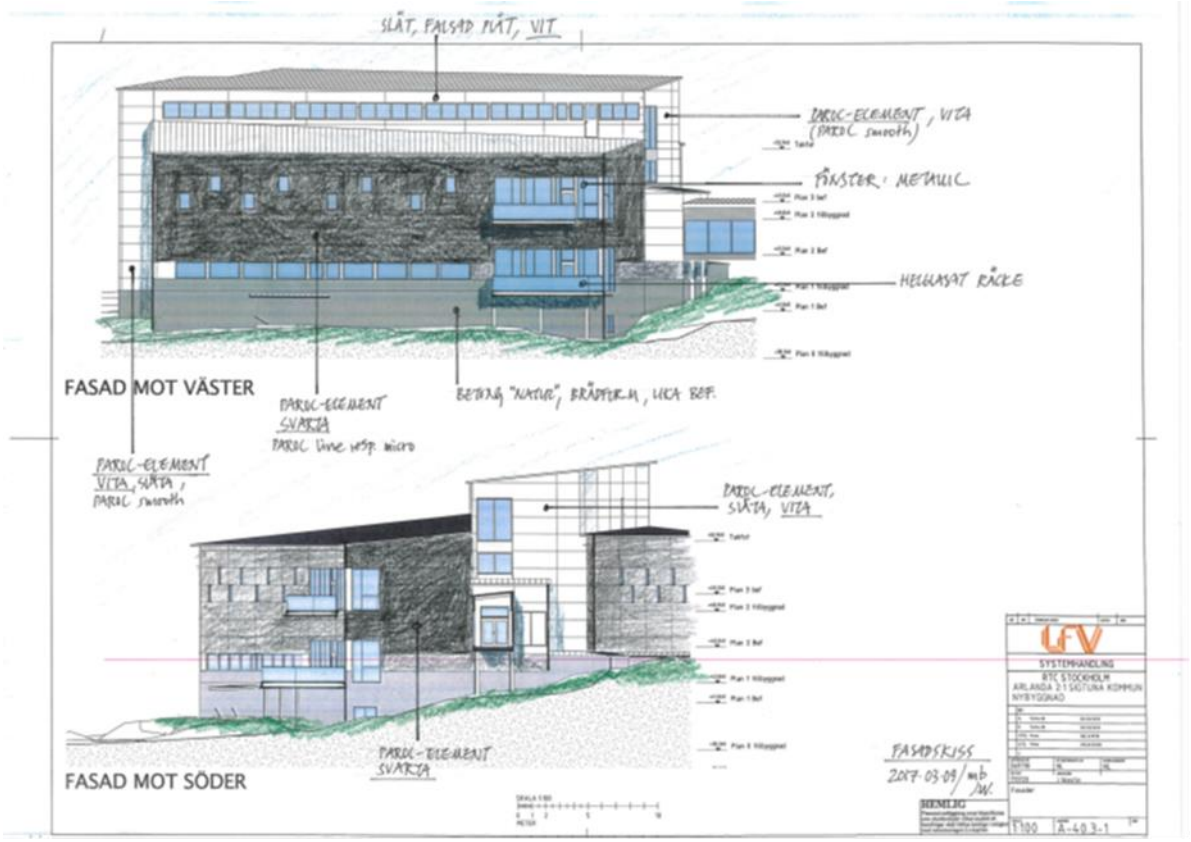
TANAH MERAH COUNTRY CLUB CLUB HOUSE

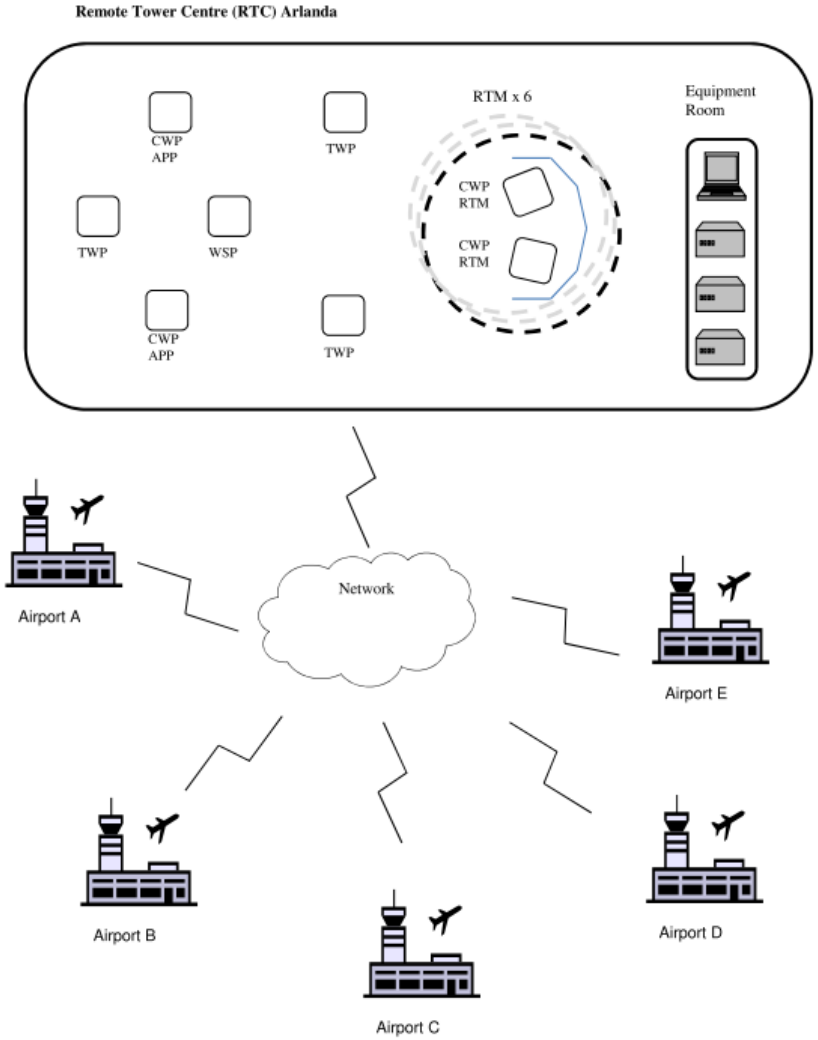
© 2016 Civil Aviation Authority Singapore



