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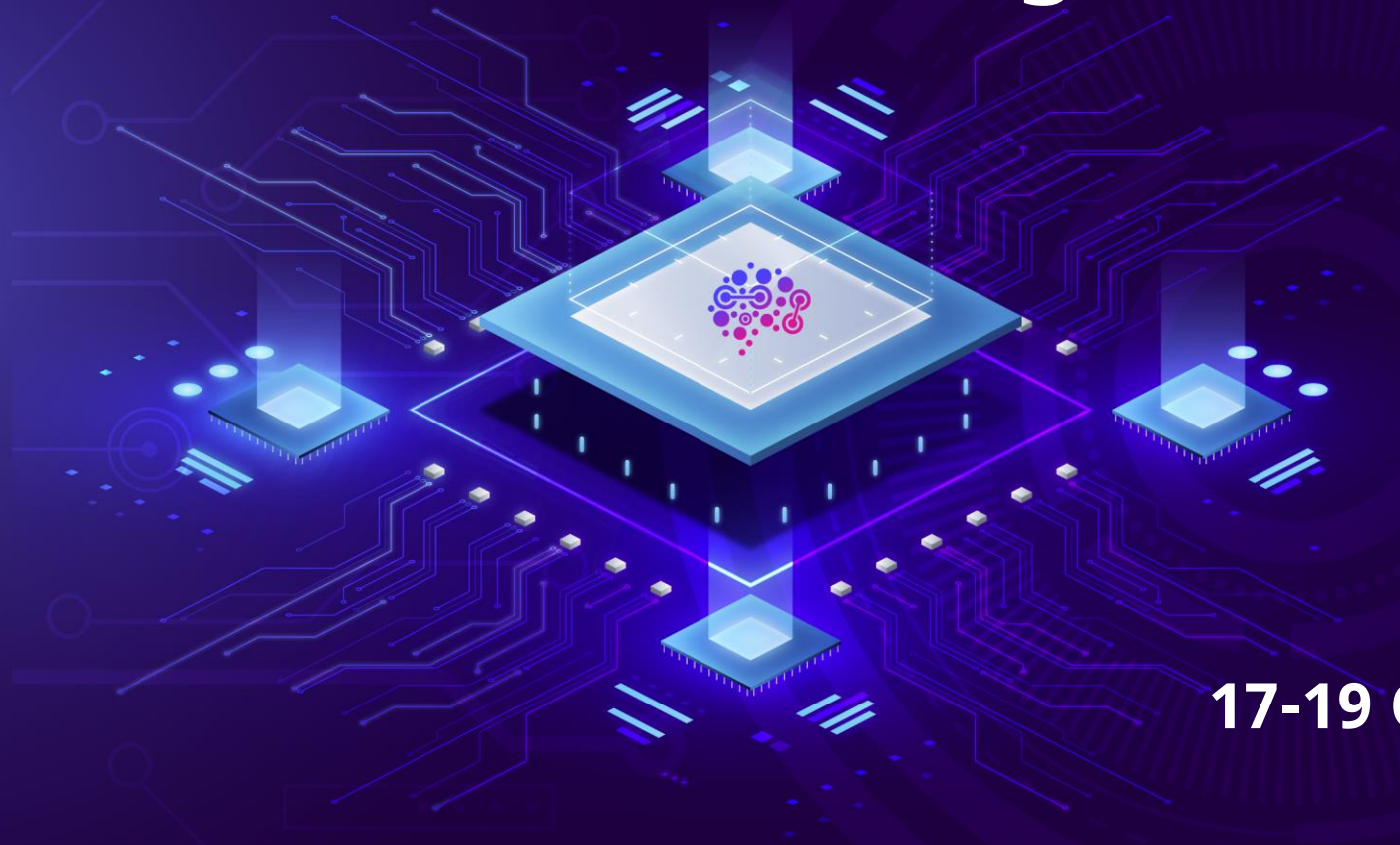

Advancing emerging edge AI technologies and driving next generation intelligent applications.

