

## Disruptive Technologies in Air Traffic Management

OCTOBER 21, 2016



# Advanced Air Traffic Services – Main themes for Thales

## Enhanced arrival and departure operations (PJ01)

- **Extended Arrival Management with overlapping AMAN operations and interaction with DCB**
- **Use of Arrival and Departure Management Information for Traffic Optimization within the TMA**
- Dynamic and Enhanced Routes and Airspace

## Trajectory and performance-based Free Routing (PJ06)

- **Optimized traffic management to enable Free Routing in high and very high complexity environments**
- Management of Performance Based Free Routing in Lower Airspace

## Separation Management En-Route and TMA (PJ10)

- High Productivity Controller Team Organisation
- Flight Centric ATC
- Collaborative Control
- **Improved Performance in the Provision of Separation**
- **Advanced Separation Management**
- IFR RPAS Integration

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# High Performing Airport Operations - Main themes for Thales

## Increased Runway and Airport Throughput (PJ02)

- Improved access into secondary airports in LVC
- Wake Turbulence Separation Optimisation
- Traffic optimisation on single and multiple runway airports

## Integrated Surface Management (PJ03a)

- Enhanced Guidance Assistance to Aircraft and Vehicles on the Airport Surface Combined with Routing

## Airport Safety Nets (PJ03b)

- Enhanced airport safety nets for controllers

## Total Airport Management (PJ04)

- Enhanced Collaborative Airport Performance Planning and Monitoring
- Enhanced Collaborative Airport Performance Management

## Remote Tower services for multiple airports (PJ05)

- Remotely Provided Air Traffic Service for Multiple Aerodromes
- Remotely Provided Air Traffic Services from a Remote Tower Centre with a flexible allocation of aerodromes to Remote Tower Modules

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# Enabling Aviation Infrastructure (1) - Main themes for Thales

## Air Vehicle Systems (PJ13)

- Airborne Detect and Avoid Systems supporting integrated RPAS operations

## CNS (PJ14)

- Future Satellite Communications Datalink
- Completion of AeroMacs development
- **Surveillance Performance Monitoring**
- **New use and evolution of Cooperative and Non-Cooperative Surveillance**

## Common Services (PJ15)

- Sub-Regional Demand Capacity Balancing Services
- Delay Sharing Services
- **Trajectory Prediction Service**
- **Data Centre Service for Virtual Centres**
- Static Aeronautical Data Service
- Aeronautical Digital Map Service

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# Enabling Aviation Infrastructure (2) - Main themes for Thales

## CWP & Virtual Centre (PJ16) - Thales Project Coordinator

- Service Interface Definition & Virtual Centre Concept
- Controller productivity (new means of human machine interface)

## SWIM Infrastructures (PJ17) - Thales Project Coordinator

- SWIM TI Purple Profile for Air/Ground Advisory Information
- SWIM TI Green Profile for G/G Civil Military Information Sharing

## 4D Trajectory Management (PJ18)

- Integration of trajectory management processes in planning and execution (*incl. FO-based IOP*)
- Management and sharing of data used in trajectory (AIM, METEO)
- Performance Based Trajectory Prediction

# New Topics in SESAR 2020

Many SESAR 2020 topics/solutions are a natural continuation / enhancement of SESAR 1 concepts and enablers

Several are new. Out of these we have picked a few high-profile ones that are potential game changers for the community or for Thales

- Virtual Centres
- Remote Towers for Multiple Airports
- Total Airport Management
- Cybersecurity
- Remotely Piloted Aircraft Systems (RPAS)

## SESAR 2020 – New Topics 1- Virtual Centres



# Virtual Centres in SESAR 2020

## A general context and ANSP pressure calling for

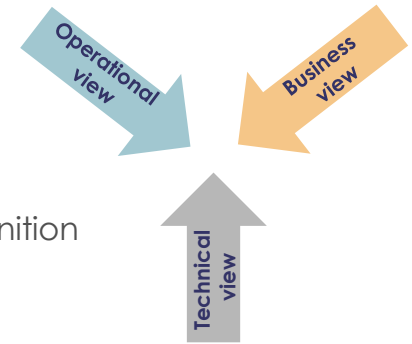
- more reliance on open standards and IP as opposed to legacy and proprietary interfaces
- A component-based modular design allowing “integrator ANSPs” to procure their system from several vendors

## Decoupling between CWP and ATM Data Service Provision (ADSP) initiated in SESAR 1

- Initial modelling of certain very basic ATC use cases + initial feasibility demonstrations (remote CWP-FDP connection)

