

# The State-of-the-Art in Map-like Visualization

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26th of May, 2020



AARHUS  
UNIVERSITY

**ETH** zürich

# What is map-like visualization?



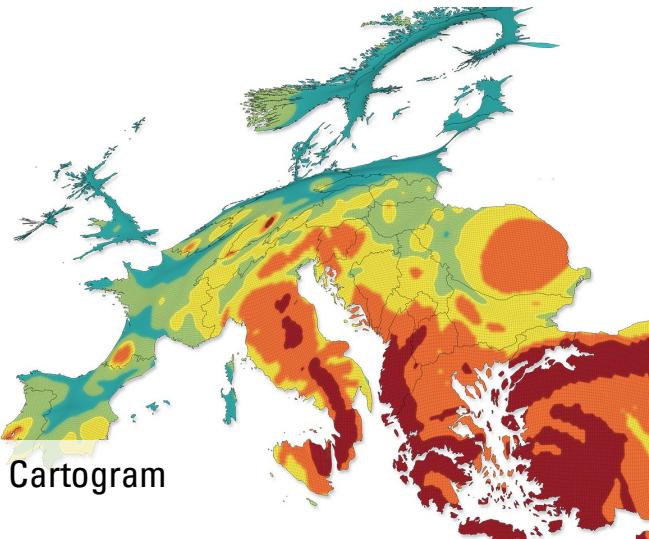
# What are maps?



Satellite image



Metro Map



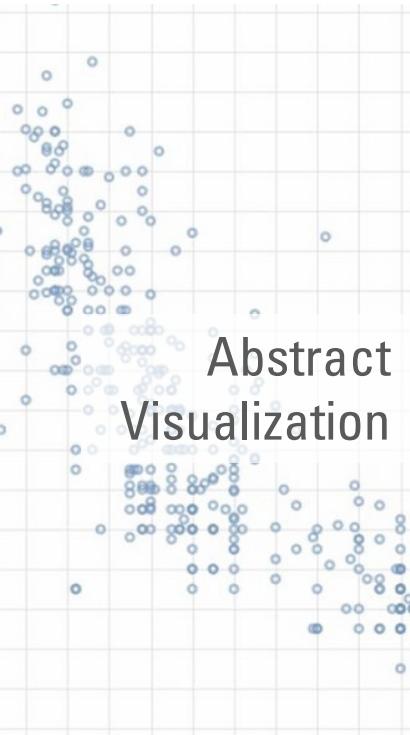
Cartogram

# Contributions

- **Definition** of the term map-like visualization
- **Classification** of map-like visualization techniques
- **Literature Overview** of existing map-like techniques

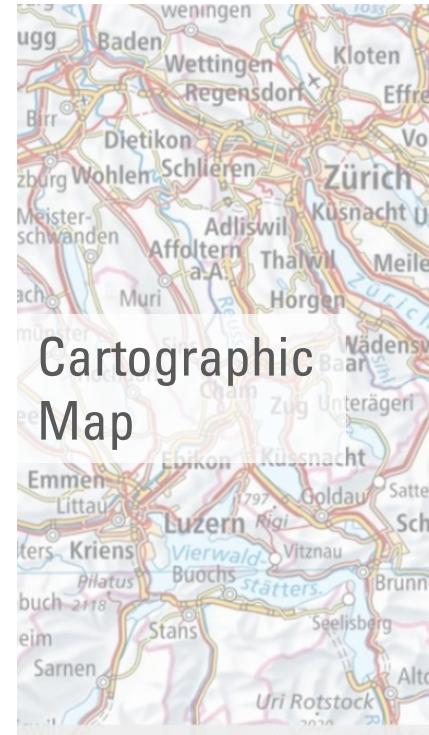
# Defining Map-like Visualization

# What is ...



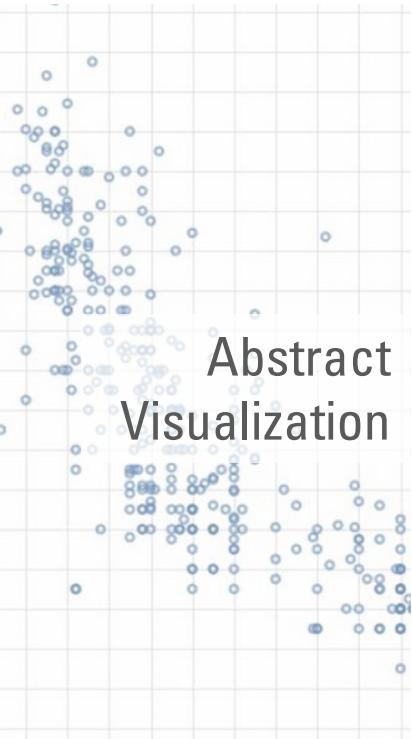
Abstract  
Visualization

Map-like  
Visualization



Cartographic  
Map

# Perspectives



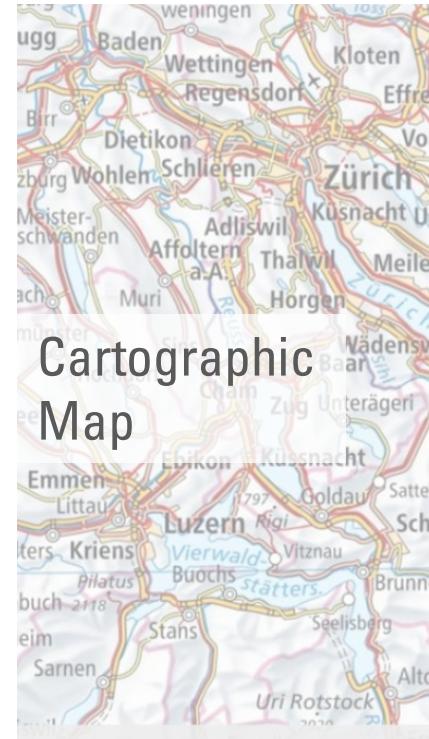
Imitation

Map-like  
Visualization



Abstract  
Visualization

Schematization



Cartographic  
Map

# Definition

A visualization is map-like, if it either **imitates** or **schematizes** a cartographic map

# Classifying Map-like Visualization

# Map Elements

Point



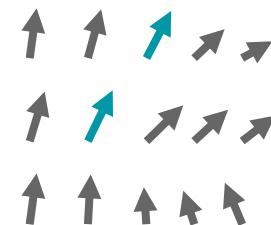
Line



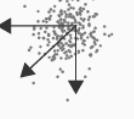
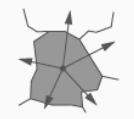
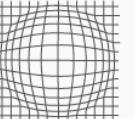
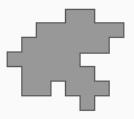
Area



