

# ENHANCING URBAN MODELS THROUGH EARTH OBSERVATION

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UN/Austria Symposium - Space4Climate Action

15.09.2022



# CITIES ARE HOTSPOTS

- 73% of the European population lives and works in cities – with a rising trend



- They consume 75% of the energy used in the EU

- 70% of total CO<sub>2</sub> emissions in Europe emerge in and around urban areas



# DIGITAL RESILIENT CITIES



Computational  
Urban Planning



Transformative  
Mobility Solutions



Urban Development &  
Infrastructure Simulation



Urban Climate  
Modelling



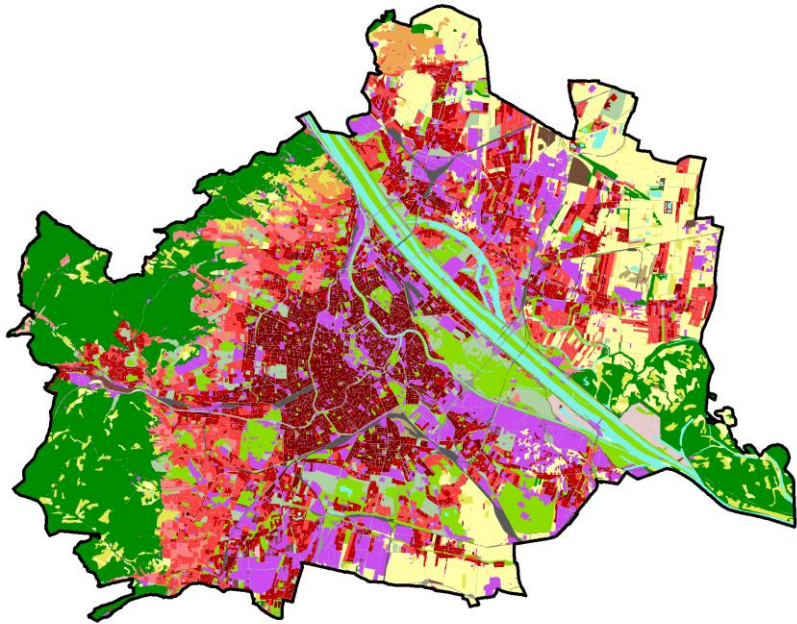
Urban Water  
Consultation



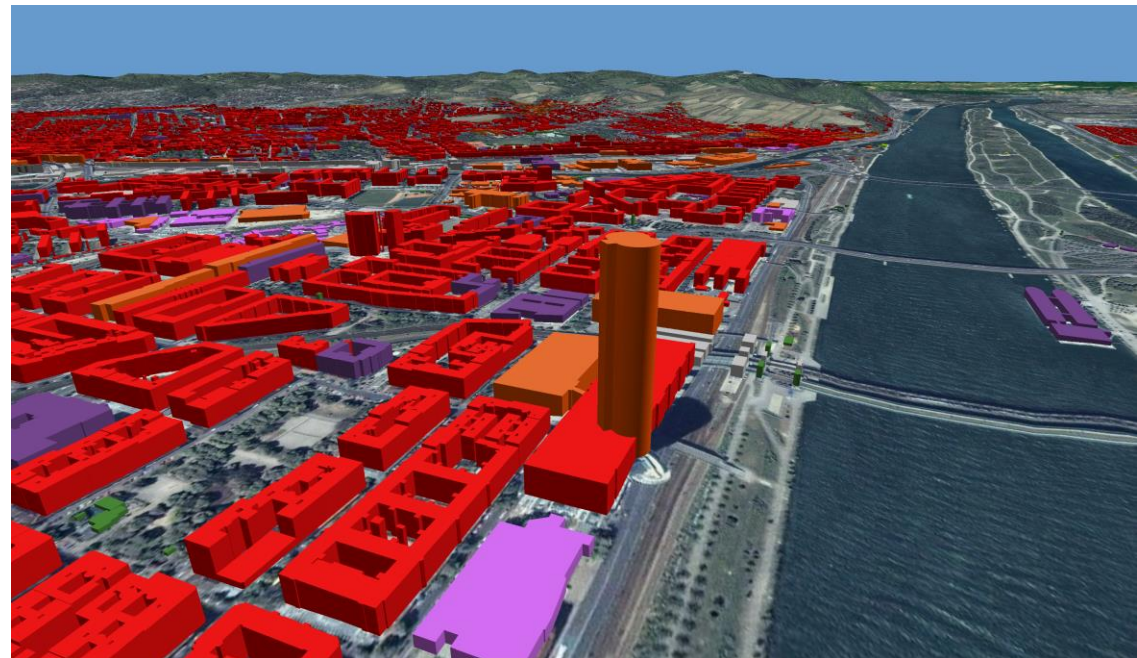
Nature Based  
Solutions (NBS)

