

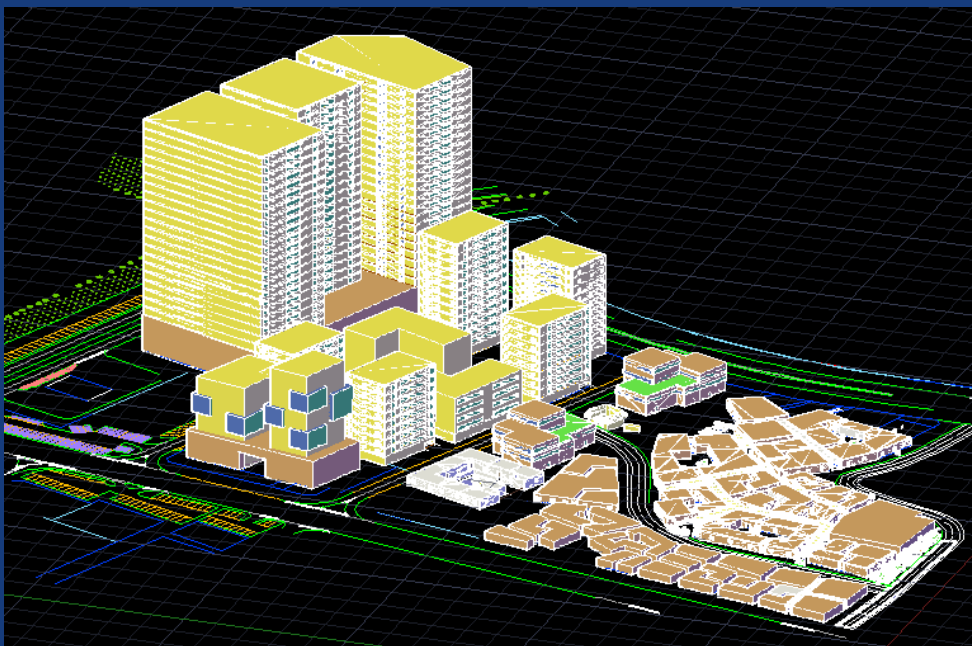
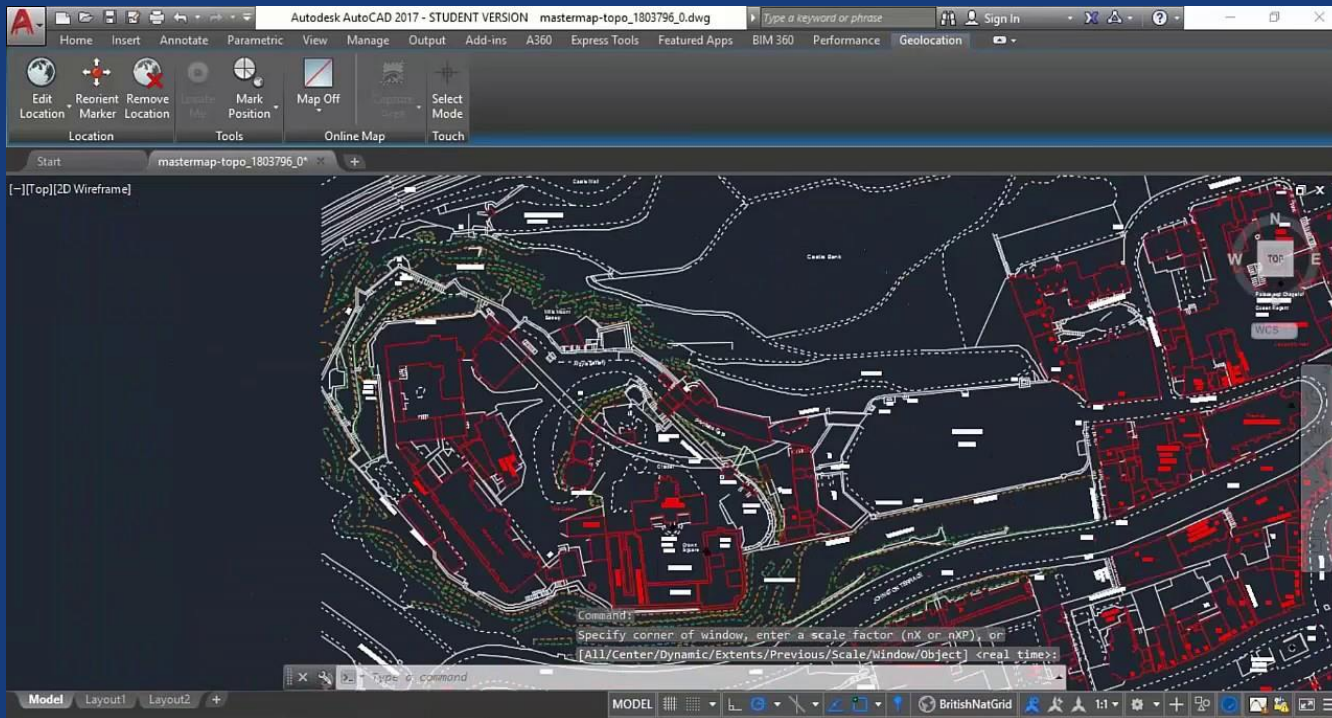
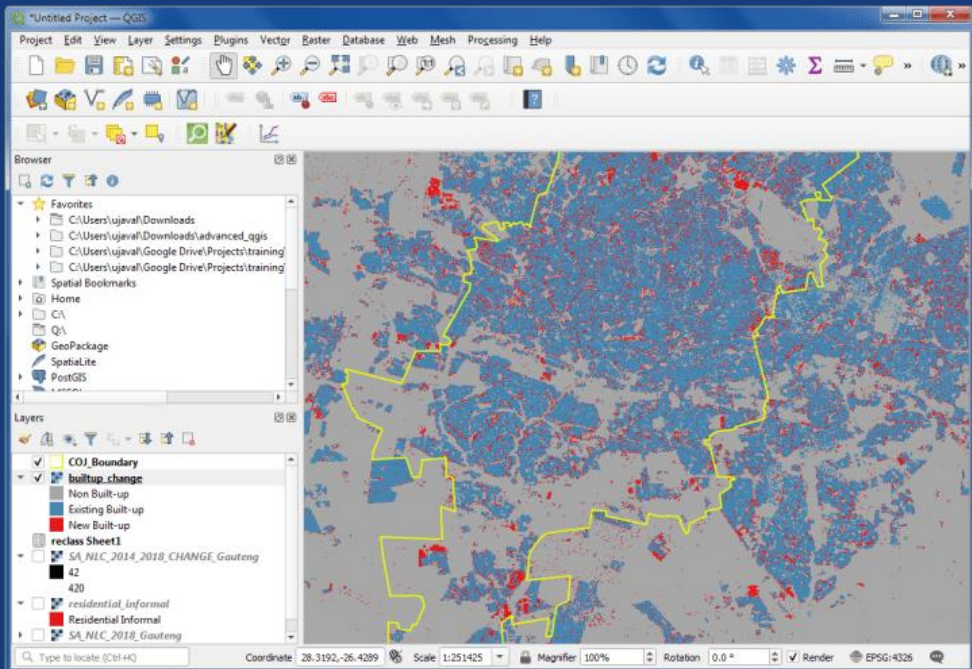
Digital Innovation and Digital Twins for Cities

