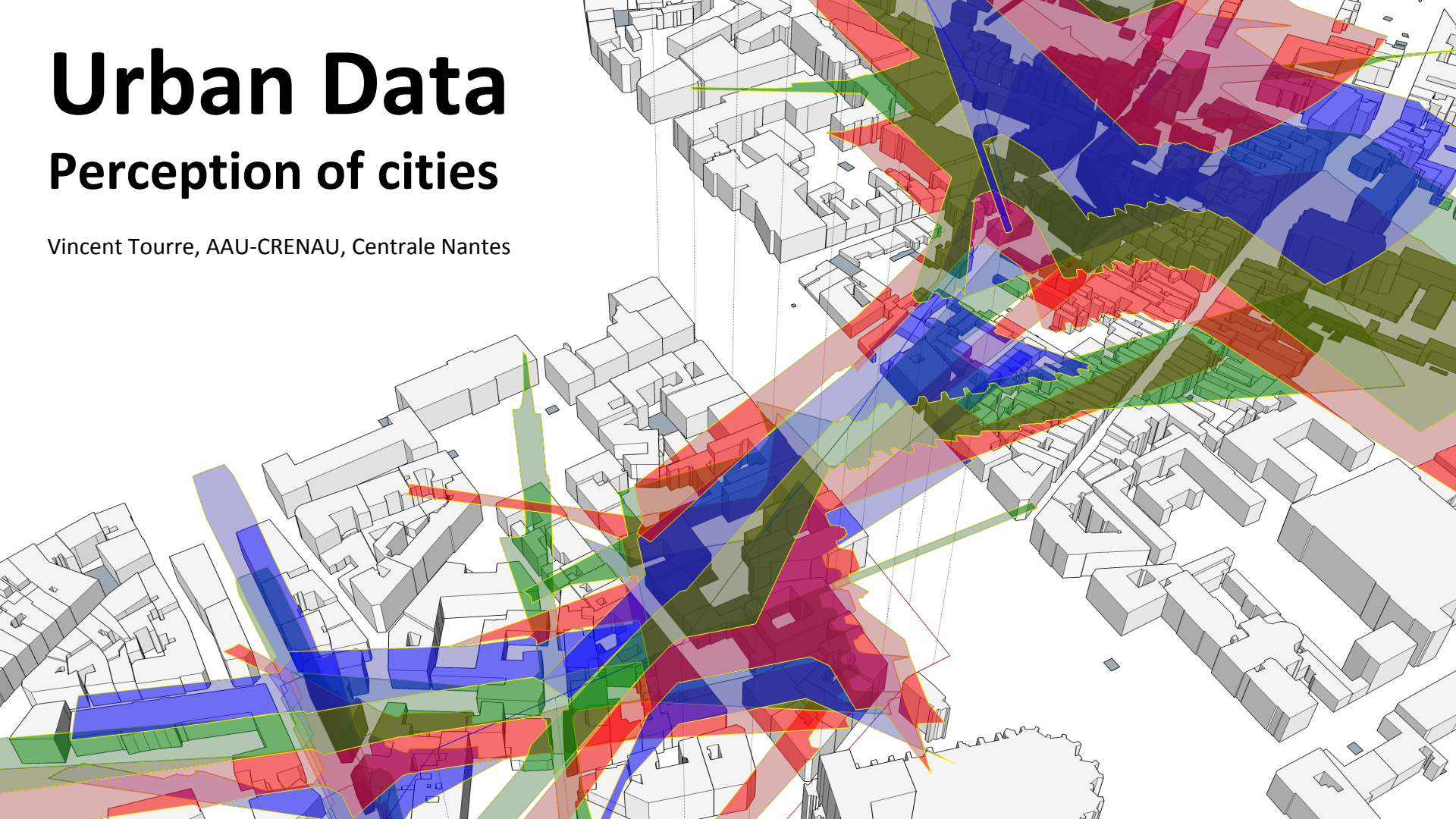


# Urban Data

## Perception of cities

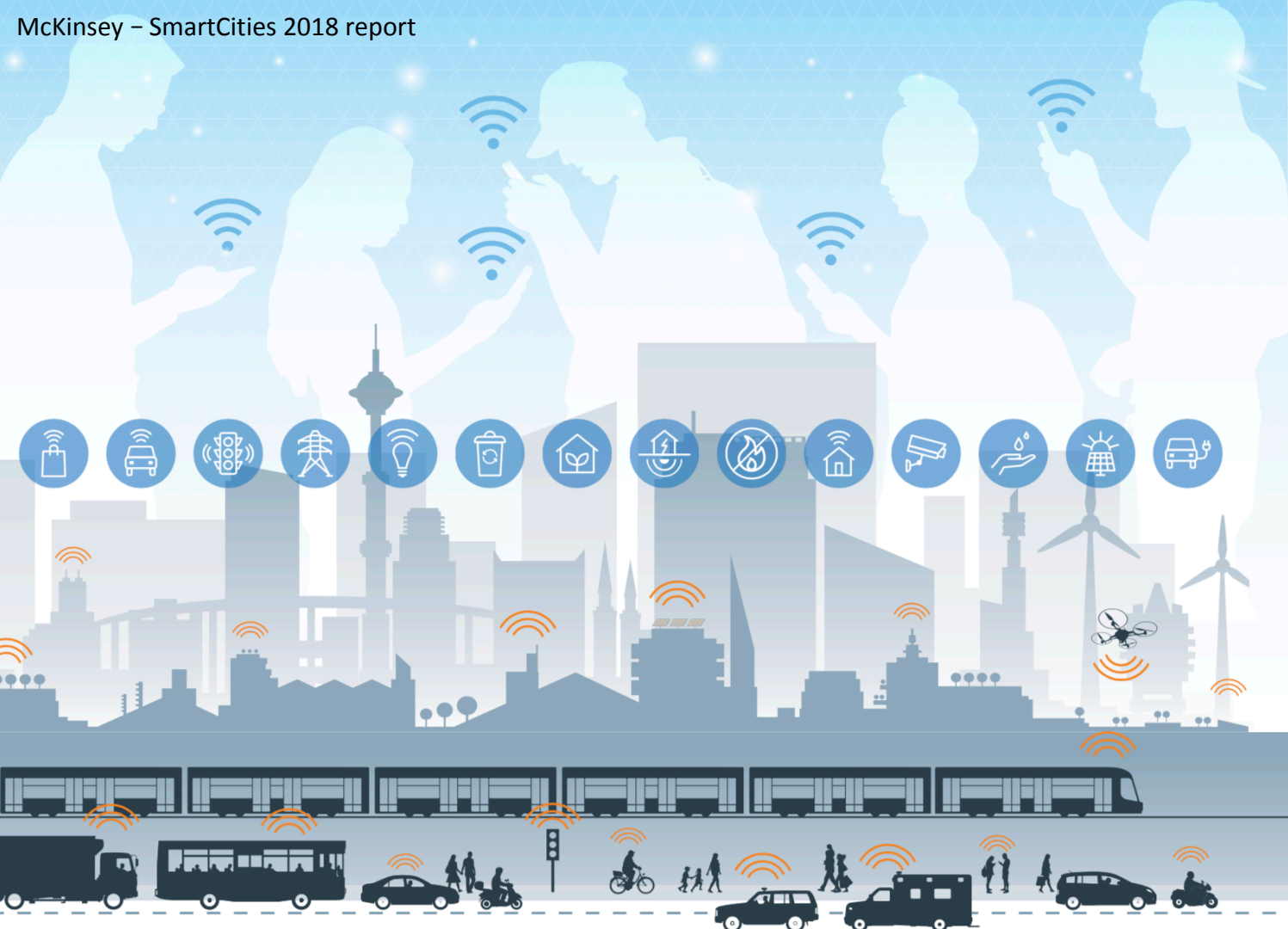
Vincent Tourre, AAU-CRENAU, Centrale Nantes



