Haiku

Human AI teaming Knowledge and Understanding for aviation safety

Overview of the project

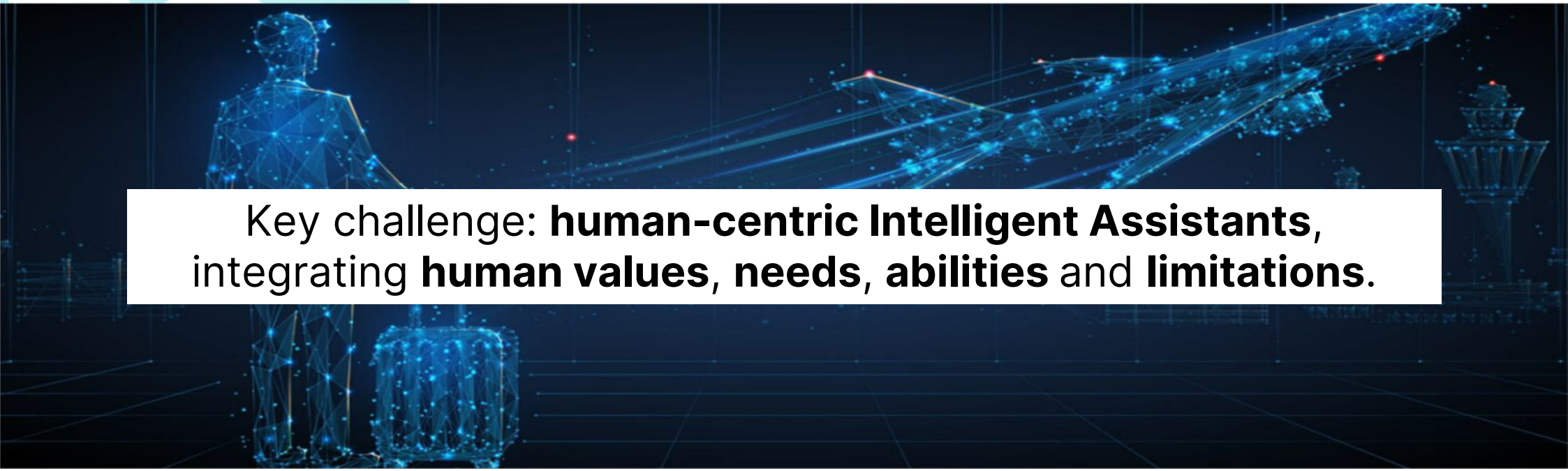
Simone Pozzi & Vanessa Arrigoni (Deep Blue)

April 30th, 2024

This project has received funding by the European Union's Horizon Europe research and innovation programme HORIZON-CL5-2021-D6-01-13 under Grant Agreement no 101075332

