



# XXVII FIG CONGRESS

11-15 SEPTEMBER 2022  
Warsaw, Poland

Volunteering  
for the future –  
Geospatial excellence  
for a better living

## Book Launch "Geospatial Data in the 2020s – Transformative Power and Pathways to Sustainability"

Chair: Hartmut Müller

Rapporteur: Markus Schaffert

Panellists: Cemre Şahinkaya Özer

Sagi Dalyot (online)

Marije Louwsma

Chryssy Potsiou (online)

Claire Buxton

Roshni Sharma (online)

Enrico Rispoli

Maria Scorza



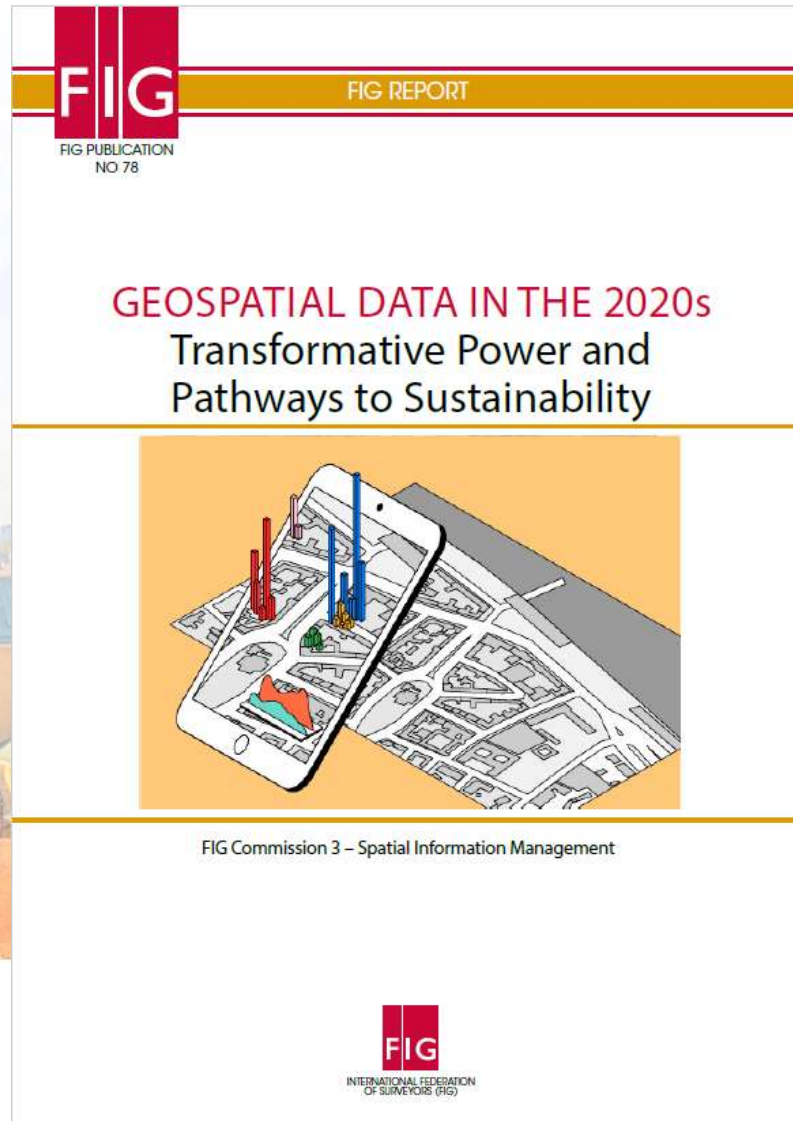
<https://www.fig.net/resources/publications/figpub/pub78/figpub78.asp>

ORGANISED BY



PLATINUM SPONSORS





**FIG** FIG REPORT  
FIG PUBLICATION  
NO 78

## GEOSPATIAL DATA IN THE 2020s

Transformative Power and  
Pathways to Sustainability

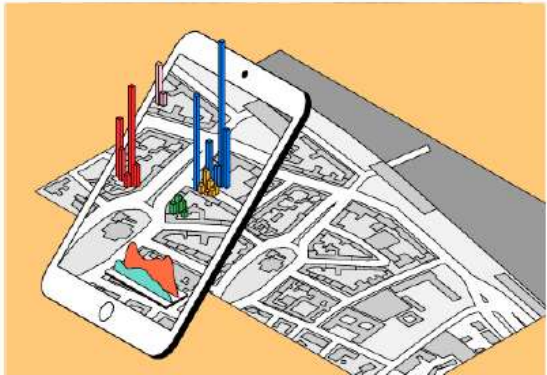


FIG Commission 3 – Spatial Information Management

<https://www.fig.net/resources/publications/figpub/pub78/figpub78.asp>



### Authors from

- ✓ Commissions 3 and 8
- ✓ Young Surveyors Network
- ✓ Volunteer Community Surveyor Program

### Geospatial data for

- ✓ spatial planning,
- ✓ health,
- ✓ diversity,
- ✓ volunteerism,
- ✓ cadastre
- ✓ property market

## Session programme

<https://www.fig.net/resources/publications/figpub/pub78/figpub78.asp>

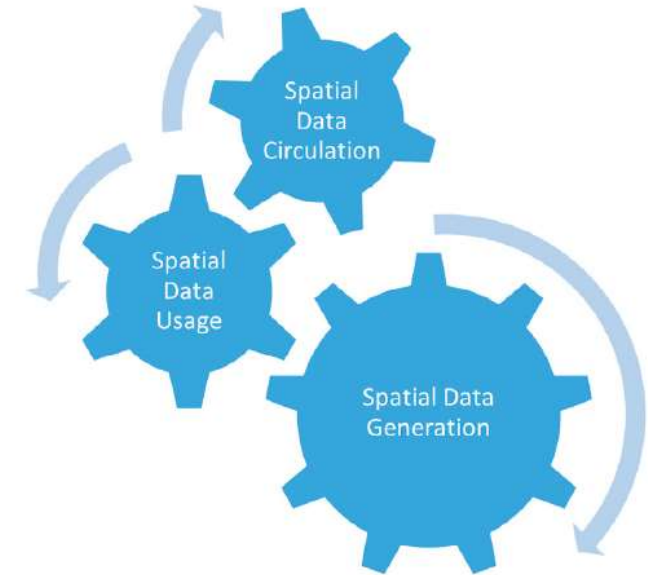
- |                    |   |
|--------------------|---|
| 1 <b>Opening</b>   | Hartmut Müller  |
| 2 <b>President</b> | Rudolf Staiger  |
| 3 <b>Chapter 1</b> | Markus Schaffert  |
| 4 <b>Chapter 2</b> | Cemre Şahinkaya Özer  |
| 5 <b>Chapter 3</b> | Sagi Dalyot, Marije Louwsma                                   |
| 6 <b>Chapter 4</b> | Roshni Sharma   |
| 7 <b>Chapter 5</b> | Claire Buxton, Sagi Dalyot                                    |
| 8 <b>Chapter 6</b> | Chryssy Potsiou, Enrico Rispoli, Maria Scorza, Marije Louwsma |
| 9 <b>Chapter 7</b> | Hartmut Müller  |
| 10 <b>Panel</b>    | all authors   |
|                    | Group photo   |



