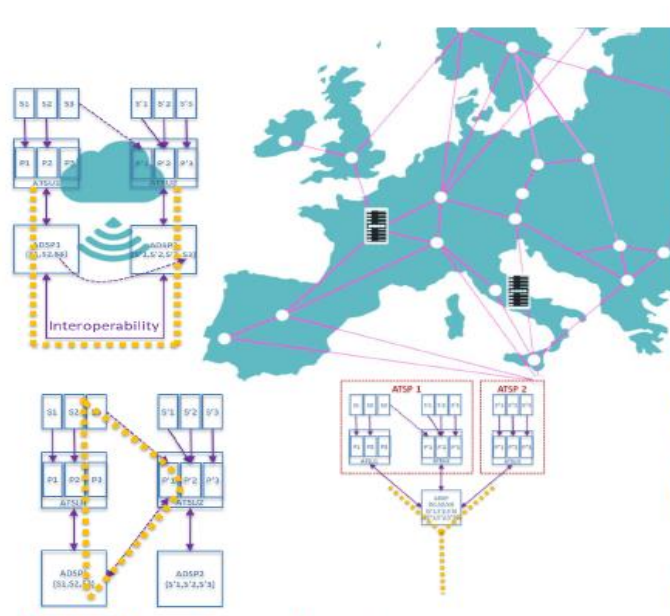


EXE3 Lead by Skyguide under SESAR PJ10 W2 PROSA Solution 93 and PJ32-W3-VC, demonstrated successful use of European Virtual Centres of different architectures (Y/U/D), for the Delegation of ATS Cross-Border ATSUs and in Contingency between Swiss and German ANSPs

Skyguide & Skysoft-ATM together with their partners (DSNA, DFS, NATS, INDRA and FREQUENTIS) have successfully developed and validated a Virtual Centre platform, composed of several ADSPs (ATM Data Service Providers) and ATSUs (Air Traffic Service Units) where all the data exchanged were managed through a central broker based in Vienna, at FREQUENTIS premises. The platform was composed of:

- Two ATC ADSPs (CCS- Coflight Cloud Service from DSNA and iTEC- Interoperability Through European Collaboration from INDRA)
- Two Voice ADSPs (FREQUENTIS and INDRA)
- Four different ATSUSs equipped with CWP's of different vendors (Skyguide Geneva & Zürich, DFS and NATS)

Therefore, this exercise validated three different Virtual Centre Architectures (the Y, U and D, see below the definitions), compliant with the on-going standardisation by EUROCAE WG-122 of VC data services defined within SESAR. These service interfaces ensure interoperability between ATSUs and ADSPs irrespective of the vendors of the systems installed at the premises. The exercise was based on Delegation of ATS and Contingency Uses cases.