Bruno Ávila Eça de Matos

City of Amsterdam, Netherlands

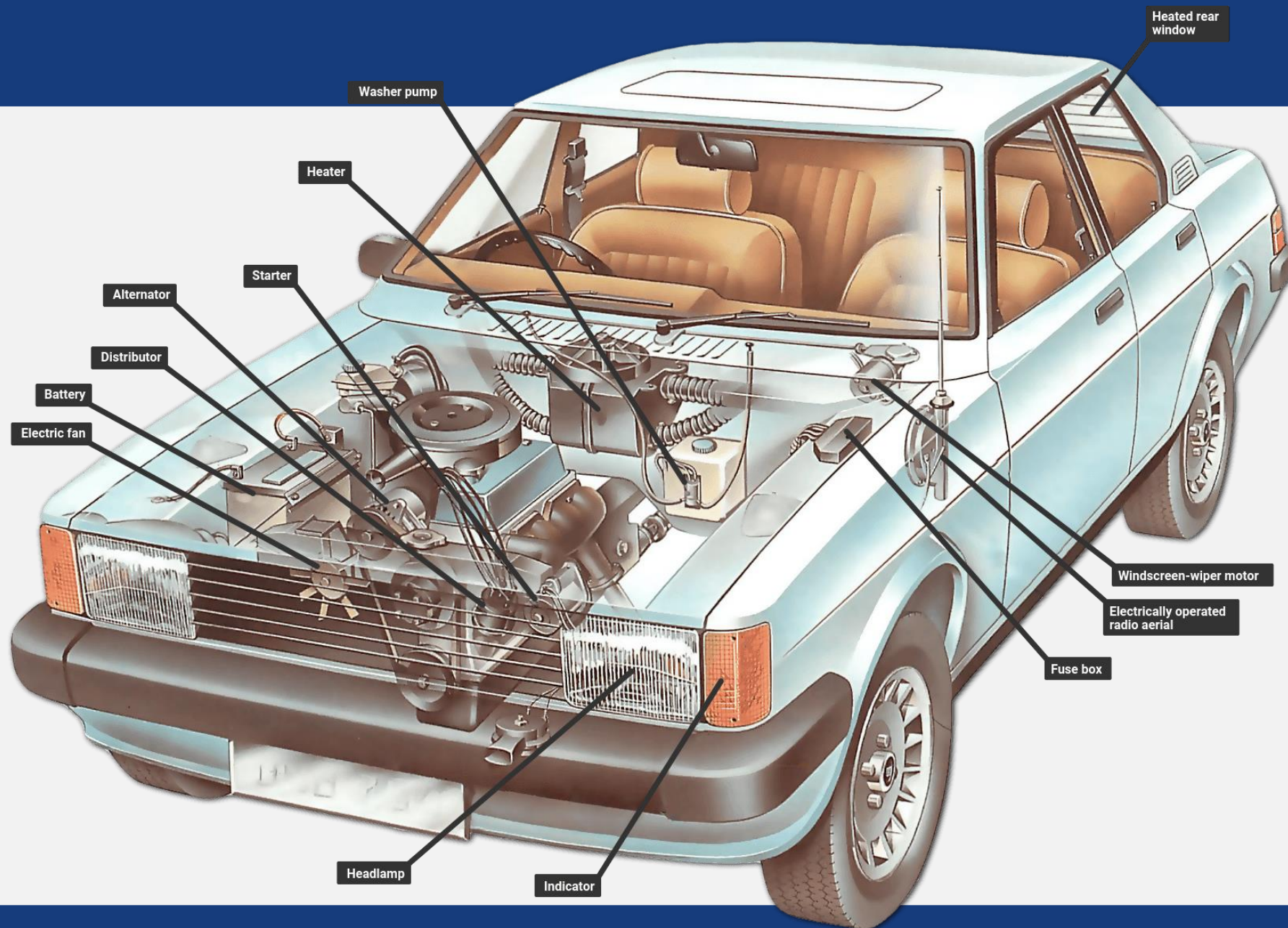
How we designed cities



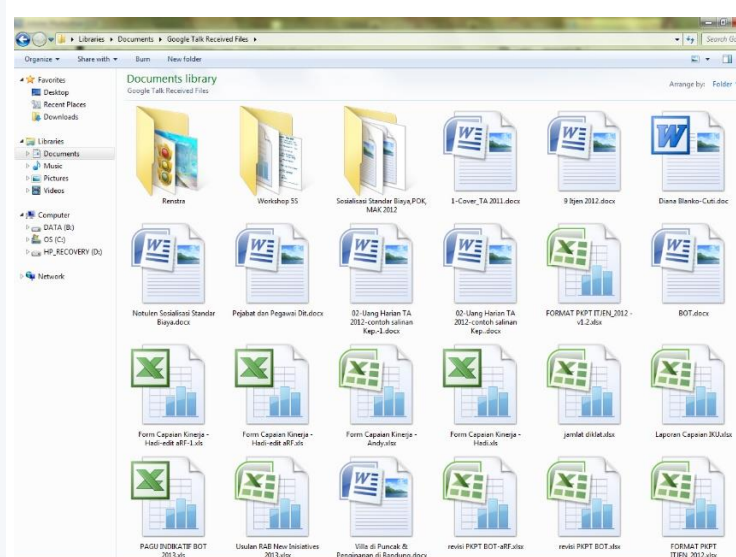
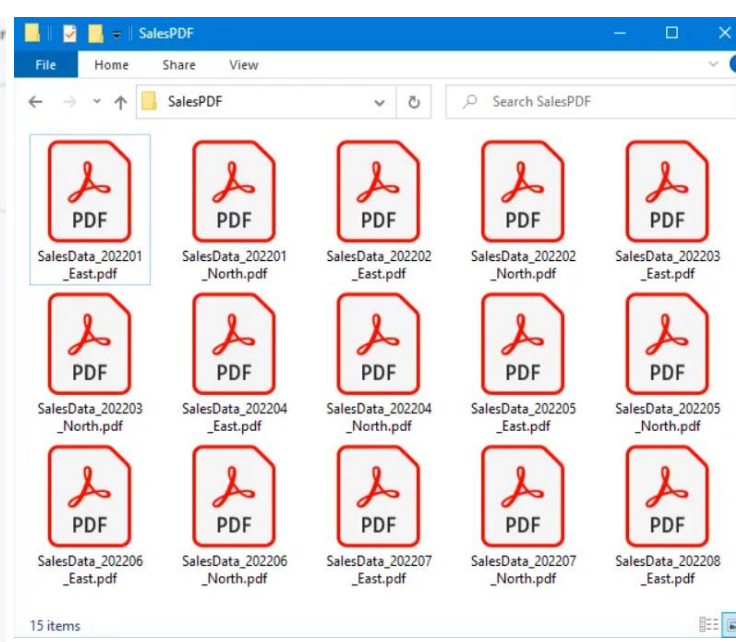
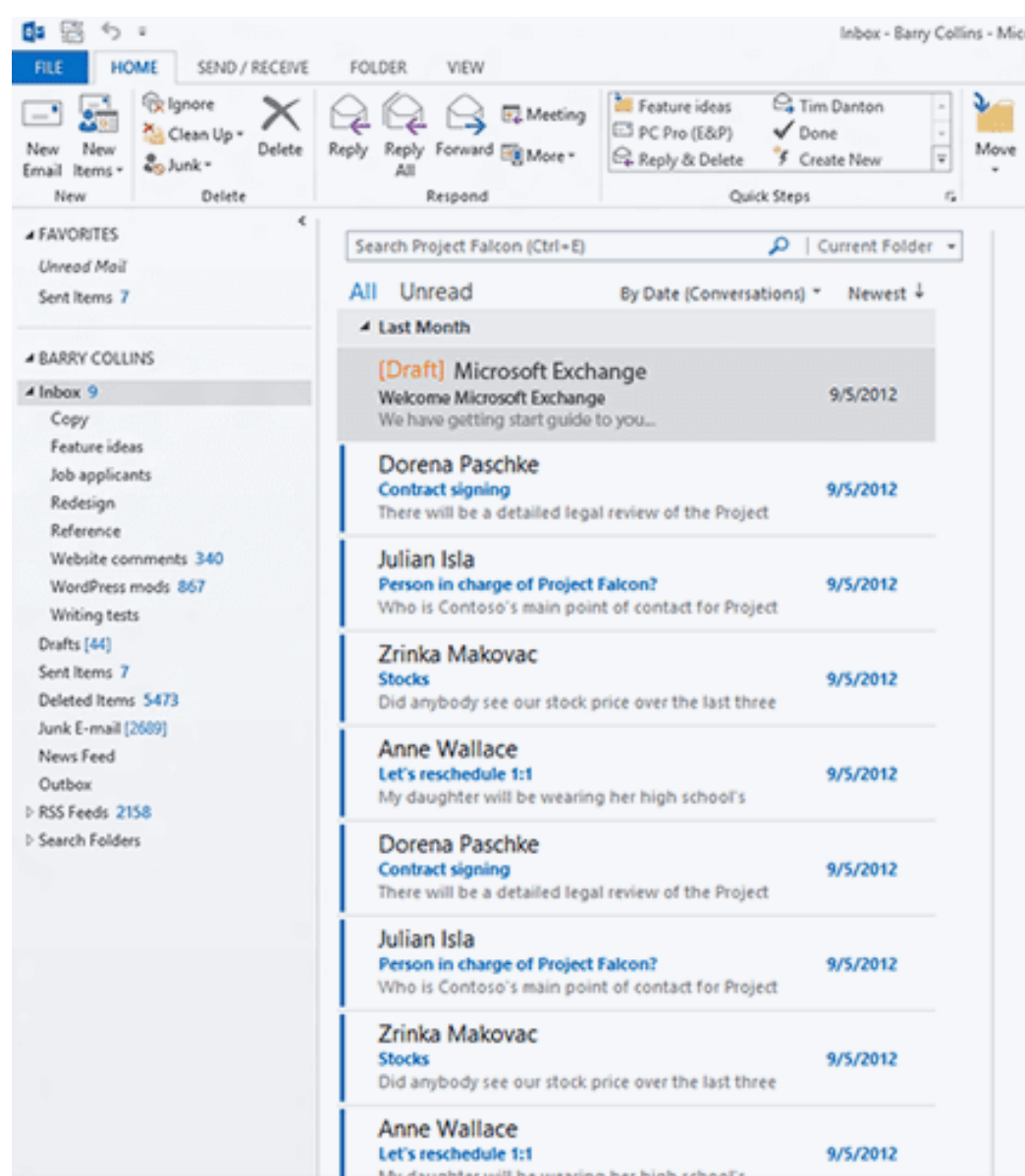


