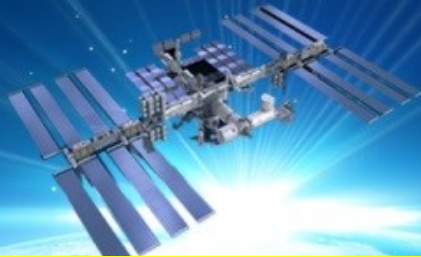


Istituto Nazionale di Astrofisica
Radio Astronomia



Bologna, 18 e 19 Maggio 2018

SRITAC 2 - 2018 Officine orbitali, primo livello di espansione civile nello spazio



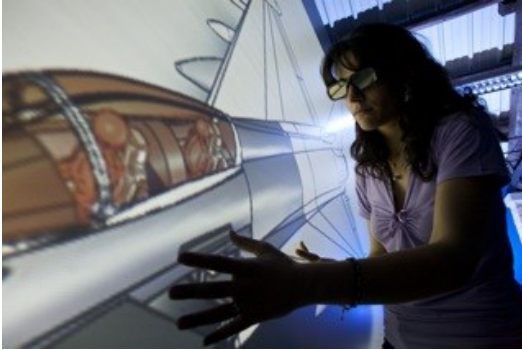
***Tecnologie Virtuali per l'Aerospazio/
Virtual Technologies for Aerospace
FRANCESCA DE CRESCENZIO, UNIVERSITA' DI BOLOGNA***

OUTLINE

- Introduction
- Virtual Reality and Augmented Reality for Aerospace
- Success Story: Retina (RETINA Resilient Synthetic Vision for Advanced Control Tower Air Navigation) Project – a SESAR 2020 PROJECT

UNIBO – VIRTUAL REALITY AND SIMULATION LAB

UNIVERSITY OF BOLOGNA – FORLÌ CAMPUS



Virtual Reality

- *Design and development of systems for **interactive visualization***
- *Experimental analysis of Virtual Reality techniques in **industrial applications***

Rapid Prototyping & Reverse Engineering

- *Experimental studies for efficient **product development** and manufacturing in:*
 - *Aerospace*
 - *Biomedical*
 - *Cultural Heritage*



Human Machine Interfaces

- *Project cooperations for innovative **cockpit infrastructures***
- *Prototyping of concepts of interfaces for future **ATM (Air Traffic Management)** systems.*

VIRTUAL REALITY AND AUGMENTED REALITY FOR AEROSPACE

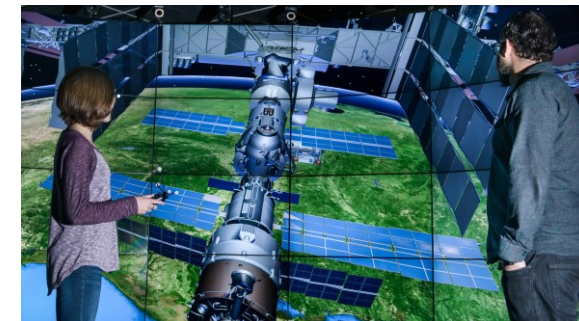
The Mixed Reality Continuum

Reality

Augmented Reality
Overlaps Computer Generated information onto the real World

Augmented Virtuality
Adds real information onto a computer generated environment

Virtual Reality



VIRTUAL REALITY AND AUGMENTED REALITY FOR AEROSPACE

Applications

TRAINING

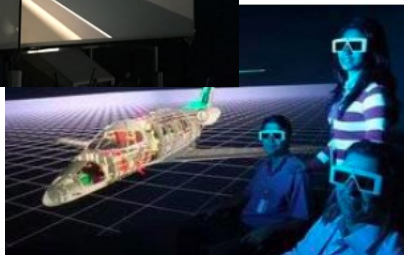
- Faster Learning
- Higher retention rates
- Real-Time Contextual Knowledge Injection (Eg. For maintenance or remote training)

DESIGN

- Improved User Centered Design Processes
- Enhanced collaborative design in complex Virtual Mock-ups
- Visual Data Integration

SAFETY

- Simulation of dangerous or difficult to replicate or live environments
- Creation of safer operational environments



VIRTUAL REALITY AND AUGMENTED REALITY FOR AEROSPACE

Challenges and Barriers



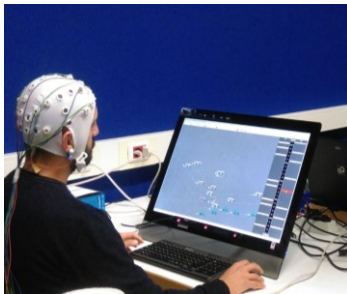
TECHNOLOGY

- Cumbersome Equipment
- Automation of Solutions
- Maturity of technological solutions (eg. Spatial Display vs. See through Display)



BUSINESS & Policy

- Cost of the Equipment
- Big Company Trends
- Industry 4.0



HUMAN FACTORS

- Sense of Presence
- Simulation Sickness
- Understanding of how human and system actors work together

VIRTUAL REALITY AND AUGMENTED REALITY FOR AEROSPACE

Evolution of Operational Concepts and Scenarios

“By 2050, passengers and freight should enjoy efficient and seamless travel services, based on a resilient air transport system thoroughly integrated with other transport modes and well connected to the rest of the world” (Flightpath 2050)

What is needed to achieve the performance ambition?



