


Remote Tower Initiative

ENAC Research platform and Perspectives



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Research Team & Platform

Outline

A decorative network diagram consisting of a series of interconnected nodes and lines, forming a complex web-like structure, is positioned on the left side of the slide.

Origin of the Research initiative
Research Questions and issues
Research Platform
Future research directions
Wrap up

Origin and first attempts

- Context : Undeniable growth of the RT concept in Europe (Sweden, Norway, Germany...) and industry investment and involvement
- Identification of operational gridlocks:
 - Social Acceptability,
 - Safety, radio frequency management (multiple?)
 - Cultural revolution and change management.
- Promises coming from Research:
 - Man-machine interaction, novel technologies
 - telecom,
 - algorithms etc.
- Need to initiate Research on this concept
- Need for a **platform** to test and support the works



oportunity

- Funding from CPER (French Gov, Region and Toulouse City)



- To build a research platform :

ACHIL -> **Aeronautical Computer-Human Interaction Lab**

- Nearby Muret Airfield – ENAC school for pilots

First projects started

- MOTO - SESAR Project Human Factors – Embodied cognition in RT
Partners : Univ Sapienza, Deep Blue and ADPi -
- ENVISION – SESAR Project - Low-cost ASMGCS via ADS-B/Video
Partners : ALTYs, Eurocontrol, Graphica
- Prospects of Eyetracking for RT – Regional funding

Platform installed

- Mast with cameras and microphone (and other sensors to come)
- Remote room at ENAC
- Data link between Muret-ENAC
 - Low bandwidth today
- Research started through simulations
- Enriched with functionalities as they mature
- Demonstrator and POC / Show Room

