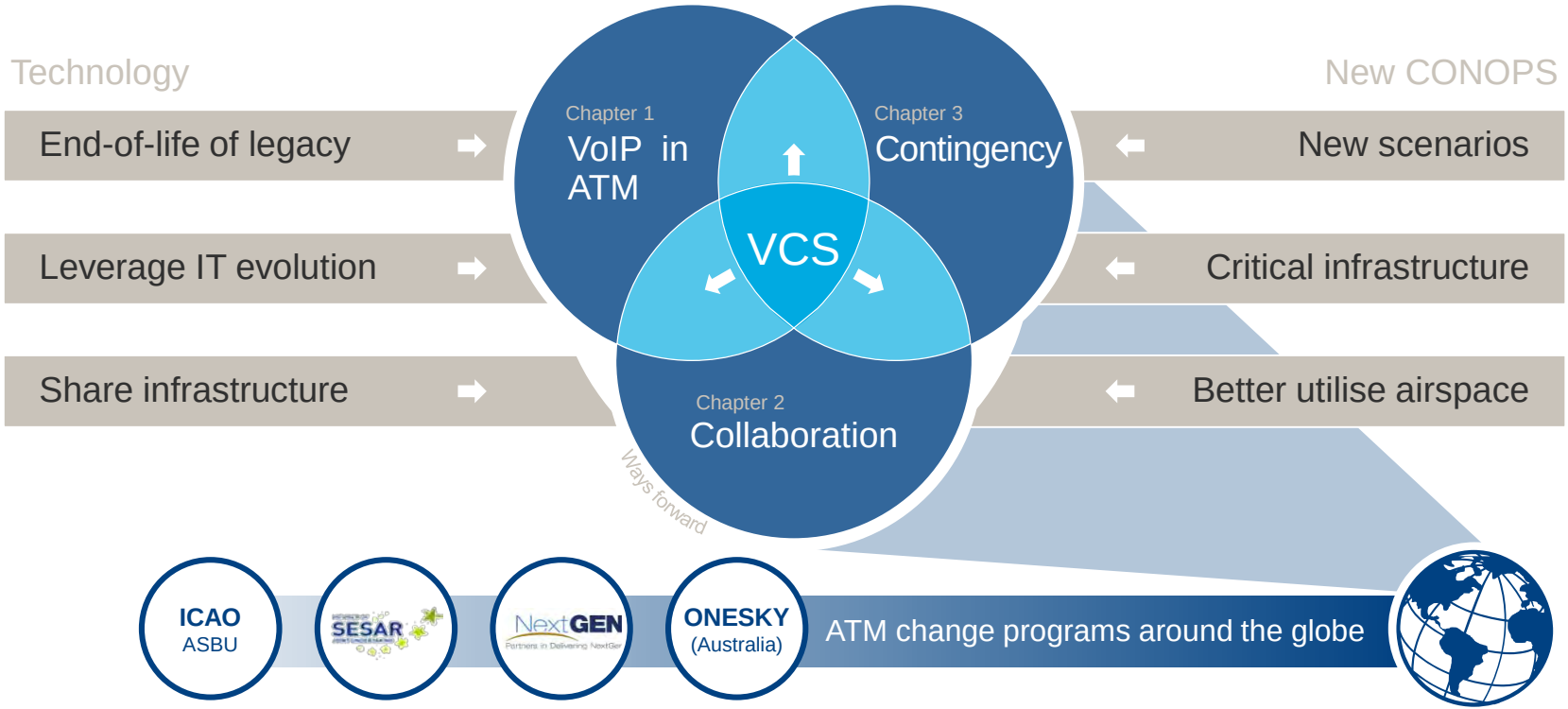
Innovation – performance – trust

Voice communication system VCS3020X

Air Traffic Management

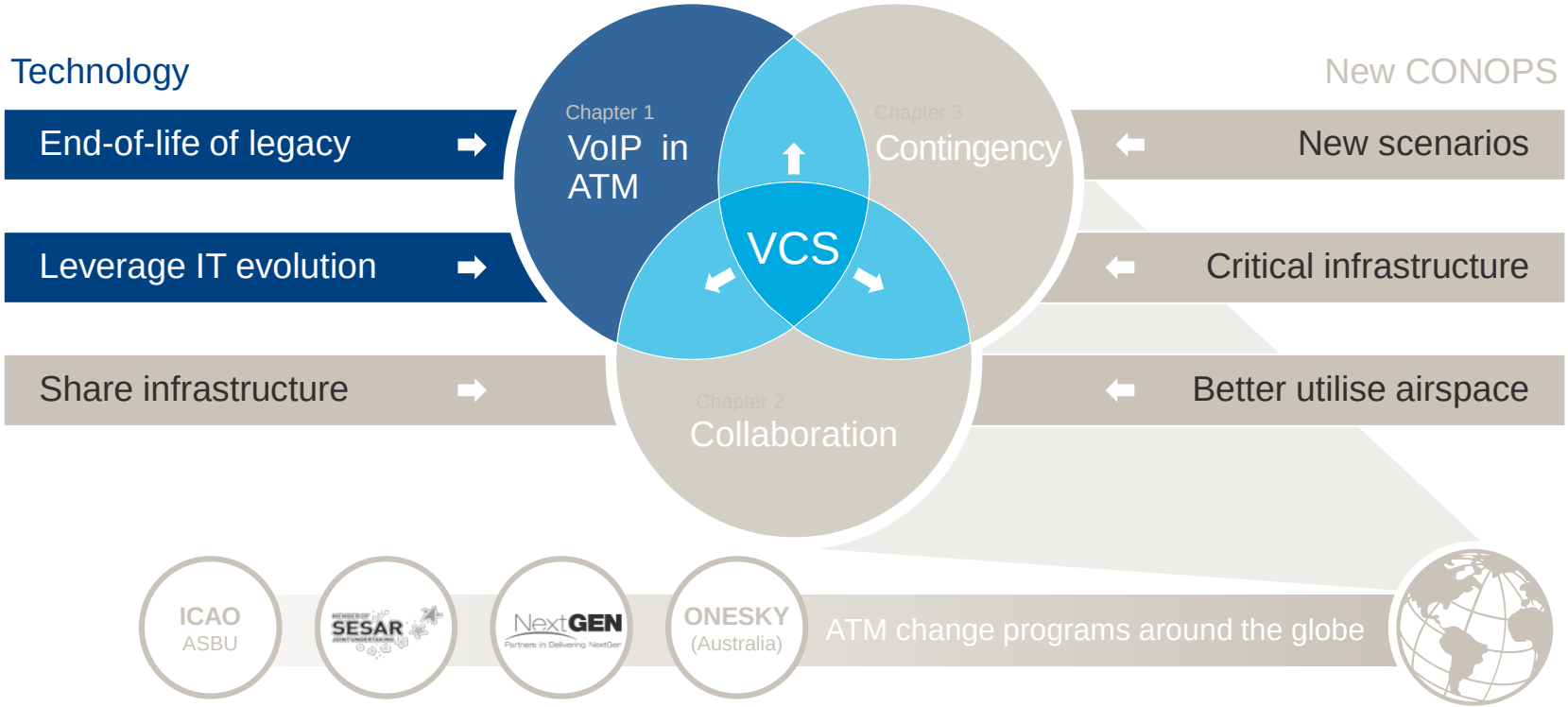
Deliver safer and more secure capacity for airspace users at lower cost

