Virtual reality to Prepare Nuclear Operations

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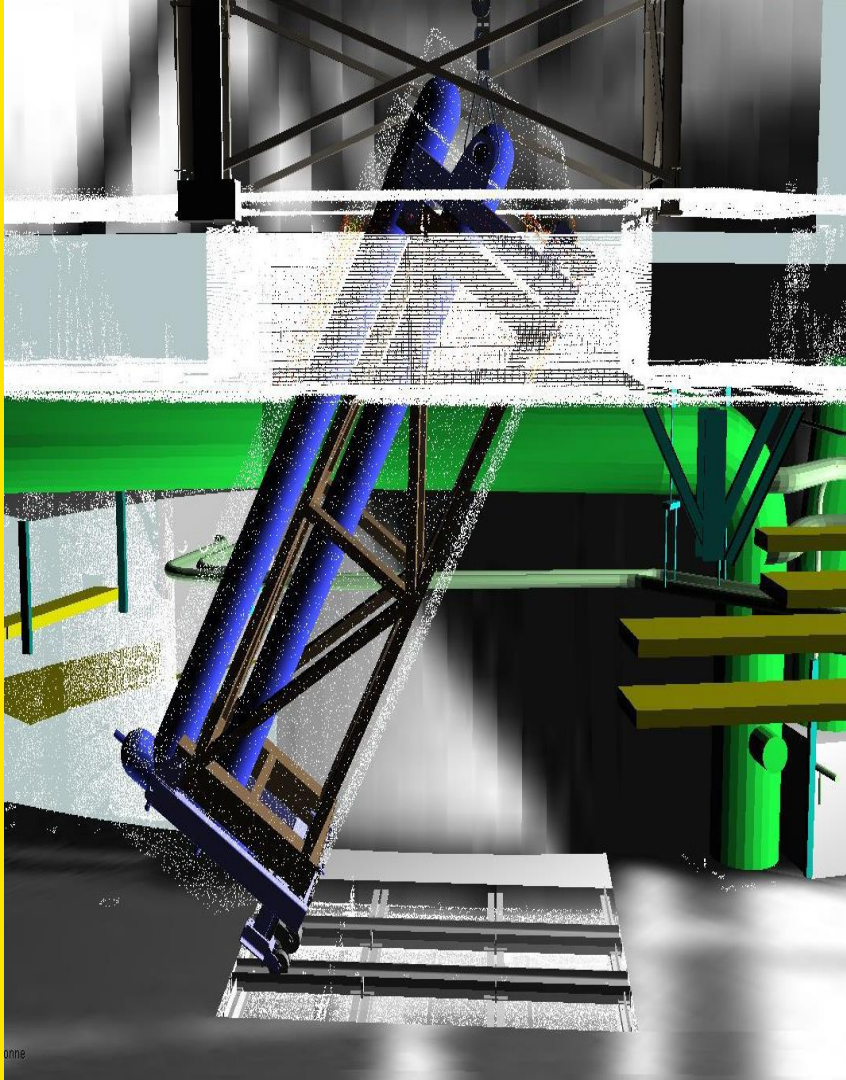
1. Introduction
2. Immersion with alternative reality
3. Application cases on nuclear activities
4. Learning interest
5. Conclusion