Position



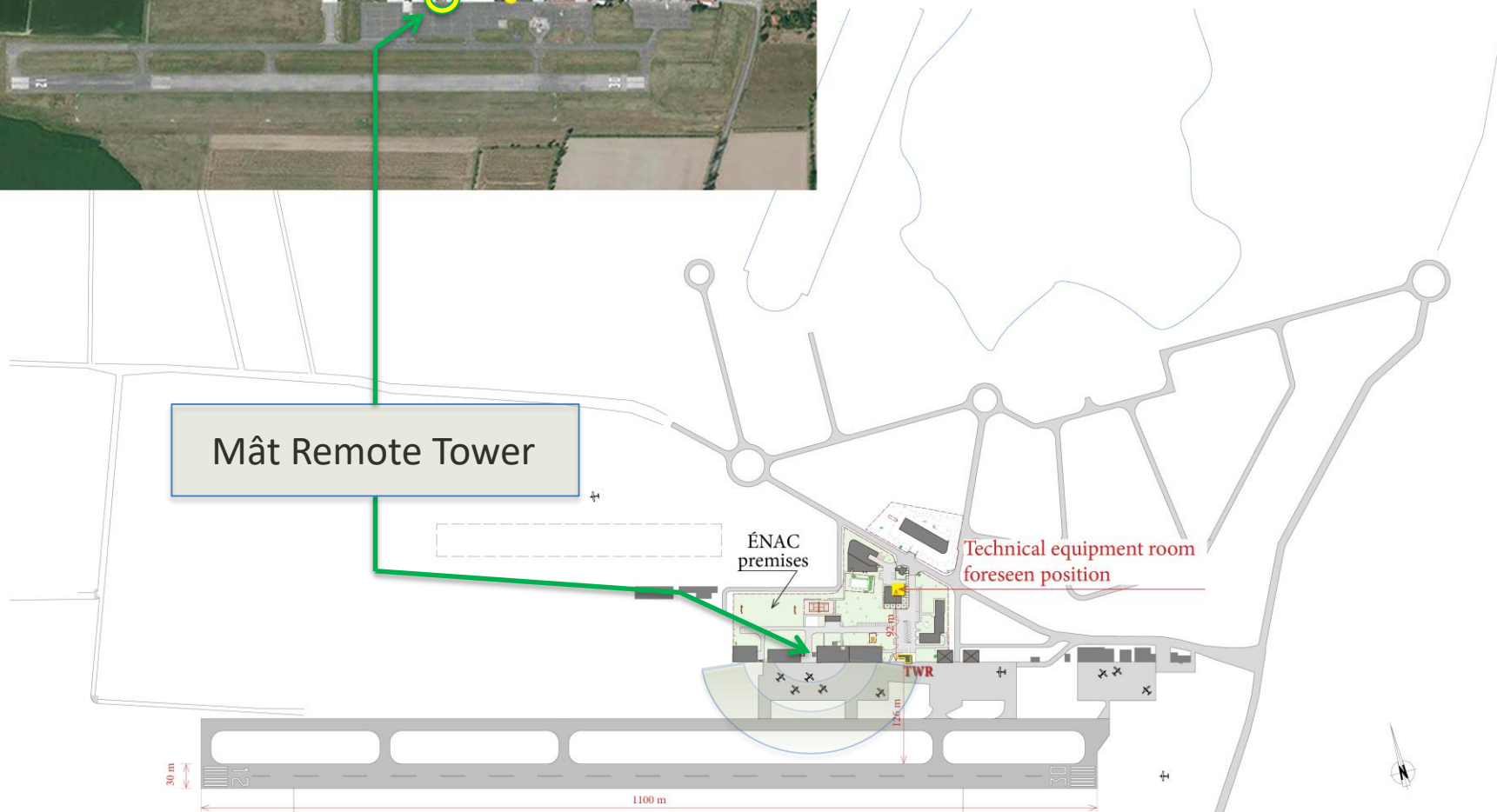
Position



ÉNAC - PROGRAMME ACHIL

ÉNAC Muret site

Project of Remote Tower installation on Muret Lherm airport



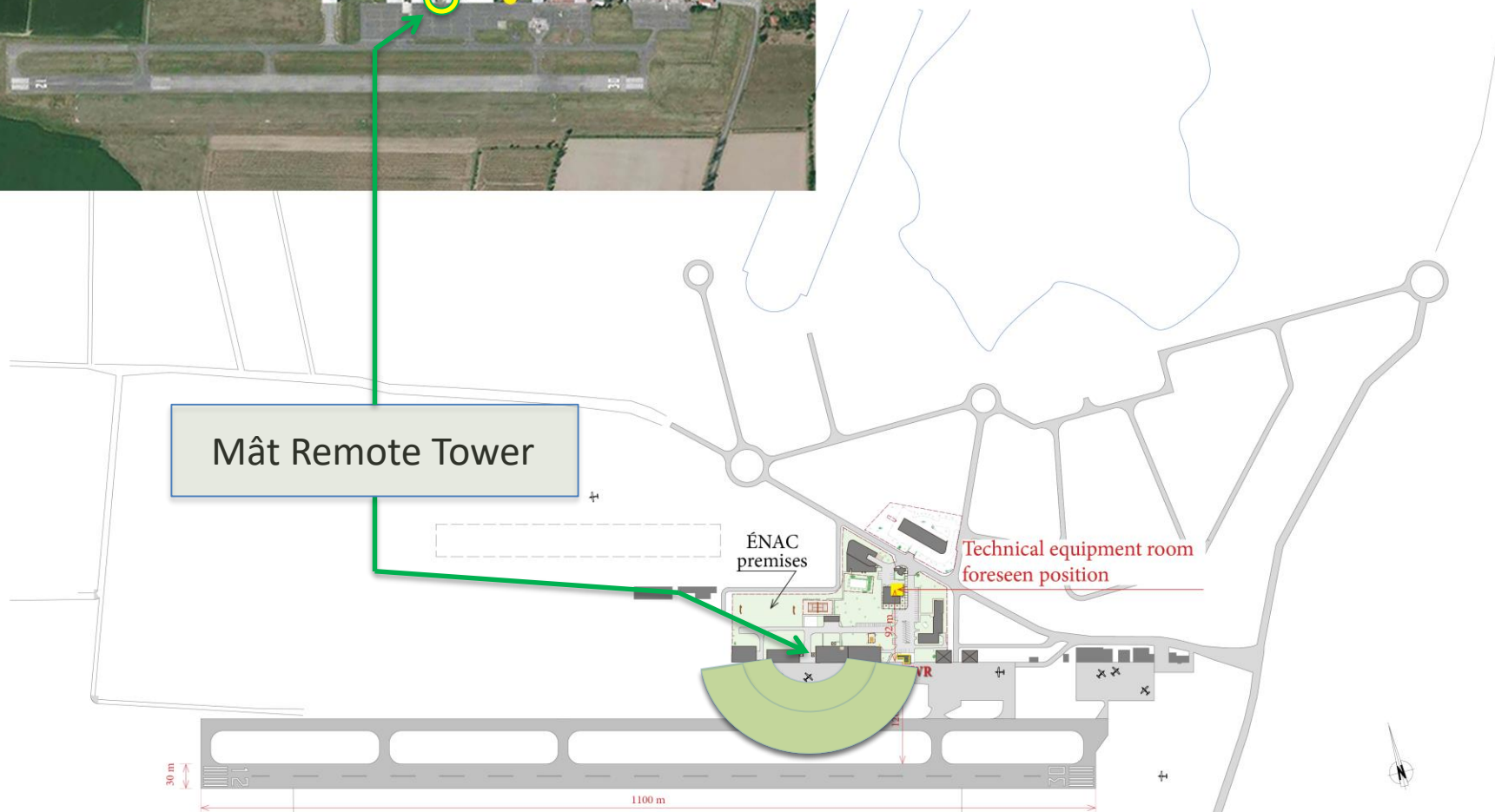
Position



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Screen Shot



View of Muret Airfield as seen through RT Cameras

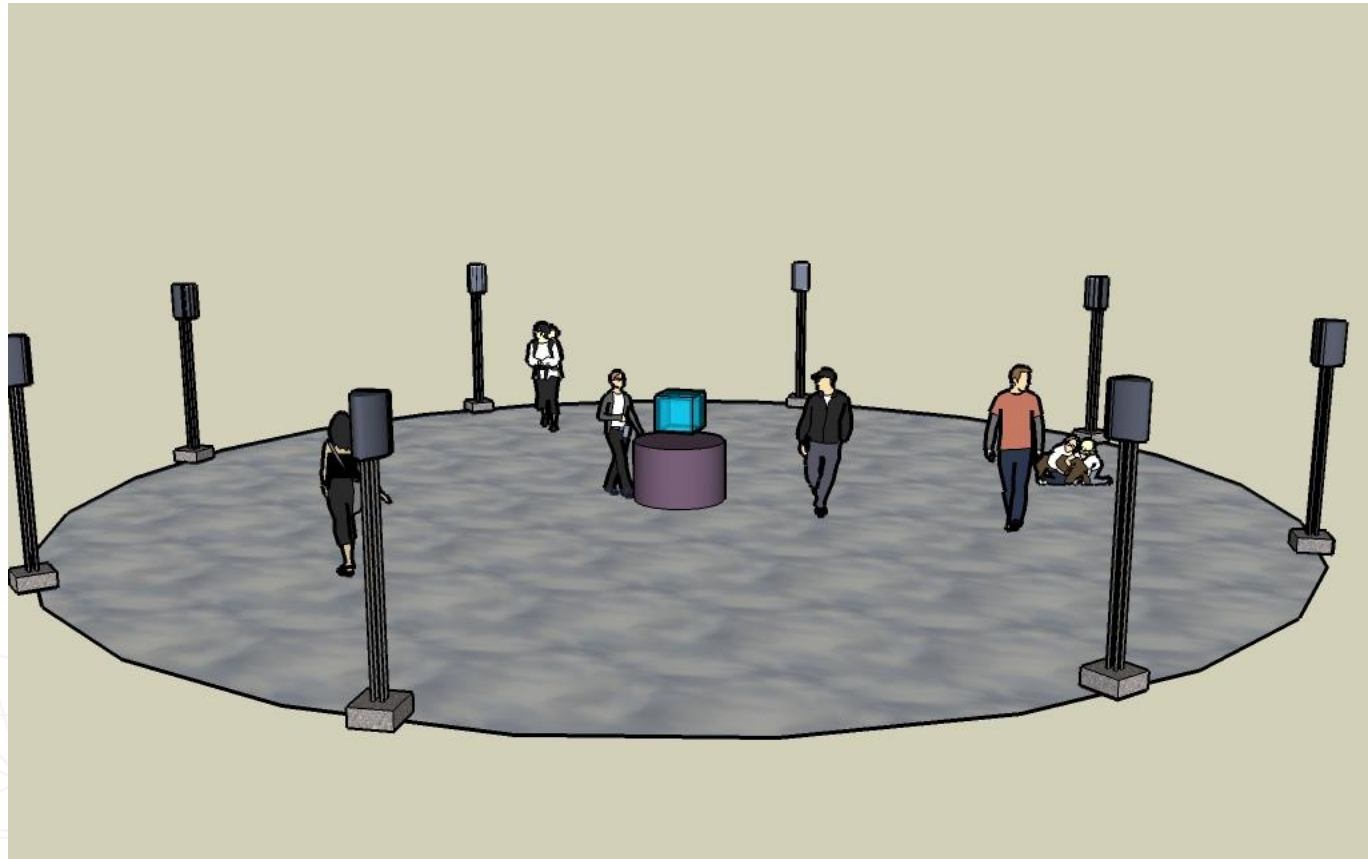
