



**HAL**  
open science

# Monitoring Air Quality in Korea's Metropolises on Ultra-High Resolution Wall-Sized Displays

Emmanuel Pietriga, Olivier Chapuis

► **To cite this version:**

Emmanuel Pietriga, Olivier Chapuis. Monitoring Air Quality in Korea's Metropolises on Ultra-High Resolution Wall-Sized Displays. International Workshop on Urban Data Science and Technology at Asia Data Week, Nov 2017, Jeju, South Korea. hal-01848431

**HAL Id: hal-01848431**

**<https://inria.hal.science/hal-01848431>**

Submitted on 24 Jul 2018

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

# Monitoring Air Quality in Korea's Metropolises on Ultra-High Resolution Wall-Sized Displays

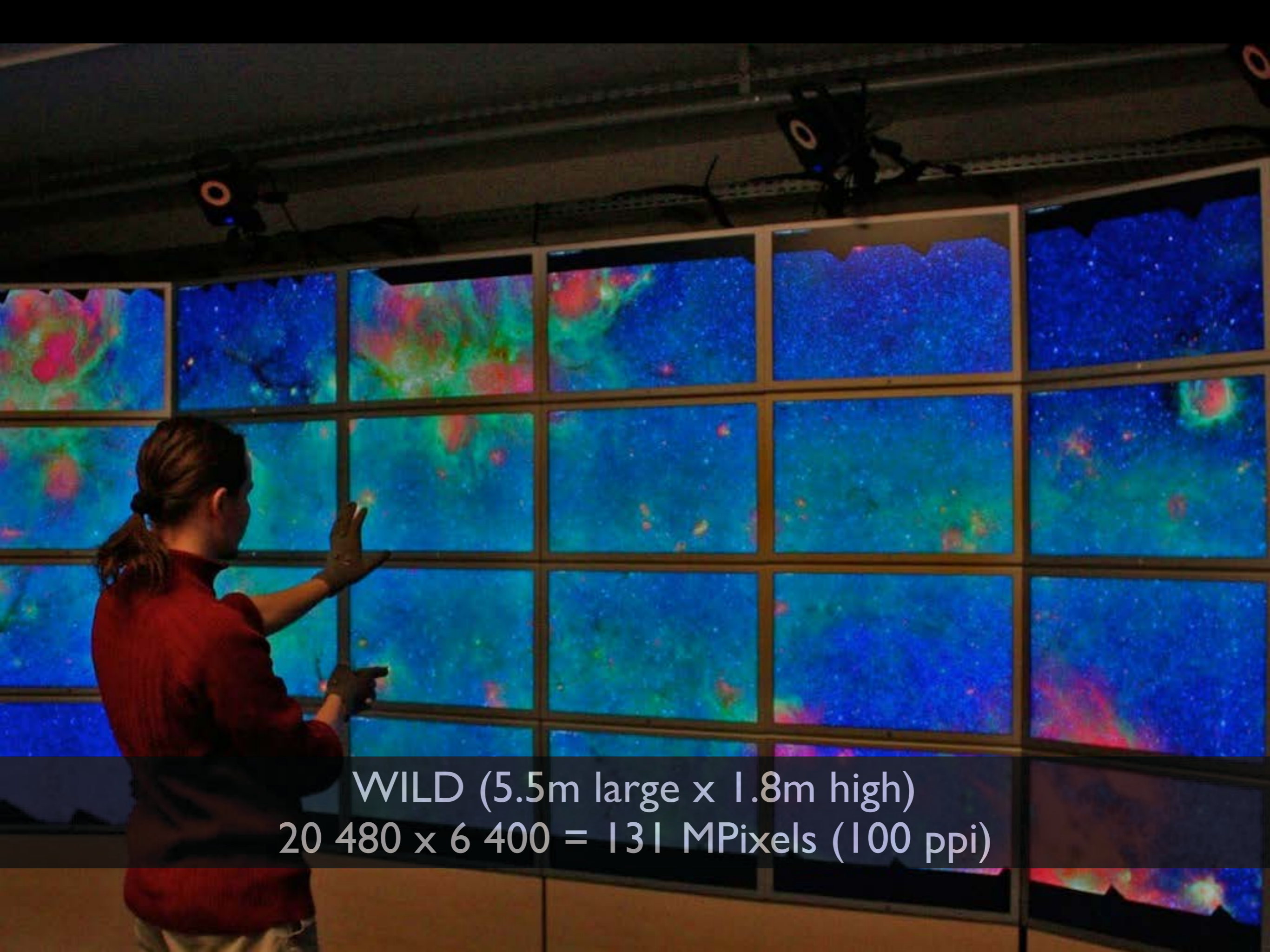
International Workshop on Urban Data Science and Technology  
@ADW 2017



Emmanuel Pietriga & Olivier Chapuis

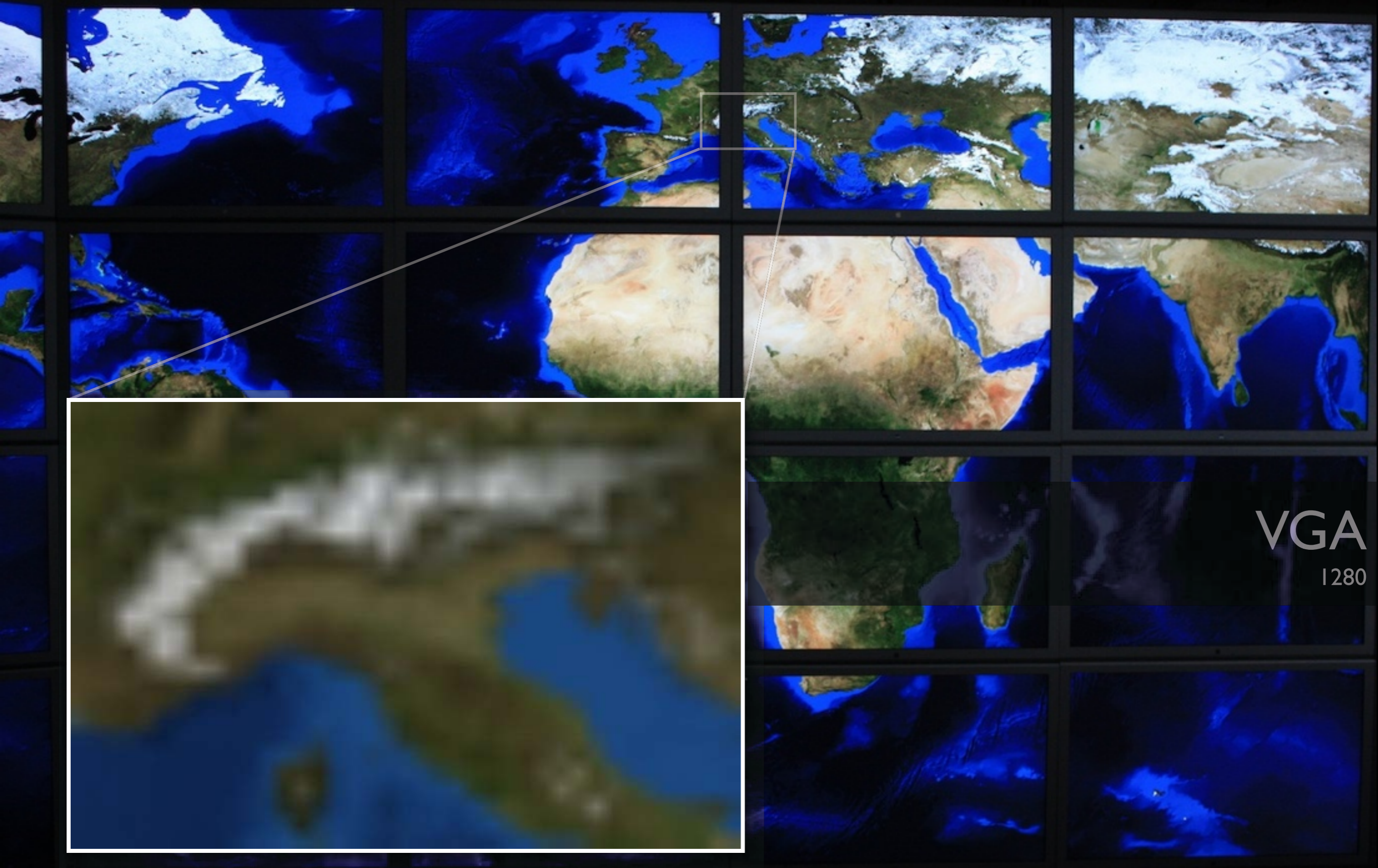






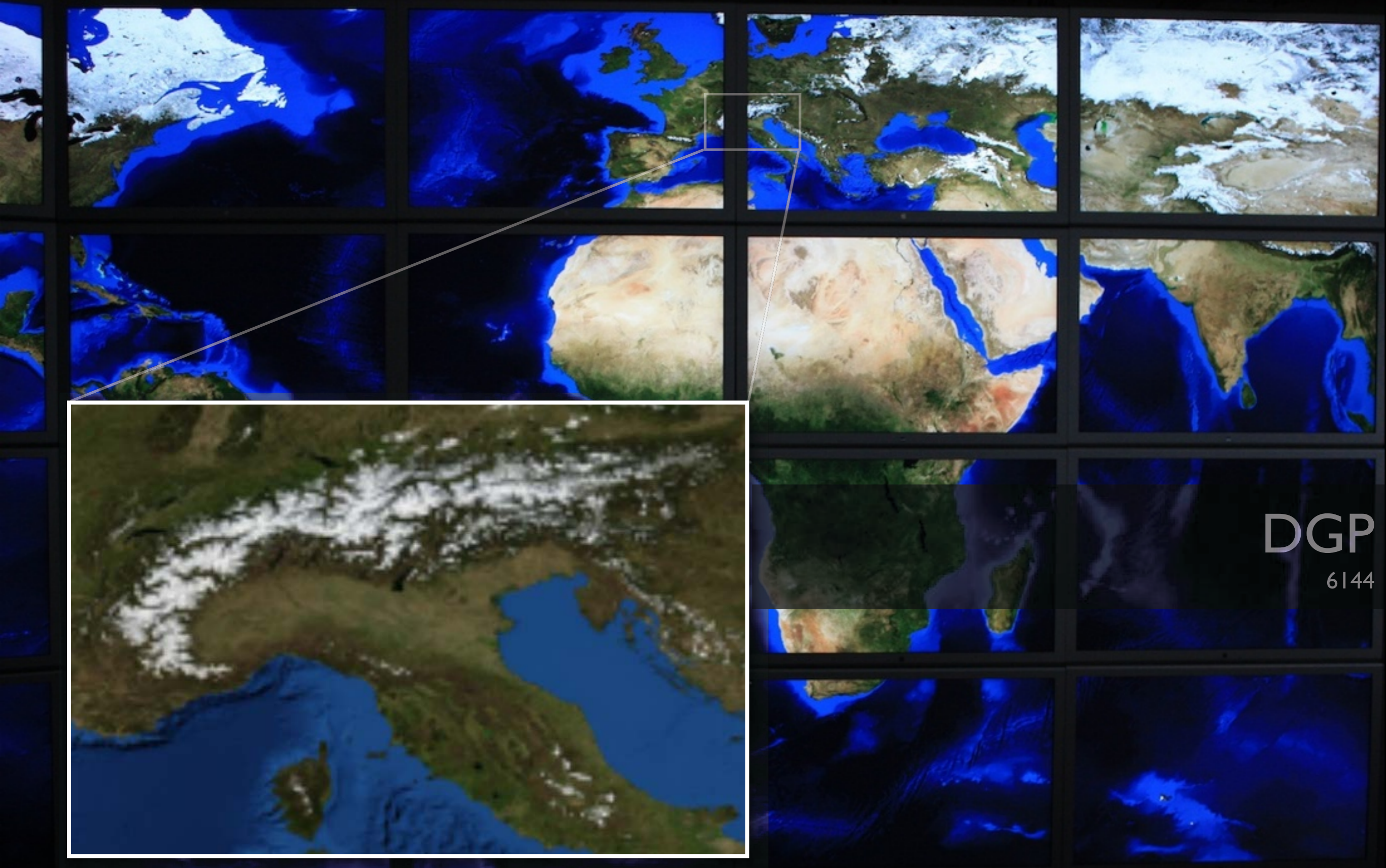
WILD (5.5m large x 1.8m high)  
20 480 x 6 400 = 131 MPixels (100 ppi)