## C1 – Geospatial Data and Sustainability – Setting the Frame

*Authors: Markus Schaffert and Hartmut Müller*

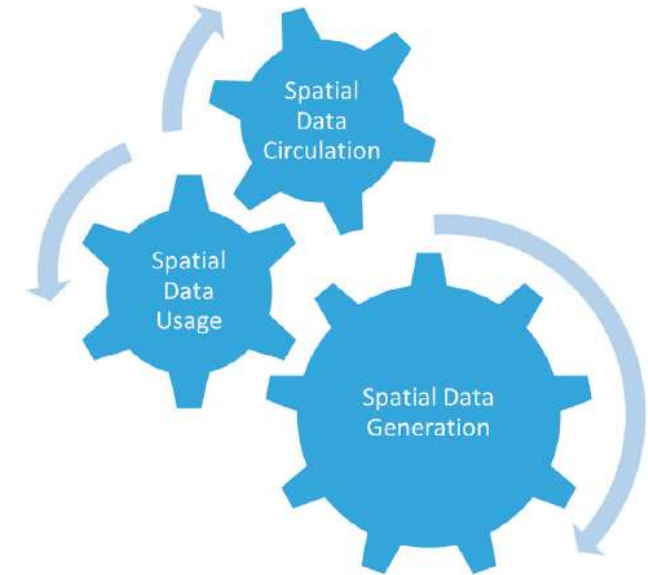
- Monitoring the SDGs requires data innovations, greater data availability and, essentially, a “data revolution” (cf. UN 2014)
- Handling the complex crises of the 2020s and paving sustainable pathways in a world in transition require even more than that
- *Data monitoring* is only one function of data contributing to sustainability, *data circulation* and *data generation* are two other functions that are not equally recognised in the debate on sustainable development



*The triad of spatial data functions for sustainable development.*

## Key take-aways

- Spatial data: a key ingredient for sustainability transitions (by providing *spatial data usage*, *spatial data circulation* and *spatial data generation*)
- Spatial data availability will not automatically lead to improved decision-making
- *Use Cases showing pathway to sustainable futures (and the role of spatial data herein) are required*
- *Furthermore, obstacles need to be tackled and overcome (data quality, empowerment, availability)*
- *Data → Information → Knowledge: This books provides use cases and best practise examples, on how to use spatial data / information for a sustainable future*



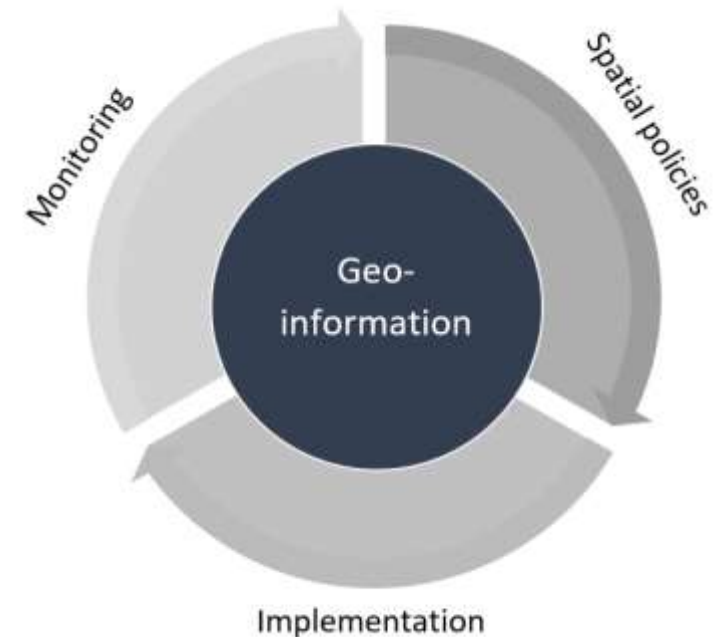
*The triad of spatial data functions for sustainable development.*

## C2 – The Nexus of Spatial Planning and Geospatial Information

*Authors: Marije Louwsma (Netherlands) and Cemre Şahinkaya Özer (Turkey)*

### The role of geospatial information in the spatial planning cycle

- the development of spatial policies and plans
- the implementation of these policies and plans
- monitoring and evaluation



## C2 – The Nexus of Spatial Planning and Geospatial Information

Authors: Marije Louwsma and Cemre Şahinkaya Özer

### Spatial policies and plans

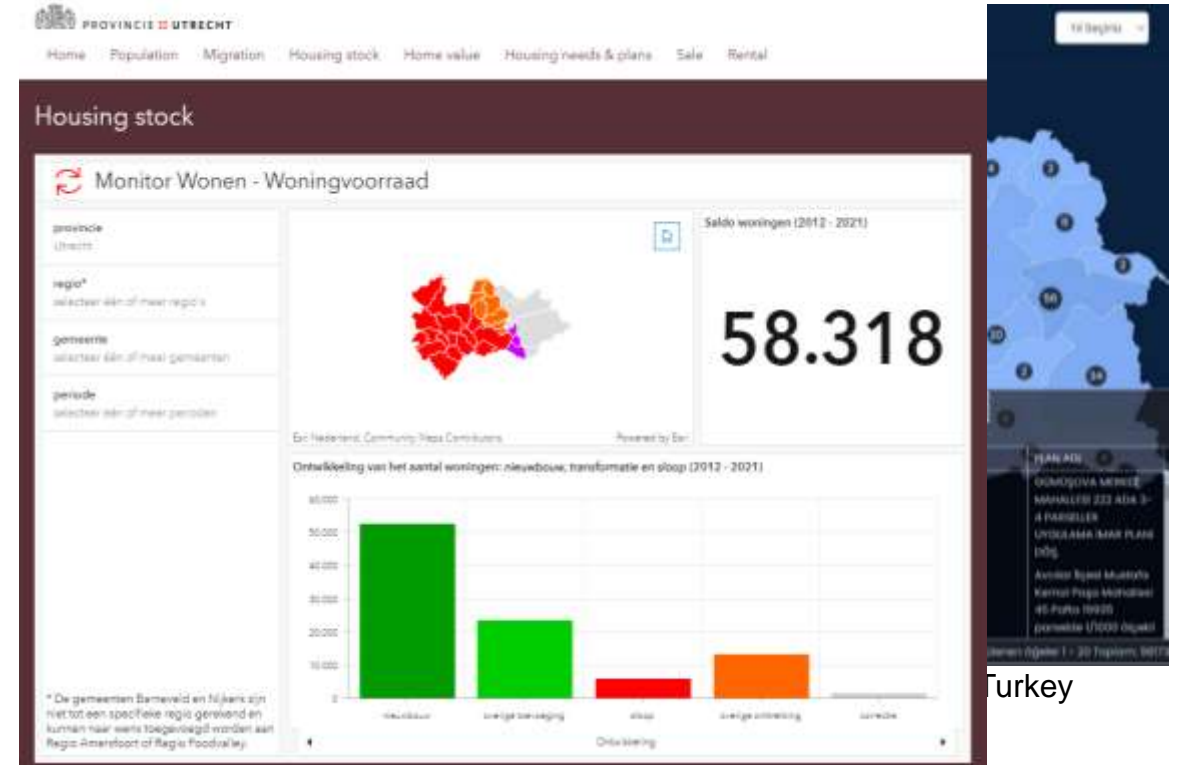
- geospatial information
- suitability and feasibility studies
- multi-criteria analyses
- environmental impact assessments & water impact assessments
- social cost-benefit analyses

