Toward Single Pilot Operations: A Conceptual Framework to Manage In-flight Incapacitation

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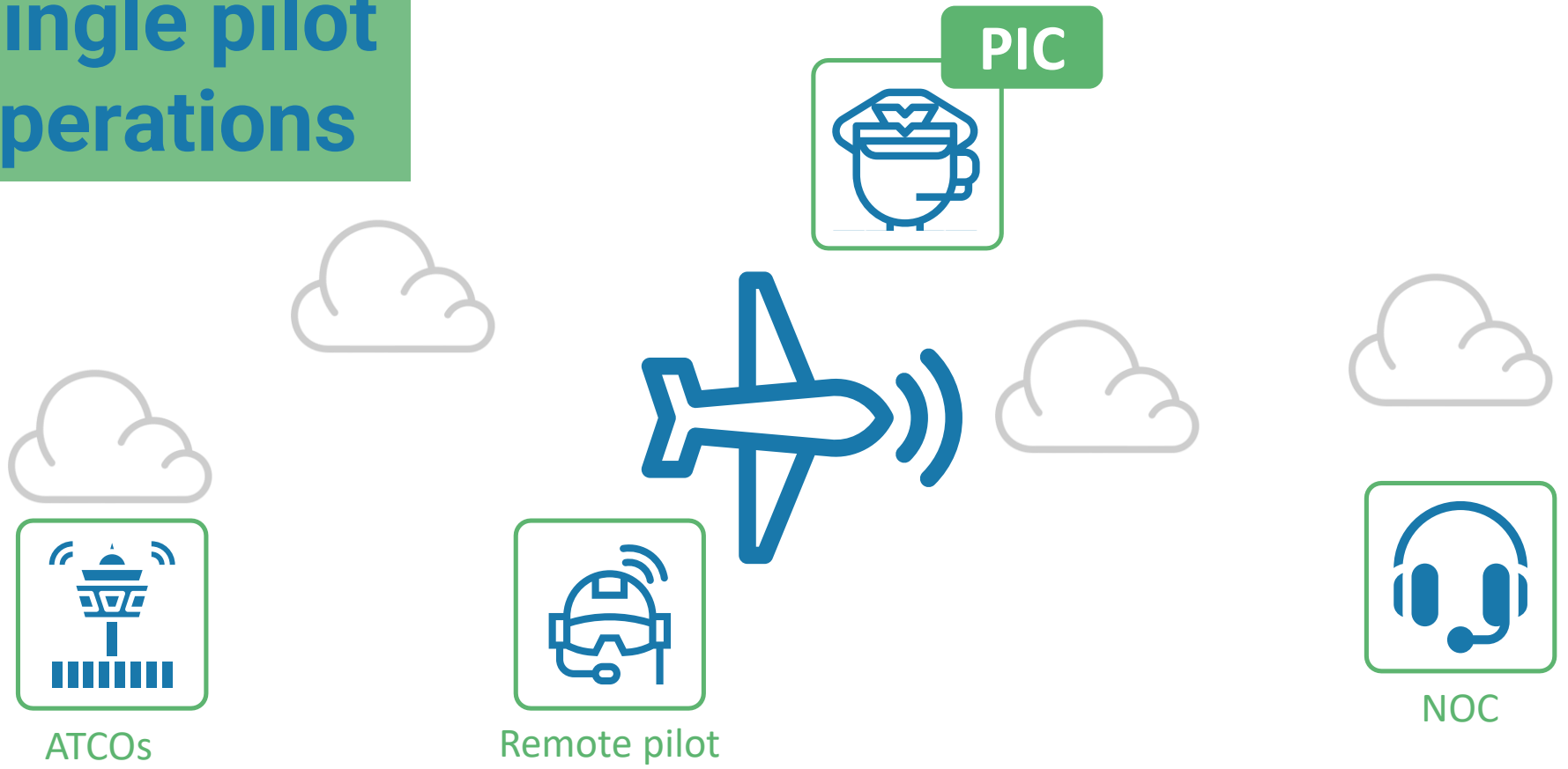
Current operations

