How to Empower Stakeholders reducing and reusing water; Collaborative Modelling

Global Water Partnership

Deltares
Enabling Delta Life

With the support:
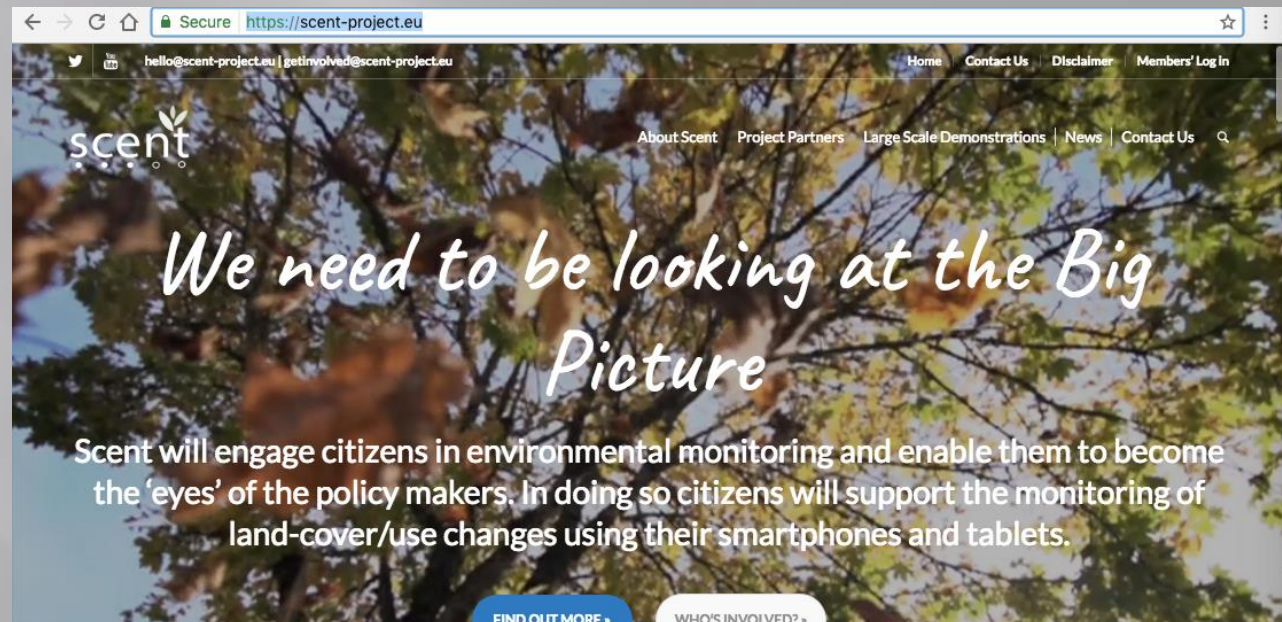
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Citizen observatories in support of flood modelling for management

I. POPESCU, A.JONOSKI

Content

- Background

- SCENT concept and architecture

- Application of SCENT to flooding problems

- Conclusions

Background

- Citizen science- what is it?

  - Citizen Science
  - Citizen Observatory
  - Trained volunteers
  - Participatory data collection methods
  - Crowdsourcing
  - Participatory sensing
  - Community-based monitoring
  - Volunteer Geographic Information
  - Eye witnesses
  - Non-authoritative sources
  - Human sensor network

- "Citizen science refers to the participation of the general public (i.e. non-scientists) in the generation of new knowledge" (Buytaert et al. 2014)

scent

Background

- Importance of monitoring for flood risk prevention

- Limited resources for new monitoring networks

- Technological advance reduces costs, however, the demand on data continuosly grow

- 'Citizens' (broad stakeholder groups, including individuals) are seen as beneficaries of environmental applications (flooding included) and as contributors of data

- In general citizens are still disengaged from flood risk management and decision making

Background

- ➤ From EC point of view, such engagement of citizens should:

  - ➤ Complement ongoing intitatives, such as ICT-led developments, INSPIRE and GEOSS, and the Copernicus programme that brings together remote sensing and in-situ envoronmental data

  - ➤ focus specifically on land cover / land use changes as most critical for many environmental processes

