

Guest Editorial

Special issue: Selected papers from the SESAR Innovation Days 2011

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SESAR Long-term and Innovative Research, Workpackage E (WP-E), supports research activities that are not currently part of the ‘mainstream’ SESAR development work packages. The SESAR Innovation Days (the successor to the INO Workshops which were held between 2002 and 2010 at the EUROCONTROL Experimental Centre at Brétigny, France) are the main forum for dissemination of WP-E results and for interaction with an enlarged ATM research community and industry representatives which is vital for the health of the air transportation community.

The first edition of SESAR Innovation Days was hosted by the Ecole Nationale de l’Aviation Civile (ENAC) in Toulouse, France from 29th November to 1st December 2011. Following the special issue of the Journal of Aerospace Operations dedicated to the 2010 edition of the INO Workshop, we have decided to dedicate a special issue to 2011 SESAR Innovation Days as well.

Amongst the papers submitted for presentation at the conference, we have selected five interesting and innovative articles and invited the authors to prepare an extended version of their original manuscript.

“Towards superior air transport performance metrics – imperatives and methods” by Andrew Cook, Graham Tanner and Massimiliano Zanin illustrates how to better characterise and measure performance, through additional metrics based on complexity science. In particular, the need of embracing variability and distribution, hence predictability, rather than focusing only on summary and central tendency, is shown. The paper also emphasizes the importance of designing passenger-centric rather flight-centric metrics as most delay costs to the airlines are driven by delayed passengers.

“Digital Meteorological Service (DMET) in support of trajectory optimization and ATM automation” by Jesús Gonzalo and Carmen Salguero presents the development of a prototype of a Digital Meteorological Service (DMET) that computes atmospheric data from several sources to produce predicted 4D atmosphere scenarios regularly available to subscribers. A DMET is a cornerstone in a net-centric service-oriented ATM system architecture where available data, air-ground connectivity and modern

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computational resources are taken advantage of to attain a 4D predictive model specifically designed for real-time support to aircraft operations.

“Designing for Shared Cognition in Air Traffic Management” by M. M. (René) van Paassen, Clark Borst, Rolf Klomp, Max Mulder, Pim van Leeuwen and Martijn Mooij presents an approach to the design of a shared representation for 4D trajectory management. The design is based on the Cognitive Systems Engineering framework and by using a formative approach in the analysis of the work domain, a step-wise refinement in the planning and execution of 4D trajectories is proposed. The ultimate goal is to design a shared representation that underlies both the design of the human-machine interface and the rationale that guides the automation.

“Relational Time-Space Data Structure To Enable Strategic De-Confliction with a Global Scope in Presence of Large Number of 4D Trajectories” by Sergio Ruiz and Miquel A. Piera introduces an innovative framework for the design and implementation of new ATM decision support tools for strategic de-confliction. Within the framework of the WP-E project STREAM (Strategic Trajectory de-confliction to Enable seamless Aircraft conflict Management), the paper presents Spatial Data Structures, i.e. new Relational Space Data Structures and Time-Space Data Structures, to support strategic Conflict Detection between 4D trajectories.

The final paper moves to legal issues in ATM. “Liability and automation: issues and challenges for socio-technical systems” by Giuseppe Contissa, Migle Laukyte, Giovanni Sartor, Hanna Schebesta, Anna Masutti, Paola Lanzi, Patrizia Marti, and Paola Tomasello presents a framework for liability in aviation, an analysis of real accidents and of a hypothetical case involving Unmanned Aircraft System according to a methodology developed in the WP-E project ALIAS (Addressing Liability Impact of Automated Systems). The paper also introduces a Legal Case, that is a methodological tool aimed at identifying and addressing liability issues of automated ATM systems.

We believe these articles will give you a flavour of some of the research projects presently ongoing in Europe on Air Traffic Management and we hope the reader will find them stimulating and rewarding.