



# AMSTERDAM'S NERVOUS SYSTEM

SESSION:

Redefining next-gen infrastructure  
through data, intelligence, resilience

Weiwei Ding - City of Amsterdam  
2026-04-30







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PHOTOGRAPHY















# 1. Starting point: defining problems, questions, motivation

**Increasing asset complexity in public space; above and underground**

Roads, charging stations, green spaces, population, accessibility, urban utilities, cables, pipes, glass fiber, tunnels, grid

**Increasing urban, societal, regulation, digital complexity**

Stakeholders and their needs are intertwined, large organisations, confusing regulations, slow law enforcement, growing digital world

**External pressure: climate, geopolitical, cyber risks**

Extreme weather conditions and temperature fluctuations, flooding/fire risks, biodiversity loss, resource dependency, invisible cyber attacks

We don't lack data

How to use data → insights → decisions → actions → impact → flexible & adapt?



## 2. Beyond visualisations, towards near real-time intelligence and actions

### Less is more

Narrow down the problem  
Filter stakeholders  
Data quality over quantity → filter, clean, minimization, safety

### Beyond graphs & dashboards

Traditional: static 2D or 3D graphs, GIS maps, snapshots, post-analysis "from a distance"

### Near real-time information fusion with actions

From raw data → operational indicators

- Street-level imagery
- Satellite data
- In-situ sensor data
- Local data
- On-site assessment
- Direct collaboration with executors



# 3. Integrated (geo)data & AI-driven solutions

## Subsidence & deformation

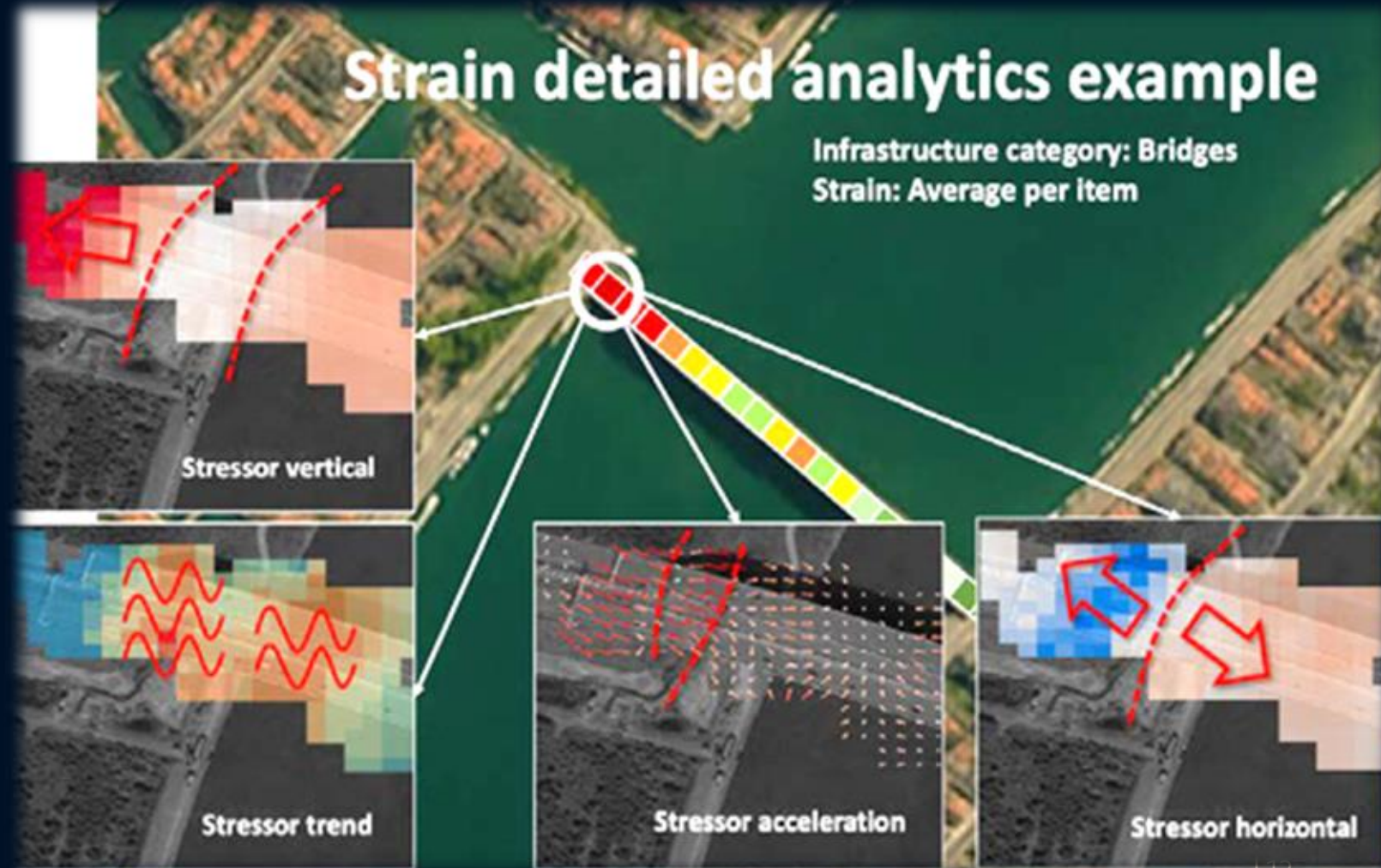
- First-line monitoring  
Satellite & in-situ  
sensor data
- Deformation at  
mm-precision
- Risk profile of the  
whole area, not only  
on asset level