# URBAN REMOTE SENSING

- Optical Earth Observation provides standard products on
  - Land cover / land use
  - 2.5 D building models



Urban Atlas Vienna

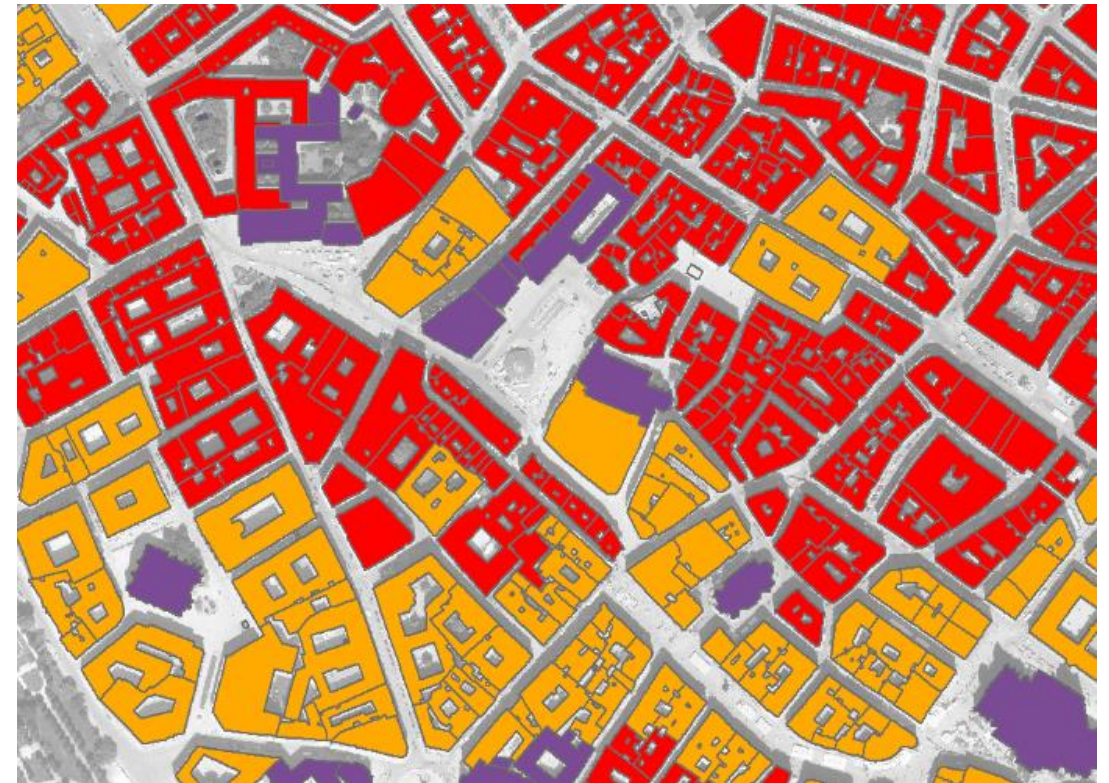


Buildingmodel Vienna



# URBAN REMOTE SENSING

- Challenge of urban EO products
  - Representation of physical objects
  - Limited representation of functional information



# DATA INTEGRATION

- Modelling of processes in the city
  - Distribution of population
  - Accessibility of services
  - Exposure of people
  - Mobility patterns
  - .....
- Earth observation provides a geo-spatial framework that becomes valuable when combined with non space data such as
  - Census data
  - Address data
  - Commuting data
  - .....

