Virtual reality applied to professional risk training

VirtuElec : A Tool Designed by and for Students for Training in Electrical Hazards

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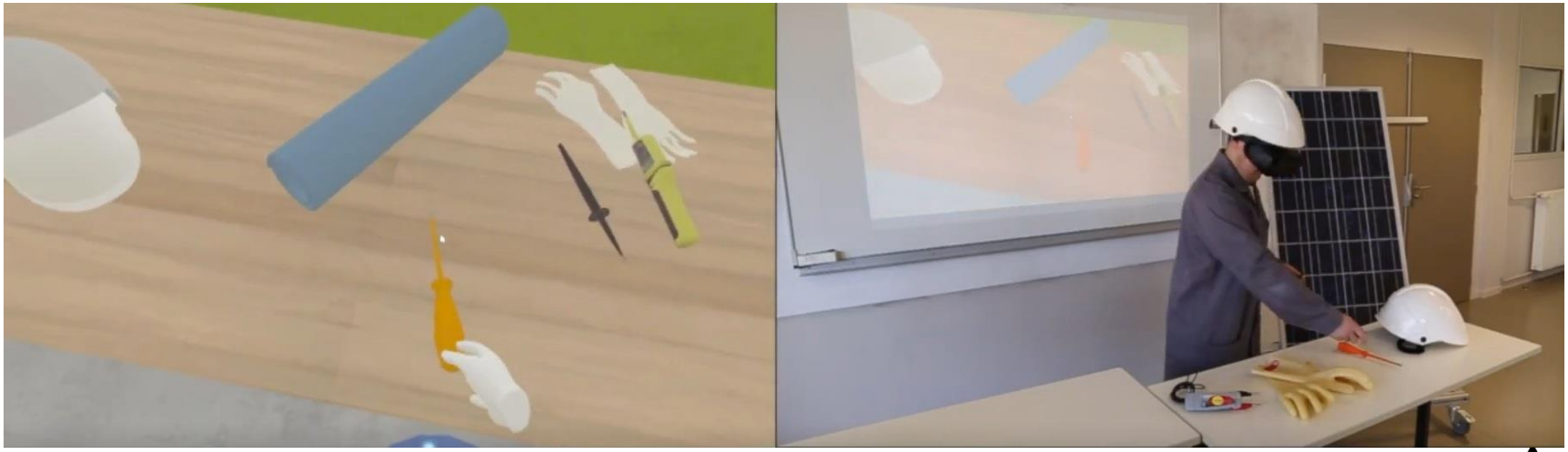