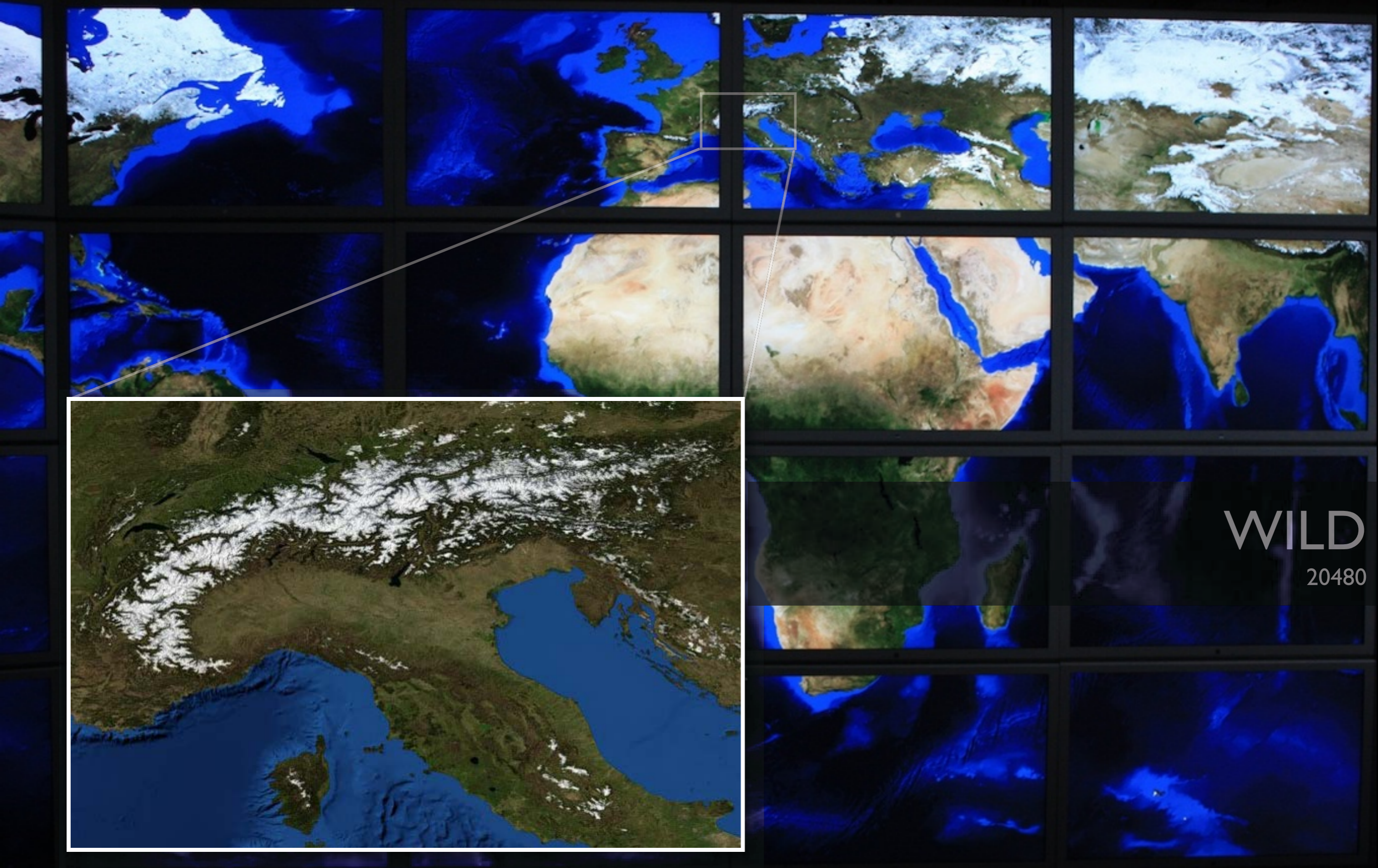
VGA  
1280





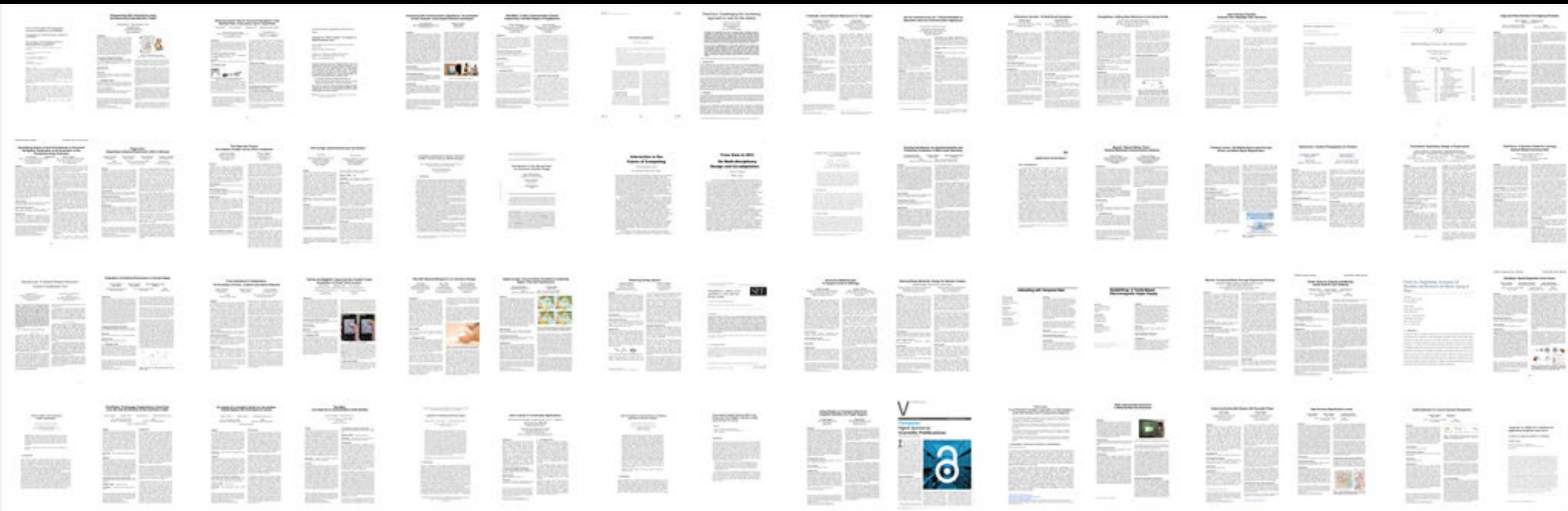
DGP  
6144





WILD  
20480

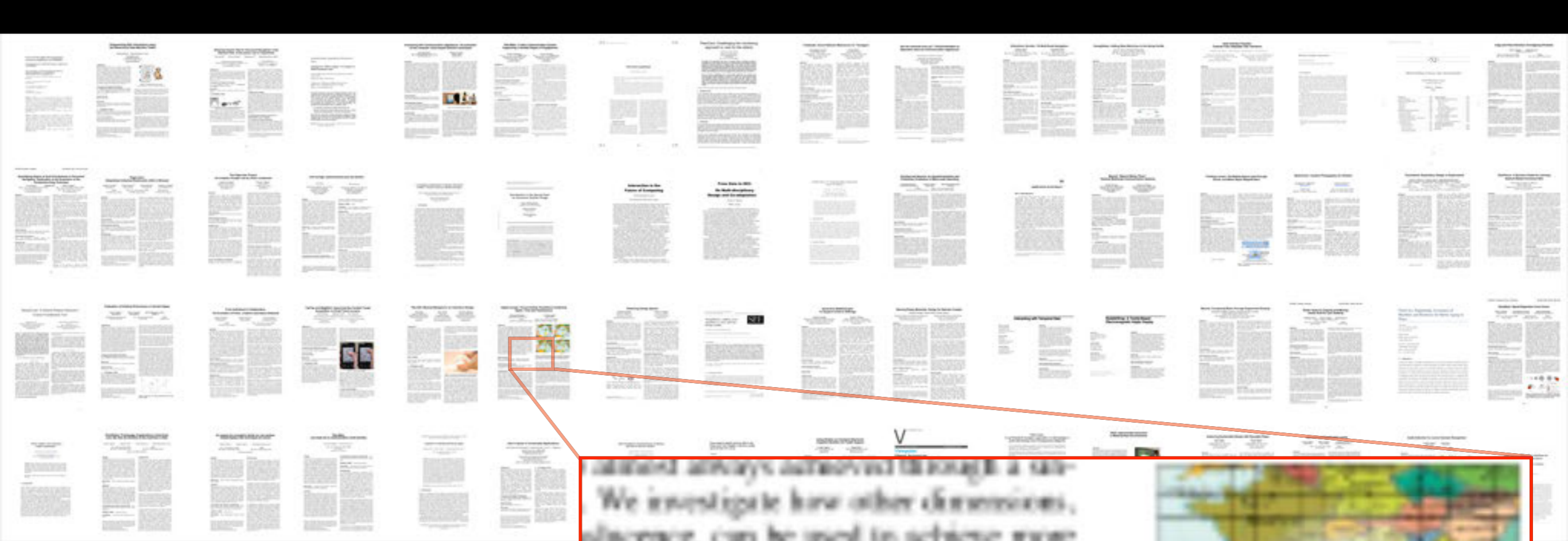




64 PDF pages

on a 5.5m x 1.8m surface





...maintained always achieved through a ...  
 We investigate how other dimensions, ...  
 We present an extension to Capen- ...  
 unifying presentation space across ...  
 dimensions. We define new lenses in that ...  
 lenses, and compare them to existing ...  
 lenses based on a generic task: focus ...  
 on that one new lens, the Sigmoid-Center ...  
 can outperform all others.



(c)

Figure 3. Various transitions between ...  
 then causing occlusion, (b) distortin ...  
 ing transitions, (c) using a combi

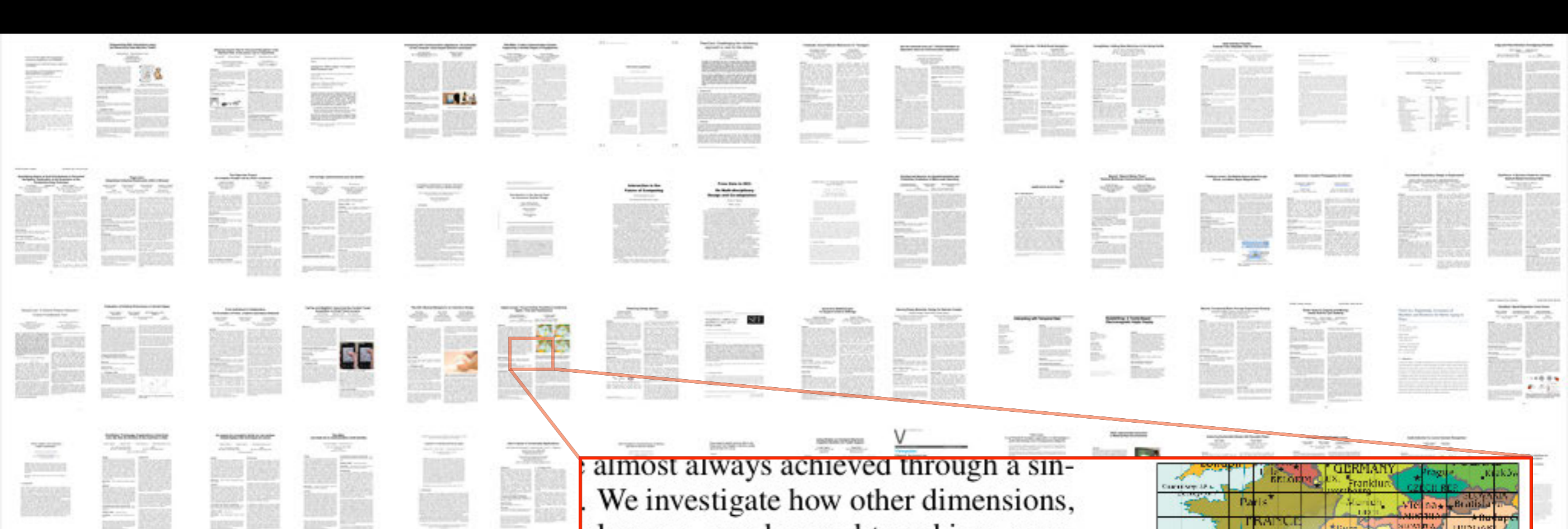
region of the context. While ...  
 are generally favored and have ...  
 in some situations [16, 22, 2] ...  
 show their limits: for instance ...  
 densely populated region, use

**DGP**  
 6144

Focus + Context, Fisheye lenses, ...  
 scrolling, Controlled experiment

**Keywords**  
 Human-Computer Interaction, HMI, ...  
 H.5 Information Interfaces and Pre- ...  
 Interfaces (H.1.2, I.3.6)





... almost always achieved through a sin-  
 ... We investigate how other dimensions,  
 slucence, can be used to achieve more  
 We present an extension to Carpen-  
 unifying presentation space accommo-  
 dimensions. We define new lenses in that  
*lenses*, and compare them to existing  
 iments based on a generic task: focus  
 ow that one new lens, the SPEED-COUPLED  
 cantly outperforms all others.