17-19 October 2023, Athens, Greece

European Conference on EDGE AI Technologies and Applications - EEAI

Shaping Edge AI that flows with Humans: Designing Trustworthy and Useful AI Applications

Nikolai Ebinger

Peter Moertl

Michael Karner

Virtual Vehicle Research GmbH
Graz, Austria

17-19 October 2023 Athens, Greece

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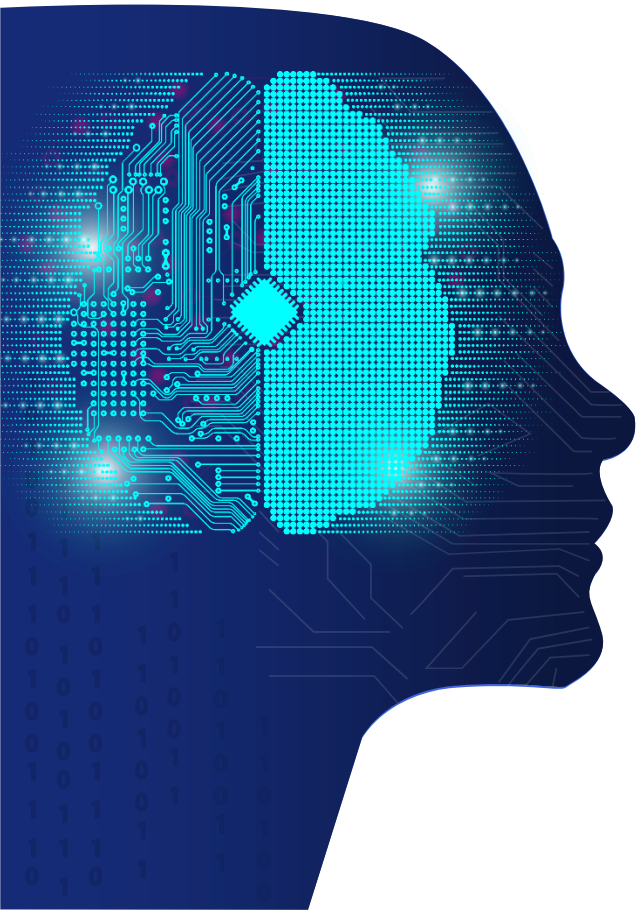
Presentation Outline



- AI developments are blossoming
- Why ethics and trust are necessary for acceptance and operational uptake of AI
- Our framework to design AI for acceptance, ethics and trust

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AI developments are blossoming

- Increased productivity
  - Taking over repetitive tasks
  - Allowing humans time for strategic & creative tasks
  - AI as helper
- Improved decision making
  - Turn complex data into digestable insights
  - Isolate trends
  - Identify changes
  - Predictive analysis
- Improved safety
  - Taking over hazardous missions
  - Increase data and information security

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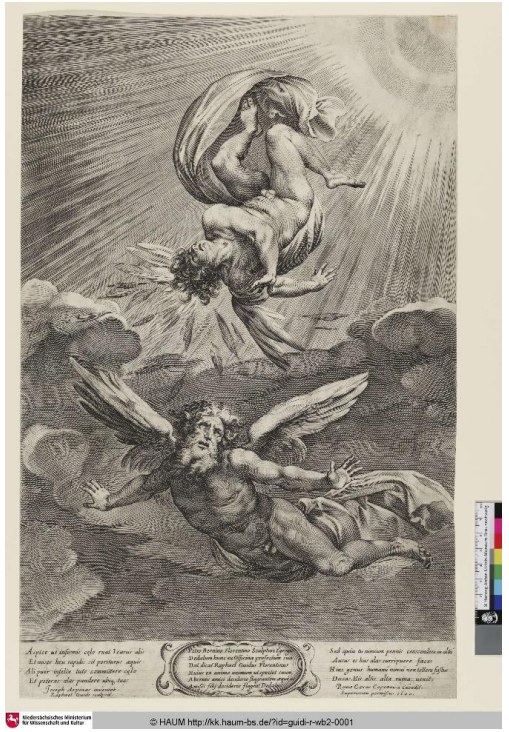
The role of ethics and trust for acceptance and operational uptake

- The promises of AI are such that businesses have to adopt AI
- However, there are backlashes
  - 2023 Hollywood strikes are also about AI
    - Use of generative AI
  - 2023 demise of a small company Prosecraft
    - „Prosecraft's founder didn't see the controversy coming."
- Wall Street Journal, Aug 2023:
  - "More and more companies say they are concerned about facing public criticism over their use of artificial intelligence, thanks to rising fears over the technology's negative impacts, including job losses."