SCANDINAVIAN MOUNTAINS

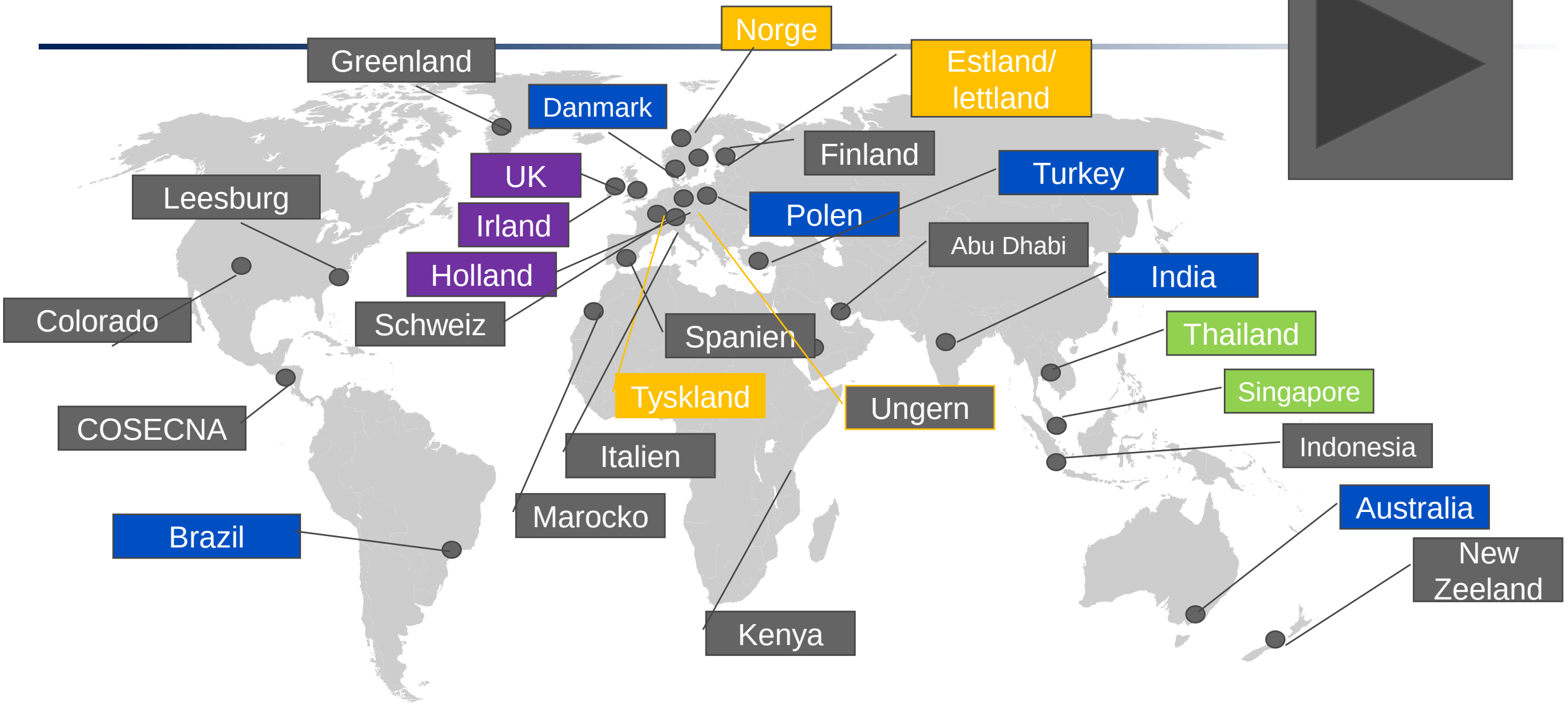
LFV – SECOND GENERATION





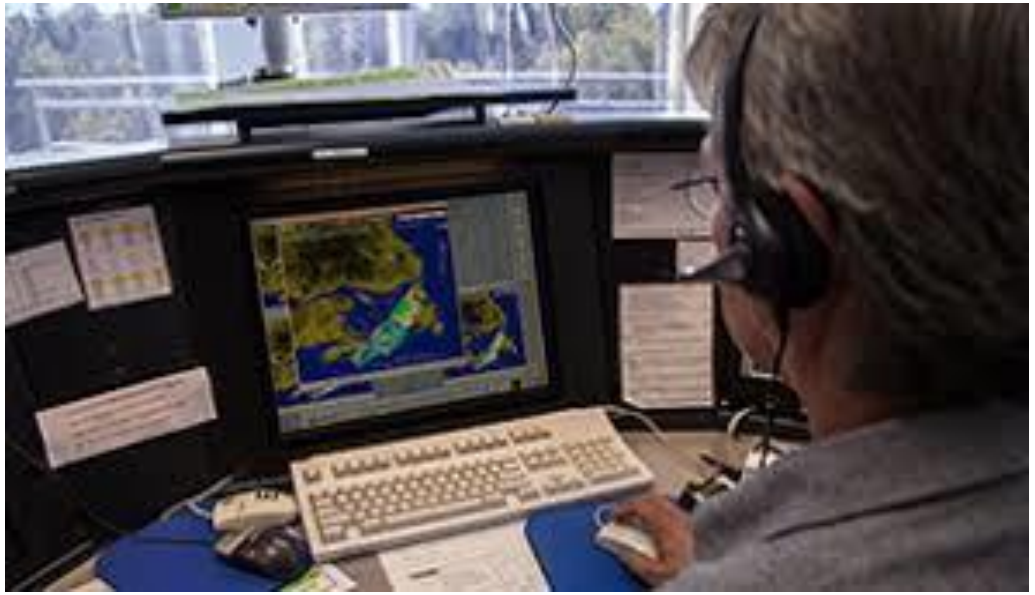
Second generation – based on operational experience

A GROWING MARKET



AFIS

- A **flight information service** (FIS) is a form of air traffic service which is available to any aircraft within a flight information region (FIR), as agreed internationally by ICAO.
- It is defined as information pertinent to the safe and efficient conduct of flight, and includes information on other potentially conflicting traffic, possibly derived from radar, **but stopping short of providing positive separation from that traffic.**
- Flight Information also includes:
- Meteorological information
- Information on aerodromes
- Information on possible hazards to flight



LETTER OF INTENT

Samarbete rörande etablering av en central för digitala, fjärrstyrda flygplatstjänster i Storuman

Letter of Intent - LoI

Ver: 1.0

Storumans kommun

Org nr 212000-2577

Blå vägen 242

923 81 Storuman

och