Drivers for ATC voice communication evolution and ways forward



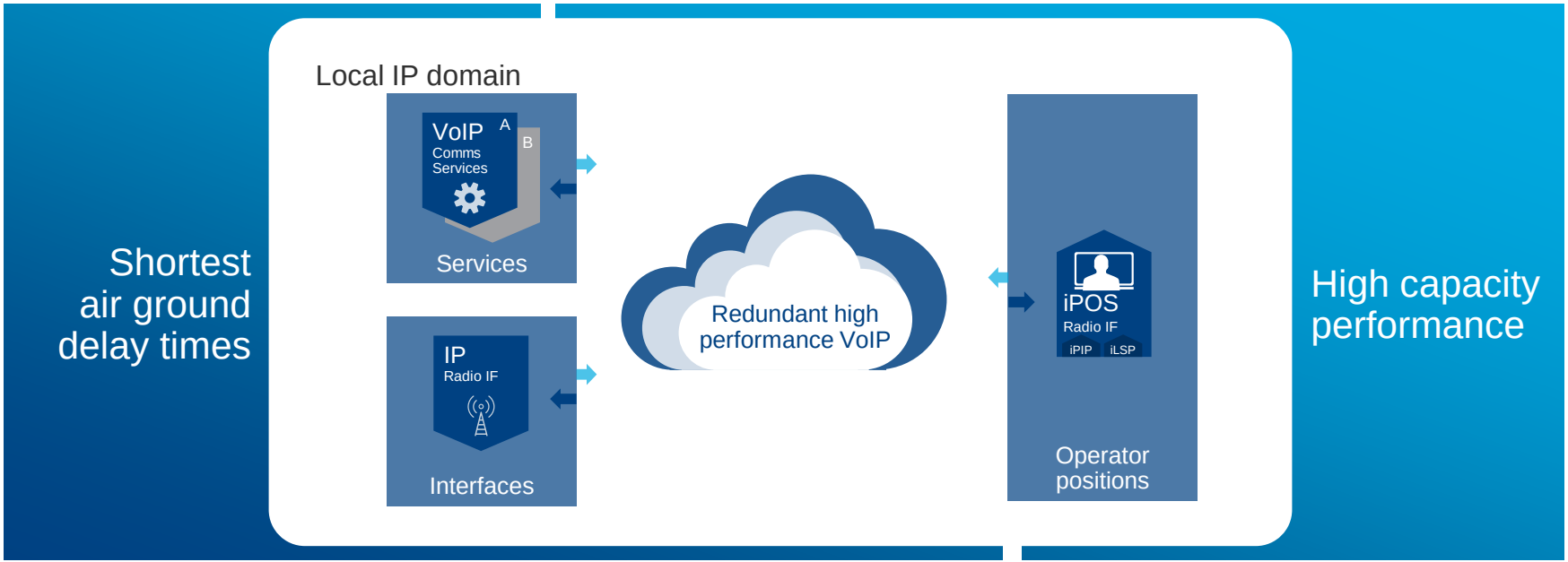
FREQUENTIS

End-to-end IP – where delay is crucial



VCS3020X – fastest end-to-end IP VCS available

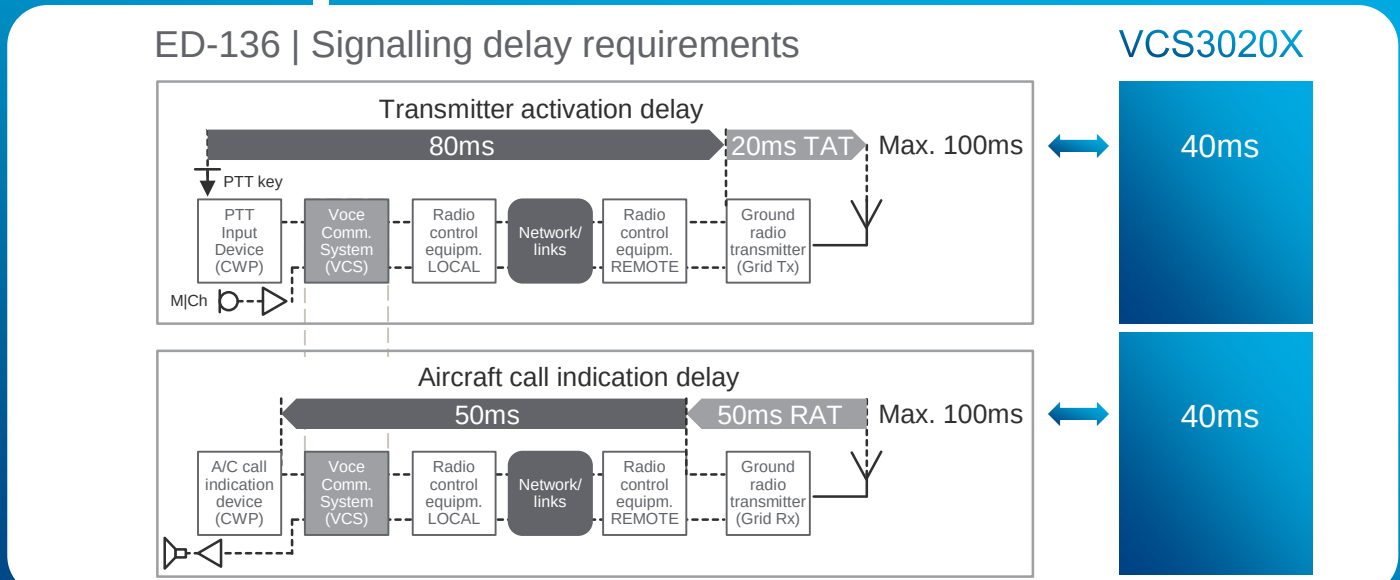
No compromises made in reaching established quality of service and safety levels



VCS3020X – fastest end-to-end IP VCS available

Outperforming the standard – relieving “network stress”

Shortest air ground delay times



Use case: Radio re-transmission / coupling

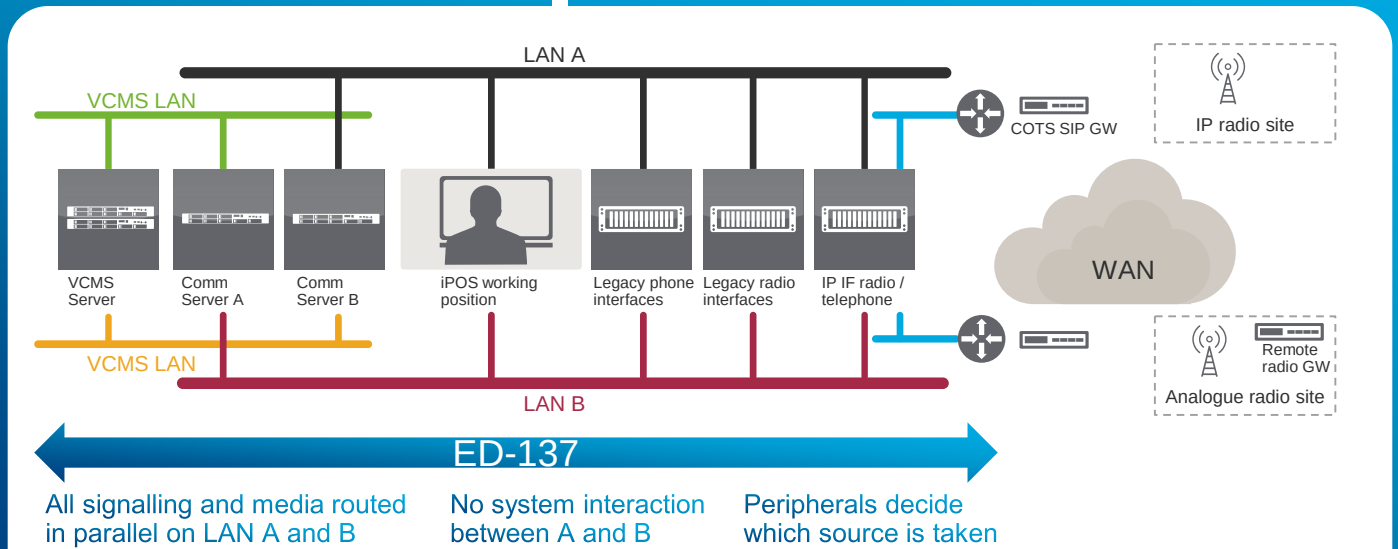
Avoid Aircraft call collisions and unwanted retransmission loops