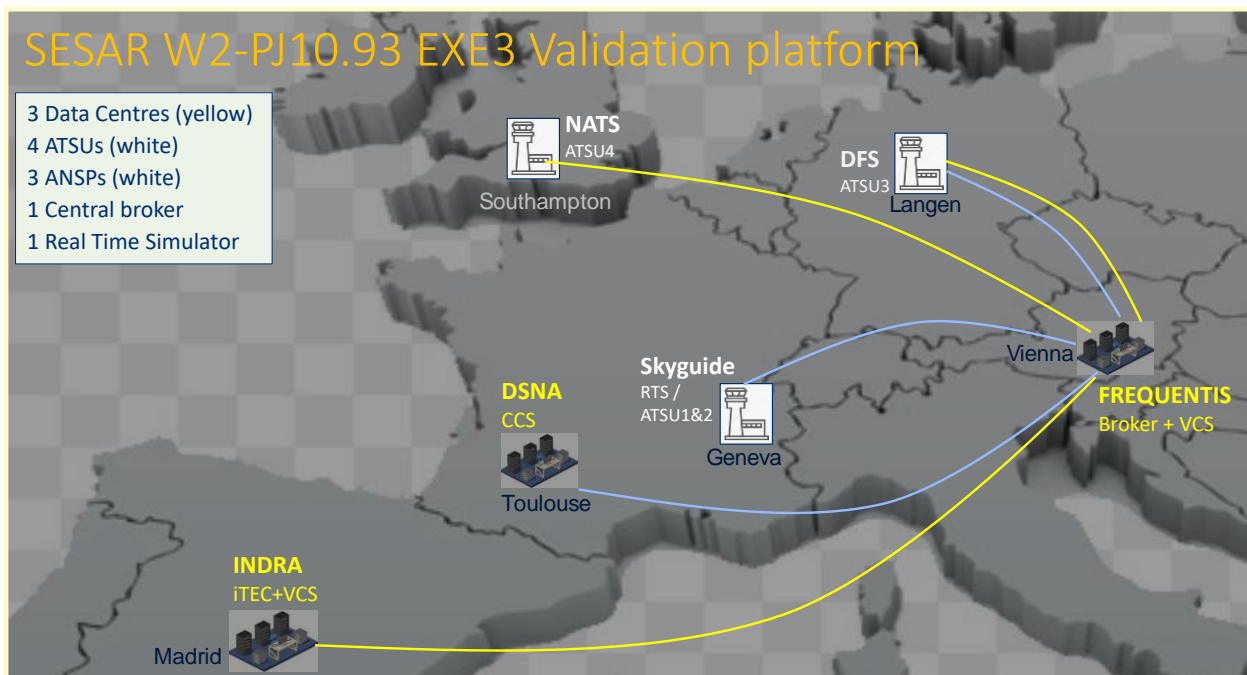
Virtual Centre architectures by EUROCAE WG-122

This exercise was focused on validation objectives from two different projects:

- PJ10 W2 Solution 93: operational feasibility & acceptability of the delegation of ATS Cross-border ATSUs

- PJ32: Validation of different architecture options for Virtual Centres, mainly the following ones:
 - o Y- Two ATSU's are connected to the same ADSP.
 - o D- Thanks to standardised services, the CWP of an ATSU can connect to different ADSPs, while providing ATS for the same airspace.
 - o U- Different ATSU's are connected to different but "interoperable" ADSPs, meaning that the ADSPs are prepared to exchange some traffic data and control actions to allow a safe delegation process.

Picture below shows the different locations where the EXE3 validation platforms were established: Geneva (CH), Toulouse (FR), Madrid (SP), Vienna (AU), Langen (GE) and Southampton (UK)



EXE3 Validation Platform over Europe

By combining different VC architectures and different operational use cases (e.g., delegation by night and in contingency situations), a total of 10 different delegation Use Cases (UCs) were developed for EXE3. These UCs were covering the following operational scenarios:

- Zürich sectors were delegated one by one to Geneva ATSU, following the usual night operation procedures or due to ATSU failure. These UCs were based on the Y-architecture: both ATSU's connected to CCS.
- Similar UCs as described in the previous bullet were played between DFS and NATS, with both ATSU's connected to iTEC.
- Using a combination of sectors from Zurich and Karlsruhe, Skyguide played delegation scenarios with DFS and NATS, under the U architecture.
- Using a combination of sectors from Zurich and Karlsruhe, DFS CWP managed to connect either to CCS or to iTEC within a delegation scenario with Skyguide, under D-architecture.



EXE3 – a Y delegation UC# within Skyguide



EXE3 –Y/U/D delegation UC# involving Skyguide/DFS/NATS

Different traffic samples were used in the various UCs. Since the main objective of the exercise was the validation of the delegation procedures & their operational acceptance, only Medium to Low traffic conditions were covered. Thus, there was no overload situation for the ATCOs, which would have been too difficult to manage, especially for the UCs with an extension of the Area of Responsibility (AoR).