the city

Remember Me - Game Artwork





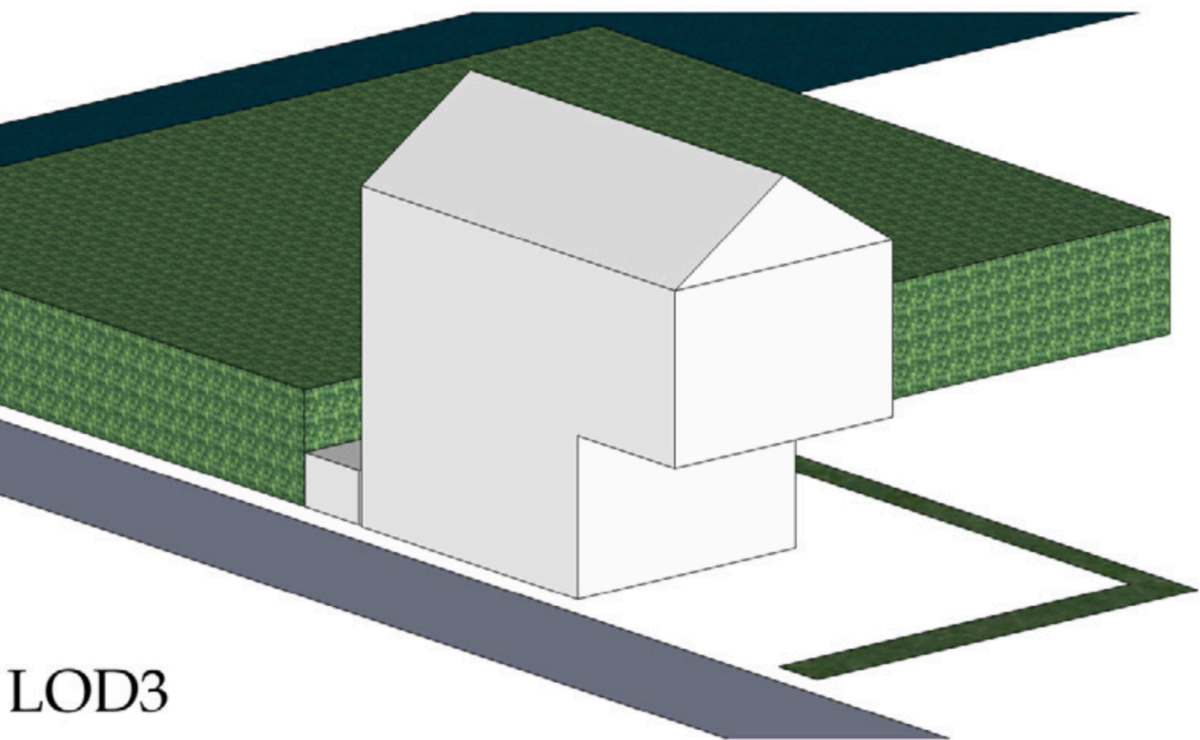
### Three layers of “smartness”:

**Adoption and usage**, often leading to better decisions and behavior change

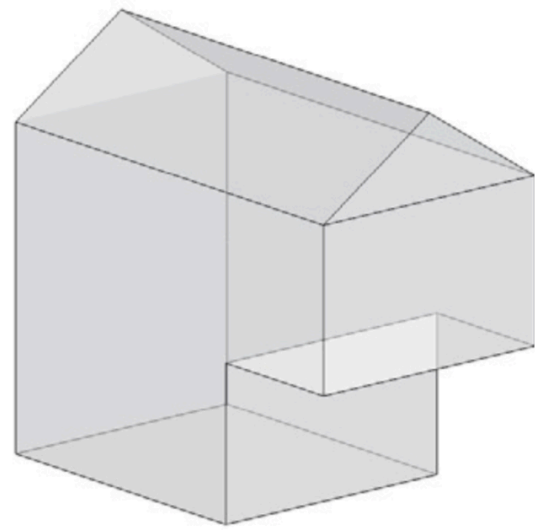
Smart **applications** and data analysis capabilities

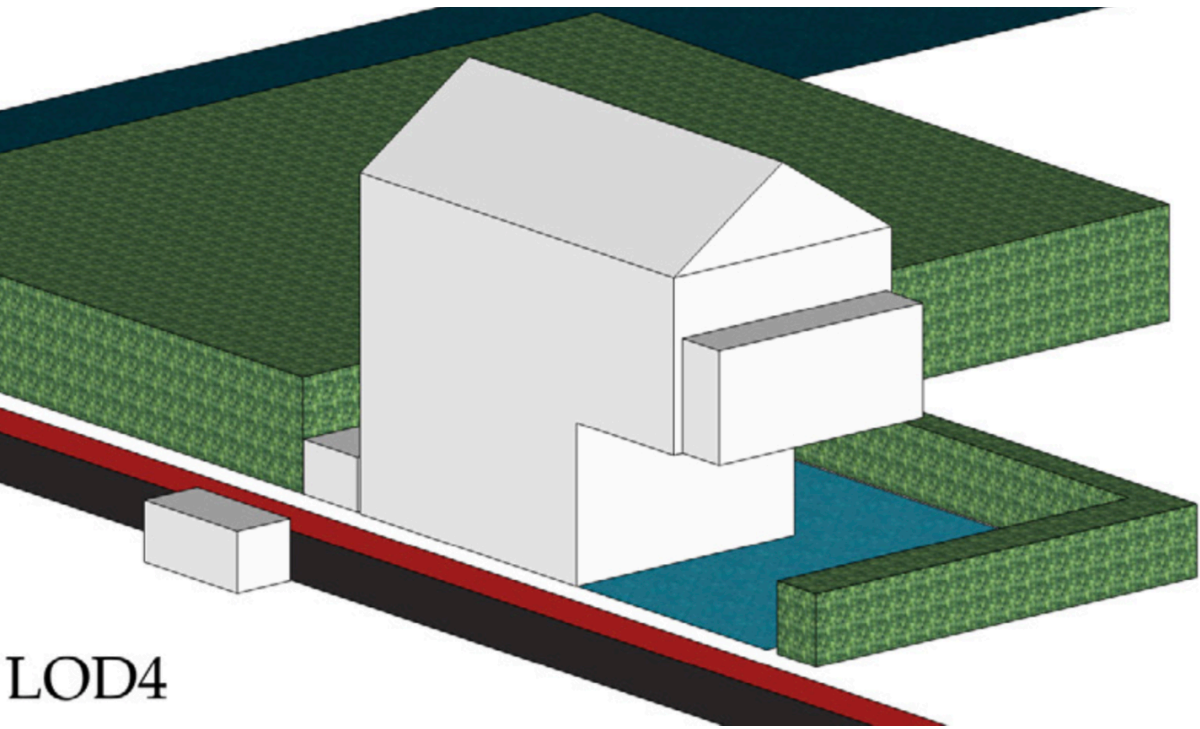
The **tech base** includes networks of connected devices and sensors

