UN-GGIM
ACADEMIC NETWORK

# Smart Citizens


## Maria Antonia Brovelli
### Politecnico di Milano, Italy


POLITECNICO MILANO 1863

## UN-GGIM Academic Network Forum
## Secure Land Rights and Smart Cities: Making It Work for Sustainable Development
## New York, 31 July 2017

# Definitions and Classification

✔ **Citizen science**: set of practices in which citizens participate in data collection, analysis and dissemination of a scientific project (Cohn 2008)

✔ Classification (Haklay 2013)

- ➔ 'classic' citizen science: amateurs engaged in traditional scientific activities
- ➔ community science: measurements and analysis carried out by amateurs in order to set action plans to deal with environmental problems
- ➔ **citizen cyberscience**: use of computers, GPS receivers and mobile phones
  - ✗ volunteered computing: citizens download data, run analyses on their own computers and send back data to the server
  - ✗ volunteered thinking: citizens perform classification works
  - ✗ **participatory sensing**: applications centered on mobile phones capabilities

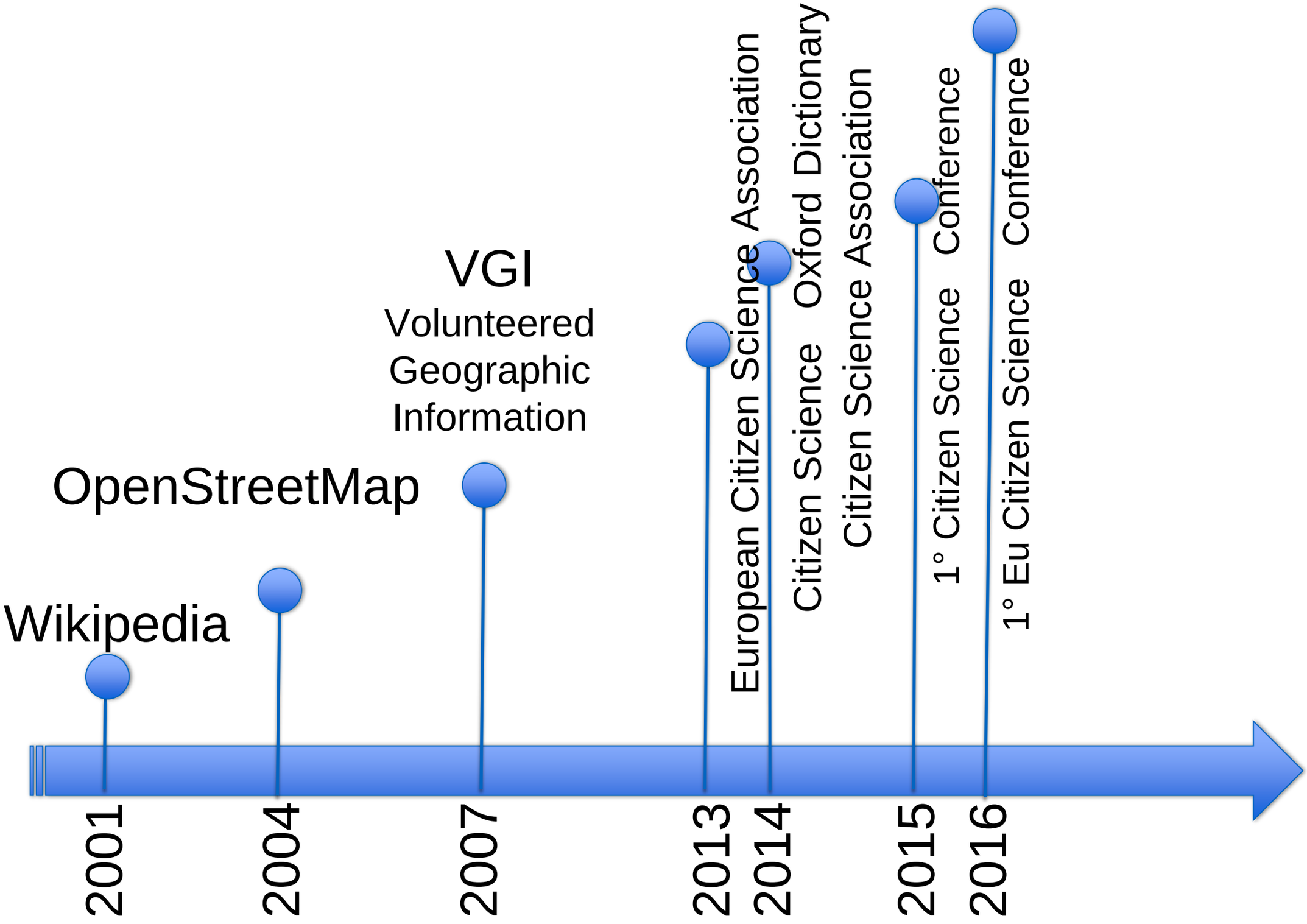
# Definitions and Classification

- ✔ **Crowdsourced geographic information** → any data contributed by the crowd with a geographical reference (they could potentially be mapped)
  - ➔ The geographic reference can be explicit or implicit (→gazetteer services, like GeoNames or Wikimapia).

- ✔ Data can be **actively** contributed (**Volunteer Geographic Information**) or **passively**.

- ✔ Data can be distinguished in:
  - ➔ **Framework** data (those previously collected by National Mapping Agencies: topographic databases, transportation networks, building footprints, etc.)
  - ➔ **No Framework** data (biodiversity, air quality, etc)

# Timeline


VGI
Volunteered
Geographic
Information
OpenStreetMap
Wikipedia
European Citizen Science Association
Oxford Dictionary
Citizen Science Association
1° Citizen Science Conference
1° Eu Citizen Science Conference
2001
2004
2007
2013
2014
2015
2016

# Ctizen Science Projects

✔Wikipedia (https://en.wikipedia.org/wiki/List_of_citizen_science_projects)

✔Scistarter (https://scistarter.com/ )

✔Citizen Science Alliance (https://www.citizenscience alliance.org/)

✔VGI Knowledge Portal (http://vgibox.eu/repository/index.php/Main_Page).