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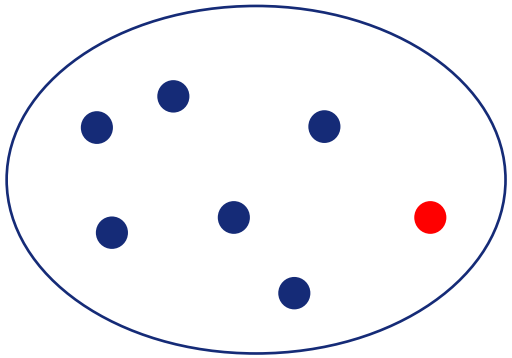
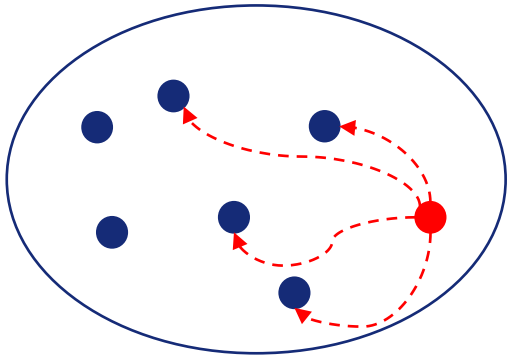
Why it is inherently difficult to design AI for acceptance, ethics and trust

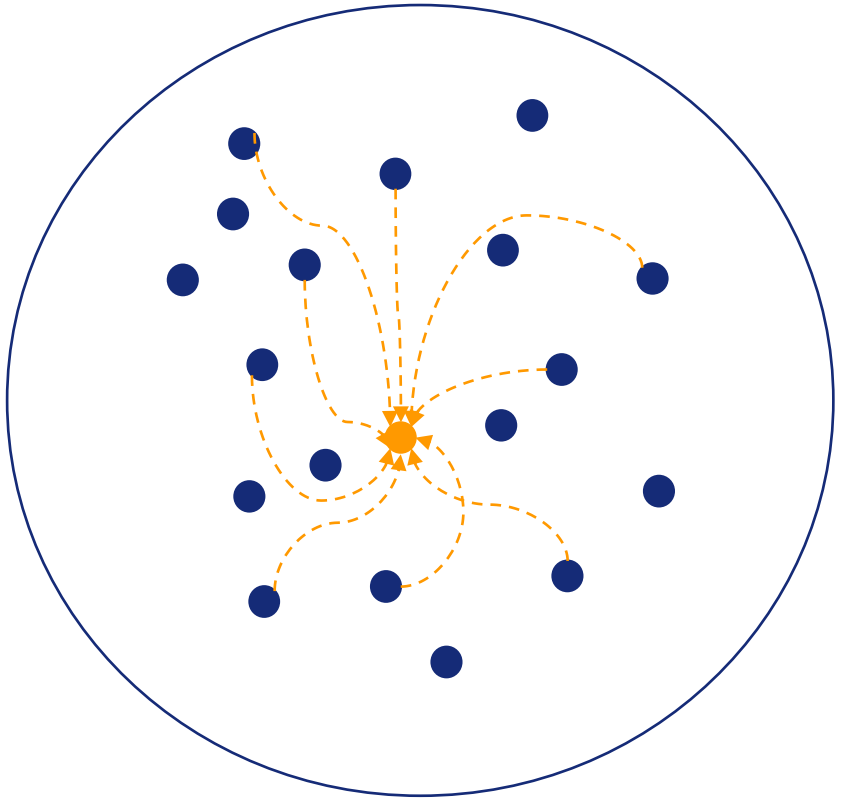
A new AI application starts often with a technical innovation idea: algorithms and data



At this time, the use conditions, users, organizations, tasks, and responsibilities are often unknown to the developers



This can lead to non-acceptance by users, mistrust, or even the above Societal backlashes



The challenge is to design the AI application with the context (users, organizations, tasks, responsibilitiies in mind)