# BUILDING USE MODELLING

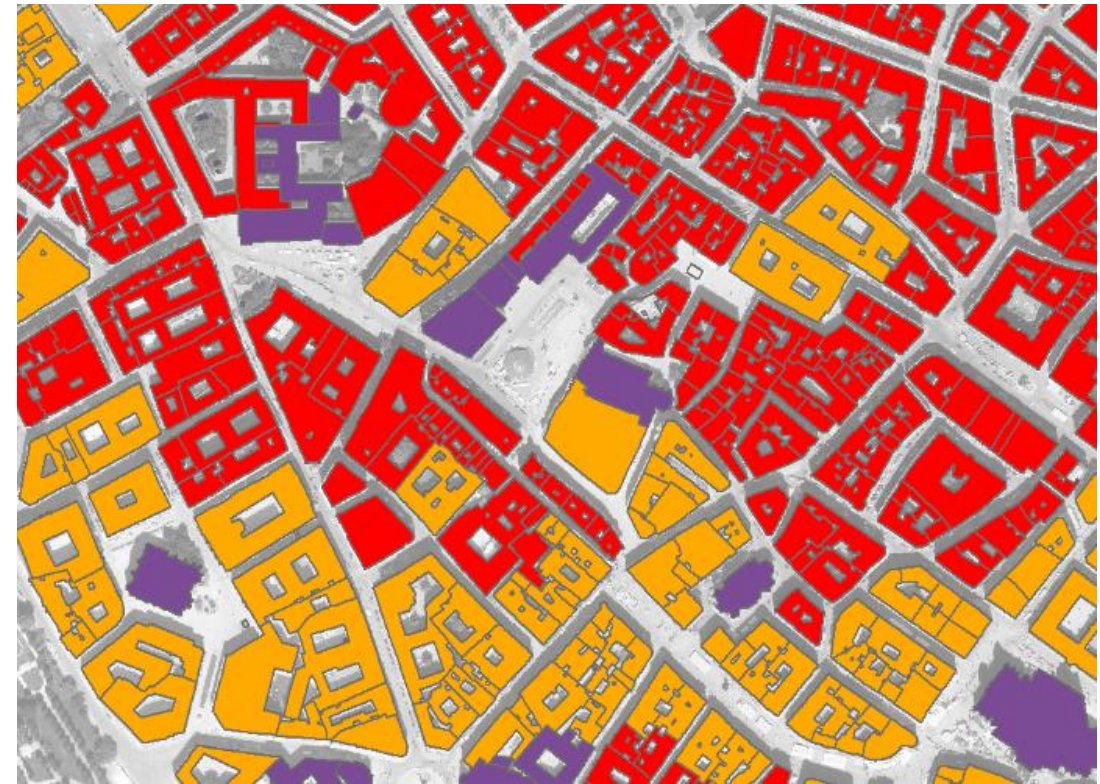
- Data integration
  - Building model
  - Address point data
  - Company data base



