



TOTAL INFORMATION SHARING FOR PILOT SITUATIONAL AWARENESS ENHANCED BY INTELLIGENT SYSTEMS

The Total Information Sharing for Pilot Situational Awareness Enhanced by Intelligent Systems, Phase 1 (TALIS 1) project was carried out from September 2001 until February 2004 by a consortium of 5 partners: LIDO, NLR, SKYSOFT, THALES Avionics and EUROCONTROL Experimental Centre (EEC). The project was coordinated by EEC. The total cost of the project was 4.4 Million €, co-financed by 50% by the European Commission, DG-IST, in the context of its 5th framework for research and development.

The objective of the project is to investigate the viability and benefits of adopting an approach based on standardised architectures to provide for pilot situational awareness resulting in a safer and more efficient air traffic management process involving interactions between the ground and the air to bring benefits to the travelling public.



TALIS Vision: A collaborative, distributed, interoperable, consistent, available and integrated information sharing system.

The mission of Air Traffic Management (ATM) is the safe, orderly and expeditious management of air traffic. The current ATM system operates close to its capacity limit in high-density

regions, and new concepts are needed to increase system capacity. Operational concepts like Controller-Pilot Data Link Communications (CPDLC) and the Airborne Separation Assurance System (ASAS) promise to increase capacity by a stronger integration of the air and the ground, and the co-operative handling of traffic management between the pilots and the controllers. However, if capacity can be increased, safety must be increased at least at the same pace to increase the performance of the overall system. For safety, it is therefore mandatory to increase the situational awareness of controllers and pilots in harmonisation. Especially the cockpit side is lacking behind and must be enhanced, pilots having very little situational awareness regarding ATM! Total Information Sharing is a technical concept that contributes to the increase of pilot situational awareness, with direct improvements of safety and cost, and indirect to capacity and environment.

Information-sharing between the air and the ground suffers from the high complexity of air-ground integration, and its high costs are a major problem. All technologies that integrate the air and the ground take a long time from research until implementation, due to the high safety concerns and costs for avionics integration, and the necessity for global deployment of infrastructures. E.g. typical implementation times for new technologies are measured in decades, as illustrated by certified Global Positioning System (GPS) approaches in the navigation domain - versus massive use in the general domain, cars and the maritime domain. The TALIS project targets at shortening the time-to-market of new avionics packages, and herewith reduces the cost of implementation, by providing early benefits coming from an earlier deployment of the operational concepts. TALIS also attempts to lower the production cost of new packages, making

intensive use of commercial-off-the-shelf software (COTS).

The information-sharing paradigm in TALIS is closely related to the World-Wide-Web (WWW), with a special focus on mobile users. Information everywhere, for everybody, as a function of need, delivered in a framework of services, protocols and browsers. The principles of the WWW are further extrapolated for safety-related business cases.



The demonstrator integrated into the THALES Avionics rapid prototyping cockpit for the A380, showing Traffic Information Service in Contract (TIS-C) with browsing capabilities for adjacent aircraft information like medium-term conflicts, positions, flight plans etc.

The TALIS project was striving for high innovation and scientific and technological excellence on three levels: technology, architecture and applications, by the elaboration of the *Federated Architecture* and two applications for pilot situational awareness. The uplink of meteorological information from the LIDO database includes Meteorological Aerodrome Report (METAR), Terminal Aerodrome Forecast (TAF), Significant Meteo (SIGMET), Tropical Storms, Volcanic Ash Advisories, Convective SIGMETs, Clear Air Turbulence Warnings, Wind Shear warnings and Notice(s) To Airmen (NOTAM).

The Traffic Information Service – Contract (TIS-C) includes uplinks for adjacent aircraft positions, tracks, flight plans, trajectories, medium-term conflict geometries and adjacent aircraft position at time of conflict. The project successfully demonstrated software architectures for self-

forming (*mobility*) and self-healing (*safety*) systems conform to the technical paradigm of peer-to-peer service-orientation as researched for business-to-business applications. It consists of a technology framework based on Java technologies for distributed systems enriched with OPENWINGS¹, a software container architecture for discovery and connectivity.

All public deliverables including system requirements, software specifications and design, and certify-ability reports are available on the project web site <http://talism.eurocontrol.fr>.

It is the conviction of the TALIS consortium that information-sharing as a cornerstone of system-wide information management will improve the overall performance of the Air Traffic Management system for safety, and also capacity, cost and environment. Technical work to allow integration into the system-of-systems will be increasingly required. The TALIS1 project should be seen as a first step into that direction.



TALIS Services-Concept illustrated for airport mobile applications.

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¹ www.openwings.org