Maps Around Me: 3D Multiview Layouts in Immersive Spaces


Kadek Satriadi


Barrett Ens


Maxime Cordeil


Tobias Czauderna


Bernhard Jenny

IA Lab

MONASH University

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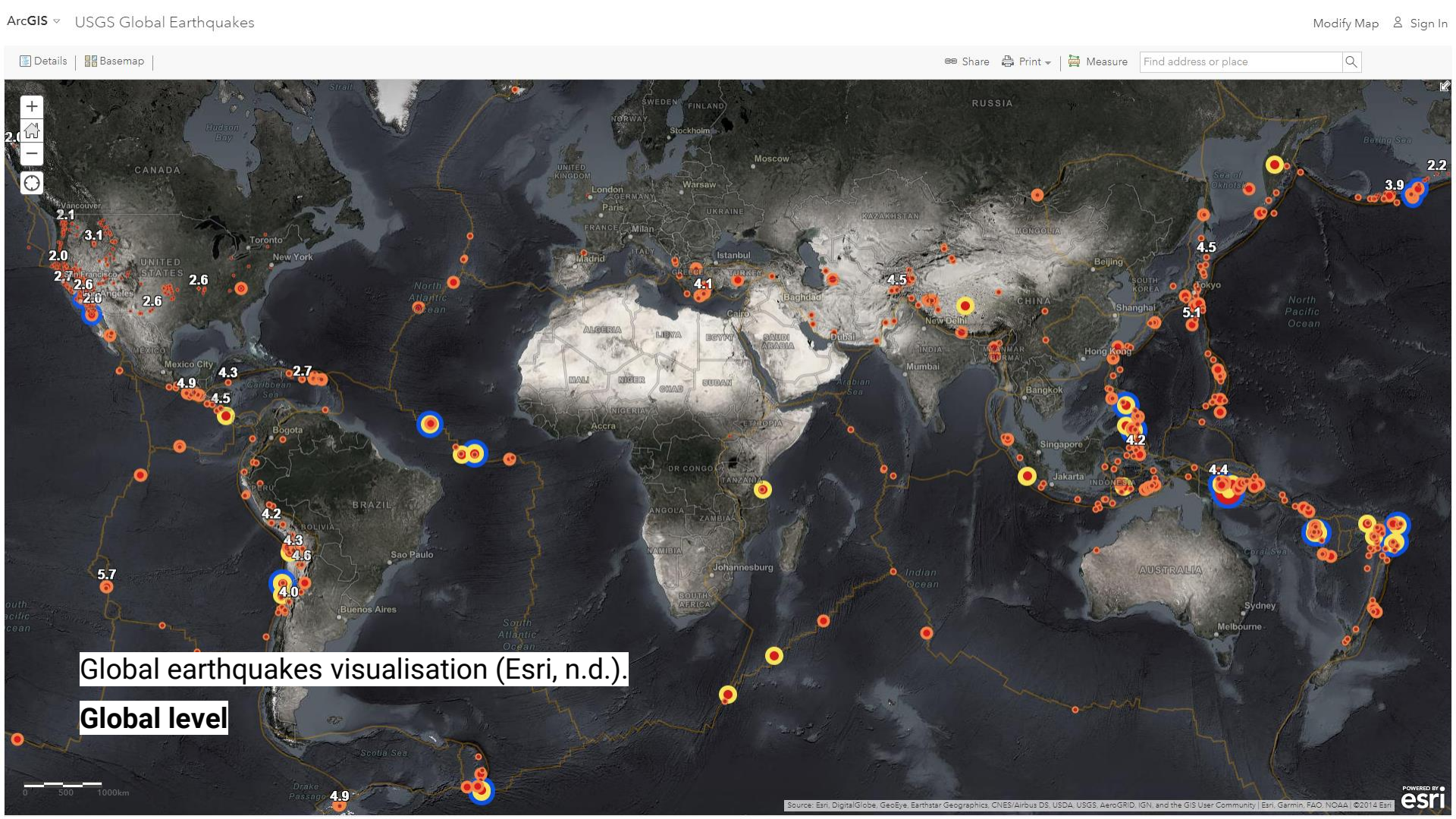
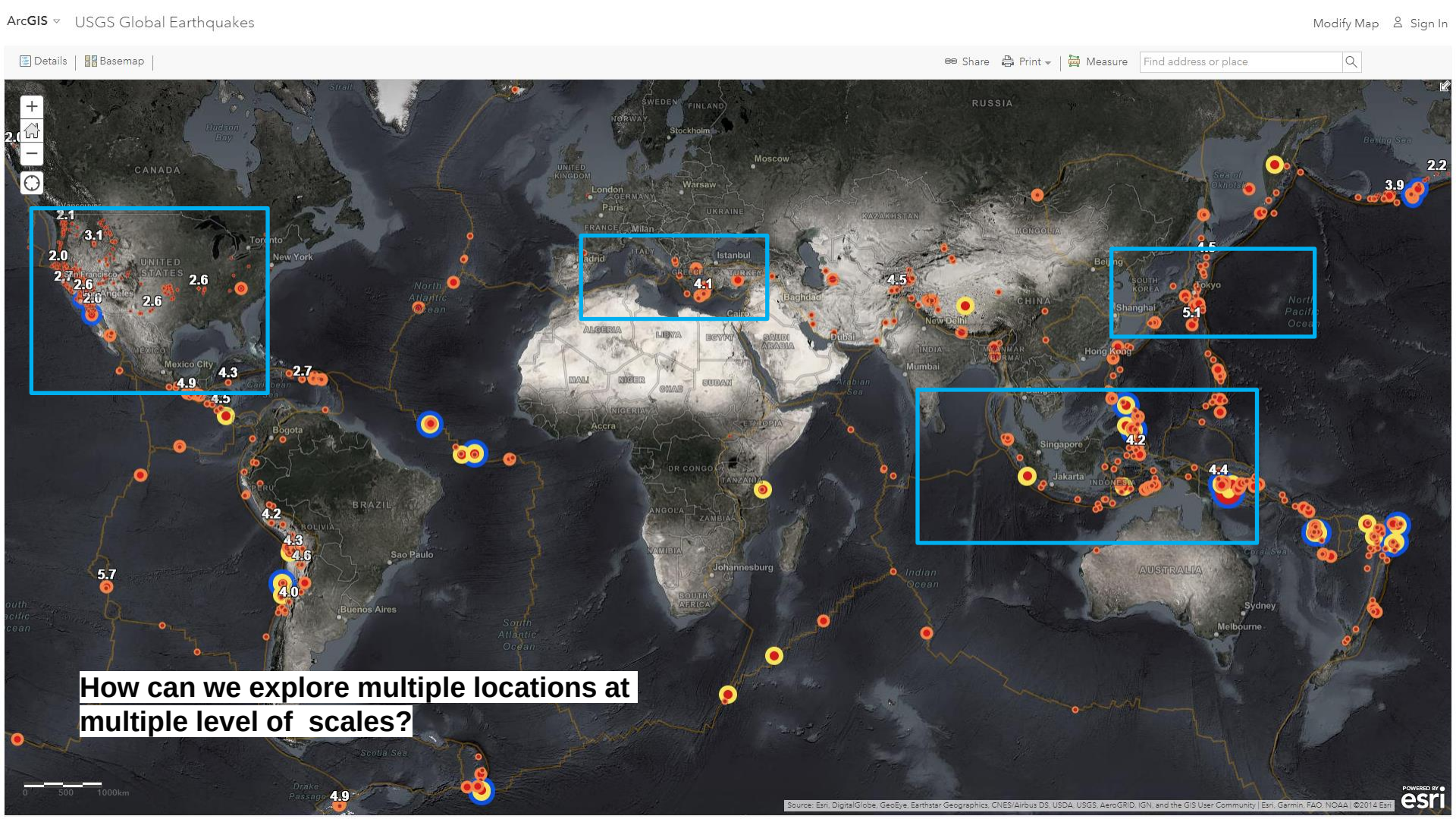