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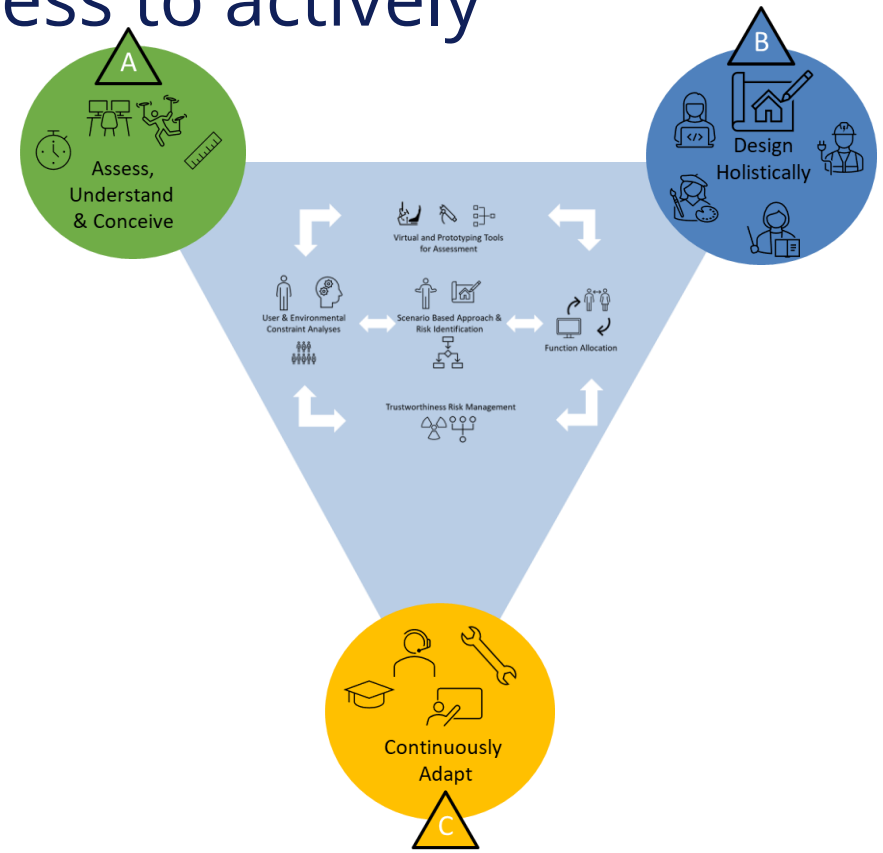
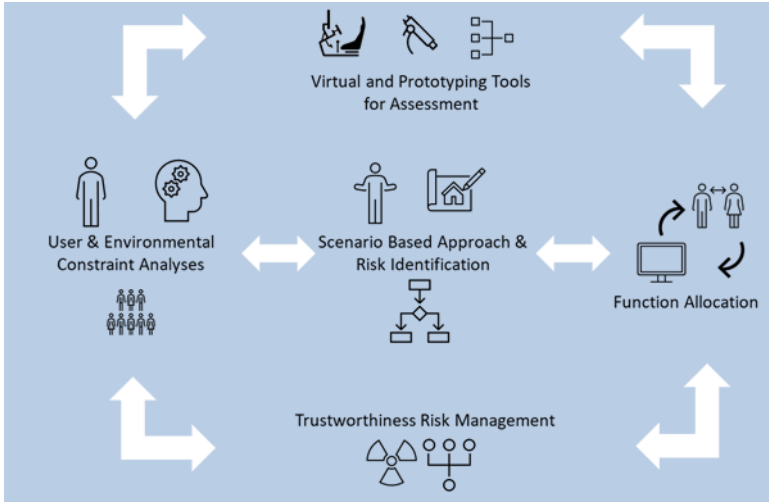
Human Systems Integration Framework

As part of the InSecTT project have we developed a framework and process to actively



