

# ➤ INTELLIGENT ASSISTANTS IN AVIATION

Augmenting to Achieve



## DISCLAIMER

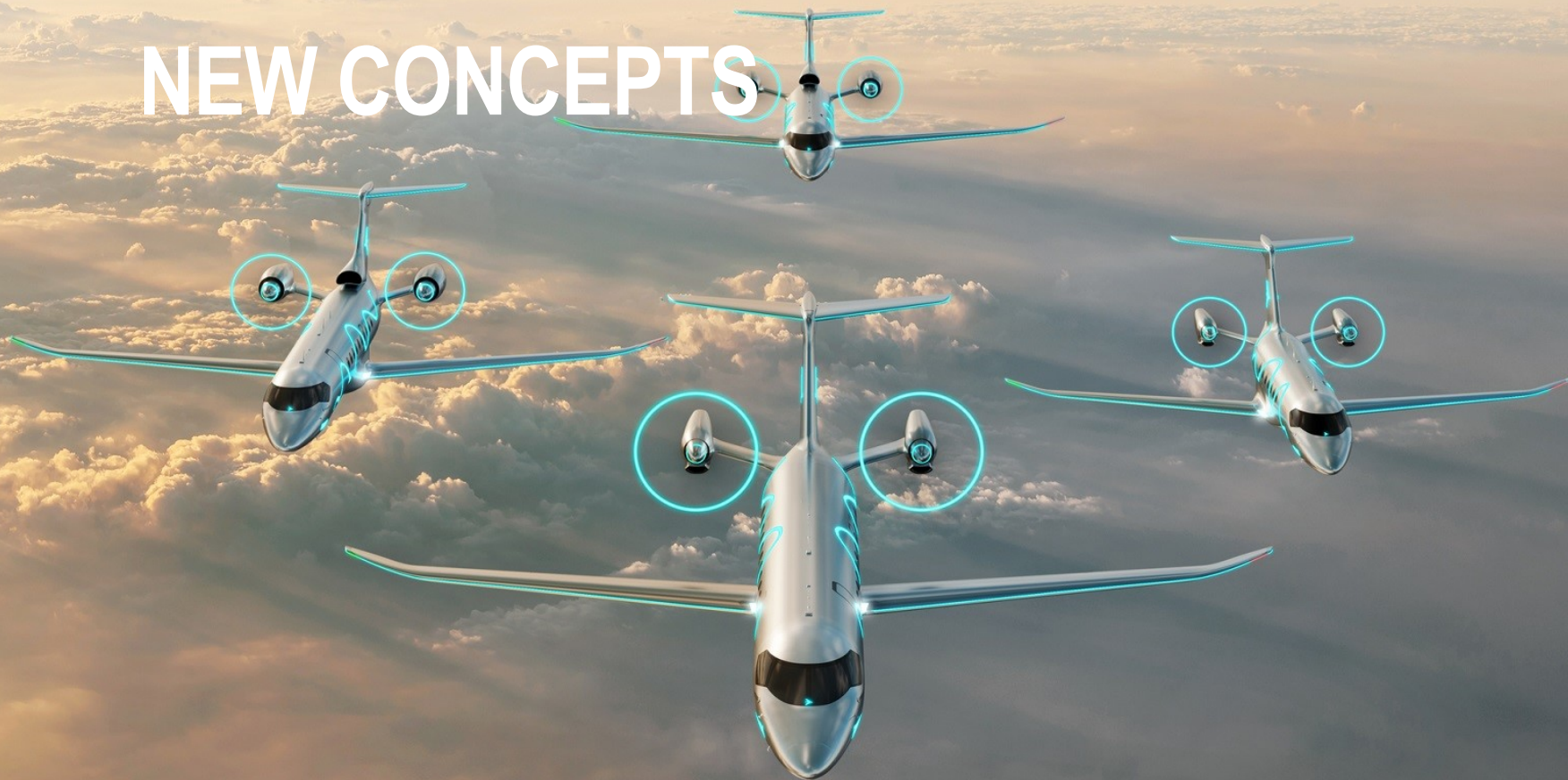
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Some images in this document were captured before the Covid-19 pandemic, showing people without masks and in crowded situations.

