

System Wide Information Management (SWIM)

Summary - SWIM: an intranet for air traffic

The System Wide Information Management (SWIM) concept is central to building the future Air Traffic Management (ATM) system that Europe needs and which is the goal of the Single European Sky ATM Research (SESAR) programme.

In essence, SWIM envisages an 'intranet of the air' where the ATM information held by different stakeholders in the system are shared over a common platform. Each stakeholder (including aircraft, airports or national airspace managers, for example) has access to the information they need to carry out their role in the ATM system.

Who needs to share information?

- Pilots - taking off, navigating and landing the aircraft
- Air Traffic Control centres - managing aircraft passing through their airspace
- Airport operations centres - managing departures and arrivals
- Airline operations centres - managing their fleet of aircraft
- Air Navigation Service Providers (ANSPs) -organising and managing the airspace over a country
- Meteorology centres - providing weather reports and forecasts.

Description: System Wide Information Management

The background

Currently the ATM environment is characterised by point-to-point communication between the various stakeholders, each with their own self-contained information systems: on board the aircraft, in the air traffic control centre, etc. In order to handle the expected increased capacity demands, economic pressures and increased attention to environmental impact, the SESAR programme is developing a new ATM system for Europe.

Implementing SWIM

The SWIM architecture will allow the exchange of data and ATM services across the whole European ATM system. The concept is not just based on greater automation; an even more important goal is to improve collaborative decision making, providing better quality information to the right people at the right time.

The architecture should also enable specific value-added information management services. These SWIM services will support flexible and modular sharing of information and will provide transparent access to ATM services, even where these are decentralised and distributed geographically.

Sharing information will mean reduced duplication of tasks and increased flexibility and safety. The SWIM architecture will also enable the optimal exploitation of the 'business trajectory' (4D trajectory) explained in factsheet 02/2010.

Some of the technology already exists; the SWIM architecture will be based on Internet protocols. Data links between airborne and ground equipment are a key component and these are already mandated to be implemented by 2020.

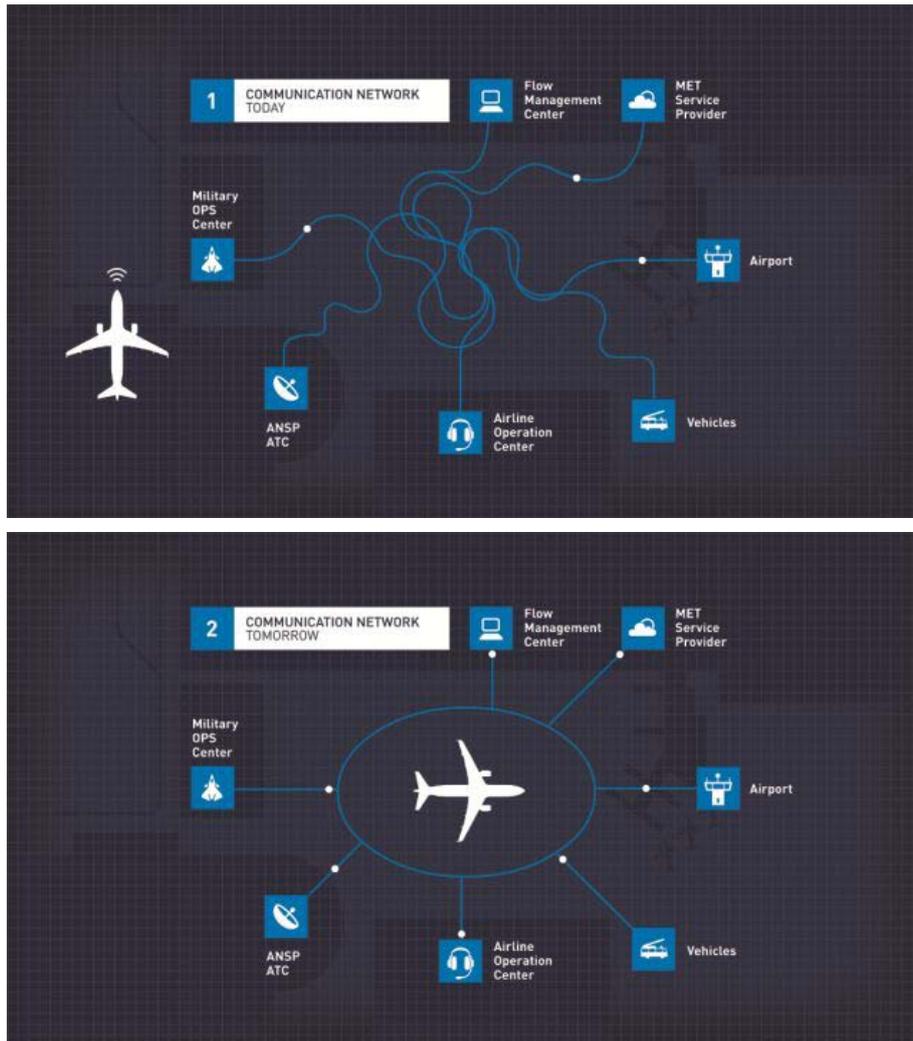
The technology architecture roadmap will require the development of European and international standards for digitising and distributing ATM information and establishing communications links with the end-user systems.