Minimum Ecosystem to develop trustworthy systems



Basic process and tools

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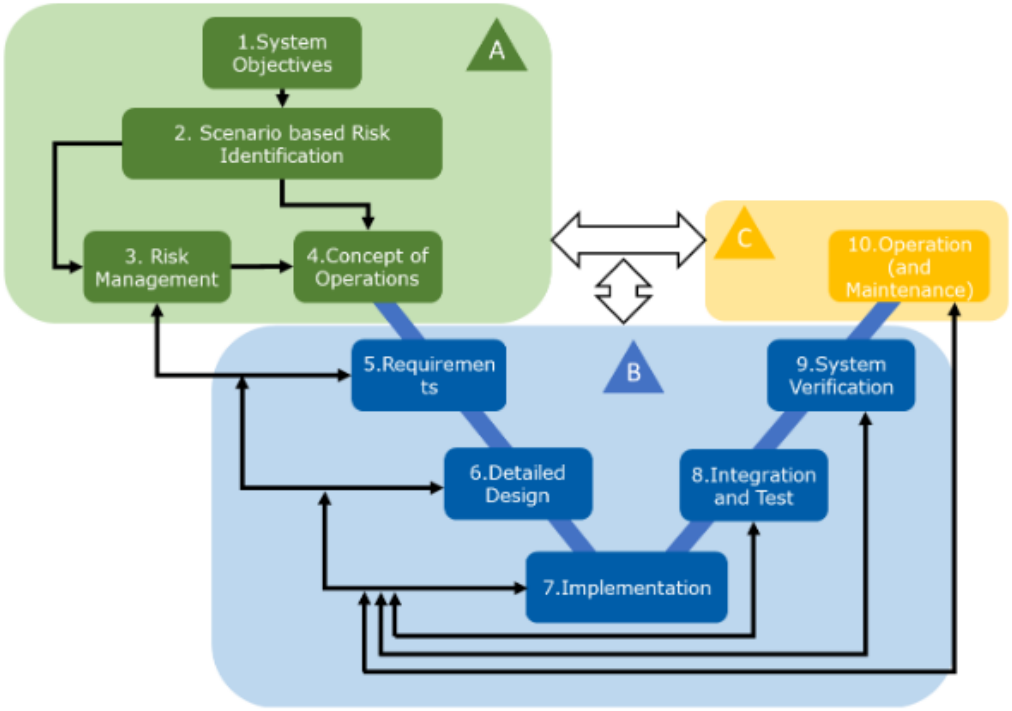
Applications of the HSI Framework

- To make this more concrete:
  - As part of the InSecTT project we applied this framework to diverse use cases
    - Transitioning from automated driving back to manual driving
    - Automated detection of security problems in manufacturing environment
    - *Emergency and rescue operations*
    - *Hospital bed management*
- Our Conclusions



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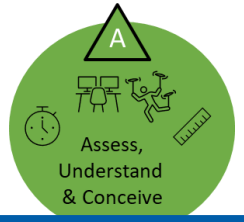
Example: Holistic approach to partial driving automation



Literature Review

Task Analysis

Identified Challenges
- System functionality & System limitations,
- Driver responsibility / division of tasks,
- Transition Procedure,
- System Warnings and Information,

User Study on the state of the Art

Identified Challenges
- System functionality & System limitations
- Mode confusion
- General interaction
- Anticipation system behavior
- Over-/Undertrust

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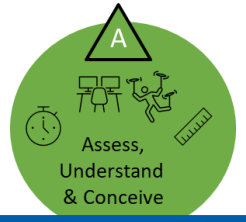

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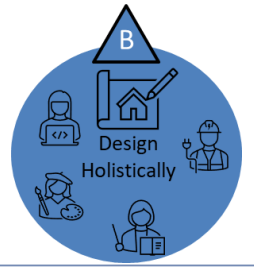


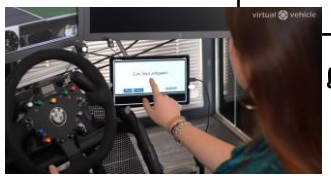
Holistic Design Expands Driving Automation System

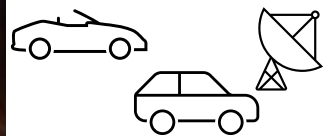
Environment
Road Infrastructure
Sensors and Messages

Vehicle Cabin
Driver State Monitoring
and Adaptive Interactions

Driver
Help Driver to meet
new responsibilities

Automation Predictability





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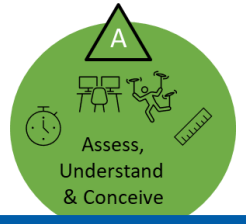