Screen Shot Zoom



Research Engineer afoot of the mast – image definition test

Some Research Directions

- Work on sound and vibration to convey the atmosphere of a Tower (hear engine power at threshold, vertical of terrain...)



Some Research Directions

- Addition of interaction in tower to facilitate traffic management (motion capture, tactile interaction, eye tracking)



Some Research Directions

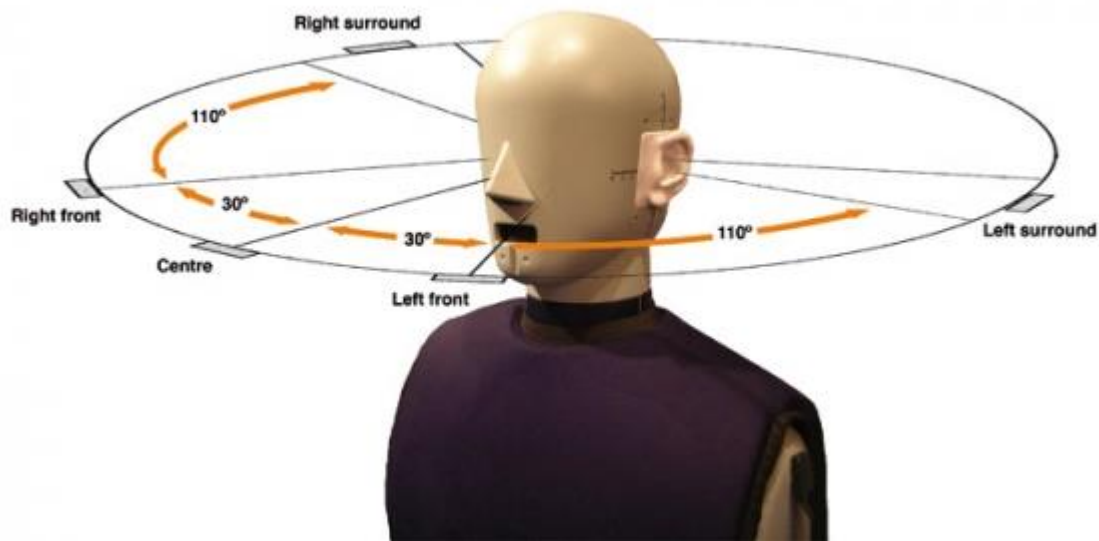
- Processing of video to support the activity of controllers (visualising aircraft, detecting conflicts)



Augmentation

Some Research Directions

- Spatialize the voice of pilots on the radio



Some Research Directions

- Recreate an image of ground movements on the terrain, based on video processing (low-cost A-SMGCS)



