

SAFELAND

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DEEP BLUE

**Enhancing safety
in case of single
pilot
incapacitation,
until landing**

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WP Leader
DLR



Current operations

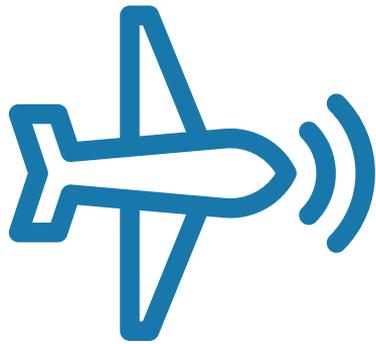


ATCOs



NOC

Single pilot operations



Remote pilot



NOC



ATCOs



Single pilot operations

PILOT
INCAPACITATION



ATCOs



Remote pilot

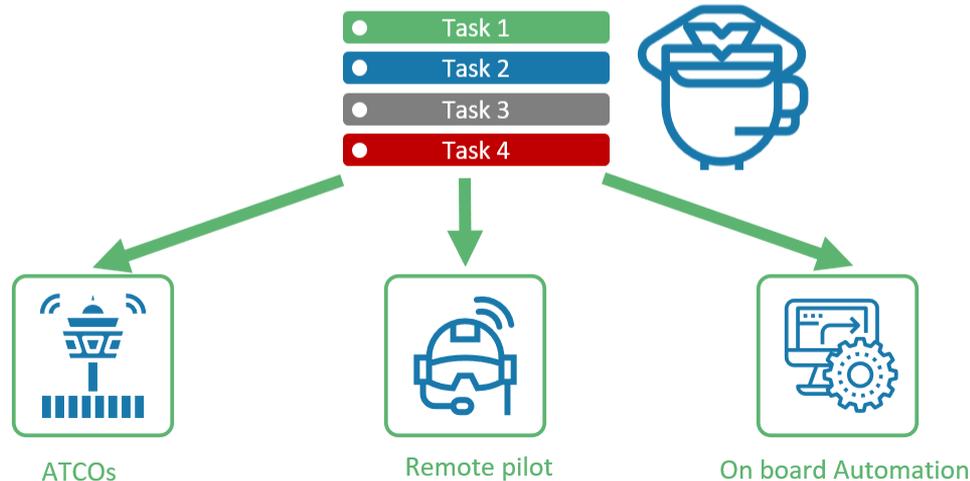


NOC

How to handle single pilot incapacitation?



SAFELAND identified the single pilot tasks that should be distributed among the other actors



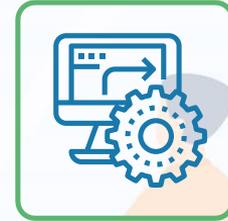
We investigated three possible approaches



ATCO Focused: most of the single pilot tasks are assigned to the Air traffic controller



GSP Focused: most of the single pilot tasks are assigned to the Ground Station Pilot



Automation Focused: most of the single pilot tasks are assigned to the cockpit automation

3 Operational Concepts have been generated and evaluated in terms of

Operational feasibility

Impact on safety

Impact on Human Factors

Liability and certification considerations

Costs



Taking into consideration internal and external feedback, a final concept mixing the best aspects of the 3 has been generated



We are going to present the work done until now...

