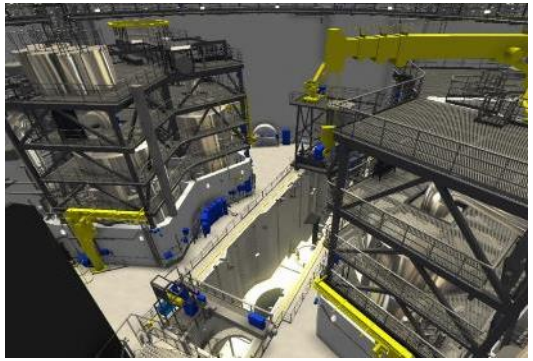
RÉALITÉ VIRTUELLE COLLABORATIVE



Arnaud MAS

EDF R&D,
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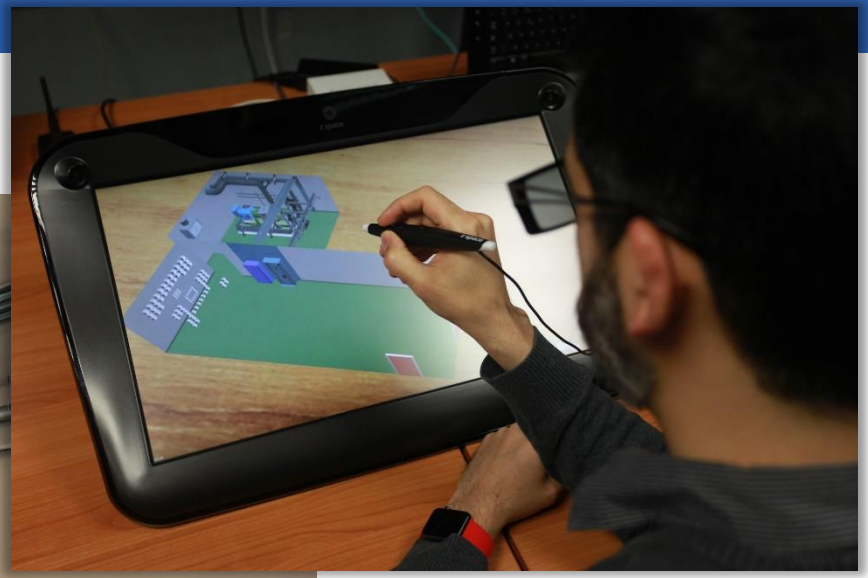
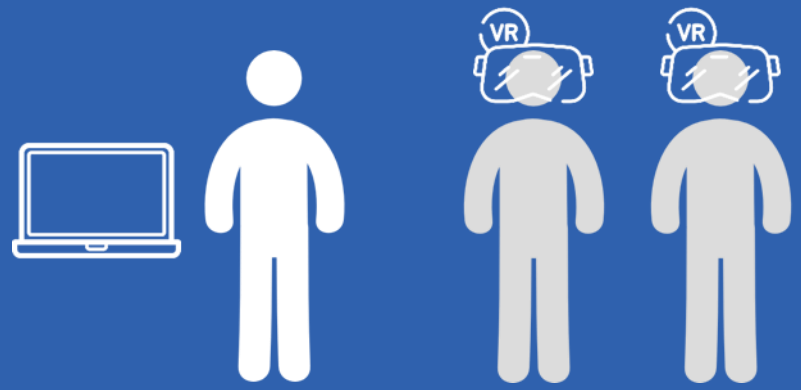
Groupe « Réalité Virtuelle et Visualisation Scientifique »