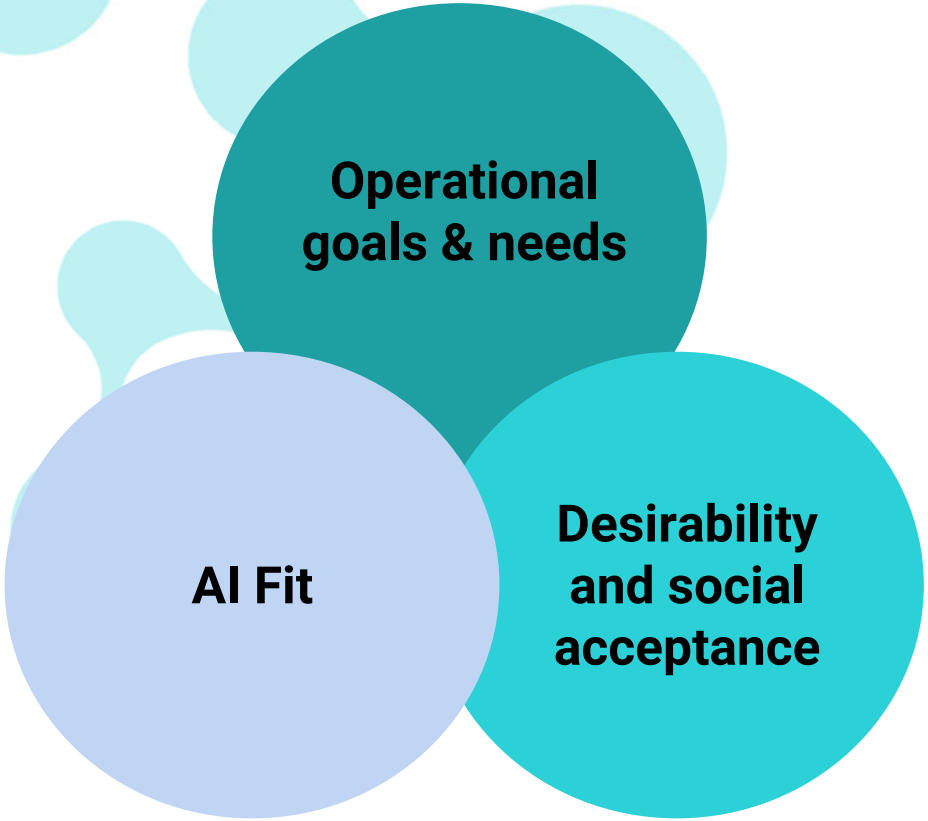
Our goal

Developing **Human-Centred AI-Based Intelligent Assistants** for **safe**, **secure**, **trustworthy** and **effective** **Human-AI partnerships** in **aviation** systems.



Key challenge: **human-centric Intelligent Assistants**, integrating **human values**, **needs**, **abilities** and **limitations**.

Our approach



- **Human-centred approach**
  starting from users' needs and pain points
- **Analysis of how technology changes human activity**
  doing the same job with a digital assistant is not "doing the same job"

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Our mix of expertise

15 Partners from 10 different countries

Three communities: **Human Factors**, **end-users, technology** suppliers

deepblue
PROJECT COORDINATOR

EUROCONTROL

CHPR

EMBRAER

ENAC

LFV

LINKÖPING UNIVERSITY

skyway

THALES

BORDEAUX INP

CATIE

Suite5
We Deliver Intelligence

DFKI

ENGINEERING
THE DIGITAL TRANSFORMATION COMPANY

CERTH
CENTRE FOR RESEARCH & TECHNOLOGY HELLAS

END-USERS

London Luton Airport

ADVISOR

EASA
European Aviation Safety Agency

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The HAIKU Swiss knife: 6 use cases

Intelligent Assistant in the **cockpit** to assist in "**startle response**"
Led by ENAC

Intelligent Assistant in the **cockpit** to assist in **route planning/replanning**
Led by THALES

Intelligent Assistant for **Urban Air Mobility** to assist in **traffic management**
Lead by Linköping University & LFV

Airport Intelligent Assistant to monitor indoor **spread of infectious diseases**
Lead by CERTH

Intelligent Assistant to improve **airport safety** through data analysis
Lead by EUROCONTROL & ENGINEERING
+ London Luton Airport

Intelligent Assistant for **tower controllers** to assist in **routine and repetitive tasks**
Lead by SkyWAY

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Our outputs: 3 strands of work

INTELLIGENT ASSISTANTS

Developed and validated for:

- Airline operations
- ATM
- Urban Air Mobility
- Airport Operations

HUMAN FACTORS APPROACHES for AI

- Explainability framework
- Human Factors Assurance process

SOCIETY

- Analysis of Liability and Ethics
- Design and assessment of new human roles
- Safety Culture Safeguards for Aviation Organisations

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HAIKU USE CASE#1

Intelligent Assistant in the cockpit to assist in “startle response” adverse events

Intelligent Assistant FOCUS
Use Case: assistance in “**startle response**”
Led by ENAC