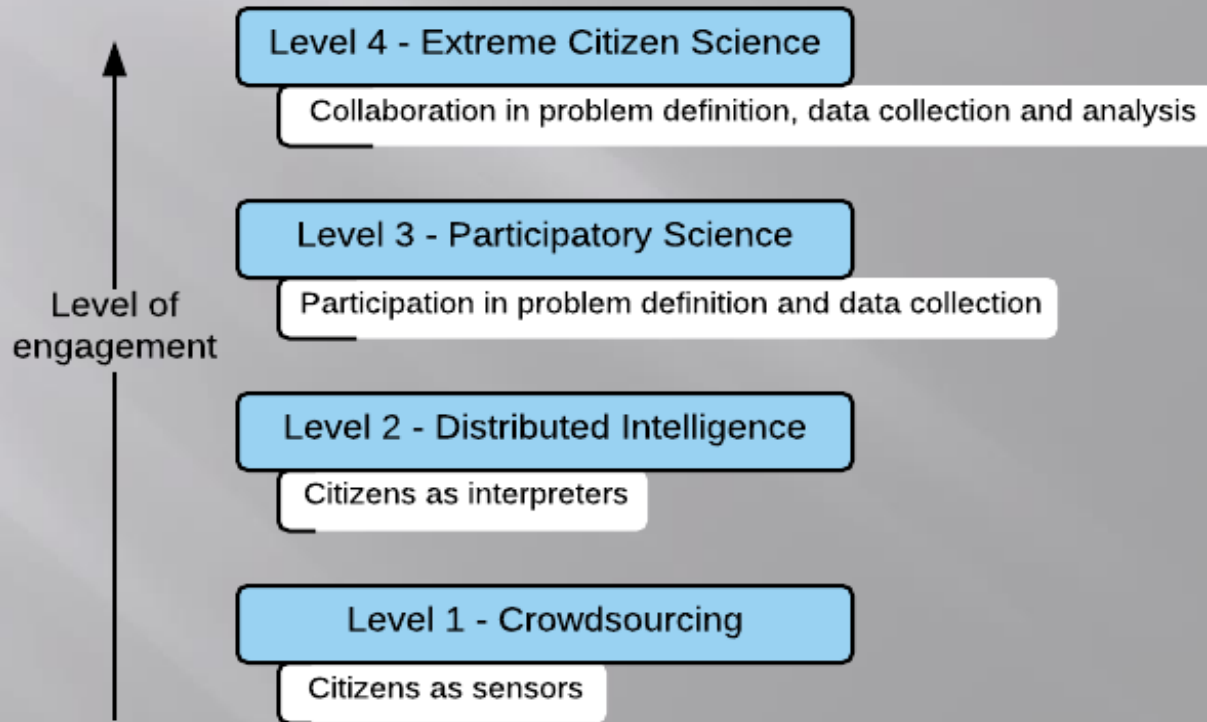- ➤ H2020 research funded projects for 2016-2019

Background

- SCENT (www.scent-project.eu)

  focuses on citizens engagement for their contribution with data on land cover / land use changes in the context of floods and flood management

