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Exploration input modalities for interacting with augmented paper maps

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Exploring input modalities for interacting with augmented paper maps



Julia Chatain



Marie Demangeat



Anke Brock



Didier Laval

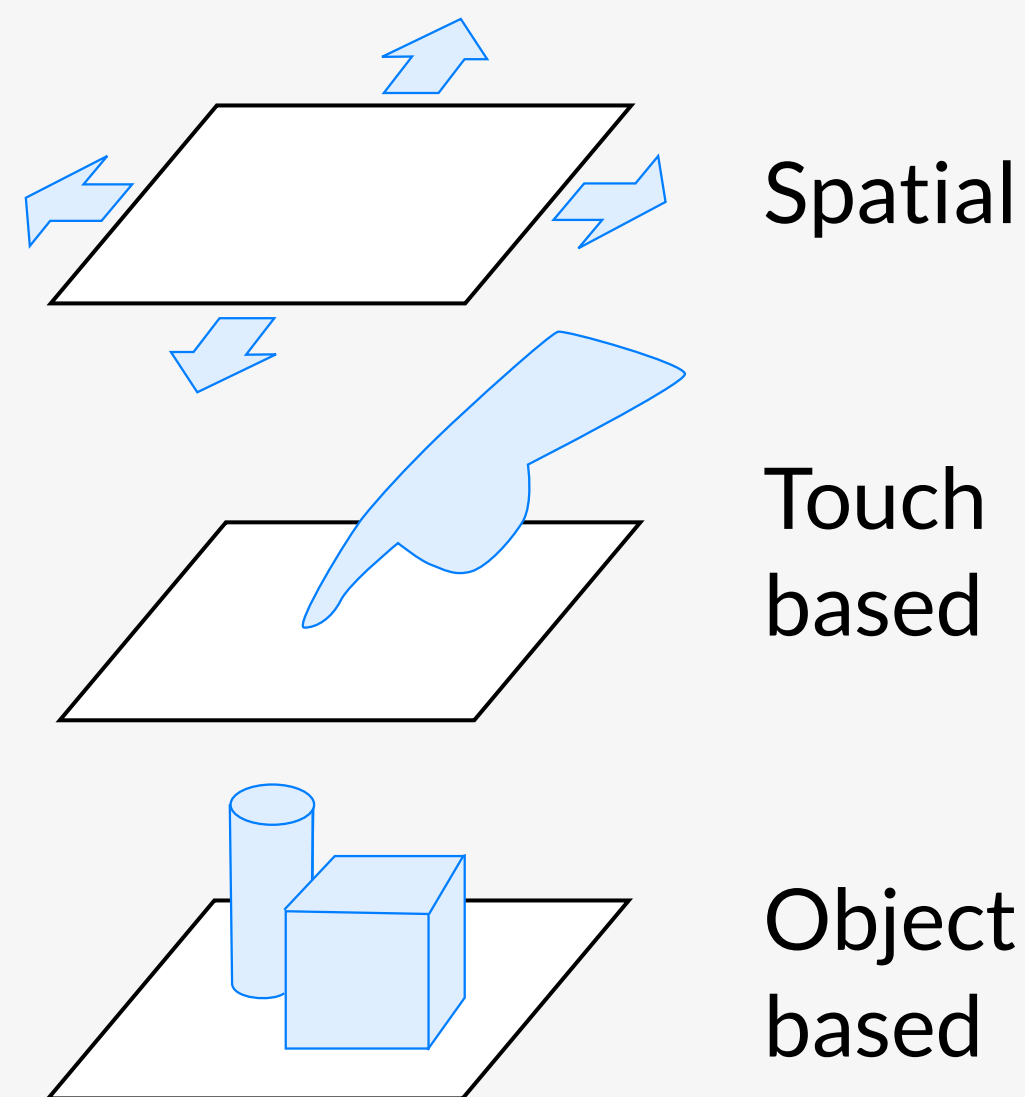


Martin Hachet

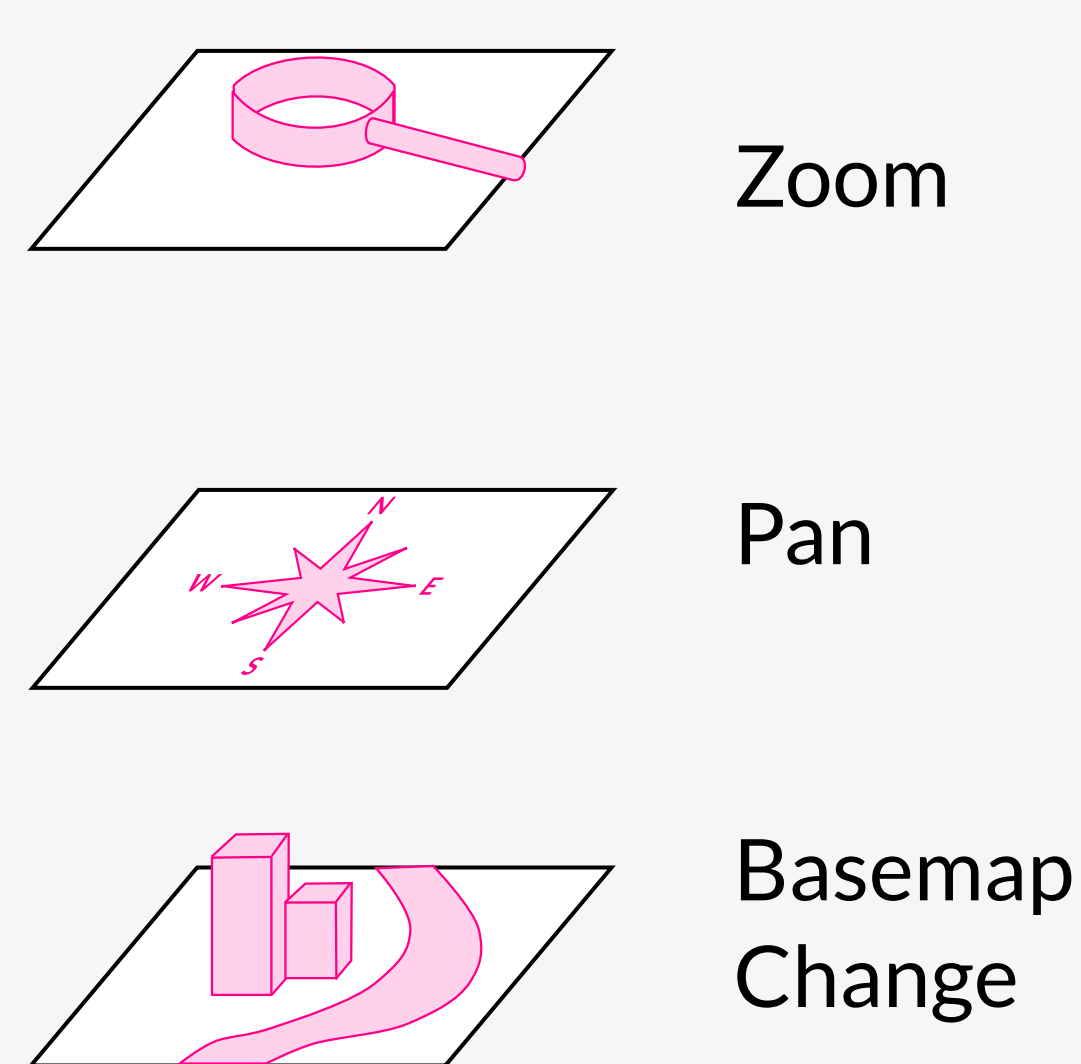
Objective

Comparing different modalities for different functions of a spatial augmented reality map.