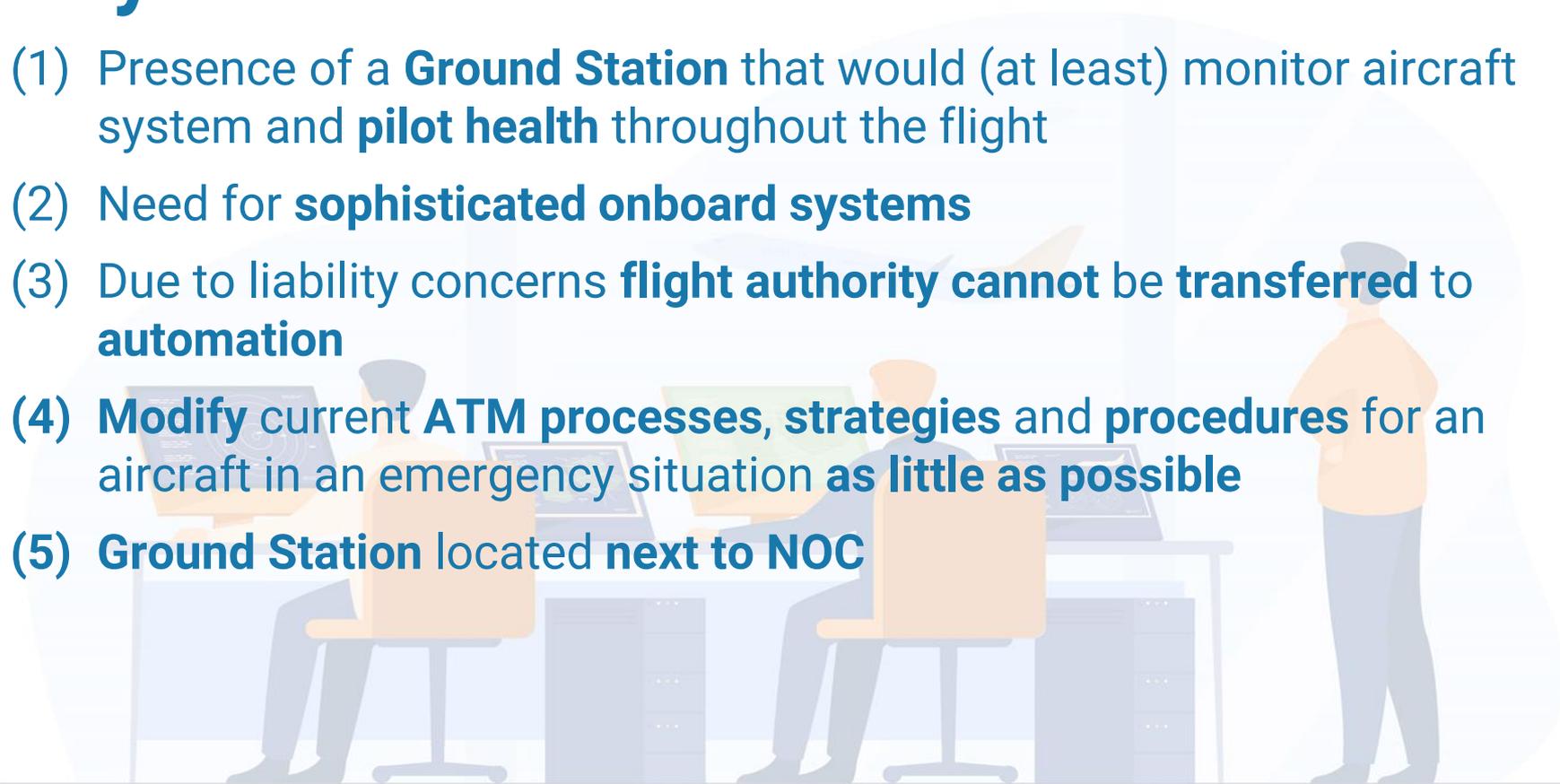
We are here



July 2020

July 2022

Key feedback

- (1) Presence of a **Ground Station** that would (at least) monitor aircraft system and **pilot health** throughout the flight
 - (2) Need for **sophisticated onboard systems**
 - (3) Due to liability concerns **flight authority cannot be transferred to automation**
 - (4) **Modify** current **ATM processes, strategies** and **procedures** for an aircraft in an emergency situation **as little as possible**
 - (5) **Ground Station** located **next to NOC**
- 