Use case: Busy frequency operation approach

Avoid communication collisions / safety precaution

VCS3020X end-to-end IP system architecture

Distributed intelligence and parallel operating for unrivalled resilience, reliability and safety



High capacity performance

Both systems run continu-ously with equal priority

Faults in peripherals not affecting other system

LAN & WAN separated by IPIF radio / phone interface

Comm server in 3 sizes: small | medium | large

VCS3020X - market leading radio networking functionality

End-to-end IP VCS with maximum reliability, efficiency and safety

Dynamic delay compensation for IP networks

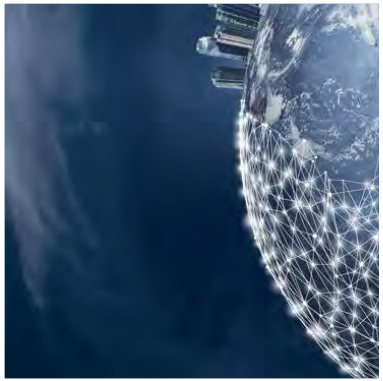
Integrated radio & gateway control directly from the Management system

Voice compression enabling bandwidth and cost reduction for A/G communication

Radio network redundancy – parallel operation

Redundant WAN connection - failover in 20ms – seamless radio connection

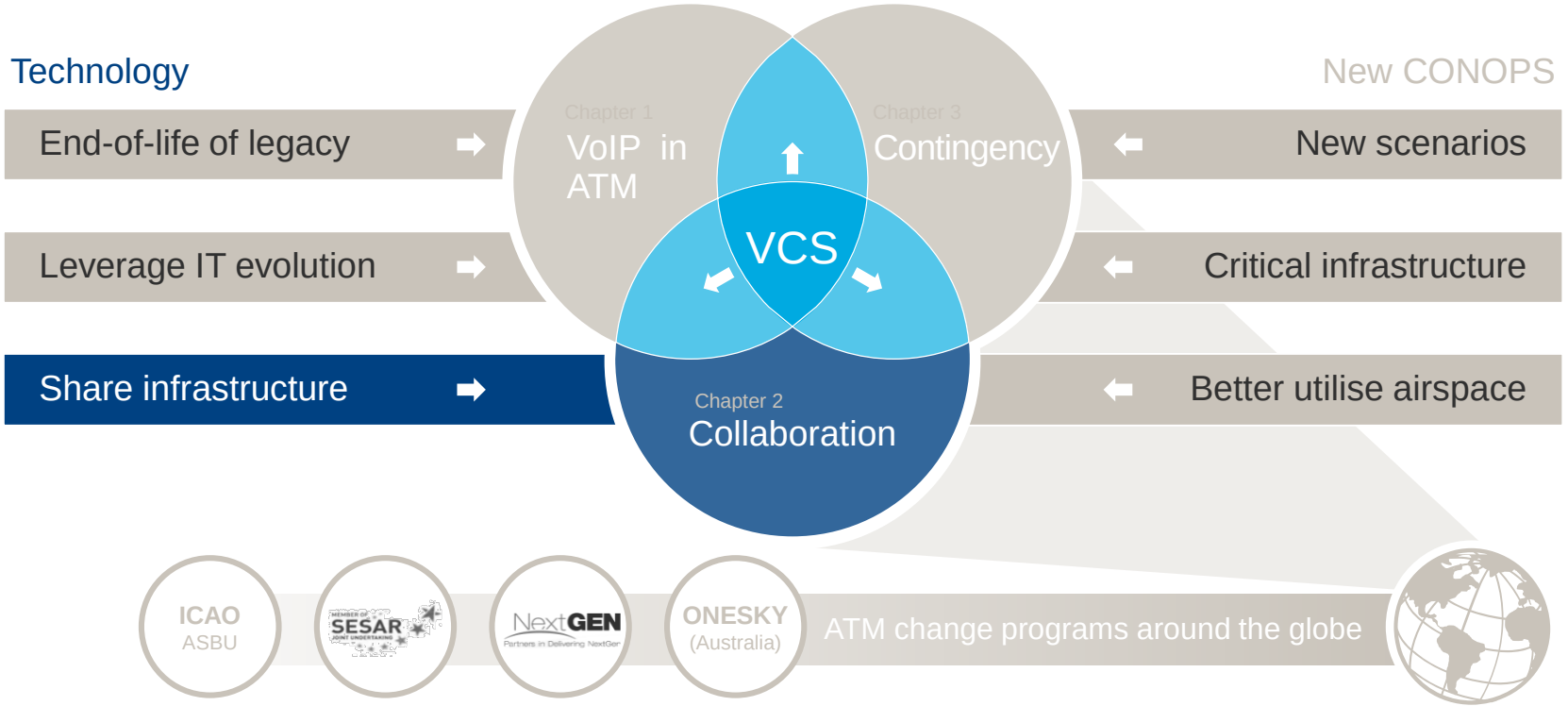
Radio main / standby – backup pooling



FREQUENTIS

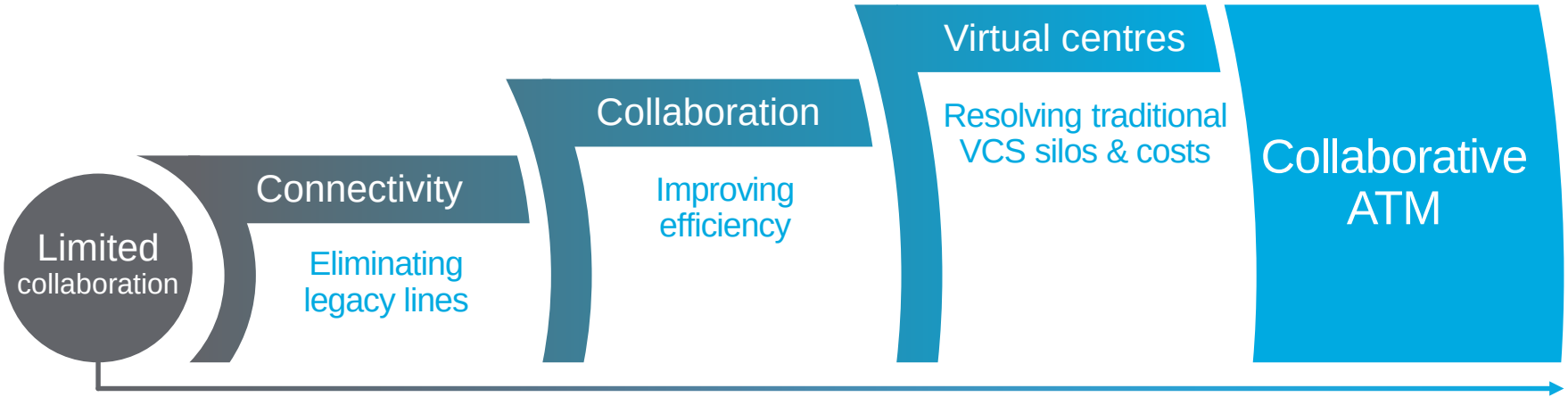
Increased collaboration between area control centres