ArcGIS
USGS Global Earthquakes
Modify Map
Sign In
Details
Basemap
Share
Print
Measure
Find address or place
Global earthquakes visualisation (Esri, n.d.).
Global level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How can we explore multiple locations at multiple level of scales?
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community | Esri, Garmin, FAO, NOAA | ©2014 Esri
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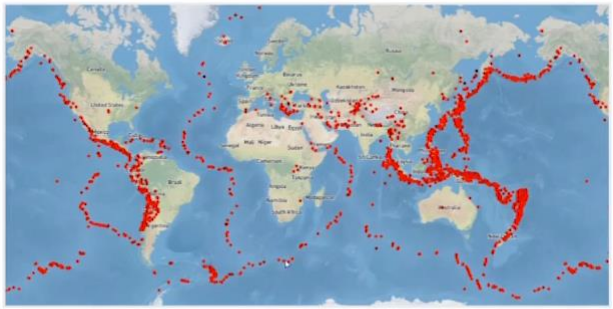
Multiview



PolyZoom (Javed et al, 2012)

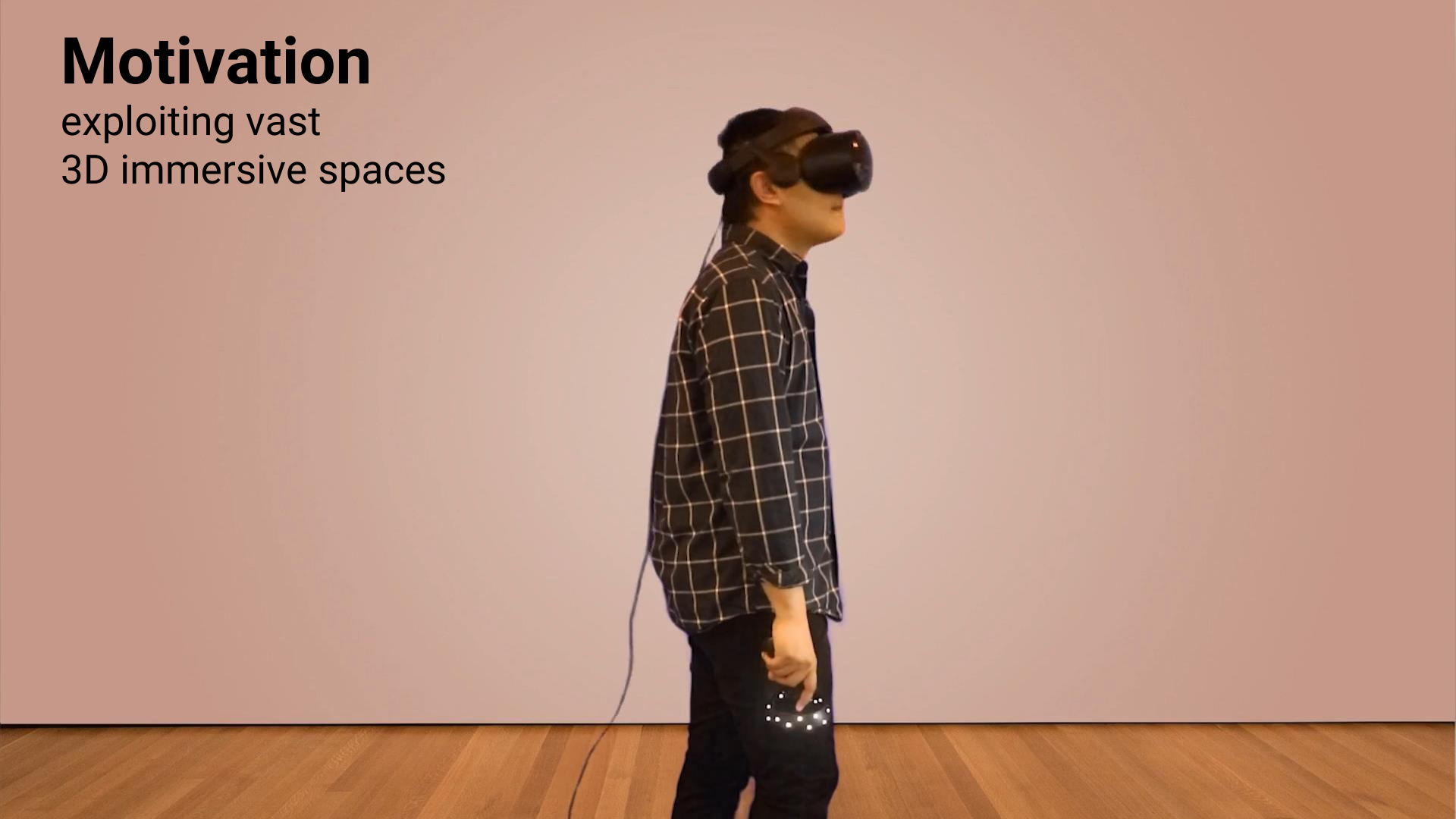
**author's implementation of PolyZoom technique*