**Traditional infrastructure** (physical and social)

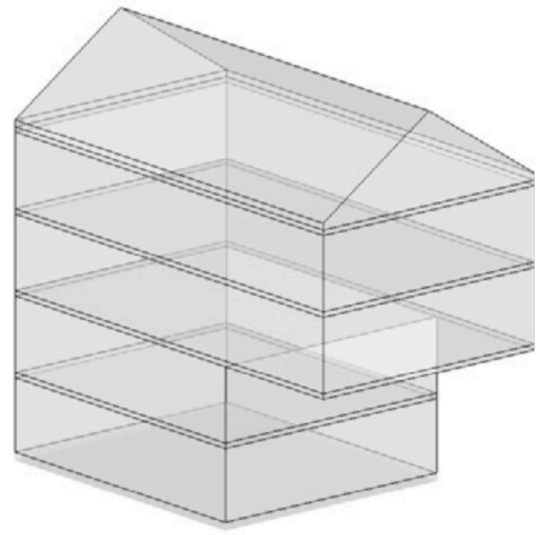


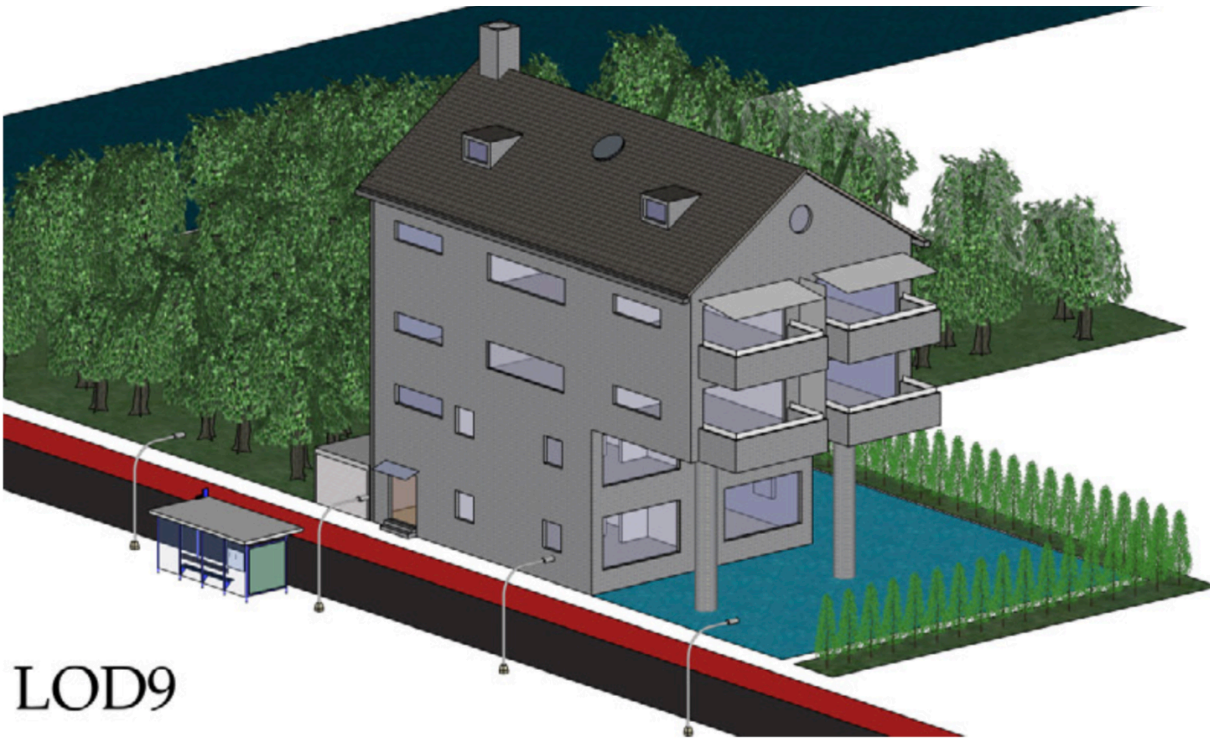
LOD3



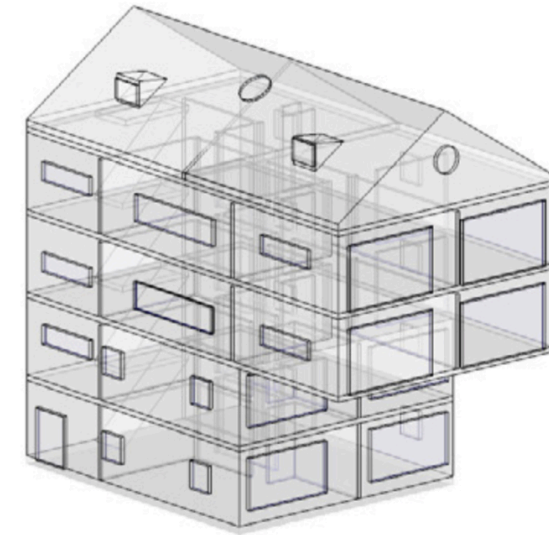


LOD4

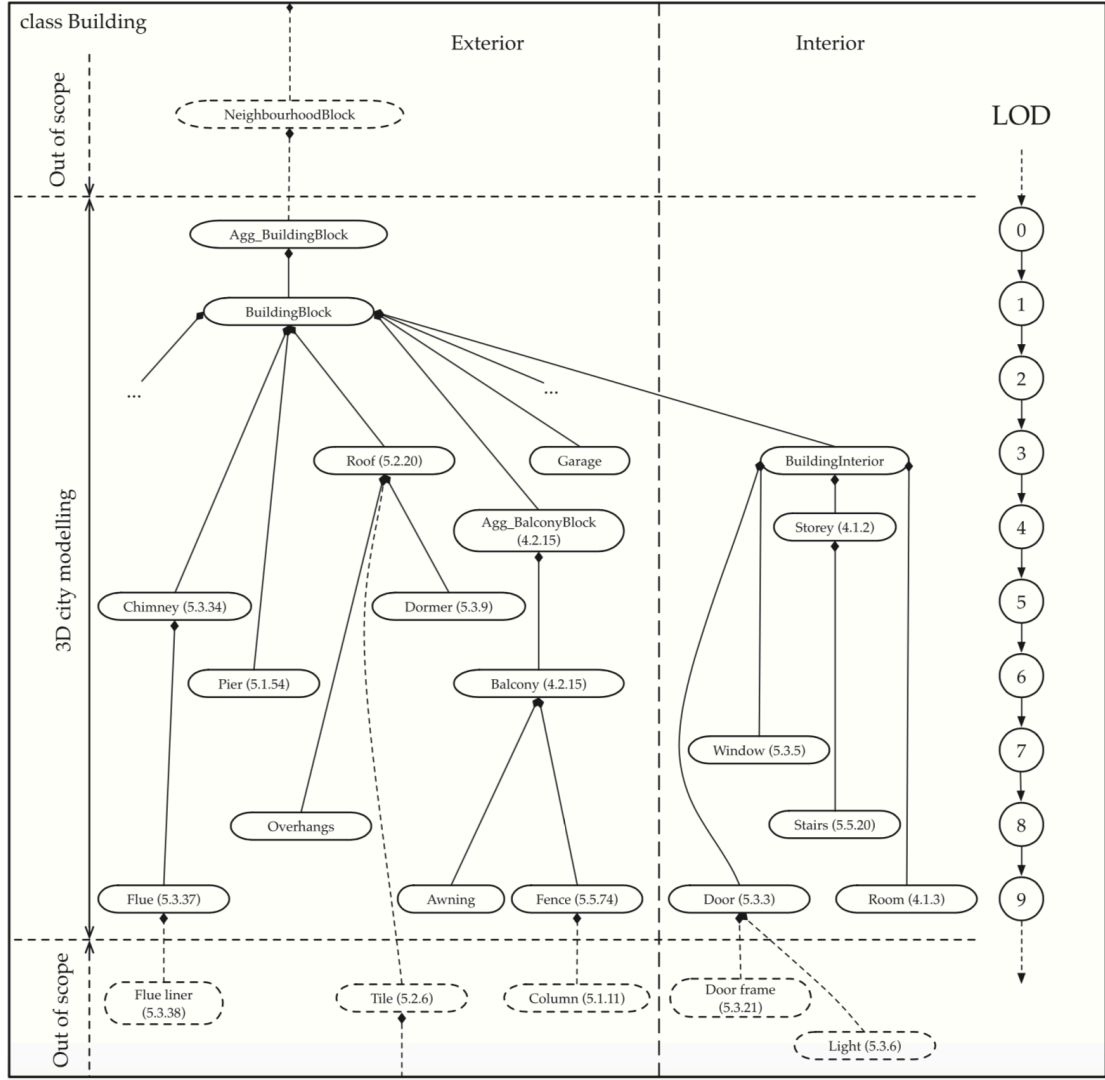




LOD9



Formalisation of the level of detail in 3D city modelling, Biljecki et al. 2014





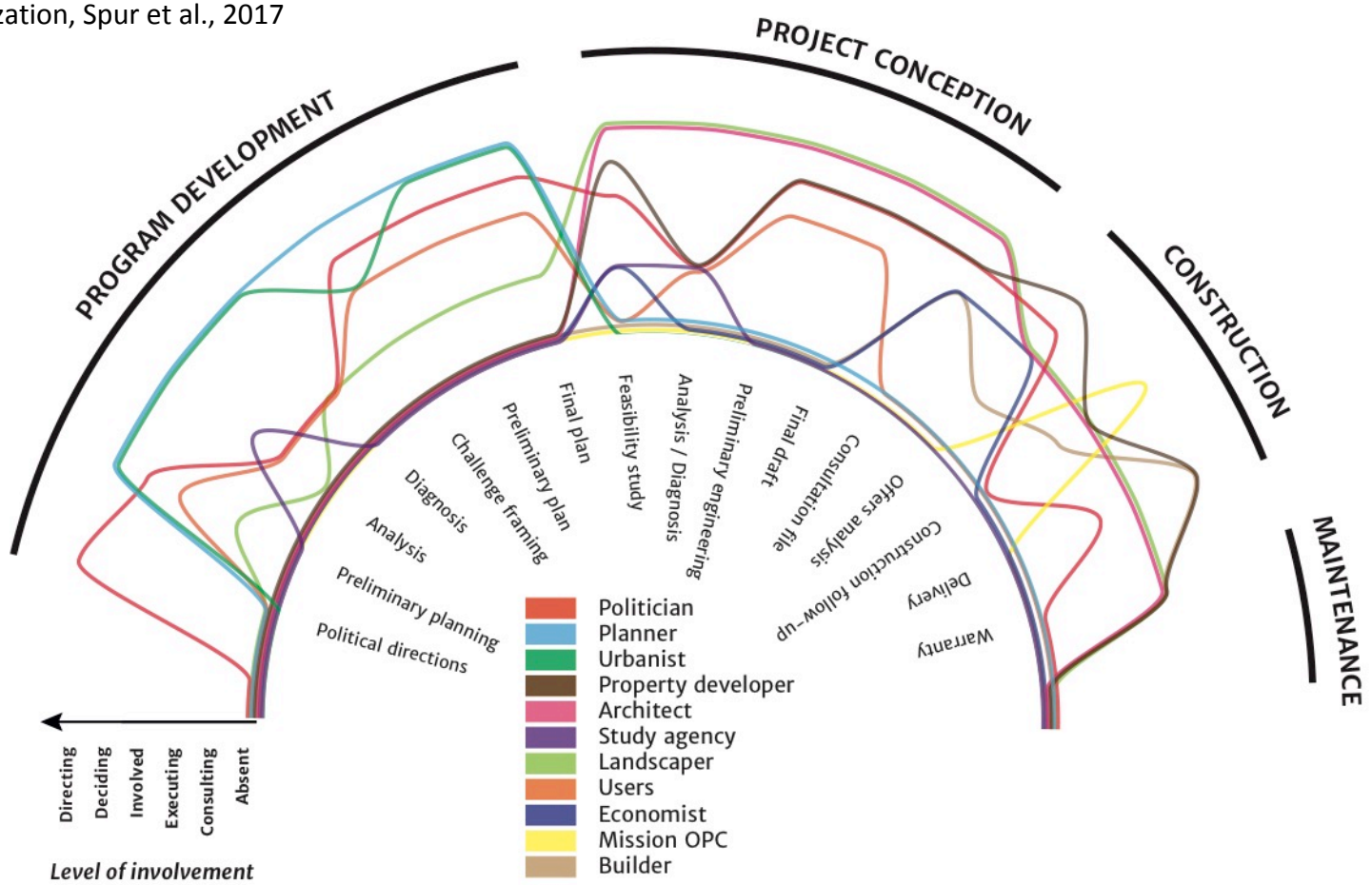


designing the city



ID cadastre : 350278 AP014  
Surface au sol : 123.052250  
Nombre d'etages : 1  
Classe energetique : G  
Adresse :  
Fonction : habitation