## 2. Integrated (geo)data & AI-driven solutions Subsidence & deformation

- Deformation analyses
- Prevention: renovation & budget planning
- Project interventions
- Protection measures





## 2. Integrated (geo)data & AI-driven solutions

### Computer Vision – Object detection in public space

**Near real-time information fusion**

From raw data → operational indicators

- Street-level imagery
- GPS
- Local data (permit, vulnerable quay walls & bridges)
- Automatic alerts
- On-site assessment
- Direct collaboration with enforcement



## 2. Integrated (geo)data & AI-driven solutions

### Computer Vision – Object detection in public space

Near real-time information fusion

From raw data → operational indicators

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- Automatic alerts
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- Detect illegal objects by Computer Vision (*image recognition*) models
- From “seeing the city” → “acting in the city”



## 2. Integrated (geo)data & AI-driven solutions

### Computer Vision – Object detection in public space

- Weekly image collection by bike (30 – 40km)
- 20000 – 30000 images

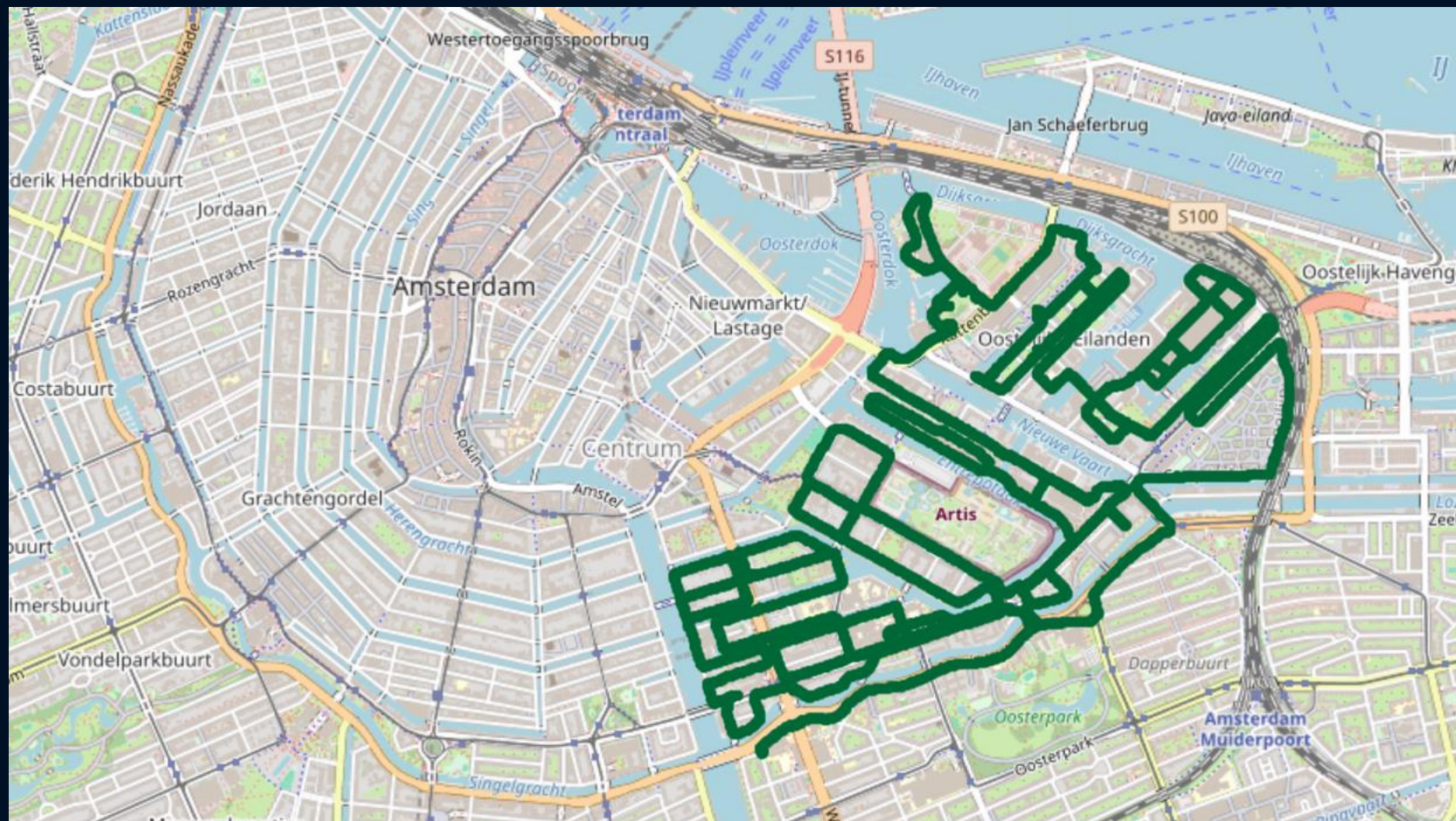




## 2. Integrated (geo)data & AI-driven solutions

### Computer Vision – Object detection in public space

- Weekly image collection by bike (30 – 40km)
- 20000 – 30000 images
- On-edge:
  - Blurring as a Service (*BaaS*)
  - Object detection
  - Bounding boxes
- Geo statistics, confidential scores