SAAB Digital Air Traffic Solutions AB

Jointly develop a case for Remote AFIS

- AFIS centre in Storuman
- Hemavan pilot site – operational
- To adress Swedish small airports and potentially outside Sweden
- Road model for Saab

AIM is to conclude on the business case in Q1 2018

POTENTIAL SWEDISH AFIS CUSTOMERS

- AFIS finns i dagsläget på följande 17 flygplatser i Sverige:

- Arvidsjaur flygplats (ATC vissa tider, AFIS andra)
- Eskilstuna-Kjula flygplats
- Falköpings flygplats
- Gällivare flygplats
- (Gävle-Sandviken flygplats)
- Göteborg-Säve flygplats (ATC dagtid, AFIS nattetid)
- Hagfors flygplats
- Hemavans flygplats
- Kramfors-Sollefteå flygplats
- Lycksele flygplats
- Mora-Siljan flygplats
- Pajala flygplats
- Svegs flygplats
- Skövde flygplats
- Storumans flygplats
- Torsby flygplats
- Vilhelmina flygplats

Finland: ~10 flygplatser

Norge:> 30 Flygplatser

Baltikum: ~ 5 flygplatser

STRATEGIC FIT – LATIN AMERICA

- AFIS services are currently being provided at 80 airports in Brazil with TWR services provided at 63