Virtually Physical Presentation of Data Layers for Spatiotemporal Urban Data Visualization, Spur et al., 2017



Nantes





seeing the city

Sienna au moyen age,  
Grand prix de Rome,  
Hourlier, 1923





1854 Broad Street cholera outbreak, Snow, 1854



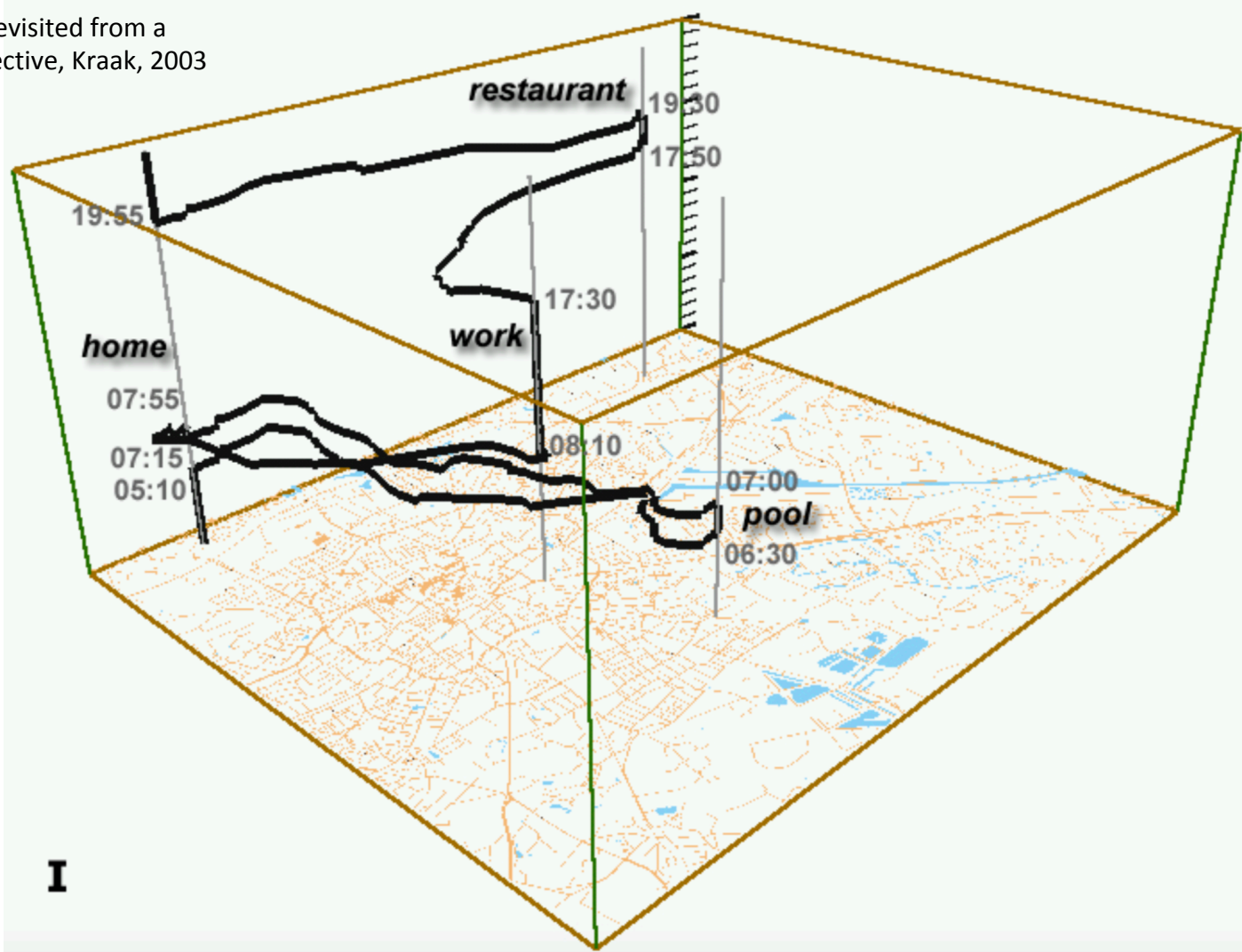
Caractérisation et  
restitution vidéographique  
des ambiances urbaines,  
Giraldo et al. 2018



Caractérisation et  
restitution vidéo-graphique  
des ambiances urbaines,  
Giraldo et al. 2018



The space-time cube revisited from a geovisualization perspective, Kraak, 2003



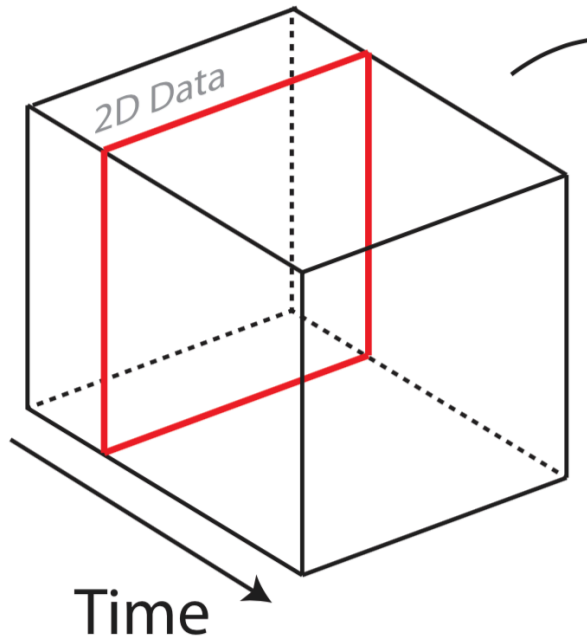
# A Descriptive Framework for Temporal Data Visualizations Based on Generalized Space-Time Cubes, Bach et al. 2016

		Operations	Time	Space	
Extraction	Point	Point Extraction			
	Curve	Planar Drilling	Orthogonal Drilling	Time Drilling	Space Drilling
			Oblique Drilling		
		Planar Curvilinear Drilling			
		Non-Planar Drilling			
	Surface	Planar Cutting	Orthogonal Cutting	Time Cutting	Linear Space Cutting
			Oblique Cutting		
		Non-Planar Cutting	Curvilinear Space Cutting		
			Other		
	Volume	Planar Chopping	Orthogonal Chopping	Time Chopping	Linear Space Chopping
			Oblique Chopping		
		Non-Planar Chopping	Curvilinear Space Chopping		
			Other		
Flattening	Planar Flattening	Orthogonal Flattening	Time Flattening	Space Flattening	
		Oblique Flattening			
	Non-Planar Flattening				

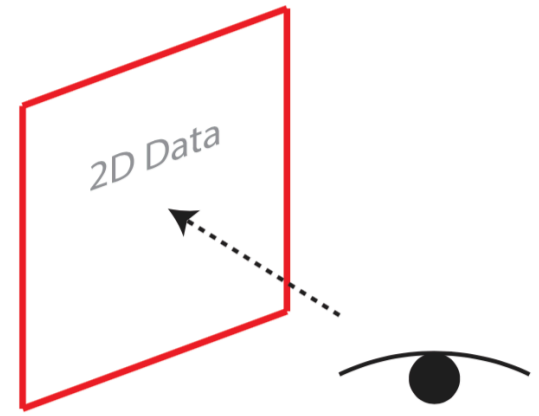
		Operations	Time	Space
Filling	Orthogonal Interpolation		Time Interpolation	Space Interpolation
	Volume Interpolation			
Geometry Transformation	Rigid Transformation	Translation	Time Shifting	Space Shifting
		Rotation	Yaw	
	Pitch			
	Roll			
	Scaling	Time Scaling	Space Scaling	
Bending				
Unfolding				
Content Transformation	Recoloring	Time Coloring	Space Coloring	
		Difference Coloring		
	Labeling	Time Labeling		
	Repositioning	Stabilizing		
Bundling				
Shading				
Filtering				
Aggregation				

A Descriptive Framework for  
Temporal Data Visualizations Based  
on Generalized Space-Time Cubes,  
Bach et al. 2016