What is special about Digital Urban Planning?

Urban planning and design is already digital, right?



A digital mess...





The screenshot displays a software interface with a 3D architectural model on the left and a data analysis dashboard on the right. The dashboard includes a table of building metrics and two charts: a donut chart for building use and a bar chart for building height.

Building name	Building ID (% of GFA)	Gross Floor Area (m ²)	Built-up Area (m ²)	Building Height (m)	Number of Storeys	Required Green Area (m ²)	Required Parking Spaces
Complex Building 1	1001823	5799,95	2285,97	9,8	3	18382,24	1495,91

Building Use

- Shop: 12%
- Residential: 57%
- Office: 22%
- Service: 9%

Building Height (m)

9,8

A new generation of digital tools!



The rise of digital twins

2010's

Products/Industry
machines, vehicles



2020's

Cities
Traffic, Infrastructure

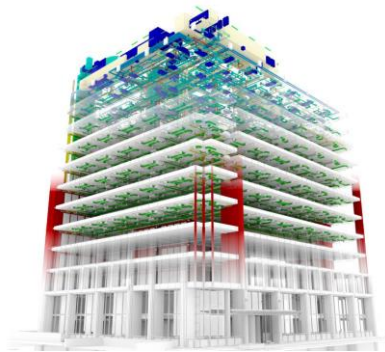


2002

Michael Grieves
Digital Twin Concept

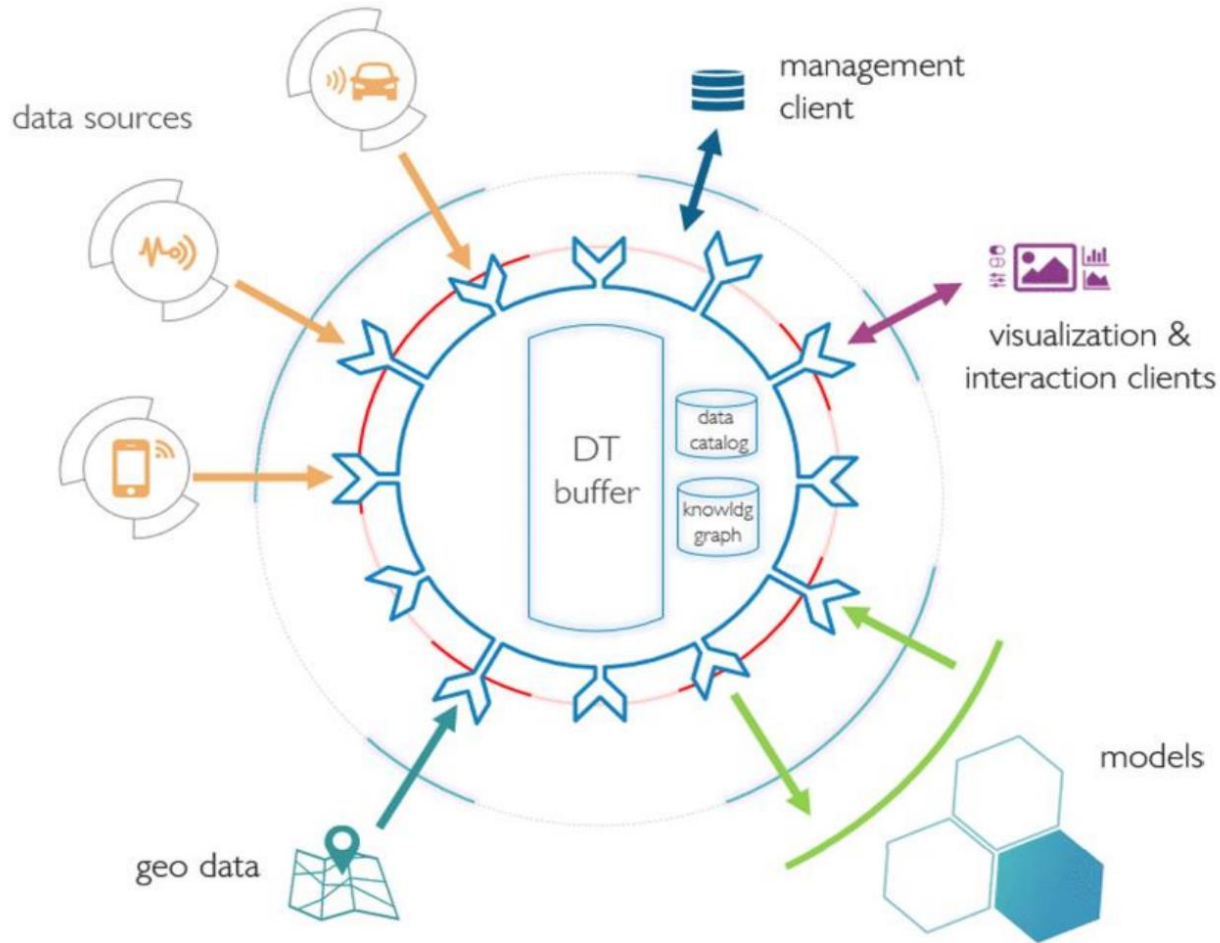
2016-
2020

Buildings
BIM, maintenance, monitoring



Now

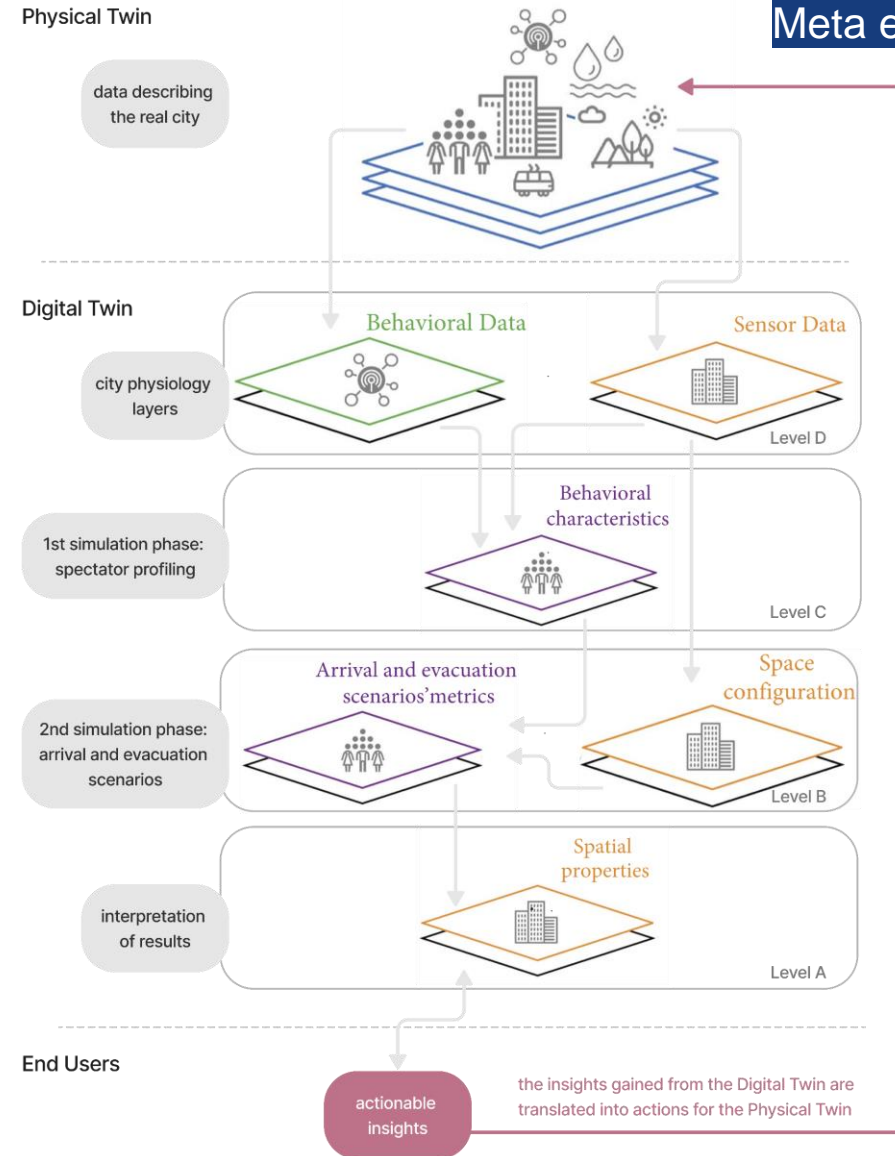
Digital Twin Frameworks



DUET T-Cell Architecture
Raes et al (2022)

City Physiology Modular Framework

Meta et al (2021)