Automation support

Automation and use of data communications



Integrated systems

Lean and modular systems, easily upgradable and interoperable



Integration of all vehicles

All air vehicles fully integrated in ATM environment (incl. RPAS)



Sharing of Information

Information shared digitally via data services



Flight- and flow-centric operations

Airspace users fly their preferred business and mission trajectory in a flow and network context



Virtualisation

Virtualisation allowing more dynamic resource allocation

AUGMENTED REALITY FOR AIR TRAFFIC CONTROL: A SUCCESSFUL CASE STUDY – RETINA PROJECT

RETINA (Resilient Synthetic Vision for Advanced Control Tower Air Navigation Service Provision) is the concept of enhancing human sight capabilities and situation awareness in the control tower by means of synthetic vision.



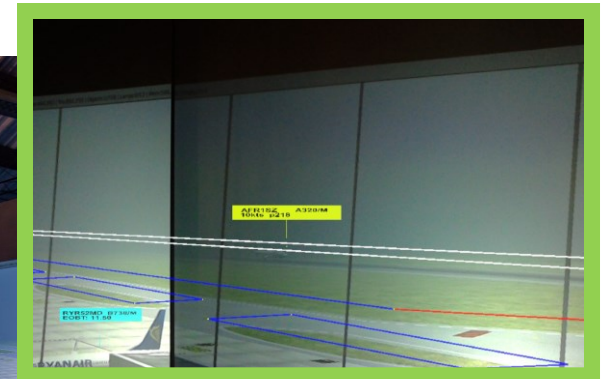
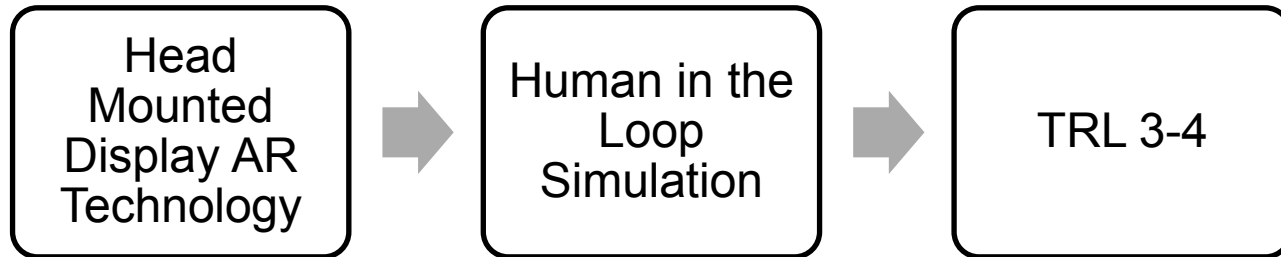
RETINA CONCEPT



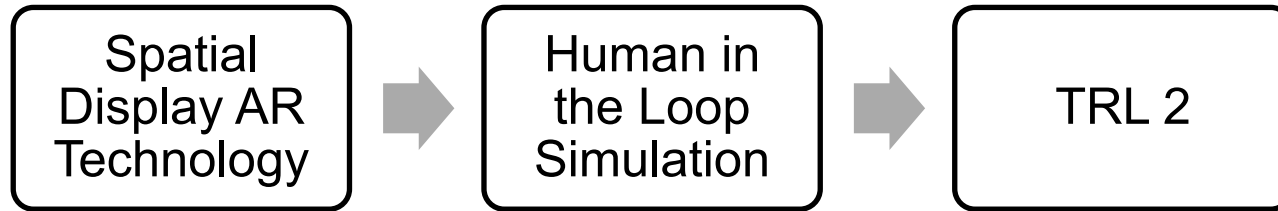
- In the RETINA concept, controllers are no longer limited by what the human eye can physically see out of the tower windows.
- As trust in digital data will continue to grow, RETINA's concept allows the controller to have a head-up view of the airport traffic even in low visibility conditions similar to the synthetic vision currently used in the cockpit.
- RETINA builds upon the technologies developed in SESAR, such as remote tower, safety nets, SWIM, to provide augmented reality tools for the tower controller.



CONCEPT VALIDATION



CONCEPT VALIDATION





RETINA is the Resilient Synthetic Vision for Advanced Control Tower Air Navigation Service Provision project



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