Dynamic sectorisation – networked VCS



Any controller, any frequency, at any site

Need for collaboration within and between ANSPs



VoIP radio networks

ED-137 based

Basic interoperability
(radio, phone, intercom)

Assets shared between VCS' & cross-centre sector handover

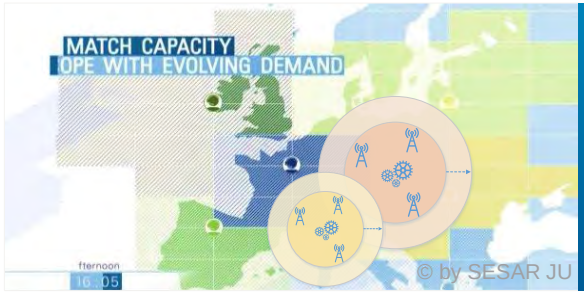
Collaboration based on standards

Communication services in the ATM network based on open standards

Accesses services from where controllers are

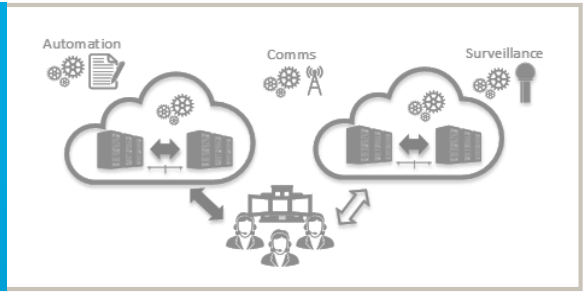
Dynamic airspace use by virtual centre operations

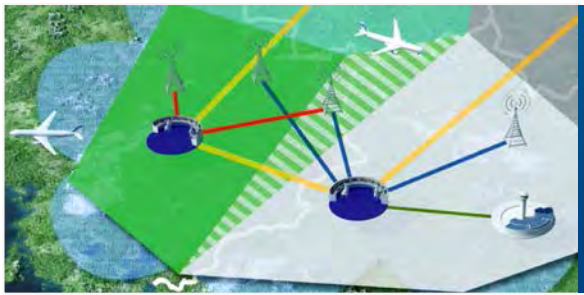
Designed for dynamic demand and flexible airspace structures



Dynamically sized airspace and flexible frequency allocation

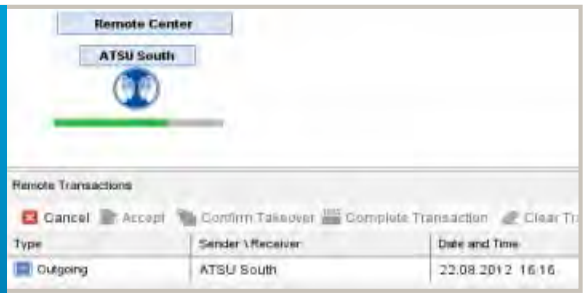
Contingency and business continuity operations





Seamless integration with other ANSPs

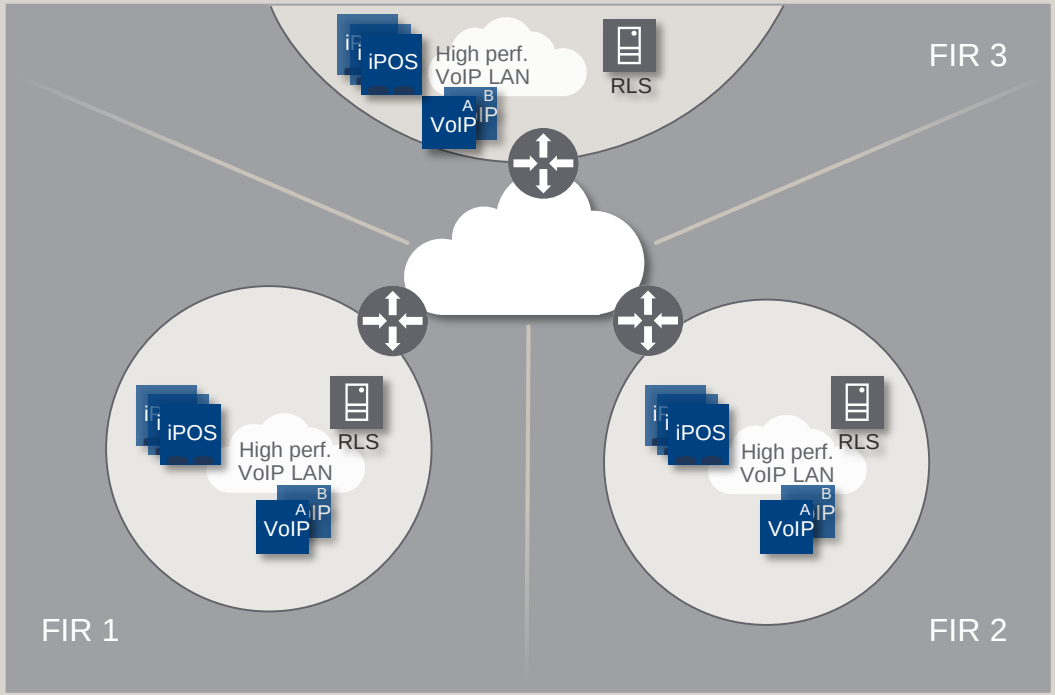
Safe handover of operations



FREQUENTIS

Transition to a flexible operational concept: One functional airspace

The architecture for dynamic sectorisation



Network communication services with Role Location Servers (RLS)

Multi FIR architecture

Sector-responsibility handover between FIRs

Role Location Server (RLS)

Stores sector responsibility information distributed across FIRs

- Roles are stored in each local VCS
- Each RLS holds all information about all sector responsibilities

Failsafe handover procedure

Guaranteed using procedures implemented in the networked VCS

It’s about understanding operations

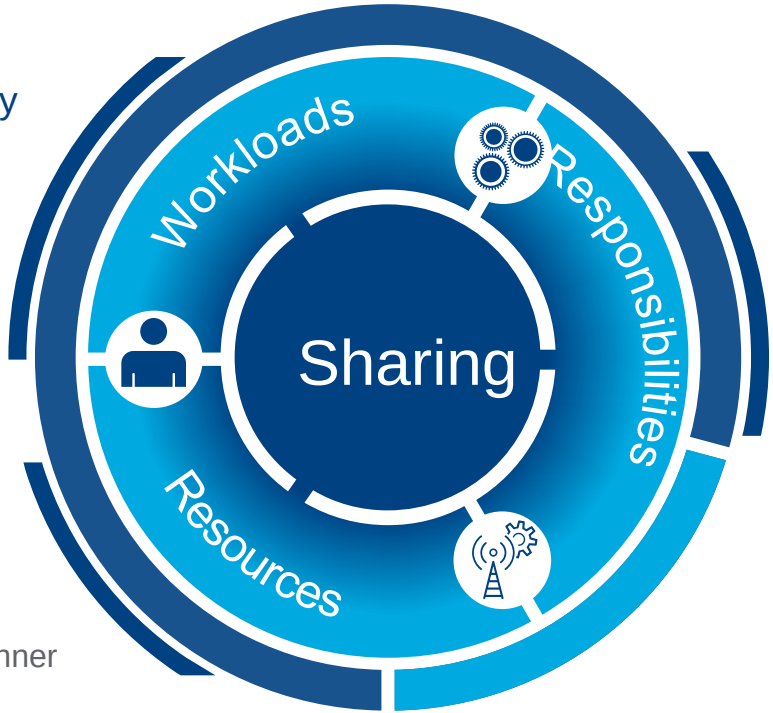
Dynamic sectorisation is not about database splitting or technological capabilities.
Implementing dynamic sectorisation successfully is about understanding the operation