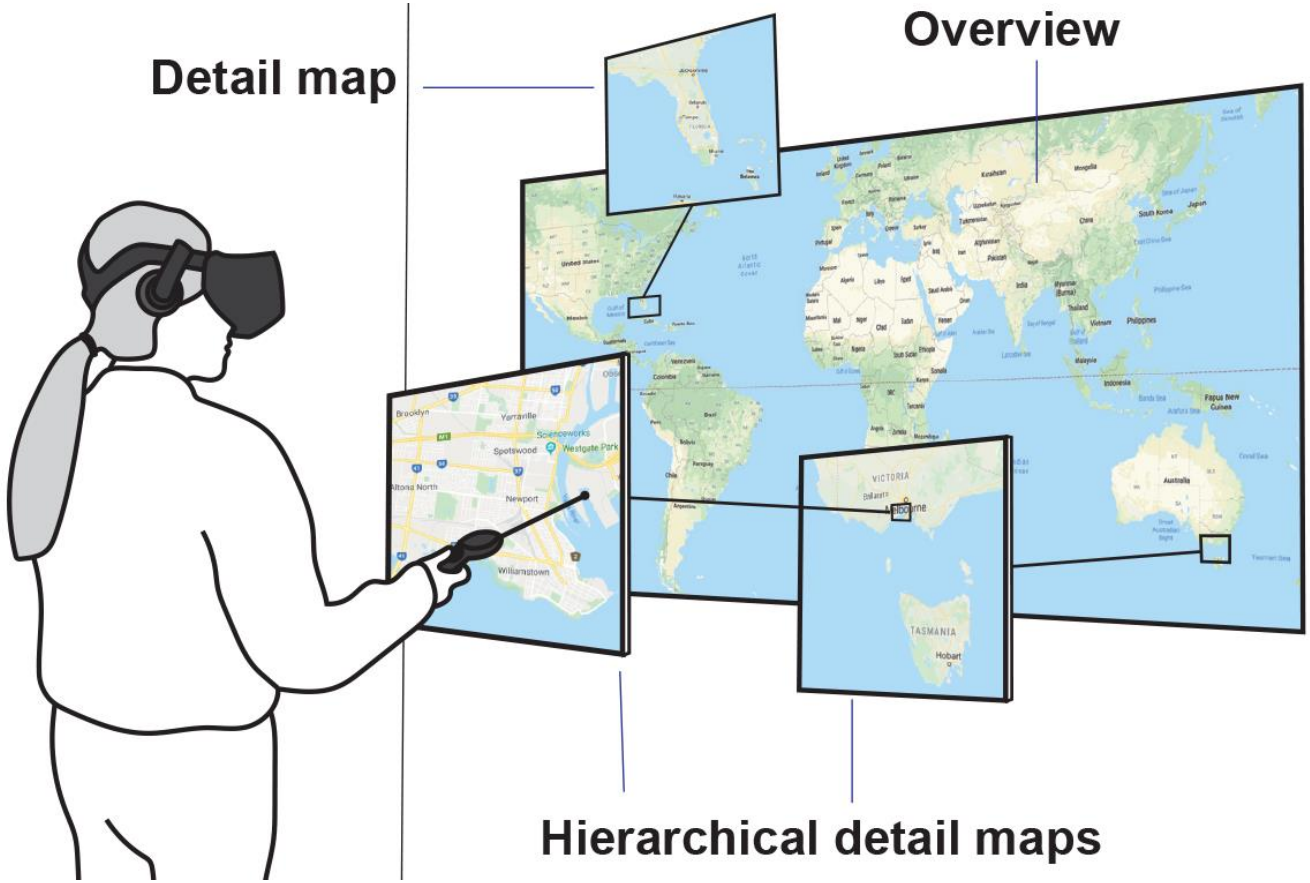
2D display space constraint

**author's implementation of PolyZoom technique*

Motivation

exploiting vast
3D immersive spaces





Immersive Multiview Map Concept

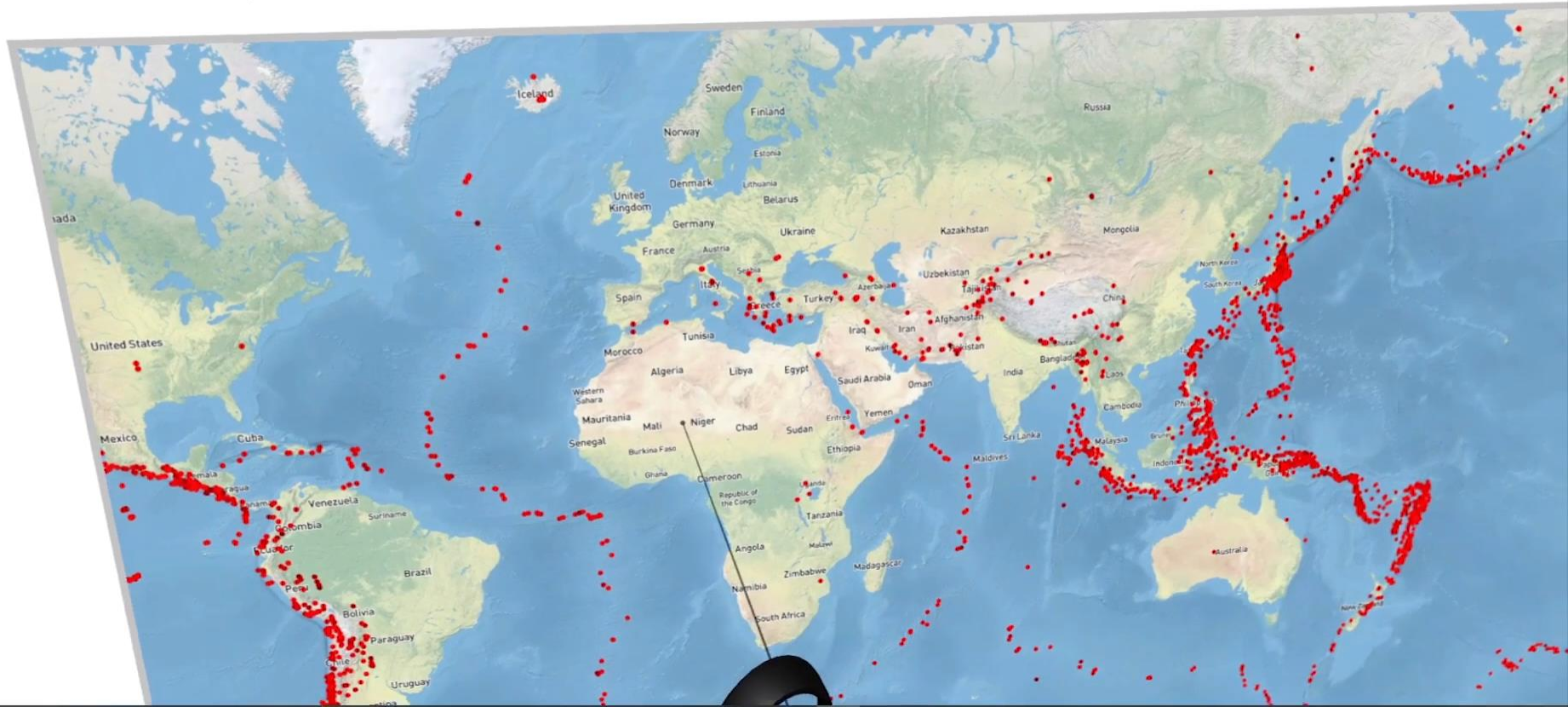
