

# Extended Minimum Crew Operations (eMCO) Programme overview

Presenters:

Gianluca Mele – EASA eMCO & SiPO Programme Manager

Andrea Boiardi - EASA Chief Expert Operational Suitability

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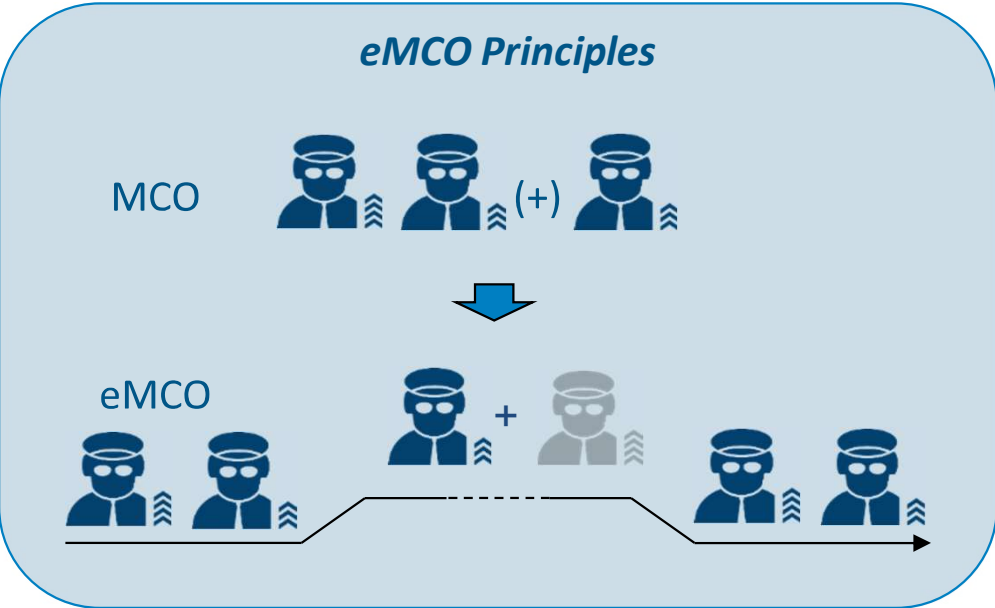
# Background

- Between 2017 and 2018, EASA was approached by EU OEMs proposing the Reduced Crew Operations (RCO) concept.
- RCO feasibility was investigated between 2018 and 2020, while an EASA Programme was launched.
- The concept was renamed Extended Minimum-Crew Operations (eMCO).
- The EU OEMs applied to EASA, between 2019 and 2022, for the airworthiness approval of eMCO capability on large aeroplanes.

# Definition and benefits

*Extended Minimum-Crew Operations (eMCO) are defined as operations in which there are extended periods of the cruise phase with a minimum flight crew of one pilot at the controls while the other pilot(s) is(are) resting.*

*The concept shall ensure at least the same level of safety of today's operations.*