### Implementation

- examples from the Netherlands and Turkey

### Monitoring

- to enforce the rules and regulations
- to assess the impact of spatial plans and planning interventions.



Monitoring housing stock per municipality or region and per housing type – example from province of Utrecht, the Netherlands

## C2 – The Nexus of Spatial Planning and Geospatial Information

*Authors: Marije Louwsma and Cemre Şahinkaya Özer*

### Conclusions and outlook

- **More examples** can be given on how geospatial data can play a role in spatial planning **as new software enables new applications...**
- Since **geodata** becoming more **commonly used outside the geospatial field**, this will all contribute to **further integration** of geospatial data and its applications in spatial planning processes i.e. use of **drones, 3D models** and **digital twins** to **visualize spatial plans** and their impact, **mobiles devices** in participatory planning, or online public **participation** ('smartification').
- **Time will tell** which innovations will be adopted by both the public and professionals in the field of spatial planning...

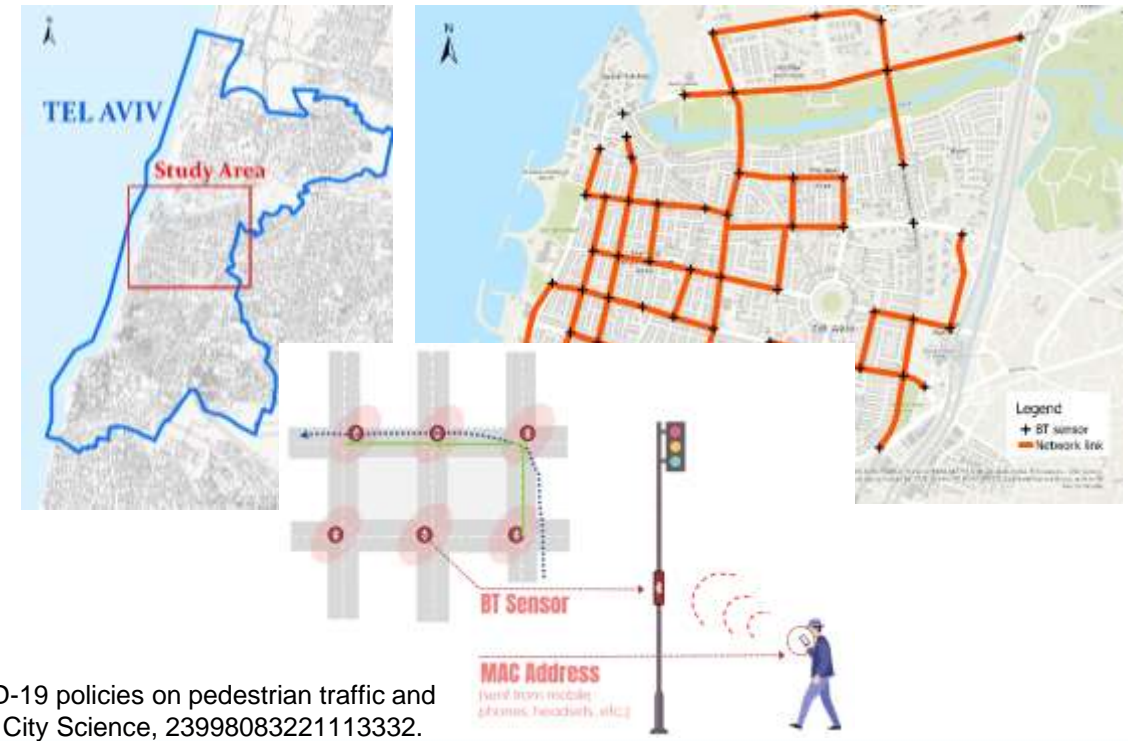


## C3 – The spatial dimension of health

### Ubiquitous big geodata for measuring the change of pedestrian mobility patterns during COVID-19

Authors: Avital Angel, Achituv Cohen, Pnina Plaut, Sagi Dalyot

- Most pedestrian mobility analysis still rely on physical observations and surveys.
- This study aims to analyze the changes in pedestrian mobility stimulated by COVID-19 policies.
- The analysis relies on Bluetooth sensor network, aiming to study *how many*, *when* and *where* people walk.
- The study includes close to 120 million pedestrian records from 2020, compared to 2019 that resembles typical, pre-pandemic conditions.