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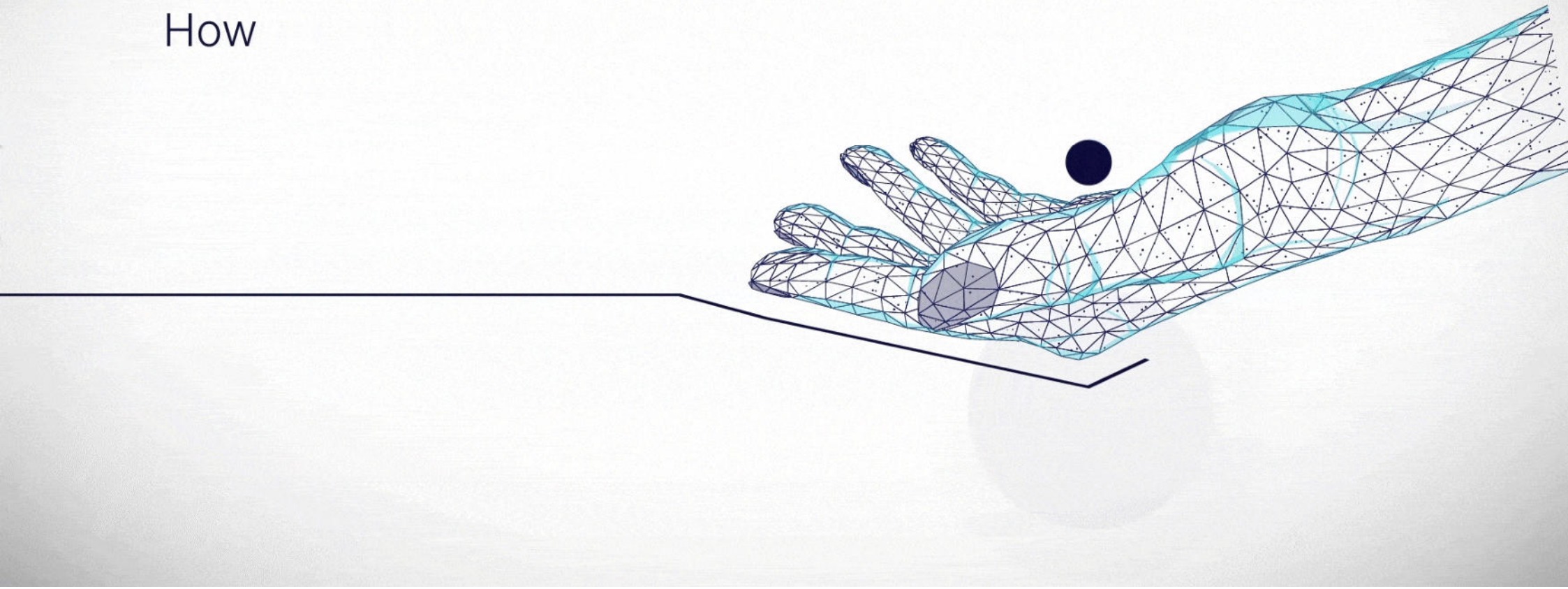
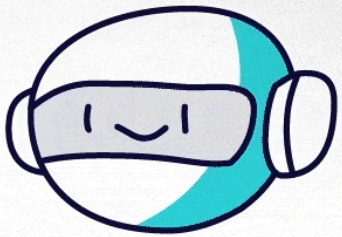
How