ATCOs

NOC

Single pilot operations



Single pilot operations

PILOT INCAPACITATION

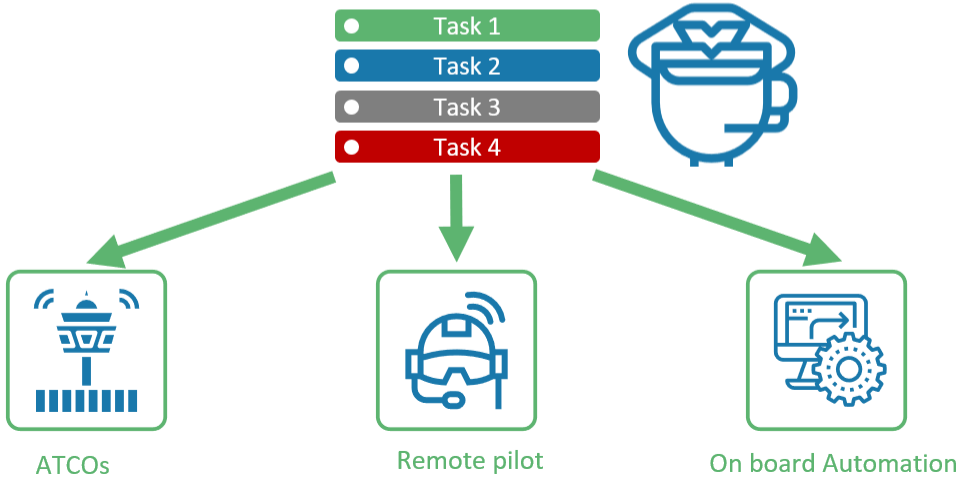
ATCOs

Remote pilot

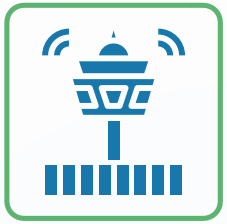
NOC

How to handle single pilot incapacitation?

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

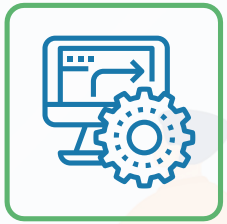


Three possible approaches



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



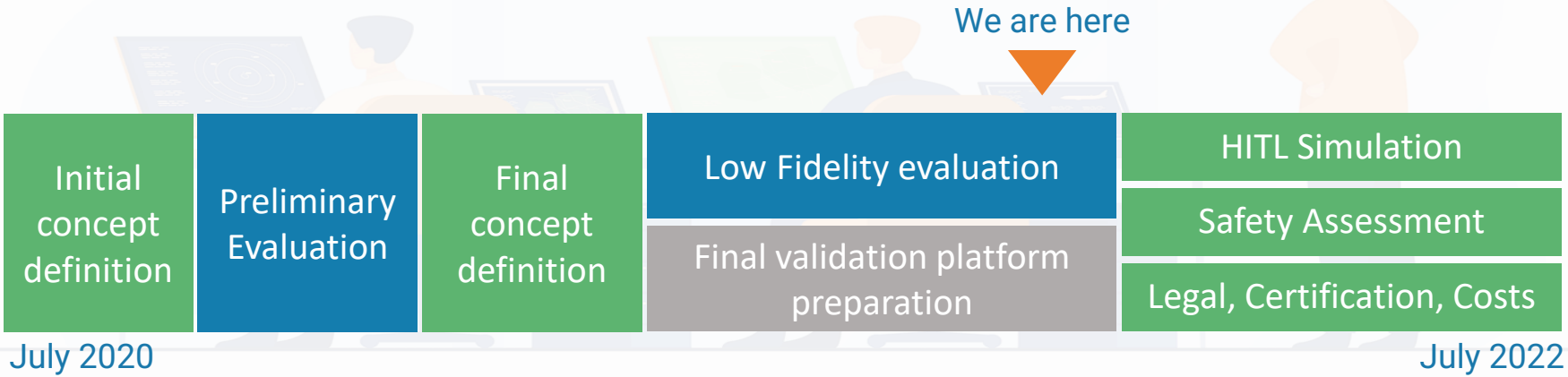
Automation Focused: most of the single pilot tasks are assigned to the cockpit automation