The SWIM architecture will eventually function like an 'intranet of the air' with each stakeholder having access to the information they need, when they need it, but with security guaranteed to prevent access to those not authorised.

What kinds of information need to be shared?

- **Flight trajectory** - the detailed route of the aircraft defined in four dimensions (4D), so that the position of the aircraft is also defined with respect to the time component.
- **Aerodrome air traffic control** - the status of different aspects of the airport, including approaches, runways, taxiways and gate information.
- **Meteorological** - reports on weather conditions and forecasts for the airspace.
- **Air traffic flow** - the network management information necessary to understand the overall air traffic situation.
- **Surveillance** - positioning information from radar, satellite navigation systems, aircraft datalinks, etc.
- **Capacity and demand** - information on the airspace users wanting to access the airspace and the aircraft already using it.

Sharing information today and tomorrow



Benefits

- **Safety** - All stakeholders will have access to the information they need, meaning that there will be greater certainty about positions and trajectories of aircraft. Greater automation of ATM will allow air traffic controllers to focus more on monitoring and contingency plans and will reduce data entry errors.
- **Cost efficiency** - Shared information will lead to less duplication, as well as more efficient routing and therefore lower fuel use. As an added benefit, as the SWIM concept grows in maturity, standardisation of interfaces between systems will bring down equipment costs for air traffic control (ATC).
- **Environmental impact** - More efficient routing and lower fuel use in turn leads to lower CO2 emissions and environmental impact.

Challenges

The main challenge in the migration to the SWIM architecture is the heterogeneous nature of ATM in Europe.

Because of this, European ATM needs to be seen as an 'ecosystem'. Just as in a real ecosystem, there will be competition between participants. Each stakeholder will address their own goals as their first priority, however in order to achieve their long-term goals, they also need to look after the community as a whole.

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The transition to a full, SWIM-based, 'intranet for ATM' will therefore take place in steps. Each incremental step will give the stakeholders additional confidence in the value of SWIM and its implementation.

The SESAR Programme

- **Work package 8** - The Information Management work package defines the ATM Information Reference Model, as well as the Information Service model which will be used by the various ATM Operational Services and which is necessary in order to develop SWIM specifications and test platforms. It will establish the framework to define seamless information interchange between all providers and users of shared ATM information, so as to enable the assembly of the best possible integrated, four-dimensional (4D) picture of the past, present and (planned) future state of the ATM situation.
- **Work package 14** - The SWIM work package builds on work carried out under the EU's Sixth Framework Programme (FP6) in the SWIM-SUIT project. It aims to demonstrate inter-system seamless exchange of data in the SESAR ATM environment by providing a SWIM test platform to validate concepts.

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