VCS 3020X and dynamic sectorisation

Release 8.0

Integrated advanced role concept increases efficiency

- Workloads can easily be distributed across control centres at peak times
- Sectors can be merged when traffic is low



Same radio resources accessible by different ANSPs

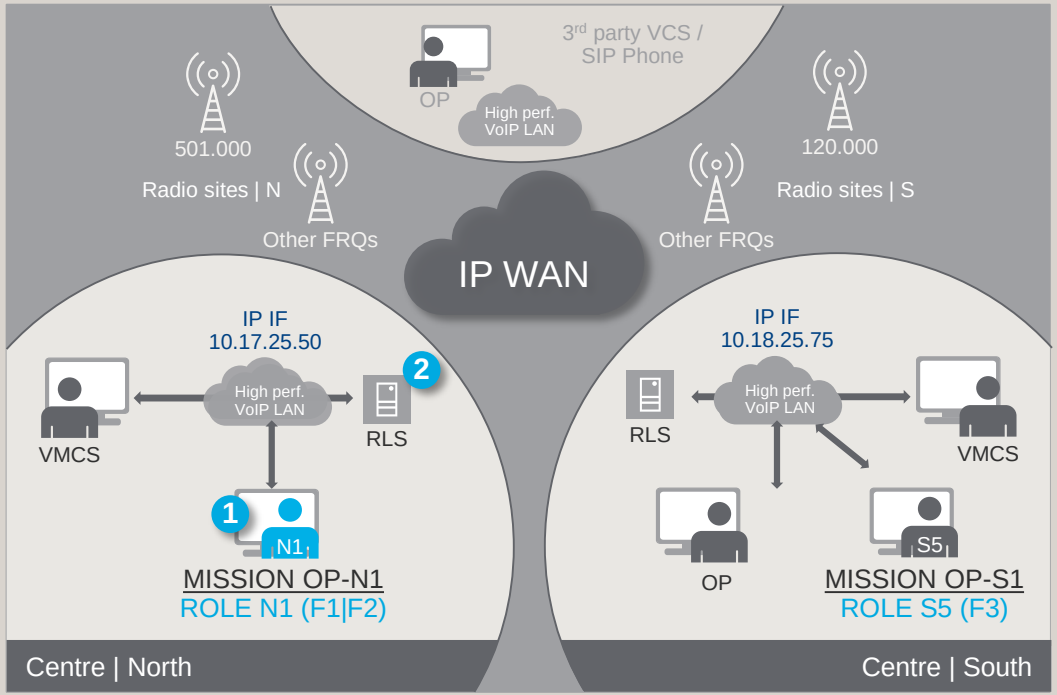
… in a safe and reliable manner

Acknowledged workflow process for sector delegation

- Airspace is never left unassigned
- Guaranteed gap-free handover

Integrated advanced role concept

Role delegation



❶ OP-N1 operates mission with role N1
❷ Role N1 is at RLS with contact address at IPIF of centre north

Role locations stored in RLS

RLS REGISTRATIONS	
Role	Contact
N1	N1@10.17.25.50
S5	S5@10.18.25.75
...	

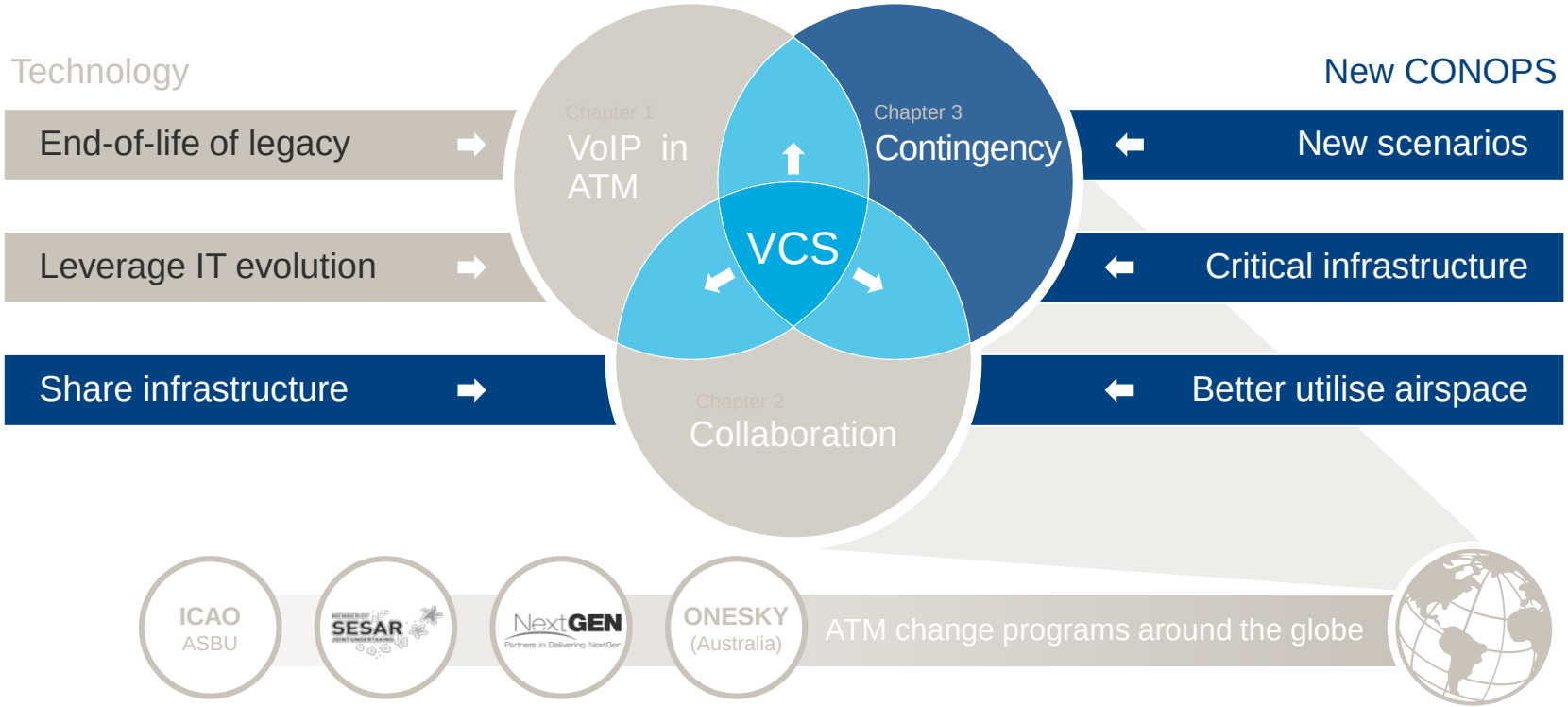
Sector delegation initiated from VCMS (acknowledged procedure)

Handover is failsafe and seamless for both A/G and G/G communication partners

New sector responsibility integrated into receiving centre, using RLS updates

“Awareness is rising for the importance of contingency”