Immersive Multiview Maps

An exploratory implementation

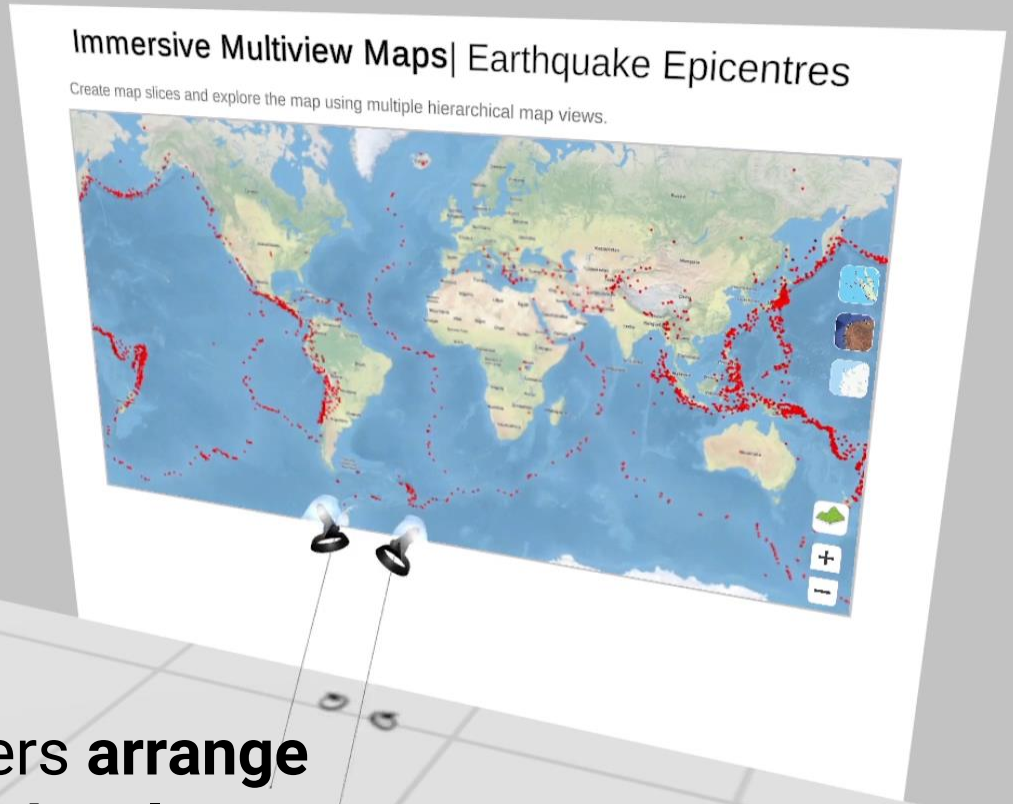
Earthquake data visualisation

Immersive Multiview Maps | *Earthquake Ep*

Create map slices and explore the map using multiple hierarchical *map views*.