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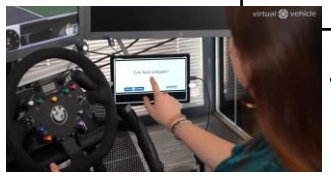
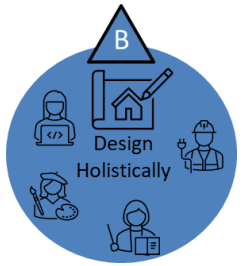
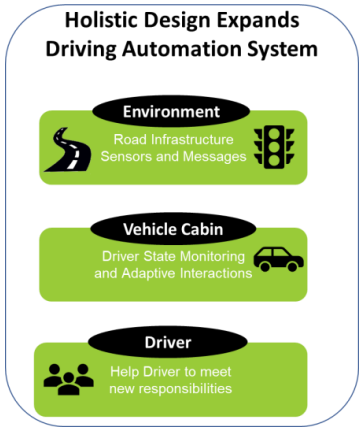
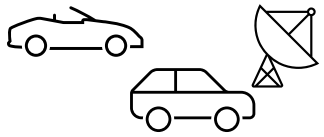
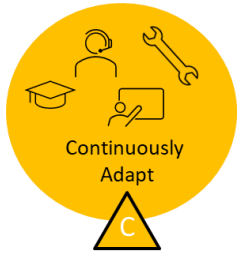






Automation Predictability





Next Step:
Eco System

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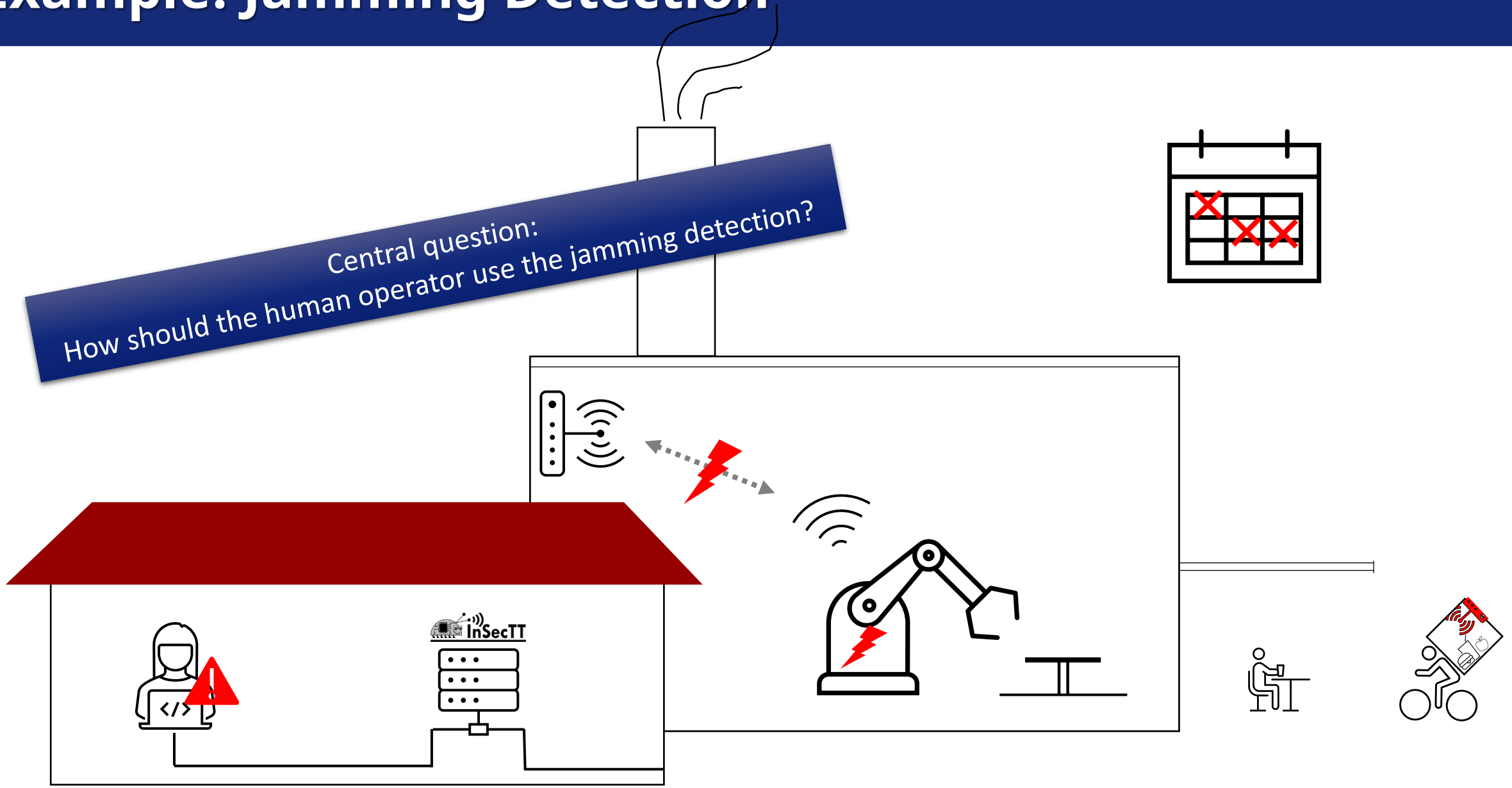
Example: Jamming Detection