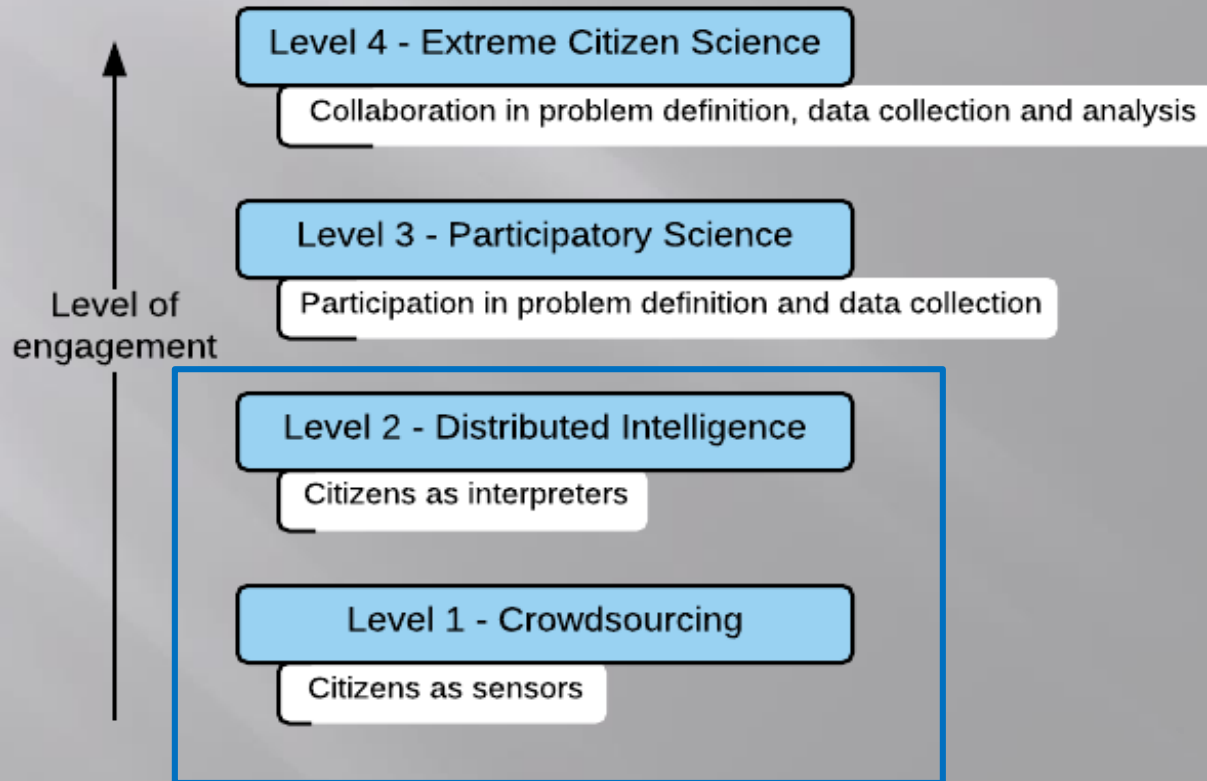- Research project carried out by 10 partners