(c)

Figure 1. Various transitions between  
 tion causing occlusion, (b) distortin  
 ing translucence, (d) using a combi

region of the context. While  
 are generally favored and hav  
 in some situations [16, 22, 24  
 show their limits: for instance  
 densely populated region suc

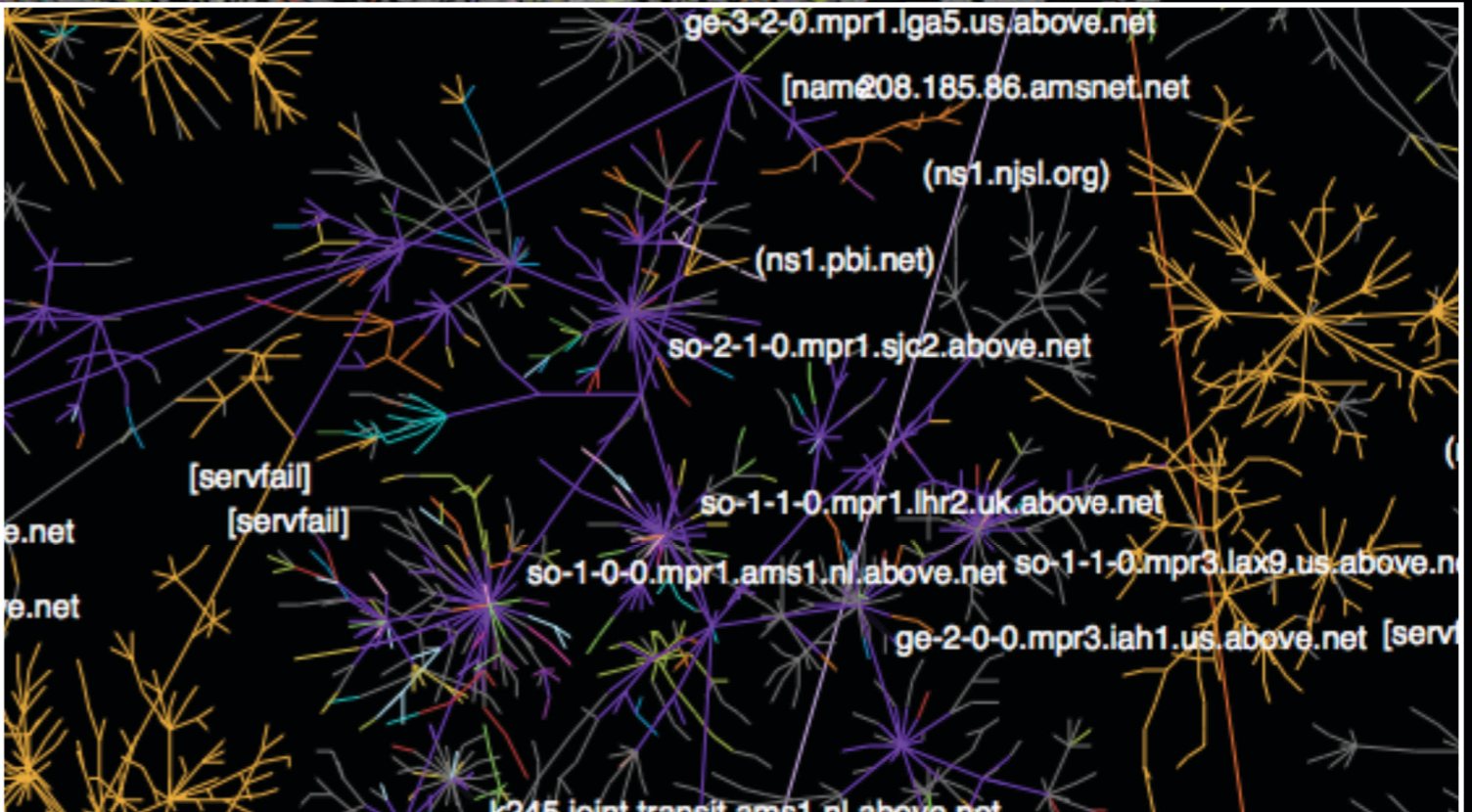
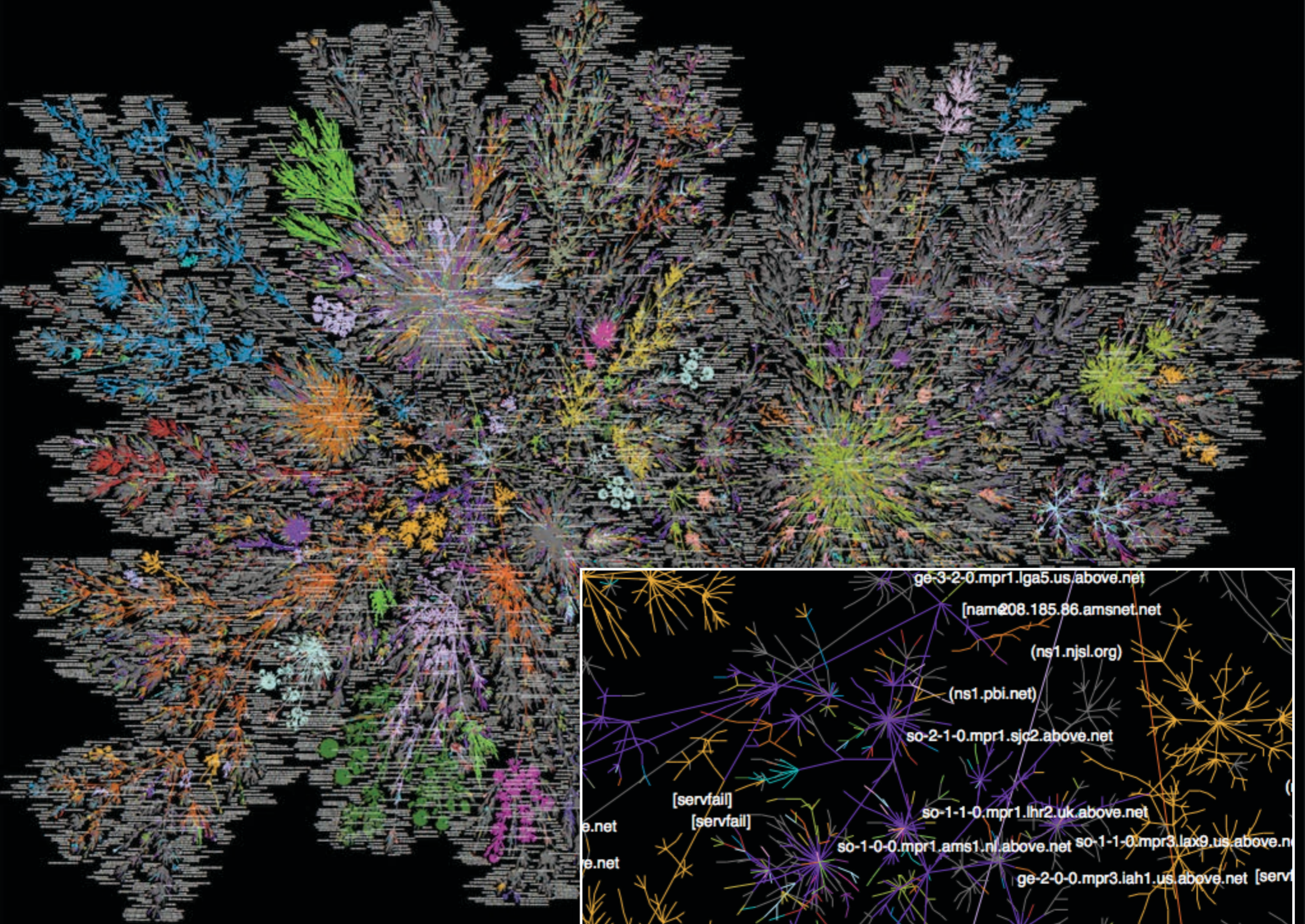
WILD  
 20480

..., Focus + Context, Fisheye lenses,  
 targeting, Controlled experiment

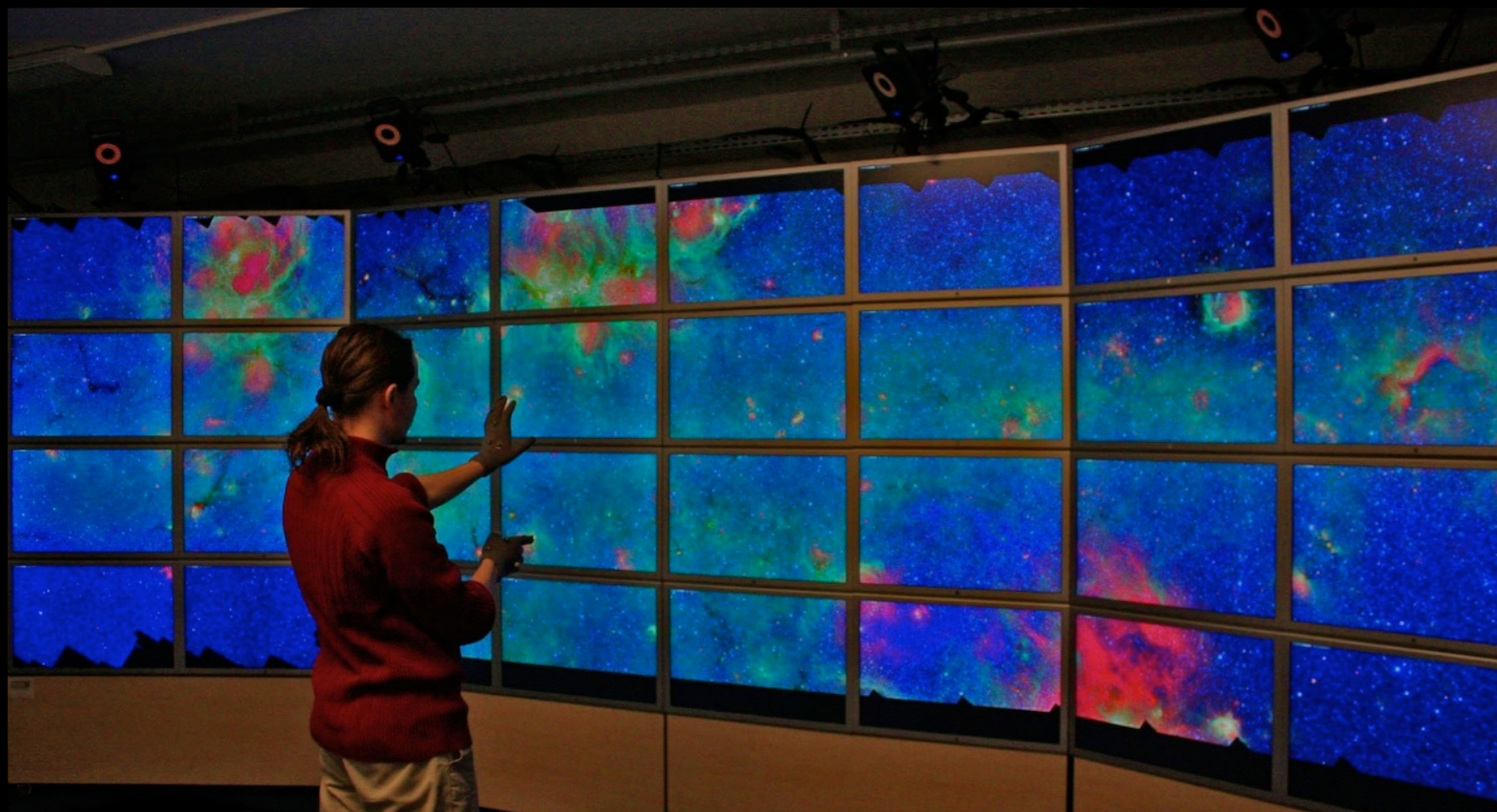
**Keywords**

ms H.5 Information Interfaces and Pre-  
 Interfaces (H.1.2, I.3.6)