HAIKU UC#1

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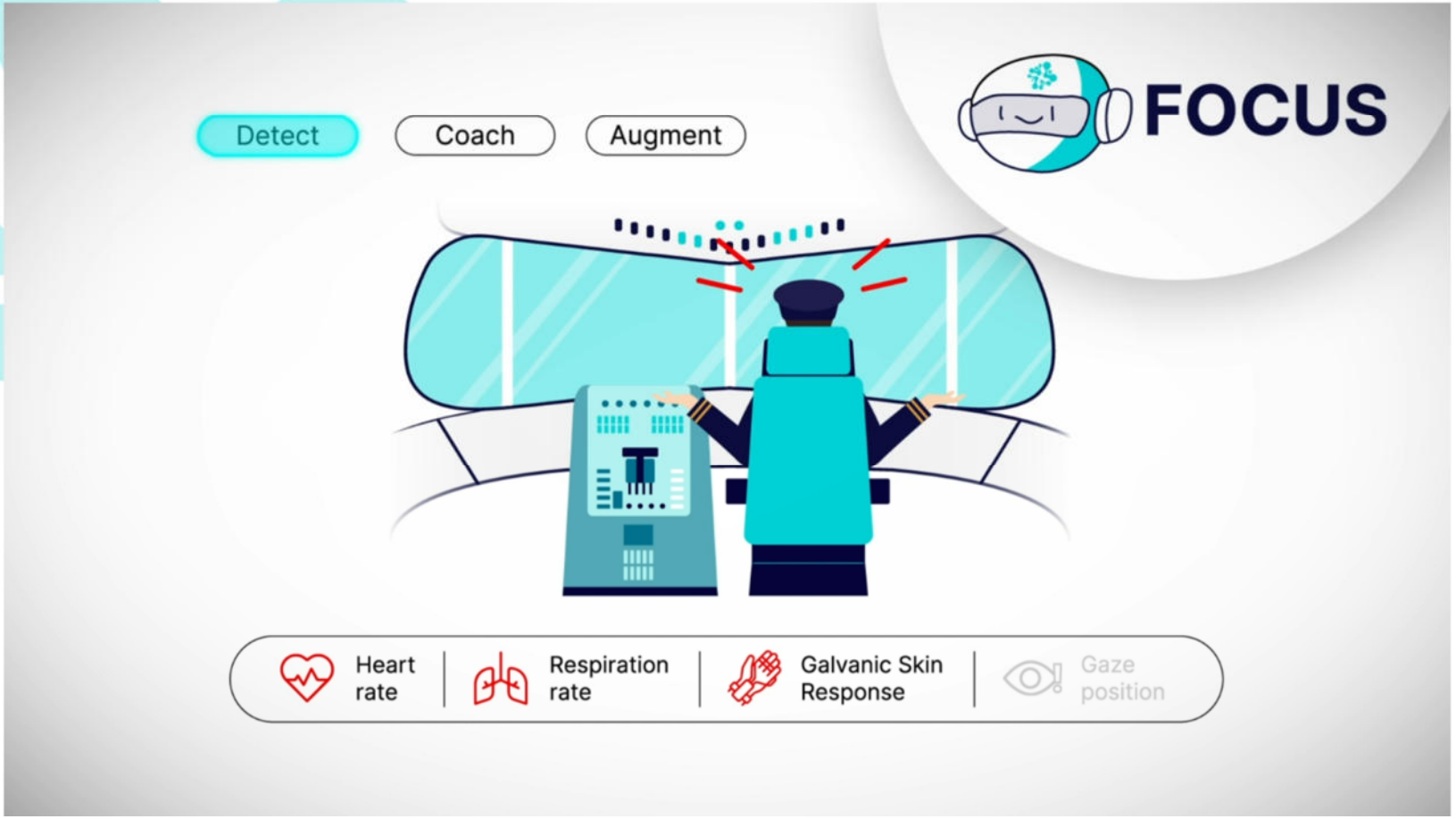
HAIKU UC#1