Communiquer en réalité virtuelle

Communiquer en réalité virtuelle



Indy : chasse au trésor virtuelle et collaborative dans un bâtiment réacteur



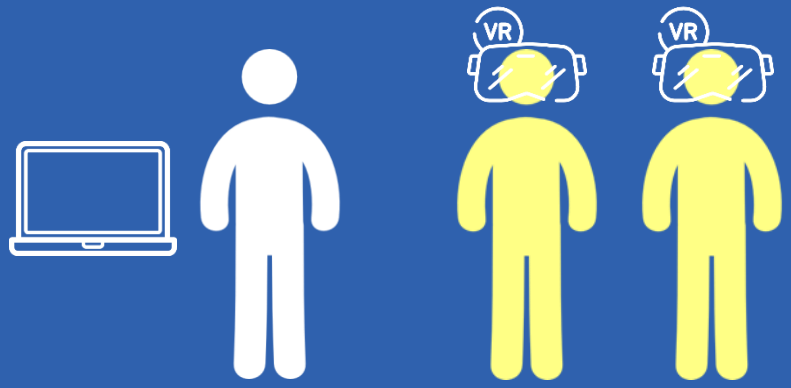
Indy : principes de conception

- Collaboration
- Gamification
- Entraînement à la navigation spatiale

Collaboration

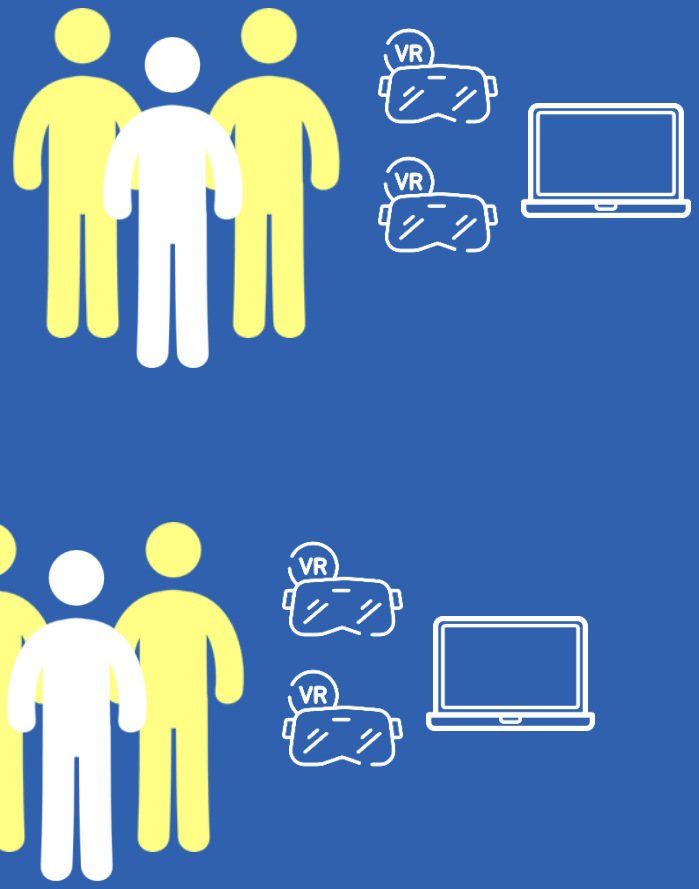
Deux rôles parmi les apprenants :