①

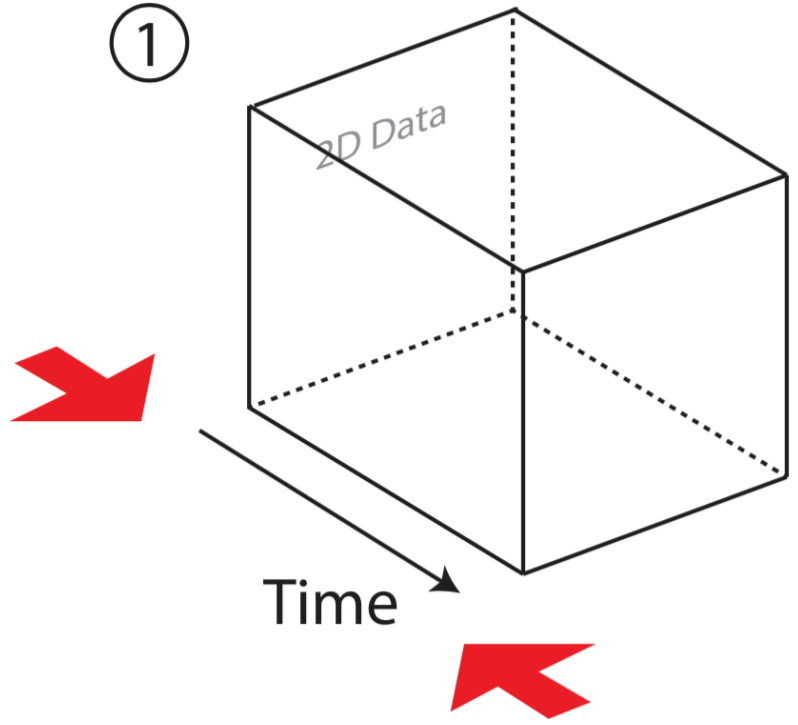


②

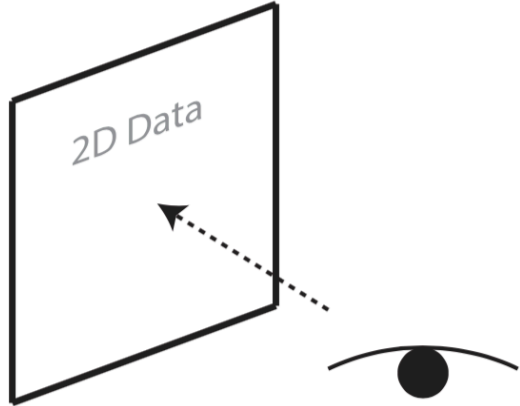


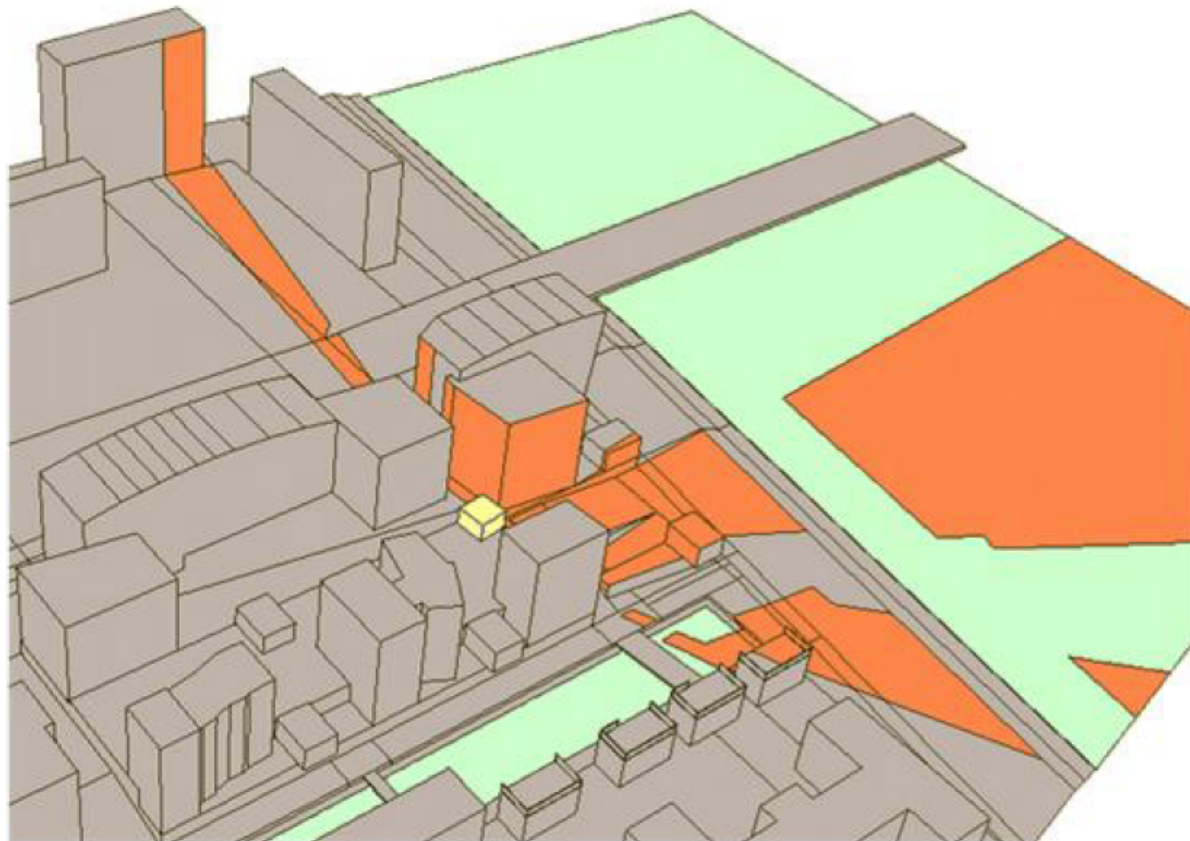
A Descriptive Framework for  
Temporal Data Visualizations Based  
on Generalized Space-Time Cubes,  
Bach et al. 2016