Even further Research to be conducted

- Christophe HURTER – researcher, data-viz

Remote Tower

Research perspectives and opportunities



Christophe Hurter
Professor

Present

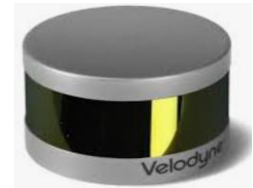
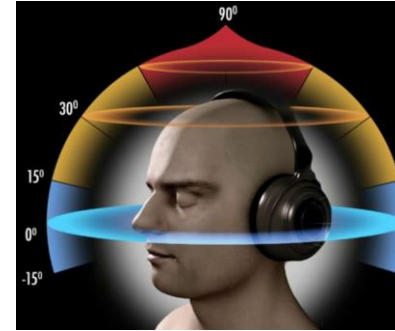
Remote towers are based on technological assets

- High Resolution Cameras
- High Speed Networks
- Progress in Human Computer Interaction
- Advanced Eye tracking (pointing technique) usages

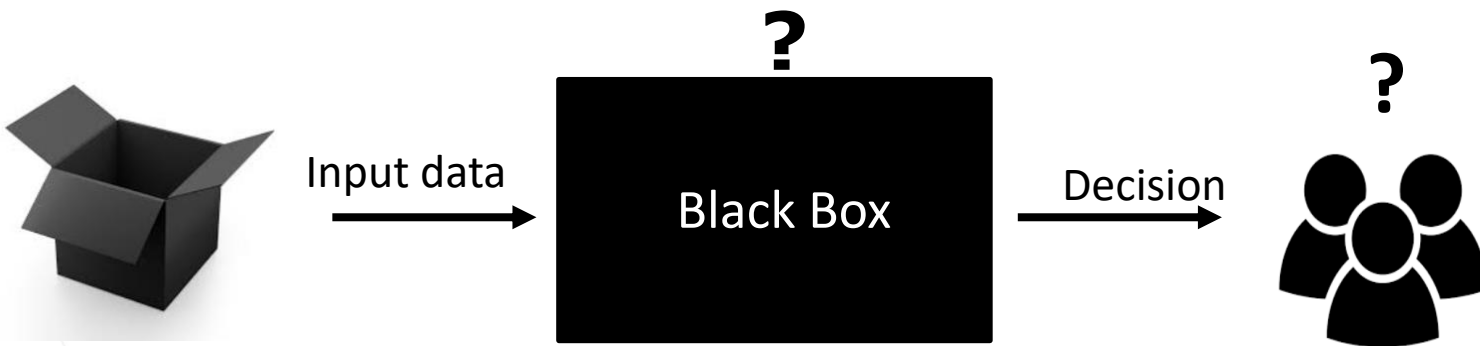


(Near) Future

- 3D cameras (LIDAR)
- Physiological measurements
- (3D) Sound Capture and replay
- The herald of VR/AR/MR
- Machine Learning for data processing



Research Issue: The Black Box Effect



Sometimes, the rationale behind the decision is more important than the decision itself