334 digital twins

58 countries

search engines

newsletters

academic papers

white papers

company websites



ownership

accessibility

openness

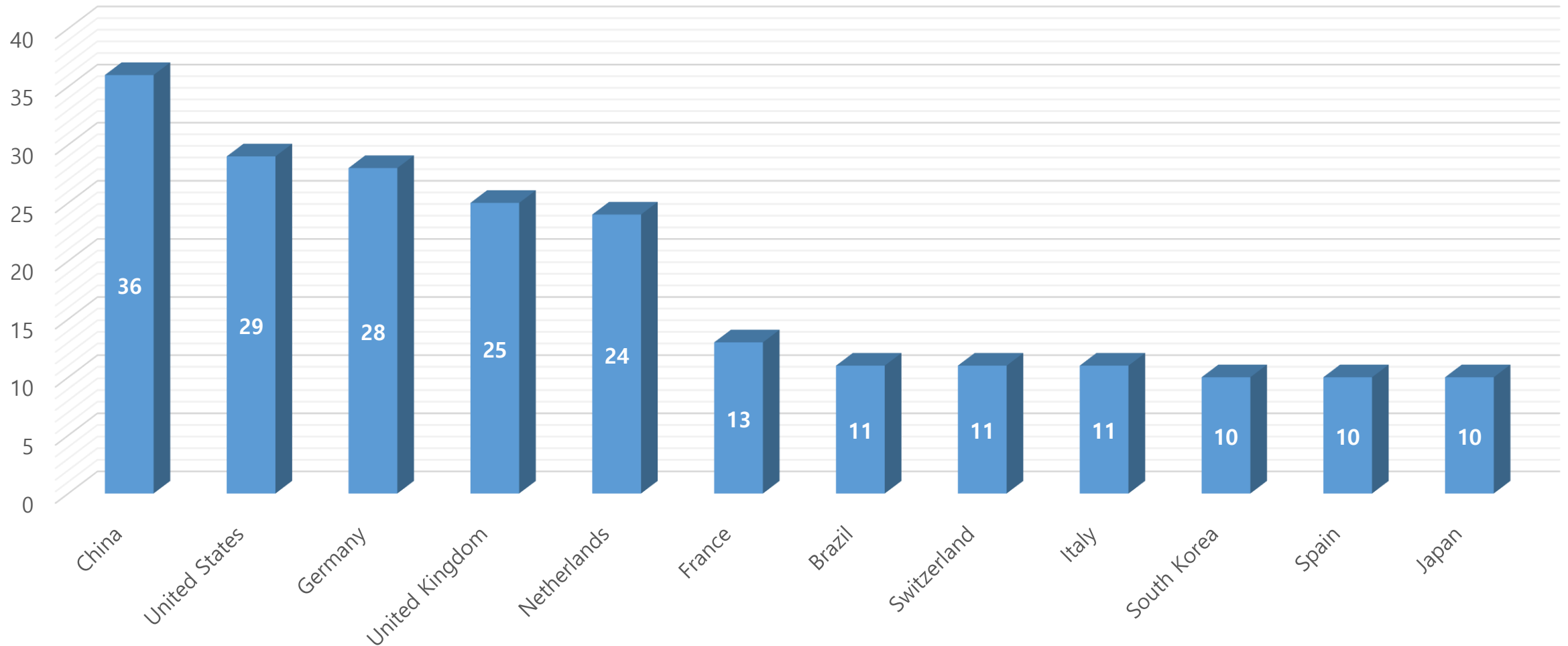
scale

operator

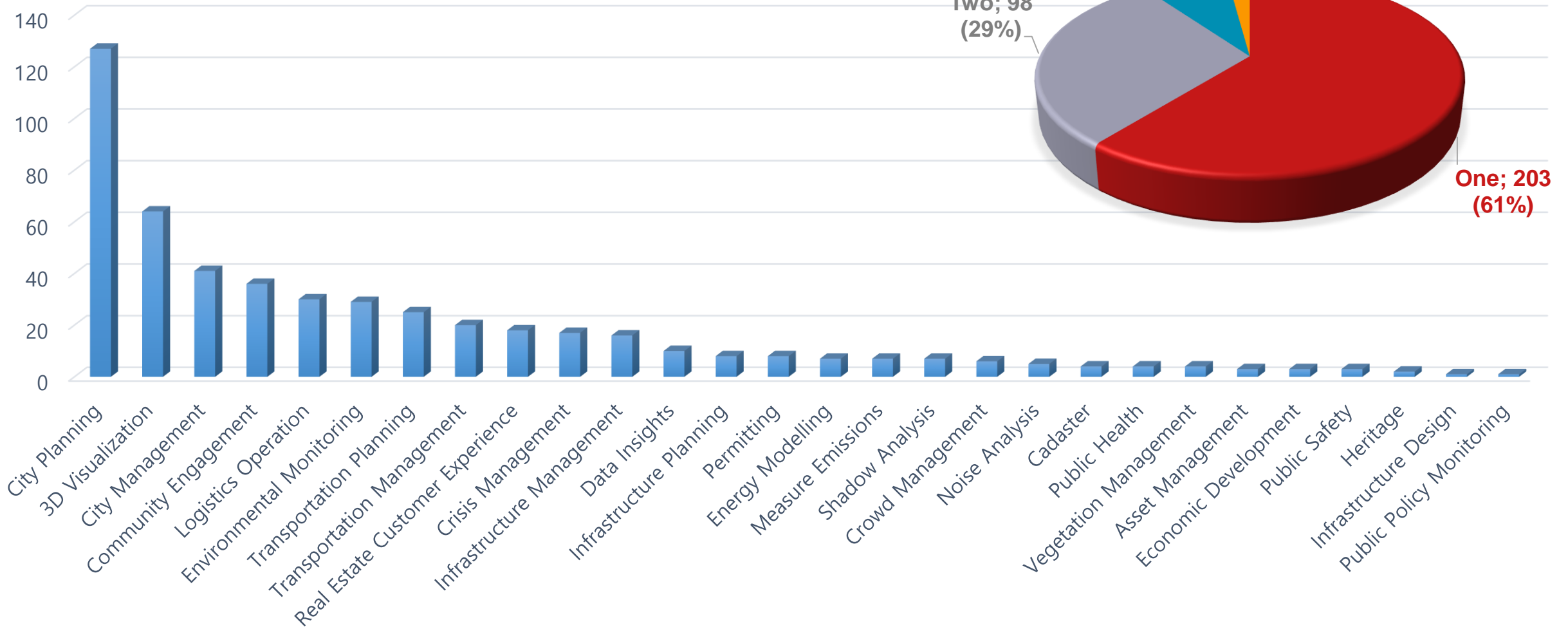
use cases

maturity level

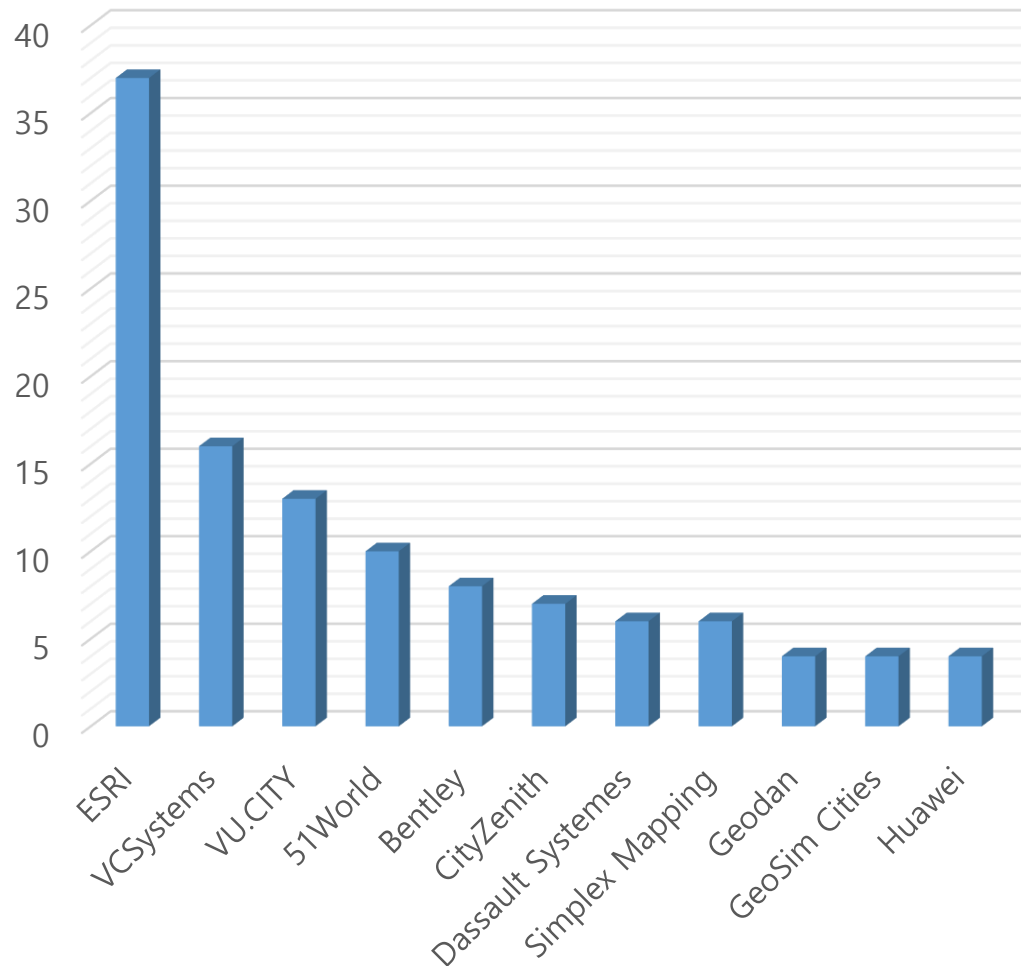
Number of identified digital twin initiatives