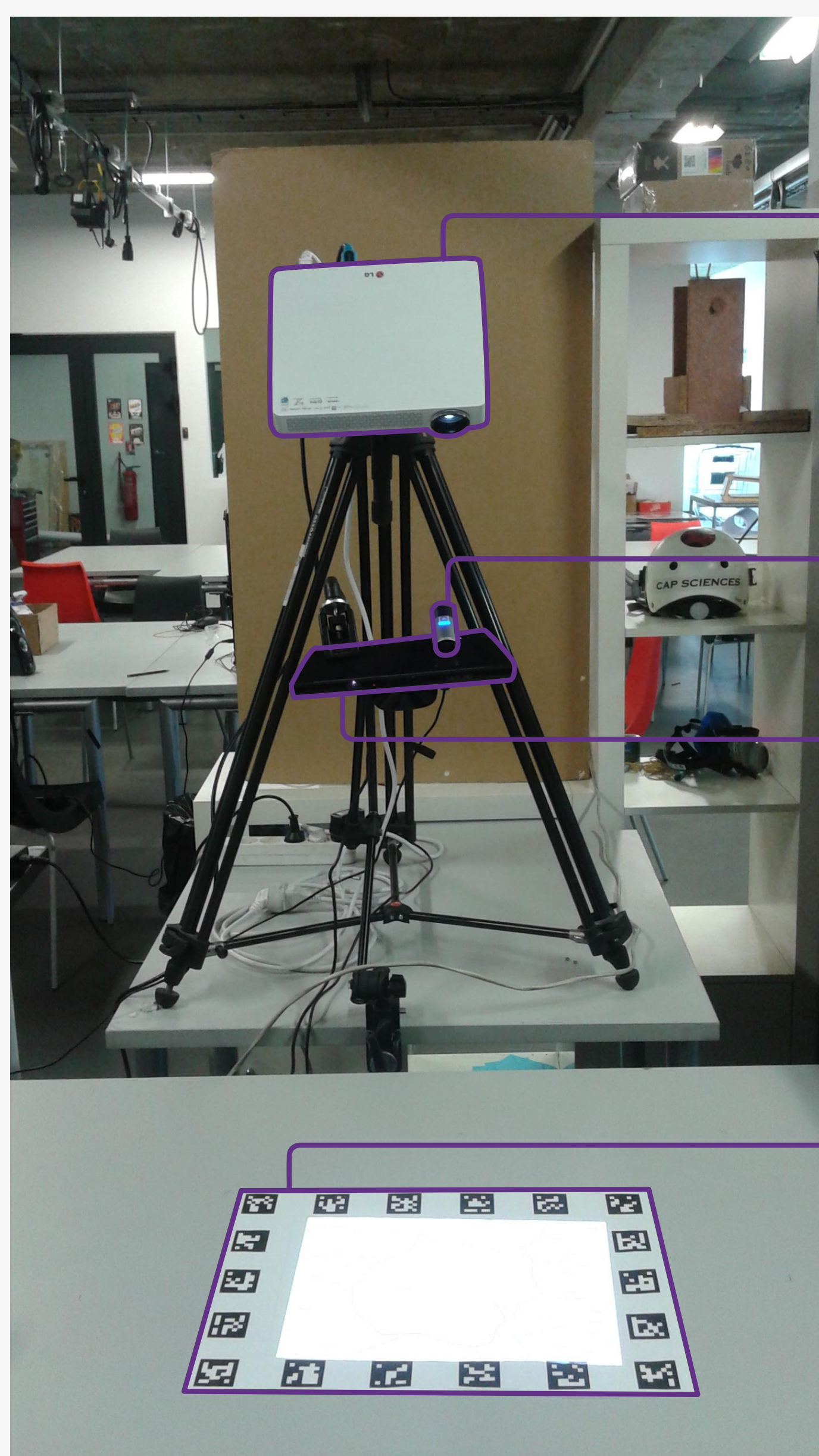
Modalities



Functions



System



Projector

Camera

Depth camera

Paper with ARToolKitPlus markers

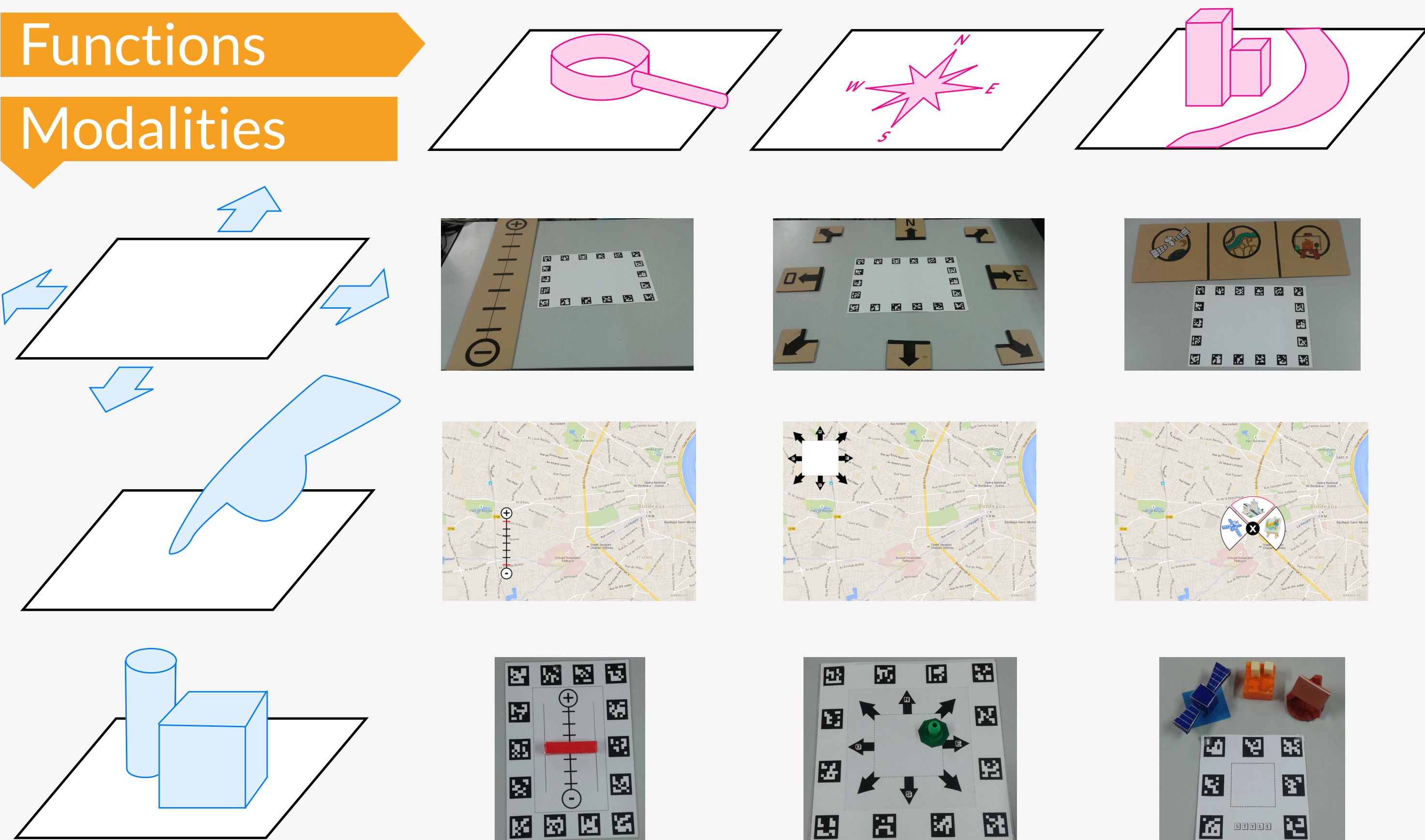
Libraries



Basemaps



Interaction techniques



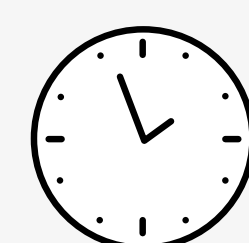
Experiment

Task

For 1 function, for 3 modalities: Find a maximum of hidden red figures in 3 minutes.