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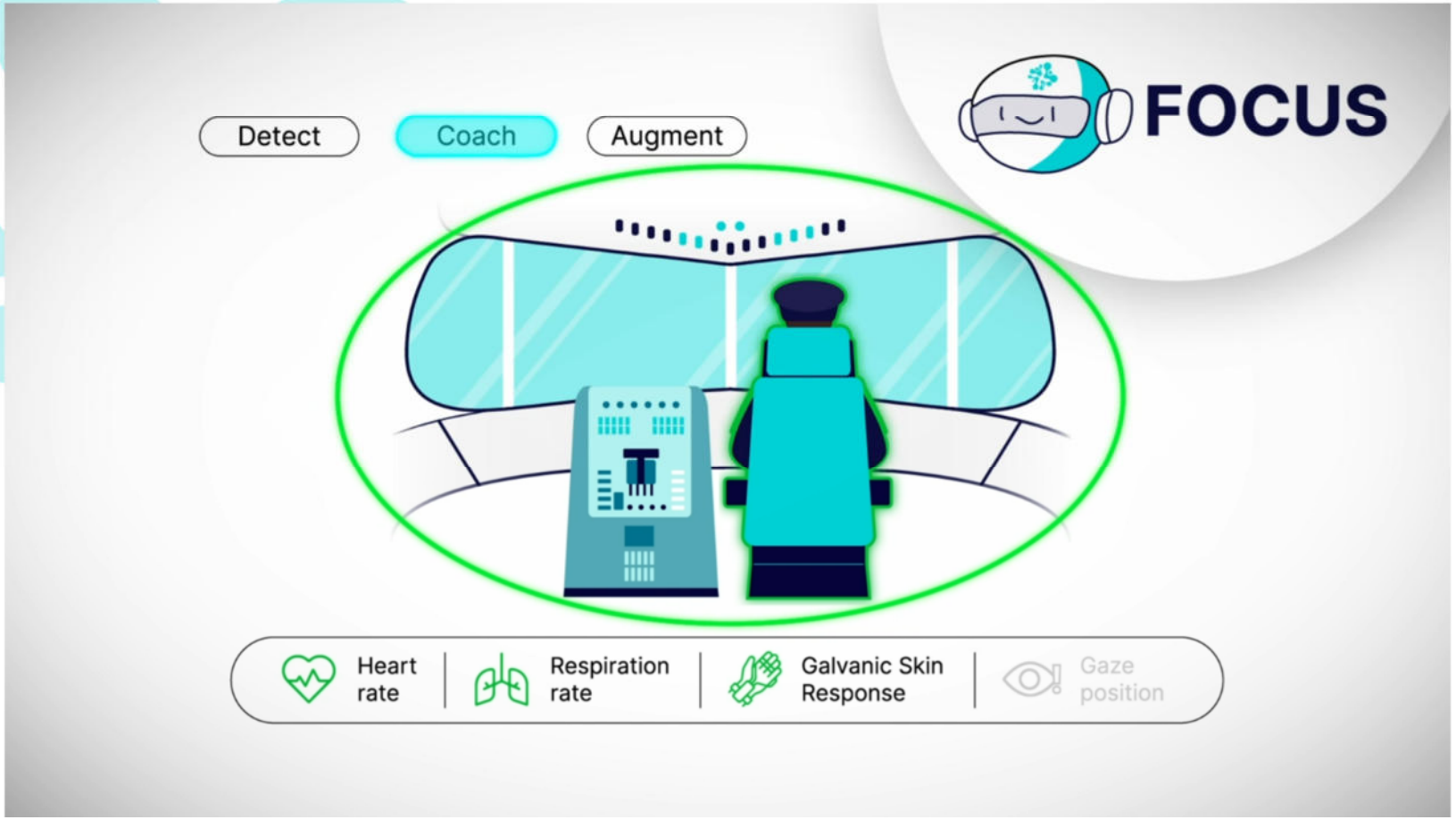
HAIKU UC#1



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HAIKU UC#1

Intelligent Assistant in the cockpit to assist in “startle response” adverse events

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IA TASKS

1. **Detect** cases of **startle** and **surprise** in single pilots (SP) operations
2. **Support** SP in **managing emotion and stress** during startling and surprise events
3. **Augment** single pilots’ **situational awareness**

IA MAIN FUNCTIONS

Detection via **physiological parameters**

Through **biofeedback**, the IA support the pilot in reducing stress

When necessary, the assistant will **draw the attention** of the pilot towards important parameters

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Developed and validated for: ▪ Airline operations ▪ ATM ▪ Urban Air Mobility ▪ Airport Operations	▪ Explainability framework ▪ Human Factors Assurance process	▪ Analysis of Liability and Ethics ▪ Design and assessment of new human roles ▪ Safety Culture Safeguards for Aviation Organisations

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Development of safety, HF and security approaches for Human Intelligent Assistance Systems

Key messages:

- **Need for integrated human-centric design and validation to AI and to human-AI teaming**

- **AI is a game-changer.**

  We cannot assume that existing safety, HF and security design and assessment methods and processes are still (fully) valid when considering human-AI teaming

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Results from HAIKU UC#1

Overview of Saf-HF-Liability results

Potential critical event

The IA inaccurately assesses the need for the startle procedure, leading to a notification when it is unnecessary

Safety: Overload due to unnecessary notification.