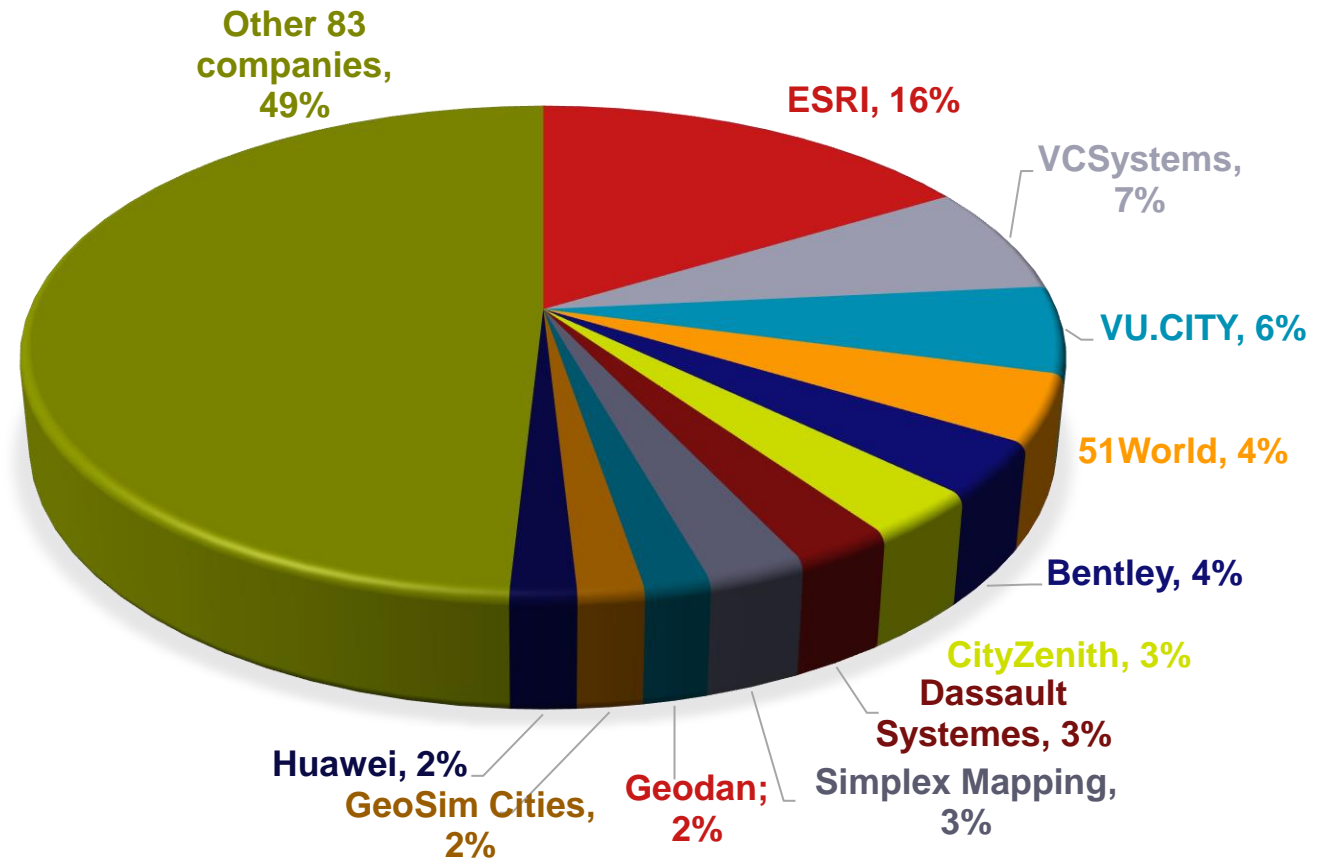
Number of identified use cases



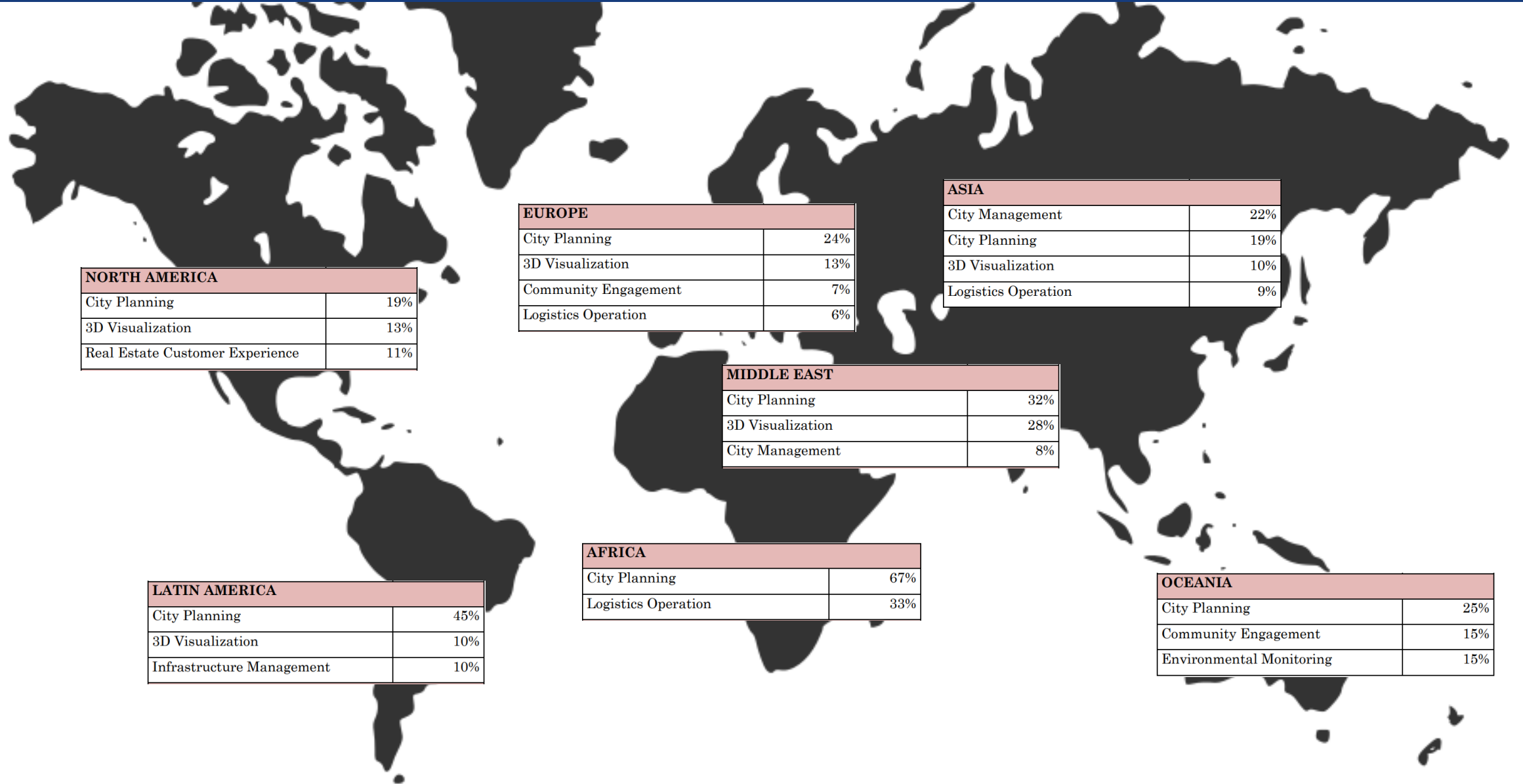
Company Ranking



Estimated market share



Region vs. Use Case




Dutch Digital Twin Ecosystem

operators


× Gemeente Amsterdam




data owners

3D BAG by  tudelft3d


× Gemeente Amsterdam




Gemeente Utrecht



Gemeente Rotterdam



Gemeente Groningen



Basisregistratie Ondergrond

data service providers



OpenStreetMap





TOMTOM




PDOK
Publieke Dienstverlening op de Kaart

data users