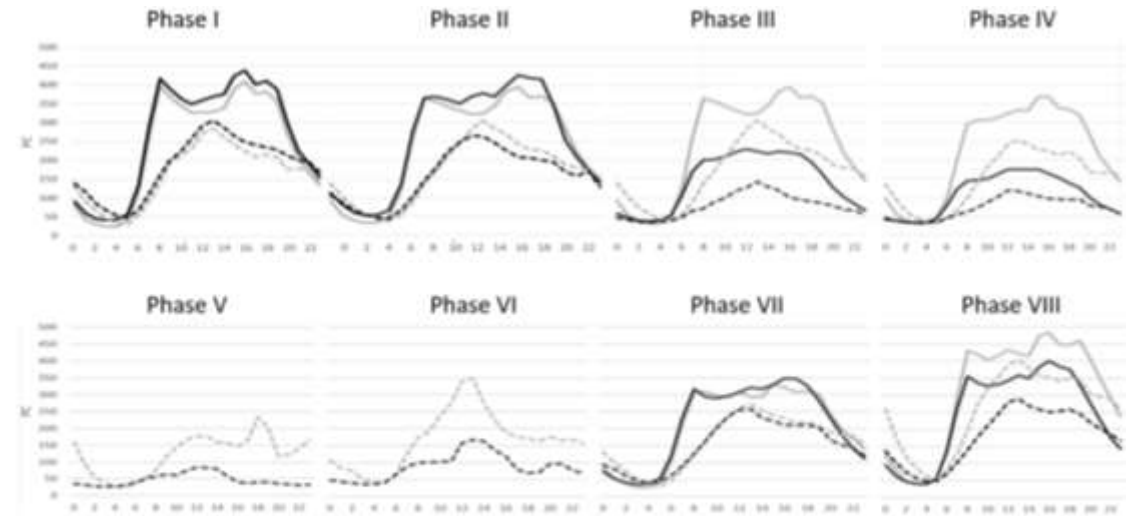


Angel, A., Cohen, A., Dalyot, S., & Plaut, P. (2022). Impact of COVID-19 policies on pedestrian traffic and walking patterns. Environment and Planning B: Urban Analytics and City Science, 23998083221113332.

## Ubiquitous big geodata for measuring the change of pedestrian mobility patterns during COVID-19

### Key findings

- Pedestrian traffic volumes were significantly affected by the various pandemic related policies - over 40% during the weekdays and up to 55% during the weekends.
- Temporal changes are evident in walking patterns, where weekdays resembled weekends.
- Regardless of restrictions, certain streets and areas continued to draw high pedestrian traffic. Plazas and boulevards were found to provide social need.
- This study demonstrates the potential of ubiquitous sensing technologies to provide stakeholders an efficient tool for monitoring and evaluating pedestrian mobility.



Phase	I	II	III	IV	V*	VI*	VII	VIII
LC (%), on weekdays	109%	107%	59%	48%	37%	52%	101%	79%
LC (%), on weekends	112%	92%	45%	48%			93%	69%

\* Phases V and VI do not include separation between weekdays and weekends as it is holidays.

LEGEND:

- 2019 weekdays
- - - 2019 weekends/holiday
- 2020 weekdays
- - - 2020 weekends/holiday

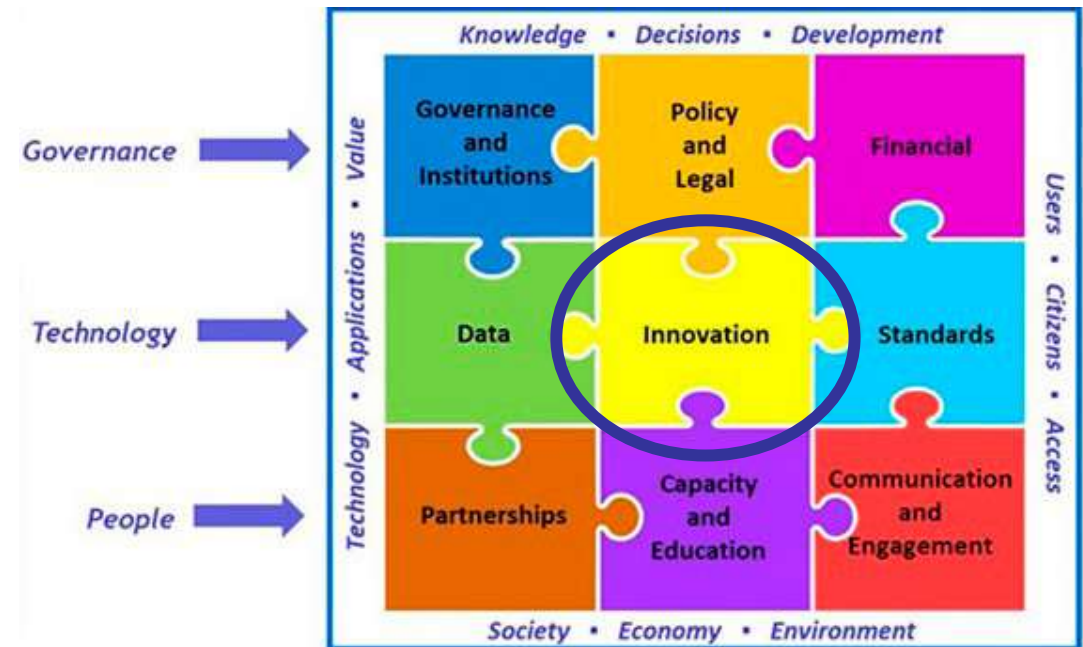
## C3 – The spatial dimension of health

Towards an integrated geospatial information management for public sector health data in the EU – The Covid-19 pandemic seen through the lens of IGIF

*Authors: Hartmut Müller and Marije Louwsma*

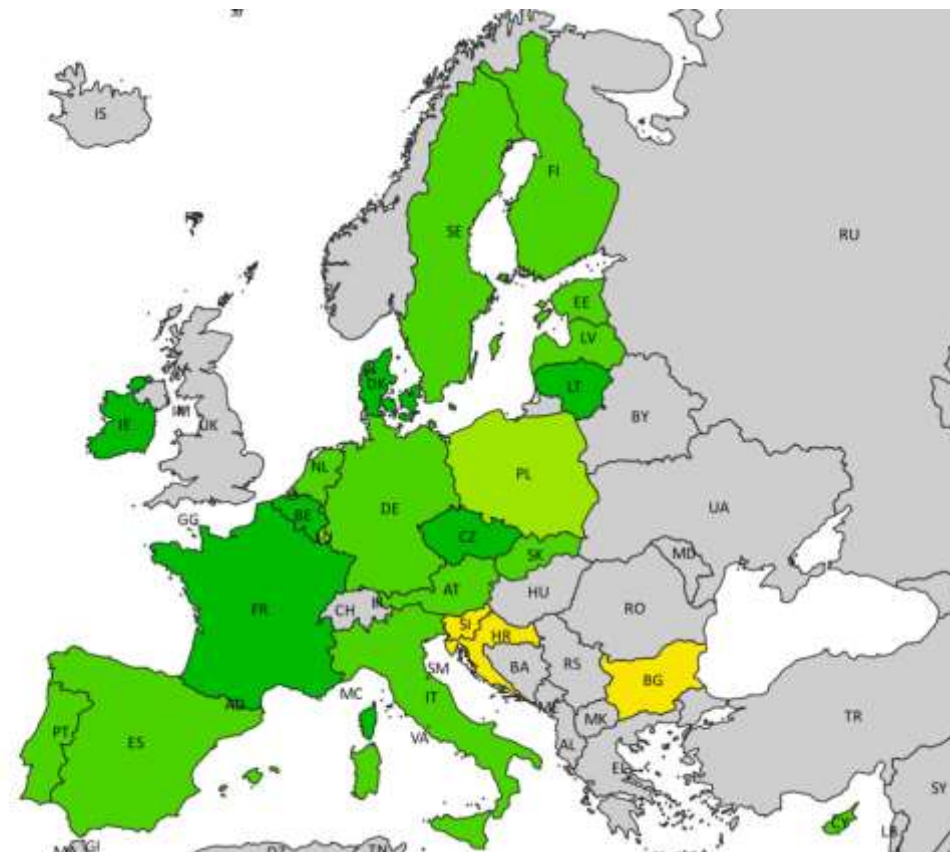
Case study:

- How were the challenges posed by the COVID-19 pandemic managed by Member States in the European Union (EU) regarding the use of geospatial data and tools?
- Pathway 5 – innovation – used as lens for analysis
- Technology maturity index ranging from analogue mapping to integrated geospatial information management



## Key take-aways

- INSPIRE framework in place
- Nomenclature of Territorial Units for Statistics in place
- Criteria related to maturity index
- Health domain new to geospatial data
- Most dashboards would rank maturity level 3 or 4, including maps, graphs, statistics, and metadata, but no dynamic information displays
- Reliability and timeliness of reporting proved difficult in beginning
- Need for unambiguous definitions



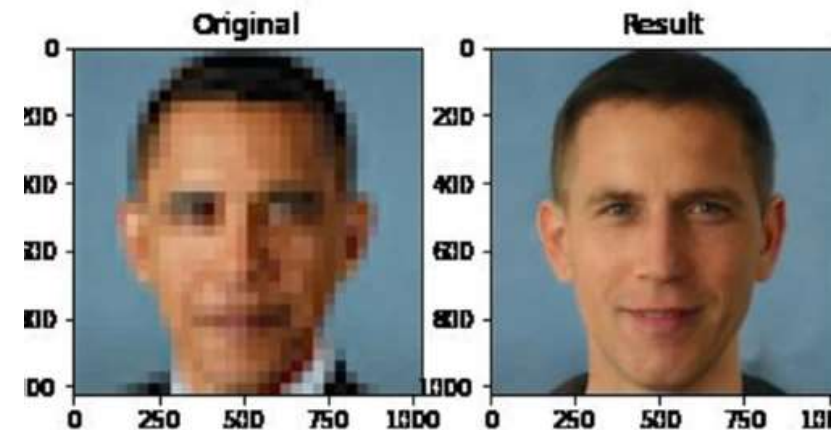
## C4 – Geospatial Data and the Changing Society

How and why diversity and inclusion are vital for the future of geospatial data management and the surveying profession

*Author: Roshni Sharma, Australia*

## Highlights

- Numerous academic studies have shown that in 2013, a staggering 95-98% of all contributions to OSM data were produced by men who are predominantly young and technologically enabled.
  - “as men feature overwhelmingly as the main participants in these practices, they subsequently serve as the gatekeepers to local knowledge...these subjective versions of the world are endlessly reproduced”(Gardner et al 2020)
- “As it is inherently imbued with the intent and context of the subjects that produce it, knowledge cannot be separated from its creators” (Haraway 1991). Therefore, “...bias inherently comes from the researcher themselves which is why we need more diversity. If an all-white set of male researchers work on project, it's likely that they will not think about the bias of their dataset or methodology.” (Alexia Jolicoeur-Martineau in Truong 2020)



## Key takeaways: Systems of power in society translate into the data we create

*“That which we ignore reveals more than what we give our attention to. It’s in these things that we find cultural and colloquial hints of what is deemed important. Spots that we’ve left blank reveal our hidden social biases and indifferences.”*

- Mimi Onuoha (2016), Custodian of the Library of Missing Datasets

When people from privileged, dominant groups create most of our data products, the result is not only that we end up with datasets that are biased or unrepresentative that get used as ‘truth’ and reproduced time and time again. An even more catastrophic and dangerous outcome is that some data does not get collected at all (D’Ignazio & Klein 2020).

Missing less in how we map: Some simple tools at the centre of our ability to be empowered in these aspects are:

- Curiosity – query what’s missing
- Non-judgement – unconscious bias is natural, and oppression only breeds more oppression
- Awareness - think about whether what you’re creating is missing other worldviews
- Reflection – what do you take for granted that someone else might not?
- Challenging – the power is yours to push back and include things that we’d otherwise miss

## C5 – Participation and Spatial Empowerment

eVolunteering and Engaging Young Surveyors in the 2020s

*Authors: Claire Buxton (Canada), Cemal Özgür Kivilcim (Turkey), Roshni Sharma (Australia), Tom Kitto (Canada), Cemre Şahinkaya Özer (Turkey)*