Research Perspectives: The Grey Box Effect



Input data



Grey Box

Decision



Explanation



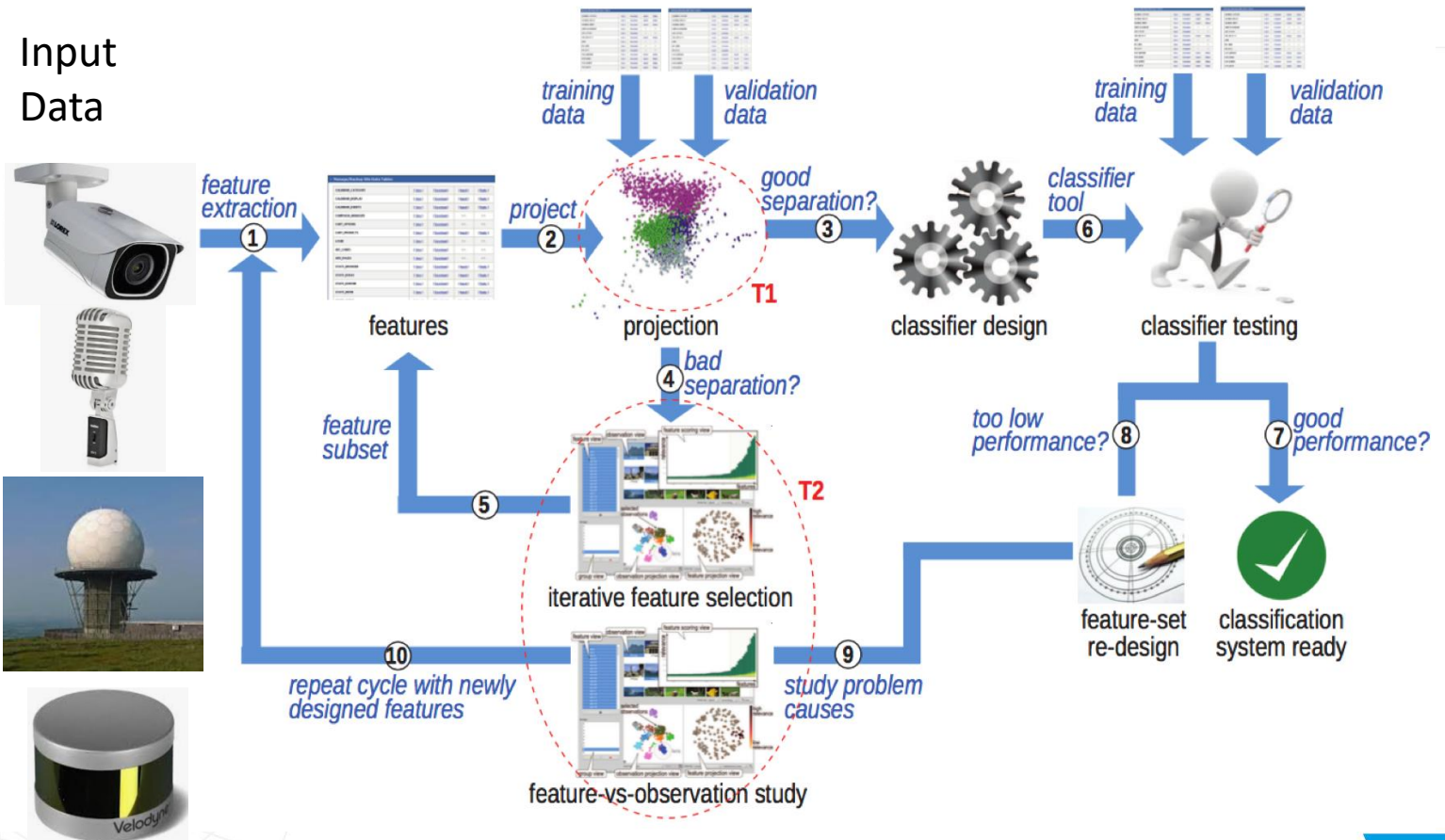
How to open black boxes?

Find the suitable balance to maintain the human in the decision loop

The key to supporting this task is not only to **visualize data**, but also to allow users to **interact with them**.



