The Effect of a Highly Automated Environment on Human Behaviour

Plans and first Results of the WP-E project

ADAHR

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Consortium

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Outline

- ADAHR Objectives
- The approach
- Gaming Technique
- First results: Roles and Responsibilities
- Next Steps
Objectives
Automation applied to an inefficient operation will magnify the inefficiency

(Bill Gates)
Problem Statement

Major issue in ATM is impact of automation and new technologies on human operator

- Automated systems must be compatible with human capabilities

One of key focuses of SESAR:

- Role of the human and their relation with advanced automation tools to work:
  - Safely
  - With an appropriate workload
  - With a high level of situational awareness.

Previous and current work

- Some knowledge about how automation impacts on workload and performance of an actor
- But little is known about how automation impacts on interaction and situational awareness among several actors with different interests

Impact of automation on human roles and interactions in 2020-2050?
Objectives

To assess the behaviour of ATM human actors in a highly automated environment

Research Questions:

• How does automation impact roles and responsibilities?
• How does automation impact human interaction?
• Which automation functionalities should be prioritized in SESAR?
• What requirements are needed to promote the acceptance of high levels of automation?
Assessment of degree of automation on human roles

Approach
Environments

Airspace Organization and Management

Airport Operation Centre
Approach (for both Environments)

Roles & Responsibilities 2020

Filter criteria

Roles & Responsibilities 2035, 2050

Paper-based

Execution

Gaming

Platform-based

Preparation / Adaptation

Scenario
Gaming Technique
What is Gaming?

- Low-cost human in the loop activity to assess feasibility and operability of immature concepts
- Simulate decision making processes and H-H / H-M interactions;
- Experts are ‘around a table’ playing different roles as they were living real processes (AOCs, Pilots, AMC, Network Manager,...);
- Every role has a particular scope, objectives and strategies during the process;
- Scenario running in real-time (or even slow time);
- Promoting non-routine thinking, thus enabling out-of-the-box thinking.
Common elements of Gaming

- Game Master
- Players (roles, objectives)
- Observers and Assistants
- Game Scenario
- Rules
- Tools to collect outcomes

**Questionnaires**
**Comment Sheets**
**Debriefing**
**Platform Data reports**
Paper-Based vs. Platform-Based Gaming

**Paper-Based**
- Relatively easy and low-cost (use of basic office material)
- Support and complement the platform-based games
- First assessment of Roles, Responsibilities and Interactions

**Platform-Based**
- Use of hardware platform
- More realistic context
- More complex game rules
- Also quantitative results
Platform-based Gaming

**CHILL**
- Collaborative Human-In-The-Loop Laboratory
- Used in Airspace Organization and Management Gaming (DCB)
- Different categories of actors work together
- Suite of interoperable modelling services and components

**ACCES**
- Airport Control CEnter Simulator
- Used in APOC Gaming (AOP)
- Several operator working positions with CDM and TOP
- Situation overview by video-wall
Focus: Interaction / CDM
Assessment of degree of automation on human roles

First Results: Roles & Responsibilities
Assessment of degree of automation on human roles

**Actors and Roles 2020**

- Air Traffic Services Operators
- Airport Operators
- Air Traffic Flow and Capacity Management
- Airspace Organization and Management
- Airspace Users

**Global role description**

Interaction with other roles

**Relevance for two environments**

Foreseen future impact of LoA
Assessment of degree of automation on human roles

- Literature where available (strategic papers)
- Consortium partners expectations

Expected future of ATM

- Literature where available (strategic papers)
- Consortium partners expectations

Level of Automation (LoA)

- Corresponds to level of automated decision making
- Several taxonomies: Parasuraman, Endsley and Kaber
- LoA in one system not necessarily at same level at any point in time

Capacities of gaming platforms

- Can (changed) role be simulated?
- Can platform be adapted?
Future Roles and Responsibilities (2020/2035/2050)

AOM roles
- Multi Sector Planner
- Executive and Planner controller
- Airspace Manager
- Local Traffic Manager

APOC roles
- Airport Duty officer
- Airport CDM project manager/APOC Supervisor
- Ground Handling Agent
- Aircraft Operator Agent

Task description
- Interaction with other roles
- Requirements for simulation environment / platform
- Indicators to measure impact of the changing role on the actor

D1.1 on Website
Assessment of degree of automation on human roles

Next Steps
Progress

Roles & Responsibilities 2020

LoA

Roles & Responsibilities 2035, 2050

2012

Execution

Gaming

Paper-based

Platform-based

Preparation / Adaptation

Scenarios for 2 ENVs.

Assessment of degree of automation on human roles
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