Field



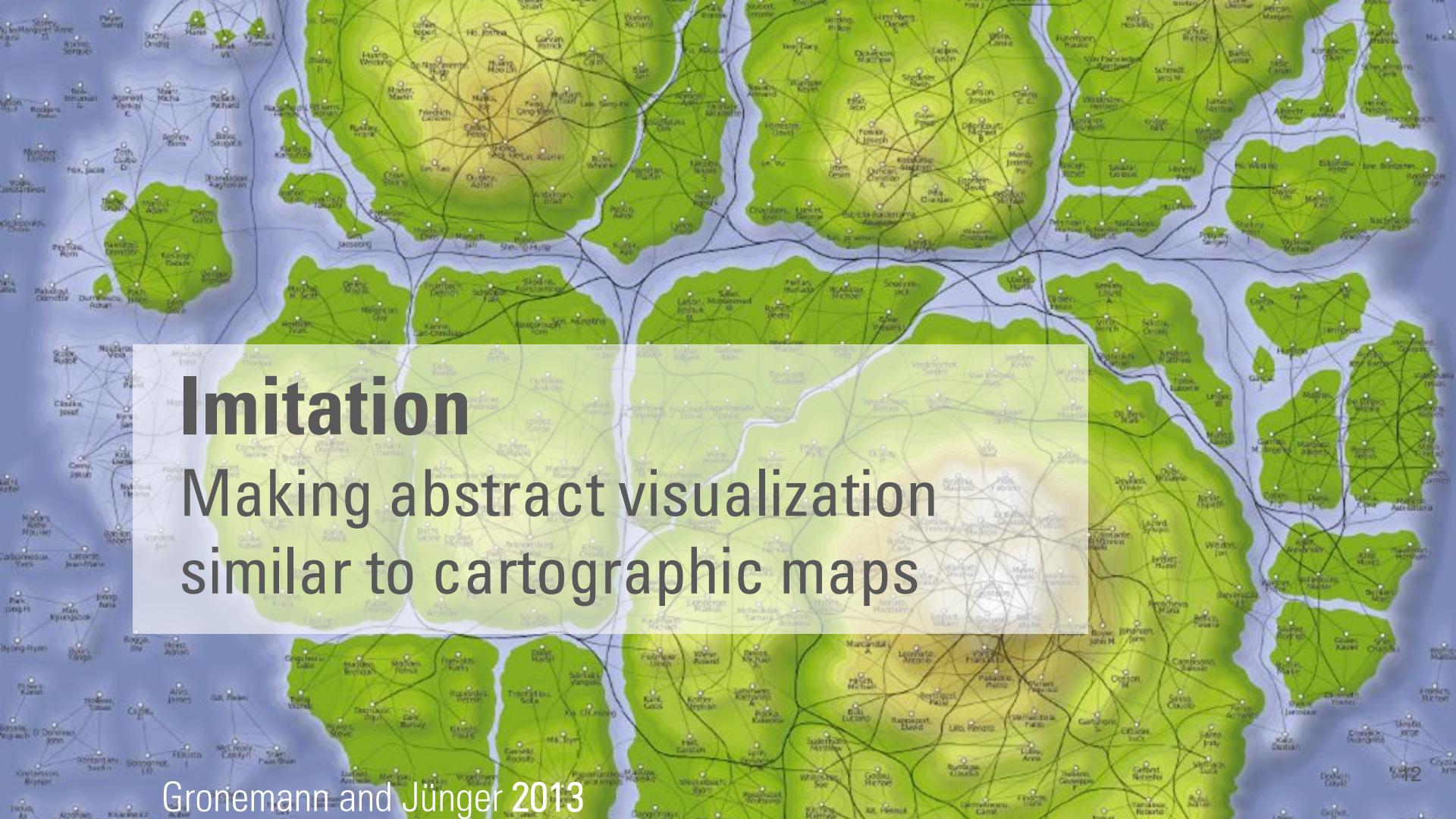
## Map-like Visualization

Perspective	Imitation				Schematization			
Category	Point	Line	Area	Field	Point	Line	Area	Field
Technique	Importance labeling 	Outline-centered 	Grid-based 	Coloring 	Reposition Data Points 	Border-centered 	Shape Deforming 	Stretching 
	Map Icons 	Edge-centered 	Geometric Tessellation 	Contouring 	Reposition Nodes 	Path-centered 	Graphical 	Density-based 
	Geometric Hull 				Cellular 			