… built into VCS3020X

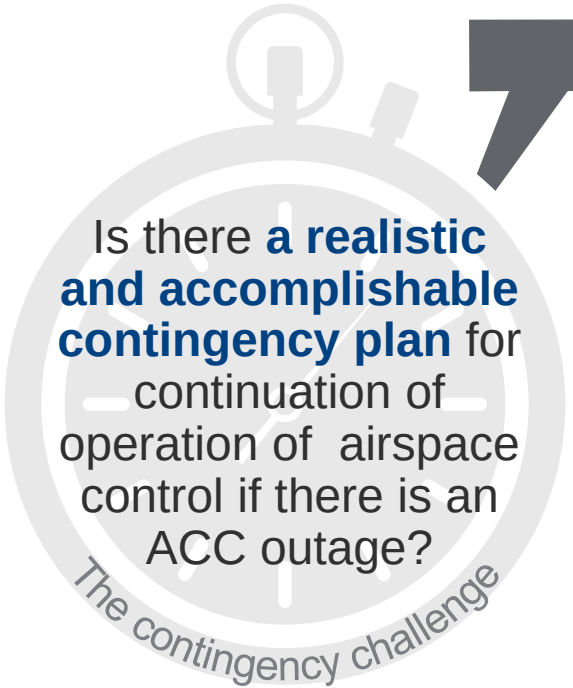


“Awareness is rising for the importance of contingency” – built into VCS3020X

Time is of the essence – in multiple ways

WHY IS THIS BECOMING MORE IMPORTANT?

New legislation (NIS Directive) forces the ANSP’s to present a viable plan for mitigation and business continuity – also the more realistic threat-scenarios drive this need



STAKEHOLDER RISKS

Public exposure of the ANSP and individual board members

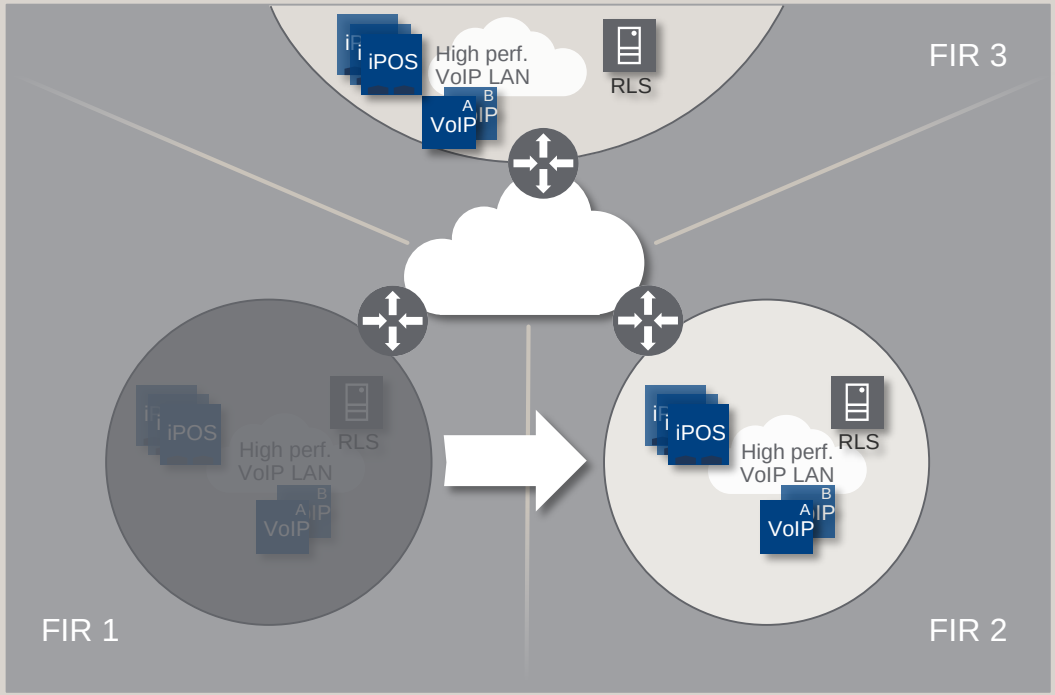
Loss of income during outage and possible compensation/ penalties by airline customers

WAY FORWARD

- Enhancement ATC infrastructure to enable contingency operations
- Increase of capacity in contingency centres
- Adaptations of CONOPS to cope with the new scenario

Contingency for Voice communications – The Frequentis solution

Continuation of voice communication services from a different center location



Continuation of operations for FIR1 from VCS in FIR2

Contingency operations

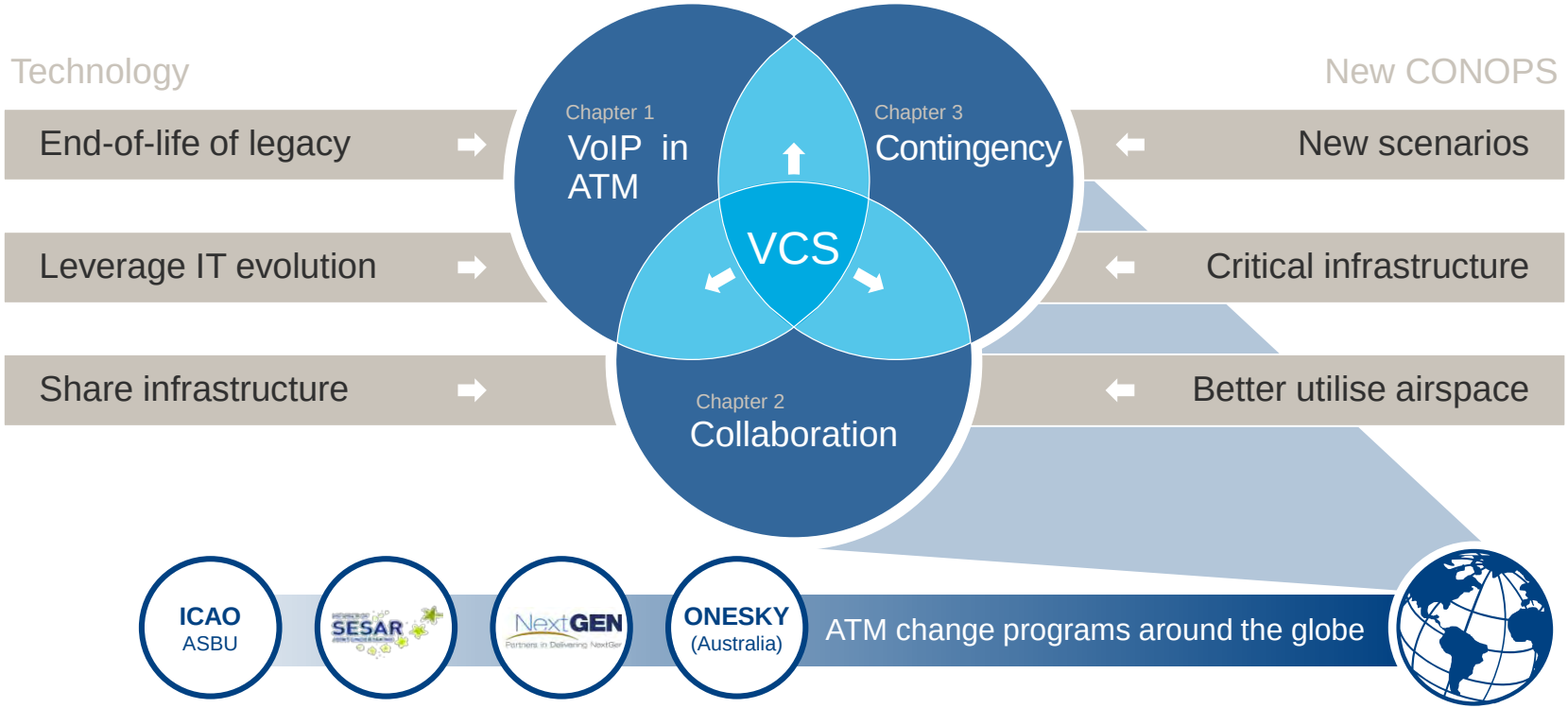
Non-cooperative move of sector responsibility from main centre to contingency location