→ **Some projects also related to land information and smart cities**

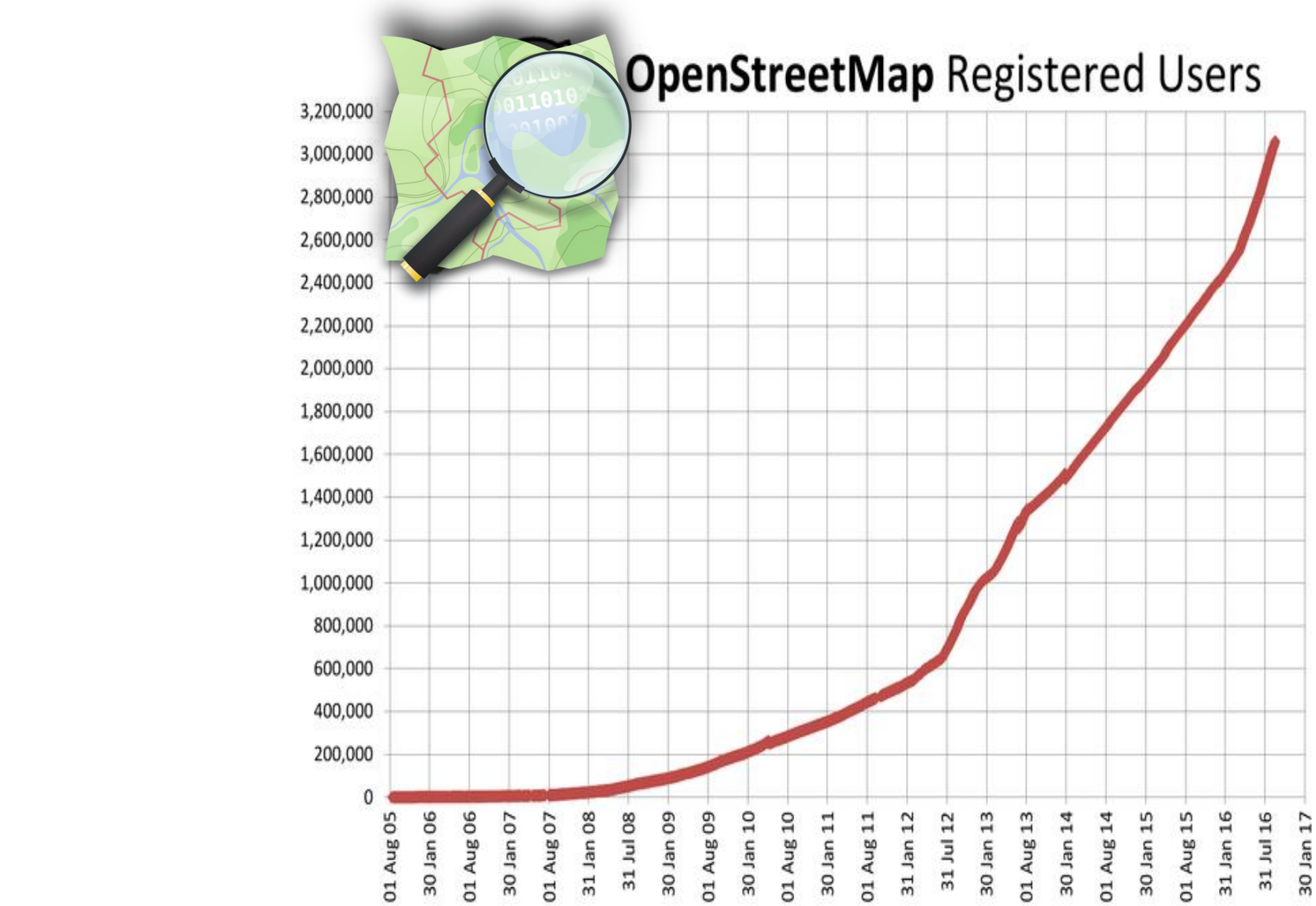
# Research Networks: Citizen Science to promote creativity, scientific literacy, and innovation throughout Europe (2016-2020)


**Chair of the Action:**
Dr Katrin VOHLAND (DE)

**Vice Chair of the Action:**
Dr Marisa PONTI (SE)

1. Ensure scientific quality of Citizen Science
2. Develop synergies with education
3. Improve society-science-policy interface
4. Enhance the role of CS for civil society
5. Improve data standardization and interoperability
6. Overarching - Cross-WG-Synthesis and overarching measures

# Timeline




2001 2004 2007 2013 2014 2015 2016

# Collaborative Mapping: OpenStreetMap

Anyone can use the OpenStreetMap data for their own purposes, even commercial ones. The only requirements are that you must credit OpenStreetMap and its contributors when you use the data and that you must release any improvements you make to the data under the same license (Open Data Commons Open Database License (ODbL)