- Radio
- Chasseurs



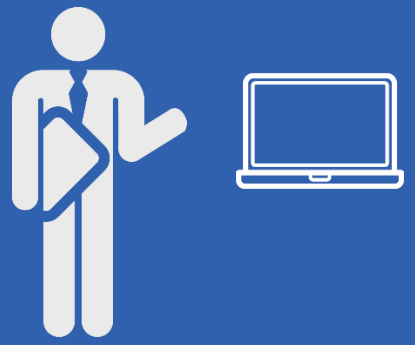
Chasse au trésor

- 1 formateur
- 12 stagiaires répartis en 4 équipes



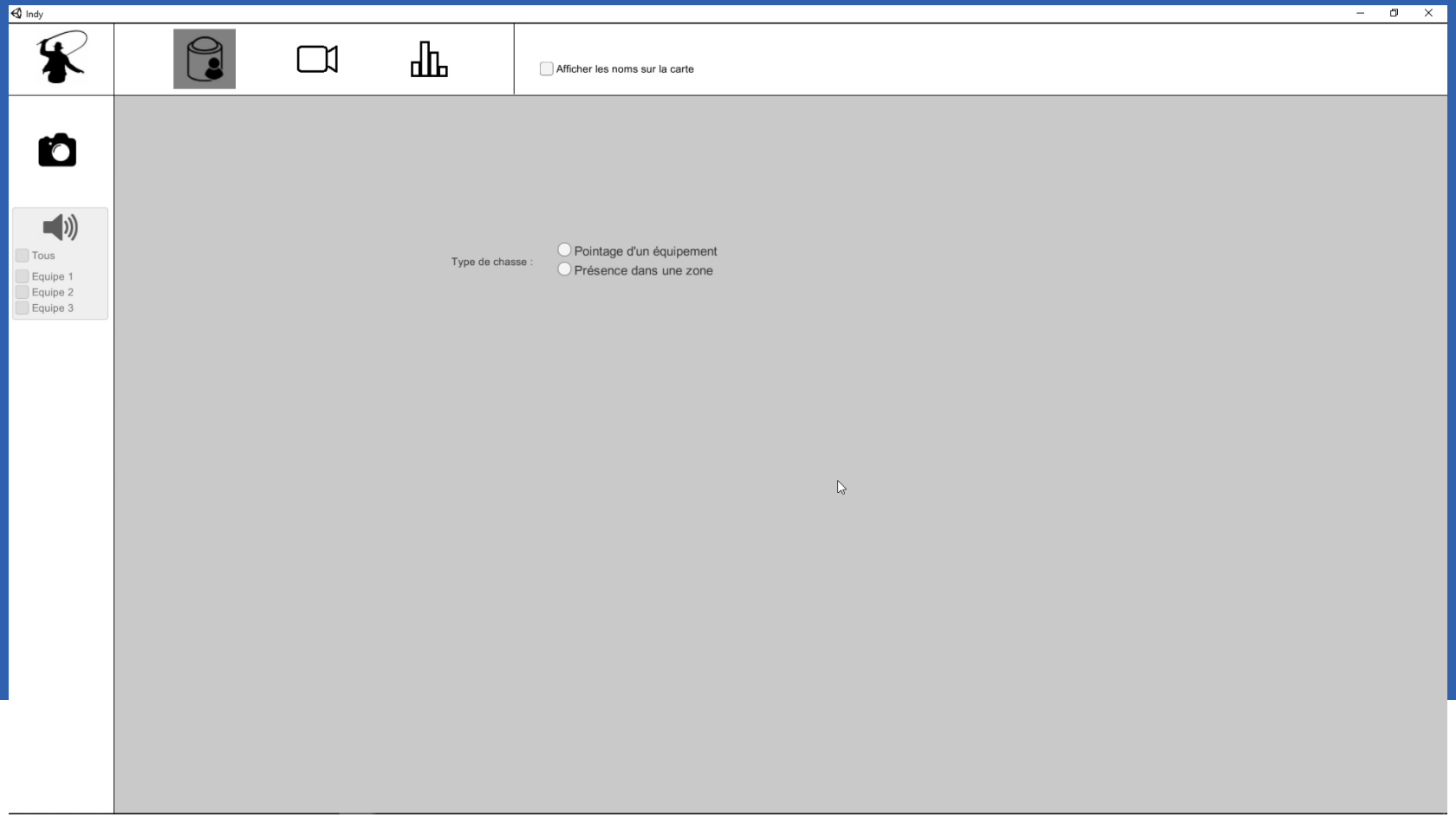
Chasse au trésor

1. Le formateur crée la chasse



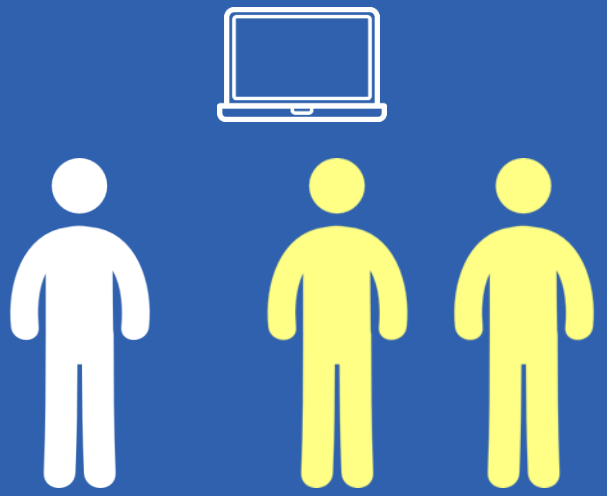
Chasse au trésor

1. Le formateur crée la chasse



Chasse au trésor

2. Les stagiaires préparent la chasse



Chasse au trésor

2. Les stagiaires préparent la chasse

Chasse au trésor

3. La chasse

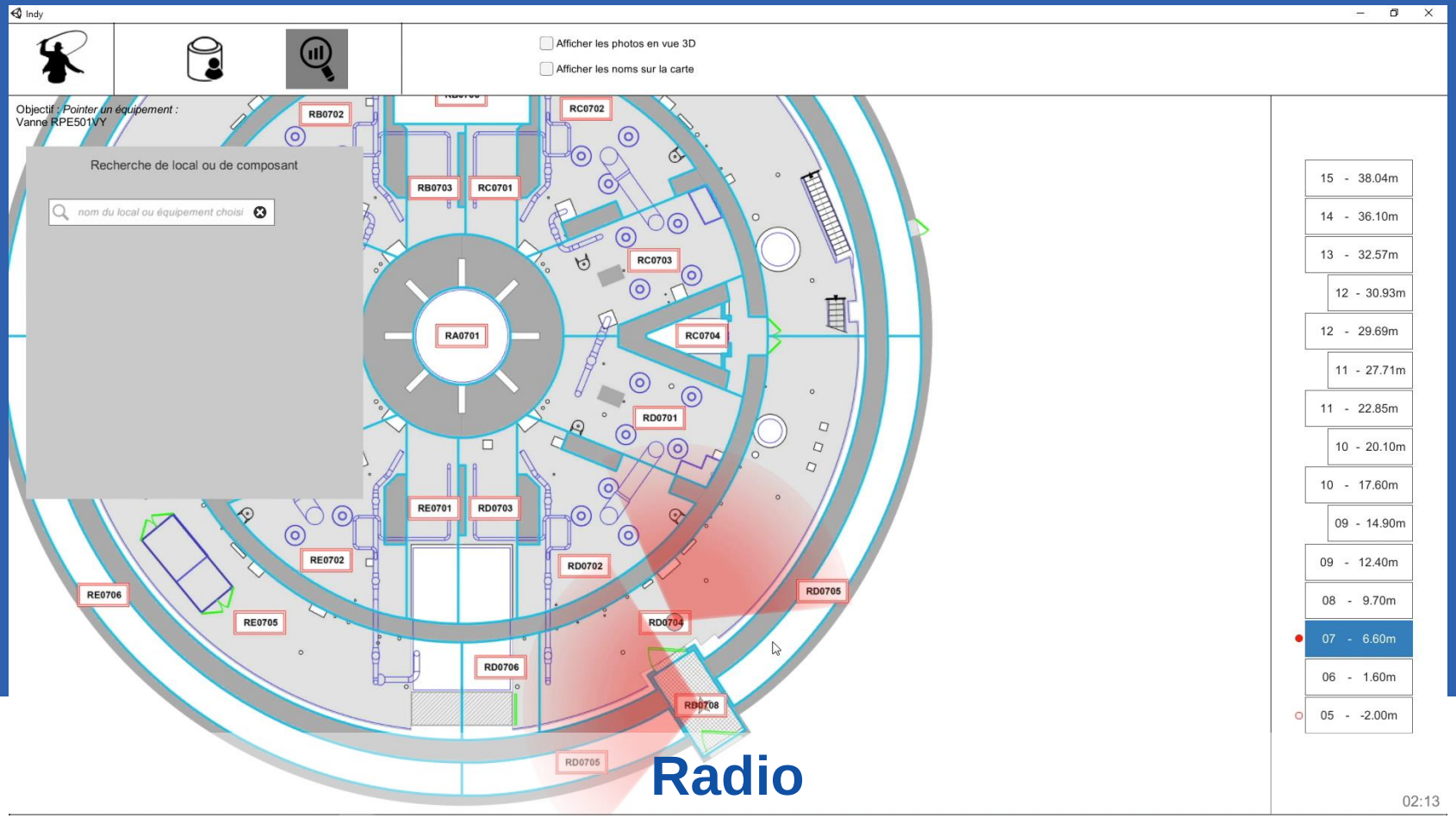
Chasse au trésor

3. La chasse

Chasseur

Chasse au trésor

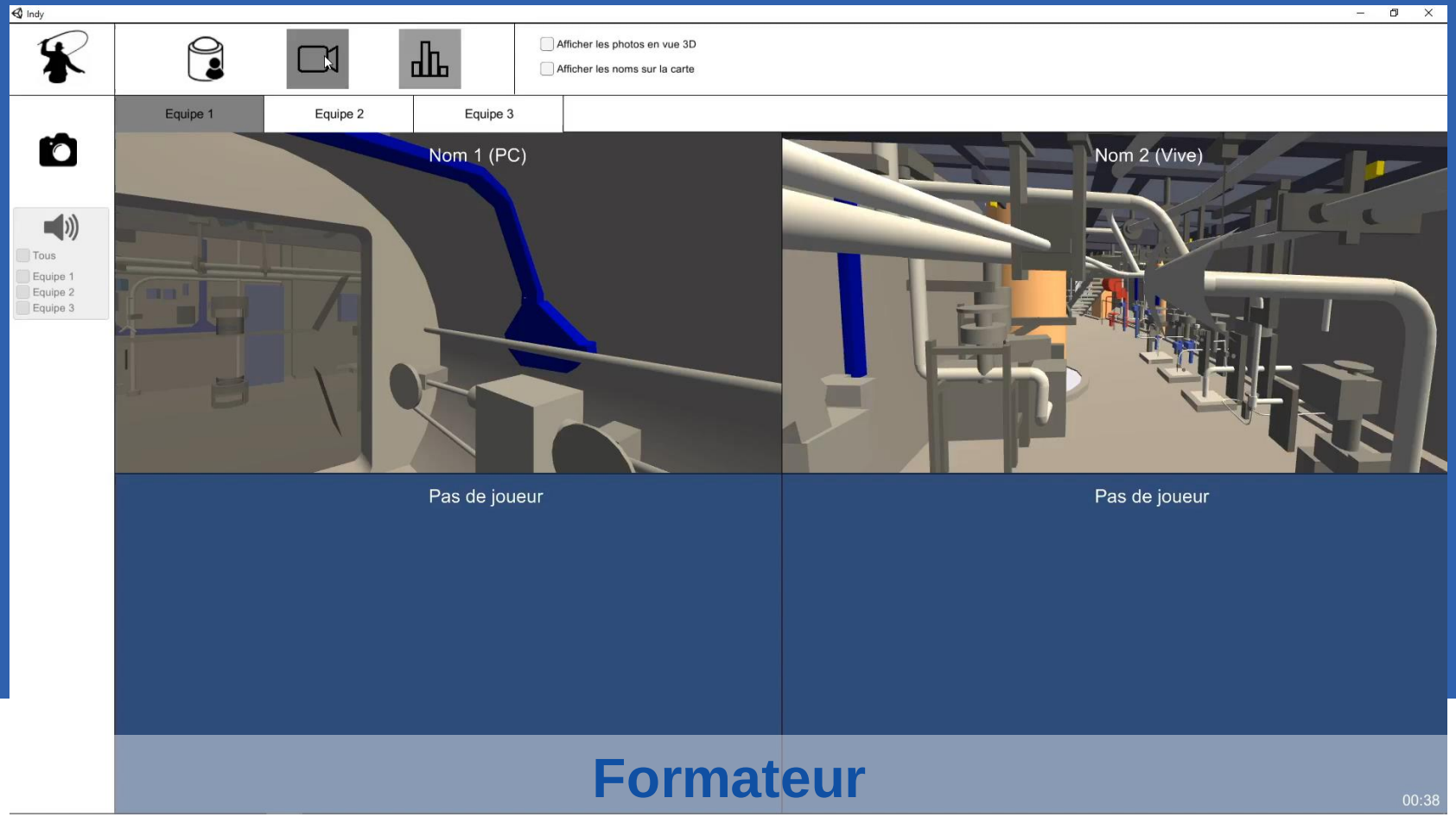
3. La chasse



Radio

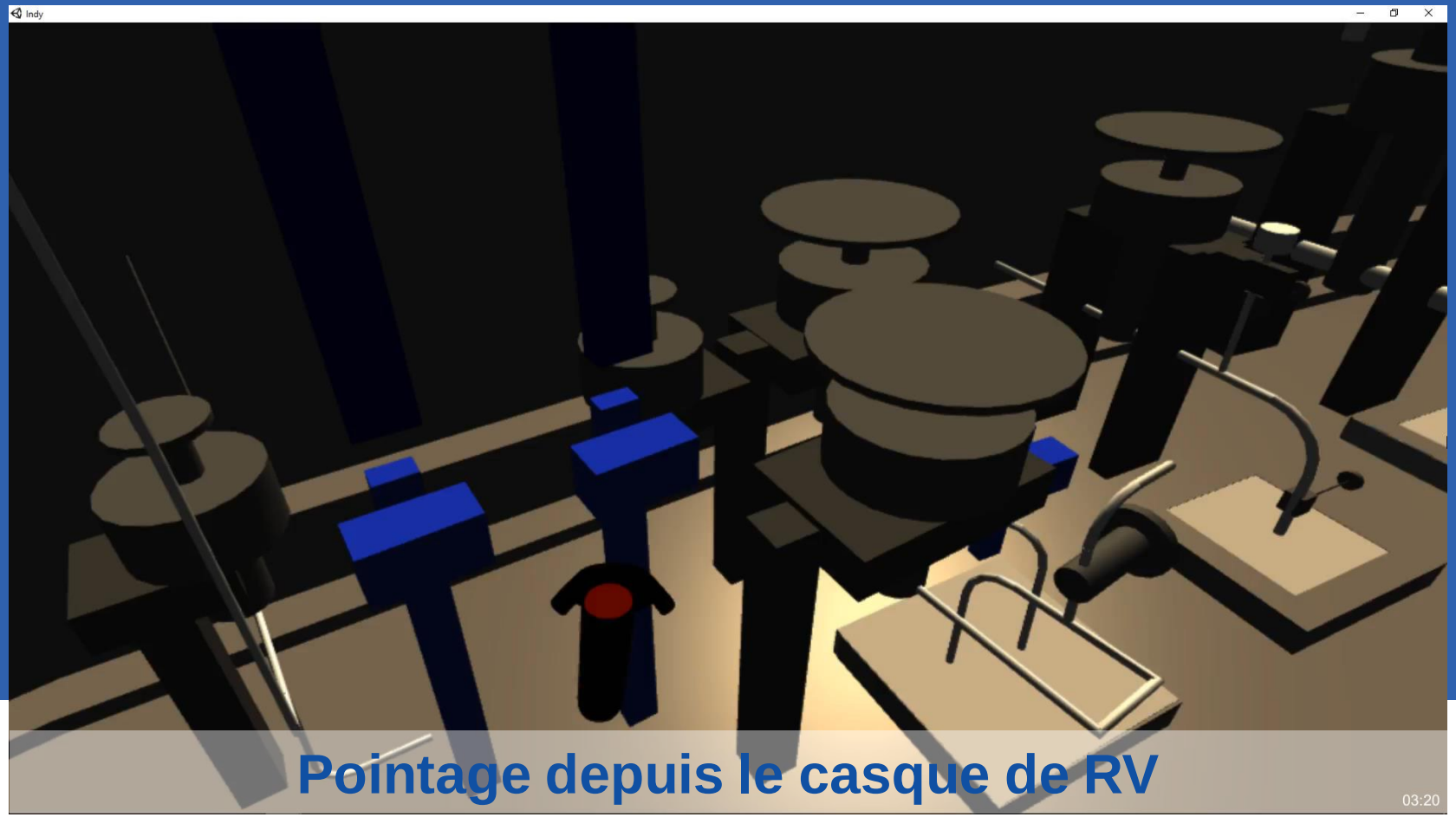
Chasse au trésor

3. La chasse



Chasse au trésor

3. La chasse



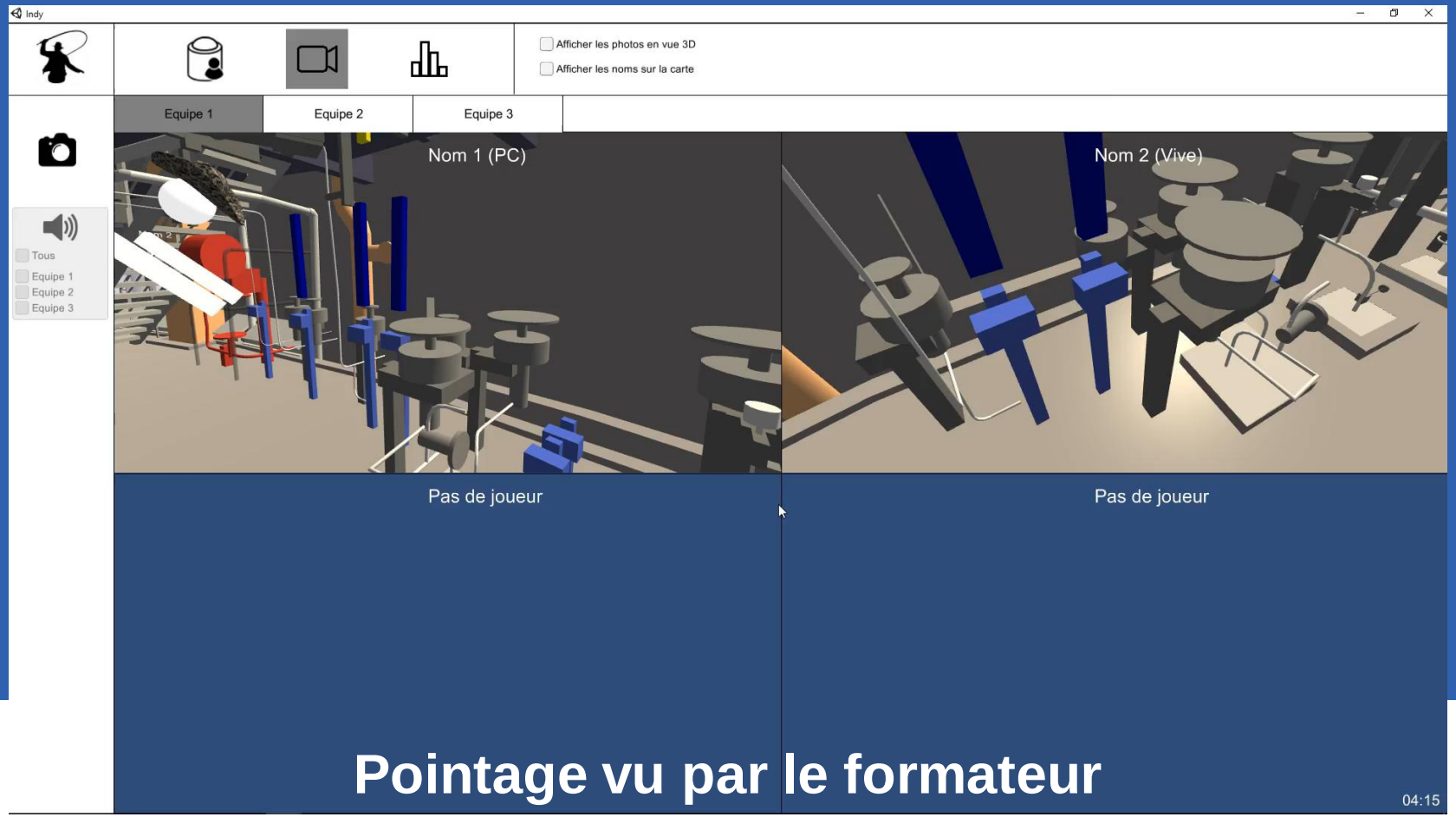
Chasse au trésor

3. La chasse

Pointage vu par le radio

Chasse au trésor

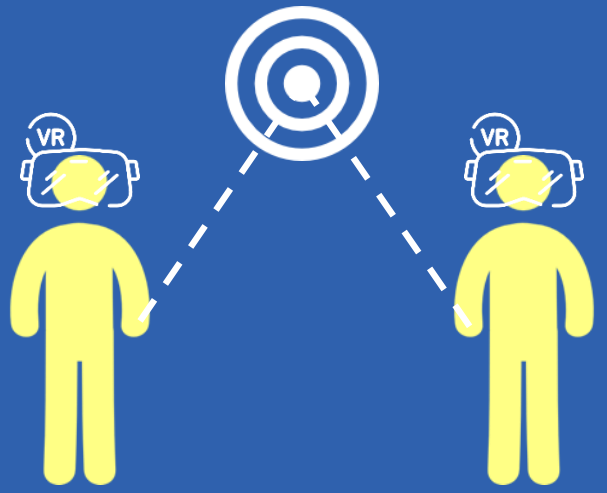
3. La chasse



Pointage vu par le formateur

Chasse au trésor

4. Les chasseurs pointent l'objectif

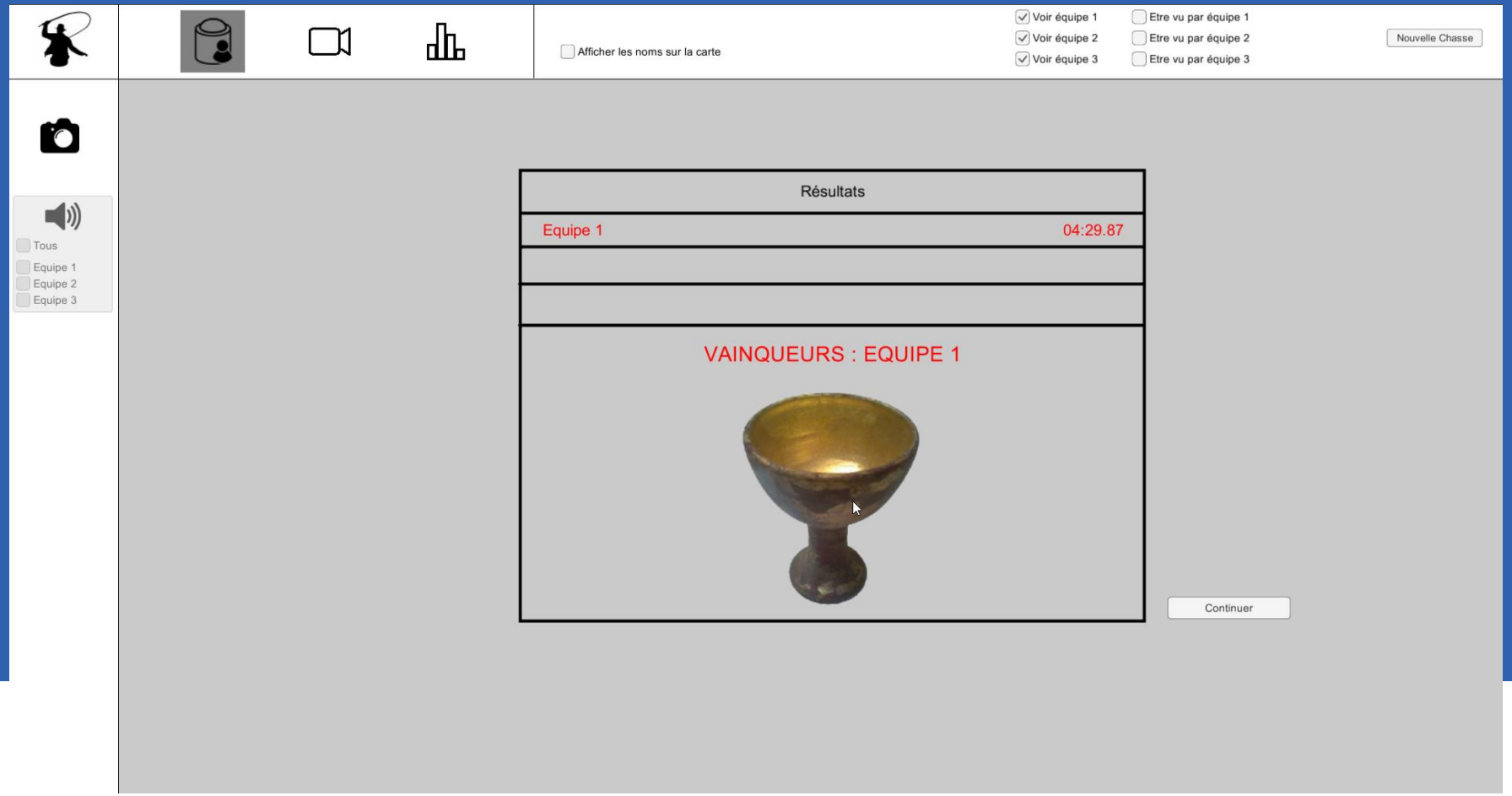


Chasse au trésor