2X speed



How would users **arrange** multiple **hierarchical maps** in 3D space?

Observation Study

observing how users arrange multiscale maps in 3D space for use in different task scenarios

Observation Study

observing how users arrange multiscale maps in 3D space for use in different task scenarios

16

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Maps

A total of 24 maps to arrange with 3 zoom levels

16

Fixed

1  **World map**

Moveable

6  **Metro maps**

18  **City maps**

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observing how users arrange multiscale maps in 3D space for use in different task scenarios

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Maps

A total of 24 maps to arrange with 3 zoom levels

Fixed

1  World map

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Tasks

Tasks are performed consecutively

Naïve Layout Task
Arrange map freely

Search Task
Find and count grey circles

Comparison Task
Find all pair of maps with the same features

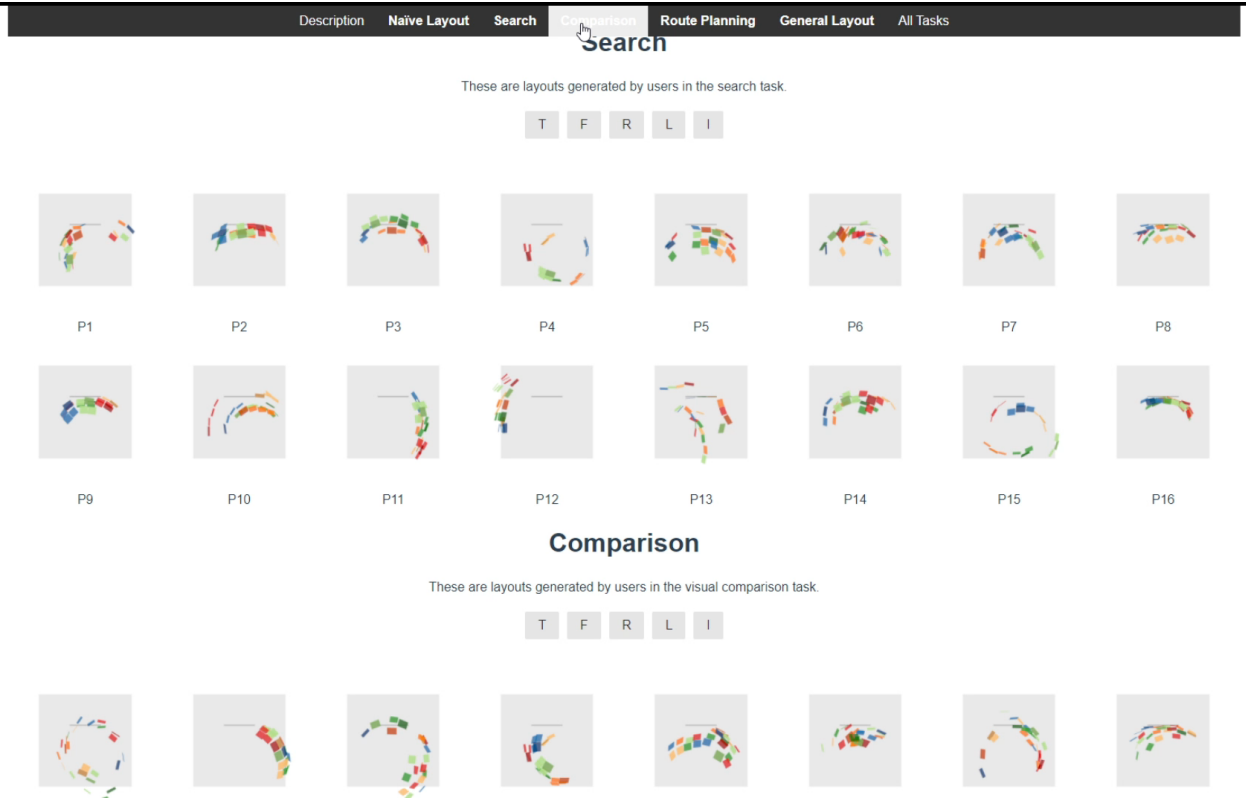
Route Planning Task
Find the shortest path between two locations

General Layout Task
Create optimal layouts for all tasks

general multiview task adaptation of interactive geovisualisation task

Analysis

Total of 80 layouts, 25 maps each



Online viewer: https://kadeksatriadi.github.io/Maps-Around-Me-Viewer

Layout Geometry

Spherical cap

(81.5%)