①



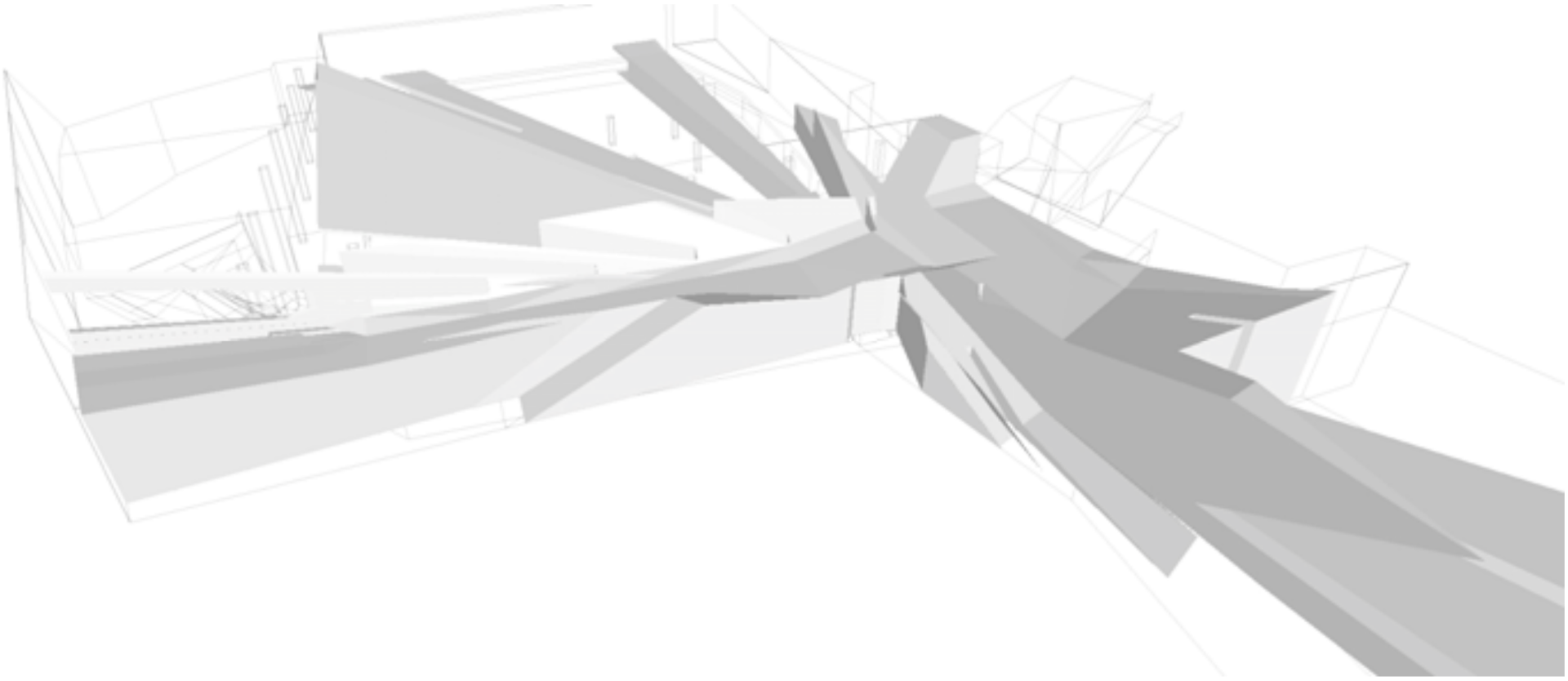
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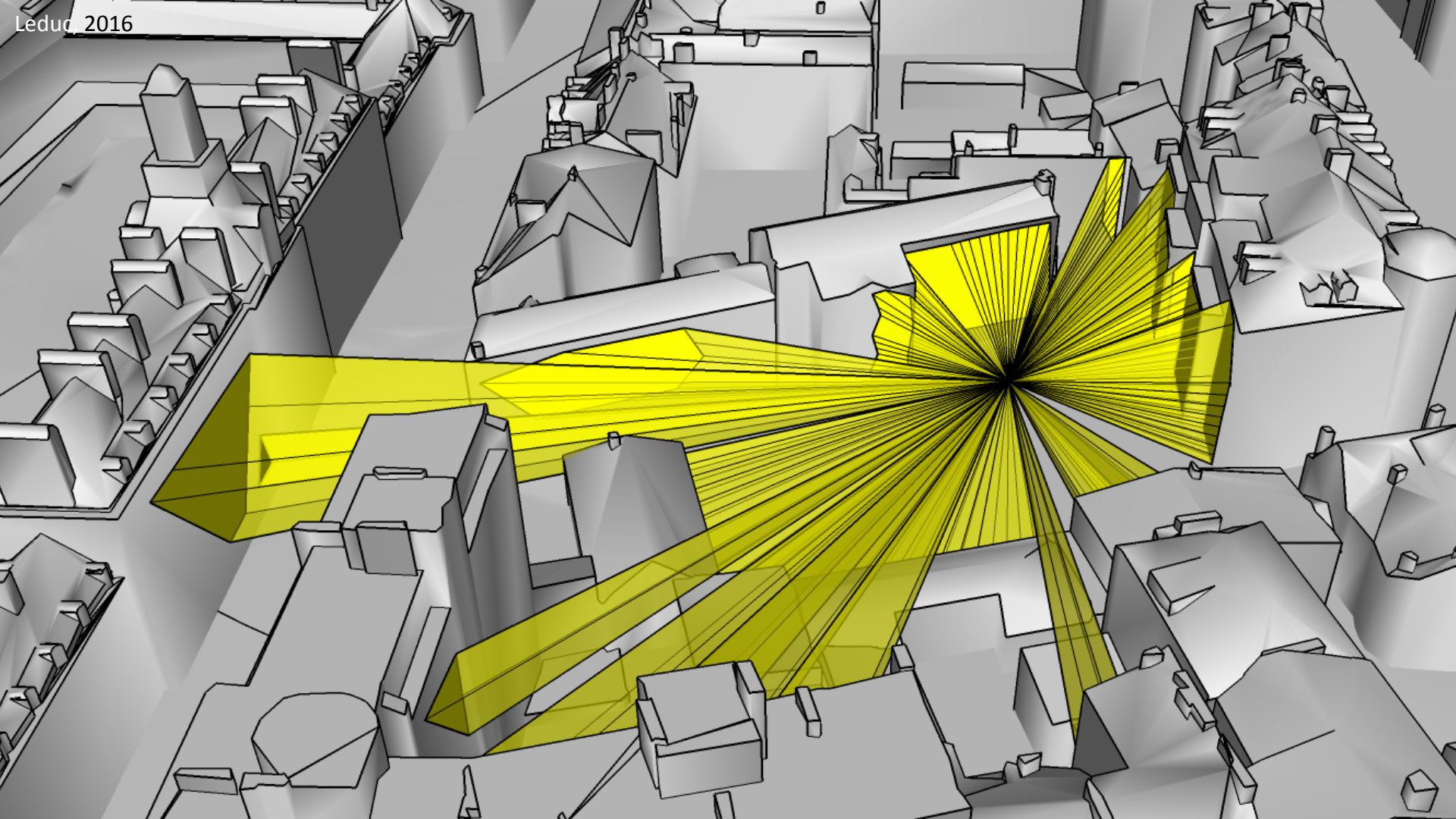


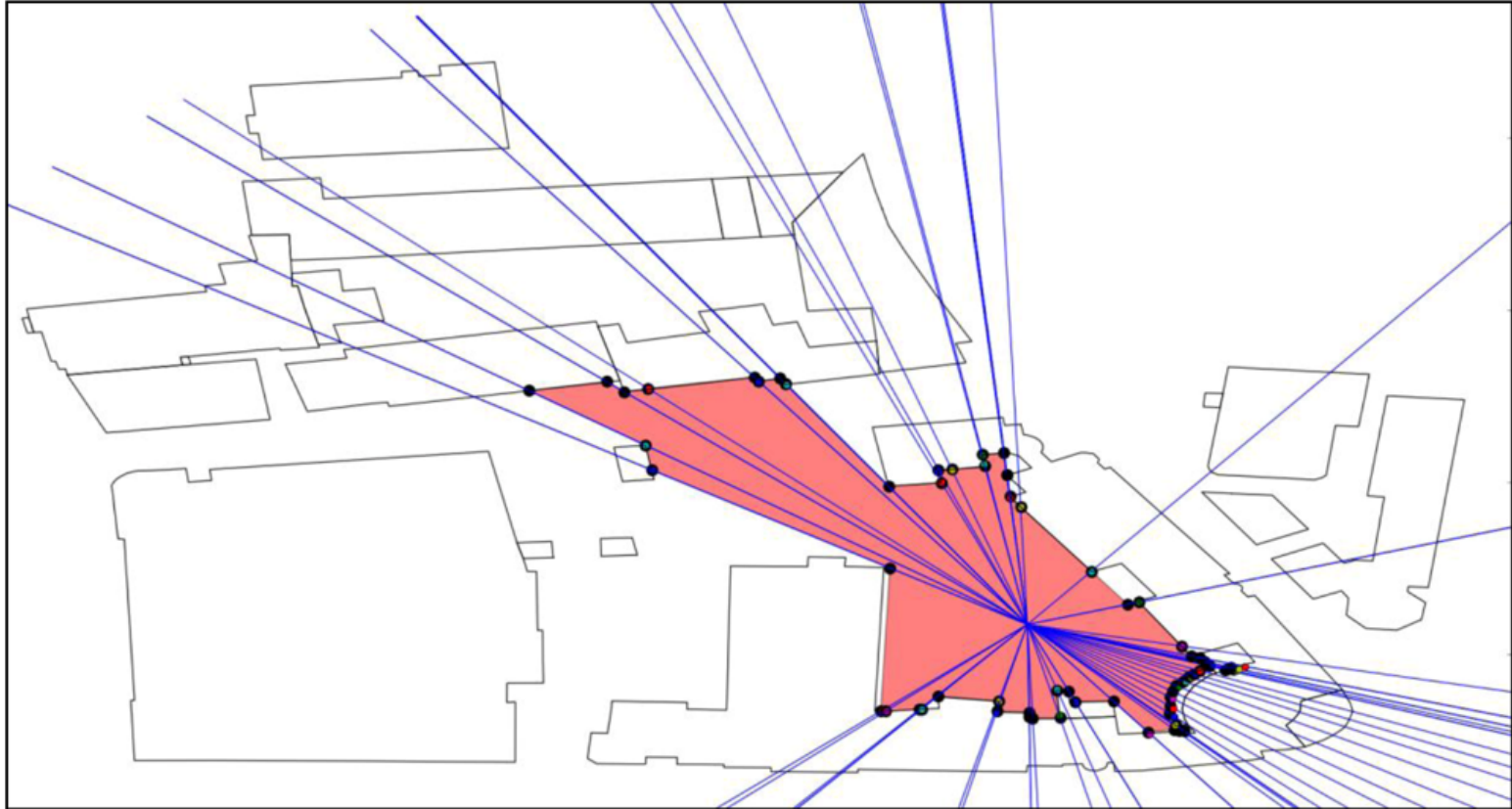




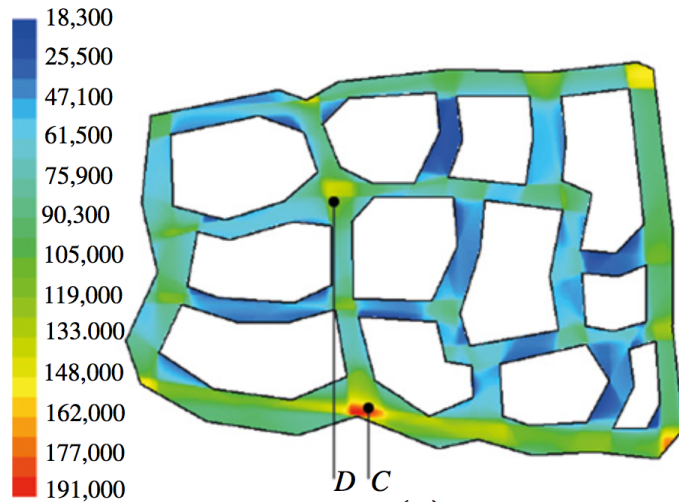
World Trade Centre Memorial Museum:  
Computational Analysis & Development  
Report, Derix et al. 2007