## Where we came from

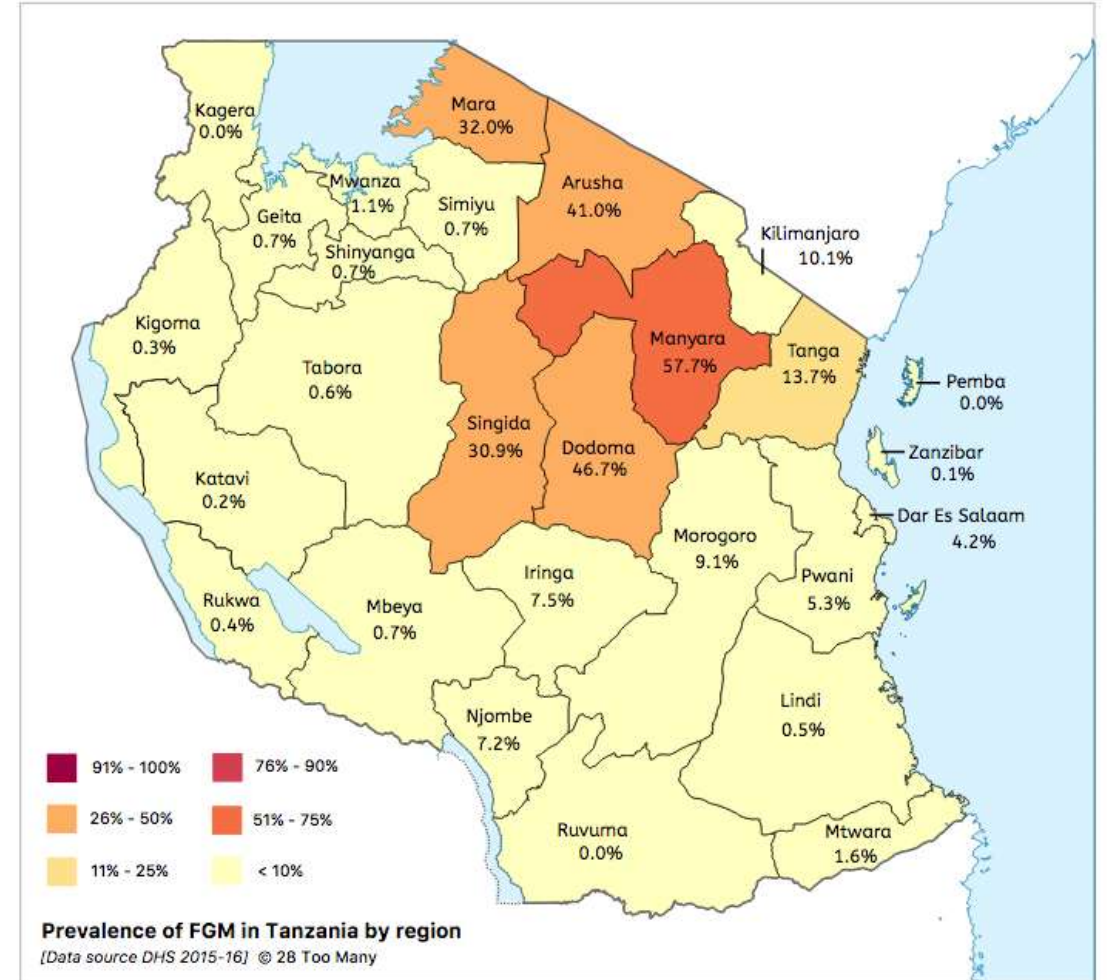
- Volunteer Geographic Information

## Whats the challenge

- Major drivers of humanitarian disaster

## What can we do?

- Solutions and Case studies
- Firewater and Tanzania



## Trending countries, cities and topics of the OpenStreetMap #world

Overall 415 contributors made 87,775 map edits in 74 countries in the last 60 min  
(Percentage of organised editors: 34%)



# Desire

# Need

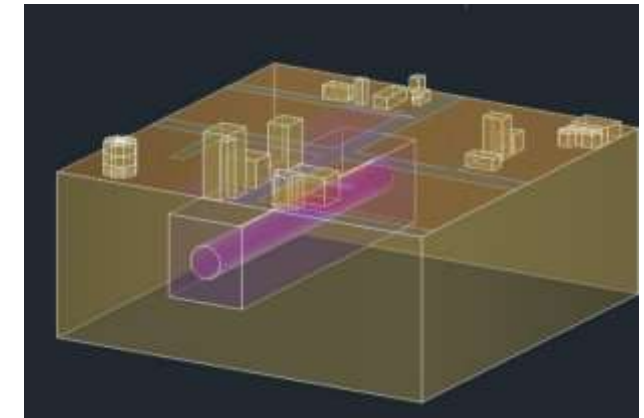
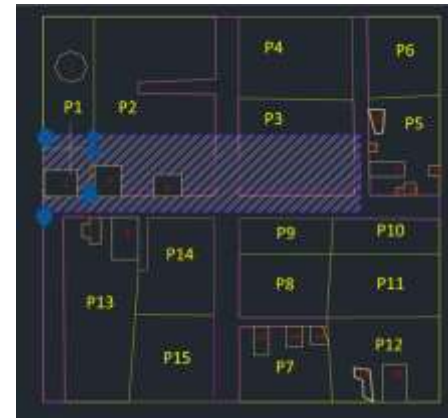
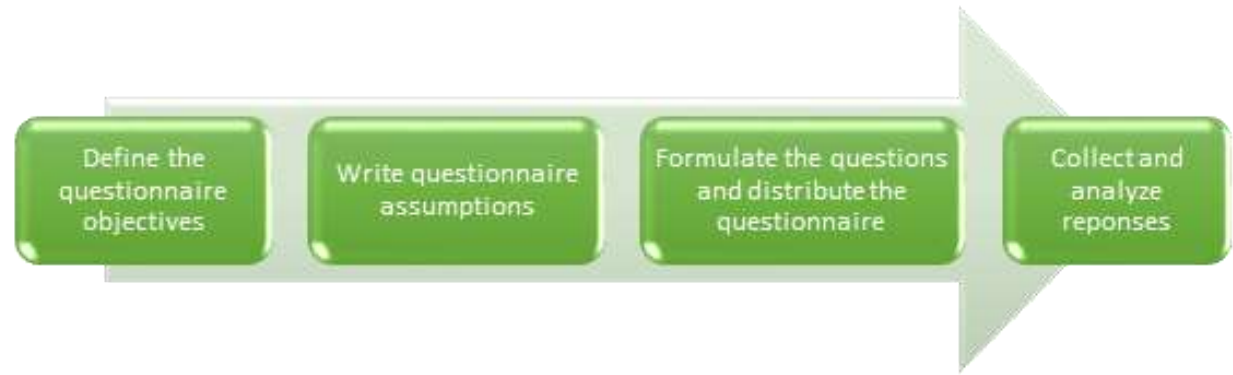
# Connect

## C5 - Participation and Spatial Empowerment

### Attributes and Ethical Preferences of Land Surveyors towards Data Contribution to Land Management Systems

Authors: Ruba Jaljolie and Sagi Dalyot (Israel)