Spherical

(13.2%)

Planar

(5.3%)

Layout Geometry

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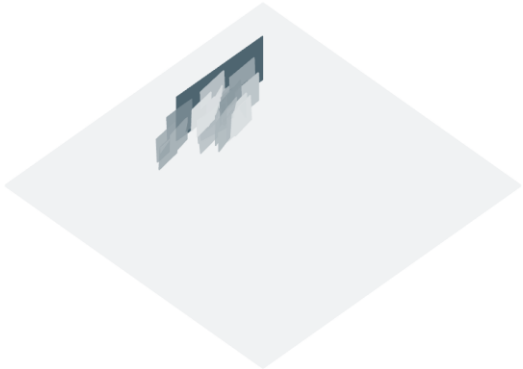

Planar

(5.3%)

Layout Geometry

Spherical cap

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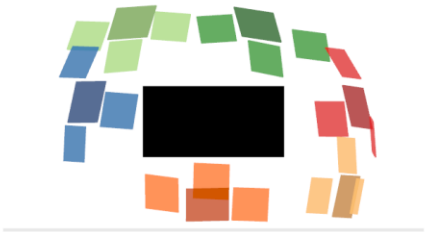
Overview-detail Relationship



Central window

(62.5%)

Coordinated

(18.8%)

Occluding

(6.3%)

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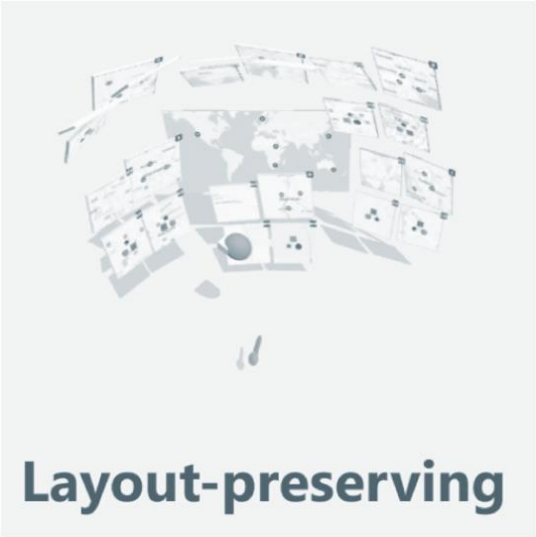
Interaction Strategy

Looking around without changing map positions during the task.

Moving maps around during the task.

Interaction Strategy

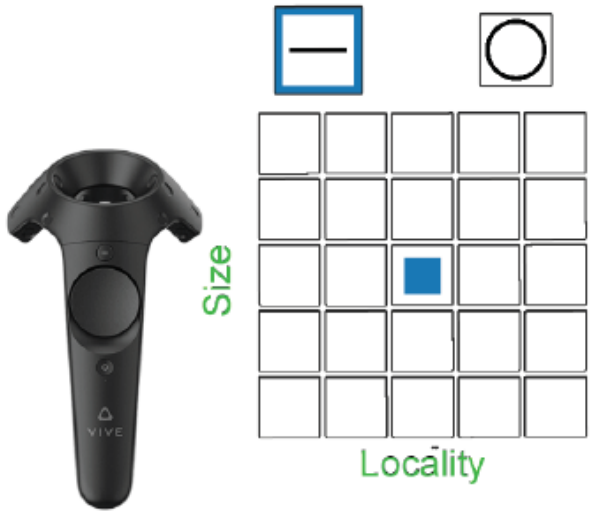


Looking around without changing map positions during the task.

Moving maps around during the task.

Revisiting Exploratory Implementation

Providing automated layout tool for layout **geometry**, **size**, and **locality**.



Revisiting Exploratory Implementation

Providing automated layout tool for layout **geometry**, **size**, and **locality**.

Changing layout geometry.

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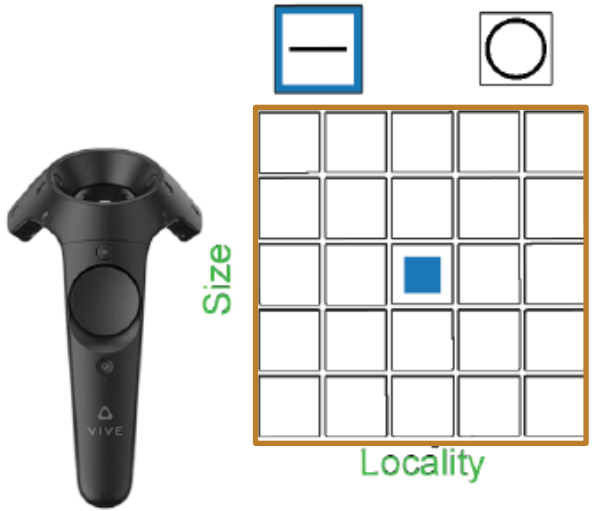


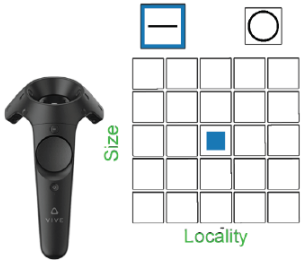
Changing locality.