## 2. Integrated (geo)data & AI-driven solutions

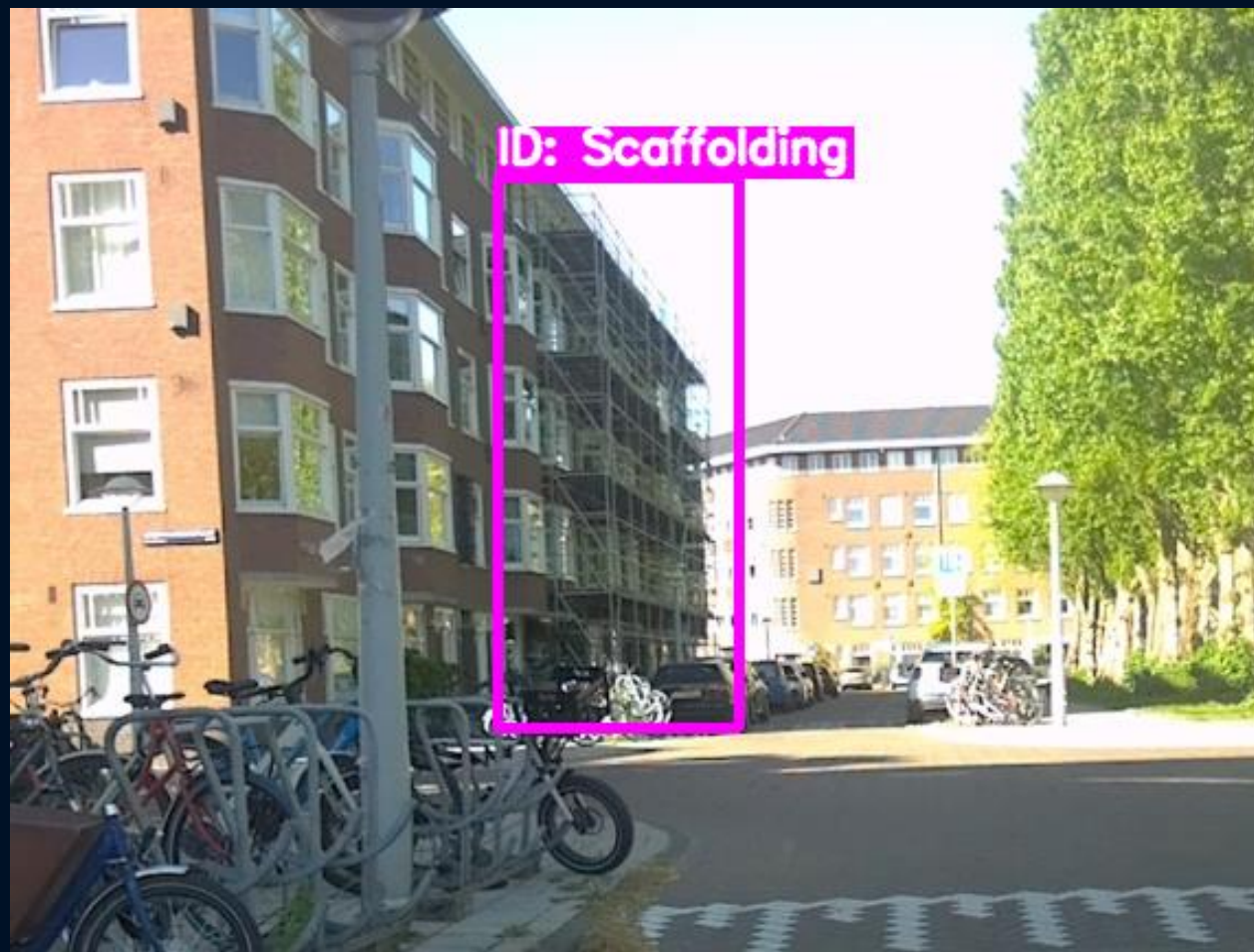