Realised via RLS

- Activation of according missions in the contingency centre
- RLS secures continuous access to and from responsible ATCO‘s
- Radio site access using the existing VoIP infrastructure guarantees contingency radio operations

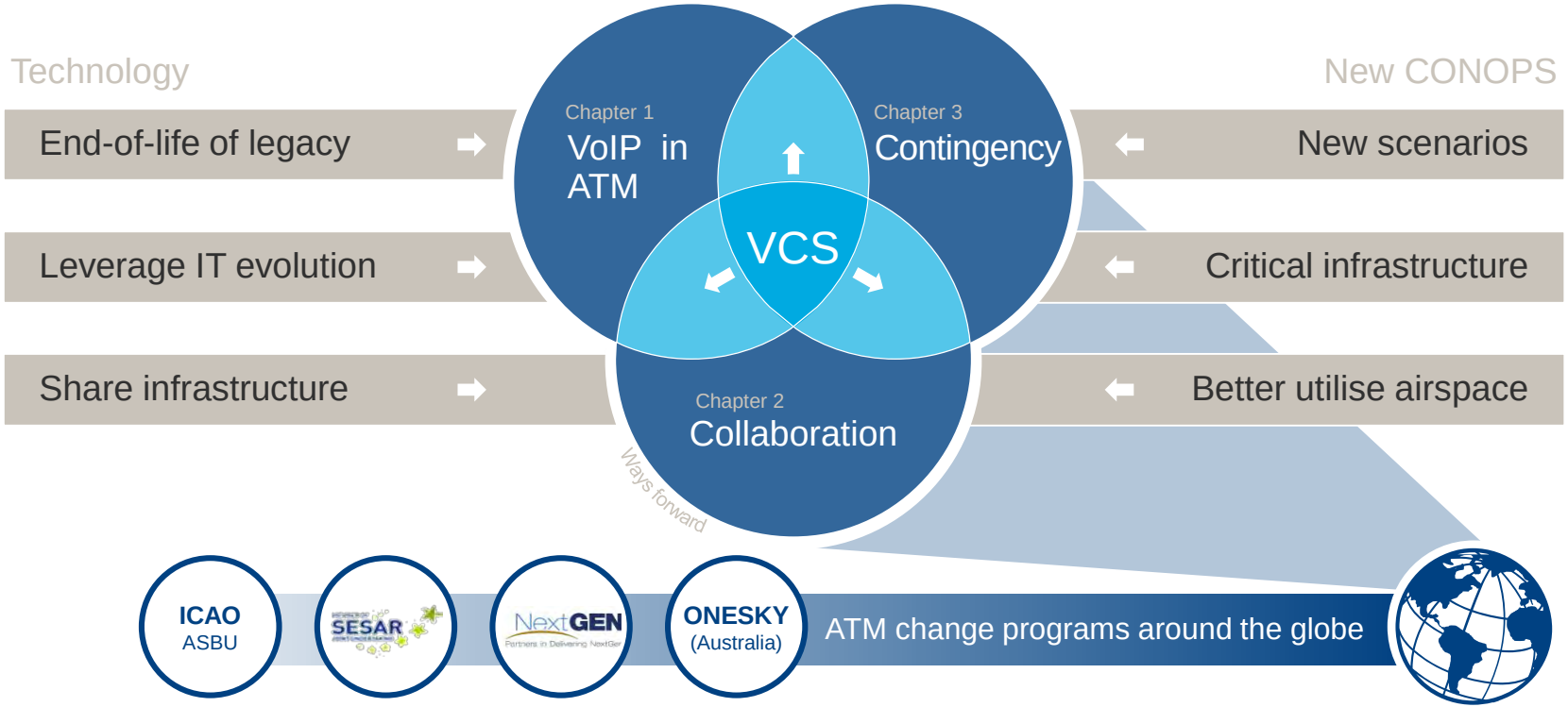
Driving change while setting standards to build the future of ATM communications

ATM change programs around the globe



Driving change while setting standards to build the future of ATM communications

ATM change programs around the globe



Driving change while setting standards to build the future of ATM communications

ATM change programs around the globe

ICAO
ASBU

ICAO
Supports ASBU Block 0 and Block 1 modules

Leading EUROCAE WG 67

EUROCAE

ED-137
All solutions

SESAR2020
Future communication infrastructure | Advanced air traffic services | Remote tower communication | Virtual centre

SESAR

Future communication infrastructure
Voice and datalink development

Transition to IP

Standardised and interoperable systems

Supporting cross-border trajectory-based operations

Virtual Centre
operational concept
Shared voice services

NextGEN

Partner in delivering NextGEN

Tower ATC voice comm system

FAA command center

Converged civilian and military communication services

ONESKY
(Australia)