Technical Outcomes

Despite some instabilities observed in the network (VPN connections over public internet were used), the exercise partners were able to play all the planned UCs. The performances of the CWP and ADSPs in exchanging data through the broker were rated from excellent to acceptable. In certain CWPs, the feeling was similar to being in a true

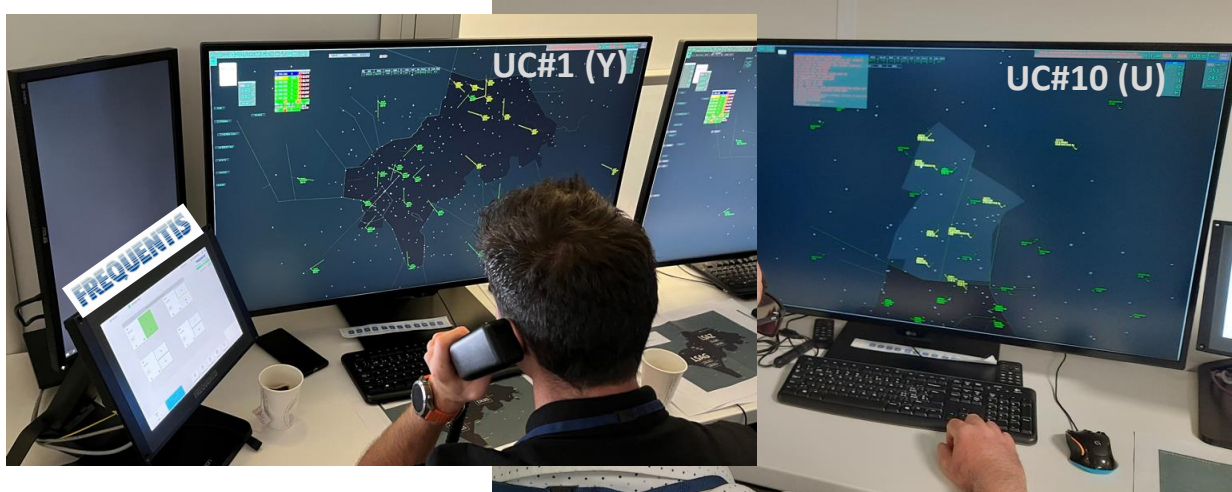
OPS room, in front of an operational system. The functionalities supporting the delegation, e.g., "Preview Traffic" of the delegating, at the receiving CWP, were successfully developed & evaluated.

Furthermore, the point-to-point interfaces connecting the ADPSs to external systems (e.g., FMTP OLDI lines) were not adapted to an architecture such as the U where Areas of Responsibility are modified. Additional research is required for more centralized or flexible European systems that should cover, not only the ATSU involved in the delegation of ATS, but all their neighbouring ATSU to unveil the full potential of ATS service delegation using U-Architecture

Operational Outcomes

The validation was performed thanks to a Real Time Simulator based at Geneva (Skyguide) involving SimPilots from Skyguide and three different ATCOs communities: from Skyguide, DFS and NATS. All of them were using different CWPs and HMIs.

Although the feasibility & acceptance of the ATS delegation was found acceptable for all the ATCOs, the maturity of the VC platform used was perceived differently depending on the architecture of the UC played. The Y-architecture platform was judged to be the most mature, and a similar perception was noted for the D-architecture. On the other hand, on the U-architecture platform, the operational feedback was that it was much less mature and almost "unsafe", due to a lack of traffic situation awareness. Later investigation of these issues showed that they were due to the lack of interoperability between the ADSPs, for which solutions will need to be researched in the future.



EXE3 –Preview Mode display at a Skyguide CWP

About SESAR HORIZON 2020 PJ10 PROSA

The air traffic controller is the main player in the traffic management at tactical level. The SESAR 2020-project PJ10 PROSA focusses on separation management. It aims at providing the air traffic controller with better and more automated tools, thus freeing capacity for situations where human intervention is crucial. However, PJ10 PROSA will not only improve current conflict detection tools but also develop new tools aiding the air traffic controller with resolution advisory and monitoring of flight trajectory. The project also addresses new ways of working together. Air traffic controllers traditionally work in pairs within specific airspace. Could we change this traditional setup to multi-planner setup, sectorless airspace and



seamless cross-border operations? Another important issue related to separation management is the integration of Remotely Piloted Aircraft Systems.

More information via the website: <https://www.sesarju.eu/projects/prosa>