Background

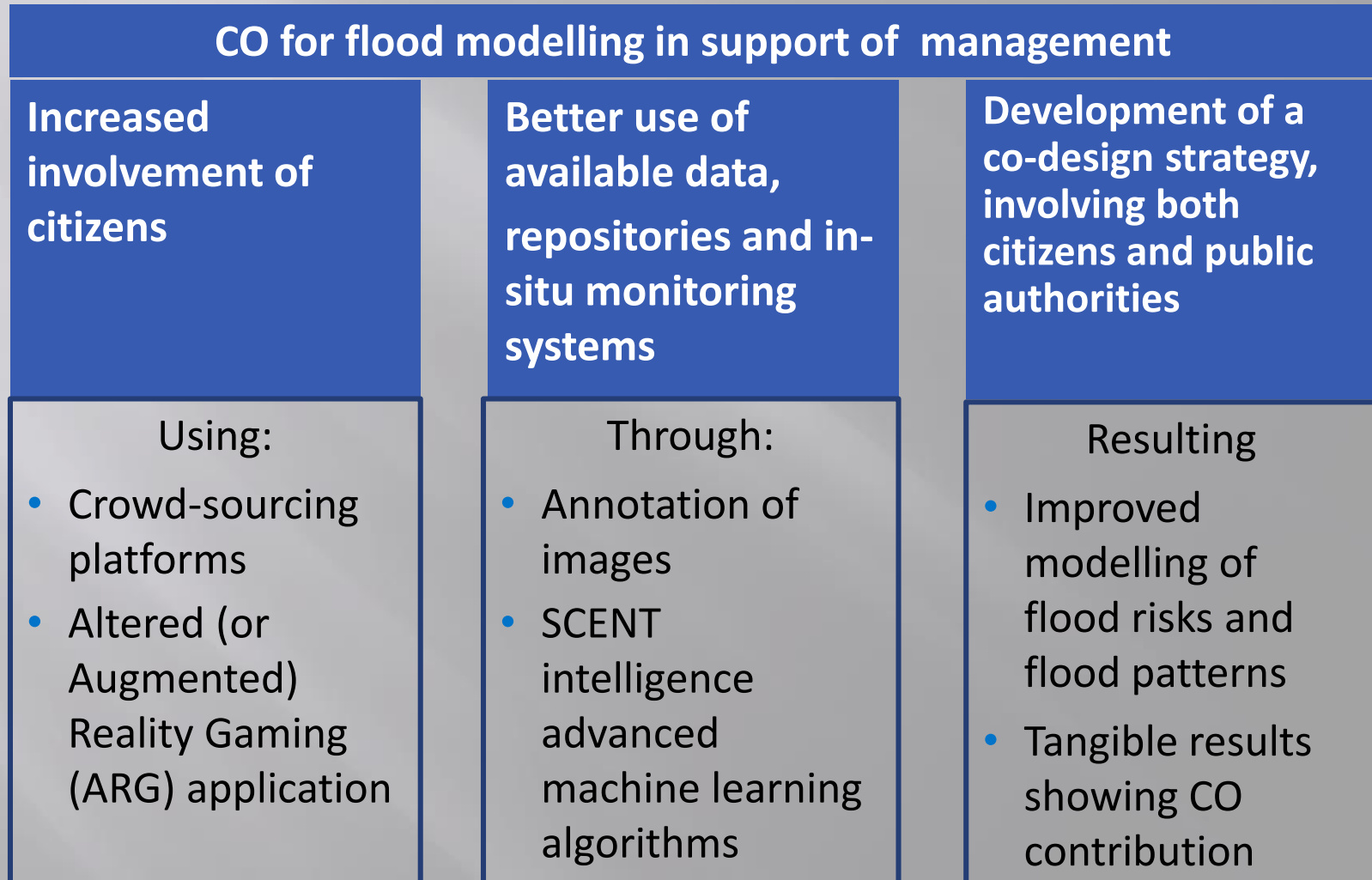