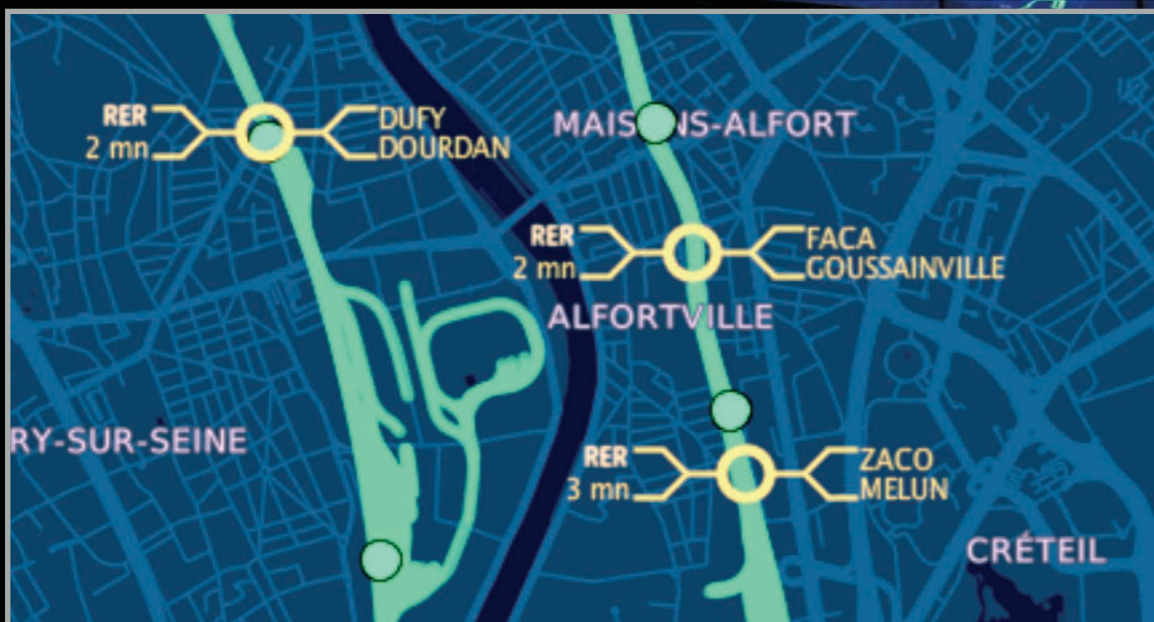
- Interactive visualization of large quantities of data
- Promote physical navigation



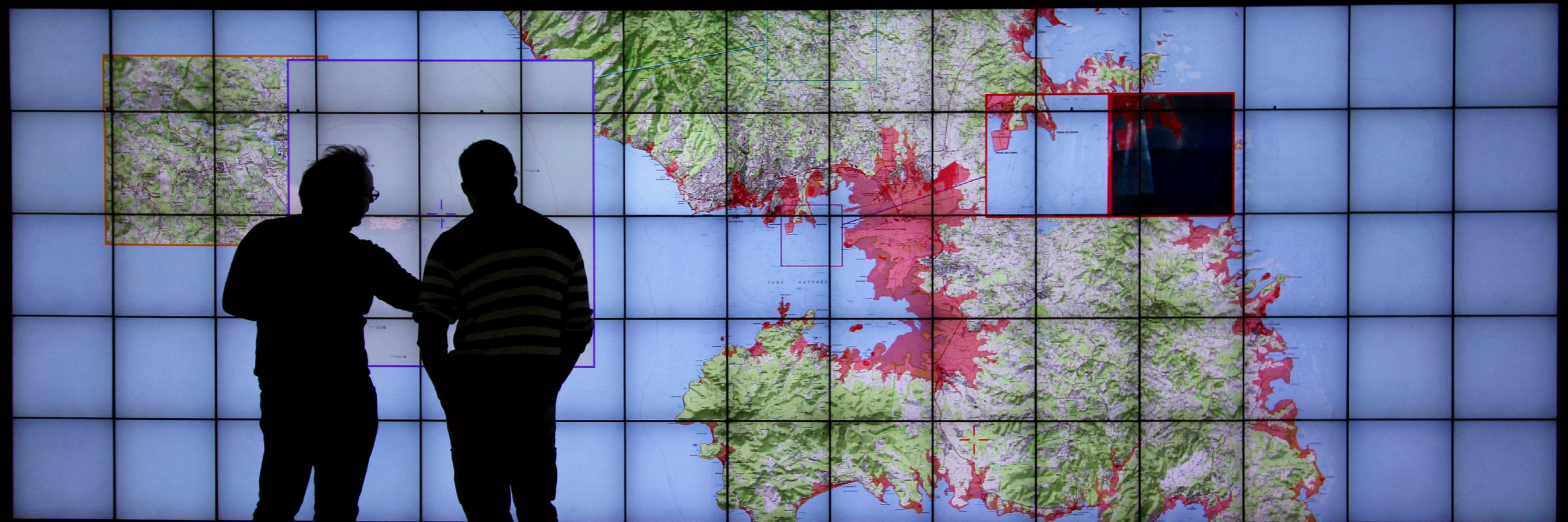
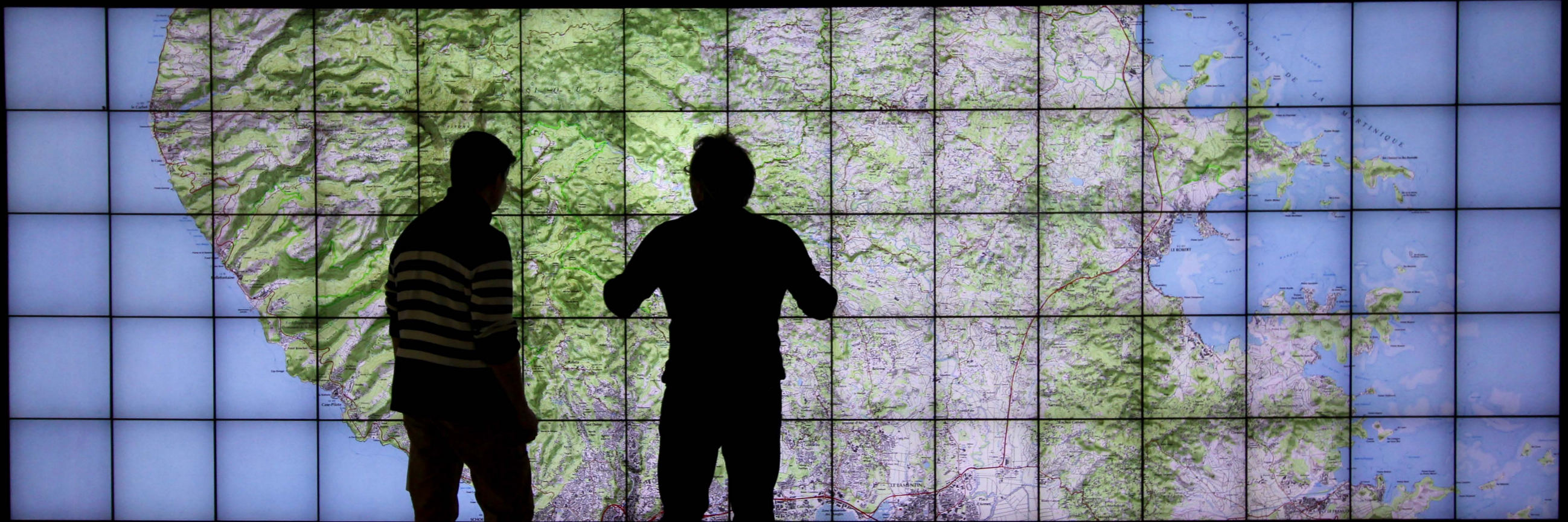
Collaborative Work



# Real-time monitoring of geolocated data









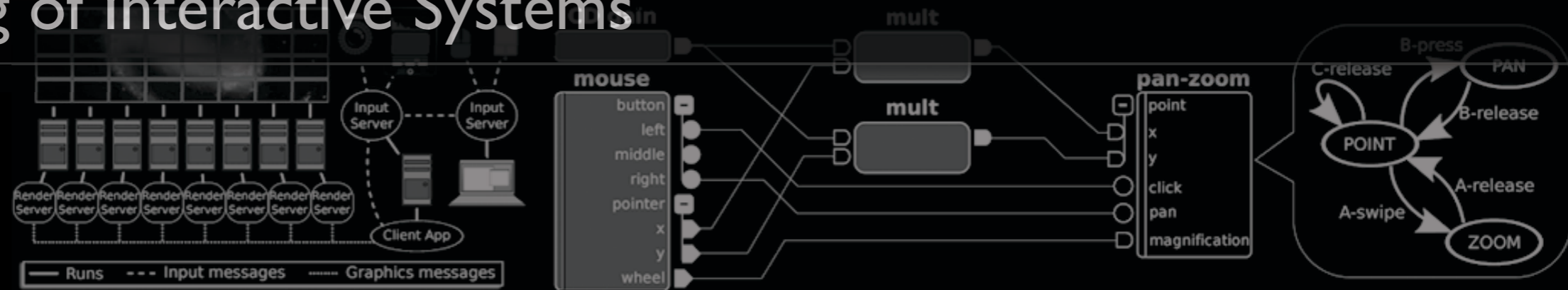
# Exploratory Visualization of Astronomical Data on Ultra-high-resolution Wall Displays

E. Pietriga, F. del Campo, A. Ibsen, R. Primet, C. Appert, O. Chapuis, M. Hempel, R. Muñoz, S. Eyheramendy Duerr, A. Jordan, H. Dole, *Astronomical Telescopes and Instrumentation*, SPIE, 2016 (invited paper)





