

## 7. Use of Innovative Slam Solution for UBH fast acquisition

by Roberto Pierdicca (Università Politecnica delle Marche, Italy)

Surveying is the starting point for every project in which the knowledge of a certain site is required. Management, conservation, restoration, documentation, just to mention some. Three-dimensional (3D) digitization of Cultural Heritage (CH) sites have increased remarkably in recent years. Such method consists on the acquisition of billions of points (Point Clouds) allowing a very accurate virtual reconstruction of sites or buildings. The growing availability of novel and affordable surveying techniques made possible the data collection of a wide variety of objects. Among the well-known, and widely adopted, acquisition tools like Photogrammetry or Terrestrial Laser Scanner, Mobile Mapping Systems (MMS) are promising, since they allow the collection of huge amounts of data, reducing time and with sufficient accuracy. MMS rely on Simultaneous Localization and Mapping (SLAM), visual Odometry, GeoSLAM and the main advantage is that data can be collected very easily, without the need of post-processing procedures. In other world, their use is very agile, since they not need registration; their relative geo-referencing is made automatically by the tool itself, when the operator walks along his path. In the context of UBH, MMS could provide a fundamental aid for documentation and surveying. UBH environments in fact, are very challenging to be surveyed, for several reasons: spaces are narrow, illumination is scarce, geometries are irregular, and the distribution of spaces is irregular as well. The adoption of State



of Art solutions, albeit more precise, would represent a bottleneck, especially due to the above-mentioned complexities of UBH environments. Emerged thus the necessity to assess novel methods to perform fast and agile acquisition campaigns, providing restorers and public administrations with efficient solution to document our valuable Underground CH. U4V Cost Action will be the playground where such methods will be experimented, to assess and validate MMS for Underground Heritage.

### SLAM - Simultaneously Localization And Mapping

