F. Experiment design — Map comparison techniques (5pts)

We want to evaluate different ways of presenting two map representations in the same interactive view. We consider the three interaction techniques illustrated on Figure 1:

- OV: The two images are overlaid in the same viewport. Users can see the image in the bottom layer through the image in the upper layer by adjusting the latter’s opacity using the mouse wheel.
- SW: The two images are overlaid in the same viewport. Users can see the image in the bottom layer by swiping the drawer horizontally.
- JX: The two images are juxtaposed, showing the same geographical region in both viewports. Any pan and zoom action applies to both of them. Cursors are instantiated in each viewport. Their position is synchronized to help relate features in the two images.

Users of your map application are cartographers. They have to identify differences between a recent orthoimagery (satellite image) and the road map in order to update (add, remove or modify) map features (building or road). You have to conduct a laboratory experiment to evaluate these three techniques.

1. What is a research hypothesis? Provide a definition and an example of such a hypothesis for the experiment presented above. (1pt)
2. What is the null hypothesis? Provide a definition and an example of such a hypothesis for the experiment presented above. Why do we need to formulate the null hypothesis for analyzing empirical results? (1pt)
3. Operationalization: (a) identify the factors and measures and (b) describe an experimental task participants will have to do in your experiment. (2pt)
4. Statistical analysis: (a) describe how your log table should look like and (b) say what statistical test you should do to test your null hypothesis (if you have formulated several hypotheses, pick one of them). (1pt)