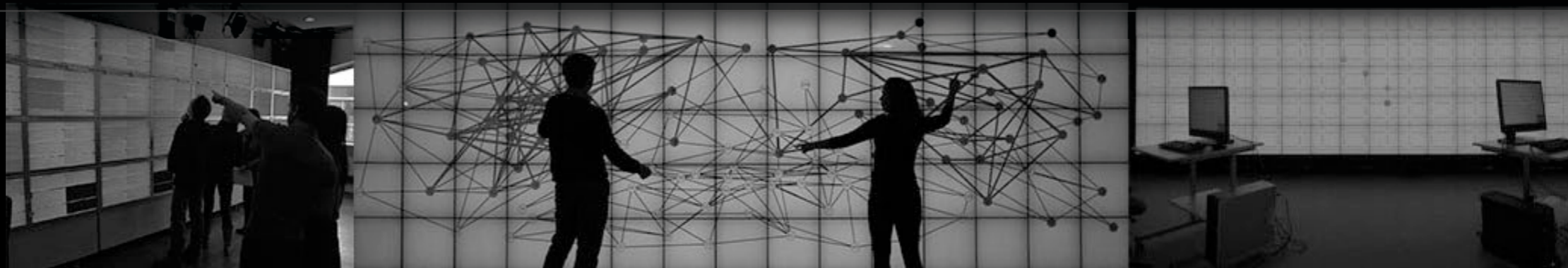
# Engineering of Interactive Systems



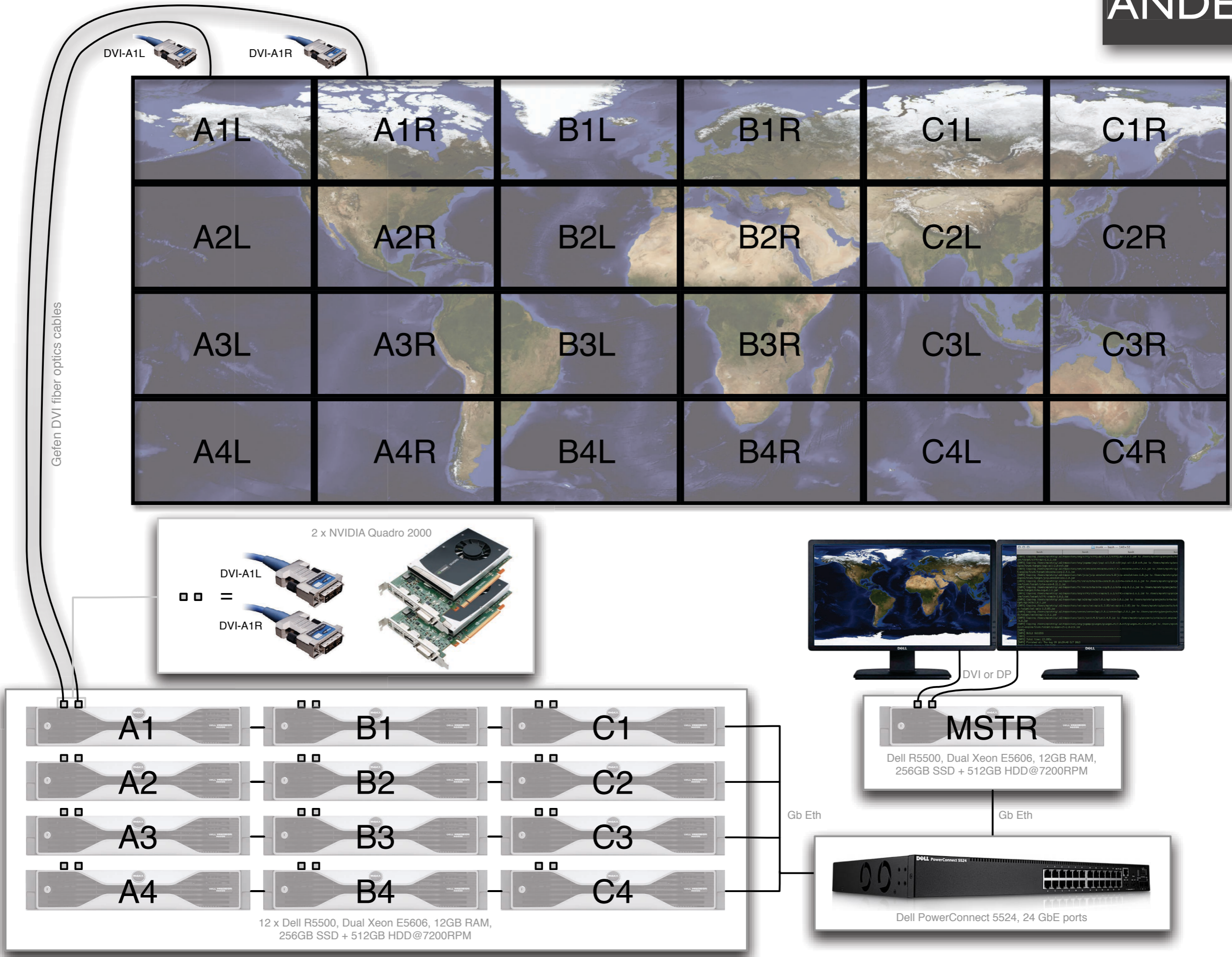
# Interaction and Visualization Techniques



# Computer-Supported Cooperative Work











**WILD (Paris, France)**

16 nodes + 2 masters

- 8x4 tiles (2560x1600)
- 36 NVidia GeForce GT8800
- Mac OS X & Linux Ubuntu
- 144 Intel Xeon cores
- 192 GB RAM
- HDD storage (10TB)

1 Gb eth network

Vicon motion tracker (10 cameras)

Fat bezels



**ANDES (Santiago de Chile)**

12 nodes + 1 master

- 6x4 tiles (1920x1080)
- 24 NVidia Quadro 2000
- Linux Fedora 19
- 144 Intel Xeon cores
- 156 GB RAM
- SSD+HDD storage (10TB)

1 Gb eth network

No motion tracking

Narrower bezels

ZaagTech multi-touch frame



**WILDER (Paris, France)**

10 nodes + 2 masters

- 15x5 tiles (960x960)
- 10 NVidia K5000
- Linux Ubuntu 2014
- 40 Intel Xeon cores
- ??? GB RAM
- SSD+HDD storage

1 Gb eth network

Vicon motion tracker (6 cameras)

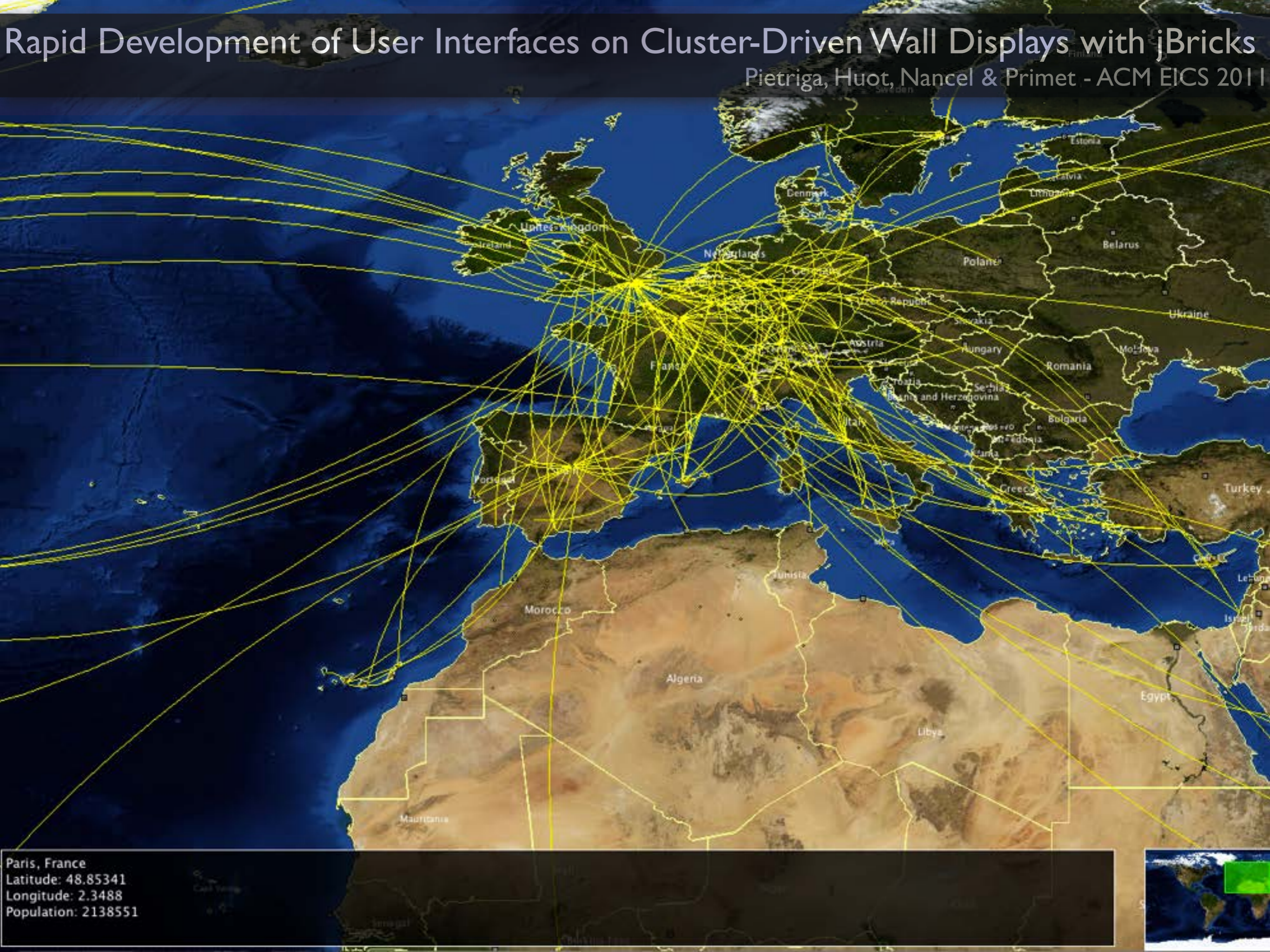
Very narrow bezels

PQLabs multi-touch frame



# Rapid Development of User Interfaces on Cluster-Driven Wall Displays with jBricks

Pietriga, Huot, Nancel & Primet - ACM EICS 2011



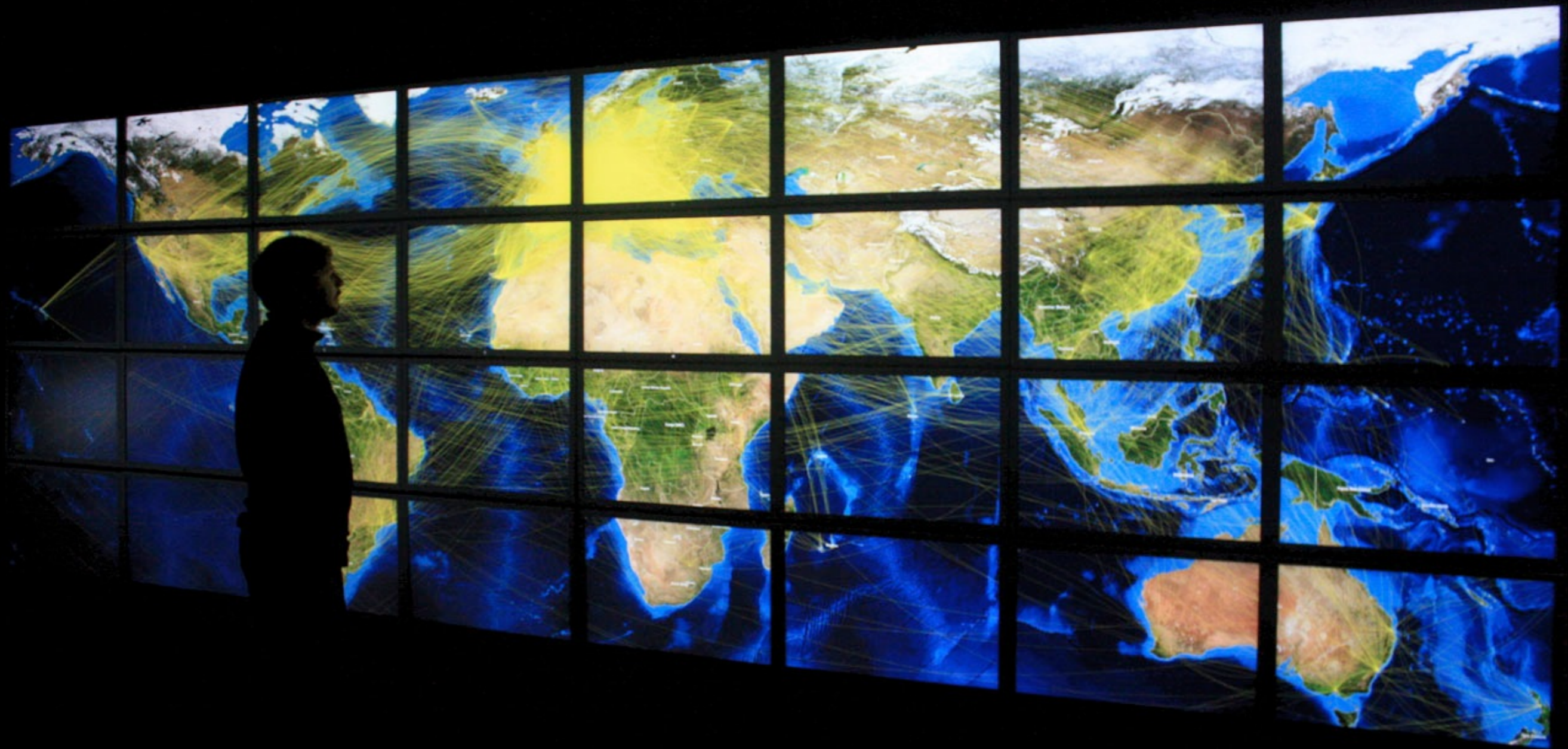
Paris, France  
Latitude: 48.85341  
Longitude: 2.3488  
Population: 2138551