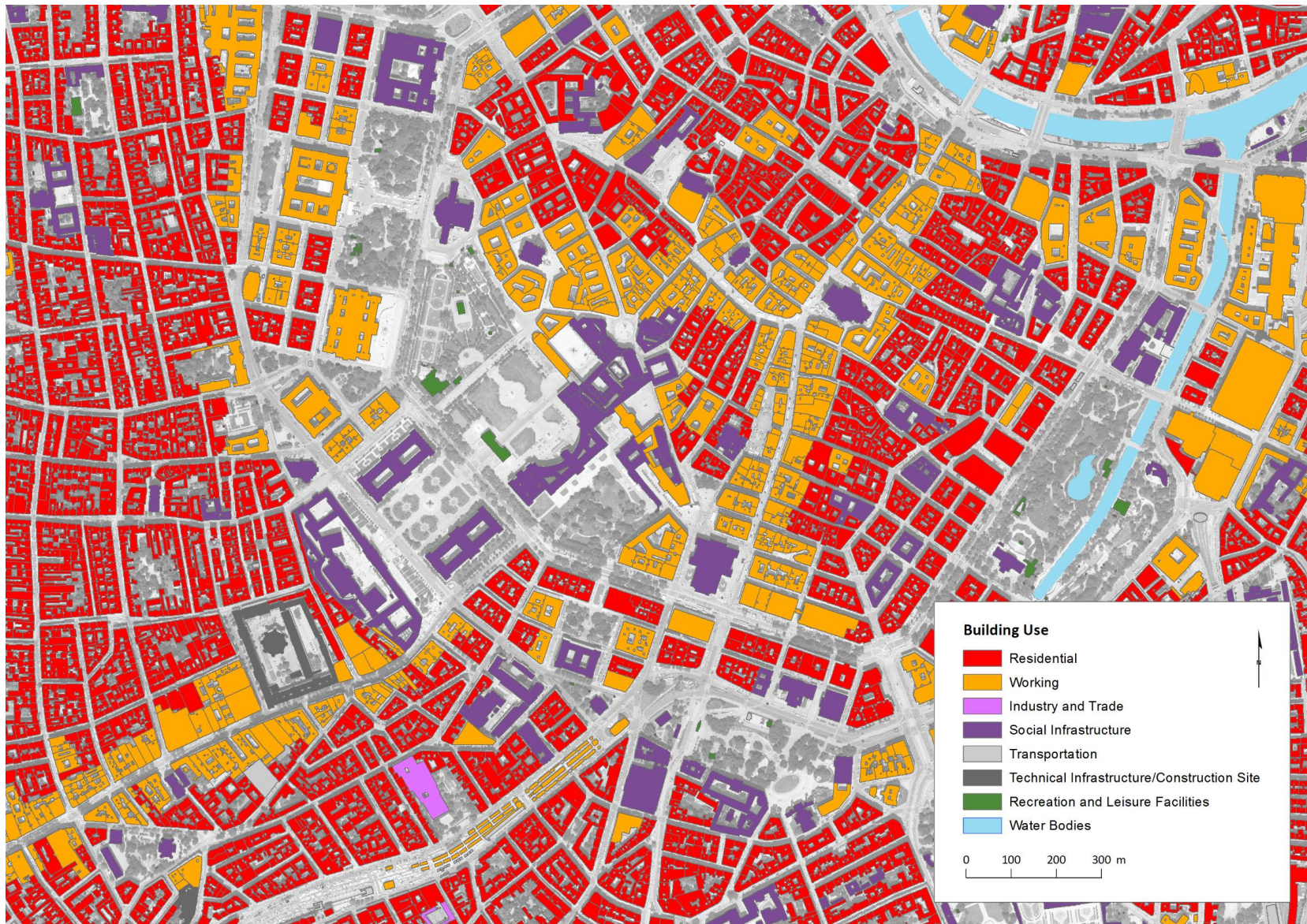


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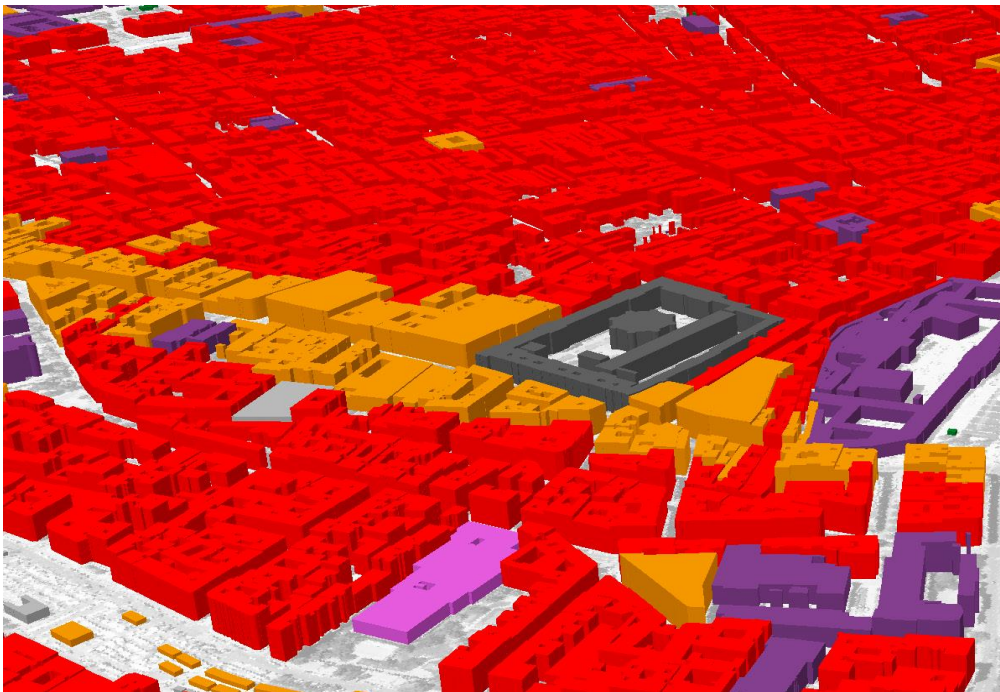