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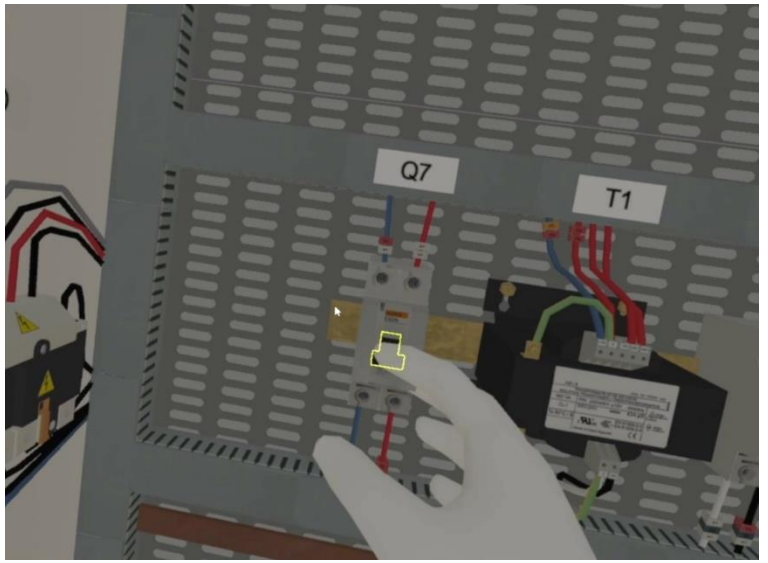
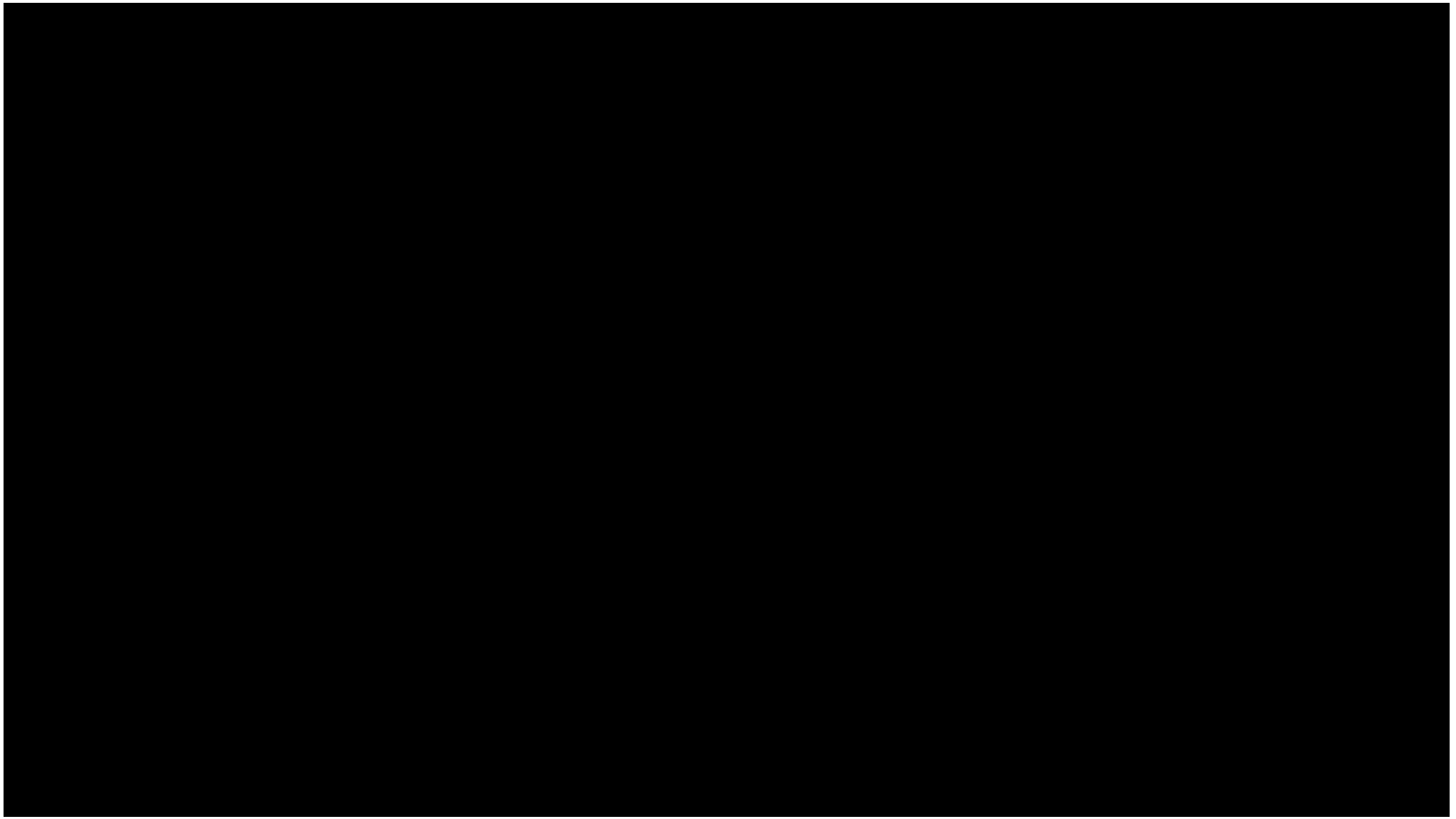
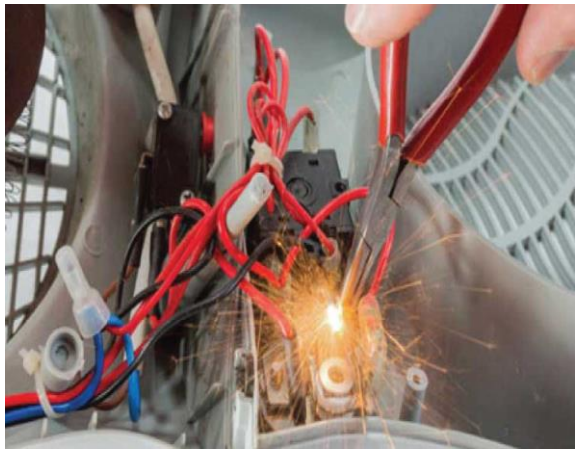