3 Operational Concepts have been generated and evaluated in terms of

Operational feasibility
Impact on safety
Impact on Human Factors
Liability and Certification
Costs

Taking into consideration internal and external feedback, a final hybrid concept was generated

We are going to present the work done until now…



Key feedback

(1) Presence of a **Ground Station** that would (at least) monitor aircraft system and **pilot health** throughout the flight

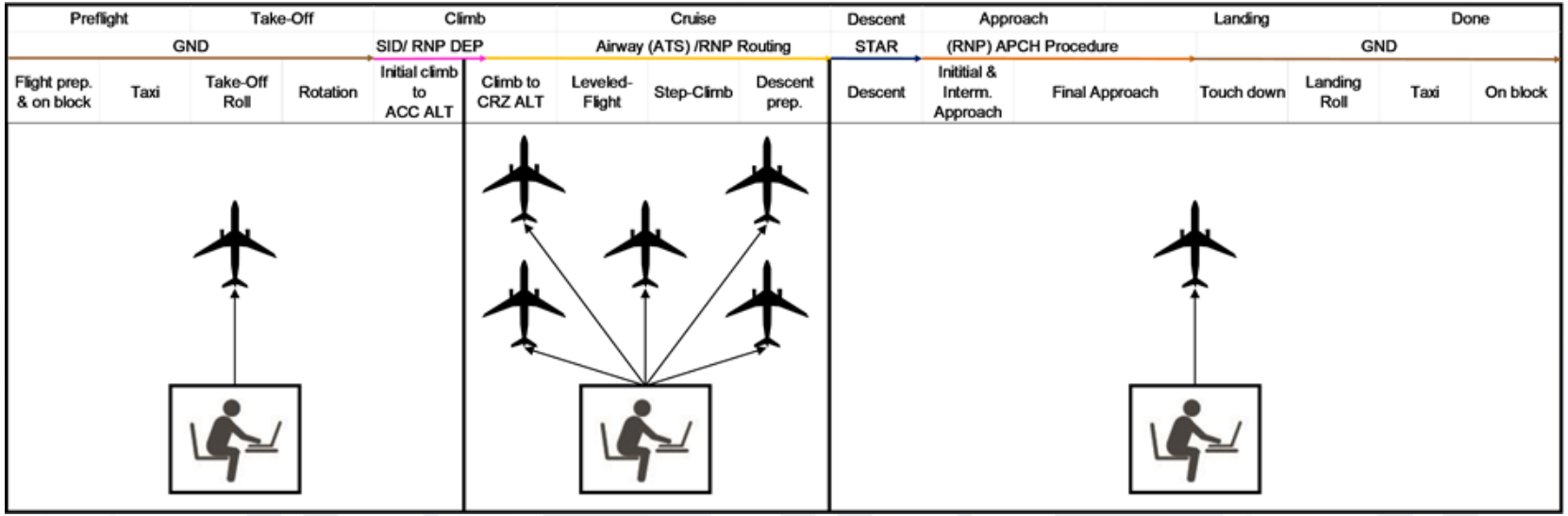
(2) Need for **sophisticated onboard systems**

(3) Flight authority cannot be **transferred** to **automation (liability)**

(4) Minimize change to current **ATM processes**, **strategies** and **procedures** for an aircraft in an emergency situation