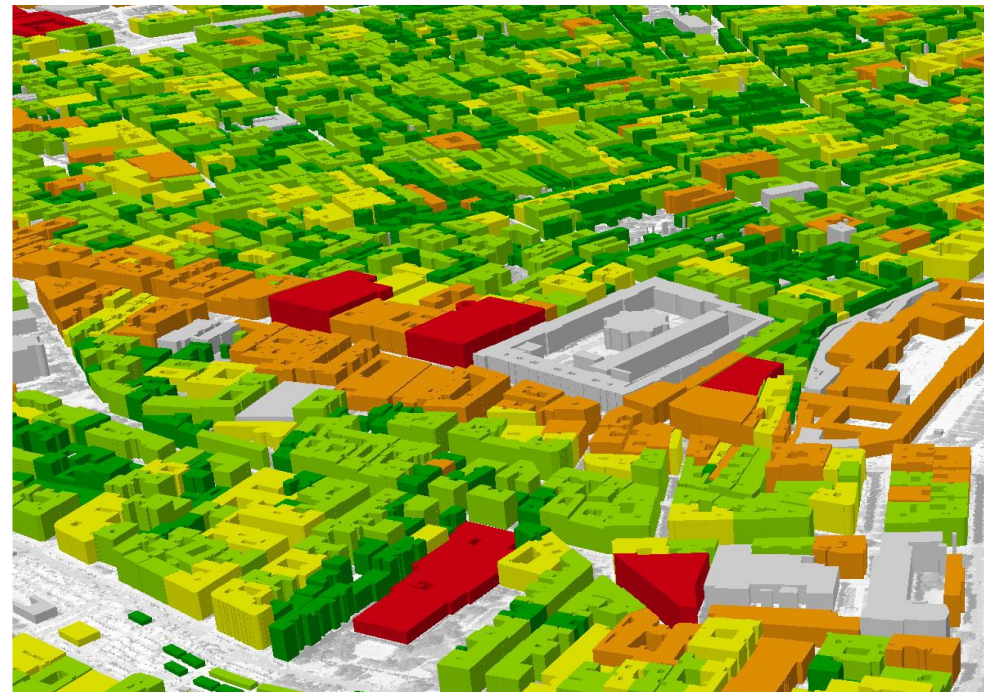


# POPULATION MODELLING

- Data integration
  - Building use model
  - Demographic data



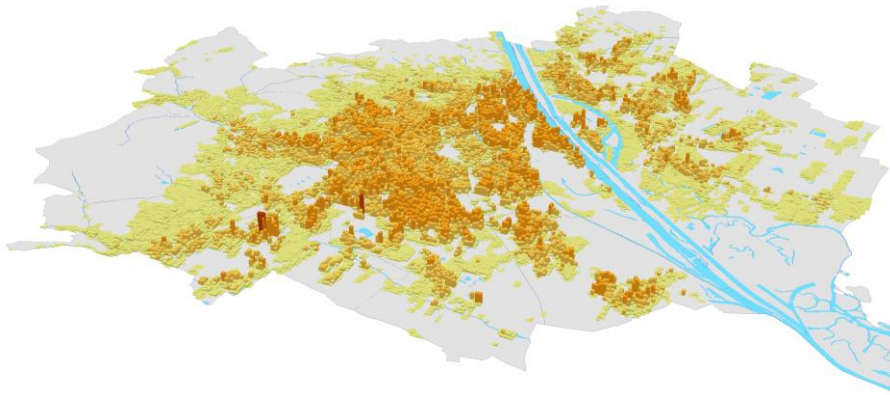
Building Use Vienna



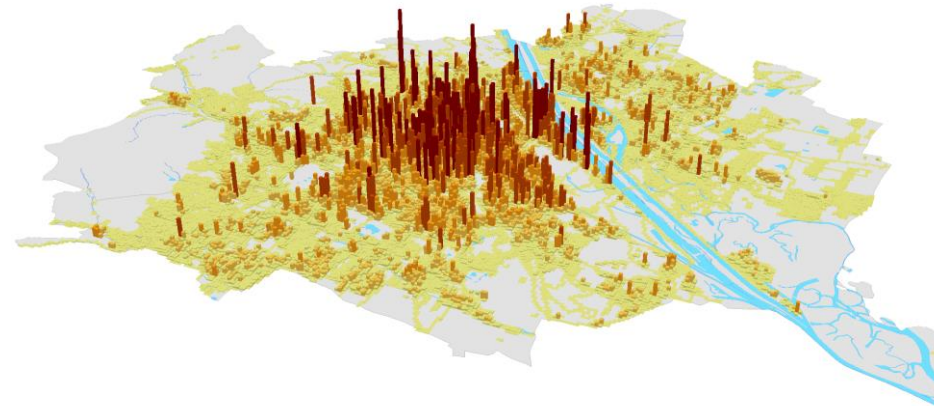
Daytime population Vienna

# POPULATION MODELLING

- Demographic information is distributed to
  - Residential buildings
  - Commercial, industrial and office buildings