# Rapid Development of User Interfaces on Cluster-Driven Wall Displays with jBricks

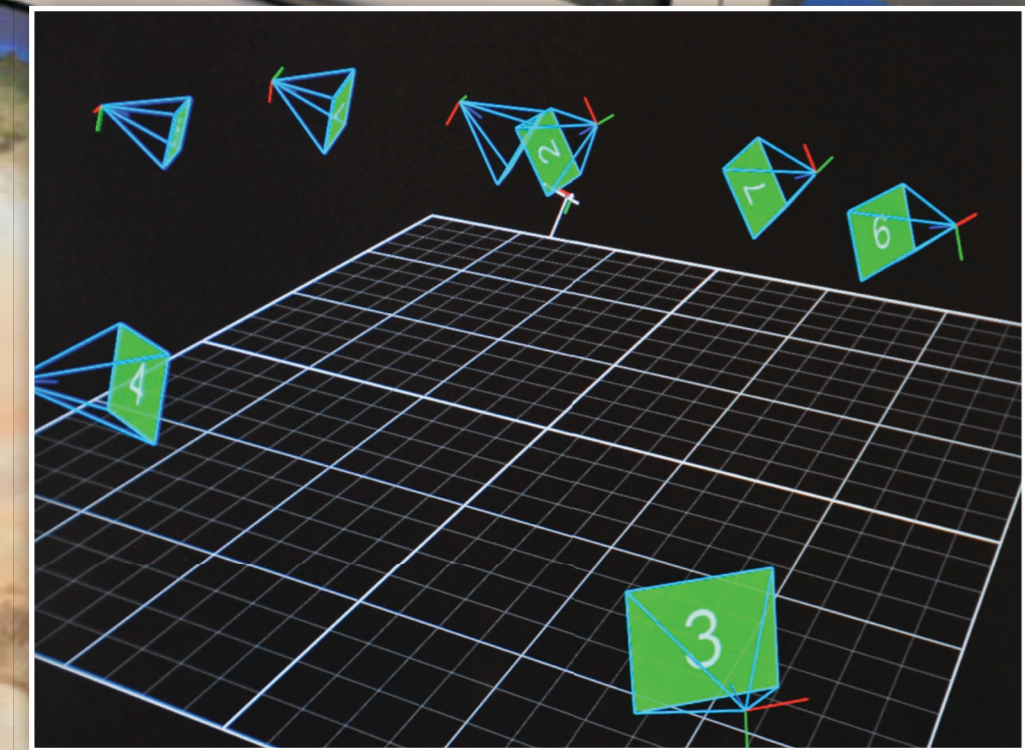
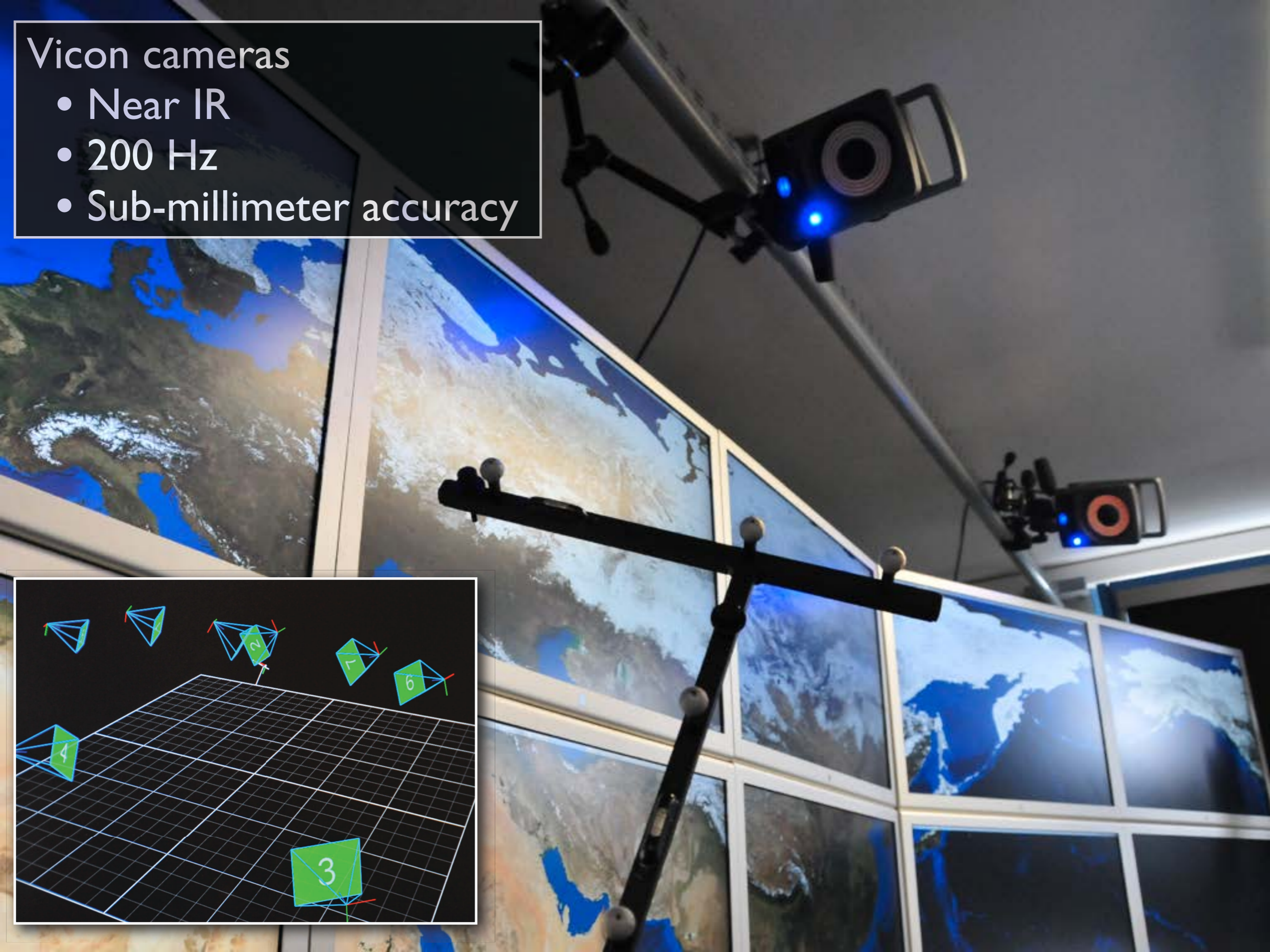
Pietriga, Huot, Nancel & Primet - ACM EICS 2011





## Vicon cameras

- Near IR
- 200 Hz
- Sub-millimeter accuracy





# Multi-touch gestures for discrete and continuous control

Olafsdottir and Appert - ACM AVI 2014

<i>Constraint</i>	FREE				ANCHORED			
<i>Reference</i>	EXTERNAL		INTERNAL		EXTERNAL		INTERNAL	
<i>Shape</i>	LINEAR	CIRCULAR	LINEAR	CIRCULAR	LINEAR	CIRCULAR	LINEAR	CIRCULAR
1 CP								
2 CP								
3 CP								
4 CP	...	...	...	...				
5 CP	...	...	...	...				

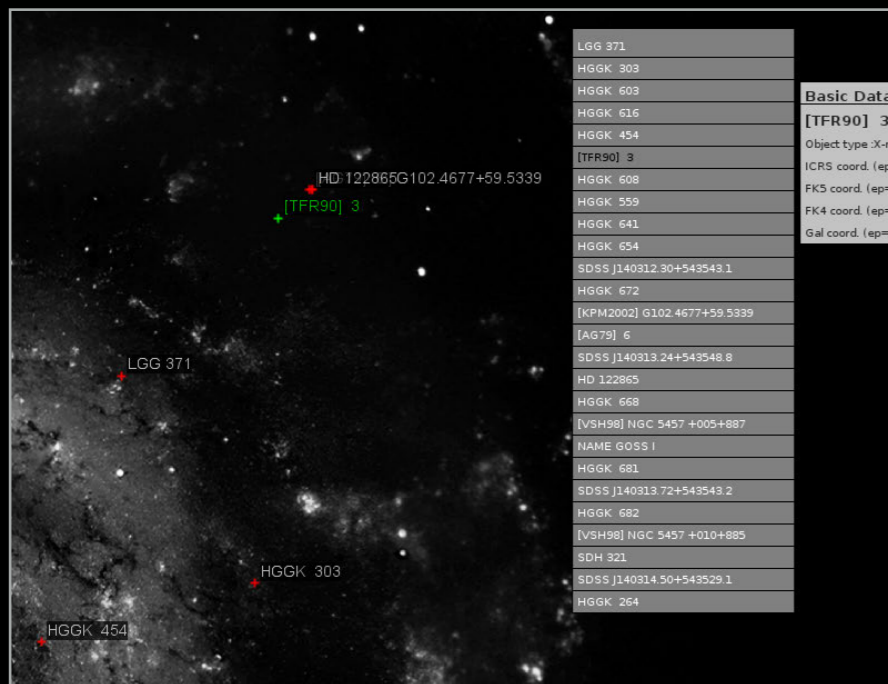
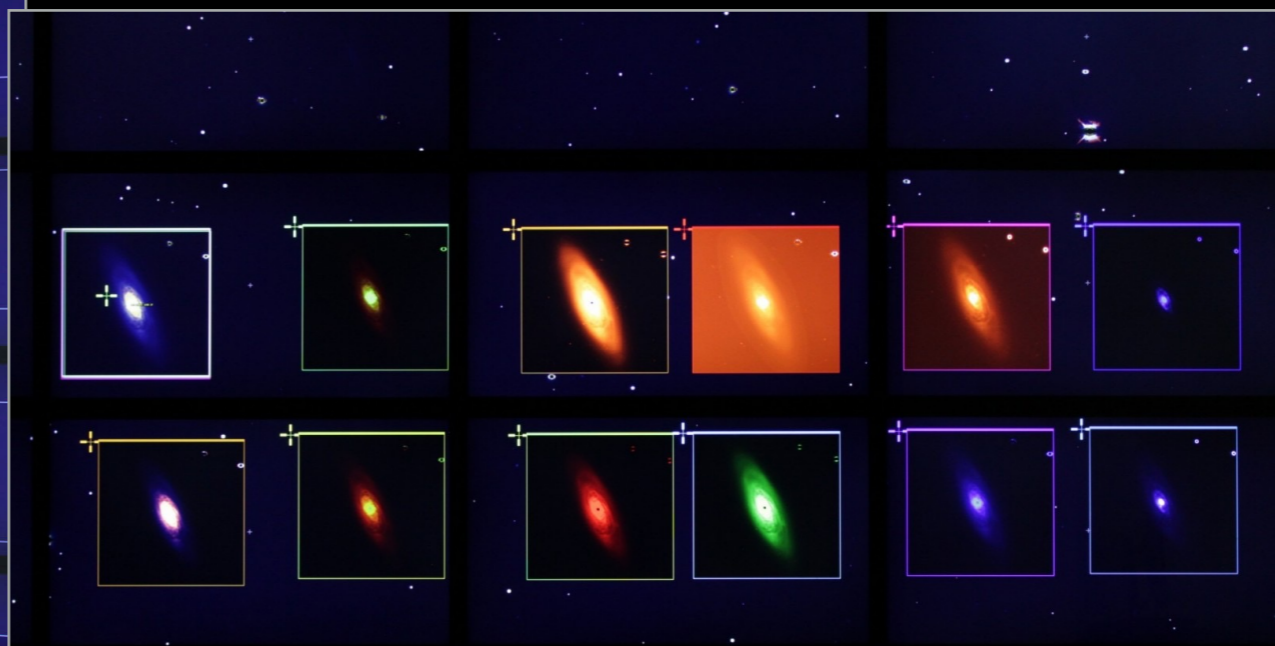
- Handling collections of images
- Dynamic color lookup table/scaling algorithm
- Handling heterogeneous data sources (SIMBAD queries, PDF documents, ...)

