MAEVA

A Master ATM European Validation Plan

**Funding:** European (5th RTD Framework Programme)

**Duration:** Mar 2004 - Jun 2004

**Status:** Complete with results

**Total project cost:** €2,800,000

**EU contribution:** €2,800,000

Call for proposal: First Call - GR

CORDIS RCN: 87123

**Background & policy context:**

The validation of air traffic management (ATM) systems is an on-going process which is carried out at the same time as the system is being developed. The detailed definition of validation programmes, methodologies, tests and trials for these systems is a quite complex task.

The major objective of the Master ATM European Validation Plan (MAEVA) Project was to provide the European Commission (EC) with an overall validation strategy for the future pre-European Air Traffic Management Programme (EATMP) for its Fifth Framework Programme (5th FP) validation projects. MAEVA, which was sponsored by the Directorate General for Transport and Energy, was also expected to provide decision-making support in managing all Fifth Framework Programme validation related projects and co-ordinating with Eurocontrol and Member States within an overall European validation initiative.

**Objectives:**

The objective of the overall Safety Analysis was to assess the safety methodologies that the monitored projects used and applied for high-level safety work performed with respect to ASAS, A-SMGCS, 4D Trajectory Management, and CDM. The purpose of this analysis was to provide guidance to European Commission policy units and other European decision making bodies as to the status and availability of applications developed with documented safety methodologies in the monitored projects. The objective was to present findings, draw conclusions and present recommendations regarding future progress in the safety area. Based on the methodologies used by the monitored projects, an analysis of each project and area was performed. The results of this analysis are described below as findings.

**Methodology:**

When reviewing all of the monitored projects, one dominating operational safety methodology was used to a larger extent than others. This is the EUROCAE WG53 / RTCA SC189 methodology. The CARE-ASAS project also used the TOPAZ methodology for risk assessment. For continued development, when addressing the functional safety aspects of the system, different methodologies exit for the ground and airborne segments. The EUROCONTROL EATMP Air Navigation System Safety Assessment Methodology addresses ground issues. A number of welldefined and comprehensive methodologies defined by the SAE address the airborne segment. The EUROCAE/RTCA, TOPAZ, EATMP and SAE methodologies are described in the following subsections.

**Parent Programmes:**

FP5-GROWTH KA2 - Sustainable Mobility and Intermodality

**Institute type:** Public institution

**Institute name:** European Commission, Directorate-General for Energy and Transport (DG TREN)

**Funding type:** Public (EU)
Lead Organisation:

Ingeniera De Sistemas Para La Defensa De Espana Sa

Address:
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Organisation Website:
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EU Contribution: €0

Partner Organisations:

Societe Des Transports Intercommunaux De Bruxelles

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EU Contribution: €0

Entidad Publica Empresarial Aeropuertos Espanoles Y Navegacion Aerea

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EU Contribution: €0

National Air Traffic Services Limited

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Bournemouth International Airport
United Kingdom

EU Contribution: €0

Avtech Sweden Ab

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EU Contribution: €0

Key Results:

Results and conclusions are part of the MAEVA outcome which comprises:

- The documentation (deliverables) produced summarising the monitoring, assessment and results obtained during the MAEVA lifetime. The most important deliverables were the Validation Guidelines Handbook (VGH) and the Validation Master Plan (VMP).
- The MAEVA Final Report is also a major result of MAEVA. These deliverables are public and will be the main reference for the users of MAEVA:
  - The VGH: This document provides guidelines for conducting validation exercises based on an uniform validation framework. The objective of the VGH is to assist the users to perform their validation activities. This document was updated within MAEVA to address and include best and most widely used practices applied in the validation exercises being monitored.
The VMP: This document establishes a validation framework for analysing projects involving validation of the ATM system. The overall MAEVA overview of the validation processes is presented in a series of tables that show the status of each of the monitored validation projects with regard to series of validation-related aspects. On the basis of all the information, this document identifies potential gaps and potential overlaps and conclusions in addressing the elements of the TORCH Operational Concept.  