night time population



day time population

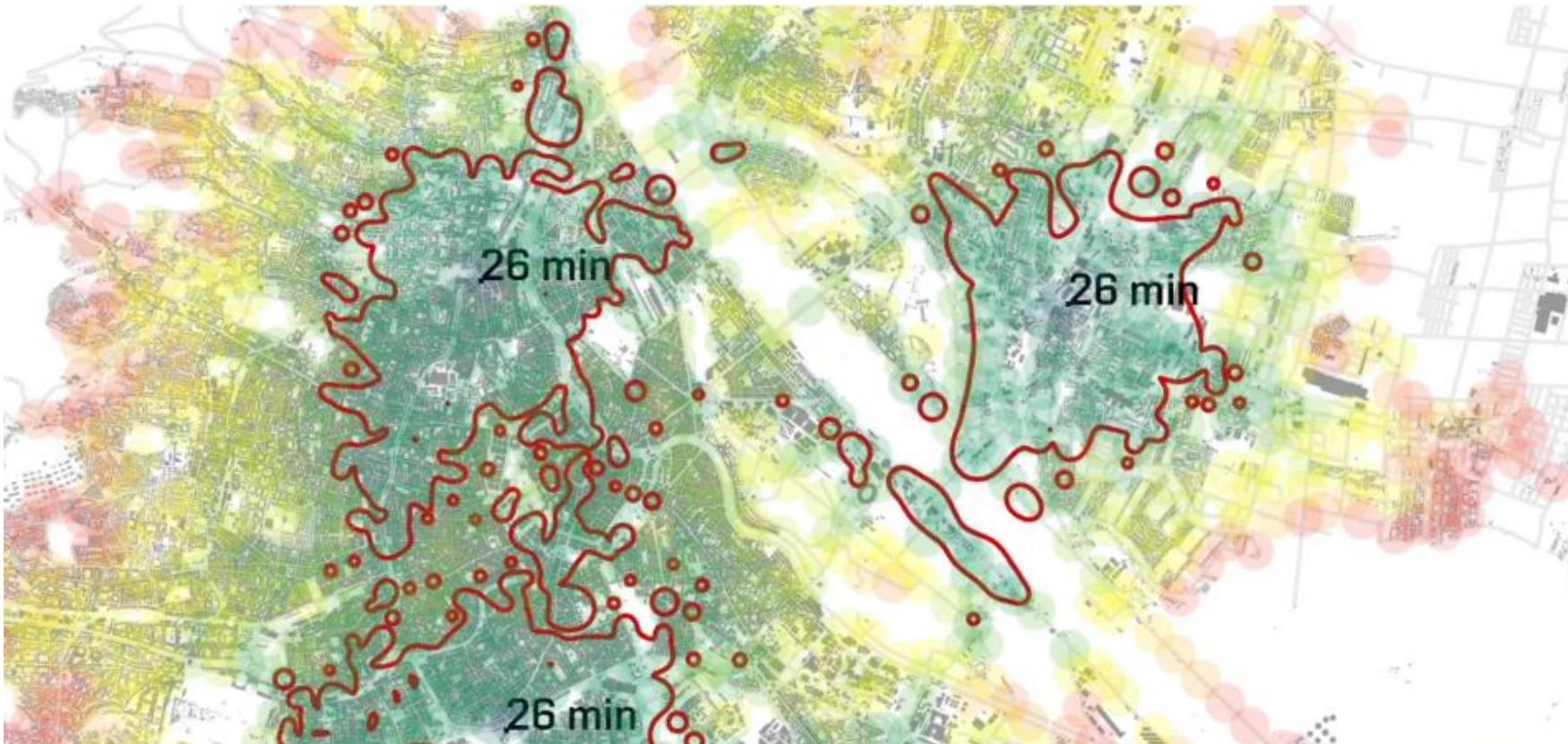


# ENHANCED DATA BASIS

- Integration of
  - EO derived standard products
  - Socio-economic/demographic data
- Enhanced data basis
  - Building use model
    - Residential, commercial, industrial
    - Use groups
      - Hospitals, public services, shopping malls, etc
  - Population distribution
    - Night time
    - Day time