Evaluation

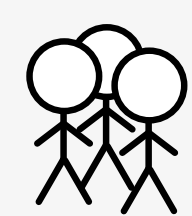
Appreciation: Likert scale (0: very bad to 10: very good)
Efficiency: number of figures found (max 13)



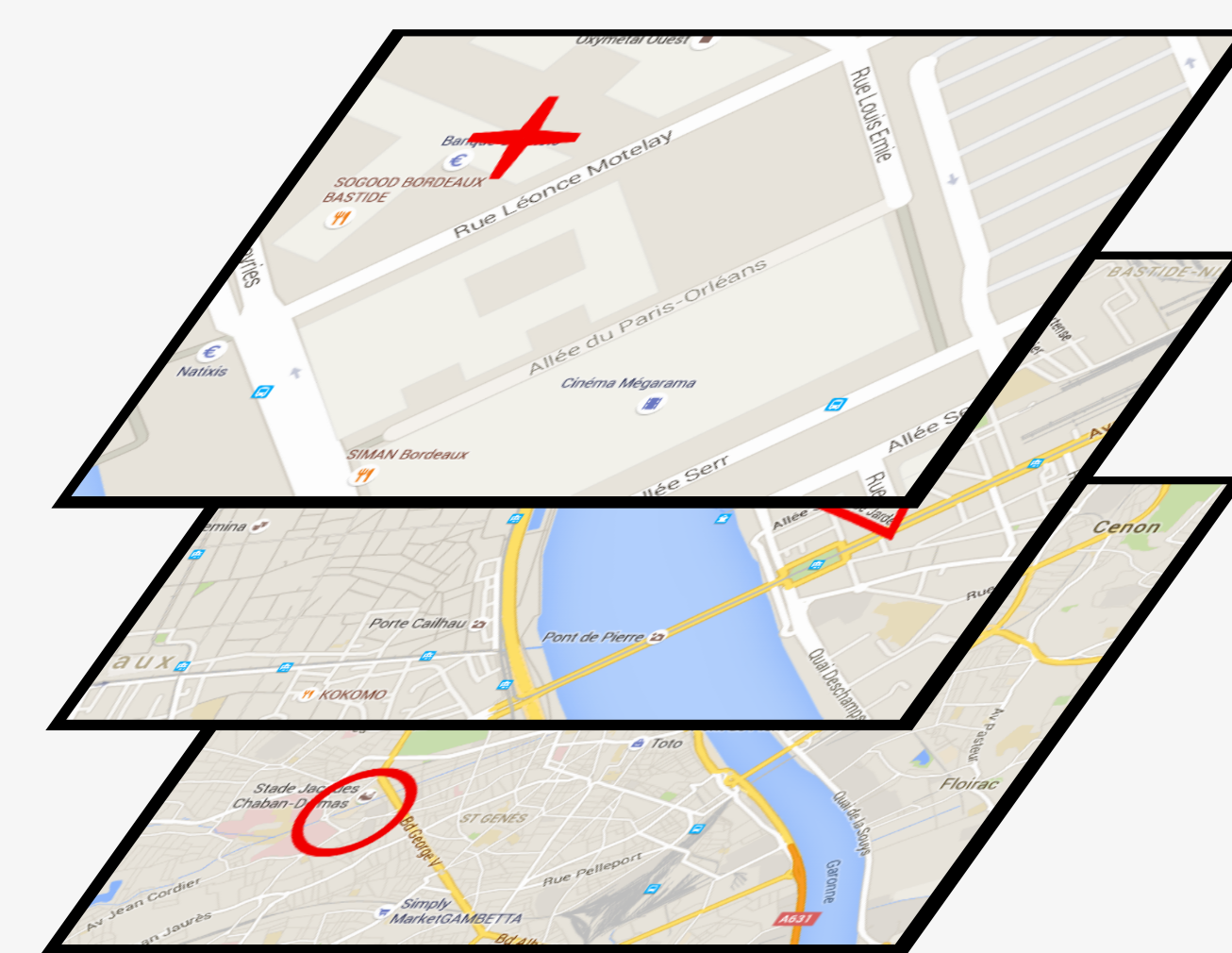
3x3 min