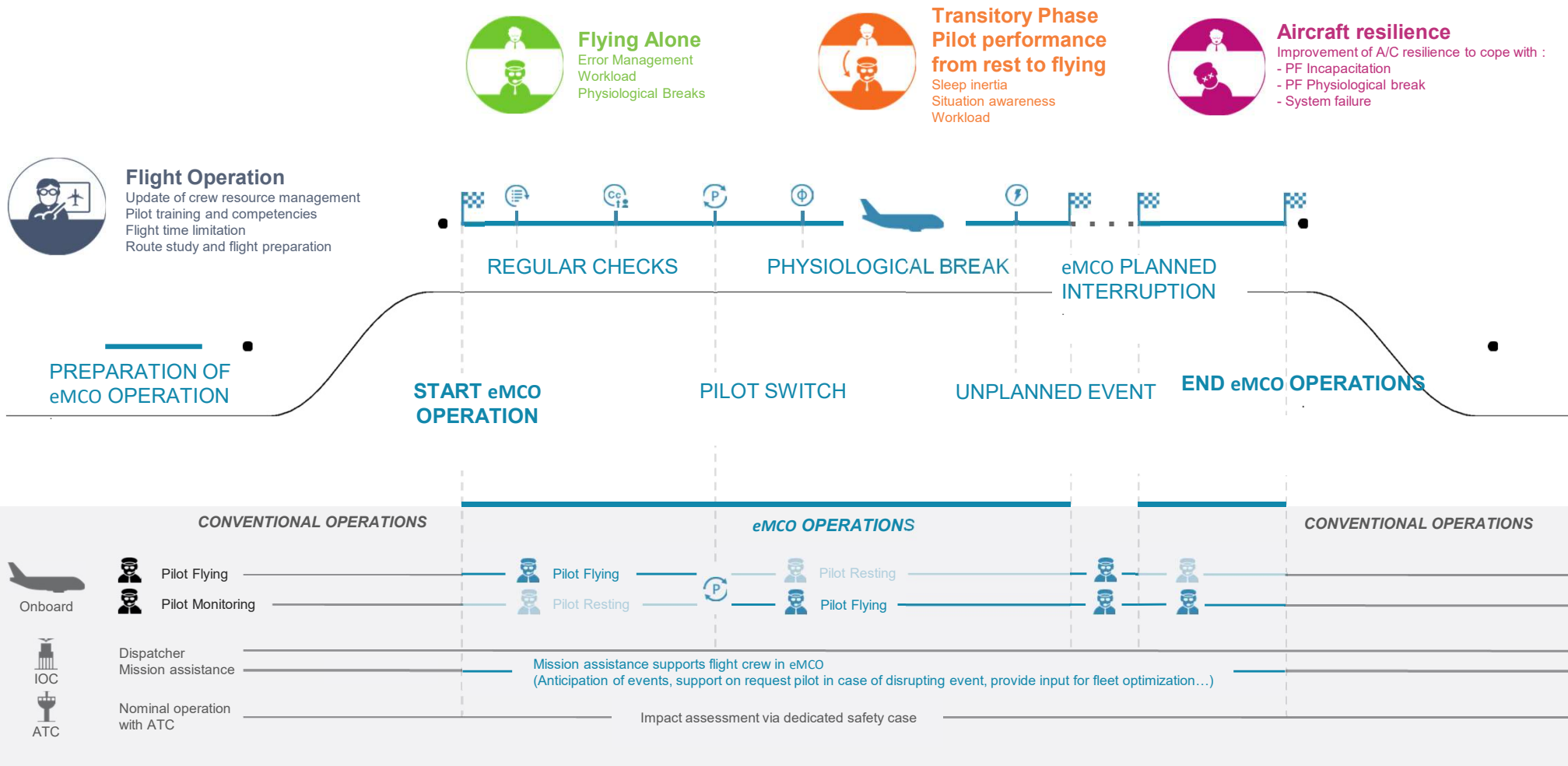


- eMCO foreseen benefits**
- ❖ Increased aircraft design resilience
  - ❖ Improved pilot fatigue management
  - ❖ Increased operations efficiency