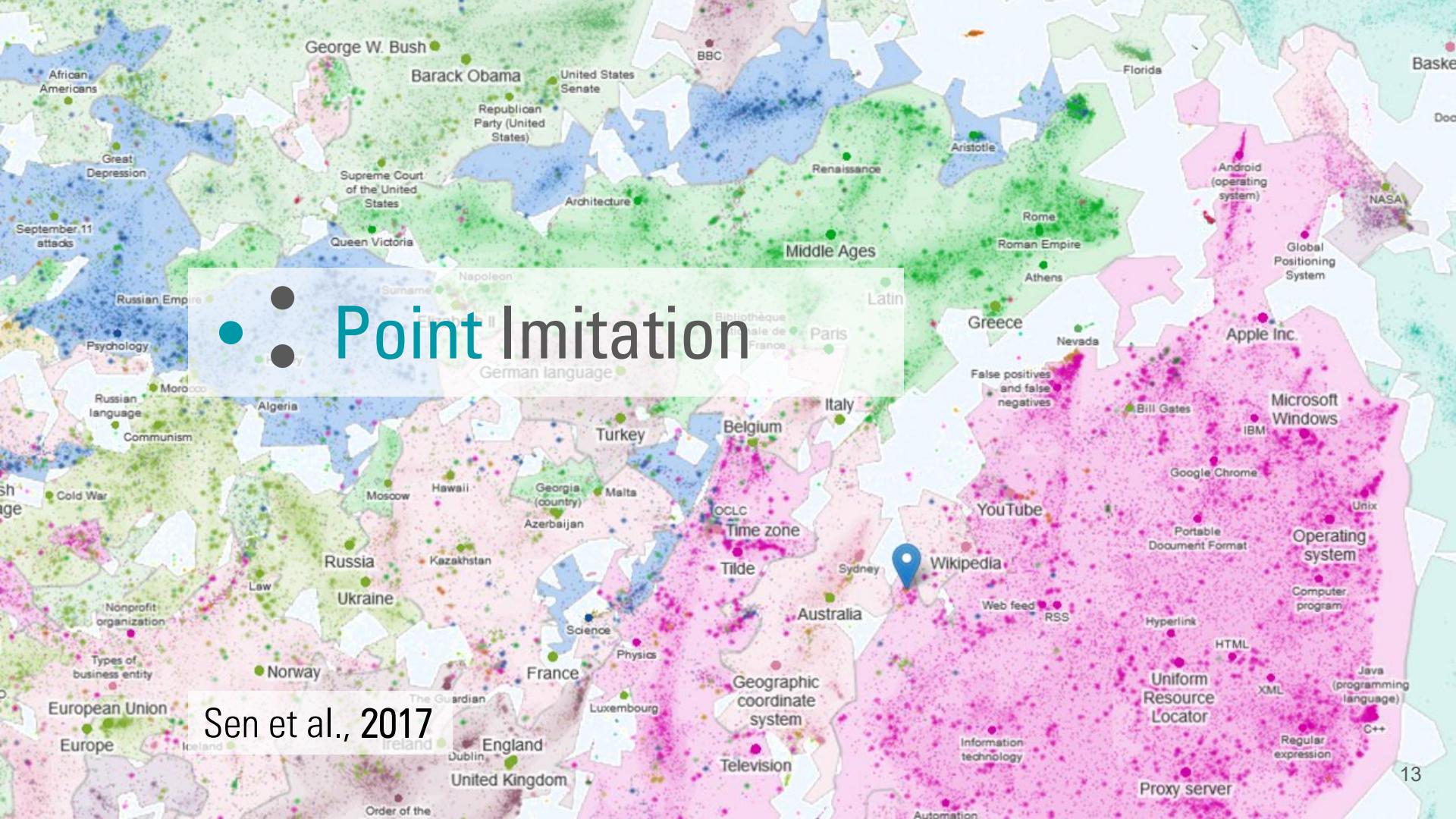
# Perspectives $\times$ Categories

# Imitation

## Making abstract visualization similar to cartographic maps



Gronemann and Jünger 2013



# Point Imitation

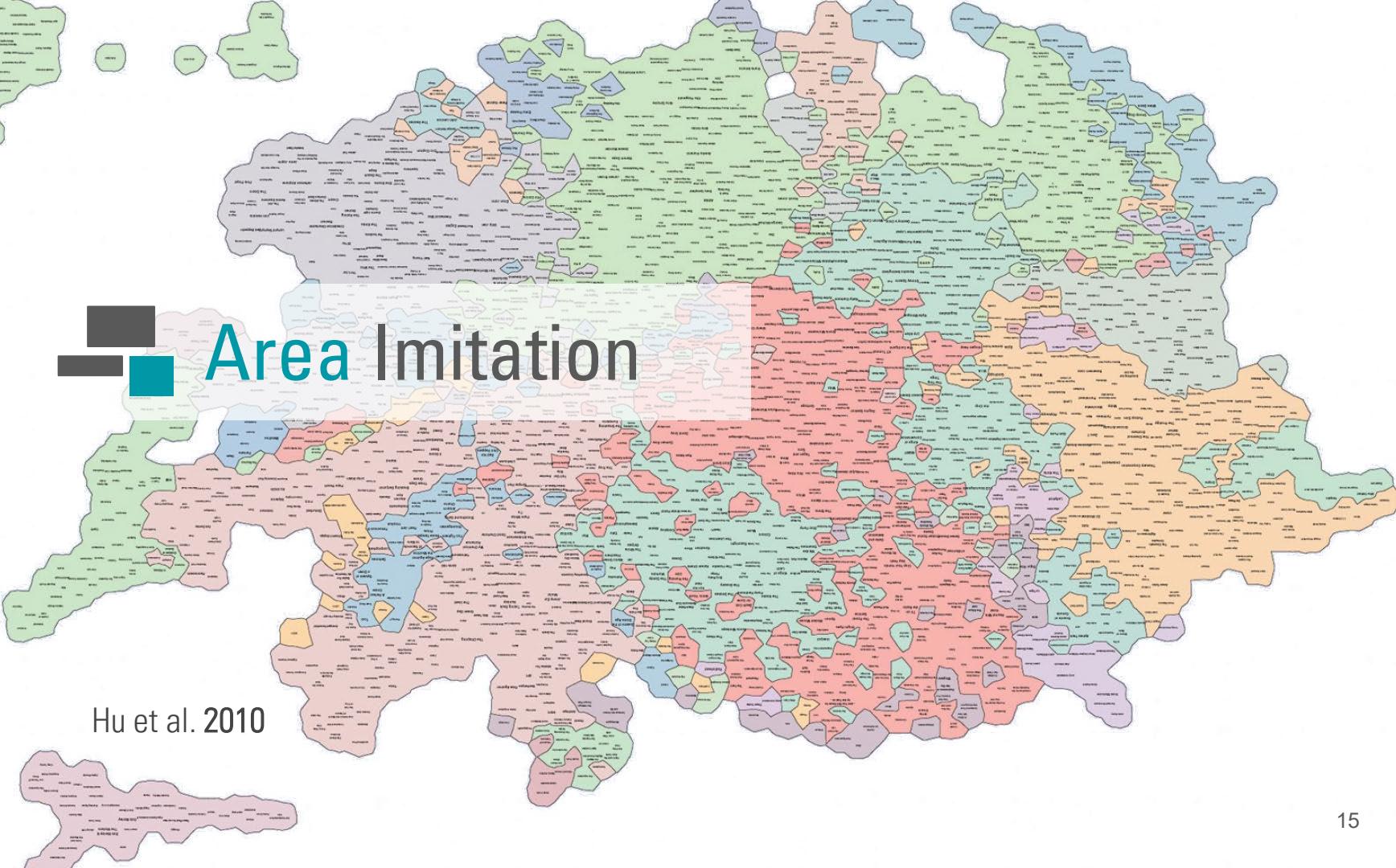
Sen et al., 2017



# Line Imitation

Mondal and Nachmanson  
2018

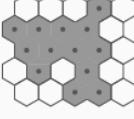
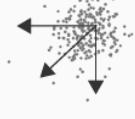
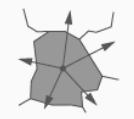
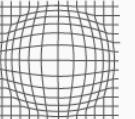
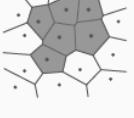