# EMBRAER



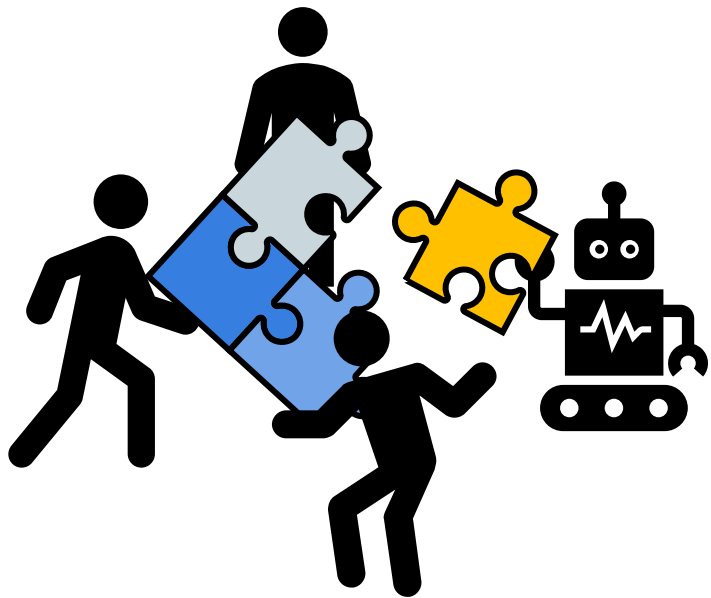
# NEW CONCEPTS





# NEW OPERATIONS

# WHAT IS “INTELLIGENT ASSISTANT”



AI enabled entity  
**able to contribute to**  
the human  
**cognitive abilities.**

# VALUE IN ASSISTANCE

- Safety improvement
- Operational Effectiveness and Efficiency
- New Operational Paradigms



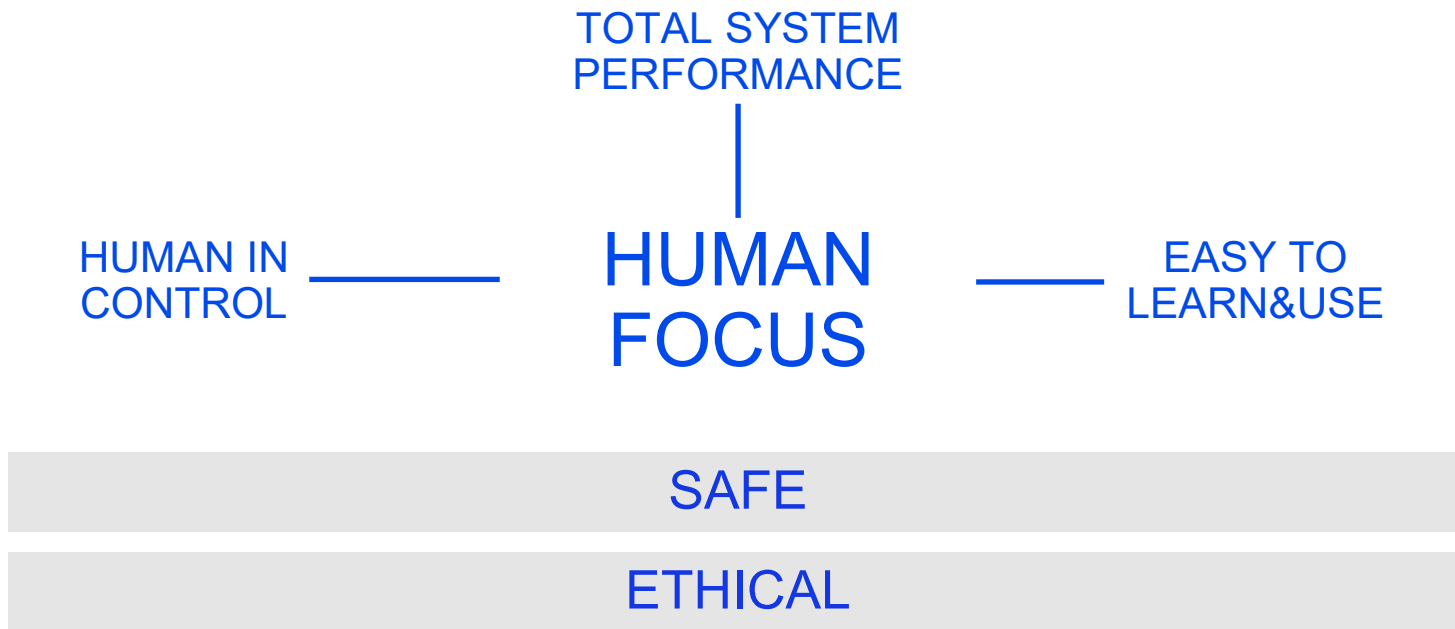
# HOW?