Interaction:

- Gestures, multiple input devices (handheld devices, RT motion tracking, ...)
- View management
- Collaborative work



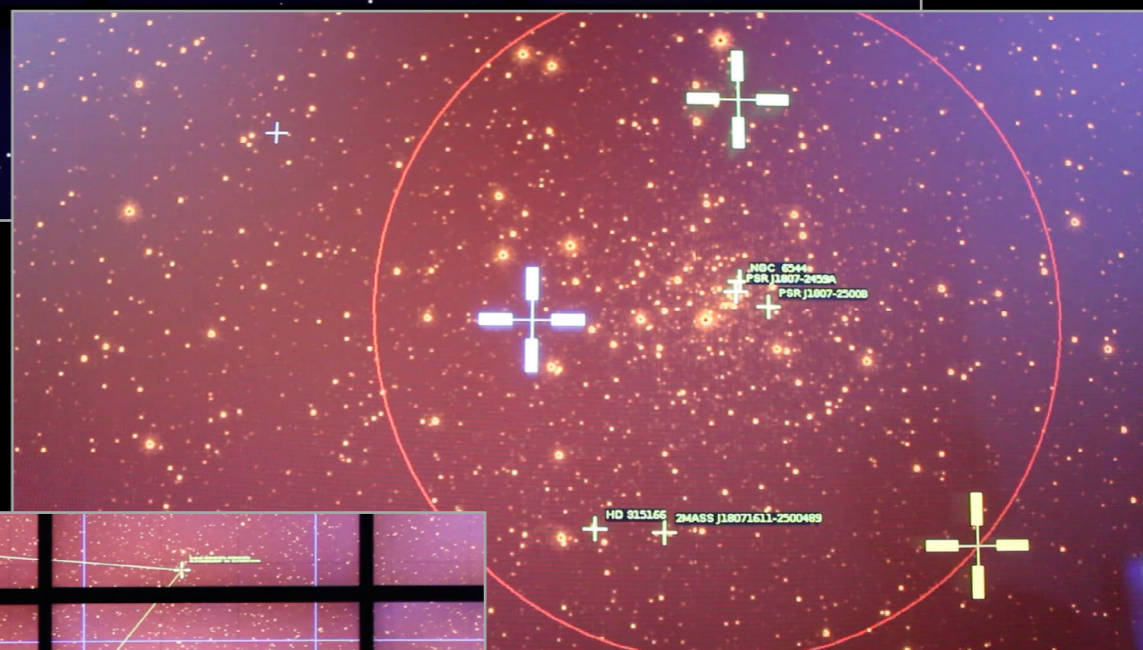
# FITS-OW: Visualization of large HDR imagery



- LGG 371
- HGGK 303
- HGGK 603
- HGGK 616
- HGGK 454
- [TFR90] 3
- HGGK 608
- HGGK 559
- HGGK 641
- HGGK 654
- SDSS J140312.30+543543.1
- HGGK 672
- [KPM2002] G102.4677+59.5339
- [AG79] 6
- SDSS J140313.24+543548.8
- HD 122865
- HGGK 668
- [VSH98] NGC 5457 +005+887
- NAME GOSS I
- HGGK 681
- SDSS J140313.72+543543.2
- HGGK 682
- [VSH98] NGC 5457 +010+885
- SDH 321
- SDSS J140314.50+543529.1
- HGGK 264

Basic Data	Measurements
<b>[TFR90] 3</b>	
Object type: X-ray source	
ICRS coord. (ep=J2000) :14 02 51.4,+54 39 40,(~),D,[3000 3000 90],~	
FK5 coord. (ep=J2000 eq=2000) :14 02 51.4,+54 39 40,(~),D,[3000 3000 90],~	
FK4 coord. (ep=B1950 eq=1950) :14 01 05.7,+54 54 03,(~),D,[3000 3000 90],~	
Gal coord. (ep=J2000) :102 27 25,+59 32 12,(~),D,[3000 3000 90],~	

Object type: X-ray source  
 ICRS coord. (ep=J2000) :14 02 51.4,+54 39 40,(~),D,[3000 3000 90],~  
 FK5 coord. (ep=J2000 eq=2000) :14 02 51.4,+54 39 40,(~),D,[3000 3000 90],~  
 FK4 coord. (ep=B1950 eq=1950) :14 01 05.7,+54 54 03,(~),D,[3000 3000 90],~  
 Gal coord. (ep=J2000) :102 27 25,+59 32 12,(~),D,[3000 3000 90],~

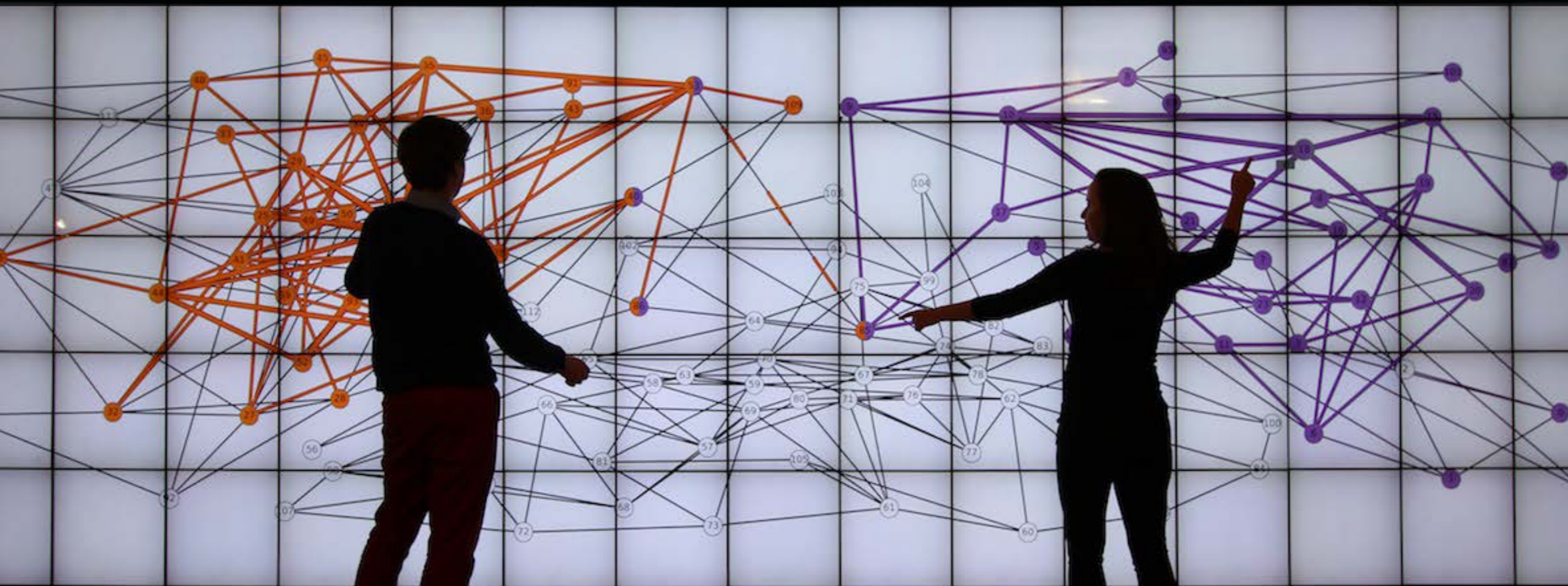


Equatorial: 18h07m33.8554s -25d28m41.1063s  
 Ra: 271.6410641522005 - Dec: -25.47806569087148



# Evaluating Multi-user Selection for Exploring Graph Topology on Wall Displays

A. Prouzeau, A. Bezerianos, O. Chapuis, *IEEE Transactions on Visualisation and Computer Graphics (TVCG)* 2016



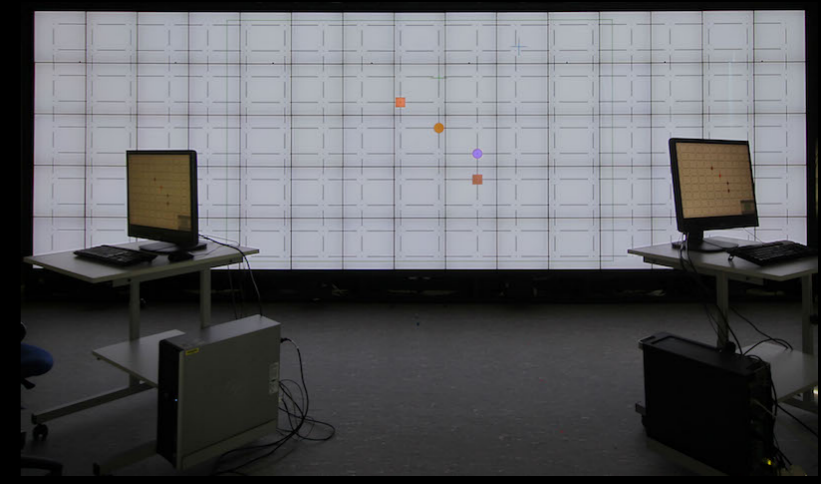
## Towards Road Traffic Management with Forecasting on Wall Displays

A. Prouzeau, A. Bezerianos, O. Chapuis  
*ACM Interactive Surfaces and Spaces (ISS)* 2016



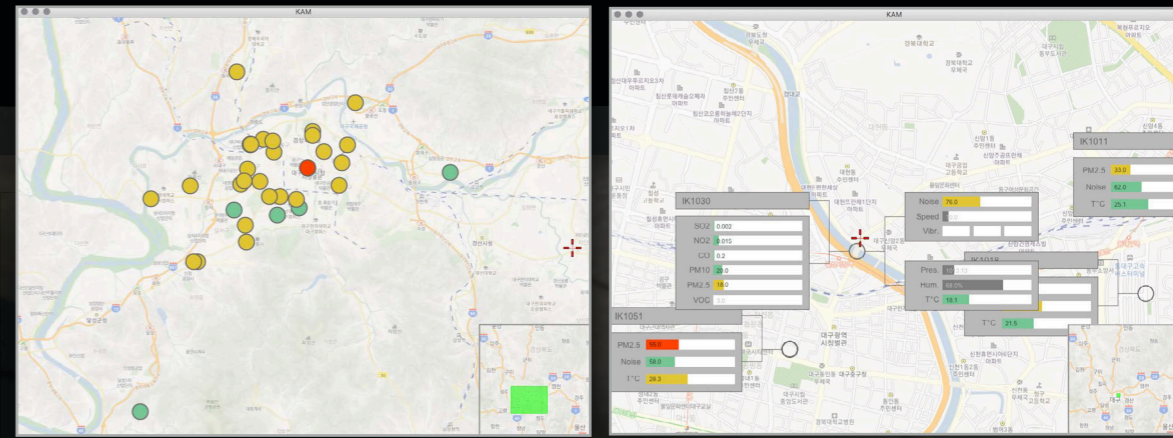
## Trade-offs between a Large Vertical Display and Two Desktops in a Collaborative Path-Finding Task