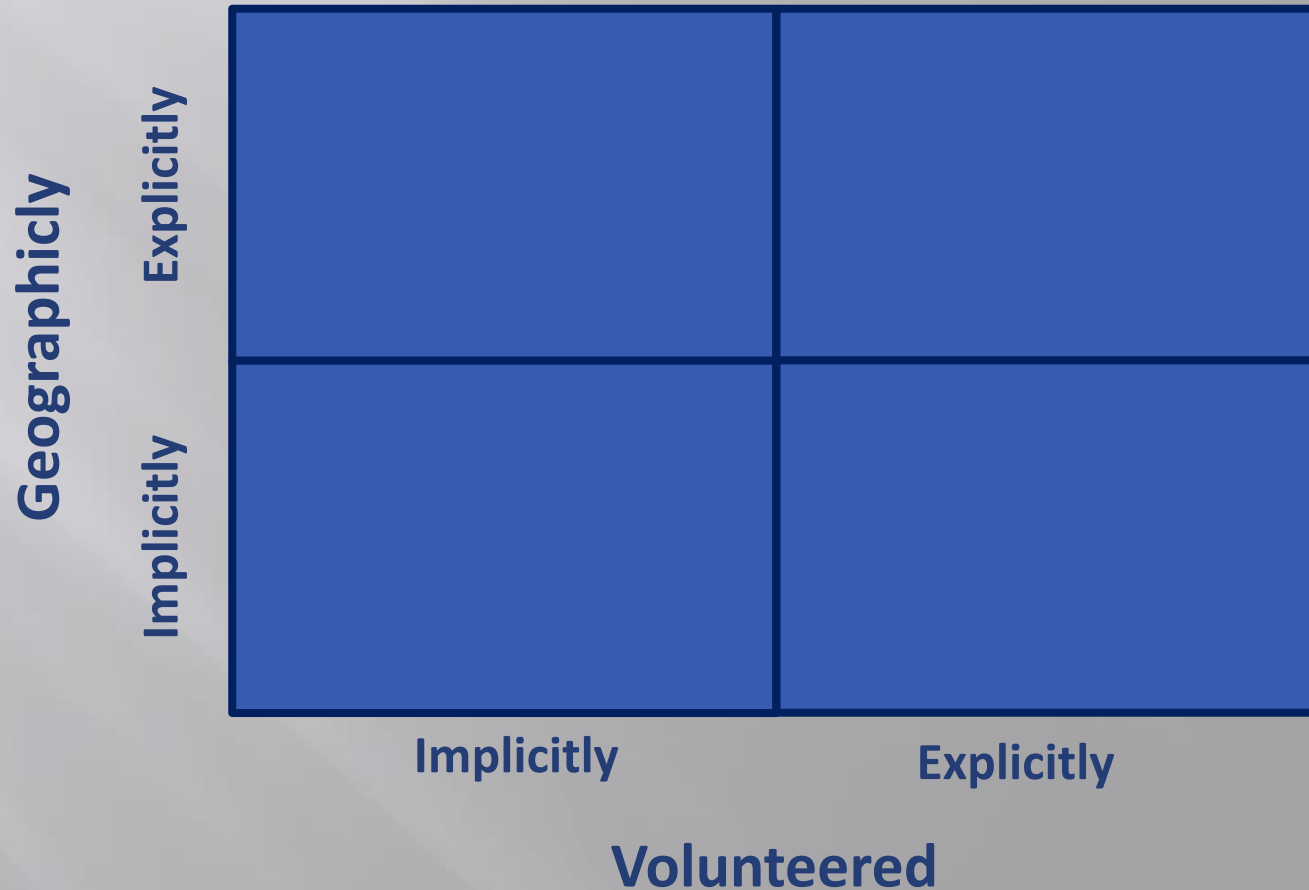➤ Level of engagement and participation

