



# Virtual reality for fire investigators trainings

*Utilisation de la réalité virtuelle pour la formation à l'enquête post-incendie*

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## Trainings for fire investigators





## Limits of in situ training

- Scenes degrade over time and participants : need to clear the scene to investigate
- ➔ Need to create a digital copy of the scene
- ➔ Usefull for both trainings and real investigations





**Fire investigator training**

**3D scene reconstruction**

**Digital training material**



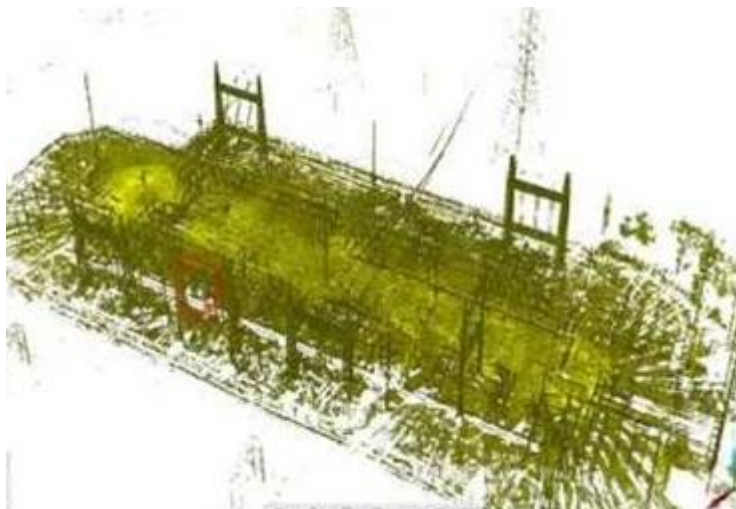


## 360 Cameras and LiDAR scans



### 360 Camera

- HDR photo capture



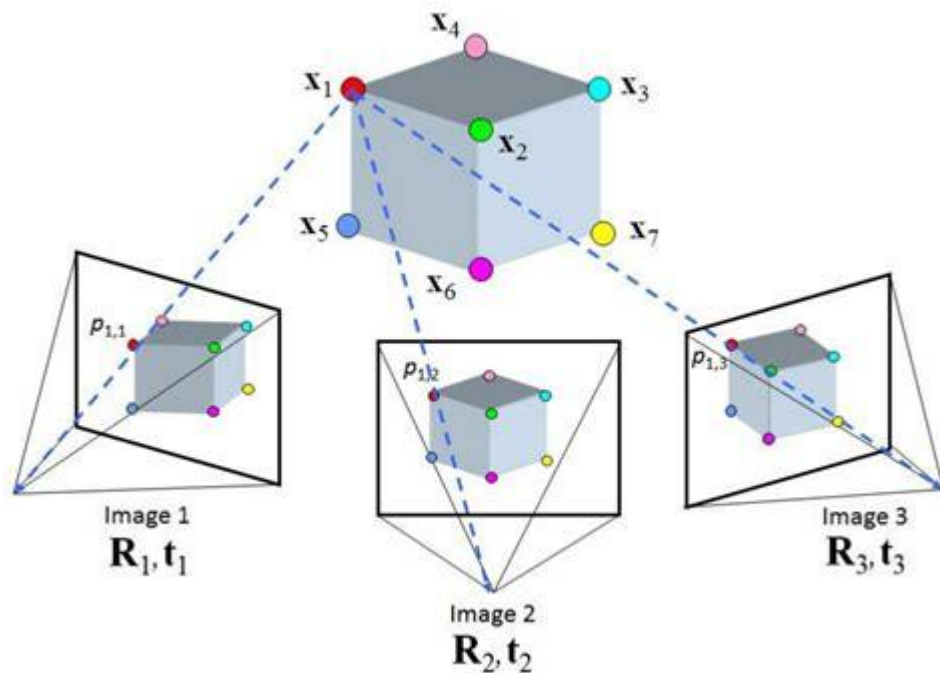
### LiDAR

- Accurate point cloud (but massive)