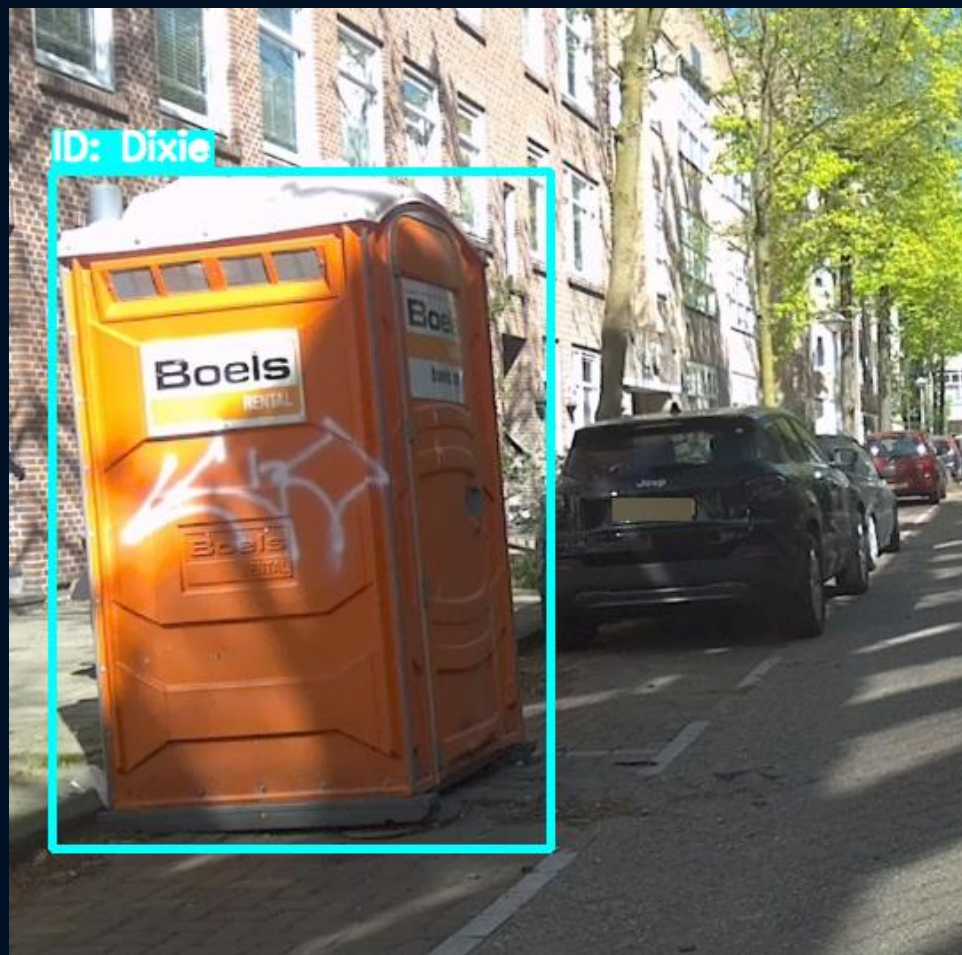
### Computer Vision – Object detection in public space