4 evaluation questionnaires

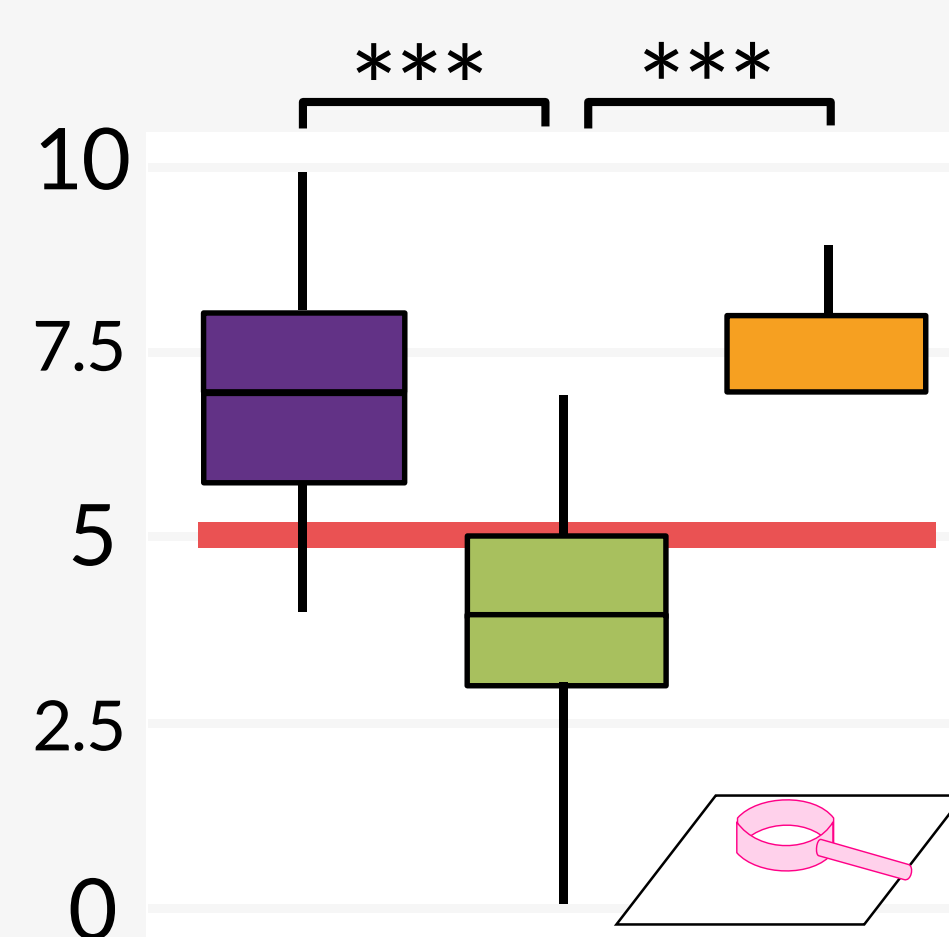


3x12 users

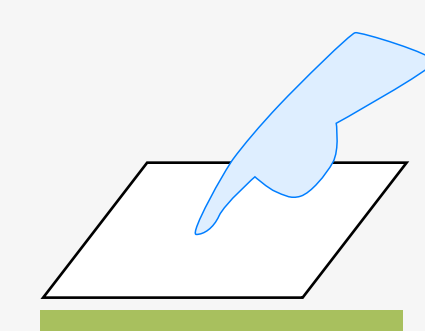
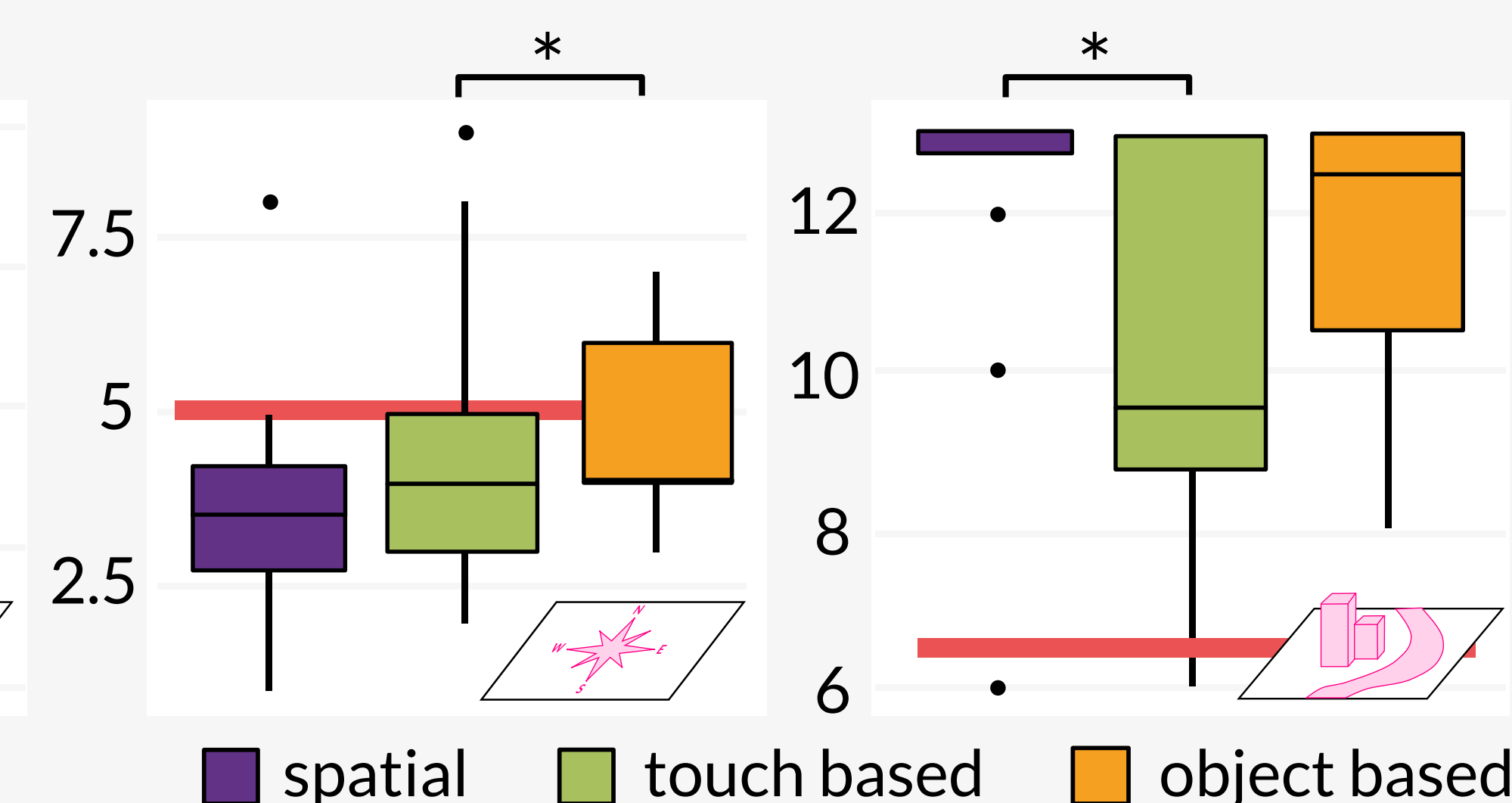


Results

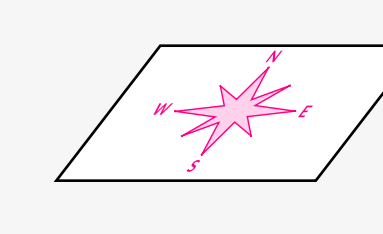
Appreciation



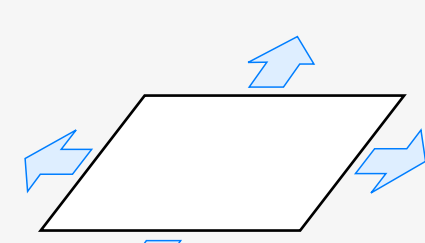
Efficiency



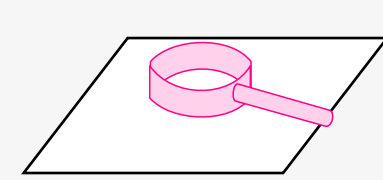
Users expect touch-based techniques to react as well as on their touch screens which is currently not the case.