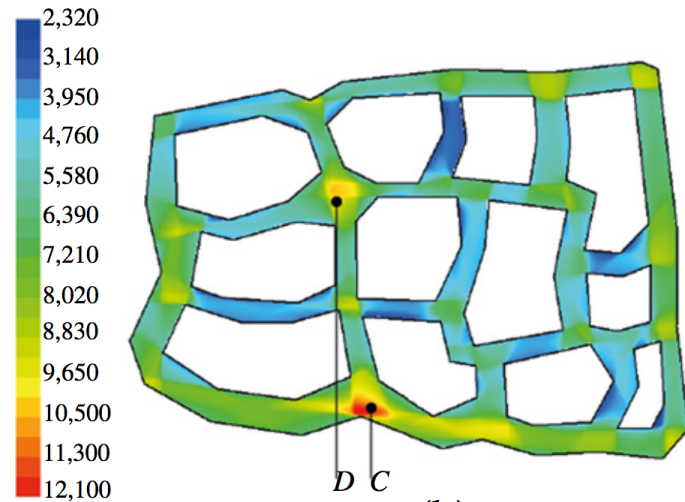




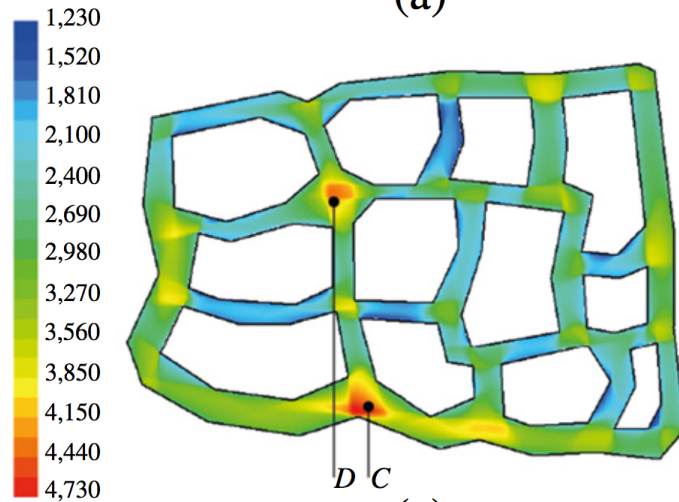
Distance-weighted isovist area: An isovist index representing spatial proximity, Kim and Jung, 2014



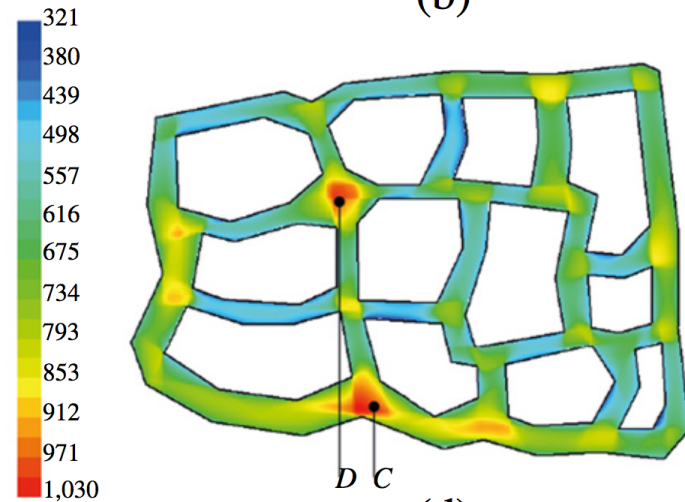
(a)



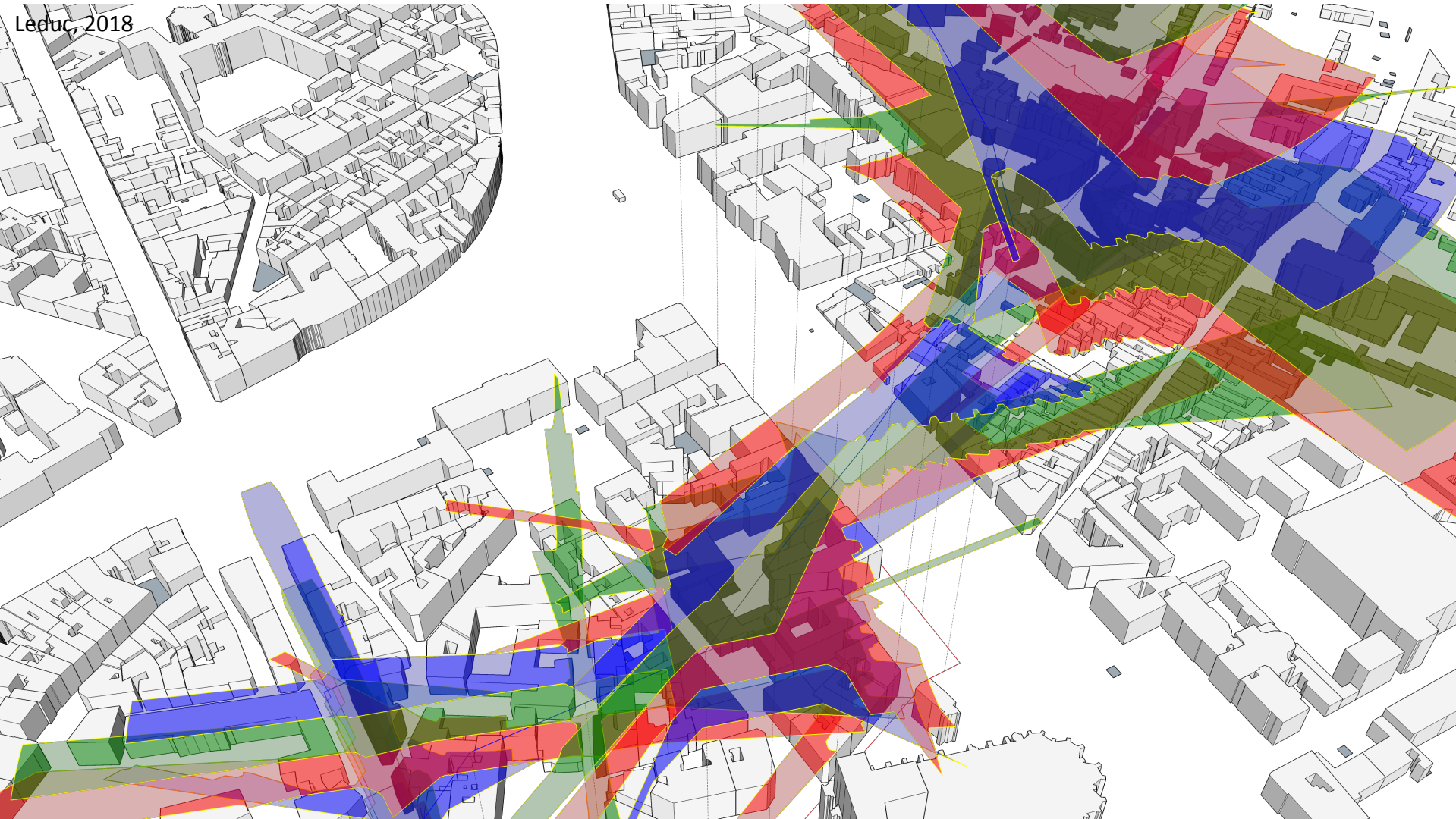
(b)



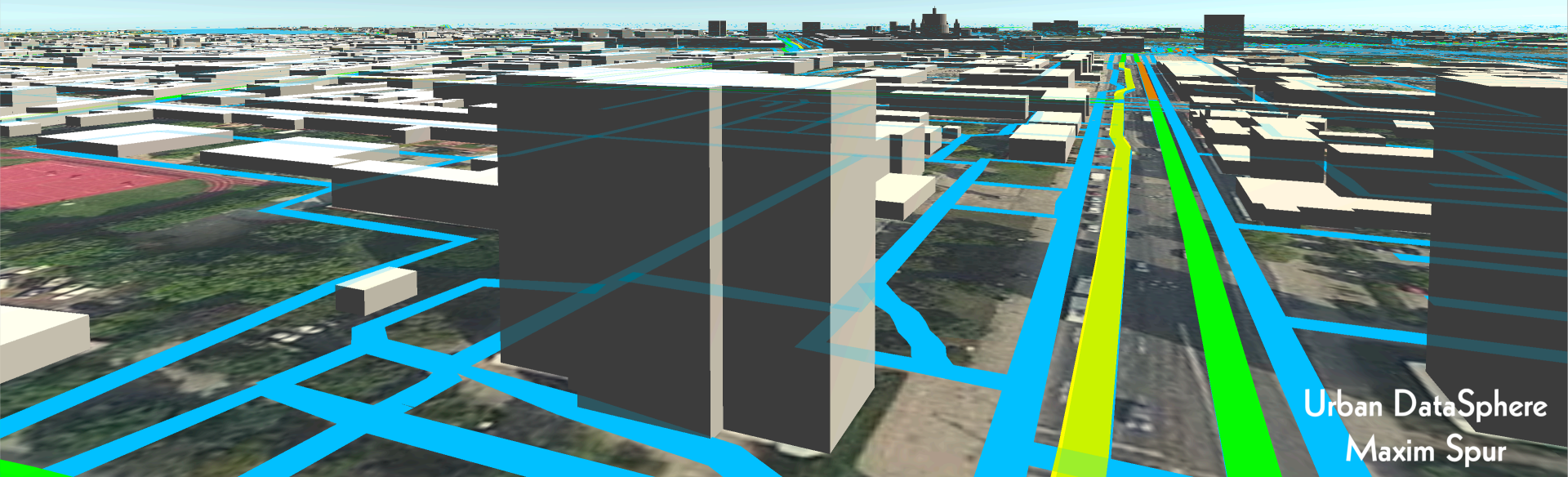
(c)