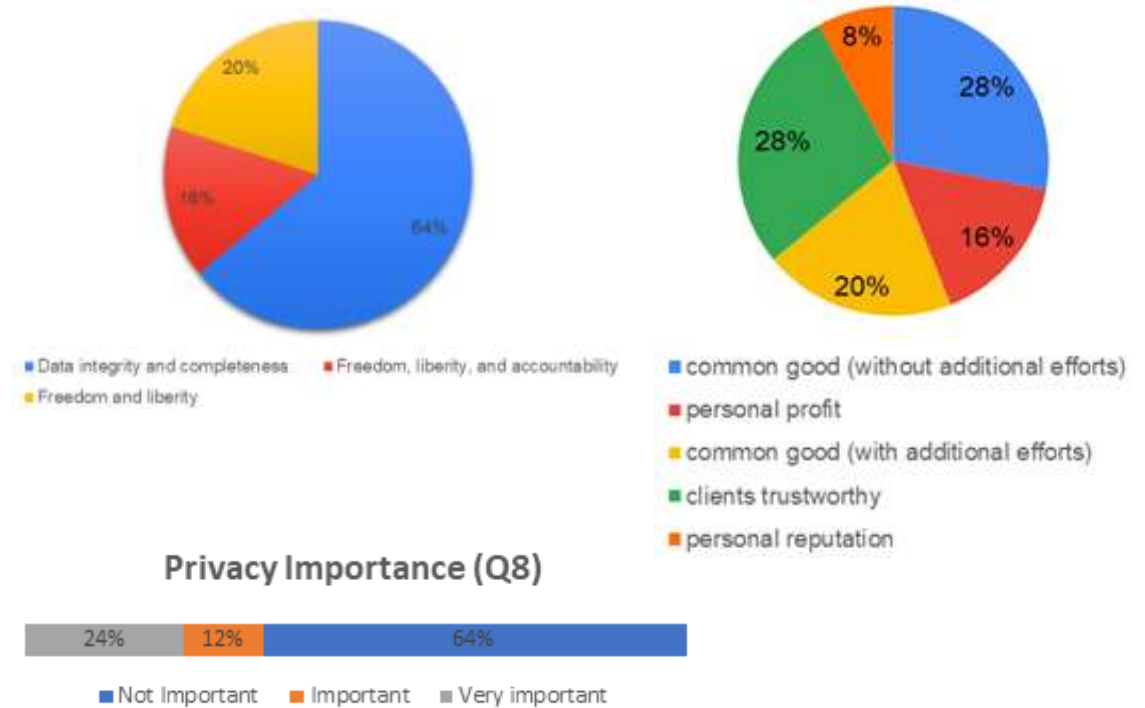
- Data in land management systems (LMS) are mostly measurements made by land surveyors who work for authoritative mapping agencies.
- Moving towards contemporary LMS, crowdsourcing and VGI are suggested as valid data sources.
- This introduces ethical dilemmas that include privacy issues and data integrity questions.
- This research aims to assess the ethical preferences of land surveyors in contributing data to LMS, and to identify the attributes of individuals who are willing to do so.



## Attributes and Ethical Preferences of Land Surveyors towards Data Contribution to Land Management Systems

### Key findings

- The land surveyors' community can be trusted, maintaining professionalism and code-of-conduct.
- Motivating land surveyors to contribute data is necessary and is expected to enhance their performance.
- Land surveyors would contribute data while protecting ethical values, namely reliability and accountability.
- Land surveyors see themselves as professionals that are held accountable for their contribution.
- The findings can serve as guidelines for adopting a code-of-conduct that will ensure the ethical preferences of land surveyors, and the overall merit of LMS.



## C6: The Role of Land Administration Data in the Real Estate Sector

*Authors: Chryssy Potsiou (Greece), Marije Louwsma (Netherlands),  
Enrico Rispoli, Maria G. Scorza (Italy)*

*Prof Chryssy A Potsiou, NTUA Greece  
chryssy.potsiou@gmail.com*

## Highlights

- For many years land registries and cadasters (inventories of land that supported registration) provided information about the evidence of ownership of rights in land and supported property taxation and property markets
- **1980s**: the era of automation. Digital systems developed at different speeds & usually on different technical platforms. Administrative and technical reforms; multipurpose cadaster ; NSDIs.

The beginning of the **digital divide**

- **1990s**: the major economic & political change initiated the largest land reform in human history (denationalization, restitution of rights, title provision, registration). New challenges.

The **efficiency divide**

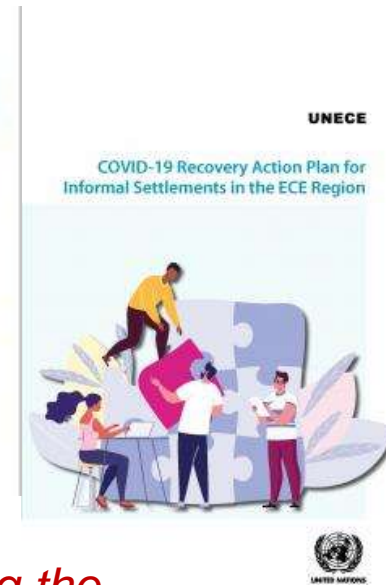
- **2000s**: UN Millennium Development Goals. FFPLA in providing secure land rights at scale.
- **2015**: UN Agenda 2030. LA & other geospatial information in support of all SDGs
- **2020s**: The world’s rapid “digital transformation” & the parallel evolution of BIM, 3d city models, cadaster 4.0, IoT, DT., smart cities, SDG 11...UNECE scenarios on future LA?

UNECE  
Scenario Study on Future Land  
Administration in the UNECE Region



## Key takeaways: The “effectiveness divide” between the developed and the less developed LAMs in the European region and the impact on property markets

- Over 13 % of the UNECE adult population feel insecure about their land and housing property — more than 130 million people
- To improve effectiveness of LAMs and thus support national economies and SDGs, countries that face the phenomenon of Informal Settlements were encouraged to initiate formalization projects & build back better
- How countries prepare for future disasters is vital. UNECE has published the Post Covid-19 Recovery Action Plan for Informal Settlements in the UNECE region
- *The 2022 War: will the “effectiveness divide” among LAM systems within the UNECE region increase?*



*FIG must continue strengthening the capacity of national and local governments to address the needs of the most vulnerable*

## C6 – The role of Land Administration in the Real Estate Sector

*Authors: Chryssy Potsiou, Marije Louwsma, Enrico Rispoli, Maria Scorza*

### Case study Netherlands

- The role of geospatial information in property markets – use cases in the Netherlands
- Cadastres can have multiple roles in developed land and property markets; e.g. monitoring land and real estate markets



#### Prijscategorie

- 200.000 euro of minder
- 200.000 tot 250.000 euro
- 250.000 tot 300.000 euro
- 300.000 tot 350.000 euro
- 350.000 euro of meer

**Figure 5:** Average sales prices of owner-occupied houses per municipality in the Netherlands.  
(Source: CBS, Kadaster, <https://www.cbs.nl/nl-nl/visualisaties/huizenmarkt-in-beeld>)



## Key findings

- Moving beyond traditional role of cadasters
- A digital LAM system in SDI setting allows for:
  - Monitoring real estate market in dashboards
  - In-depth spatial and statistical analysis of real estate market (housing and land)
  - Support strategic choices in policies