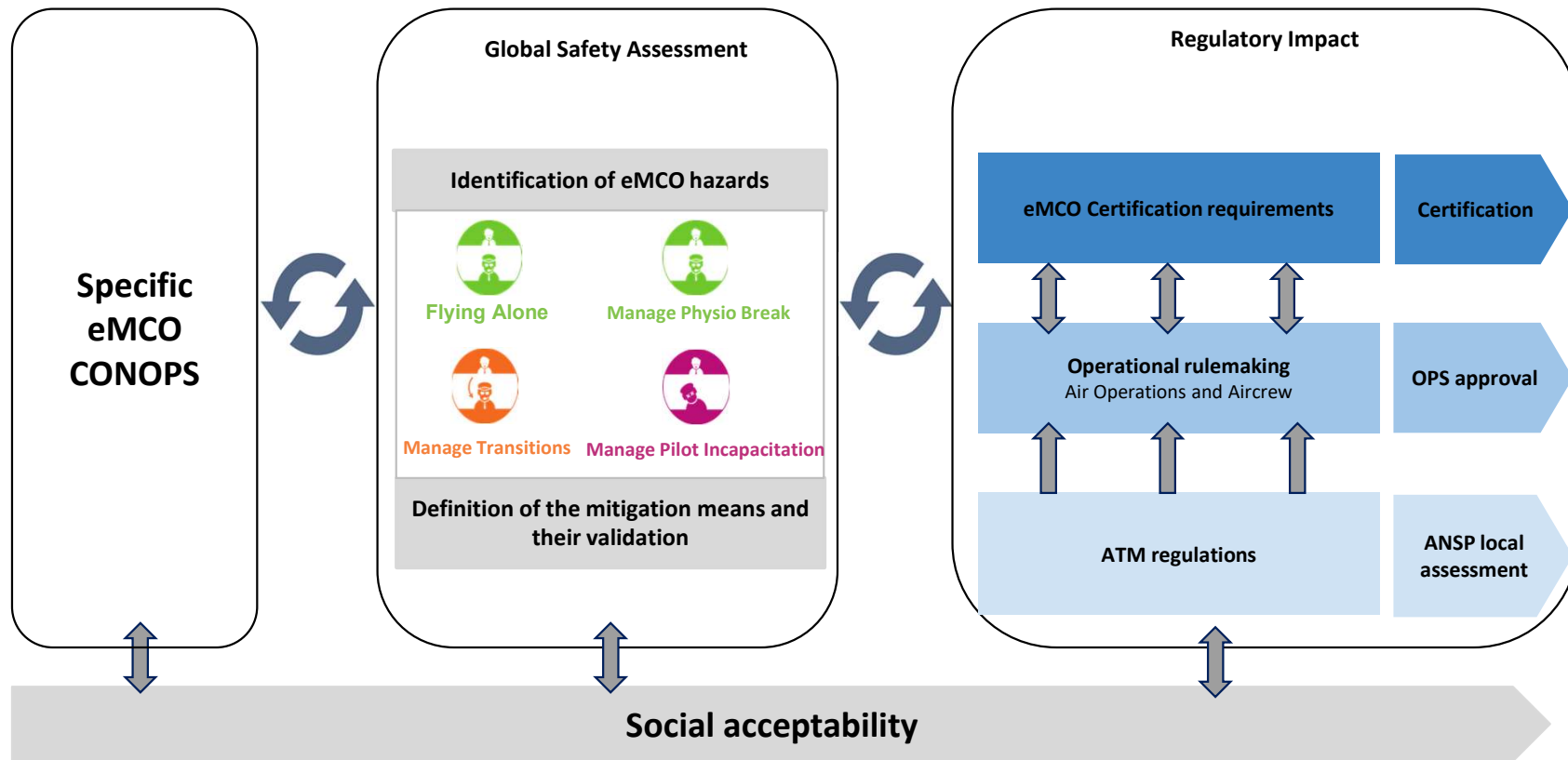
# General principles

- Minimum Crew of 2 pilots at the controls from start-up to level-off at cruise altitude
- Minimum Crew of 1 pilot at the controls during the cruise phase of the flight
  - Other pilot(s) resting
  - Equivalent level of safety based on design improvements and specific functions and training/OPS requirements
- Minimum Crew of 2 pilots at the controls from top-of-descent to parking and shut-down
- Anticipated benefits in term of pilot fatigue management

# Concept of operations



# eMCO safe integration in current system



# High level assumptions

- **Safety objective: equal or better than today's operations**
- Minimum licensing and experience level
- Minimum medical certificate: Class 1 with no limitations
- Operations limited to cruise phase (minimum altitude FL200)
- Specific Operator authorization (Part-SPA) foreseen with training, CRM and OPS provisions



