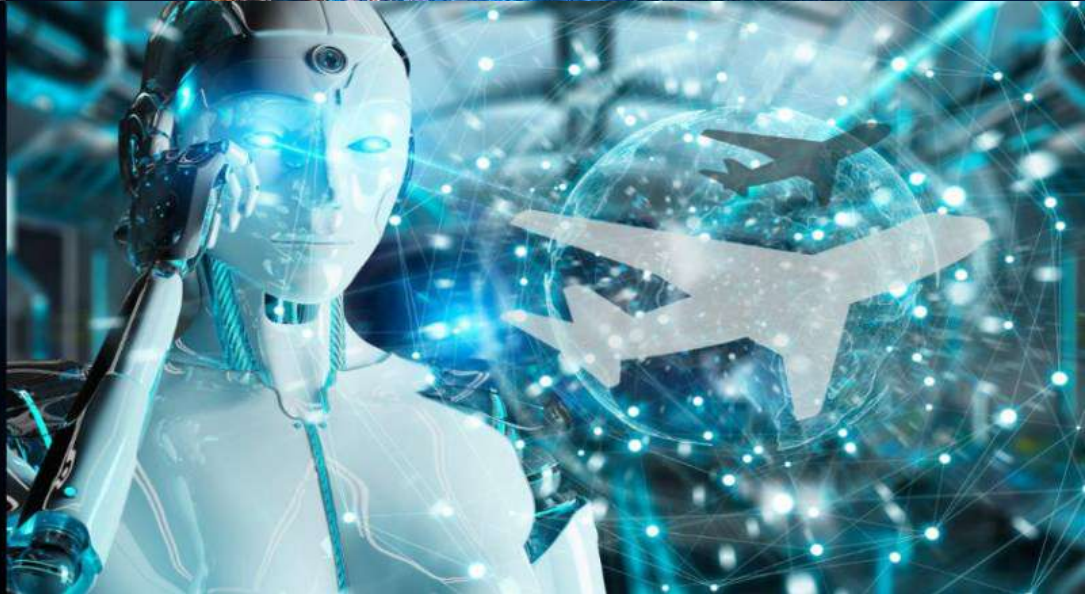


HAIKU

The Project

Visions of AI in Aviation...



...in diverse aviation operations



Our research questions

1

What is the **recommended Human-AI partnership** for each AI aviation application?

AI purpose, benefits, design principles and means of interaction

2

What does it mean for AI to be **explainable**?

Precondition of trustworthiness

3

How do we **best teach AI**?

Human-in-the-loop AI learning, personalized AI

Our goal >>>

is to pave the way for
human-centric-AI
via the exploration of
interactive **AI**
prototypes in a
wide range of
aviation contexts