The MAEVA Final Report (deliverable D8.1): This document summarises the findings, recommendations and conclusions obtained after performing the assessment of the validation processes conducted by the monitored projects. Broad dissemination of the MAEVA results through the ATM community: three Dissemination Forums were organised during the projects. These Forums were held in Barcelona and in Palma de Mallorca (Spain).

Technical Implications

The ATM FP5 projects that were assessed by MAEVA related to the Operational Improvements mainly in the areas of airport, ATC, en-route and terminal ATC with little work related to airspace organisation and management, air traffic flow and capacity management. Analysis of the operational concepts of these projects against the OCD Invariant Processes showed that the projects aligned mainly with Airport Operations, Conflict Management and Airspace Organisation and Management. The broad scope of Airspace Organisation and Management covered by EUROCONTROL’s Operational Improvements showed that these projects only covered a limited number of the changes anticipated by this document. There was only limited coverage of Demand and Capacity Balancing and Traffic Synchronisation. There was only one project related to Information Management and Services and this was airport CDM. The synthesis of the operational concept highlighted that the focus of the work in FP5 was at the tactical phase of the operations. Within Airport Operations, LEONARDO validated a system that addresses some parts of airport operations from an integrated viewpoint. However, although the application of P-RNAV routes and ASAS spacing were considered individually, there was no view on their relative merits or the feasibility of a system that integrates both approaches.

The final analysis focused on four operational koncept themes, ASAS, 4D-trajectory management, CDM and ASMGCS. The maturity of each of these themes was evaluated in terms of technical, operational and economic aspects. The view derived from this analysis was that the more basic functionalities in each of these areas are fairly immature in technical terms and mature in operational terms. Advanced functionalities are in general immature. The operational areas are also generally more advanced than the technical aspects. The economic validation is immature and not well documented. There is particular lack of work to support CBA in CDM and A-SMGCS, both areas that have potential to provide early benefits to the airlines.

Policy implications

The overall findings of MAEVA’s Assessment Phase are presented below in the main areas of the work performed in the final phase of MAEVA, these being: safety, cost benefit, transition issues and the operational concept. The assessment focused on ASAS, 4D Trajectory Management, CDM and A-SMGCS.

Findings on Safety

The main safety methodology used by the projects working in the four focus themes was ED-78A. Despite this there is limited expertise in this methodology in the ATM community and no single project has followed the entire process to its conclusion. In the four focus areas, safety was addressed to different degrees, ranging from a high level of detail in ASAS and ASMGCS to more limited coverage for 4D trajectory management and CDM. Some projects performed extensive work on safety, which should be beneficial to other projects and the overall safety process. The feedback or exposure of this work was quite limited however, and there is difficulty in accessing these results. Some of the safety results presented by NUP 2 on ASAS spacing applications imply significant certification issues for the airborne side that could make installation of the system uneconomic. Security was not examined by any of the projects monitored. This can be considered a safety issue.

Findings on Cost Benefit Analysis

Limited work on cost benefit analysis was performed in the four focus areas and it was difficult for MAEVA to obtain documentation on the work that was completed. Earlier projects have not moved to operations owing to the unwillingness of stakeholders to invest in new technologies and systems. Cost benefit analysis was identified as an important factor in providing stakeholders with the information that they need in order to support the preparation of business cases for these investments. The metrics most often used in the CBAs that were performed are Delay, Predictability, Flexibility, Efficiency, Access, Capacity and Cost of Service. Capacity has historically been defined as throughput in TMA and en-route, but airport throughput is becoming increasingly important. The most significant problem in investing in ATM systems is the requirement for a number of stakeholders to invest in the technology. Consequently, co-ordination is required between airlines, ANSPs, airports (ideally all) and potentially
other parties in order for the full benefits of these systems to accrue. An important difficulty in performing the CBAs was the unwillingness of stakeholders.

**STRIA Roadmaps:** Network and traffic management systems  
**Transport mode:** Air transport  
**Transport sectors:** Passenger transport, Freight transport  
**Geo-spatial type:** Other