(d)

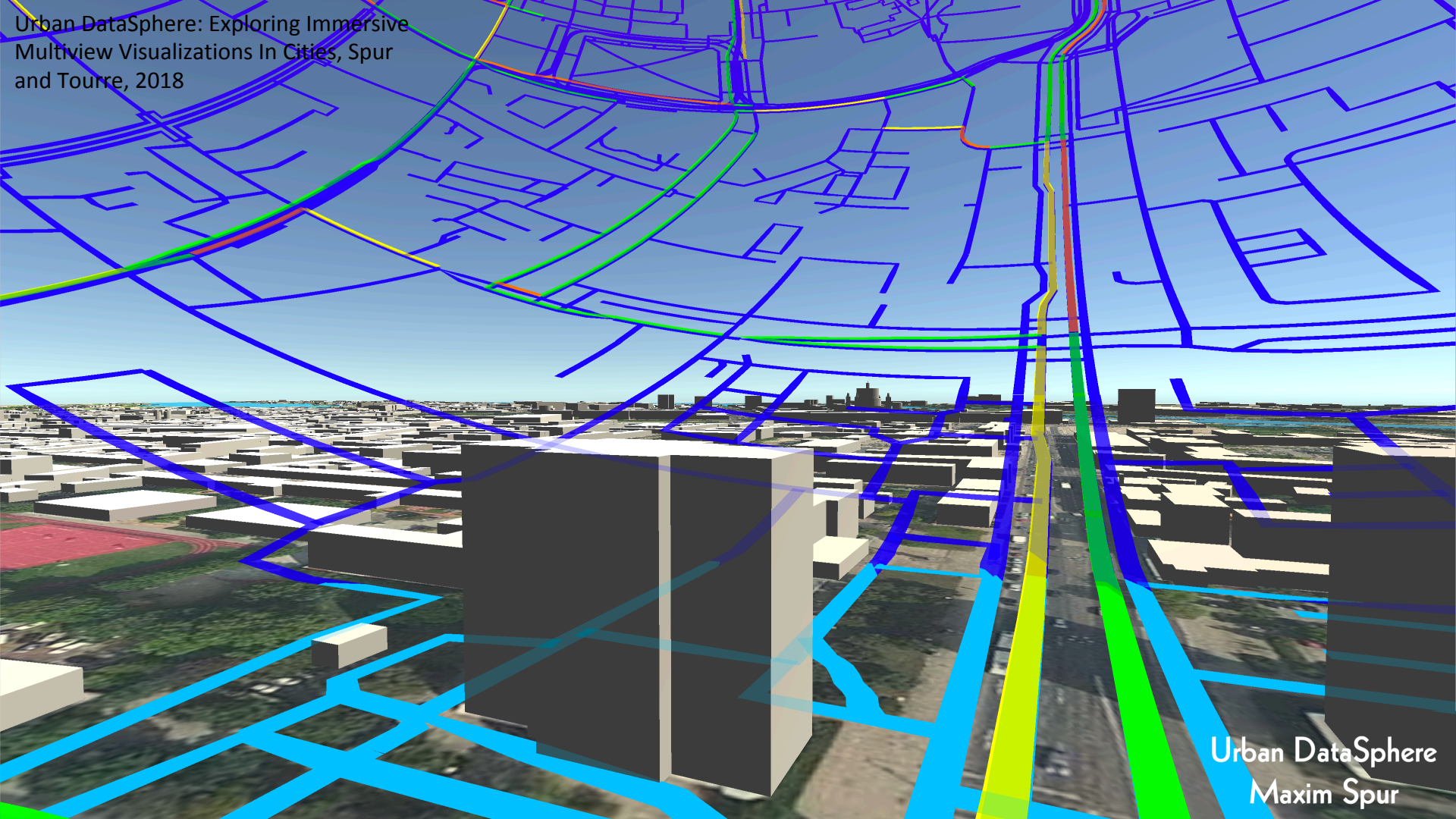


Urban DataSphere: Exploring Immersive  
Multiview Visualizations In Cities, Spur  
and Tourre, 2018



Urban DataSphere  
Maxim Spur

Urban DataSphere: Exploring Immersive  
Multiview Visualizations In Cities, Spur  
and Tourre, 2018

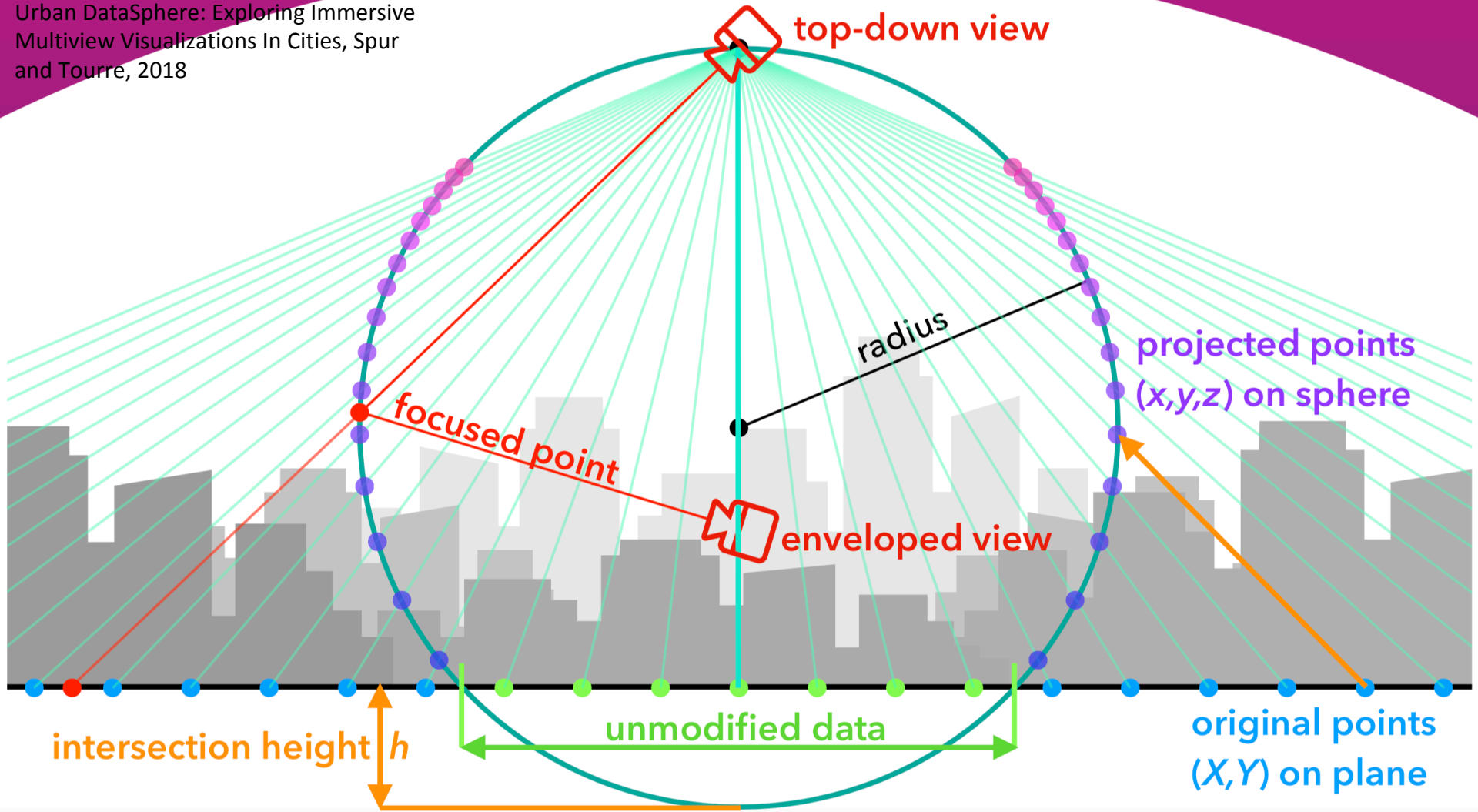


Urban DataSphere  
Maxim Spur

Urban DataSphere: Exploring Immersive  
Multiview Visualizations In Cities, Spur  
and Tourre, 2018







# Urban Data

## Perception of cities

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