## SESAR 2020 to build upon this first step and

- Further develop modelling and standardisation of CWP /ADSP interfaces
- Address more advanced virtual centre applications
  - Develop virtual centre concepts, use cases, business models and technical definition
  - Prototype and validate certain selected use cases
  - Scope extension to Voice Communications, ATFM, TWR, ASM, MET
  - Large Scale Demonstration foreseen in Wave 2



## Virtual Centre concepts can apply to a wide range of application contexts and use cases e.g.

- Training, Contingency, Operations
- Shared back room, shared contingency facilities, load balancing, consolidation between centres

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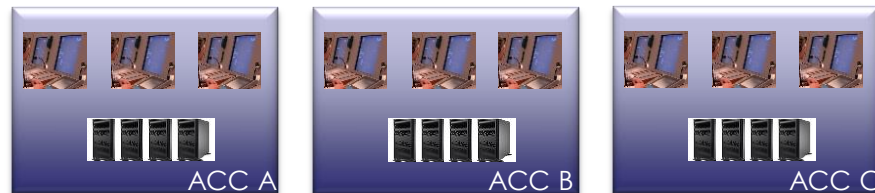


# Example 1: Shared Data centres

Technical

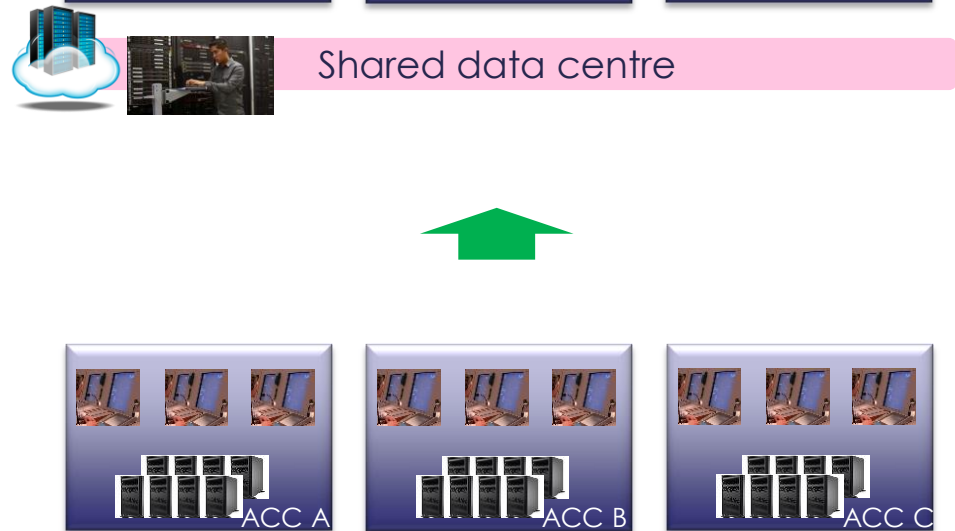
## Several ACCs share a common data centre

- This shared back room can either be located at one of the sites or remotely located in a cloud facility



## Benefits:

- Savings on backroom real estate, equipment and maintenance staff
- Easier management of software upgrades



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# Example 2: Load balancing between centres