A. Prouzeau, A. Bezerianos, O. Chapuis  
*Graphics Interfaces (GI)*, 2017



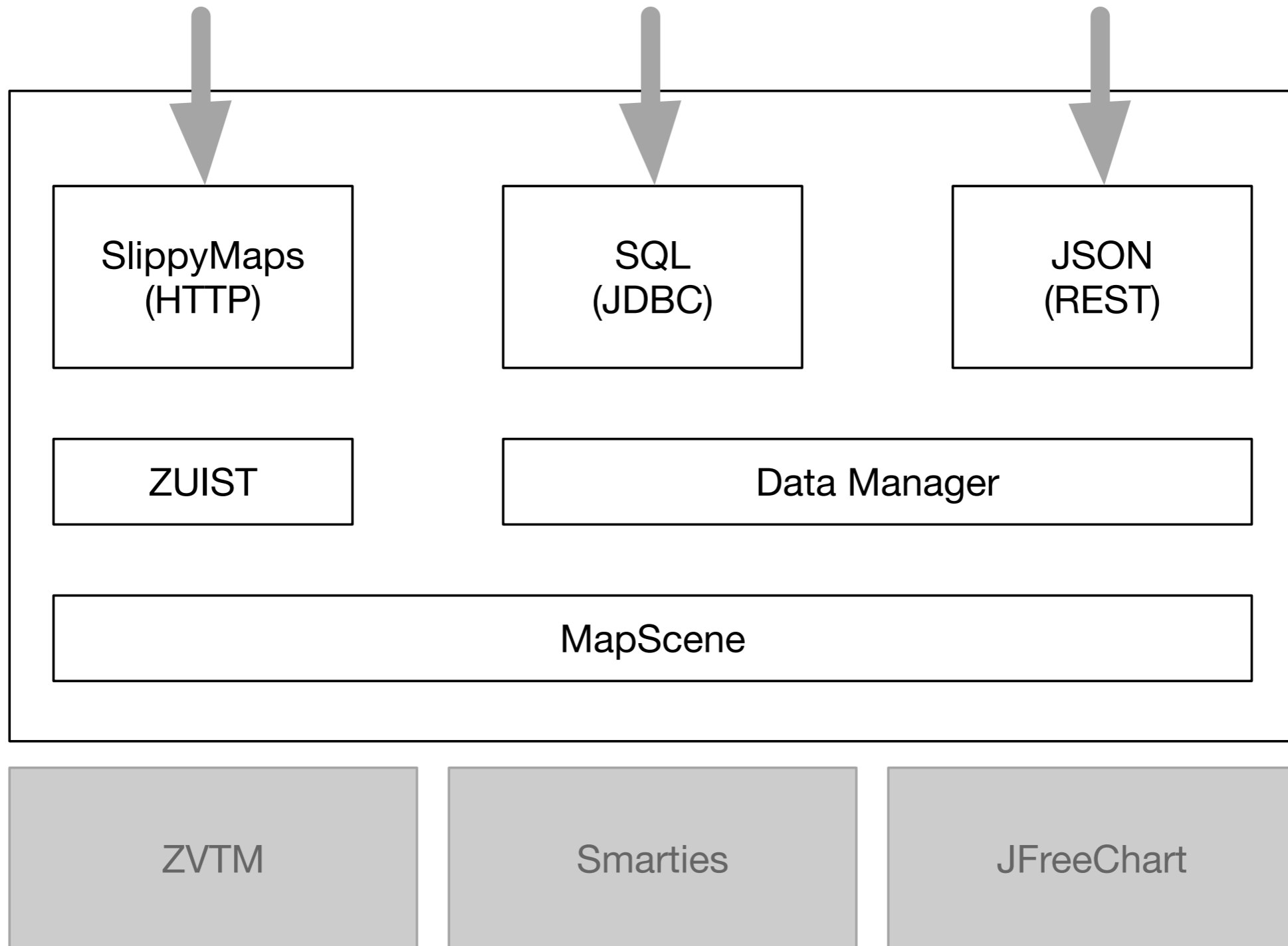


# Monitoring Air Quality in Korea's Metropolises





# KAM: Data Management & Dependencies





# KAM: Multi-scale Navigation

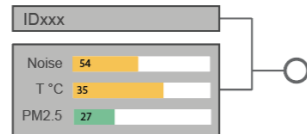
Zoom L0



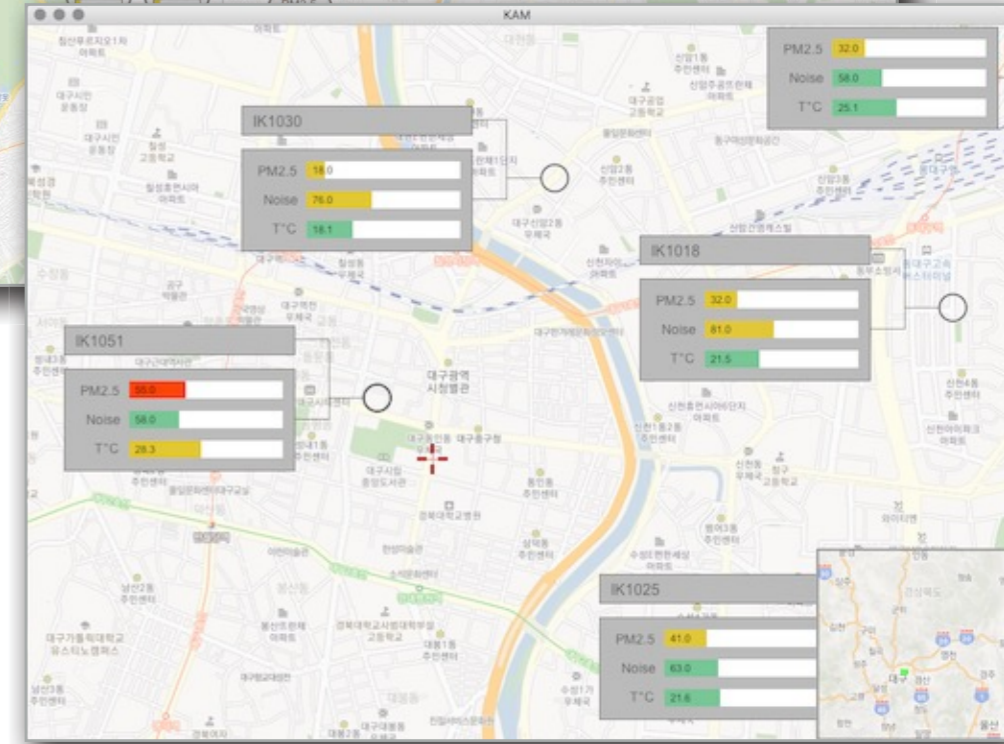
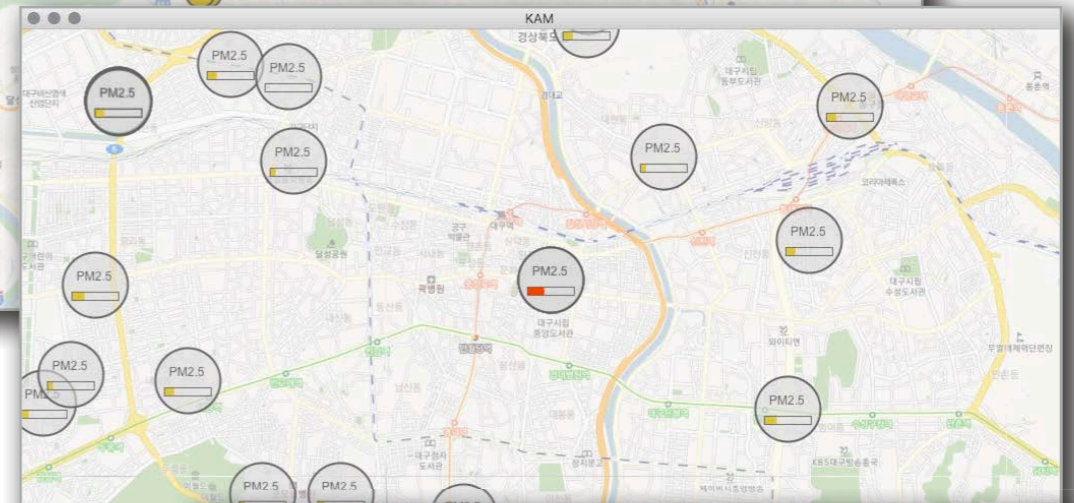
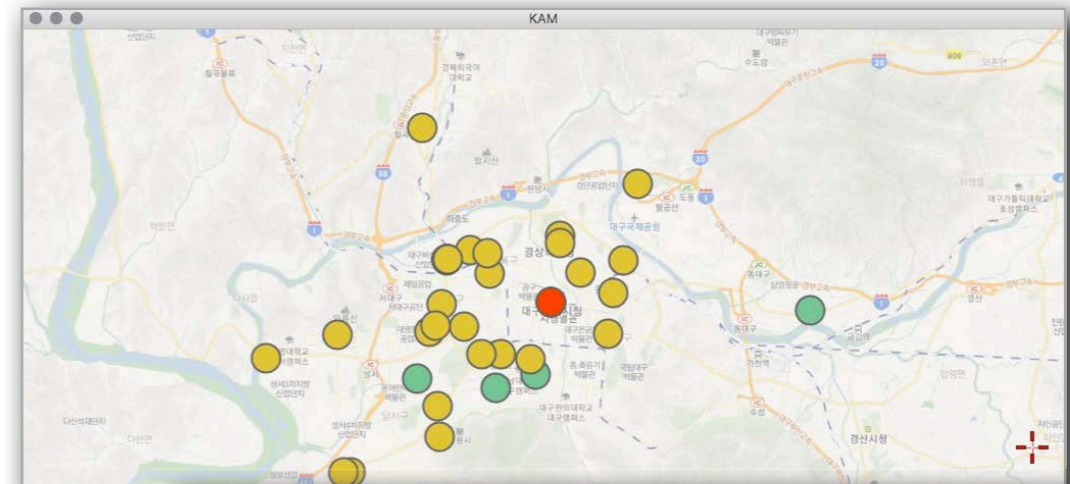
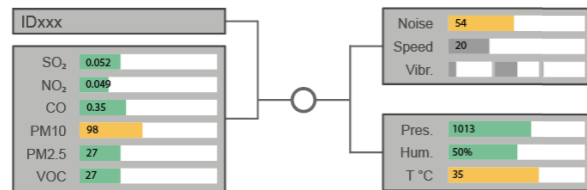
Zoom L1



Zoom L2

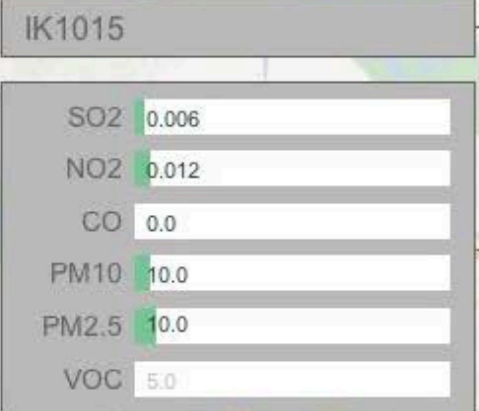
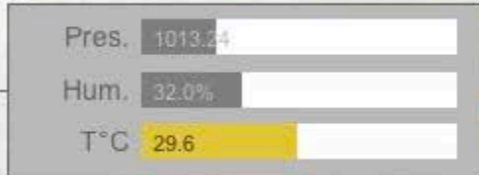
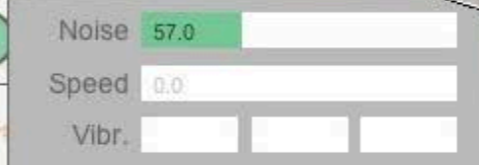
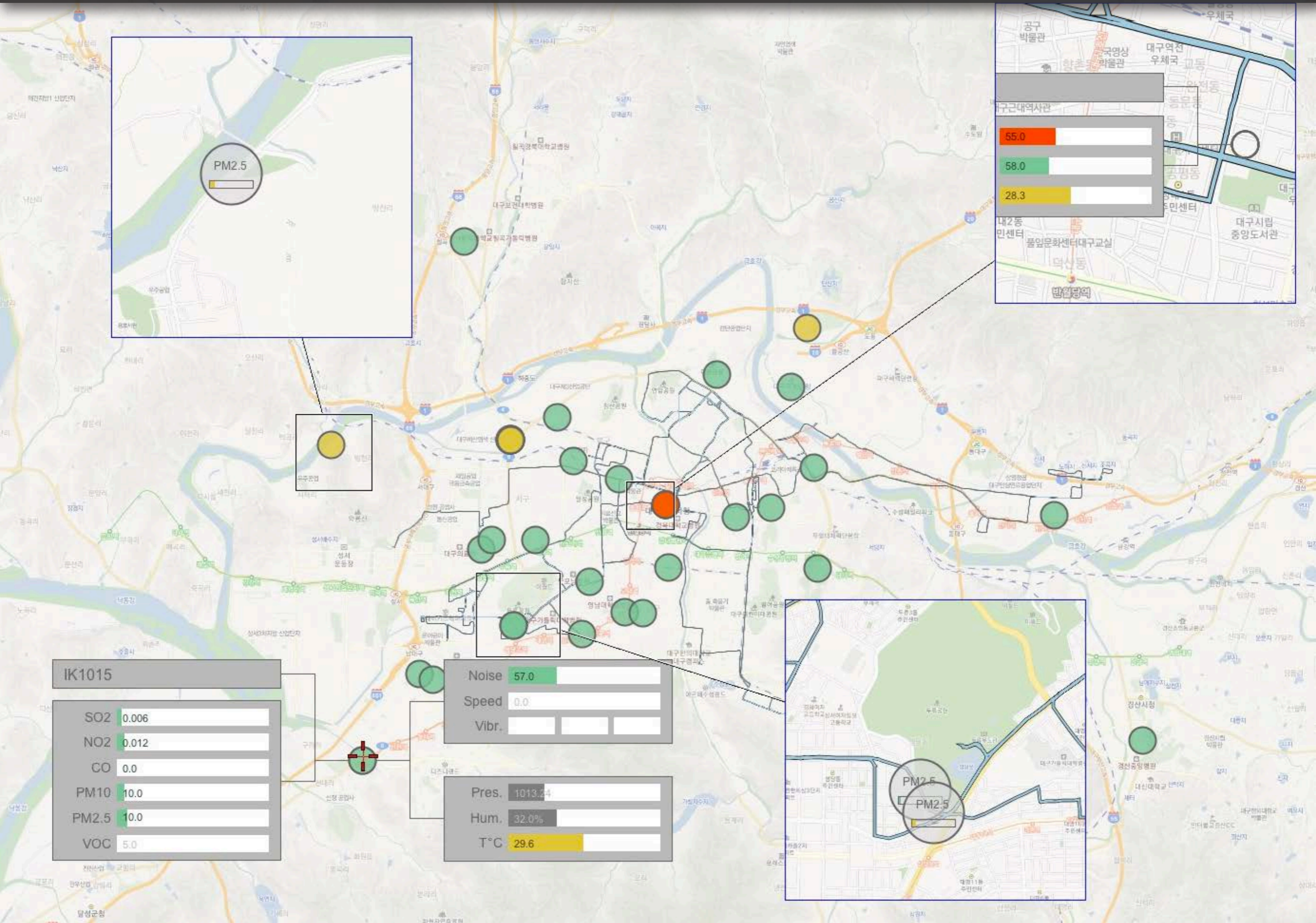


Zoom L3





# KAM: Multi-scale Navigation





# KAM: Route & Sensor History