Xu et al. 2013

## Map-like Visualization

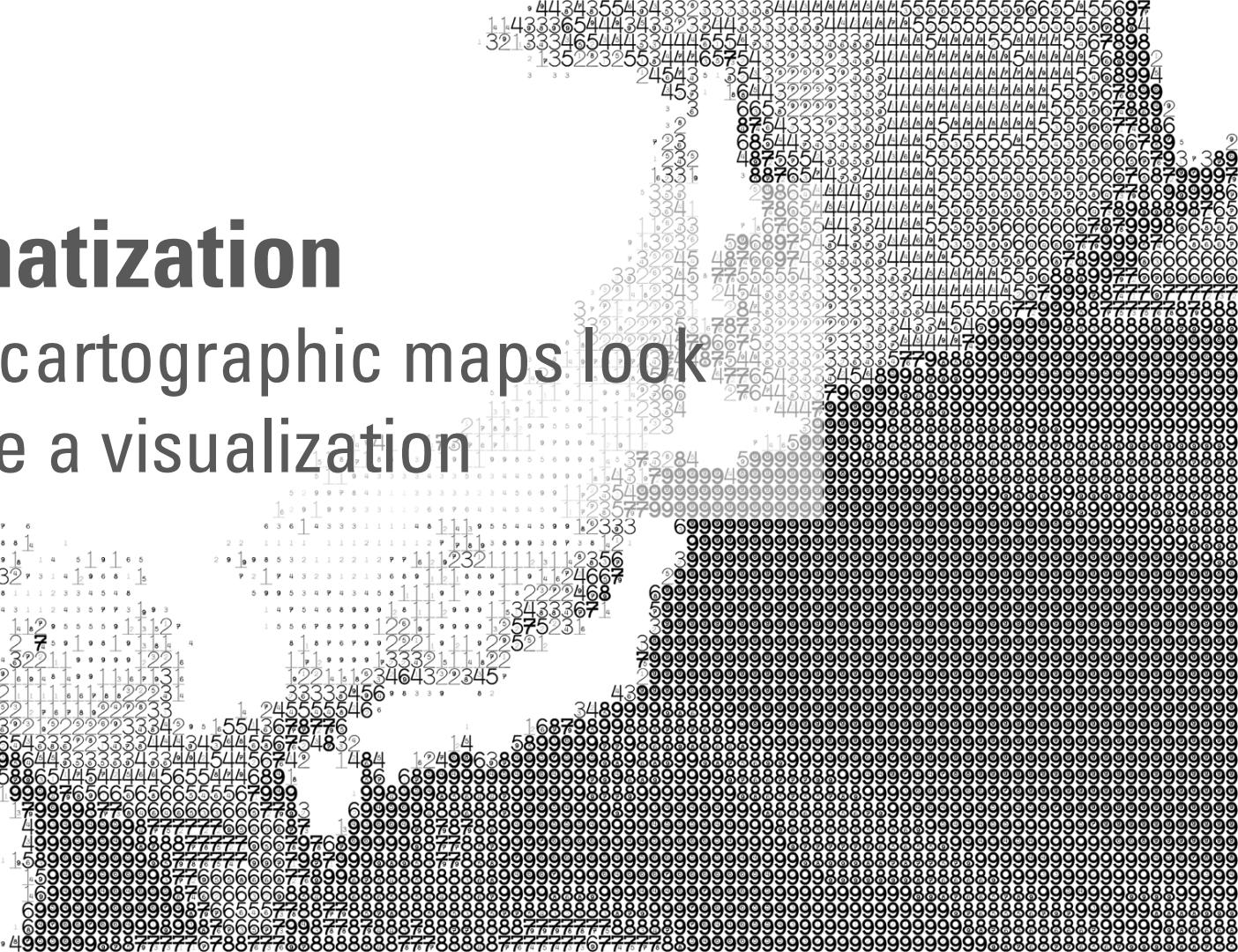
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				Geometric Hull 				

# Literature Overview

# Schematization

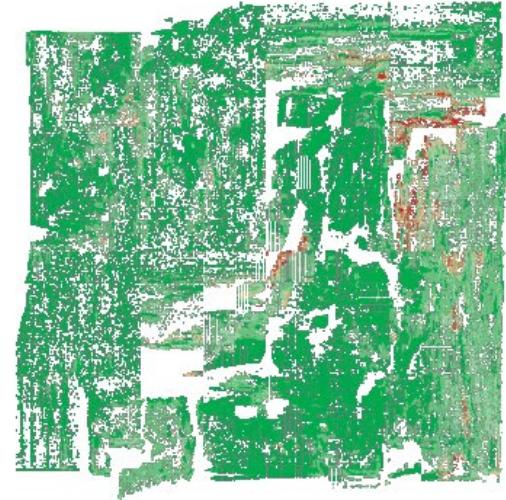
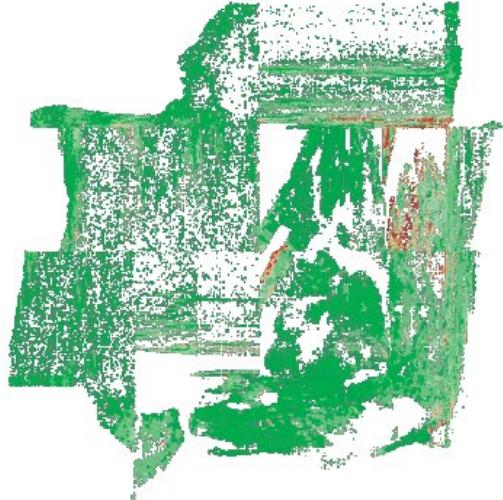
## Making cartographic maps look more like a visualization

Nacenta et al.  
2017

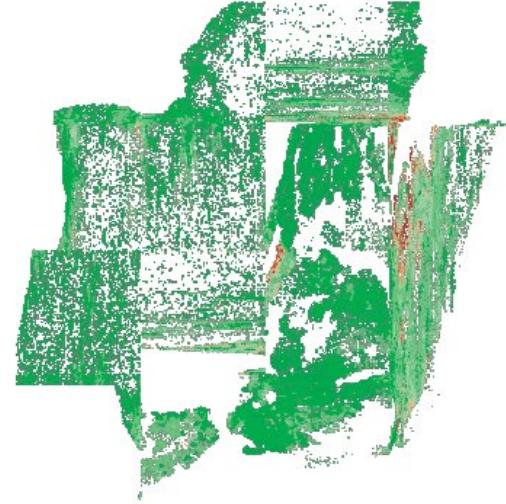
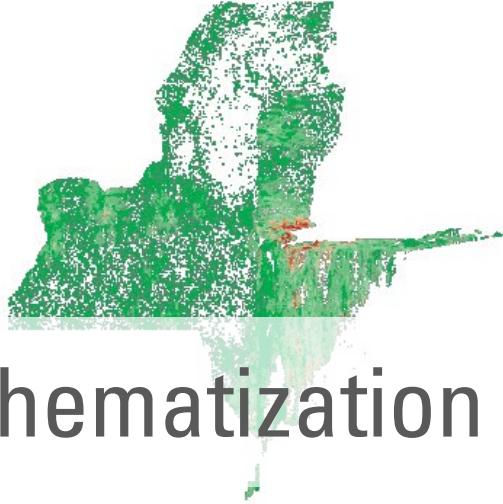
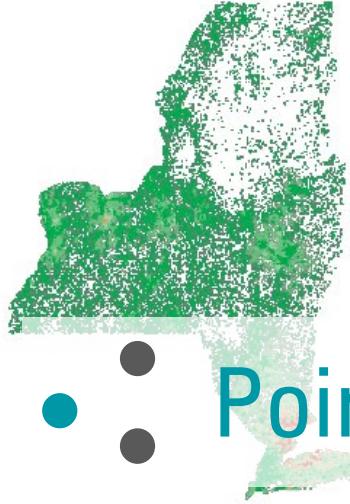