Introduction



Introduction



⇨ Good knowledge of electrical hazards essential for students in electrical engineering.

⇨ Development of apprenticeship training : learners increasingly confronted in their training course with potential danger in an industrial environment.

⇨ Training equipment exist but generally not realistic enough, or if they are realist (presence of real risks) : situation stressful for the student and for the trainer

⇨ VirtuElec project : co-development of a virtual environment with different scenarios of electrical risks.

⇨ Different expertise level simulated : a mission is given and the right decisions must be taken (choice of intervention and protection equipment, behavior, professional gestures).

Originality of the project : A real partnership with a company, really involving students co-developing the tool in terms of ergonomics and functionality:

An educational tool developed by students for students.

Context

⇨ **Virtual reality for safety and health education more and more widespread**

<u>Advantages</u> :

. Possibility of exploring an environment of potential danger without risks to oneself, others or equipment

. Possibility to perform actions and make mistakes without feeling the pressure of other colleagues or the assessor

. Obligation to be a real actor of his or her formation

<u>Specific case of electrical hazards</u> :

. Still one of the main causes of fatal accidents in industrial environments

. Virtual reality already used for the training of electricians working on substations, in construction or power distribution networks

. Generally designed for experienced professionals

<u>VirtuElec project's approach is complementary to these developments</u>:

. Designed for students with no professional experience

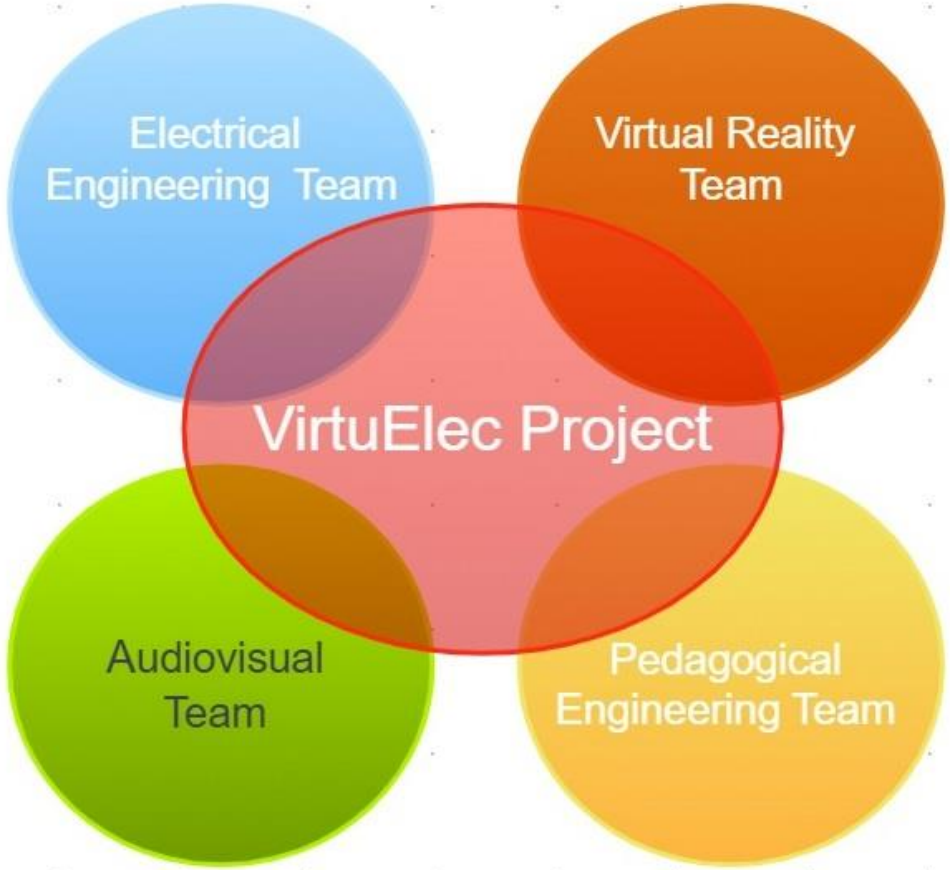
⇨ **virtual environment intended to make students discover their real future environment**