public officials 

citizens 

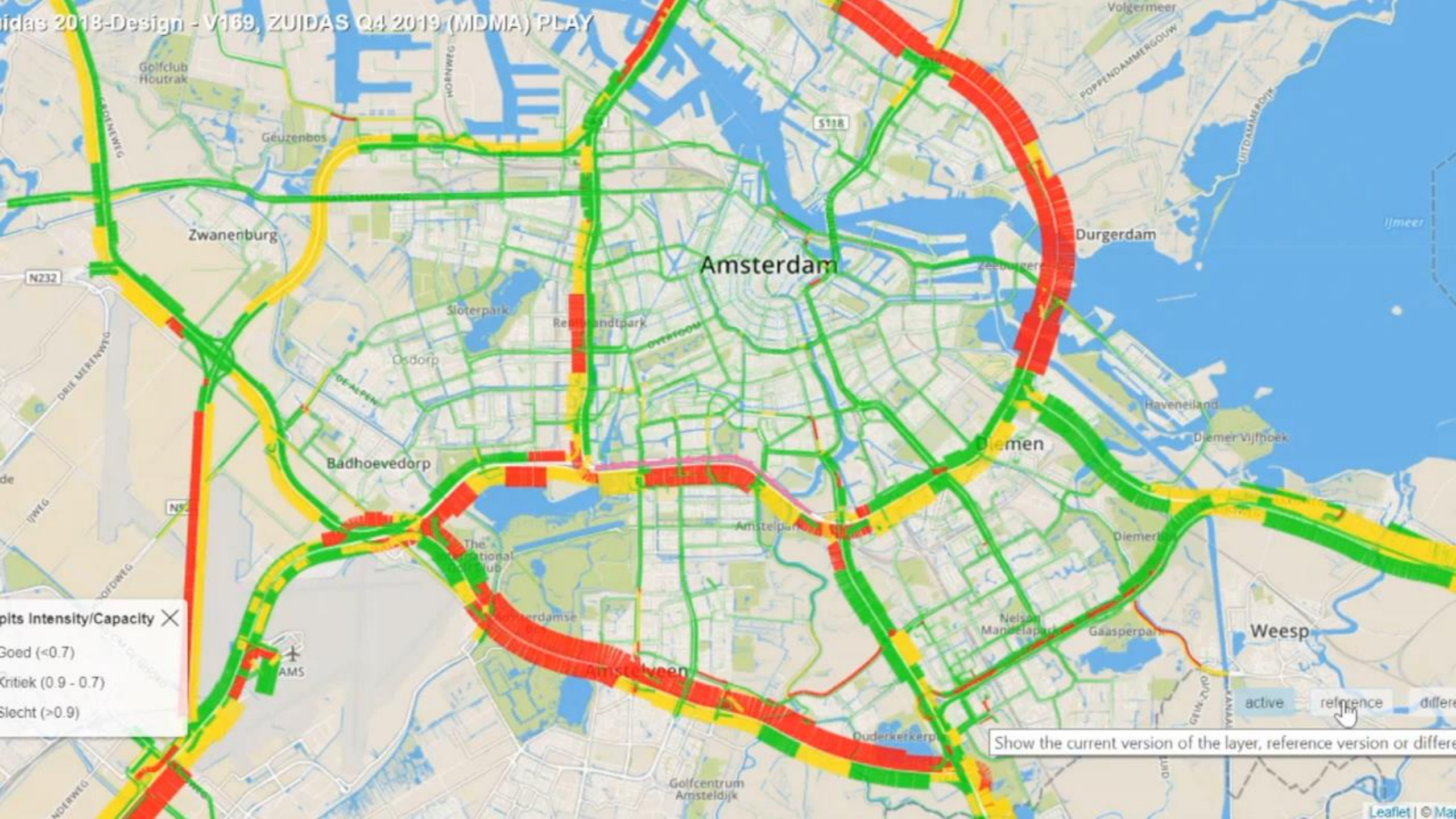
engineers/architects 



Zuidoostrijk



Centrum



Spits Intensity/Capacity X

- Goed (<math><0.7</math>)
- Kritiek ($0.9 - 0.7$)
- Slecht (>0.9)

active reference difference

Show the current version of the layer, reference version or difference



Object informatie



Pand 0363100012171127

BAG ID	0363100012171127
Stadsdeel	Centrum
Wijk	Grachtengordel-Zuid
Buurt	Rembrandtplein e.o.
Bouwjaar	1898
Bouwlagen	0
Verblijfsobjecten	7