01

Immersion with alternative reality



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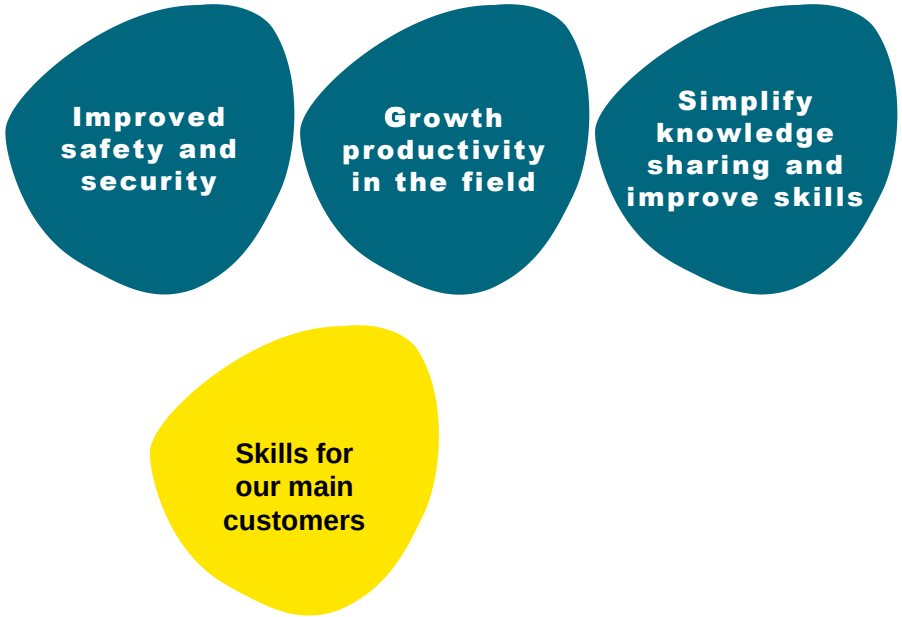
Alternative reality

- **Simulation**
  - Reproduce 3D environment closer to reality
  - Facilitate learning and understanding of your environment
- **Virtual reality**
  - Immersion in environnement
    - 3D modeling
    - Scan Integration
  - Preparation and training
- **Augmente Reality**
  - Interact with the real environment
  - Monitoring activity
- **Mixte reality**
  - 3D elements in a real environment
  - Interact on key elements superposed with the real environment

Three ambitions



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Application cases on nuclear activities

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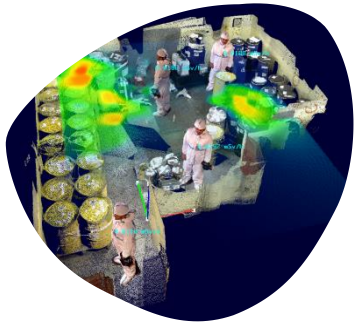
Augmented and virtual realities

Innovation examples to prepare projects

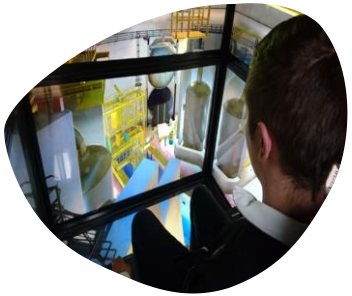
- **MANUELA™**

Construction of 3D radiological and topographical maps



- **Polar crane driving simulator**

Learning and training in the driving of a polar crane in a nuclear polar plant



- **Virtual Reality glasses**

Prepare an intervention, alone or in a team, through a virtual scenario before going on the field

- **Augmented reality glasses**

Go to the building site with digital and accessible data

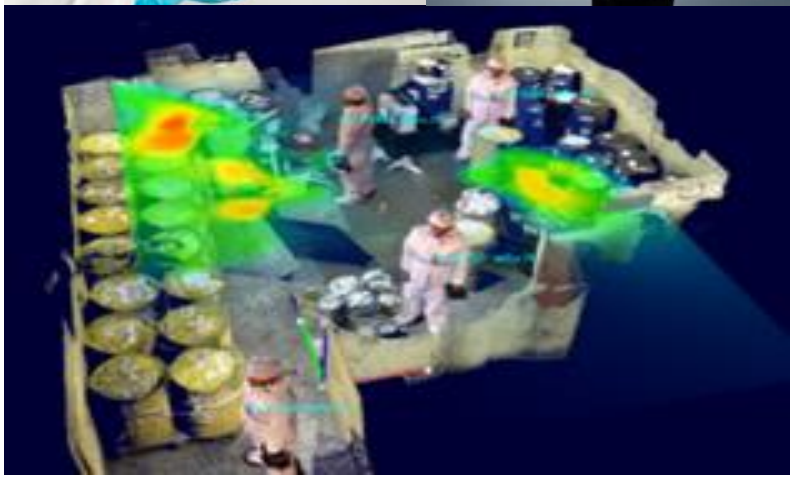
Operations preparation

- **Polar Crane driving simulator**
  - Identical reproduction of driver station
  - Incorporation of all typical scenarios related to movements to be performed during a unit outage
  - Possibility of adapting the scenarios to take account of exceptional cases
  - Incorporation of a foreman avatar with semi-artificial intelligence
  - Real-time monitoring of activity, possibility of interacting with the crane operator via the control desk
  - https://www.youtube.com/watch?v=hQHQDAA4aXw&index=7&list=PLqs_K3dKbUvcSKPip62KVCumfLyaKaIhS