⇨ **necessity to simplify the environment**

⇨ **Wide target audience and electrical hazard situations**

⇨ **virtual environment compatible with several intervention scenarios.**

Methodology



<u>Project team</u>: close partnership between :

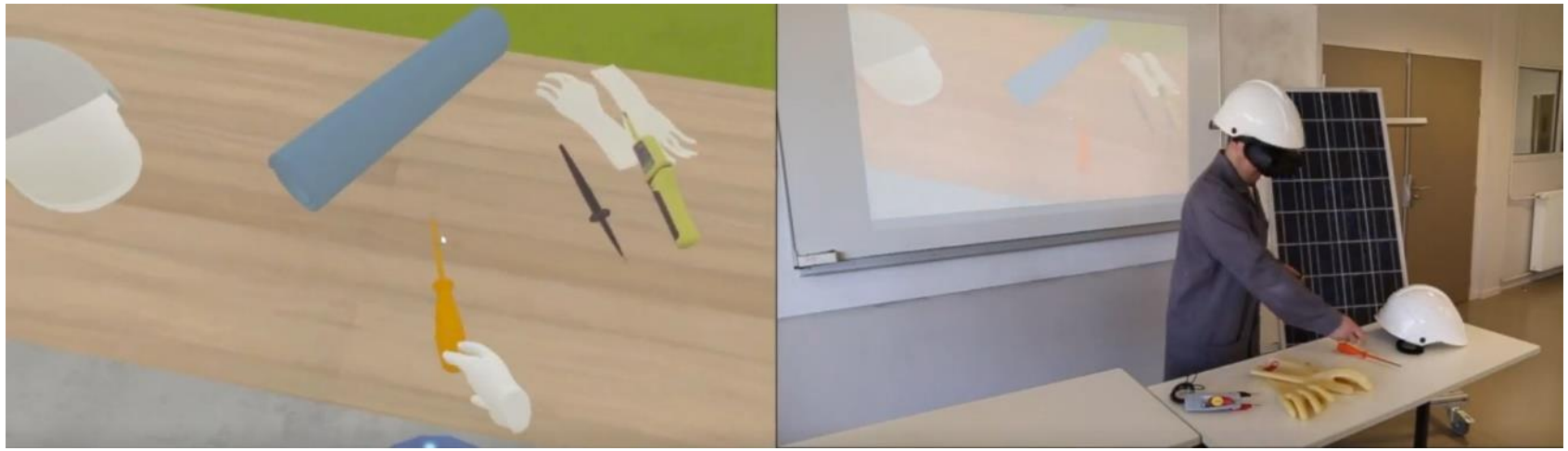
- ⇨ **the Electrical Engineering Team (2 teachers, 2 technicians and 9 undergraduate students)**
- ⇨ **the Partner Company, a specialist in virtual reality and recipient of several awards in this field**
- ⇨ **the Audio-visual Team (2 technicians)**
- ⇨ **the Pedagogical Engineering Team (2 pedagogical engineers)**