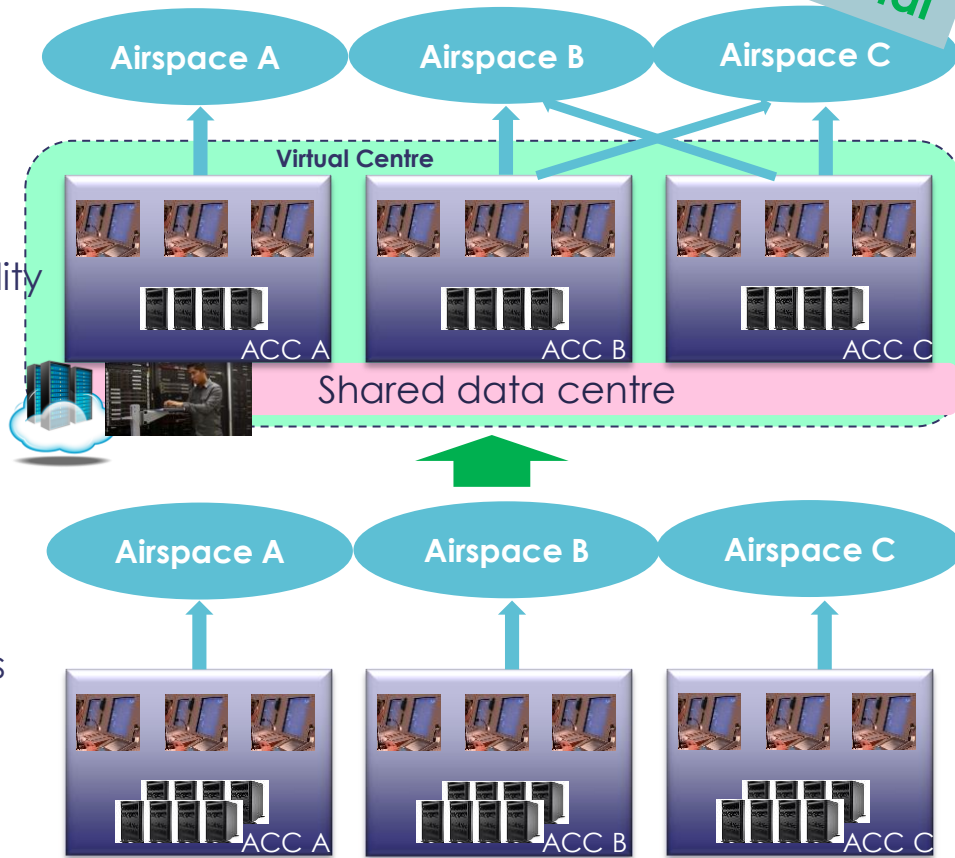
Operational

## Several ACCs operate as a virtual centre

- Airspace to ACC allocation can be dynamically modified within the virtual centre
- A shared data centre can facilitate this flexibility

## Benefits:

- Possibility to dynamically redistribute load between ACC e.g. during overload situations
- Possibility to shut down ACCs at night
- Supports FAB consolidation and SES objectives



# Thales' key partners and focus areas for virtualisation in SESAR 2020

## COOPANS

- Key focus: Shared Data Centres, Training, Contingency

## Hungarocontrol, skyguide, Frequentis (Voice Communications)

- Key focus: Load balancing / Sector delegation between ATSU's, including related voice and data distribution aspects
- Large Scale Demonstration intentions in a Wave 2 VLD across Switzerland and Hungary

## DSNA

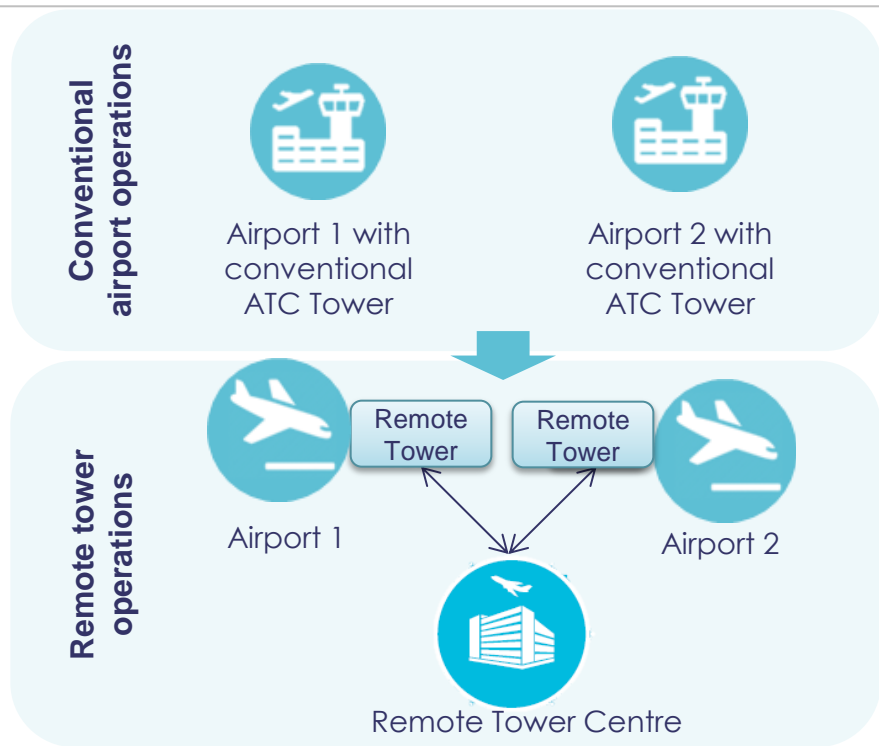
- Key focus: CWP-ADSP decoupling, FDP/Coflight as a Service

## SESAR 2020 – New Topics 2- Remote Towers



# Remote Tower in SESAR 2020

- Enables Air Traffic Control services from a remote location with no direct “out of the window” view of the airport, instead of from the conventional ATC tower
- Utilizes innovative technology such as high resolution cameras, sensors and local processing linked to a remote ATC automation system
- Provides displays and controls for the air traffic controller to deliver the same ATC services as if at the conventional tower
- Offers potential to consolidate multiple airport ATC operations into a single remote tower center