Changing map size.

User Walkthrough Sessions

Participant + Setup

8



- Similar maps setup
- Automated layout tool
- Advance interaction modes

Key findings

- Influence of automatic layout and interaction modes.
- Wider variety of layout geometry.
- Layout-changing interaction strategy is still common.

User Walkthrough Sessions

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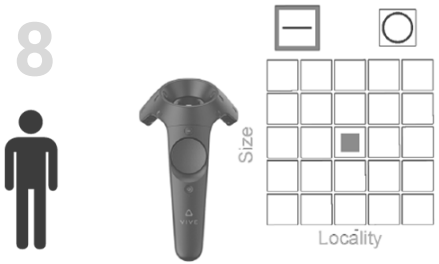

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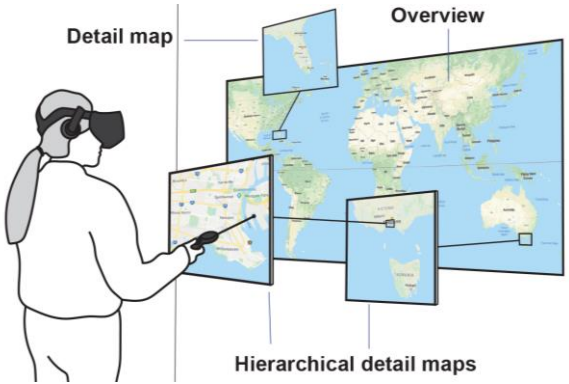
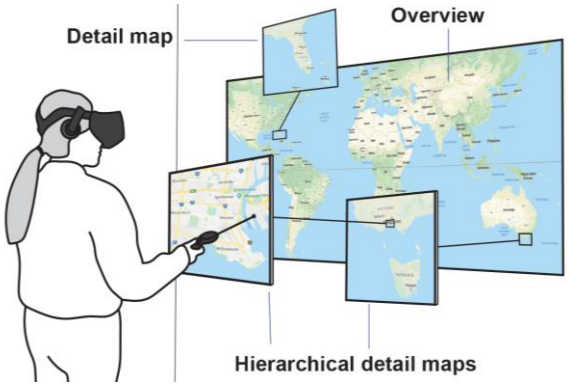


Summary

Immersive Multiview Maps



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Layout Geometry

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Overview-detail Relationship

Central window Occluding Coordinated

Interaction strategy

Layout-preserving Layout-changing

Summary

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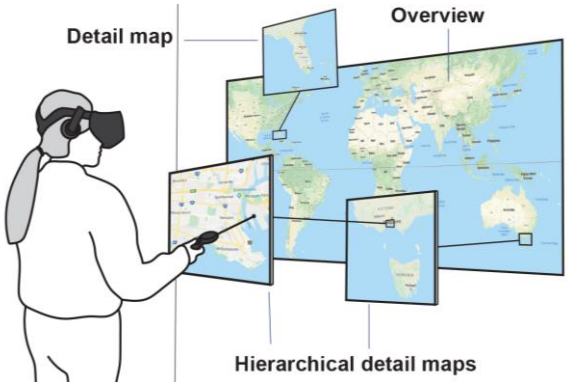

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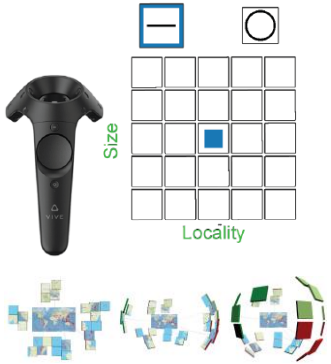

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Project Link:
https://kadeksatriadi.com/publication/maps-around-me

Get in touch:

- Contact : Kadek Ananta Satriadi
- Email : Kadek.Satriadi1@monash.edu
- Website : https://kadeksatriadi.com

We would like to thank all participants of our studies.

References

Esri. (n.d.). USGS Global Earthquakes. https://www.arcgis.com/home/webmap/viewer.html?webmap=31cfc5b138e24dee866c457948773ac4

Javed, W., Ghani, S., & Elmqvist, N. (2012, May). Polyzoom: multiscale and multifocus exploration in 2d visual spaces. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 287-296).