## Point Schematization



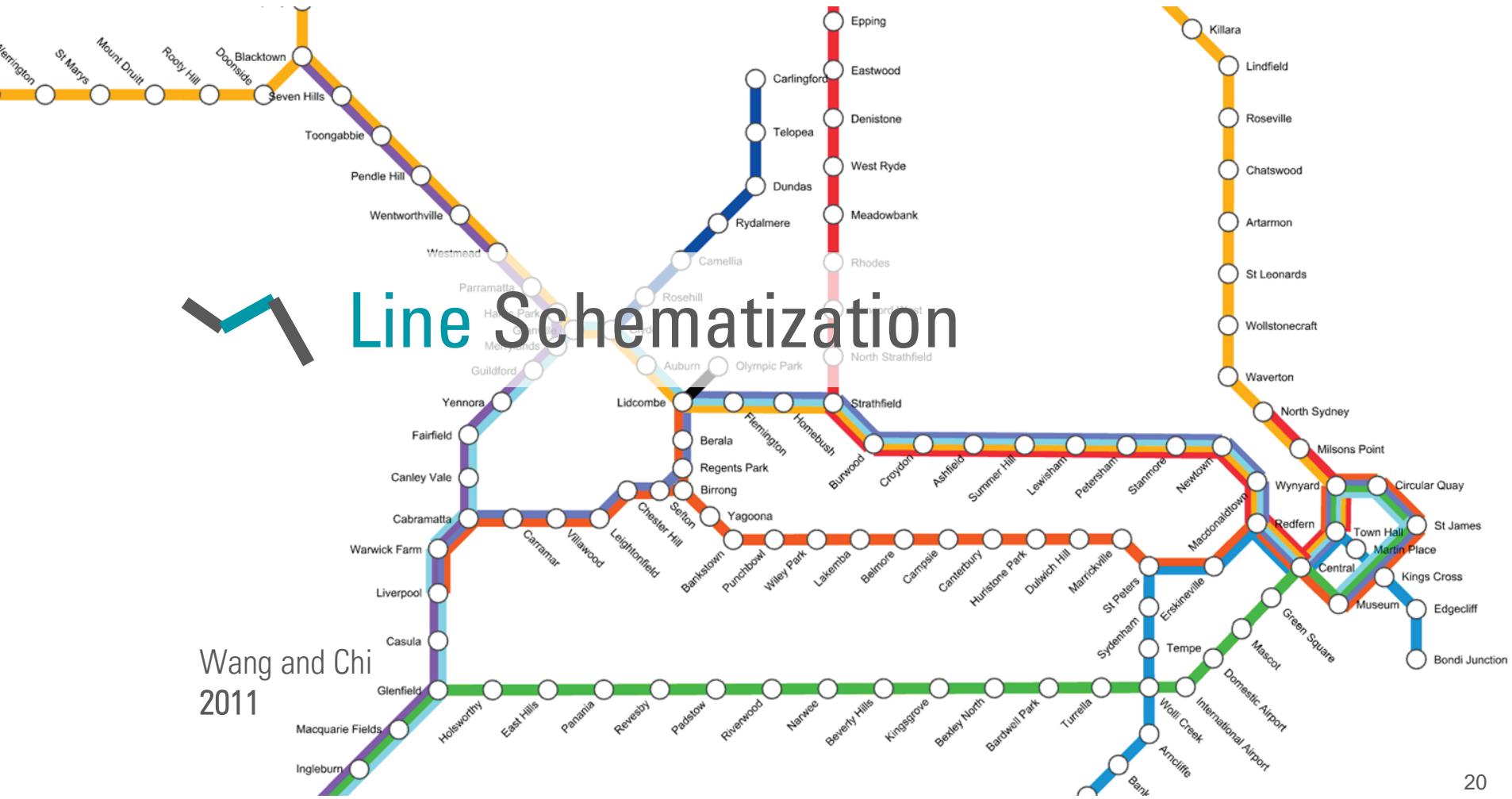
Keim et al.  
2003

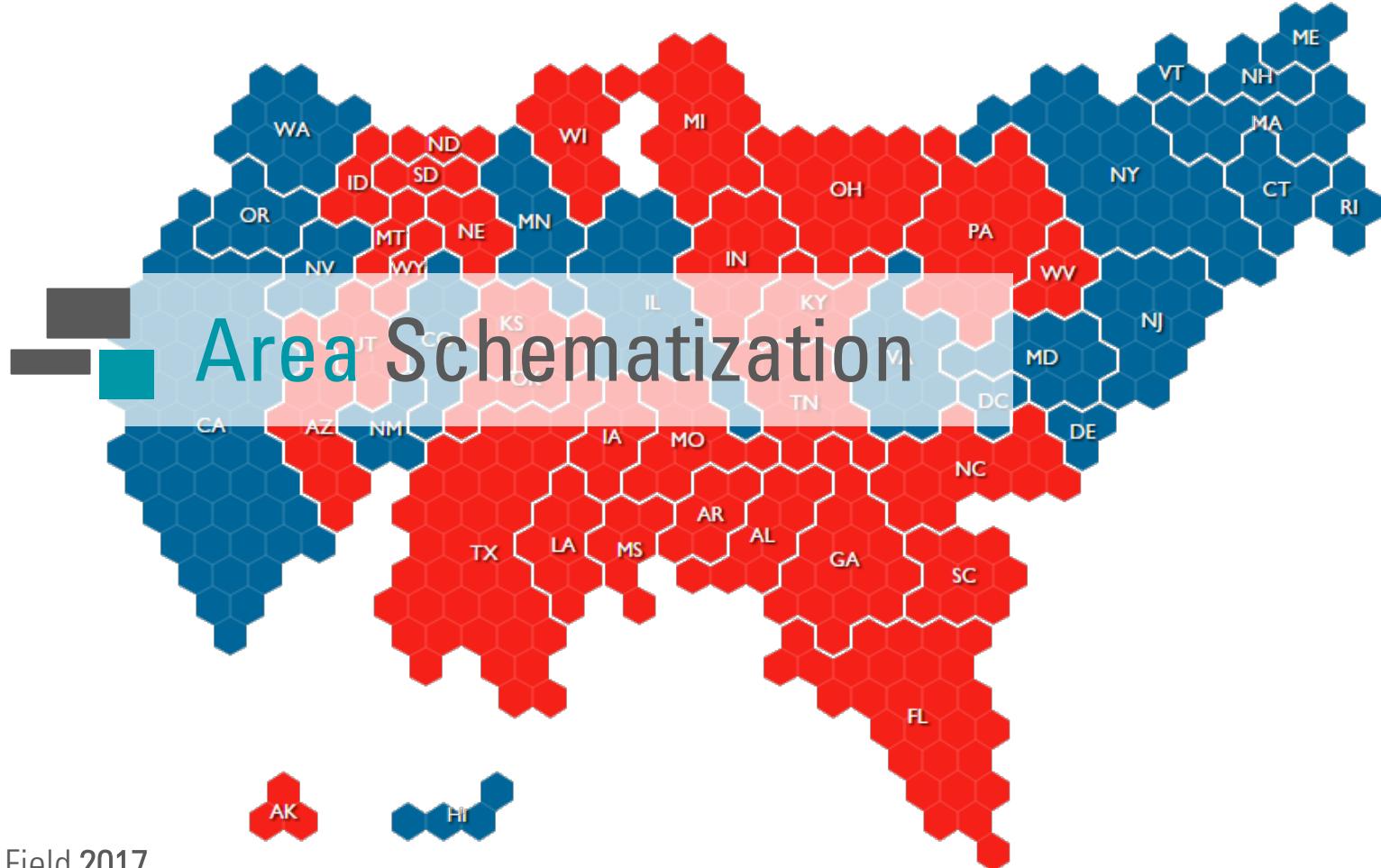


Wang and Chi  
2011

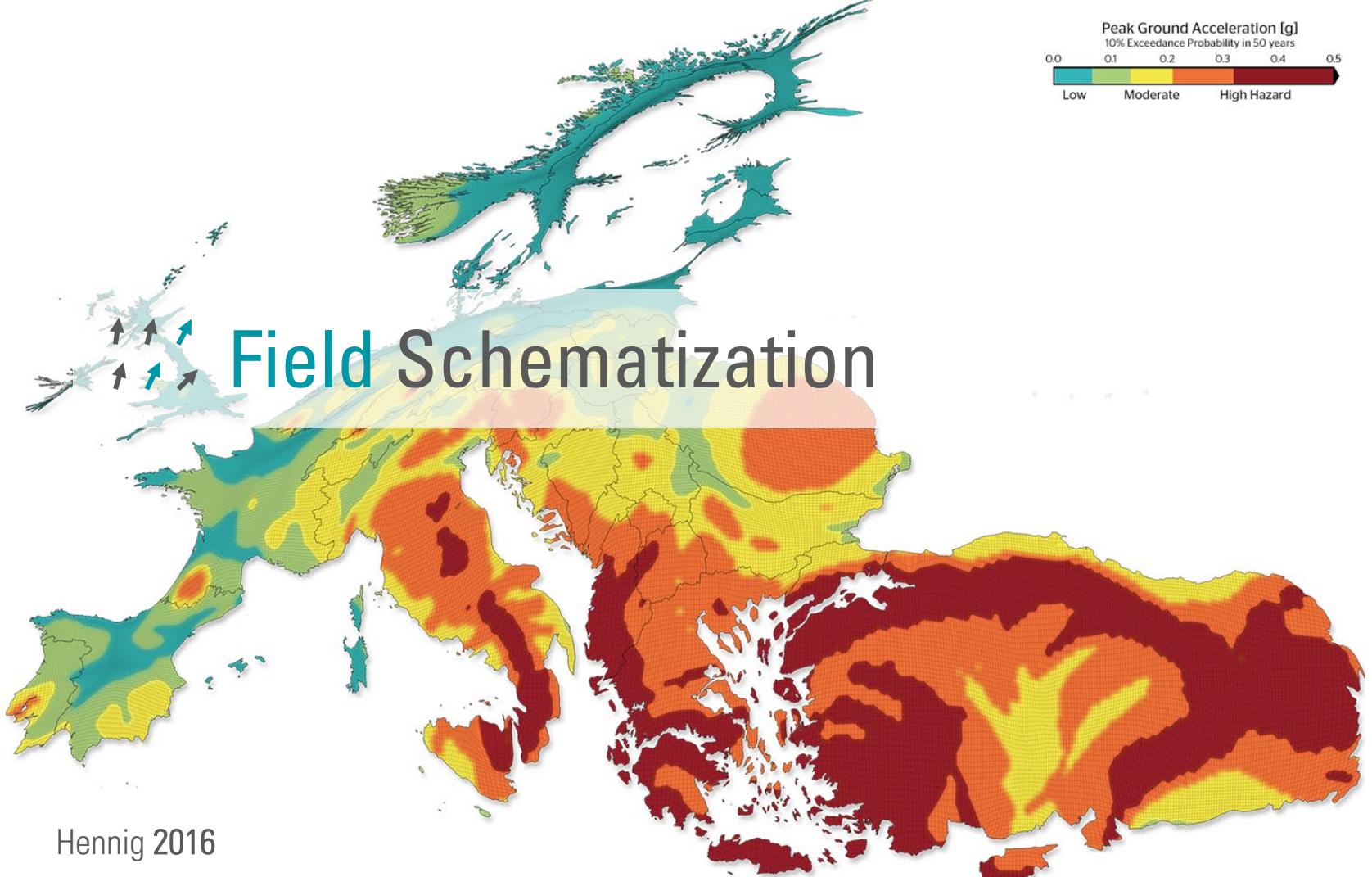


# Line Schematization



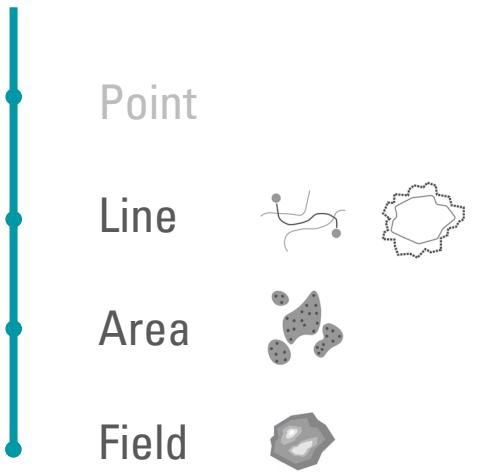


Field 2017