- Situational Awareness Increase
- Release of human cognitive resources
- Improved focusing
- Increased understanding

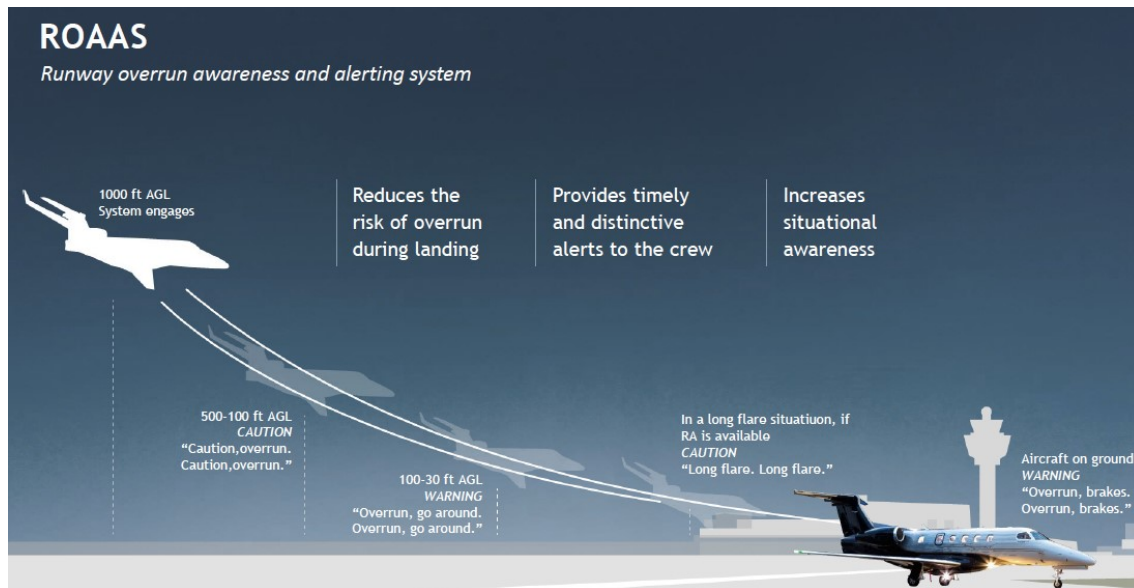




# DESIGN PHILOSOPHY



# TODAY: AUTOMATED ASSISTANCE



Additional **surveillance**, enhanced **situational awareness** and **peace of mind** during the most crucial stage of flight