# URBAN MODELLING

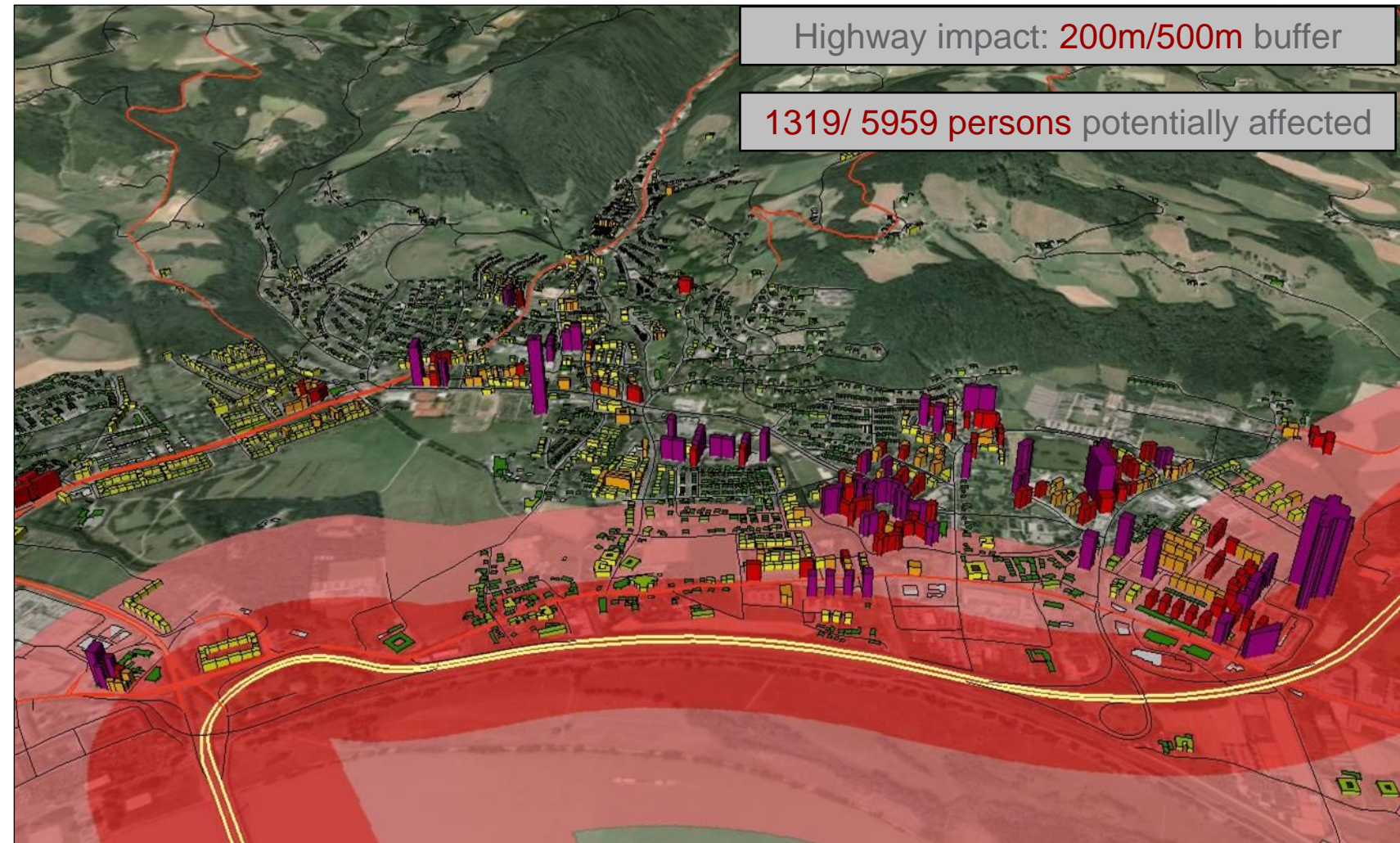
- Accessibility of Services – catchment areas