# Applying Map-like Visualization

# Imitation



# Schematization



# Imitation

Point

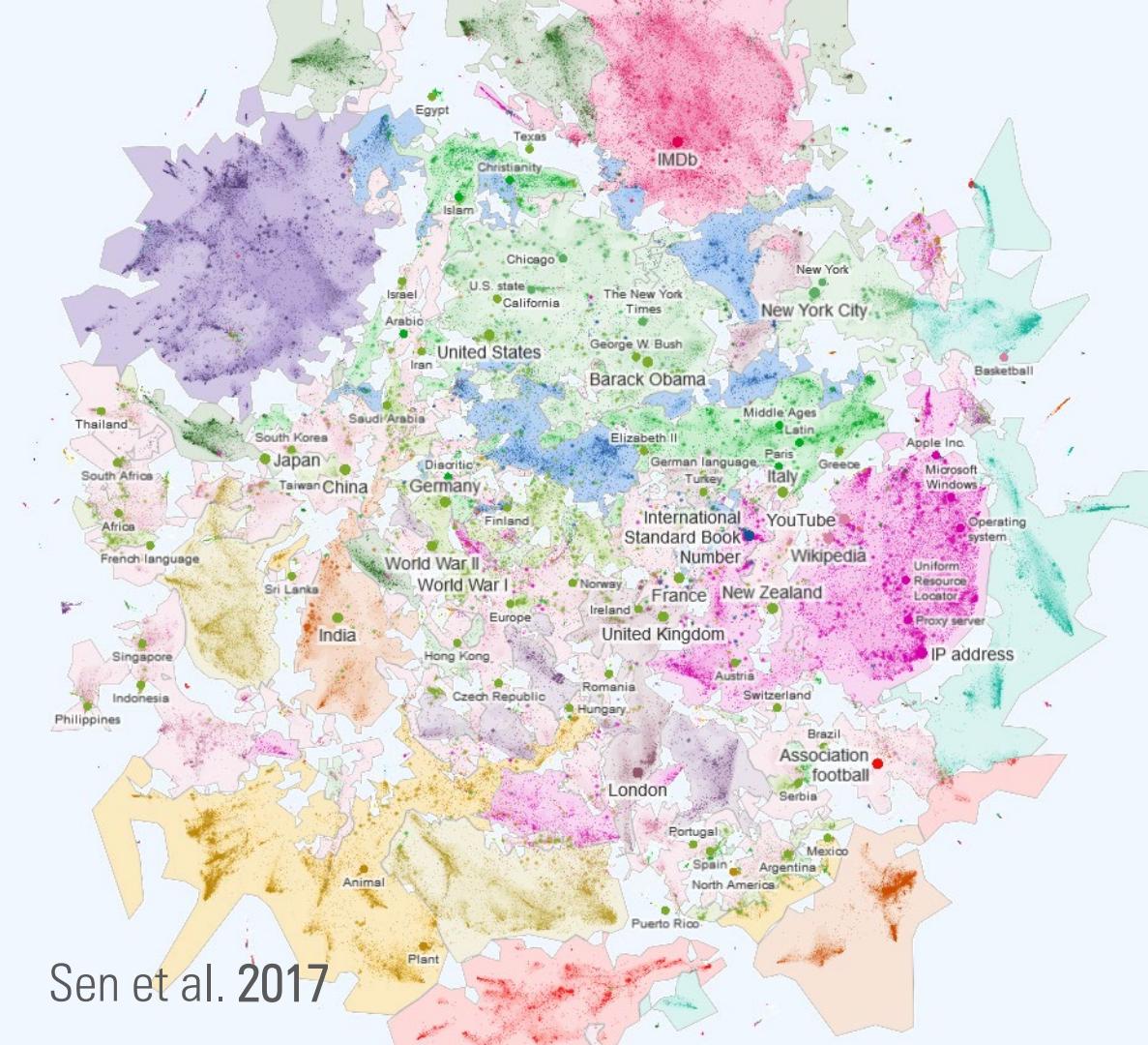
Line

Area

Field



Schematization



Sen et al. 2017

# Using Map-like Visualization

**Identify** Location

**Retrieve** Value