[Meer pand informatie](#)

Adressen

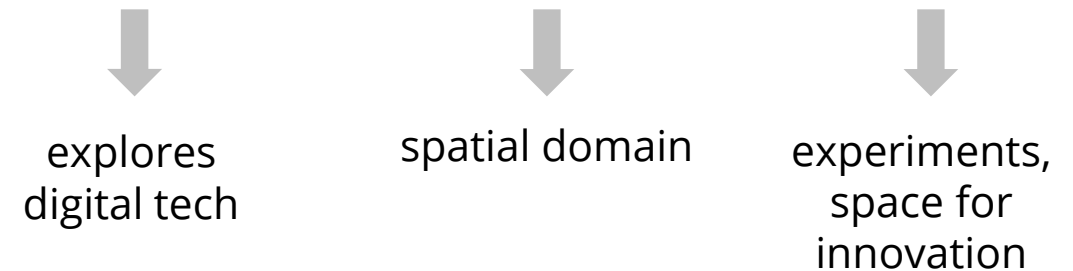
- Rembrandtplein 17
- Rembrandtplein 17-H
- Rembrandtplein 17-1
- Rembrandtplein 17-2

DIGITAL URBAN PLANNING LAB

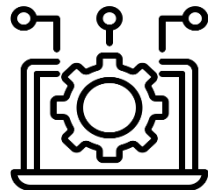
- Community Advisor
- Software Architect
- Digital Urban Planner
- Scrum Master
- Product Owner
- Service Designer
- Business Analyst
- Digital Artist



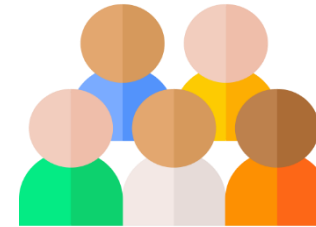
Digital Urban Planning Lab



Create Impact



building capability
in the process

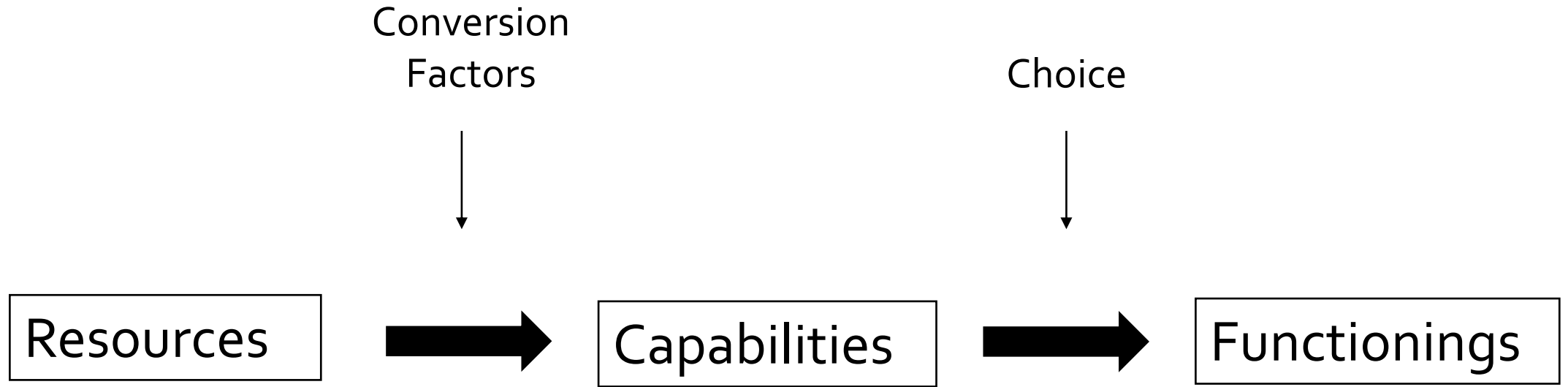


Lab Products

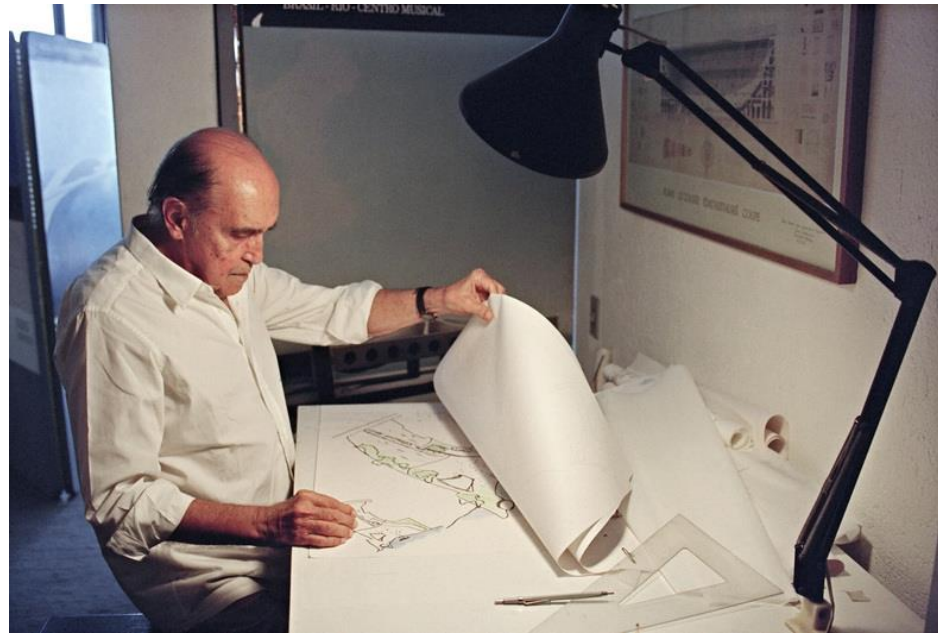
Amsterdammers



Input/Feedback



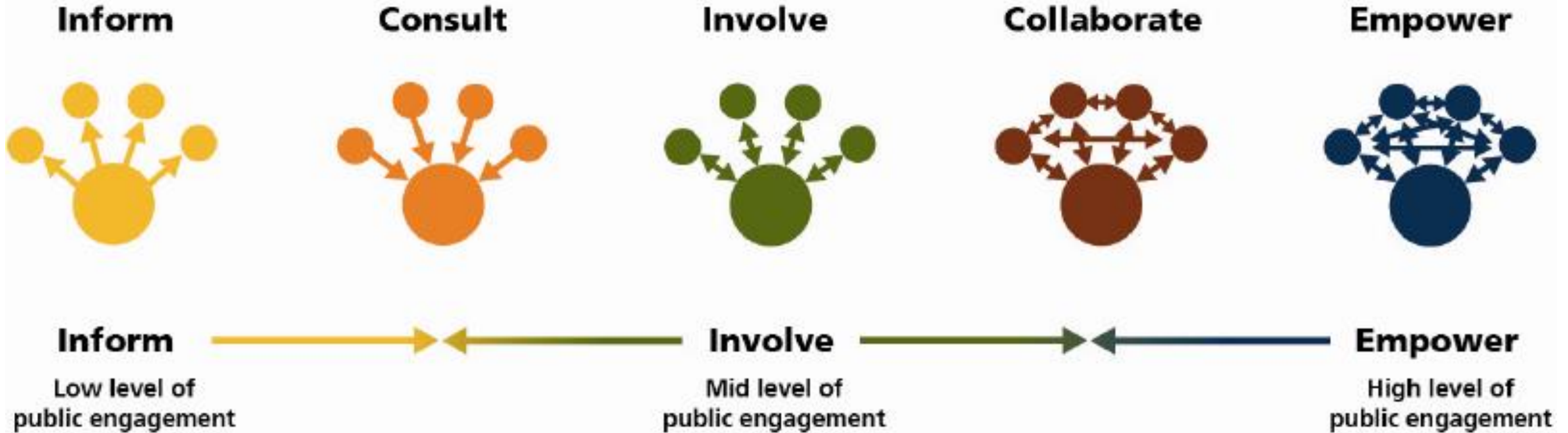
But what is capability?