4. Les chasseurs pointent l'objectif

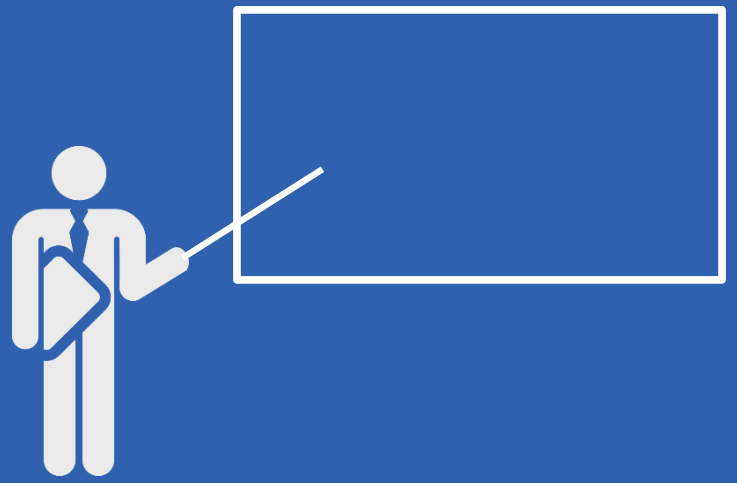
Chasse au trésor

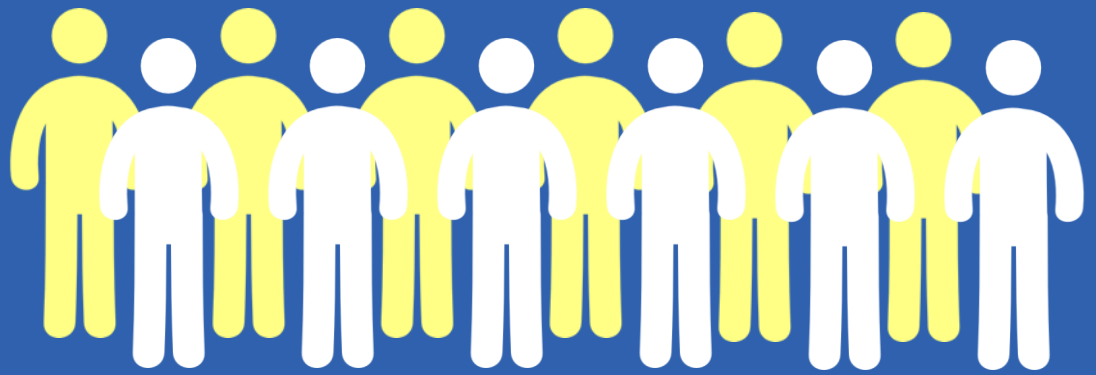
5. Fin de la chasse



Chasse au trésor

6. Débriefing





Chasse au trésor

6. Débriefing

Communication

Arnaud Mas, Idriss Ismaël, Nicolas Filliard

Indy: a virtual reality multi-player game for navigation skills training.

Fourth IEEE VR International Workshop on 3D Collaborative Virtual Environments (3DCVE 2018), Mar 2018, Reutlingen, Germany.

https://hal-edf.archives-ouvertes.fr/hal-01835801

Indy: a virtual reality multi-player game for navigation skills training

Arnaud Mas*, Idriss Ismaël*, Nicolas Filliard*

* EDF R&D, Palaiseau, France

ABSTRACT

Working in complex industrial facilities requires spatial navigation skills that people build up with time and field experience. Training sessions consisting in guided tours help discover places but they are insufficient to become intimately familiar with their layout. They imply passive learning postures, are time-limited and can be experienced only once