# Safety pillars

## eMCO safe operations

### Airworthiness

- Enhanced design and AC resilience
- Workload and error management
- Pilot Monitoring System
- Pilot incapacitation
- Management of sleep inertia
- Pilot physiological breaks

### Operational

- Operator approval
- Specific ops procedures
- Medical aspects and fatigue management
- Pilot qualification, CRM and training
- Route eligibility & flight planning
- ATM integration

### Security

- Pilot malicious intent
- Cockpit protection
- Pilot(s) exposure to security threats

# Aircraft resilience



**AIRBUS**

Simplify pilot task and reduce workload

Assist pilot with more automation to manage aircraft failure

Mitigate the risk of error

Enhanced aircraft resilience in abnormal events

Detect incapacitation & drowsiness

# Rest facilities and alerting



# Approach to the global safety case

## → Normal eMCO operations during cruise (Pilot flying alone)

- Workload, Threat and error management, Situational Awareness and Decision Making process robustness, effects on fatigue of eMCO shift, adapted CRM

## → Abnormal conditions and failure management

- Threat and error management, workload management in abnormal conditions, increased workload and focus on failure management, failure resolution and initial decision making

## → Lavatory usage

- Mitigated with limited shift duration, different cases depending on con-ops, managing unplanned physiological needs

## → Transitions

- Planned vs. unplanned, duration and effects of sleep inertia, building Situational Awareness of the pilot resting

## → Pilot incapacitation

- Detection of Sudden vs. subtle incapacitation of Pilot Flying, combination of incapacitation with failure conditions, protection of the pilot resting

# Research in support of the safety case

Research Project RES.0028 funded by Horizon Europe (included in EPAS) with objectives:

→ Assess:

- cockpit configuration changes and Develop baseline risk assessment framework
- risks in nominal operations
- failure conditions management
- sleep inertia duration and effects on performance
- incapacitation of the pilot flying
- the impact of eMCO on pilot fatigue and boredom
- physiological break solutions

→ Consolidate assessment results and recommendations

→ Communication, Dissemination, Knowledge-sharing, Stakeholder involvement

**Further research activities foreseen across the initial implementation**

# ATM/ANS Safety assessment

- Extensive analysis performed jointly by Airbus, Eurocontrol and EASA on impact assessment on the ATM environment
- Report with specific recommendations being finalized
- Outcome driving airworthiness and operational requirements
- Completion by end of 2024

# Regulatory actions in the EU

- Airworthiness Special Condition being drafted to integrate large aeroplanes airworthiness requirements with eMCO specific ones
  - Internally generated
  - Publicly consulted
- Wide scope regulatory task launched in early 2024 (RMT.0739) to adapt the regulatory framework and support deployment of eMCO
  - Longer term formal approach
  - BIS and ToR published
  - Rulemaking group to be formed

# Special condition to CS-25

Identifies airworthiness requirement to mitigate some of the eMCO specific hazards.

**Introduction of airworthiness requirements to:**

- Demonstrate at A/C level the equivalent level of safety of the ConOps
- Equip the aircraft with a crew monitoring alerting and awakening capability
- Account for the pilot flying incapacitation hazard when demonstrating the safety requirements imposed by CS25
- Mitigate the hazards associated with physiological breaks of the pilot flying
- Develop an aircraft design resilient to sleep inertia of the pilot resting following pilot flying incapacitation
- Complement the current safety standard for Fire protection, Oxygen Supply, MMEL justification

**Public consultation period expected to start at the end of Q2 2024.**



# RMT.0739 Main objectives

The RMT aims at supporting the implementation of eMCO ensuring at least an equivalent level of safety to today CAT operation.