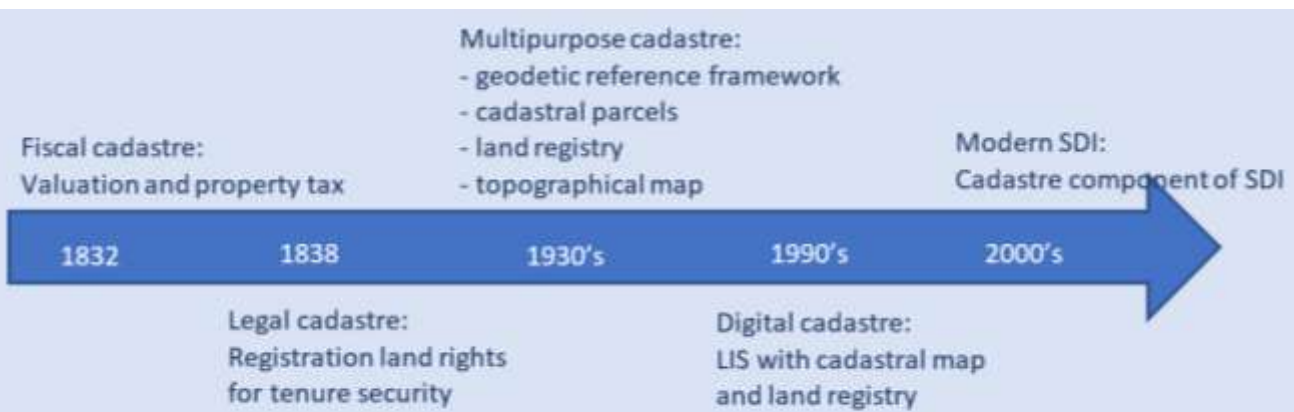


Figure 5.5 Overview of historical development of Dutch cadastre

### number of residences



Figure 6: Dashboard of the Dutch cadastre, land registry and mapping agency with access to various bits of information about the real estate and land market, such as the number of transactions per housing type.

(Source: <https://www.kadaster.nl/zakelijk/vastgoedinformatie/vastgoedcijfers/vastgoeddashboard/aantal-woningen>)

## C6 – The role of Land Administration in the Real Estate Sector

Authors: Chryssy Potsiou, Marije Louwsma, Enrico Rispoli, Maria G. Scorza

### Case study Italy



### Cadastral Information System

In Italy, a considerable amount of information concerning the territory is connected to the computerized systems of the advanced digital cadastres.

In fact, through the Cadastre it will be possible to consult the distinct territorial information existing in the various sectoral platforms and concerning the whole country.

It ensures that, with a few clicks, it is possible for anyone in Italy to access various databases



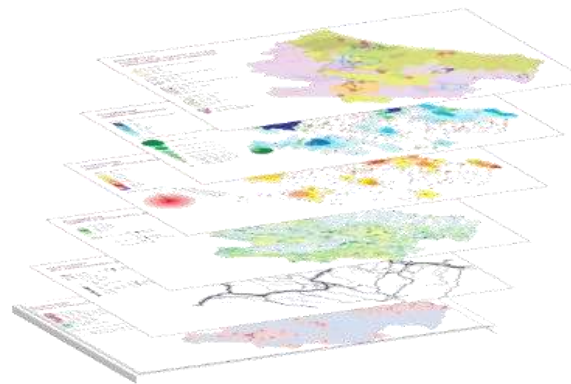
## The Real Estate Price Exchange

The strategic-operational tools, including the real estate database, support professionals and in particular real estate valuers in their professional research, facilitating the retrieval of data and market information necessary for the preparation of a valuation report. With the Real Estate Price Exchange it is possible to quickly identify geo-referenced sales prices and other information connected to it, such as: year of sale, month of sale, transferred share, consistency, cadastral category and Real Estate Market Observatory area.



## The “ghost houses”

At the moment over 90% of the buildings have been formalized. The “ghost houses” operation revealed over 1.2 million real estate units not known to the Land Registry, 2/3 of those units were declared by the owners within the deadline.

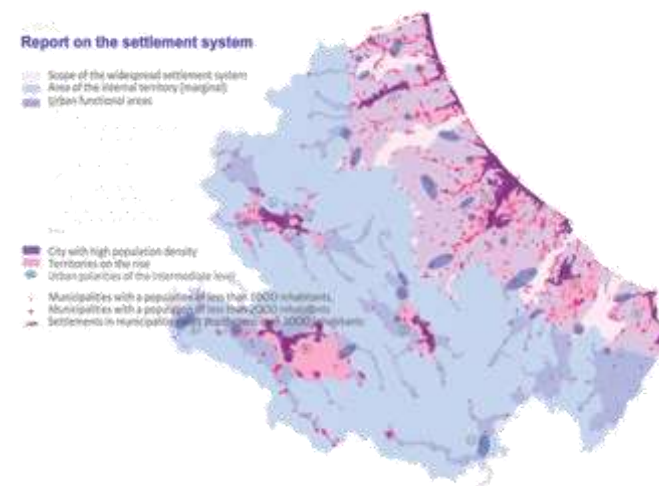


## Conclusions

The propensity of the real estate market traced on the territory outlines the places where interest is concentrated but should be used in the best possible way, as a reference point to trigger the appropriate development or rebalancing mechanisms in favor of economically marginal areas.

## Territorial development

The management of GIS is also a tool for the design and implementation of policies to balance territorial development, taking into account the interests of consumers as a necessary component of the economic well-being of the territory and a primary factor in the profitability of investments.



## C7 – Discussion and Conclusions

Geospatial Information in the 2020s – paving the way to sustainability?

*Authors: Markus Schaffert and Hartmut Müller*

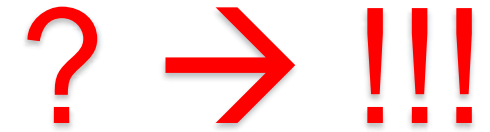
Turning the question mark ?

into exclamation marks !!!

**10 Key Takeaways**

## *Geospatial information in the 2020s – paving the way to sustainability*

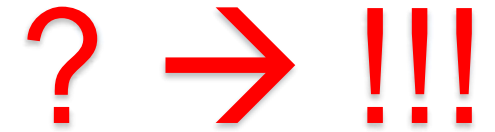
### 10 key takeaways, no 1 to 5



1. Identify and close data gaps
2. Strengthen public-private-partnerships for data capture
3. Make authoritative datasets easily available and accessible
4. Generate innovative data products by data fusion
5. Integrate geospatial information into user-specific business processes

## *Geospatial information in the 2020s – paving the way to sustainability*

### 10 key takeaways, no 6 to 10



6. Integrate geospatial information into pathways to sustainability
7. Address multi-dimensional quality aspects
8. Find the balance between data protection and knowledge generation
9. Find the balance between data empowerment and establishment
10. Improve geospatial data literacy

## Panel discussion



## Group photo