HF: Inconsistent warnings may erode the pilot's trust.

Liability:

- Product Liability risk for AI providers
- Corporate Liability risk: end-users training

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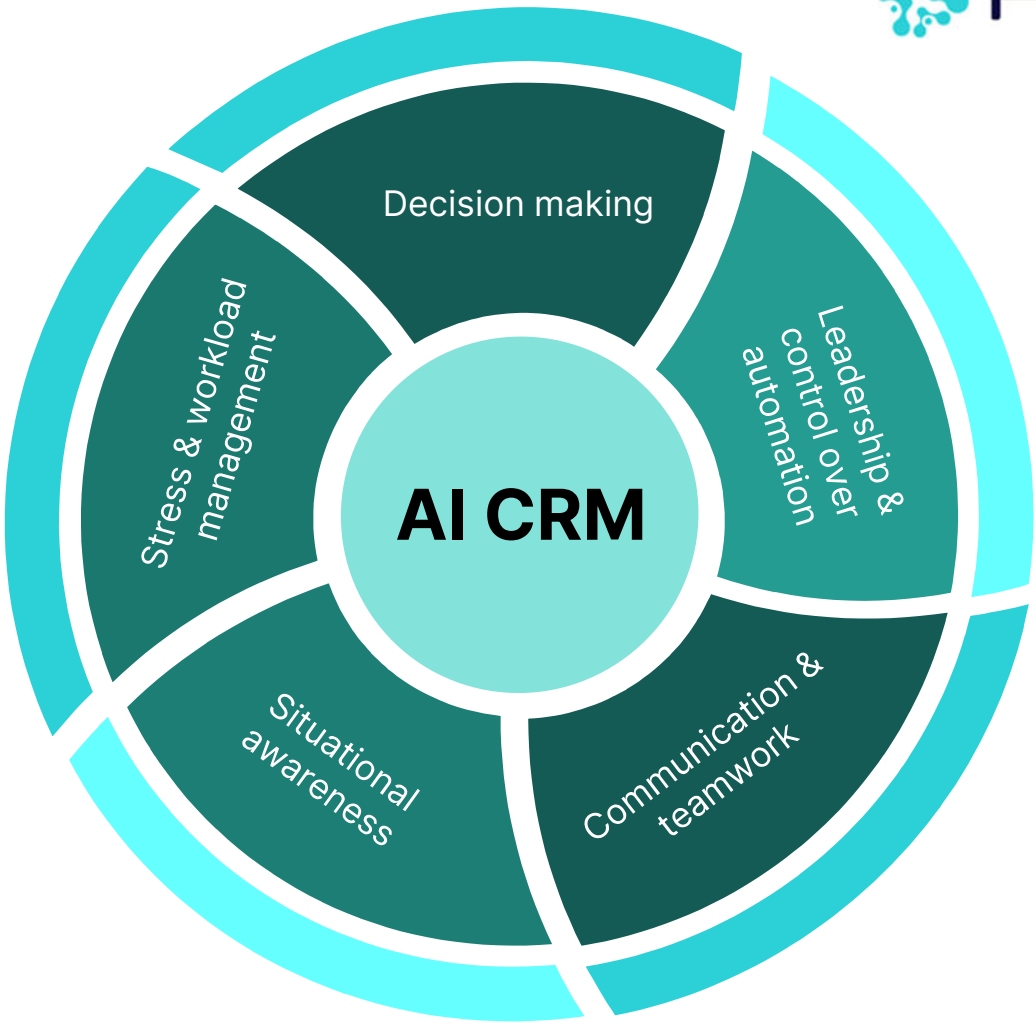
Impact on human role

Future interactions between pilots and their environment

Revised skill-set

New training requirements for pilots



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Thanks for your attention

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