**RMT.0739 includes the following actions:**

- Detailing the specific safety consideration of eMCO
- Ensuring eMCO hazard identification and subsequent risk mitigation
- Developing an adequate regulatory framework to enable the eMCO operations
- Supporting a safe implementation
- Ensure continuous harmonization with ICAO

**A Rulemaking Group will support EASA in the RMT.**

**A call for experts is open until 29.02.2024**

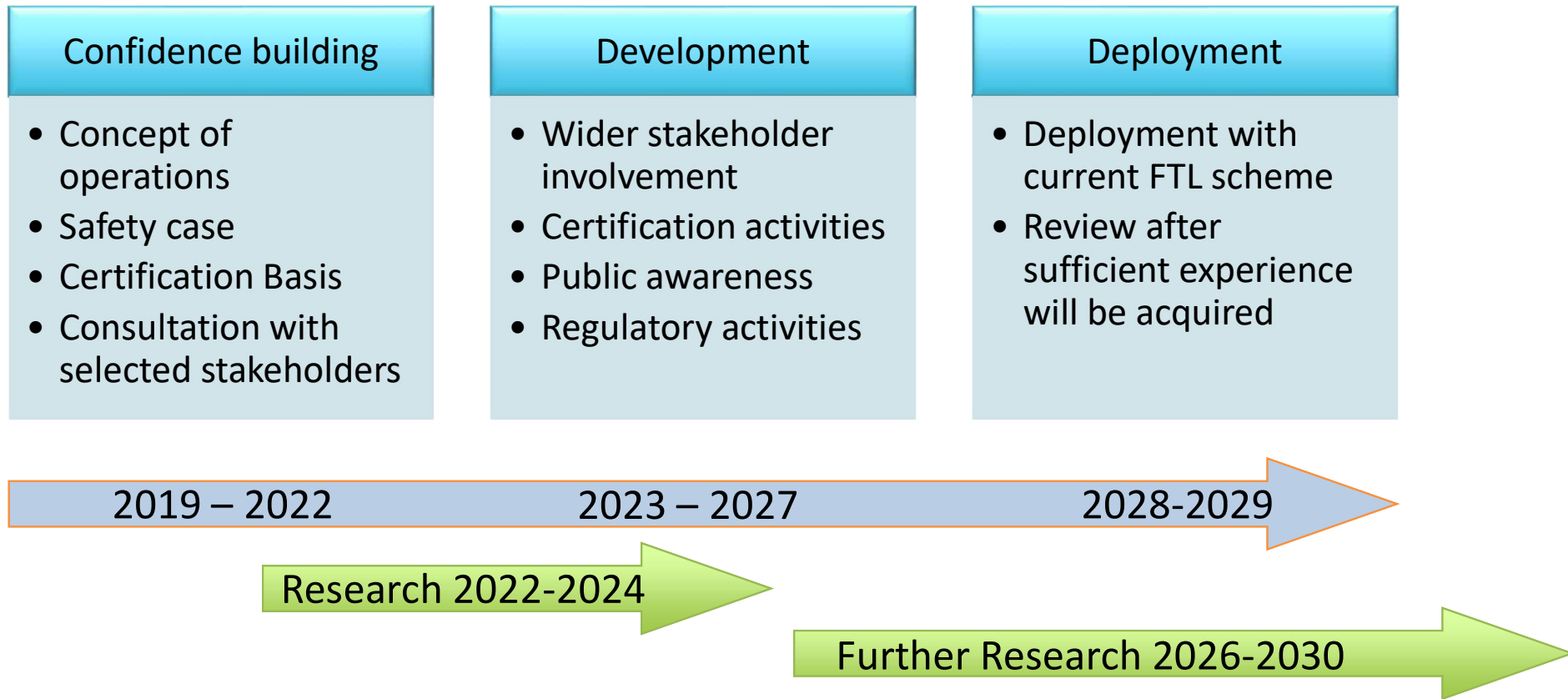
# International activities

→ ICAO Assembly WPs

→ Involvement of FLTOPSP

→ Exchanges with EASA partner authorities

# eMCO foreseen implementation timeline



# Thank you for your attention

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