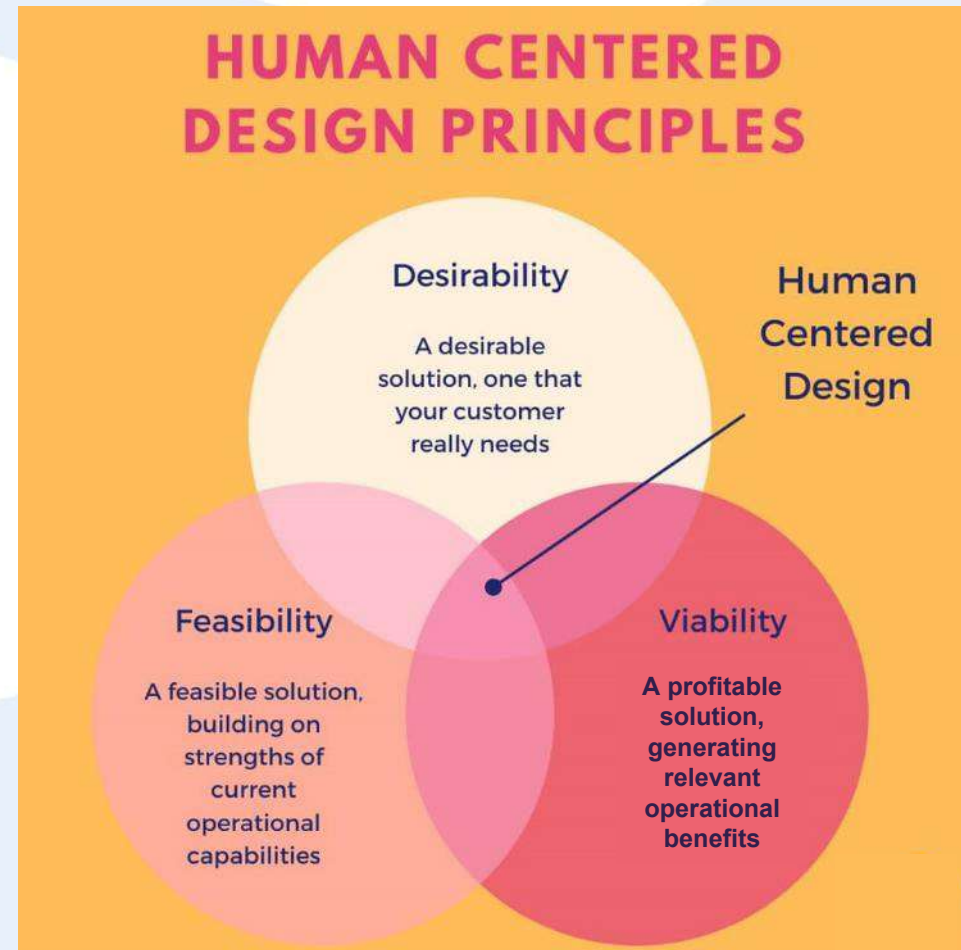
Our challenge

is to deliver
truly *human-centric*
Digital Assistants,
capable to ‘**fit**’ the
way humans work!

Our approach

What differentiates HAIKU from the typical AI project

- **A truly 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”
- **The Swiss knife of digital assistants:** different assistants for different tasks



... but keeping our feet on the ground...



Use Case #1

Digital Assistant in the cockpit to assist in 'startle response' adverse events.

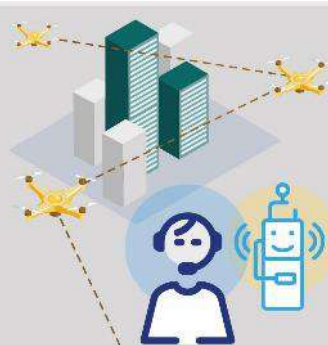
Led by ENAC



Use Case #2

Digital Assistant in the cockpit to assist in route planning/replanning.

Led by Thales



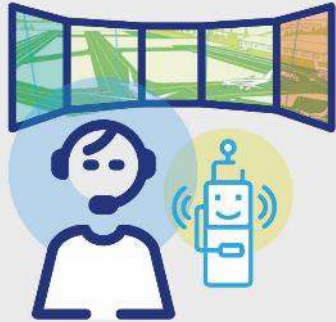
Use Case #3

Digital Assistant for Urban Air Mobility coordinator to assist in traffic management.

Led by Linköping University and LfV



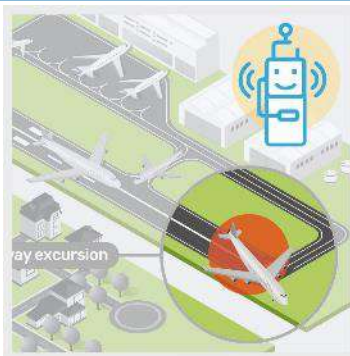
... showing tangible uses and improvements



Use Case #4

Digital Assistant for tower (and remote tower) controllers to assist in routine and repetitive tasks for aircraft on approach.

Led by FerroNATS



Use Case #5

Digital Assistant in the airport to assist safety experts in data analysis.

Led by Luton Airport



Use Case #6

Digital Assistant in the airport to monitor risk factor conditions associated with indoor spread of infectious diseases.