because of organization constraints and potential interferences with ongoing activities in the buildings. To overcome these limitations and improve the acquisition of navigation skills, we developed *Indy*, a virtual reality system consisting in a collaborative game of treasure hunting. It has several key advantages: it focuses learners' attention on navigation tasks, implies their active engagement and provides them with feedbacks on their achievements. Virtual reality makes it possible to multiply the number and duration of situations that learners can experience to better consolidate their skills. This paper discusses the main design principles and a typical usage scenario of *Indy*.

Keywords: Collaborative virtual reality, learning, gamification, spatial navigation.

1 INTRODUCTION

Developing spatial understanding of an industrial building's structure can be quite difficult. Indeed, the facility priority use is production. In particular, learning sessions in such a building, even short ones, have to meet the production constraints such as busy schedule and safety measures.

Virtual learning environments (VLE) offer a great alternative for learning tasks difficult to undertake in the real world [4]. Indeed, they allow learners to visit a facility without any consideration about availability, distances or safety. They also give trainers the possibility to modify characteristics of the environment beyond what is possible in real life. They give learners the possibility to learn through active action instead of passive knowledge acquisition, as explained for instance by Pan et al. [14]. Besides, attention, active engagement, feedback and strengthening phases are important in a learning process to ensure effective acquisition of knowledge, as already identified by Dehaene [5] in the way children learn how to read.

Indy is a new virtual reality application for professionals who will work in industrial facilities. It aims at helping them get familiarized with the facilities during their training period. It is designed to provide professional trainers a tool to build new pedagogical strategies based on virtual reality.

2 DESIGN PRINCIPLES

2.1 Collaboration

Literature tend to show that fostering social interactions and collaboration leads to higher learning efficiency for a virtual group [5][11][19]. Based on this hypothesis, we designed *Indy* to foster collaboration in a learning context, as defined by Roschelle et al. [16]: "the mutual engagement of participants in a coordinated effort to solve the problem together".

According to Slavin [19], group goals and individual accountability can contribute to collaborative learning achievements. Kreijns et al. [11] also cite positive interdependence and promotive interaction as levers to enforce collaboration. The authors insist on the fact that "the key to the efficacy of collaborative learning is social interaction, and lack of it is a factor causing the negative effectiveness of collaborative learning". Nonetheless, they point out that technology allowing communication won't automatically imply social interaction, and that off-task casual communication is important for group cohesion.