**Assess** Distance

**Trace** Path

# Identify Location



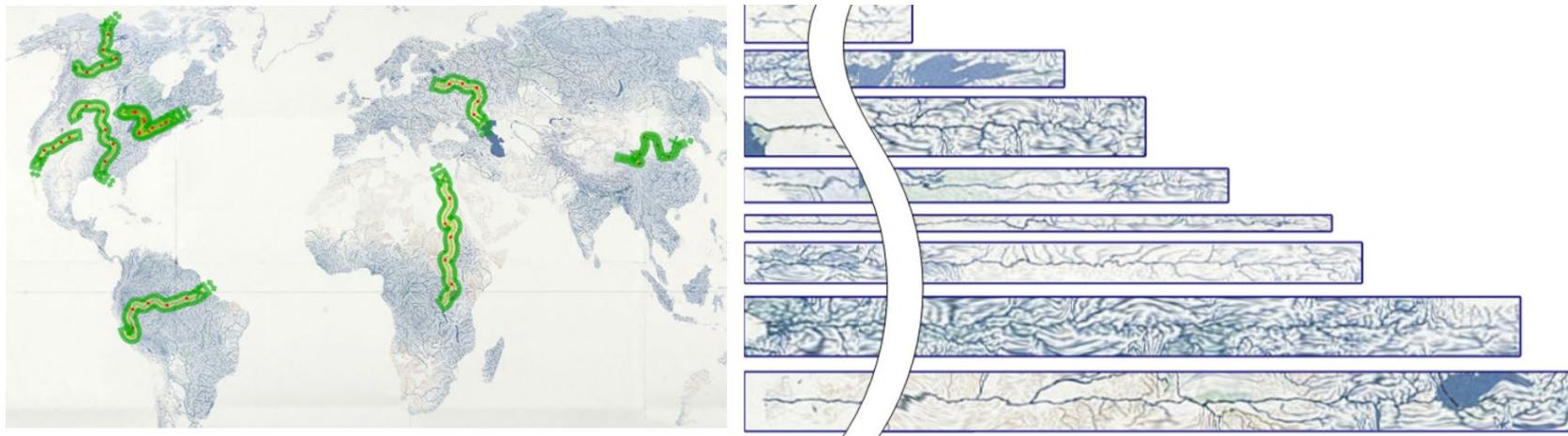
Sen et al. 2017

# Retrieve Value



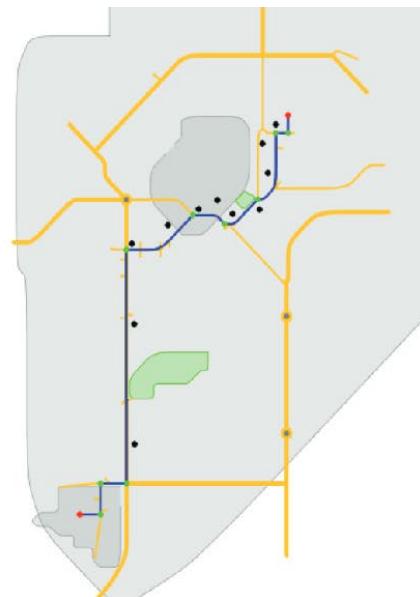
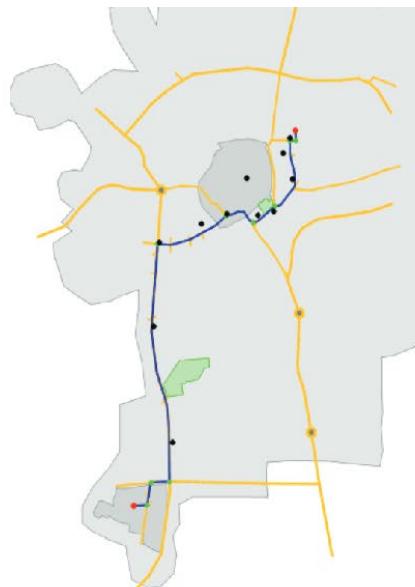
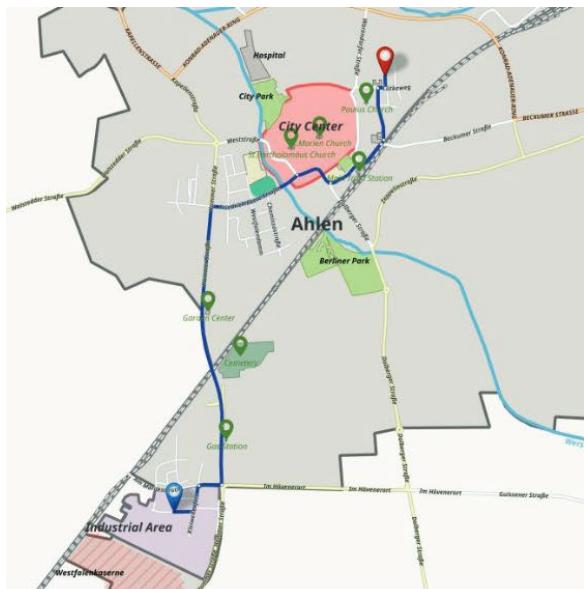
BigKnowledge 2020