FREQUENTIS

Trusted by 25,000 air traffic controllers every day

VCS3020X – trusted by 25,000 air traffic controllers every day

World market leader in ATC Voice Communications

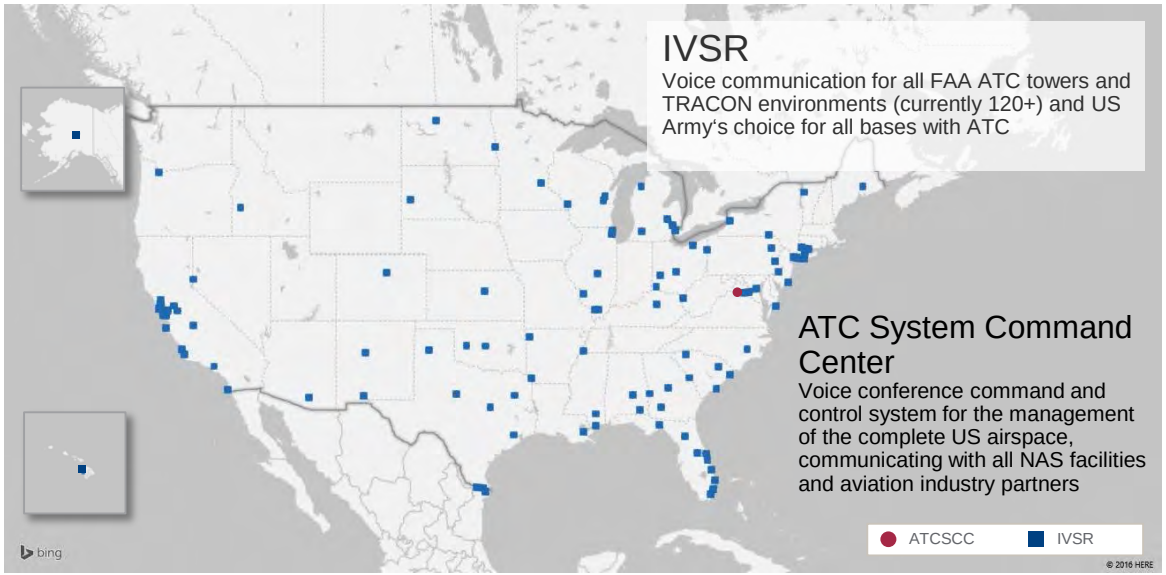
80+
countries

> 23M
operating hours

500+ successful
Project deployments
around the globe

FAA IVSR: Largest air traffic control VCS rollout program in the world

Ensuring reliable communications in the world's busiest airspace



>1,500
operator positions

681,244
movements p.a. Dallas/Ft. Worth 3rd biggest airport worldwide

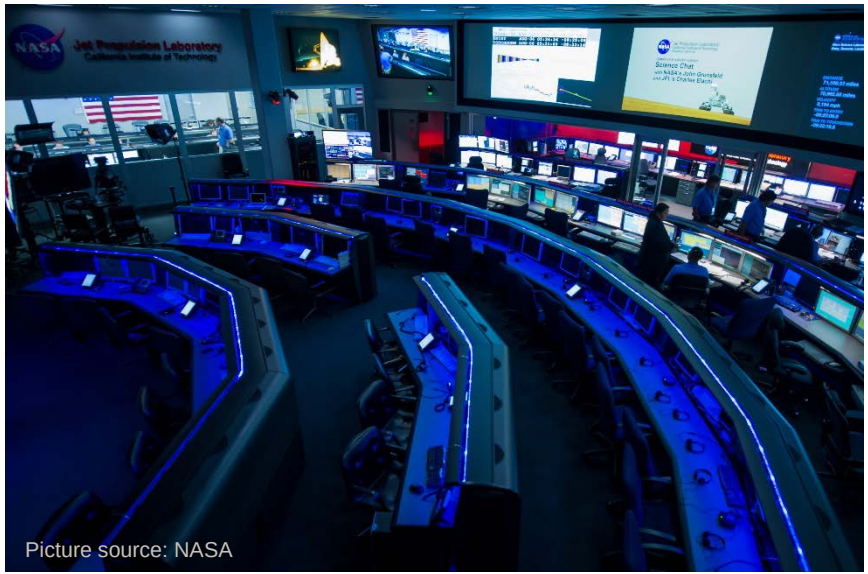
25%
of the US Tower & TRACON environment already upgraded to IVSR: 120+ systems

1,000
conferees for US-wide air traffic flow management and disaster recovery

» "Over the last decade Frequentis has proven to be a dependable partner to the FAA. Their outstanding technical expertise is supporting the NAS modernization to enhance operational efficiency and safety of the flying public." – Dan Duncan, FAA IVSR program manager

NASA MOVE: Space flight voice communications for all NASA missions

Assure mission-critical communications for all manned and unmanned space flights



Picture source: NASA

NASA space operation centers with VCS3020X
Space flight centers, tracking & data relay, deep-space communication

>4,000
operator positions and 18 systems delivered

5 types
of operator positions – reduced from 23 different types

National program for all major NASA sites to reduce types of operator positions

>1,000
operator positions using Voice-over-IP (VoIP)

Logistics & maintenance
Cost reduction through standardized solution

» “The 3020 system for the MOVE program is the first system worldwide using mission critical VoIP in a large scale. It impressively shows the maturity and scalability of the technology.” - Dieter Eier, Frequentis USA

ISAVIA VoIP deployment – largest and most modern air/ground IP VCS

Improving efficiency and air security in one of the worlds largest control areas

ANALYSIS

- Cutting edge technology
- Continued operations

PLANNING

- Upgrade scenarios evaluated jointly
- Controller involvement in simulated env.
- Selection of proper timing based on traffic forecasts

MIGRATION

- Sequential upgrade of test and operational systems
- Seamless transition

50
positions and 100+ VoIP air-ground radios interconnected

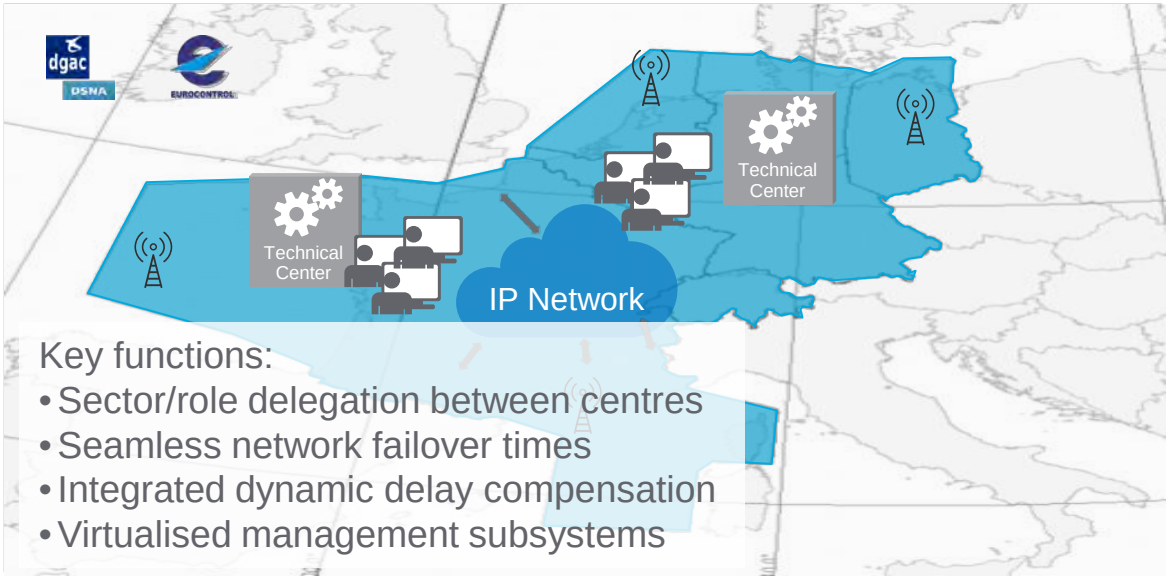
<48h
Hardware upgrade during live operation

Cost↓
telecom cost savings

» “Innovation is part of our DNA, so IP-based voice communication systems are now a must for our ACC facilities” – Hjalti Palson, Manager R&D ISAVIA

FABEC N-VCS: First and largest cross-border project in Europe

Need for operational and technical interoperability moving towards Single European Sky



Key functions:

- Sector/role delegation between centres
- Seamless network failover times
- Integrated dynamic delay compensation
- Virtualised management subsystems

100
positions and 7 remote radio sites

250 CWP
peak load and stability

600
ED-137 IP radio channels

<10ms
failover time

» Maurice Georges (DSNA): N-VCS will enable new strategic ATM development, such as dynamic airspace sectorisation.

Jac Jansen (MUAC): In order to maintain our high safety and performance levels, we must rely on a robust technology base.

Airservices Australia: Communication and tower control system for Sydney

High performance for high capacity tower operations

KPI‘s requirements

Quick and efficient project execution

Reliability demonstrated and proven

Design & build

Agile vs. waterfall

Agile development to capture also requirements not initially formally defined

Early end-user involvement with HMI workshops

Implementation

Transition during mission critical ops of the most important tower in AU

VCS3020X

iSeCCOM backup system

smartTOOLS tower information display & control

12 months timeframe for integrated project team

ED-137

End-to-end VoIP

Usability↑

controller-driven user interface to support runway operations

+10%

instrumental in managing traffic growth since 2013 (Contract)

» “The technology replacement provides greater resilience in our operations at the airport and ensures that we are well positioned to meet the future demands of air traffic growth.” - Mark Rodwell, Airservices Executive General Manager Projects and Engineering

VCS3020X: Innovation – performance – trust

Fastest end-to-end IP VCS

Market leading communication server for **unrivalled scalability and redundancy** – without compromising established quality of service and safety levels

World‘s first VCS supporting dynamic sectorisation

Cornerstone component for a flexible approach to airspace use

Adding the capability to **share workloads, network resources and management responsibilities**

Trusted by 25,000 air traffic controllers every day

Technology leader in ATM communications

500+ successful projects in

80+ countries around the globe