Led by CERTH



Our outputs: The HAIKU 4 pillars

HUMAN FACTORS APPROACHES for AI

- Human-AI teaming interaction model
- Human-in-the-loop AI learning
- Future Workforce requirements and skills

AVIATION USE CASES

- Airline operations
 - #1 Startle response*
 - #2 Route planning*
- ATM
 - #3 Digital Towers*
- UAM
 - #4 Drones and sky taxi ops*
- Airport operations
 - #5 Safety data*
 - #6 Prevention of COVID-19 spreading*

INTEGRATION

- New HF, Safety and Security Case Methods
- Acceptable Means of Compliance for AI
- Legal Case

SOCIETY

- Socially Acceptable AI Guidance
- Aviation Safety Culture and AI

We are a powerful team...

... bringing together:

- **Human Factors** expertise
- Domain's key **end-users**
- **Technology** suppliers of excellence

... to ensure *high standards* and a strong link between *industrial needs, cutting-edge technologies* and *research outcomes!*



Use Case 2 - Planning in the cockpit

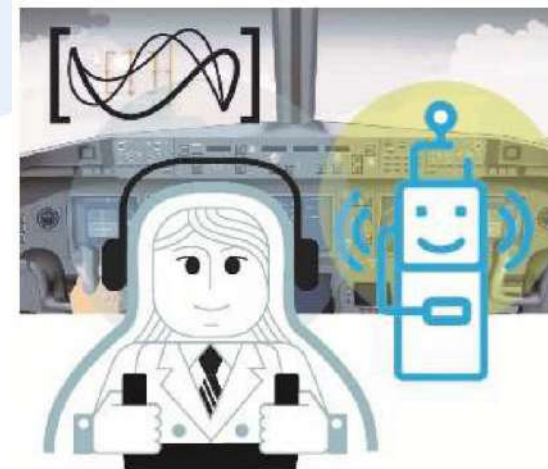
Digital assistant for route planning/re-planning

Jaime DIAZ PINEDA

Sylvain HOURLIER

THALES AVS

Lisbon, 8 September 2022



Use case overview

- Pilots must manage complex situations (bad weather, complicated terrain, dense traffic, technical failures, human errors, etc.)
- To solve these problems, Intelligent Assistance Functions are being developed.
- But all that **efficiency is threatened** when there is a communication breakdown **between operator and technology**, because of :
 - Unpredictable failure (system)
 - Unpredictable event (situation/environment)
 - Operator cognitive resources impairment (fatigue, illness, ageing, ...)

The operator doesn't know what the system is doing...

The system can't figure out what the operator wants...

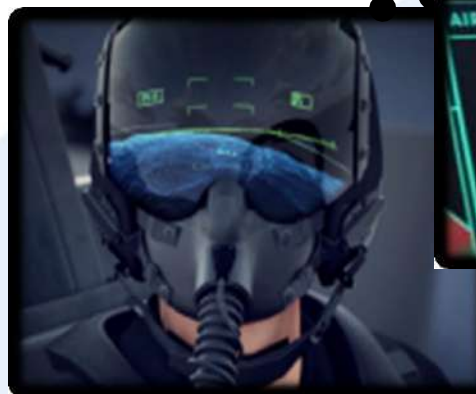
... No HMI is designed to resolve that situation