Background

- ➢ Level of engagement and participation

Level of engagement

Level 4 - Extreme Citizen Science
Collaboration in problem definition, data collection and analysis

Level 3 - Participatory Science
Participation in problem definition and data collection

Level 2 - Distributed Intelligence
Citizens as interpreters

Level 1 - Crowdsourcing
Citizens as sensors

SCENT- three pillars concept

CO for flood modelling in support of management		
Increased involvement of citizens	**Better use of available data, repositories and in-situ monitoring systems**	**Development of a co-design strategy, involving both citizens and public authorities**
Using: • Crowd-sourcing platforms • Altered (or Augmented) Reality Gaming (ARG) application	Through: • Annotation of images • SCENT intelligence advanced machine learning algorithms	Resulting • Improved modelling of flood risks and flood patterns • Tangible results showing CO contribution

CO contributions

Geographicly

Explicitly

Implicitly

Implicitly   **Explicitly**

Volunteered

CO contributions

Geographicly

Explicitly

Implicitly

	Implicitly	Explicitly
Explicitly		**Geowiki project**
Implicitly	**Studies using social media**	**WeSenseIT project**

Volunteered

CO contributions

SCENT arhitecture

*A: GPS enabled/smartphone embedded cameras   *B: Portable sensors for soil moisture monitoring
*C: Sensors mounted on multicopters
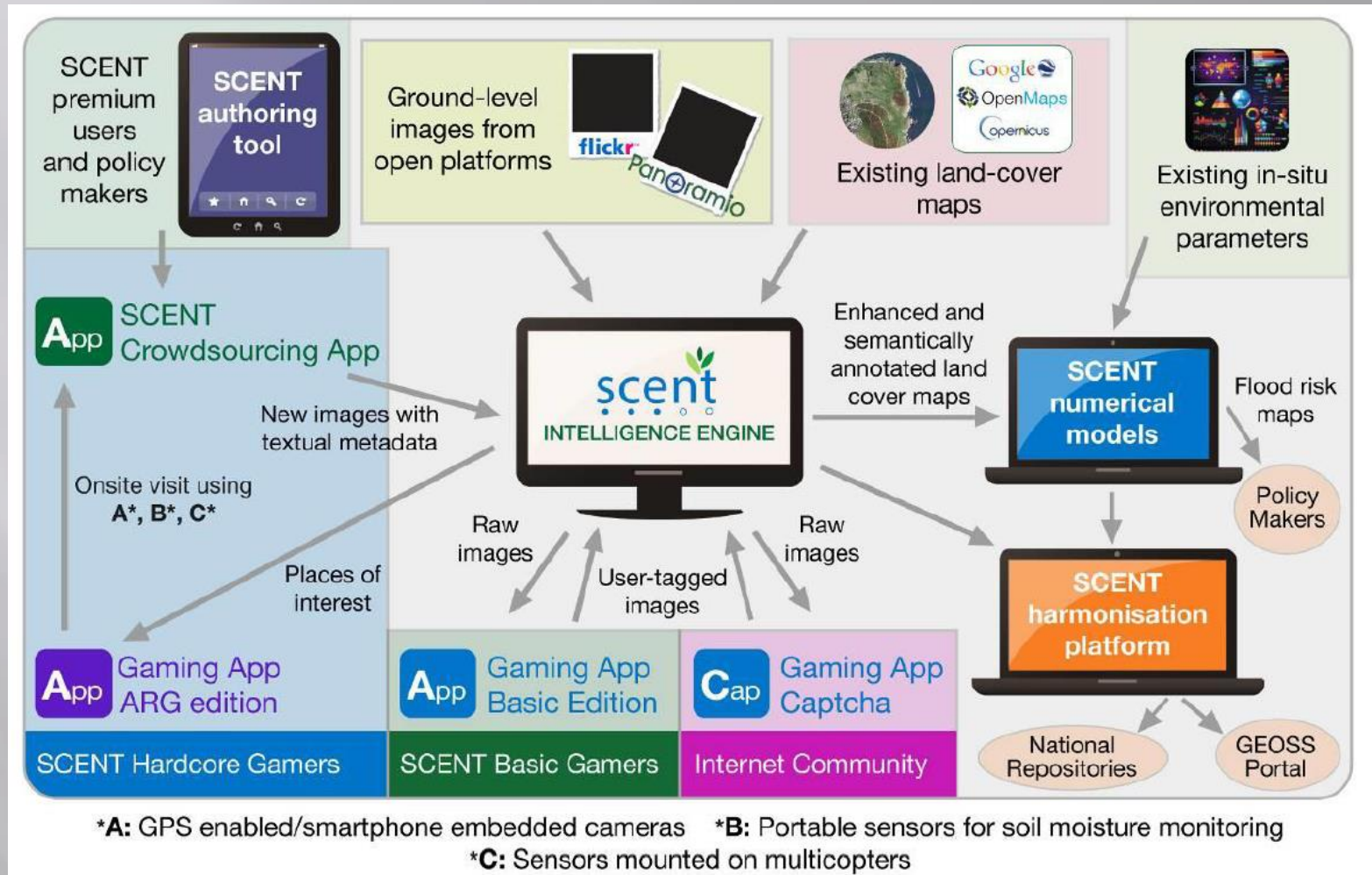
SCENT application to flooding