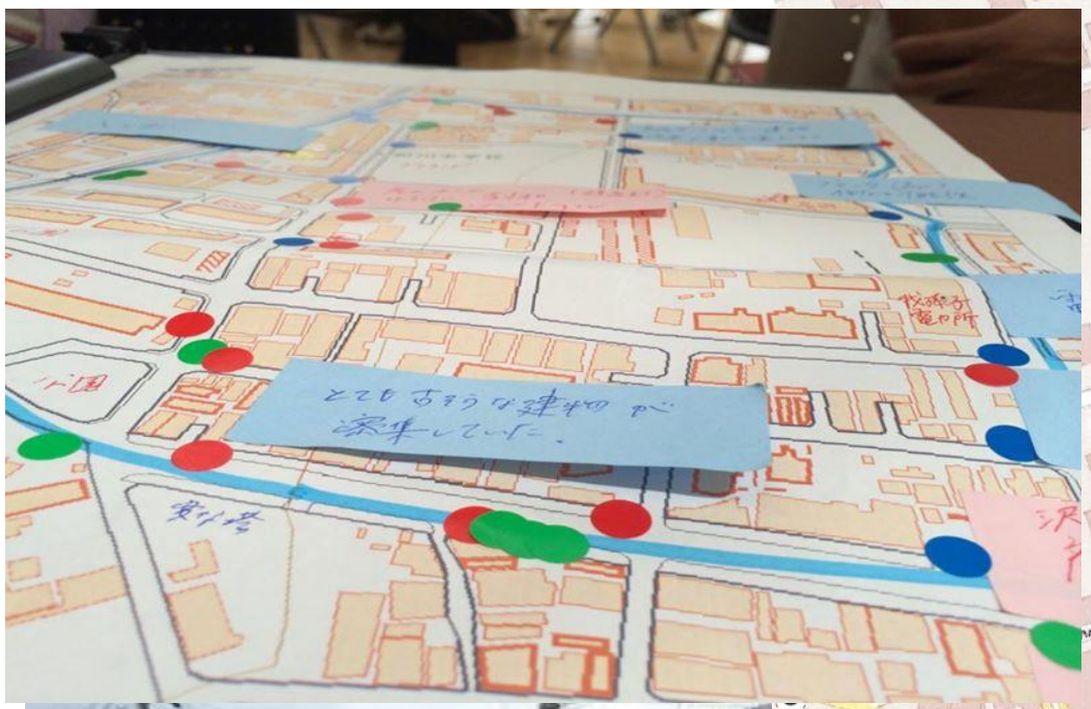
## Freedom:

- To share
- To create
- To adapt

## Requirements:

- To attribute
- To share-alike
- To keep open

# Mapping parties




# Mapathons and Humanitarian Mapathons

Humanitarian OpenStreetMap Team

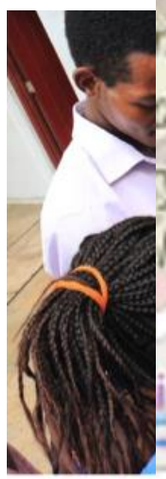
MISSING MAPS

- A **Mapathon** is a coordinated mapping event held generally **INDOOR**.

**Step 1**
Remote volunteers trace satellite imagery into OpenStreetMap

**Step 2**
Community volunteers add local detail such as neighborhoods, street names and evacuation centers

**Step 3**
Humanitarian organisations use mapped information to plan risk reduction and disaster activities that save lives.



Madaba Road
Kipanda Road
Jangwani Road
Kigogo Msimbazi River
Sangawe Road
Sangawe Road
Kyera Sreet

# YouthMappers

**The motto of YouthMappers: WE DON'T JUST BUILD MAPS. WE BUILD MAPPERS.**

Capitalizing on web-based open geospatial technologies, the mission is to cultivate a generation of young leaders to create resilient communities and to define their world by mapping it.



youthmappers

POLI MAPPERS

UN-GGIM ACADEMIC NETWORK

United Nations Initiative on
Global Geospatial Information Management

# MiniMapathons

More than 200 kids mapping buildings in the northernmost part of Swaziland in a project for malaria elimination (task #1577)