Users felt lost when using panning techniques because there is no overview.

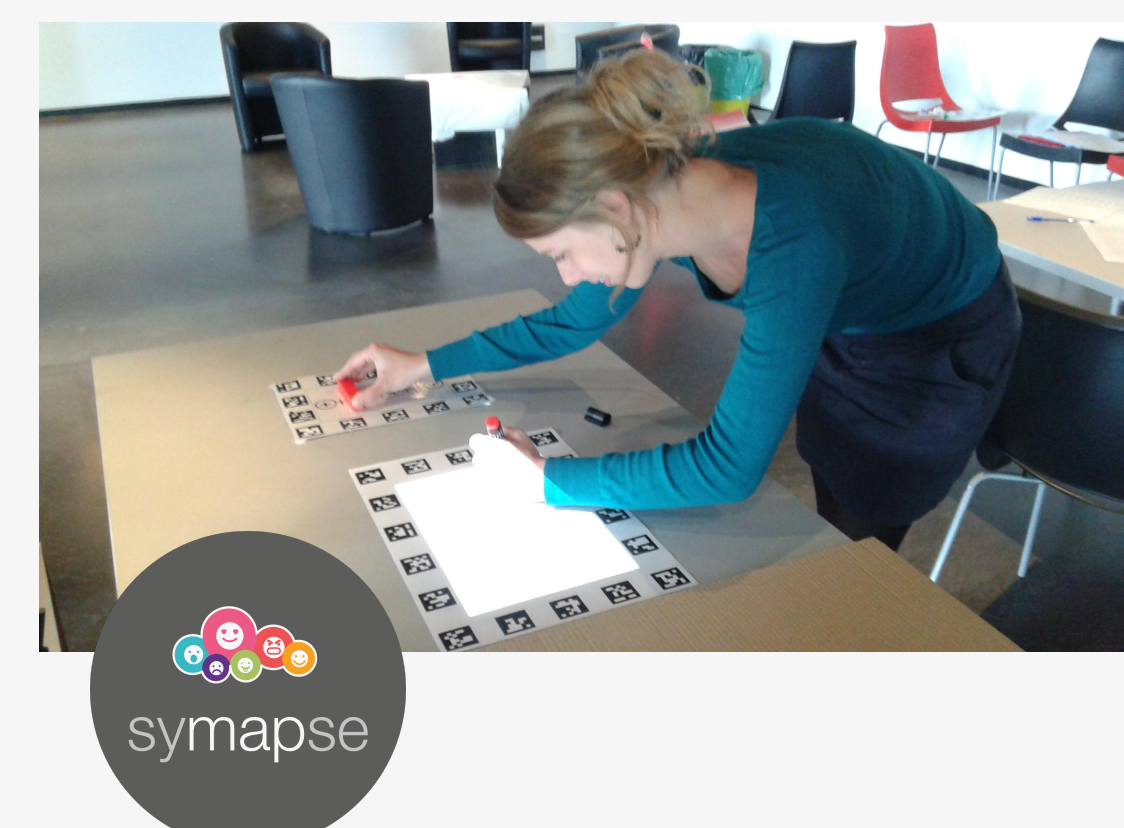


Spatial and object based techniques were appreciated. This result for object based techniques is in line with the literature.



The zoom function has lower efficiency scores due to imprecisions.

Next steps



- Exposition at Cap Sciences museum to let visitors express their views and stories of Bordeaux
- Use of the prototype with geography students
- Exploitation in a Smart City context
- Designing new interaction techniques
- Providing focus and overview
- Combining paper and digital maps

References

Laviolle, J., and Hachet, M. PapART: Interactive 3D graphics and multi-touch augmented paper for artistic creation. Proc. of 3DUI 2012, 3-6.

Nagel, T., Klerkx, J., Vande Moere, A., and Duval, E. Unfolding - A library for interactive maps. Dans Human Factors in Computing and Informatics, vol. 7946 LNCS, Springer (2013), 497-513.

Wagner, D., and Schmalstieg, D. ARToolKitPlus for Pose Tracking on Mobile Devices. Dans Computer Vision Winter Workshop (2007), 6-8.