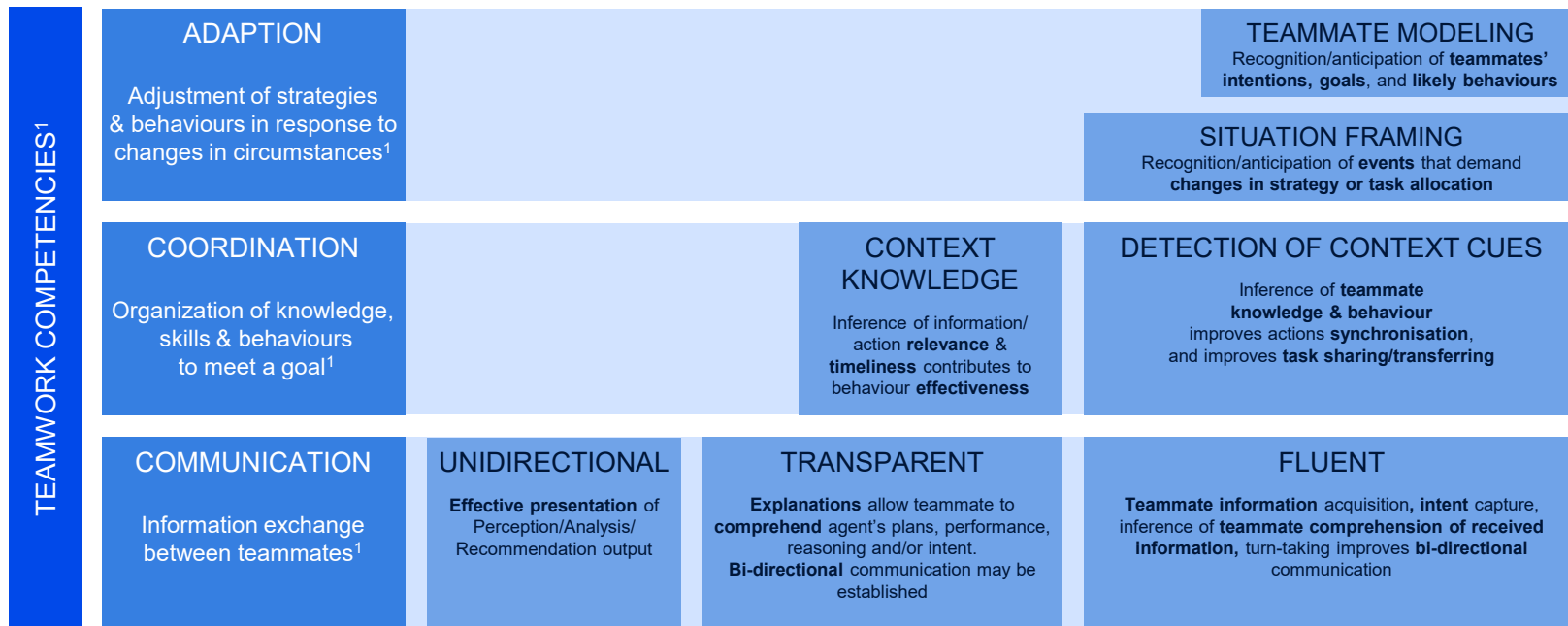
## AUGMENTATION:

- Aircraft energy **monitoring**
- **Clear picture** of landing conditions
- **Clear instructions** to avoid overrun





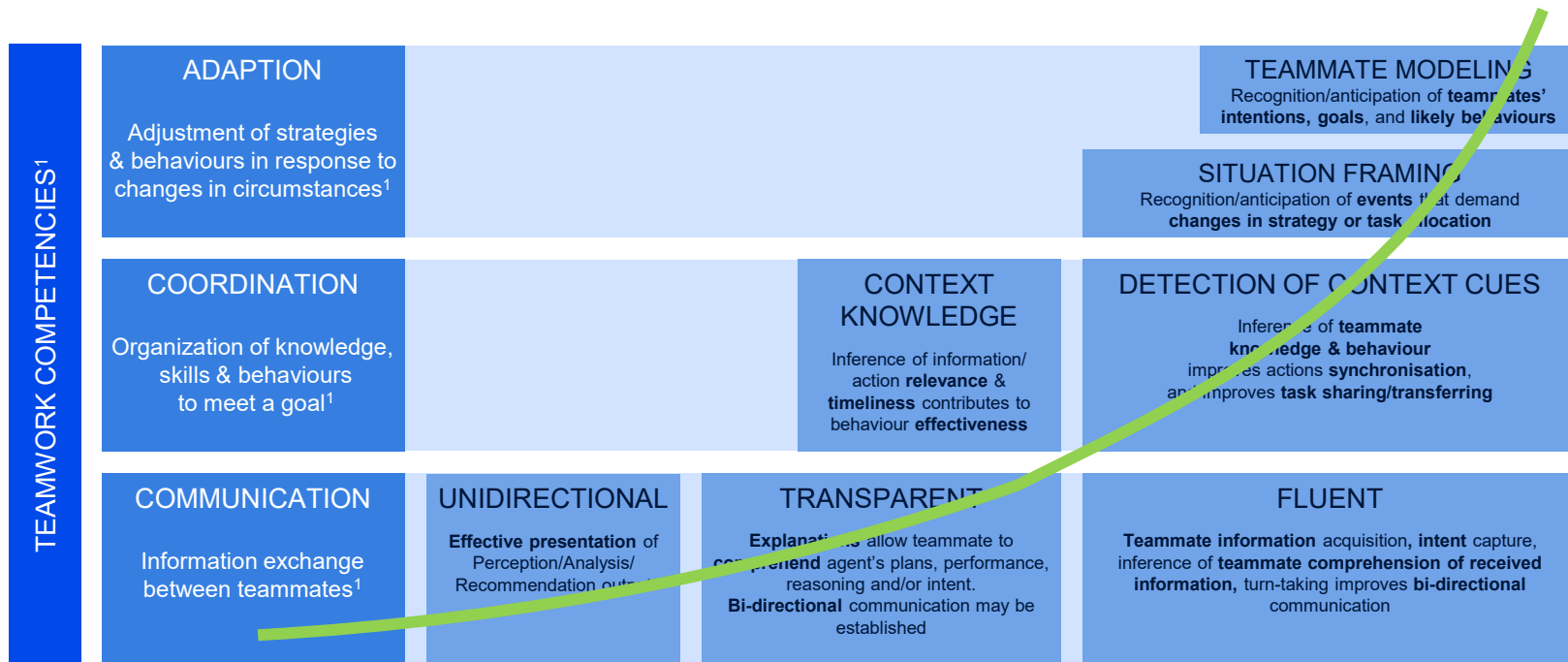
# FUTURE: TEAMING-UP?