Design is power!



Technology as a tool for community empowerment

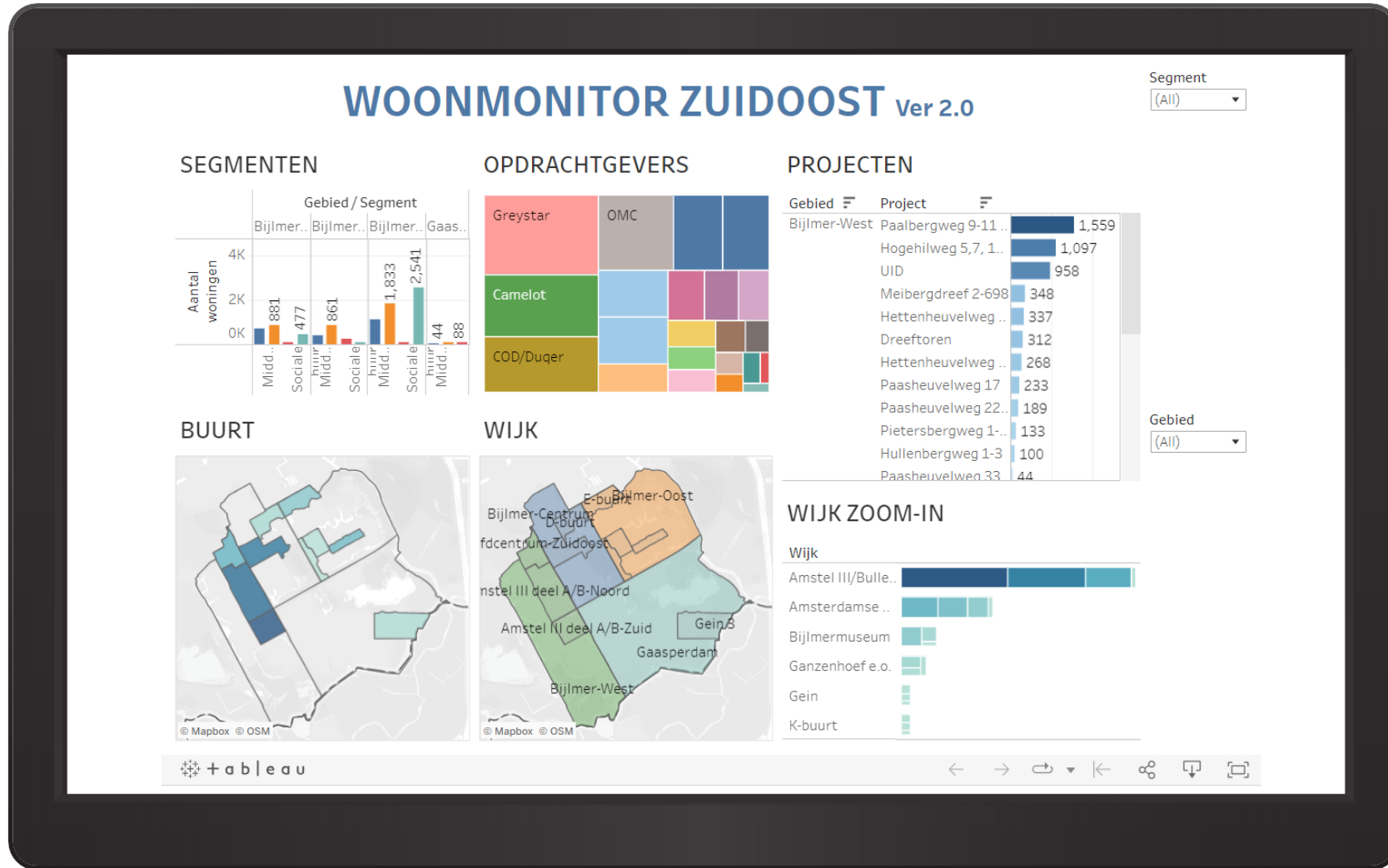




People at the center of innovation

Augmented Reality for Participation

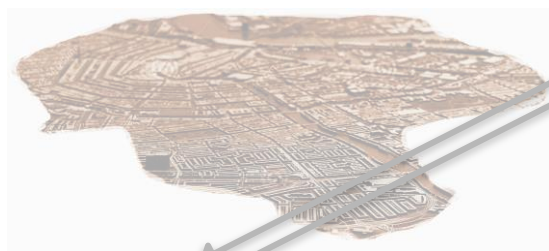




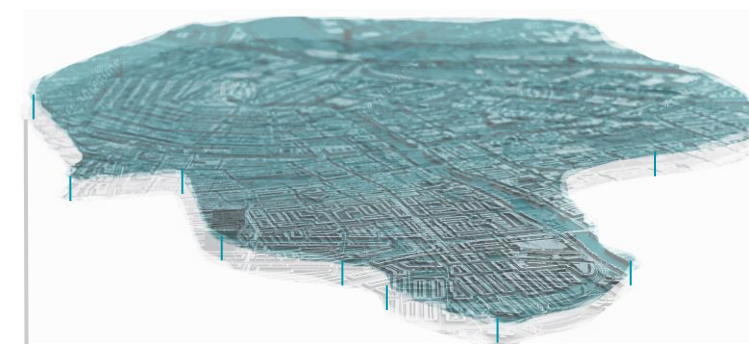
Vision

Epic #1
Gebiedsontwikkeling Monitor
>stadsbreed >overzichtelijk

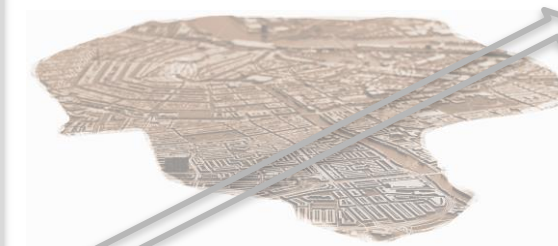
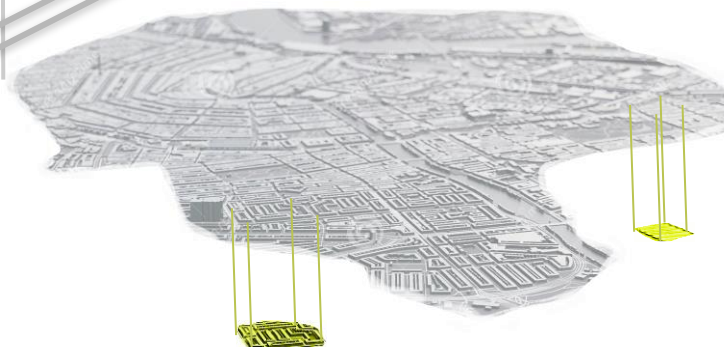
e.g. Amsterdam in de Gouden Eeuw, Zuidoost in jaren 80.



Past



Current
3D Amsterdam



Future

e.g. Amsterdam Omgevingsvisie 2050

Data

Epic #2
Digitale Participatie
>lokaal >inzichtelijk

Epic #3
Digital Twin Ecosystem
>predictive >catalyzer

BEDANKT!



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City of Amsterdam

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