Operational concept

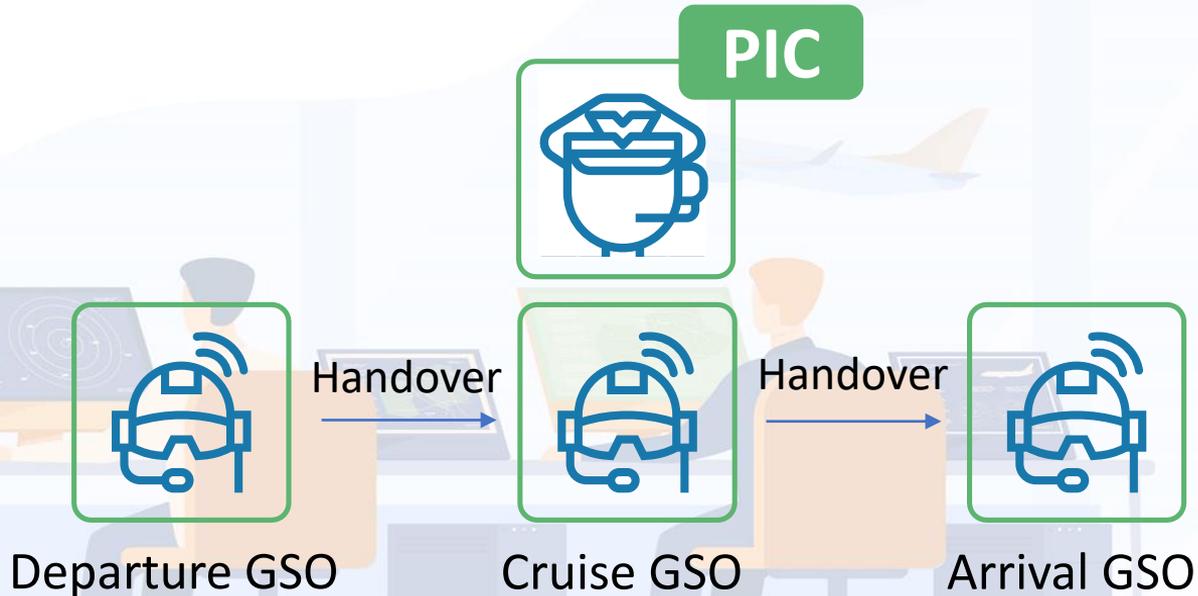
Following the concept, proposed by Schmid & Korn (2017), the presence of **three different kinds of ground stations** is assumed

- Departure (one single pilot serially, at a time)
- Cruise (multiple single piloted aircraft, simultaneously)
- Arrival (one single pilot serially, at a time)