ENAC: a multidisciplinary research environment





Christophe Hurter

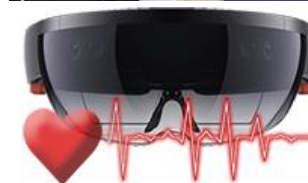
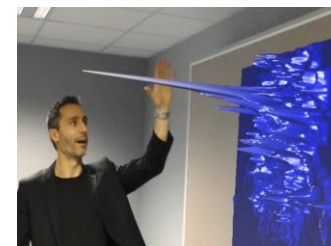
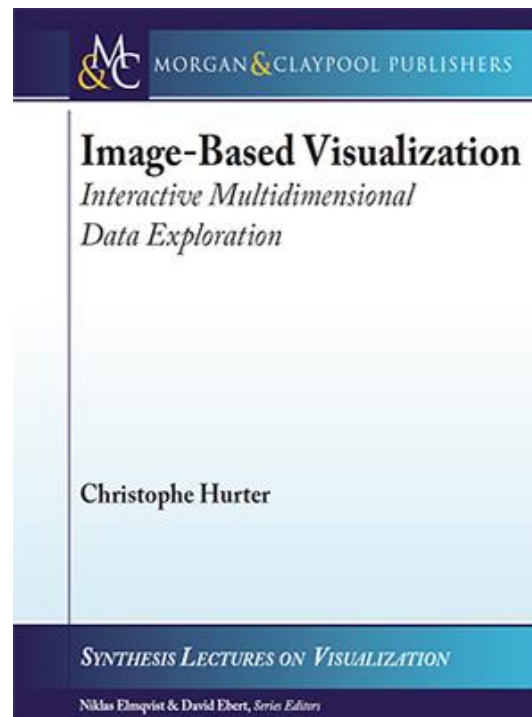
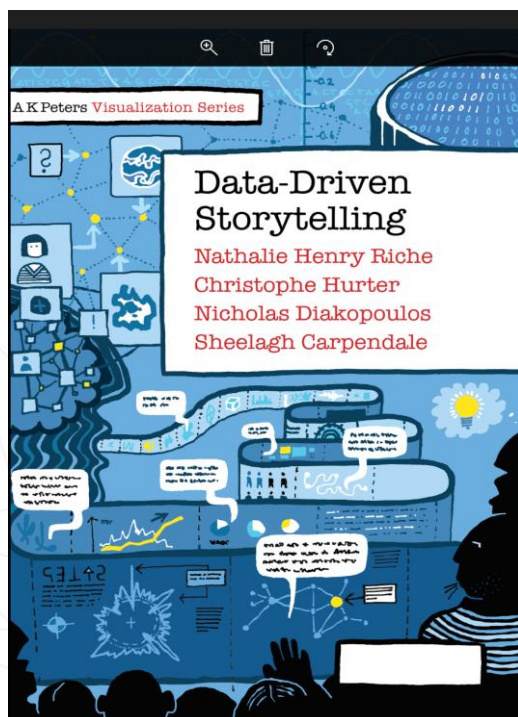
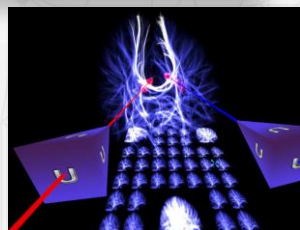
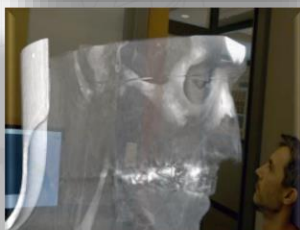
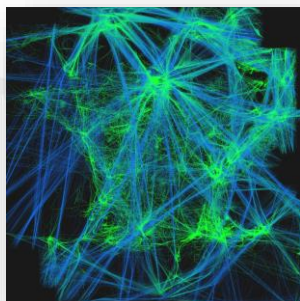
Professor

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[@TofHurter](#)



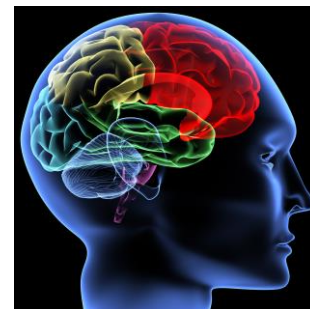
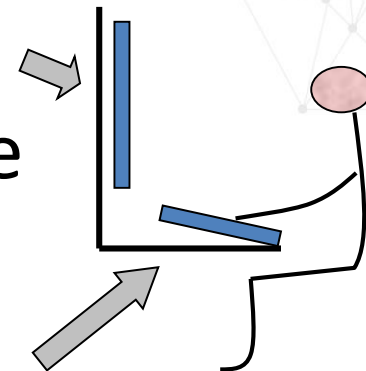
To Conclude

Some ideas to conclude

- Innovations could be of interest to conventional Towers
- Training has to be re-invented in such a context

Some ideas to conclude

- The digital environment facilitates the insertion of novel / innovative mechanisms and tools
- The technical Challenge is the opportunity to capture elaborate cognitive mechanisms



A decorative graphic in the top right corner consisting of a network of interconnected nodes and lines, resembling a mesh or a stylized aircraft structure.

Thank you for your time and attention

A decorative graphic in the bottom left corner consisting of a network of interconnected nodes and lines, similar to the one in the top right.

Any QUESTIONS ?