			Airport	AFIS		TWR	
			Operator	(X)	Provider	(X)	Provider
RJ	SBRJ	Santos Dumont	Infraero			X	Infraero
	SBGL	Galeão	RIOgaleão			X	DECEA
	SBAF	Campo dos Afonsos	DECEA			X	DECEA
	SBCP	Campos	Infraero	X	Infraero		
	SBFS	Campos - São Tomé	Petrobrás	X	Petrobrás		
	SBCB	Cabo Frio	Costa do Sol	X	Costa do Sol		
	SBME	Macaé	Infraero			X	Infraero
	SBEC	Macaé (Enchova)	Petrobrás	X	Petrobrás		
	SBMM	Macaé (Marlim)	Petrobrás	X	Petrobrás		
	SBLB	Macaé (Albacora)	Petrobrás	X	Petrobrás		
	SBES	São Pedro D´aldeia	Air Base			X	DECEA
	SBJR	Jacarepaguá	Infraero			X	Infraero
	SBSC	Santa Cruz	DECEA			X	DECEA
SP	SBGR	Guarulhos	GRUAirport			X	Infraero
	SBSP	Congonhas	InfrAaero			X	DECEA
	SBKP	Campinas	Infraero			X	Infraero
	SBMT	Campo de Marte	Infraero			X	DECEA
	SBGP	Gavião Peixoto	EMBRAER	X	EMBRAER		
	SBGW	Guaratinguetá	Air Base			X	DECEA
	SBSJ	São José dos Campos	DECEA			X	DECEA
	SBRP	Ribeirão Preto	Infraero			X	Infraero
	SBBP	Bragança Paulista	DAESP	X	DAESP		
	SBSR	São José do Rio Preto	DAESP	X	DAESP		
	SBTA	Taubaté	CAVEX			X	DECEA
	SBJD	Jundiaí	DAESP			X	PAIM
	SBDN	Presidente Prudente	Infraero			X	Infraero
	SBAE	Bauru Aurealva	DAESP	X	DAESP		
	SBAU	Araçatuba	Azul	X	Azul		
	SBBU	Baurú	Infraero			X	Infraero
	SBML	Marília	Azul	X	Azul		
	SBYS	Pirassununga	DECEA			X	DECEA
	SBAQ	Araraquara	DAESP	X	DAESP		

AFIS IN FRANCE – OVER 70 AIRPORTS

LARGE NUMBER OF AIRPORTS – A VITAL INFRASTRUCTURE

- AIRNAV is serving over 250 airports
- Over 600 airports in Indonesia in five time zones.
- New additional airports planned or being built
- ATS and AFIS in demand

THE WAY TO A REMOTE – AFIS PRODUCT

Scale down of existing RTS/ATS product

Level of complexity/ cost

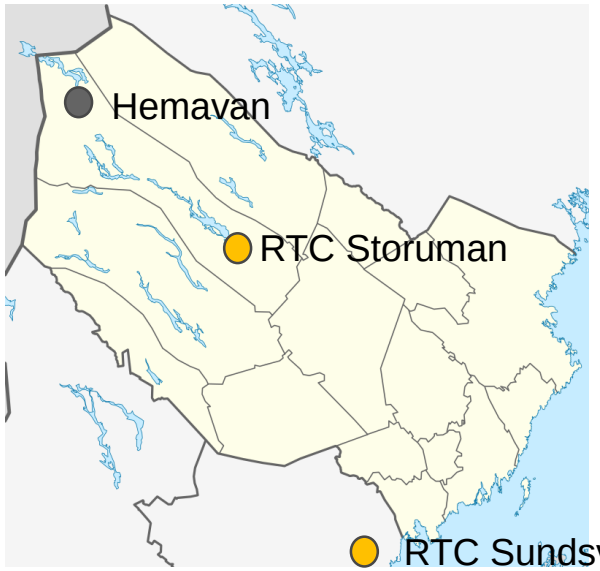
ICAO-INTERNATIONAL CIVIL AVIATION ORGANIZATION (1988). *Aerodrome Flight Information Service .Circular 211-An/128*. ICAO (Montreal, Canada). 1988.

R-AFIS - product

Low end R-ATS product

Scale-up from local AFIS operations

PILOT AIRPORT HEMAVAN



Passagerare (2016)
14 301 [2]

Varav inrikes (2016)
14 081 [2]

Varav utrikes (2016)
221 [2]

Landningar (2016)
558 [2]


SAAB
TECHNOLOGIES
SAAB
MOBILITY | SECURITY | CONTINGENCY

NO CONVENTIONAL TOWERS
TO BE BUILT AFTER 2020