- **Virtual reality glasses**
  - Training of crane operators, foremen and operators in a share environment
  - Preparation and training in the handling of large components, through the creation of specific scenarios (lifting machine, negative pressure machine, steam generator, etc.)
  - Simulation of co-activity, risks and specific limitations (radiological, time,equipment, etc.))
  - Integration of unexpected events, exposing operators to exceptional situations without any risk
  - https://www.youtube.com/watch?v=B-Q0aQ2aCMY&list=PLqs_K3dKbUvcSKPip62KVCumfLyaKaIhS&index=5

Operations preparation

- **Manuela**
  - **3D radiological mapping**
    - Simultaneous 3D radiological and topographical mapping of facilities
    - 3D reconstruction of the existing environment
  - **Spatial identification of the location of hot spots and their characteristics**
    - Visualization of the distribution of the intensity of gamma radiation
    - Spatial identification of irradiation sources location and characteristics
  - **Assessment of the accumulated operators dose performing interventions**
    - Integration of virtual operators into the reconstructed mapping
    - Assess the accumulated dose of personnel performing interventions
    - Simulation of operating scenarios and optimization of workstations
  - **Transmission of information to teams prior to performing intervention**
    - Present the worksite environment to the operators,
    - Export of data to a virtual reality interface for immersion of operators into the workspace
    - https://www.youtube.com/watch?v=nfq_AFlYp6A&index=12&list=PLqs_K3dKbUvcSKPip62KVCumfLyaKaIhS



03

Learning interest

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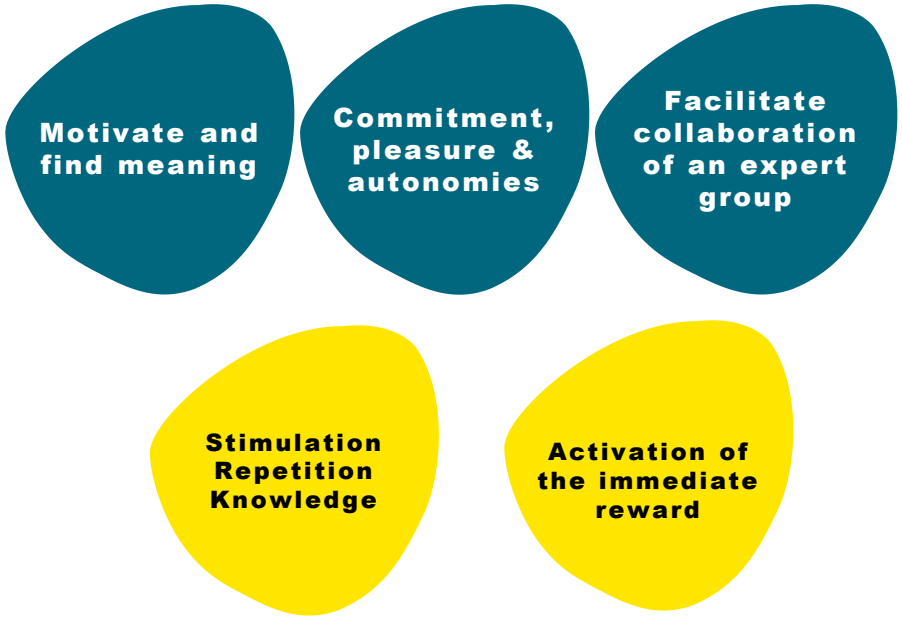
Learning interest

- **Training room : Learn in immersion**
  - Impact on all senses
  - Simplify learning with technical gestures performing
  - Simplify collaboration and sharing
  - Rehearse and repeat the gestures, understand the risks and thus make the intervention more reliable

- **On the ground : Field help**
  - Facilitate access to documentation for all employee
  - Being the vector for the data capitalization from the field
  - Decision support
  - Facilitate skills & knowledge transmission



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Conclusion

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Donnons toute sa valeur au nucléaire