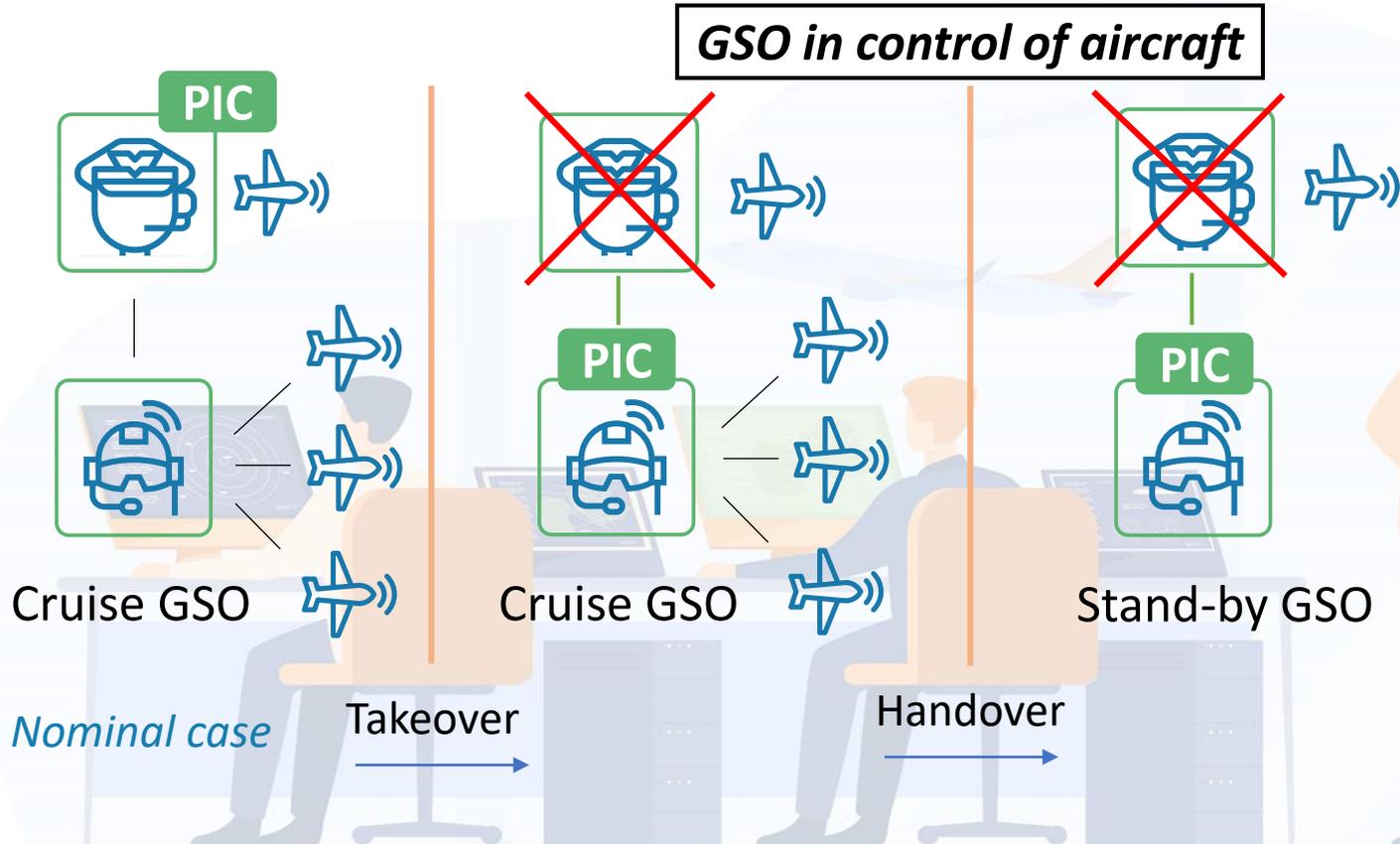
Operational Concept

Aircraft pilot always in control



GSO only monitoring duties

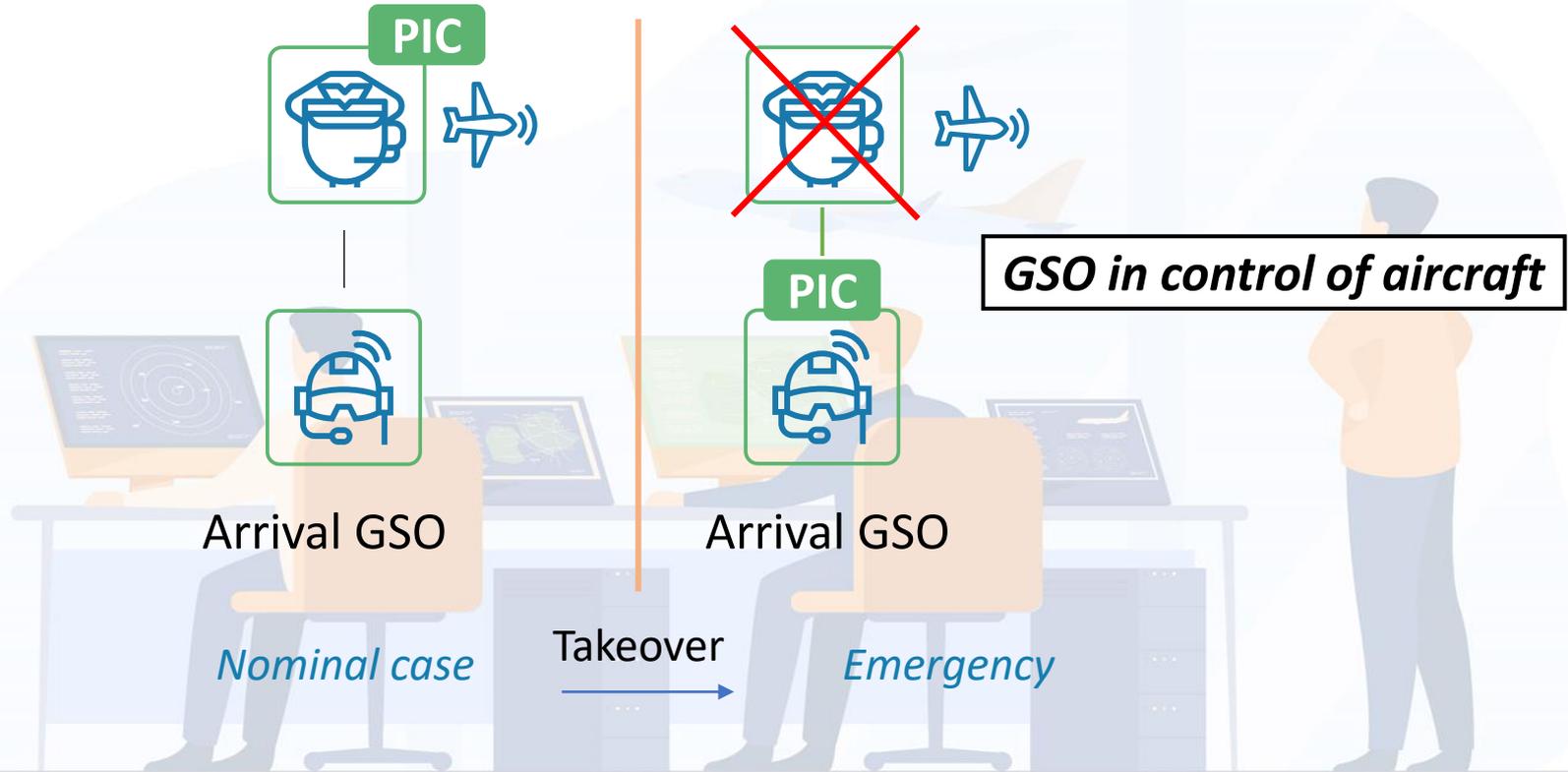
Incapacitation en-route



Takeover phases until safe landing



Incapacitation in TMA



Takeover phases until safe landing (TMA)