Deliver reliable and safe ATC services more efficiently leveraging today's modern technology and communication capabilities

# Thales Remote Tower plans in SESAR 2020

## With Hungarocontrol

- RT for Budapest airport (medium) and two small regional airports
- Focus on supervisor position tasks and functions (optimum dynamic airport allocation vs safety...), RTC coupling

## With Oronavigacija

- Up to 7 small Lithuanian airports interconnected via a wideband comm. Network
- Possible extension to Polish airports (PANSA)

**Other partners: Searidge for video, Frequentis for voice communications**

## TopSky ATC Remote Tower



## SESAR 2020 – New Topics 3- Total Airport Management





# Total Airport Management

## Integration of AOCC (Landside) & ATM platform (Airside)

Partner:



- Coordinated planning of airport processes on landside and airside between AOCC and ATC/ATFM tools
- Definition of relevant KPIs in order to monitor and benchmark airport Performance

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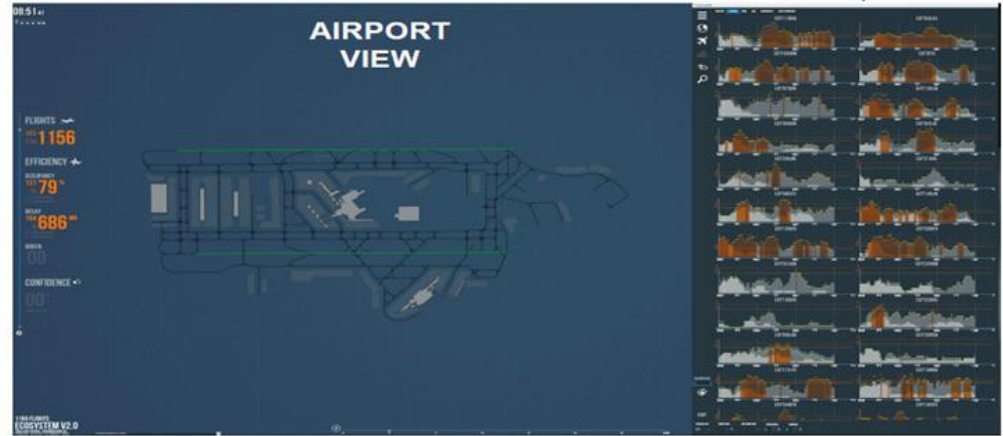


# Total Airport Management - Airport Turnaround optimisation

EC

Right Frame - Resource Occupation Per Time Period  
One Tab Per resource category - Runway/Airway/Waypoint/Sector

- **ECosystem cloud-based services provide processed Flow/Capacity and MET data relevant for the airport environment**
- **ECosystem naturally complements an integrated AOCC/ATM solution to support improved planning and optimisation of airport turnaround**



Left Frame - Air Situation Display  
Airport/Approach/EnRoute Adjustable Zoom Level

ECOSYSTEM

is also used in other SESAR 2020 projects, mostly related to Optimised Airspace User Operations, Airspace Management and Dynamic Capacity Balancing

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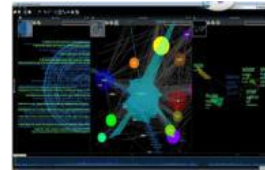
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## SESAR 2020 – New Topics 4- Cybersecurity



# Cybersecurity in SESAR 2020

- A key requirement to be addressed in each individual SESAR 2020 project
- All the more important in the context of increased reliance on open standards such as IP-based communications as opposed to proprietary or ATM dedicated interfaces
- Particularly relevant for architectures with exposed cyber security posture including WAN, SWIM, Virtualisation and Remote Services
- PJ19 (Content integration) is expected to play a central role in defining a SESAR 2020 CyberSecurity Framework including guidance and/or minimum set of requirements
- Still unclear and to be secured how sensitive issues will be handled e.g. feared events, potential attack vectors, mitigation means if any



## SESAR 2020 – New Topics 5- RPAS



# RPAS in SESAR 2020

## SESAR 2020 IR&V to address the integration of RPAS traffic into non-segregated controlled airspace

- Substantial participation of Thales Airborne Systems for Detect & Avoid technologies – Issue with PJ13 not selected
- Limited Thales Air Systems involvement as the assumption is that ATCOs will manage RPAS traffic exactly in the same way as regular traffic => limited impact on our ATC systems
  - Will nevertheless review / monitor progress for any specific requirements e.g. linked to limitations in manoeuvrability, speeds, climb performance



## SESAR 2020 Exploratory Research (ER) to address UAS Traffic Management (UTM) in Very Low Level airspace call on-going

## Second ER call regarding RPAS in Q4/2016

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