## 2. Integrated (geo)data & AI-driven solutions

### Computer Vision – Object detection in public space

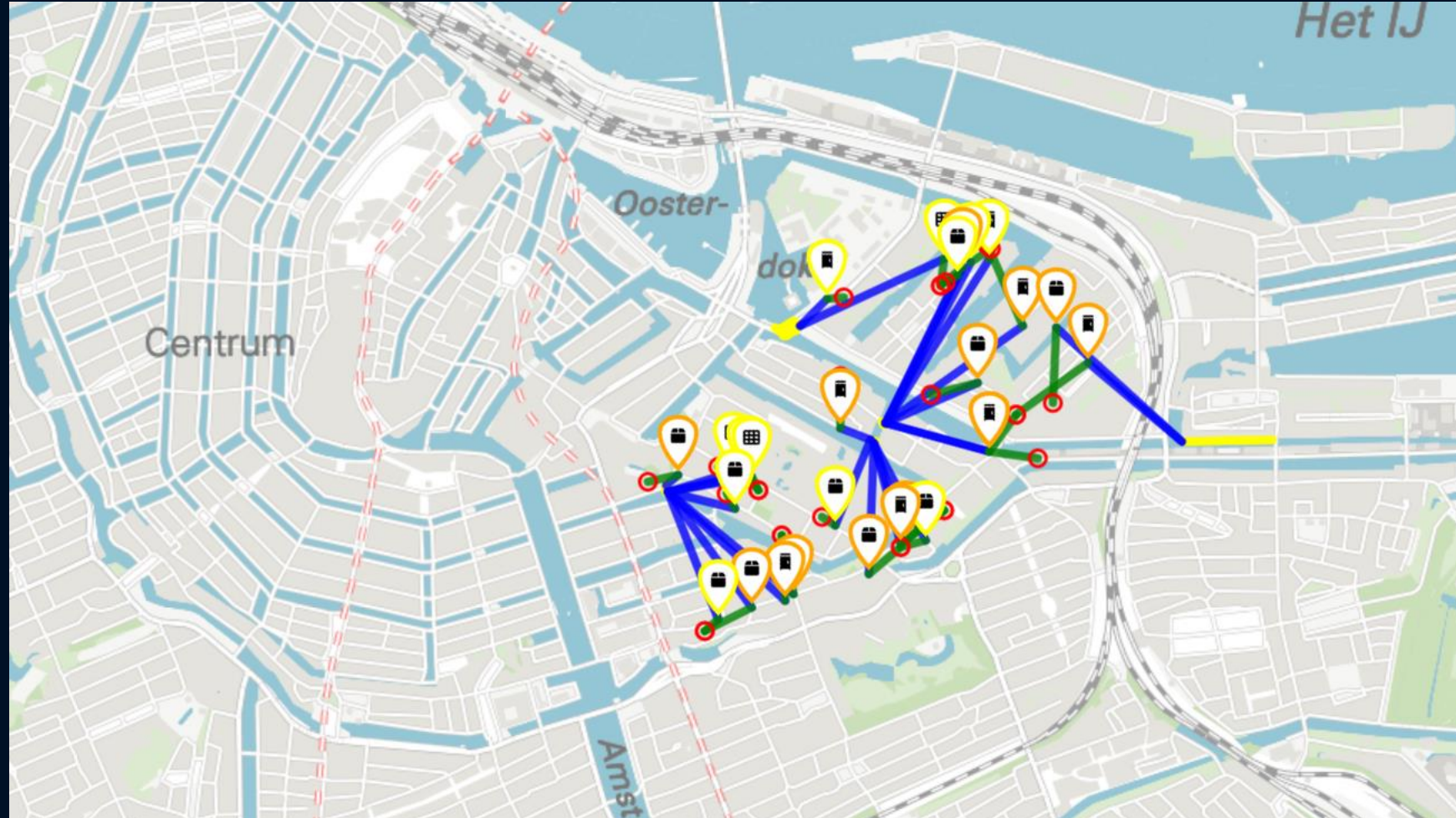




## 2. Integrated (geo)data & AI-driven solutions

### Computer Vision – Object detection in public space

- Validated detections
- Azure/Databricks pipeline
- Refinement filters:
  - Valid permits
  - Private areas
  - Festivals
- Vulnerable quay walls and bridges
- Distant to permit areas
- Send to enforcement