Central question:
How should the human operator use the jamming detection?



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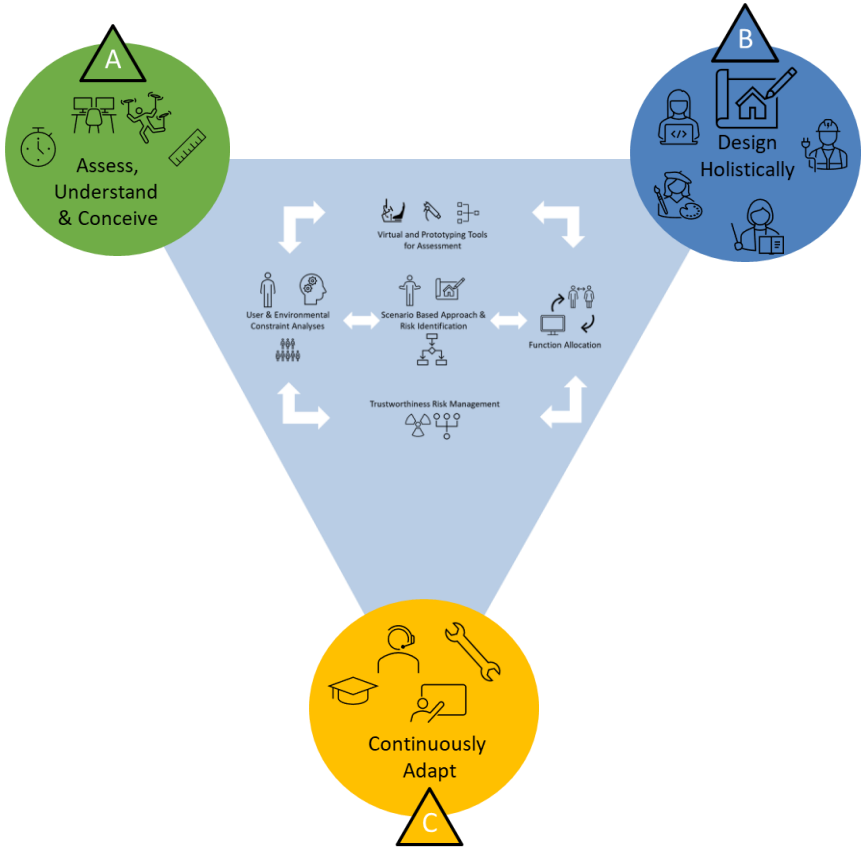
Conclusion

- Existing technical processes are surprisingly resistant against designing trust and acceptance
  - Silos of technical excellence
- A holistic approach and eco-system seem necessary to break them open and shape technology for humans
- This requires sufficient contextualization from the beginning of the AI development
- Tight interactions between inter-disciplinary teams
- New tools and processes for development and risk management
- Extended product life-cycles → increased complexity!



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At this conference:
Poster on „Human Oversight“

Whitepaper:

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EDGE AI

virtual vehicle

Thank You

For your attention

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SFG

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