UN-GGIM ACADEMIC NETWORK

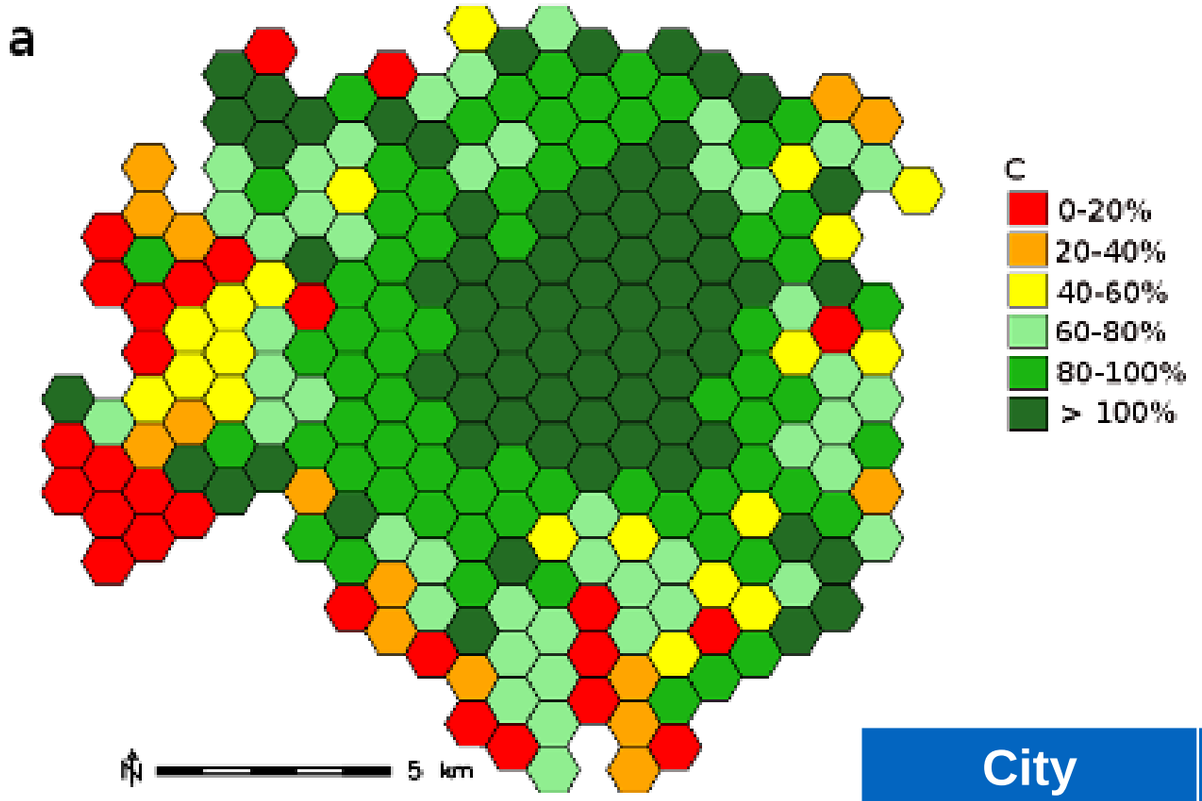
United Nations Initiative on
Global Geospatial Information Management

# Open questions

- ✔ Eliciting participation
- ✔ Ethical Issues
- ✔ Legal Issues:
  - ➔ Privacy
  - ➔ Property
  - ➔ Responsability
- ✔ Quality
- ✔ Standards

# Quality

**Completeness:** OSM vs Authoritative Topographic DB at scale 1:2000, Milan 2016 (building footprints)




**Positional Accuracy:** distance between homologous pairs of OSM and the Authoritative Maps before and after multiresolution transformation

| City | # homologous pairs | m(d) before (m) | RMS(d) before (m) | m(d) after (m) | RMS(d) before (m) |
|---|---|---|---|---|---|
| **Milan** | 141251 | 2,33 | 2,42 | 0,54 | 0,24 |
| **Berlin** | 247523 | 1,28 | 1,68 | 0,02 | 0,00 |
| **S. Francisco** | 766565 | 0,5 | 0,76 | 0,20 | 0,11 |

# Conclusions

- ✔Citizen science is relatively new but it is a high-pace evolving approach to science and research (see as most relevant example OSM)
- ✔It is still a research in progress in various fields, from the legal and ethical point of view to the more technical questions.
- ✔Being highly related to sensors (IoT), connectivity (the Cloud), volume, variety, velocity and veracity (Big Data) we are just at the very beginning and we expect a great evolution in next years.
- ✔Citizen science can be the new approach for documenting land and resource rights information and for making cities inclusive, safe, resilient and sustainable, i.e. smart!

# THANK YOU!


1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS

MIGRATE

# Play:
# MIGRation pATterns in Europe

http://geomobile.como.polimi.it/migrate/