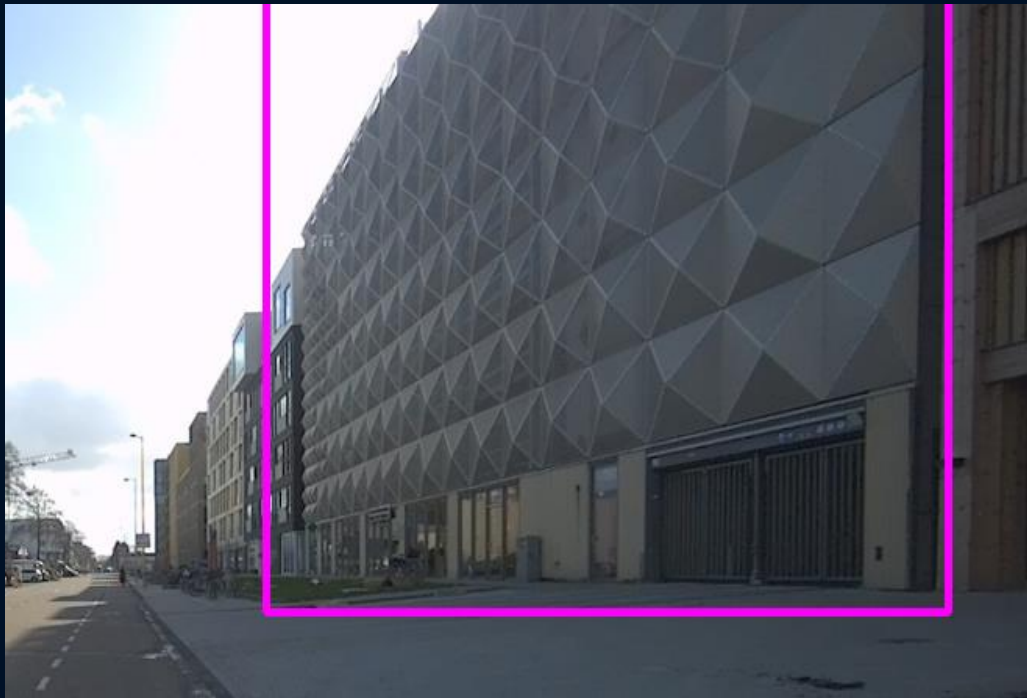




## 2. Integrated (geo)data & AI-driven solutions

### Computer Vision – Object detection in public space

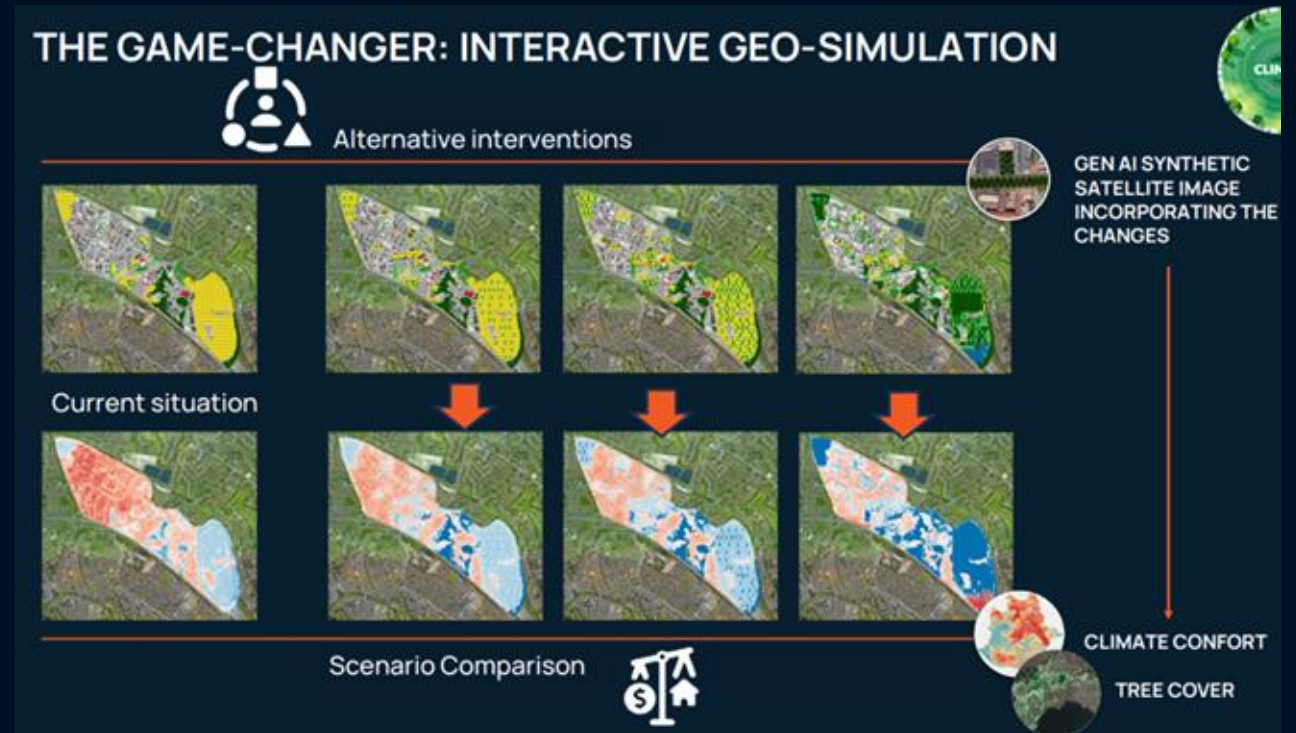
Manually assessment confidential scores and validation still needed for false positives





### 3. Digital Twins: simulation → planning support Green space management

- Not only monitoring & detections
- Test scenarios & responses before investment
- Representation of reality
- Compare or design options before deployment
- Trade-off → justify
- Adjust, iterate if possible



**Geo-simulator:**  
City planners draw interventions, assess outcomes



