



Addressing future operations concepts with increasing automation using human in- the-loop simulations: the SAFELAND project

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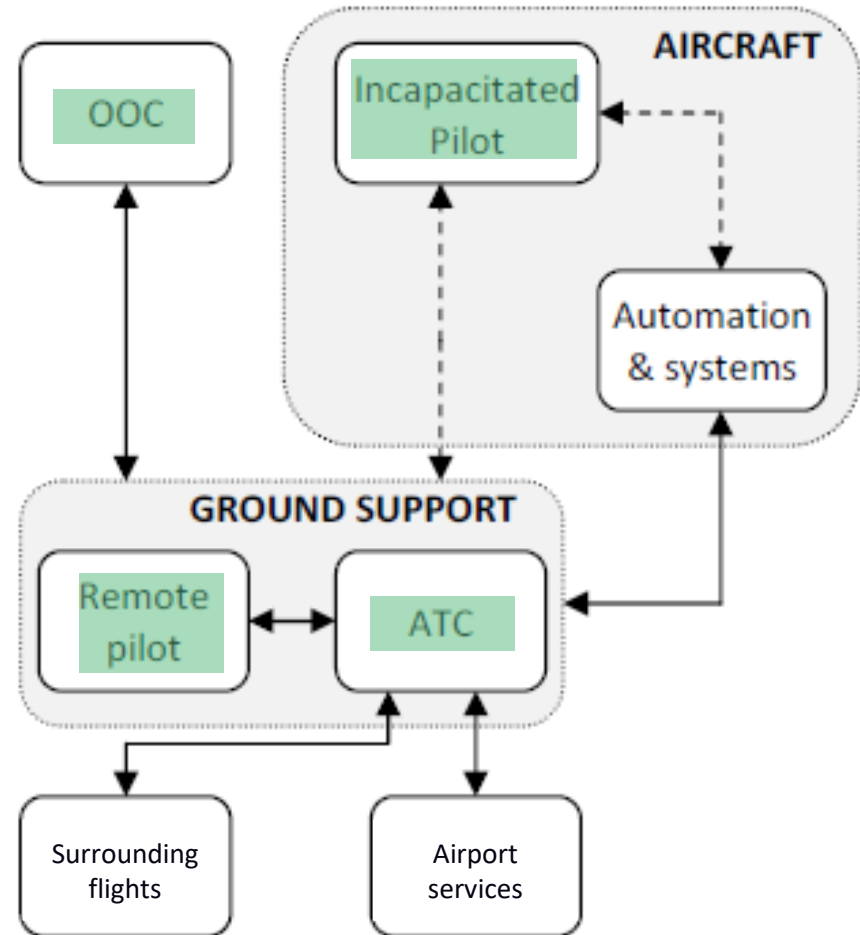
CONTEXT



- **SESAR Project**, started on 01/07/2020
- **Single Pilot Operations (SPO)**
 - **Pilot incapacitation** is one of the key issues for the development of SPO
- Not many studies on the role of **ground support** operators for SPO
- Different **approaches to handle pilot incapacitation**:
 - Replacement Through Automation
 - Second Pilot Displacement

SAFELAND Concept

- SAFELAND will consider both approaches with the aim of **enhancing safety in case of single pilot (partial/total) incapacitation,**
- SAFELAND will develop an **improved ATM centered concept,** offering ground support for the management of the flight until it lands safely



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Approach



- The project takes into consideration **controllers, pilots** (including remote), **airlines** and aims at building an integrated system.
- The project will **evaluate different possible options**, chose the “best one” and simulate it.
- The options are evaluated taking into consideration many aspects including **operational needs/constraints, technical feasibility, human factors, safety, security and cybersecurity, legal, economic and regulatory aspects.**

Validation of the concept

INITIAL
CONCEPTS

- Desk studies and internal workshops
- **Advisory Board Workshops**
 - W1 – January 2021: Review of the **preliminary concept**
 - W2 – April 2022: Validation of the **results of the simulation** and of the preliminary safety and cyber-security assessment;
 - W3 – November 2022: Final dissemination event to evaluate the level of maturity reached by the **project results**