COMBI Bidirectional Communicator

Maintain human in/on the loop when AI is used in the cockpit

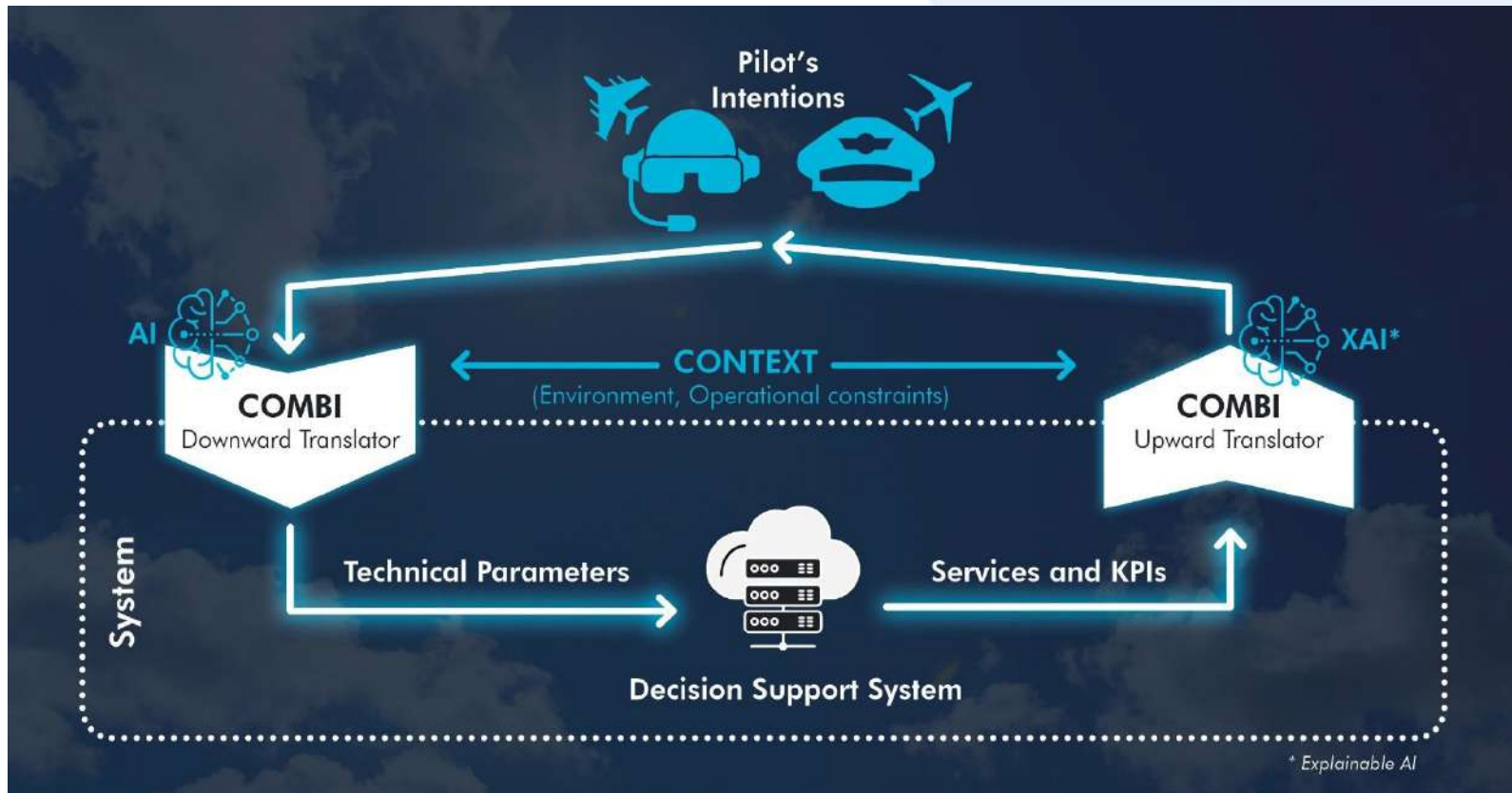
- management by the highest level of abstraction, the one relative to pilot's **INTENTIONS**
- an easy human/machine **bidirectional dialogue** (translation in same semantic field and explainability)


**ON BOARD
WORKLOAD
MANAGEMENT**



COMBI Bidirectional Communicator

1. A **Downward transfer function** that **translates** PILOT intentions & **prioritizes intelligent agents'** technical parameters
2. An **Upward transfer function** that **explains** proposed services & **assesses** in the semantic Pilot Domain of intentions



Thank you!