### 3. Digital Twins: route planner for wheelchairs Accessibility regulations (Accessibility Act 2025)

Thousands of people can't move freely, conventional maps don't show barriers for wheelchairs, rollators.

If you're limited to move around, you can't fully participate in society and feel isolated.



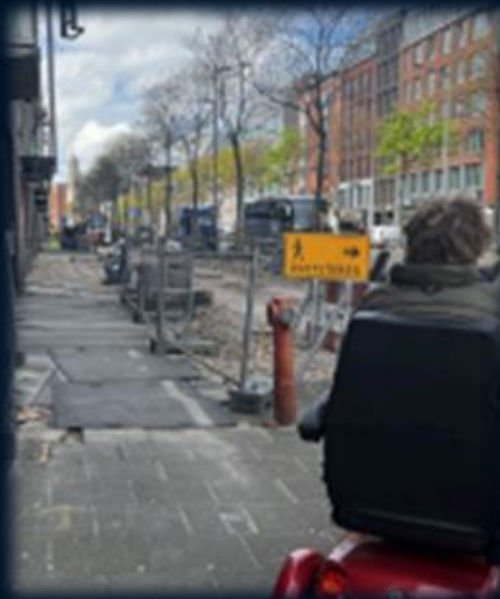


### 3. Digital Twins: route planner for wheelchairs Accessibility regulations (Accessibility Act 2025)

Too narrow



Constructions



Impossible....





# 3. Digital Twins: route planner for wheelchairs Direct impact societal inclusion





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