CATS

Contract-based Air Transportation System

**Funding:** European (6th RTD Framework Programme)

**Duration:** Oct 2007 - Oct 2010

**Status:** Complete with results

**Total project cost:** €2,906,654

**EU contribution:** €1,669,313

**Call for proposal:** FP6-2005-TREN-4-AERO

**CORDIS RCN:** 86355

**Background & policy context:**

In recent years, the Air Traffic Management (ATM) situation has changed, and - while safety and capacity are still major issues - the picture has become more varied with a greater emphasis on performance and cost efficiency. There is a constant: overall Air Transport will continue to grow while facing demanding challenges. Considering the current ATM system, there is a clear need for more capacity, more efficiency and more safety. There is a clear need to introduce measures to meet these important objectives.

CATS proposed an innovative air traffic management (ATM) solution which would be able to deal with the challenges of traffic growth (2012+ horizons), and improve the efficiency of the European air transport system.

This new ATM paradigm was based on an innovative operational concept: Contract of Objectives (CoO). This concept introduced an innovative way of managing ATM by mutually agreed objectives, leading to a market-driven air transportation system.

It addressed the entire air transport supply chain by reconciling operational links between air and ground services.

This functional and operational continuity between air and ground will enhance efficiency by increasing the predictability of the air transport system. The objective assignment and negotiation should be performed through a collaborative decision-making process which will establish the operational agreement, including the right balance between productivity and safety. Through the Contract of Objectives, a guarantee of results respecting punctuality will be offered to the airline by the air traffic system.

**Objectives:**

The CATS project aimed at giving a common, known and agreed objective to all the air transportation system actors with an integrated input of their own constraints through a negotiated trade-off, leading to an efficiency improvement in the organisation of flights and so to a cost reduction. The objectives were:

- to link ATM actors together through agreed objectives and interfaces;
  - The Contract of Objectives (CoO) allows ‘reconciling’ ATCo, airlines and airports by giving mutual awareness of the constraints (i.e. target window) and focusing on the ultimate target - punctuality at destination.

- to integrate flexibility to cope with uncertainties;
  - Target window modelling includes both technical level constraints and room to keep sufficient flexibility when disruptions occur. The target window gives the available management space for ATCos and aircrew to deal with any uncertainty during airborne flight life, but always respecting the initial schedule.
• the coordination of actors' resources to deliver the best service;
The Contract of Objectives is the elementary unit of the collaborative process - built, agreed and shared by all the actors. It represents a 'guarantee of service results' where each actor provides the relevant resources and infrastructure to deliver the appropriate service.

• enhanced collaboration over Single European Sky.
The Contract of Objectives and target windows represent a commitment on agreed interfaces between actors. To be efficient, the network should be considered at a European level. The Contract of Objectives involves the collaboration of all actors focused on a unique area - the European airspace.

Methodology:
The aim of the CATS Project was to assess the Contract of Objectives (CoO) and associated Target Windows (TWs) by involving the major actors in the supply chain. The CATS concept assessment, following European Operational Concept Validation Methodology (E-OCVM), was conducted by:

• Operational validation which analyses how the proposed CoO and the associated TWs impact the operators' performance regarding selected Key Performance Areas (KPAs) defined by SESAR;
• Systemic validation, which highlights the impacts for the overall ATS on safety and risk management, cost benefits, and legal consequences.

Operational validation is led by three successive Human-In-the-Loop (HIL) experiments which focus on different validation objectives:

• HIL-1: Evaluation of the impact of the CoO between Air Traffic Controllers (ATCOs);
• HIL-2: Evaluation of the impact of the CoO between ATCOs and aircrew;
• HIL-3: Evaluation of the renegotiation process involving ATM actors (airlines, airports and ANSPs).

The aim of these three HIL was to evaluate whether:

• CoO implementation allows safe operations;
• TWs integrate flexibility to cope with uncertainty;
• The ATCOs' and aircrews' working methods deriving from CoO execution and renegotiation are acceptable;
• CoO execution and renegotiation do not impact the ATCOs' and aircrews' performance;
• CoO execution and renegotiation do not impact the ATCOs' and aircrews' activity;
• Collaboration between ATCOs and aircrews is high;
• CoO is still manageable with growth of traffic as foreseen in the 2020;
• Renegotiation of TWs is manageable for airport, airline and network manager staff.

Parent Programmes:
FP6-IST - Information Society Technologies - Priority Thematic Area 2 (PTA2)

Institute type: Public institution
Institute name: European Commission
Funding type: Public (EU)

Lead Organisation:

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EU Contribution: €0

Partner Organisations:

The European Organisation For The Safety And Air Navigation
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Key Results:

The three HIL experiments objectives were to assess the CoO concept and associated TWs, even if they cannot be fulfilled, to investigate the impact of this concept on controllers' and pilots' activity and relationships, and to evaluate the operational acceptability from the point of view of the actors (airport and airline operators, network manager) and operators (controllers and pilots). All participants were very positive about the concept. It was considered feasible and acceptable by the controllers and pilots, and the TWs were manageable, even with the 2020 traffic load, without any impact on safety.

However, participants think that the potential benefits are of more concern for airlines and the Air Transport System as a whole than for themselves. They all recognise that implementation of the Contract-Of-Objectives concept will increase the collaboration between crew and ground, as they share not only the same data but also they visualise the same robust objective all along the flight. Actors and operators found the renegotiation concept fully manageable without major impacts on their activity.

The HILs results show that the CATS concept could be seen as a possible driver for implementing the SESAR Business Trajectory, and its assessment could also contribute a significant understanding of the validation required for such complex concepts. The introduction of TWs constitutes a fundamental tool to achieve Collaborative Decision Making process (CDM) capabilities.

Technical Implications

The CATS concept proposes a transition from means-based management to performance-based management (through a contract-based system) and could provide one mechanism for achieving the SESAR business trajectory. The CATS project could also contribute a significant understanding of the validation required for such complex concepts.

Documents:
- Project Information (Project presentation)
- STRIA Roadmaps: Network and traffic management systems
- Transport mode: Air transport
- Transport sectors: Passenger transport, Freight transport
- Transport policies: Safety/Security, Societal/Economic issues
- Geo-spatial type: Other