PROJECT

HUMAN

Model-based Analysis of Human Errors During Aircraft Cockpit System Design

Funding: European (7th RTD Framework Programme)

Duration: Mar 2008 - Aug 2011

Status: Complete with results

Total project cost: €3,909,789

EU contribution: €2,777,378

Call for proposal: FP7-AAT-2007-RTD-1

CORDIS RCN : 89633

Background & policy context:

The HUMAN project was successfully concluded in June 2011, with a symposium at Airbus, Toulouse. The symposium was well-attended by representatives from Airbus and other aviation companies. During the day, the project partners gave an overview of the project results and the added value for the design and development process of safer cockpit systems.

The objective of the HUMAN project was to develop a methodology with techniques and prototypical tools based on a cognitive model of the crew behaviour, to support the prediction of human errors in ways that are usable and practical for human centred design of systems operating in complex cockpit environments. The methodology was developed and tested in the frame of a flight management system (FMS) case study. The results of the project will contribute to ensuring that aviation safety remains at current high standards or even improves regardless of air transport growth.

The project will support improved understanding of the human factor and prediction of potential pilot errors right from the beginning of the system development and thus would enable considerably improved human centred design of cockpit systems.

Objectives:

The overall objective was to contribute to the enhancement of safety. One aim was to reduce the accident rate by 80%. The project contributed to this by:

- Impact 1: enhancing the accuracy of pilot error prediction by around 40%.

Another aim was to achieve a substantial improvement in the elimination of and recovery from human error. The project contributed to this by:

- Impact 2: reducing the design effort of active and passive safety measures by around 30% and
- Impact 3: reducing the effort of flight simulator tests for active and passive safety measures by around 30%.

Research dimensions:

- Cognitive modelling: an integrated cognitive crew model to predict relevant pilot behaviours (including errors);
- Virtual simulation platform: a high-fidelity virtual simulation platform to execute the cognitive crew model in realistic flight scenarios;
- Knowledge base on human performance: to build up a detailed knowledge base about cognitive processes and to develop formal techniques and prototypical tools to validate and further develop the cognitive model.

Improve human centred design of cockpit systems:

- a cognitive crew model able to predict design relevant pilot errors;
- a high-fidelity virtual simulation platform enabling execution of the cognitive model;
- a prototypical tool based on the virtual simulation platform supporting usability of the platform and cognitive model;
- formal techniques and prototypical tools for analysis of simulator data;
- a detailed knowledge base about cognitive processes leading to pilot errors and derived guidelines for cockpit system design;
- a methodology that integrates all the techniques and tools for their application during system design.

Methodology:

The HUMAN project was structured in seven work packages (WPs). The requirements for the preparation of the physical and virtual platforms were defined in WP1. The functionalities and the user interface of the target system were defined, along with the normative activities associated with its use. Two platforms were prepared in two dedicated work packages: WP2 prepared the physical simulation platform and WP3 prepared the virtual simulation platform. WP3 included the initial development of the cognitive model. In WP4 the two platforms were used in parallel to produce and subsequently compare actual and predicted activities in experimental scenarios, in two validation-development cycles.

A major aim of the project was to integrate the cognitive model and virtual simulation platform in a methodology for the analysis of human errors that is practical and usable by industrial manufacturers. WP5 was dedicated to this objective, resulting in a dedicated generic system design methodology, incorporating the cognitive model and virtual simulation platform as a human error prediction tool intended for the manufacturers of interactive systems used in complex dynamic environments in aviation and other transportation domains. The results, intermediary or final, of the project were disseminated and exploited during the project. This was the objective of WP6. Project management was the topic of WP7.

Parent Programmes:

FP7-TRANSPORT - Transport (Including Aeronautics) - Horizontal activities for implementation of the transport programme (TPT)

Institute type: Public institution

Institute name: The European Commission

Funding type: Public (EU)

Lead Organisation:

Offis E.v.

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ESCHERWEG 2
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Germany

EU Contribution: €879,800

Partner Organisations:

Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek Tno

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2595 DA DEN HAAG
Netherlands

Organisation Website:
http://www.tno.nl

EU Contribution: €476,203

Airbus Operations Sas

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ROUTE DE BAYONNE 316
31060 TOULOUSE
France

Organisation Website:
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EU Contribution: €272,787

Universite Catholique De Louvain

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1348 Louvain La Neuve
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EU Contribution: €140,383

Deutsches Zentrum Fr Luft Und Raumfahrt E.v

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EU Contribution: €865,033

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Italy

Organisation Website:
http://www.aermacchi.it

EU Contribution: €143,172

Technologies:

Cabin and cockpit design
Cockpit-based technologies for improved pilot workflow

Development phase: Validation

Key Results:

The results of the HUMAN project adds to the design and development process of safer cockpit systems.

Innovation aspects

The HUMAN project developed a novel methodology based on a cognitive model of crew behaviour, to support prediction of human errors in ways that are usable and practical in complex cockpit environments. The project results contribute to ensuring that aviation safety remains at current high standards or even improves safety.

Strategy targets

An efficient and integrated mobility system: Acting on transport safety (saving thousands of lives)

STRIA Roadmaps:

Cooperative, connected and automated transport, Vehicle design and manufacturing

Transport mode: Air transport

Transport sectors: Passenger transport, Freight transport

Transport policies: Safety/Security

Geo-spatial type: Other