## Photogrammetry



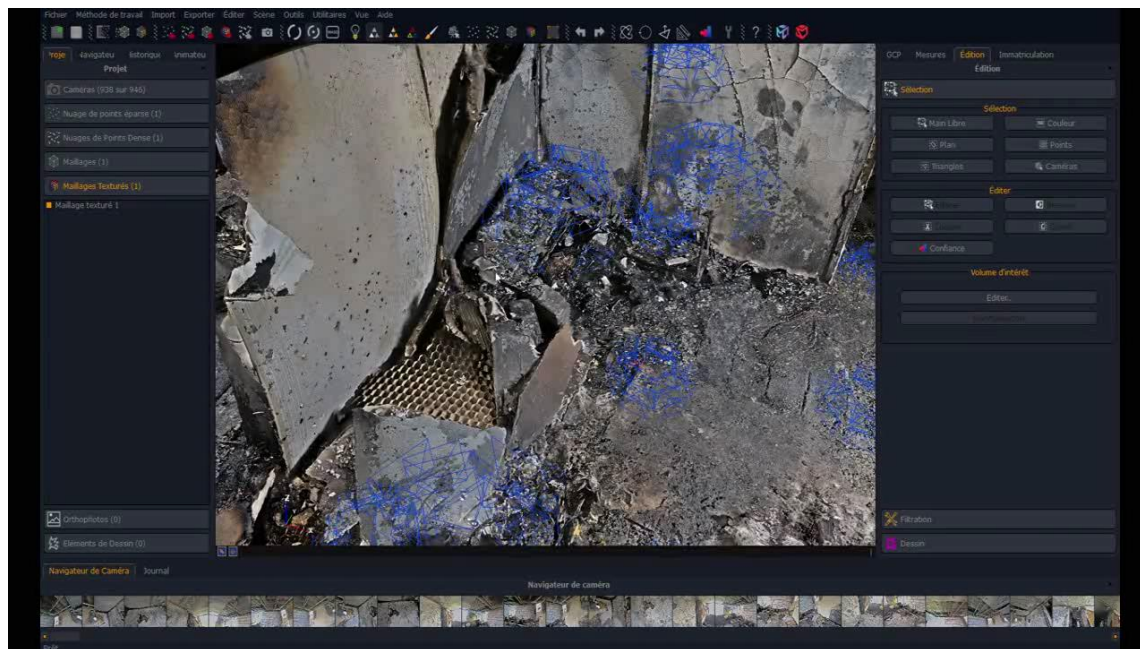
Several photos from different angles

Reconstruct photo positions from images

Construct a point cloud, then a textured mesh



## Focus on photogrammetry : pros and cons





## Focus on photogrammetry : pros and cons

### Pros :

- High quality textures and meshes
- Textures are continuous, contrary to point clouds
- Fire investigators already have a camera

### Cons :

- ~200 photographs at least for a room: time consuming on site
- Complex to modify afterwards : possible holes in the mesh are difficult to fix easily.





# What to do with these ?





**Fire investigator training**

**3D scene reconstruction**

**Digital training material**





## Training sessions for investigators

- Groups of 2 : engineer and technician
- Presentation as if they were welcomed on the scene by first responders
- One VR Headset each to discover the scene and perform first steps of investigation



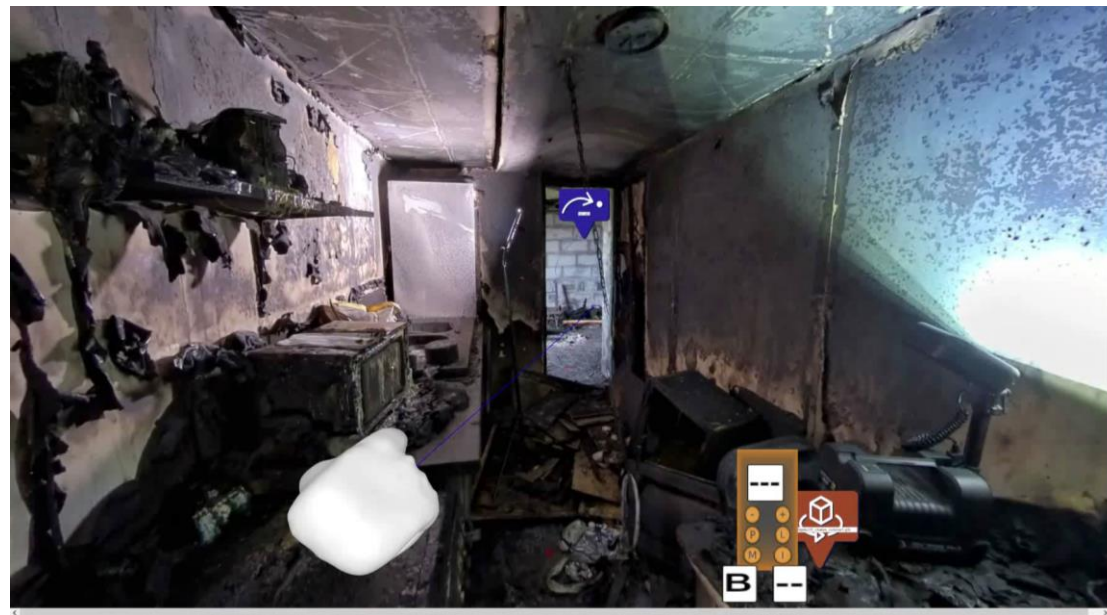
# Scene discovery







## Web scene





## Perspectives

- Improve rendering of texture : Unreal Engine 5 (Nanites)
- How do we measure the difference in efficiency of the virtual training or the real training
- How to improve interactivity during training ?
- How to immerse the trainee in more realistic conditions ?
- Could the virtual scene bring something different from the real scene ?