Methodology

Virtual environment developed to be implemented on Oculus Quest 2 virtual reality headsets

Possibility of connecting the helmet to a large screen for demonstrations

Possibility to record the journey of each learner in the virtual environment in video format, to be able to debrief a posteriori.



Methodology

Results

Pedagogical interest : creation of a custom VR tool + pedagogical approach of co-design including future users
⇨ Tool still under development : analysis of the impact on the electrical risk training of students not possible yet.

Analysis of co-designing the teaching support involving the students themselves :
Pedagogical follow-up (questionnaires) : collect the feelings of students on different aspects :

Overall satisfaction level of 9.5/10 :
100% satisfaction for the autonomy given to students 89% very satisfied, 11% satisfied for the support and follow-up

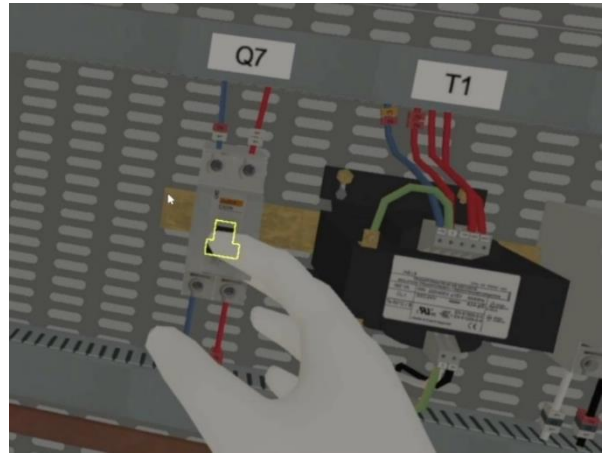
Support : no difficulty managing the high number of interlocutor : Collaborative work evaluated as an asset by 78% of students, both an asset and a constraint by 11% and neither an asset nor a constraint by 11% of students

Links between the project and teaching : students feel they have developed competence in fields not directly related to their core training, electricity : 56% strongly agree and 44% agree with this perception.
They are also aware that they have made progress on aspects related to electrical safety, but less noticeably:
0% strongly agree 78% somewhat agree and 22% somewhat disagree with this perception
⇨ Clearly students underestimate their rise in competence in electrical hazards

Multidisciplinary and collaborative dimensions of the project : the most appreciated by the students, more than the technical contribution on the heart of the subject (management of electrical risks)
Perception of the main skill developed : 56% the ability to communicate with interlocutors from various fields of competence, 33% the ability to formalize expectations and only 11% the ability to master the technical elements.

Conclusion

The VirtuElec system allows the learner to be truly immersed in the virtual context



Students projected into their future professional world, and progress at their own pace, with a level of autonomy that they can manage

The realization of this project by the students aroused a great deal of enthusiasm

The organisation of the project team as an engineering office allowed a lot of interaction within the micro-enterprise thus formed.

<u>Initial idea</u> : involve students in the design of teaching tools

⇨ enable students to develop technical and pedagogical skills

<u>Evaluation results</u> : students placed greater emphasis on the opening of their field of expertise to virtual reality, video production, and team-based collaborative work experience.

⇨ Highlighting the perception gap between teachers and students perception :

⇨ allow to better support future initiatives.

Acknowledgements

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CAP 20-25 I-SITE Clermont Clermont Auvergne Project

Innover, c'est dans notre nature
Innovation. It's in our nature

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Thank you for your attention