(5) Ground Station located **next to NOC**

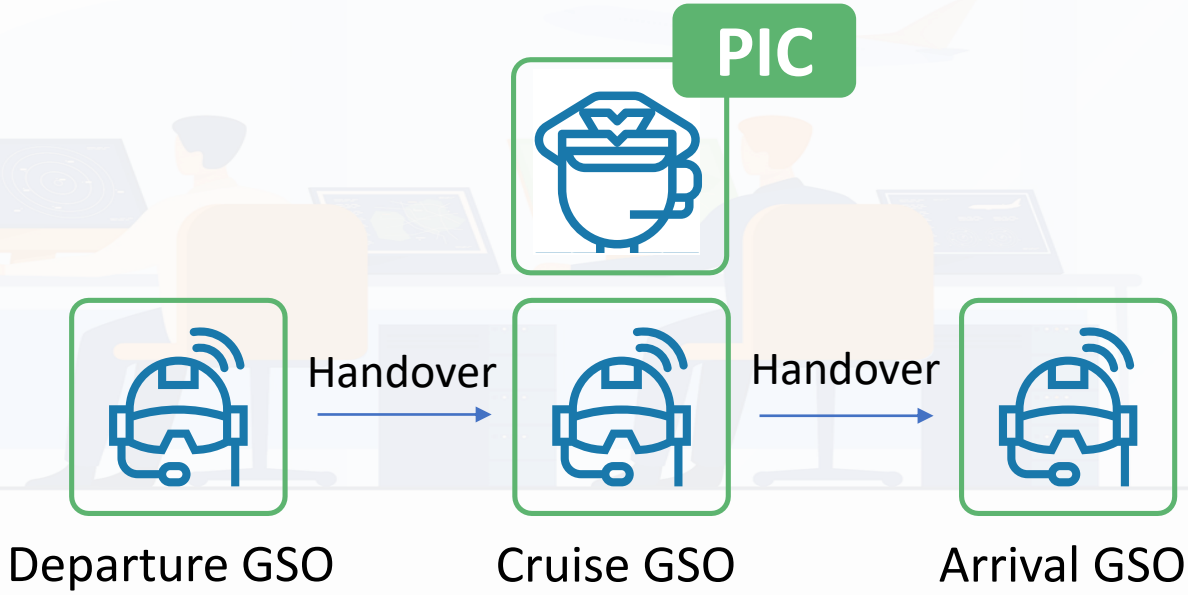
Operational concept



Schmitd & Korn (2017)