Indy offers trainers a tool to create a training scenario where several teams are immersed in a virtual industrial building, relying on an asymmetric collaboration method [12]:

- Some learners are immersed, using a head mounted display (HMD), in a virtual mockup of the building. They will play the "hunters", who will have to find their way to the objective.
- Some learners use floor maps and 360° photographs, on a desktop computer. They will play the "radios", who will have to guide the hunters.

With this method, learners have access to complementary information according to their role: each one has a key capability to achieve the scenario objective. This makes the communication within the team necessary to navigate in the virtual building. Besides, each team member has a particular point of view and professional background that can be shared with the other team members either to help one to be more efficient or to explain his/her choices.

In *Indy*, communication between teammates relies on two components: oral communication and pointing at objects in the 3D environment. This way they can help each other, share their viewpoints to confirm the itinerary (current position and future direction) and identify the objective.

However, communication is not limited to the VLE: *Indy* is designed as part of a full training sequence, during which the trainer and the learners are physically in the same room. Although VLEs allow virtual teams, with physically separated members [10], we wanted to preserve the training sequence, which fosters social interaction.

2.2 Gamification

Gamification can be defined as "the use of game design elements in non-game contexts" [6]. It is commonly used to increase users' motivation and engagement [8][15]. Nah et al. [13] list the following design elements commonly used in gamified applications, in the educational and learning contexts: points, levels/stages, badges, leaderboards, prizes and rewards, progress bars, storyline, and feedback. Sailer et al. [18] also list specific elements known to show positive effect on users' motivation: points, badges, leaderboards, performance graphs, meaningful stories, avatars and teammates.

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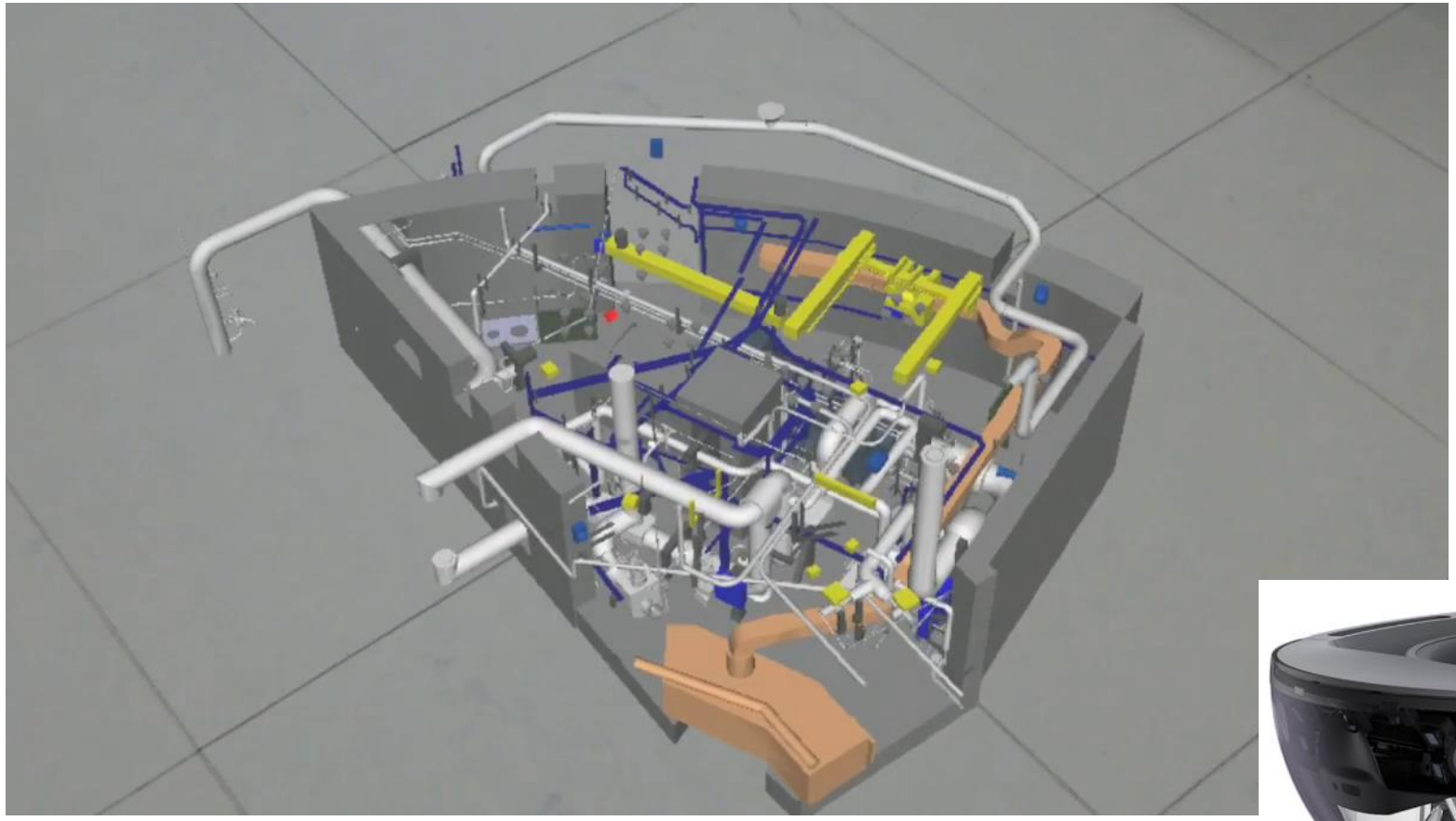
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