# URBAN MODELLING

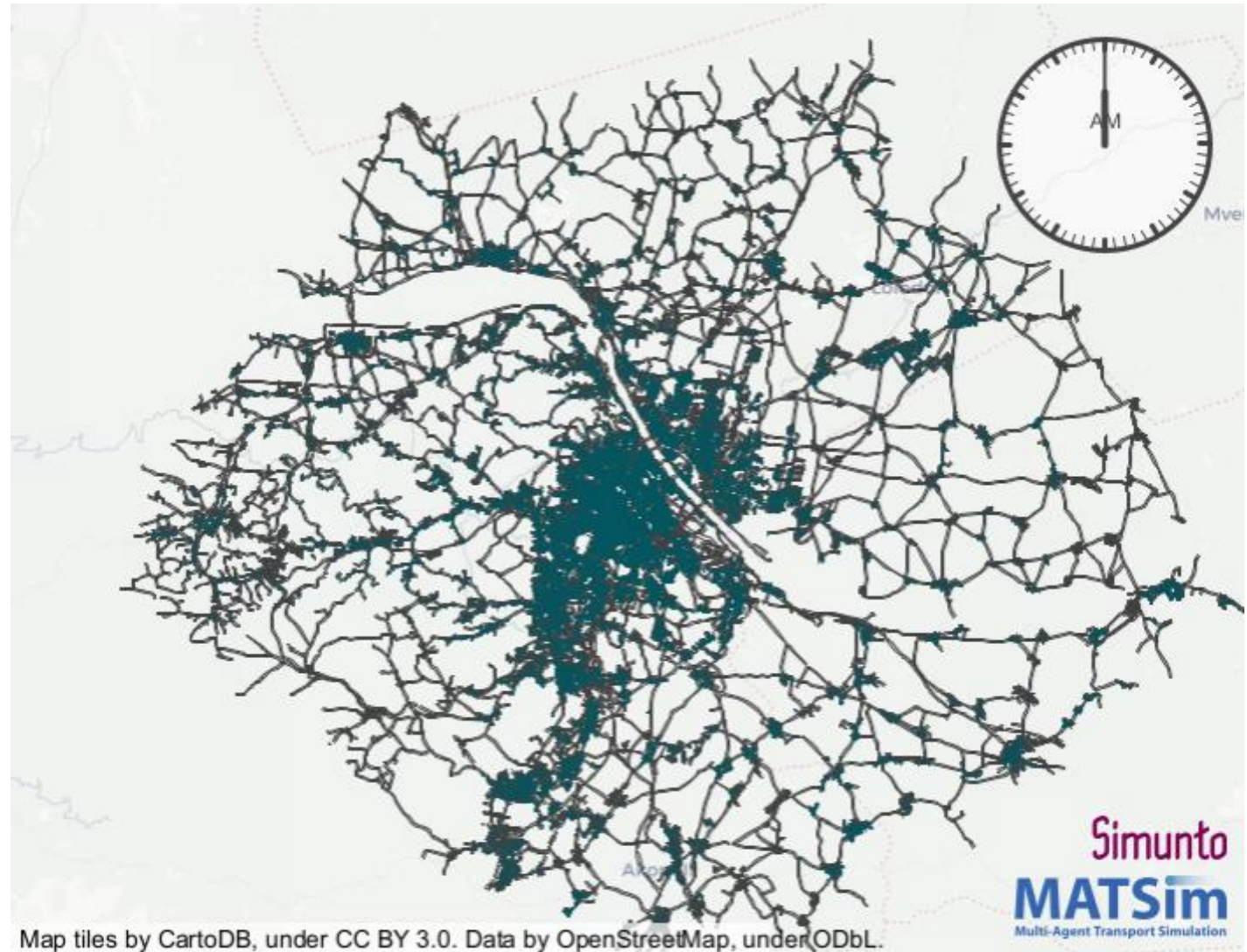
- Exposure mapping
  - Related to time of exposure
  - Natural disasters
  - Man made incidents





# URBAN MODELLING

- Mesoscopic traffic model
  - OD-Matrix estimation
  - MATSim model generation



# CONCLUSION

- Standard EO products provide
  - Distribution of physical objects
  - Geo-spatial layout
- Socio-economic data provide
  - Functional content
- Integration results in
  - Geo-spatial representation of functional content
  - Providing an enhanced basis for urban modelling

# THANK YOU!