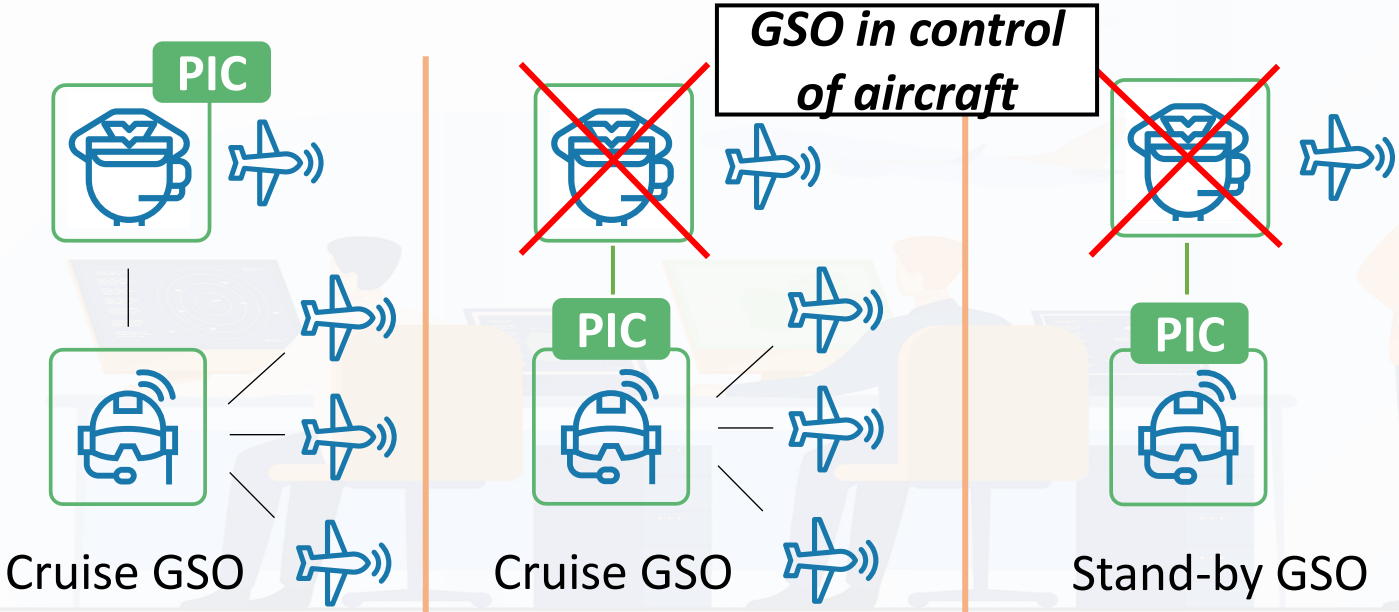
Operational Concept

Aircraft pilot always in control



GSO only monitoring duties

Incapacitation en-route



Nominal case

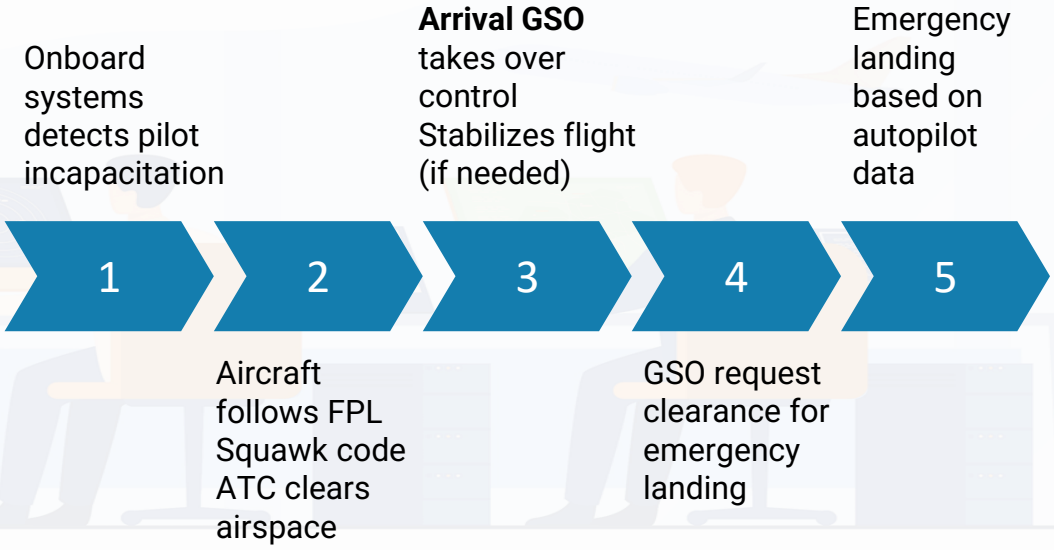
Takeover

Handover

Takeover phases until safe landing

Incapacitation in TMA

Takeover phases until safe landing (TMA)



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)

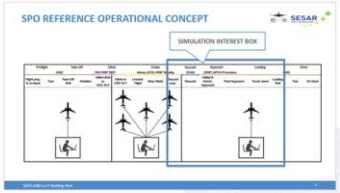
(4) **No significant changes** on the tasks and responsibilities of **ATC**

(5) Remote pilot able **to control multiple highly automated UASs**

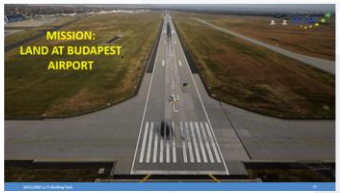
(6) GSO is **not expected** to operate the aircraft under **manual control**

Low-Fidelity Simulations

MANUAL
(CONCEPT,ROLES, SYSTEMS, PROCEDURES)



MISSION



VIDEO EXAMPLE
(NOMINAL SPO)

(1) Cooperation with SAFEMODE project: http://safemodeproject.eu/

(2) Descent to land incapacitation over MS Teams: 9 pilots trial of GSP

(3) First assessment of concept feasibility

(4) Support to RTS set-up and use

Next events

- **May 2022:** Final concept presentation workshop
- **November 2022:** Final dissemination workshop

Public deliverables

https://safeland-project.eu

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