[1] K. Stowers, L. L. Brady, C. MacLellan, R. Wohleber, and E. Salas, 'Improving Teamwork Competencies in Human-Machine Teams: Perspectives From Team Science', 2021.



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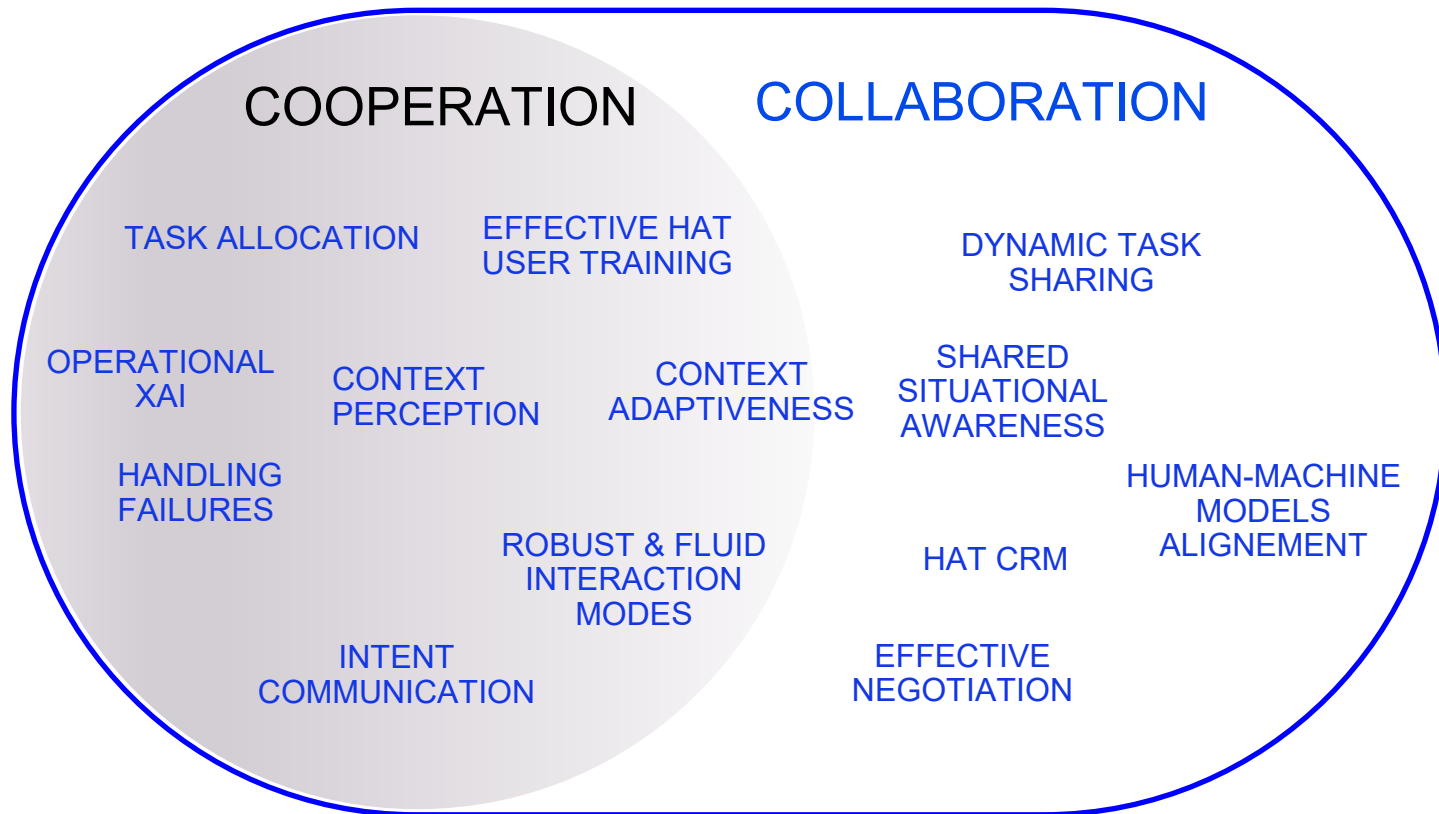
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# HUMAN-AI TEAM (HAT) CHALLENGES