➢ Pilots

➢ Danube Delta (Romania)
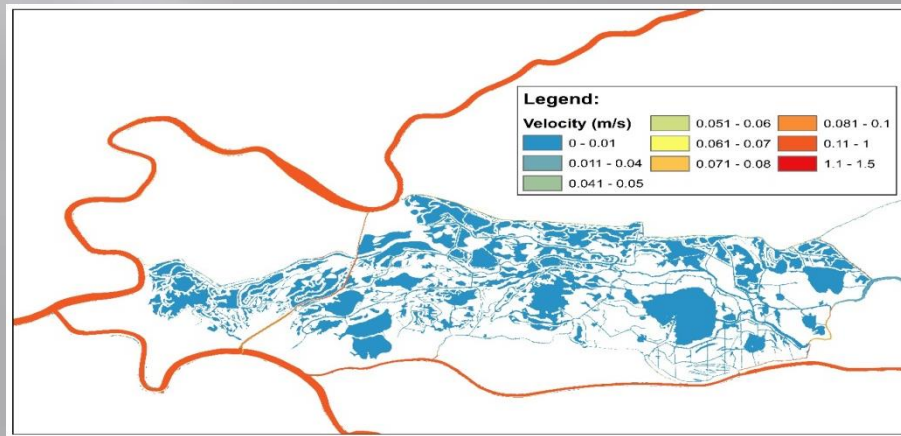
➢ Kifisos catachment (Athens, Greece)
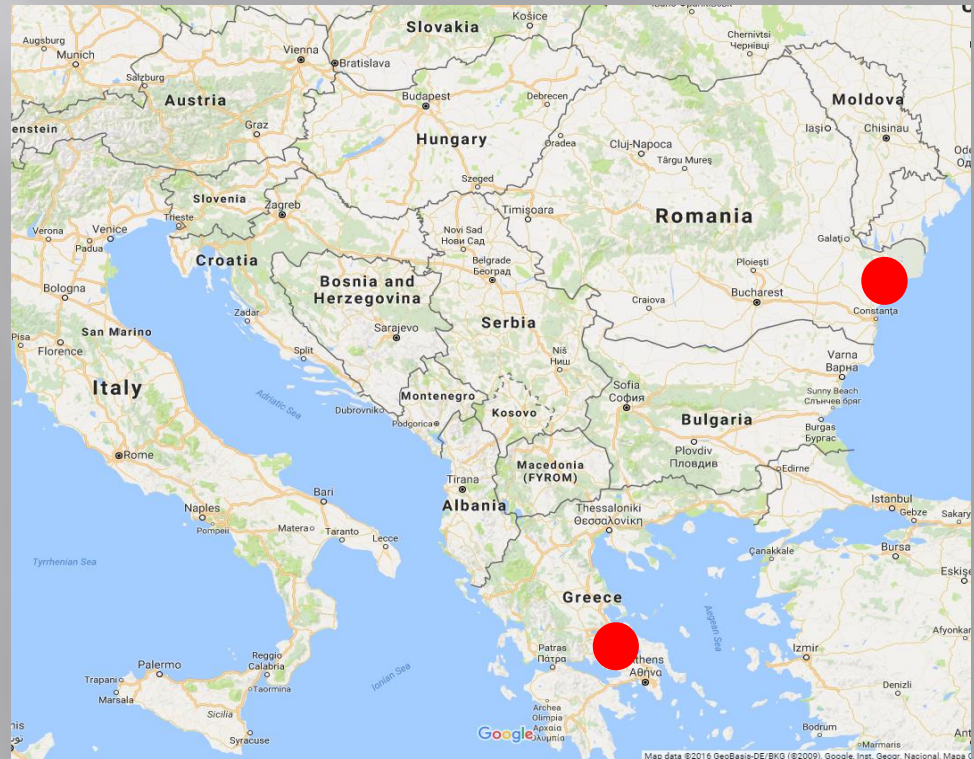
SCENT application to flooding

- Danube delta models
  - Focus on flooding patterns in support of the ecosystem
  - Model type: Hydrodynamic 1D-2D model (with given boundary conditions)
  - Model tool: HEC-RAS 5.0 1D-2D (USACE – free modelling system – not open source)
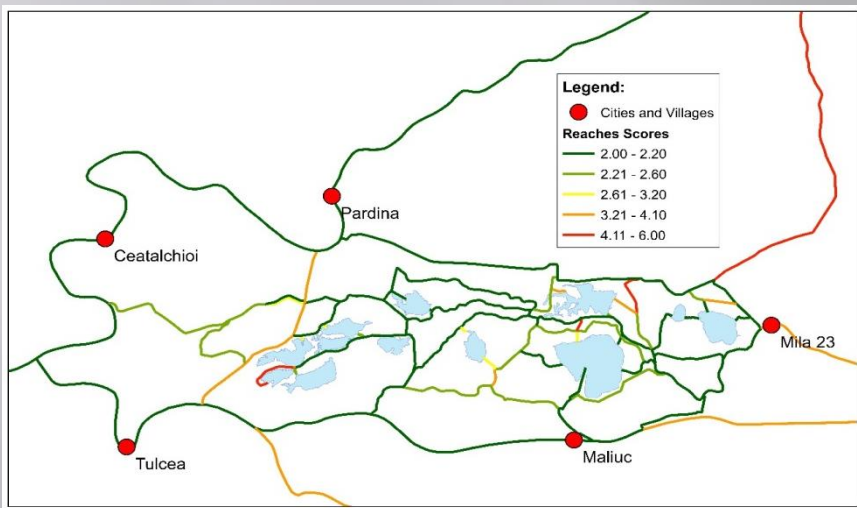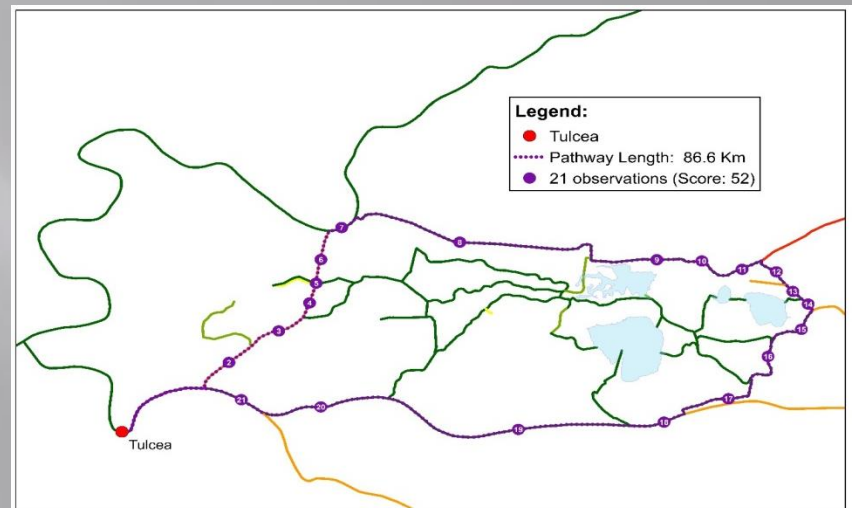
Danube delta ecosystem   The HEC-RAS 1D-2D implementation