Onboard systems detects pilot incapacitation

1

2

3

4

5

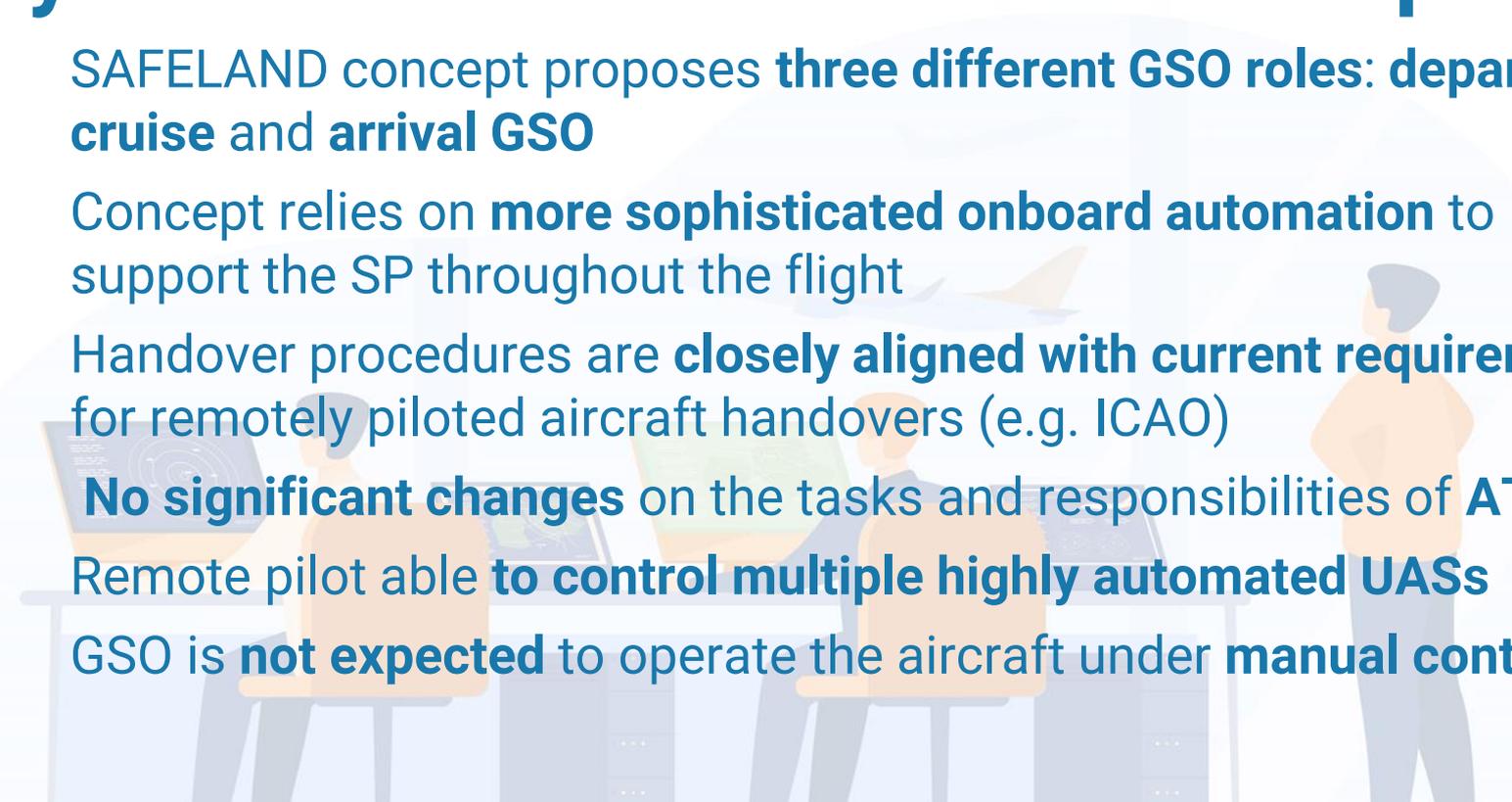
Arrival GSO takes over control
Stabilizes flight (if needed)

Emergency landing based on autopilot data

Aircraft follows FPL
Squawk code
ATC clears airspace

GSO request clearance for emergency landing

Key attributes of SAFELAND concept

- (1) SAFELAND concept proposes **three different GSO roles: departure, cruise and arrival GSO**
 - (2) Concept relies on **more sophisticated onboard automation** to support the SP throughout the flight
 - (3) Handover procedures are **closely aligned with current requirement** for remotely piloted aircraft handovers (e.g. ICAO)
 - (4) **No significant changes** on the tasks and responsibilities of **ATC**
 - (5) Remote pilot able **to control multiple highly automated UASs**
 - (6) GSO is **not expected** to operate the aircraft under **manual control**
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Next events

- **30/09/2021:** 11th SESAR INNOVATION DAYS
- **May 2022:** Final concept presentation workshop
- **November 2022:** Final dissemination workshop

Public deliverables

- **Visit:** <https://safeland-project.eu/dissemination/public-deliverables>

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For any questions or request
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**Thank you
very much
for your
attention!**