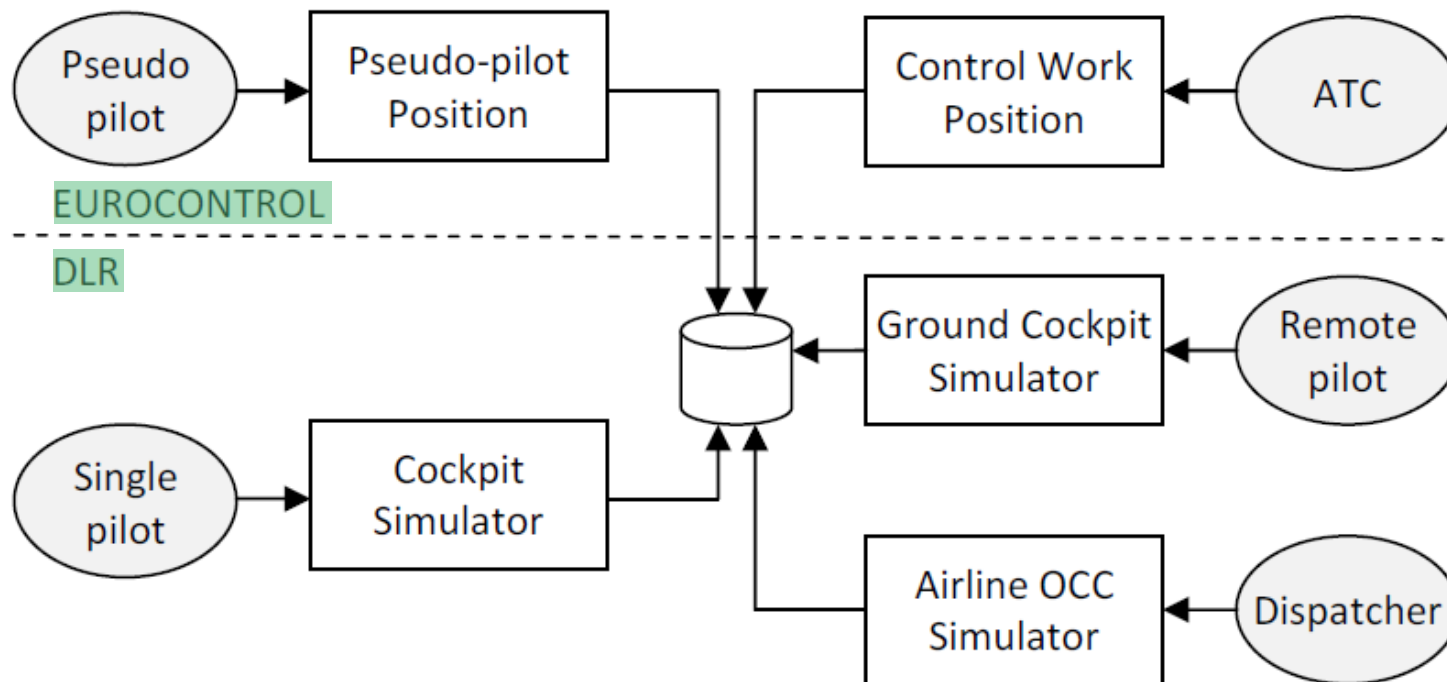
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- **Human in the loop simulation**

FINAL
CONCEPT

Human in the loop simulation

- The concept resulting the selection process will be evaluated through simulations involving all the main actors of the single pilot incapacitation management



Why a Human in the loop simulation



- To evaluate the **Human Factors** aspects, and
- to provide supporting information for the *Safety and Cyber-security* assessment.

- A preliminary list of aspects includes:
 - **acceptability** of the concept by involved actors
 - adequate **situational awareness** to execute the functions assigned
 - absence of unacceptable peak **workload** situations for remote pilot and air traffic controller
 - absence of evident potential **showstoppers** for the concept
 - special **operational needs** to perform the task (e.g. information about the aircraft status for the controller)
 - strategies adopted by the **team** to keep a shared awareness (for an effective extended TRM)

Main aspects to be considered while designing the SAFELAND simulation



- Adapt it to the **SAFELAND solution maturity level**: test the concept
- Choice of **scenarios**, to test a broad/significant set of situations: e.g. nominal vs. emergency (failures, bad weather)
- Get feedback on the **interaction** among the different actors/systems (e.g. different operational needs, constraints, etc.)

Outcomes

- **April 2022:** AB Workshop
- **July 2022:** “Final Evaluation Results & New Systems” public deliverable
- In the meantime...



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researchgate.net/project/SAFELAND-project



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for your attention!



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Founding Members