SCENT application to flooding

- Danube delta models
   - Co pathways for gathering data

Points of interests for monitoring

CO pathways

SCENT application to flooding

- ➢ Kifisoss catchment
- ➢ Main catachment around Athens
- ➢ Kifisos river is main recipient of Athens urban drainage
- ➢ Issues:
  - ➢ Urbanisation
  - ➢ Alteration of river and drainage char
  - ➢ Inadequate maintenance (vegetation debris, improper construction)
- ➢ Consequences
  - ➢ Incresed flood risk
  - ➢ Impact on downstream critical infrastructure
- ➢ Focus on flood risk

scent
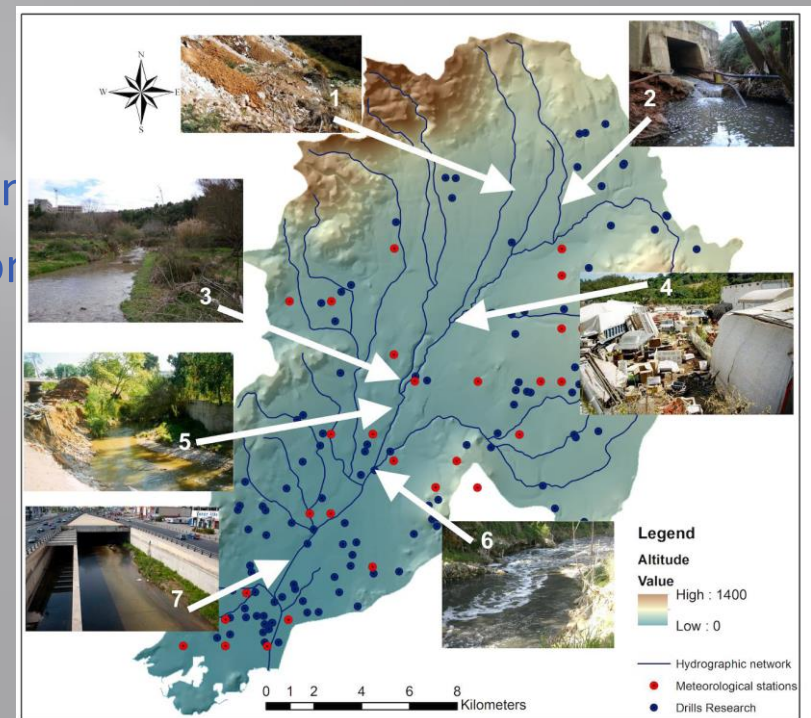
Conclusions

- CO is in its infancy, it is an emerging field
- CO vary widely on aspects monitored (from air quality to ocean monitoring, from safety of public spaces to noise in city environments)
  - all of them use a crowd-sourcing application for active citizen involvement.
  - in all these cases the involvement of citizens is limited to either sensing or in one case to interpreting images.
- SCENT **a new level of engagement and data collection for monitoring and modelling**:
  - crowd-sensing solutions, in which citizens act as a source of data relevant to environmental aspects, with particular focus on flooding
  - the ability of humans to interpret data, including multimedia, for which state-of-the-art artificial intelligence solutions normally have numerous shortcomings.

Thank you!
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Questions?