- Socio-technical challenges in the life cycle
- Integration into “living” Systems of Systems
- New Operations and Sustaining: Human Centred Concept and Development



# OPERATING WITH HAT







# CREATING HAT

- **Metrics:** effectiveness, performance (Human, AI)
- **Architecting:** trade-offs, attribution, design
- **HAT Requirements:** e.g., XAI, trust calibration, data, Human SKA
- **AI risk analysis:** tools, methods, approaches
- **V&V:** HITL, processes

XAI – eXplainable AI

SKA – Skill, Knowledge, Abilities

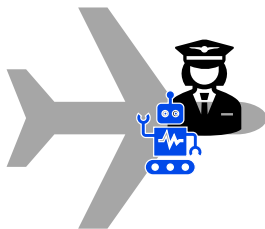
HITL – Human-in-the-loop



# EVOLVING HAT

- Governance of learning systems
- Transitioning new roles, co-existence
- Monitoring and managing for emerging unknowns-unknowns (black swans)
- Evolving Safety Management System

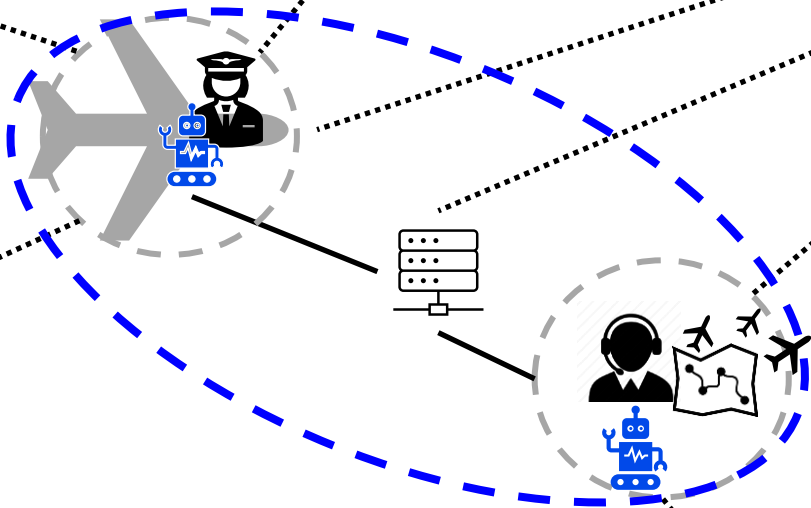
# AND ...



PILOT +  
ASSISTANT:  
LOCAL HAT



AND ...



ASSISTANTS TO  
SUPPORT DISTRIBUTED  
TEAMING?



# FINAL THOUGHTS

- Promising world: flexibility and complexity management
- Challenges at all system levels: the “product”, the life cycle, transition
- Crawl, Walk, Run, Fly...
  - before being able to “team”, we need proper “assistant capability”
  - but!, “assistant capability” must be driven by teaming needs.

# TEAMMATES CAPABILITIES...



Illus. in: Thomas Dilworth, A New Guide to the English Tongue, Part IV?, 17, p. 209



Detail of "Cats Suggested As The Fifty-three Stations of the Tōkaidō",  
Utagawa Kuniyoshi, 1850



# FOOD FOR THOUGHT...

*“We become what we behold.  
We shape our tools and then  
our tools shape us.”*

*Marshall McLuhan*



THANK YOU