# Assess Distance



Brosz et al. 2013

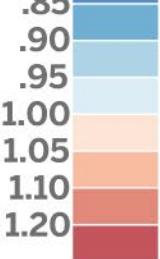
# Trace Path



Schwering et al. 2019

# Expanding Map-like Visualization

# Beyond Geospatial Data



**UNDER 0.85**

**0.85 - 0.90**

**UNDER 0.85**

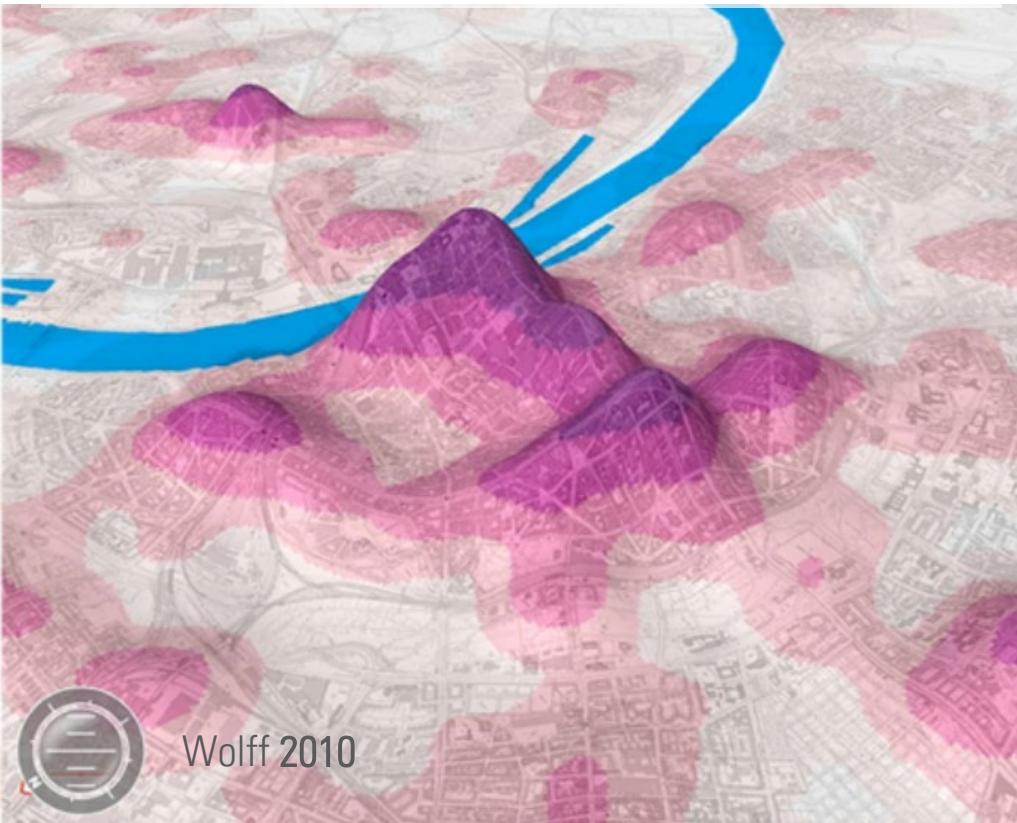
**1.2+**

**1.1 - 1.2**

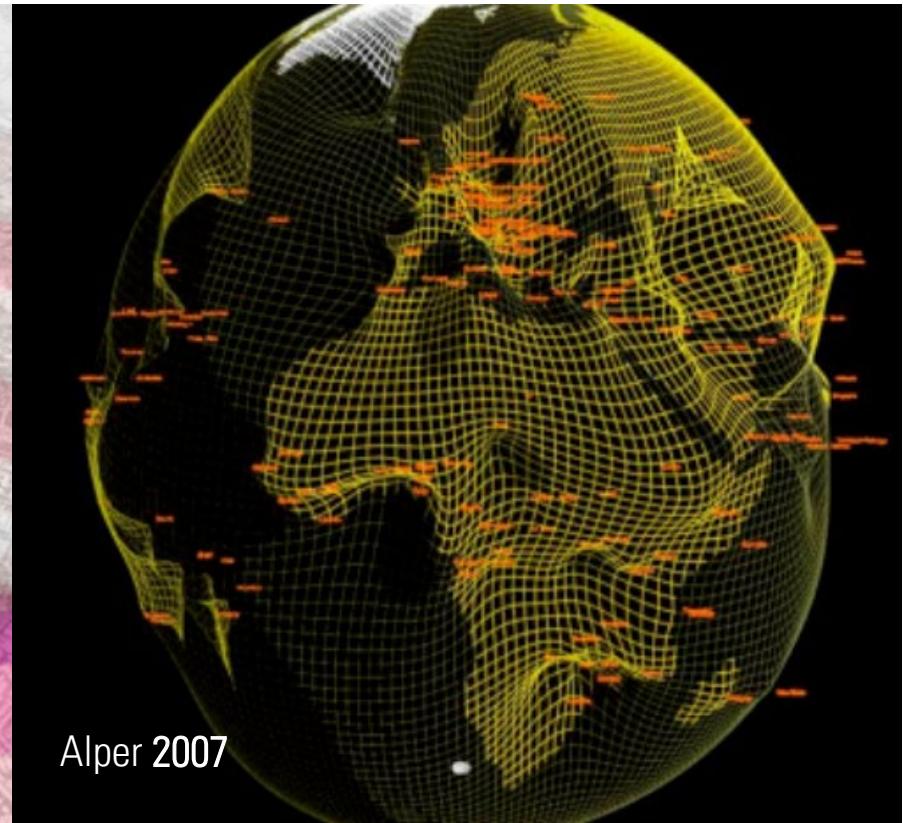
Goldsberry 2010

**1.1 - 1.2**

# Beyond Maps



Wolff 2010



Alper 2007

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