Citizen sensing meeting community informatics: from power to empowerment?

Aldo de Moor
CommunitySense
CIRN Prato 2019
It started with a – DIY! - sensor...
It started with a – DIY! - sensor...
Then a panel...

Nudging for climate through Citizen Sensing

Date: 3rd October 2019  Time: 20:30  Location: Cube 217

Why is it important? If I know, I can act..
Measure your city!
Citizen monitoring stations
Ongoing, *hyperlocal* measurements

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</table>
Citizen sensing communities

LoRa IOT-in-action Network
Tilburg, Oisterwijk & Waalwijk Area

Tilburg, Netherlands
156 members · Public group
Organized by Rene van der Weerd and 3 others

Share: Facebook Twitter LinkedIn
Citizen sensing “easy” case: local climate change *adaptation*

**Hittestress, bouwavond deel 1 en status Ambasat**

Hosted by Marcel Meek
From LoRa IoT network in Apeldoorn
Public group

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**Details**

Wed, Sep 04 · 7:30 PM
Hittestress, bouwavond deel 1 en status Ambasat
Citizen sensing “hard” case: local (woodsmoke) air pollution prevention

Doctors demand clean air act to stop thousands dying early

Air pollution is the health crisis of our age, so why are we still getting log burners and jogging in cities?

Scores more heart attacks and strokes on high pollution days, figures show

Nanoparticle emissions from residential wood combustion: A critical literature review, characterization, and recommendations

The EPA Declared That Burning Wood Is Carbon Neutral. It’s Actually a Lot More Complicated
Citizen sensing “hard” case: local (woodsmoke) air pollution prevention
Citizen sensing: key dimensions

- This combination of human-in-the-loop sensing, Web 2.0, and mobile computing has led to the emergence of several citizen-sensor networks (Sheth, 2009)
- Citizen sensing enables citizen scientists to act as human relays to facilitate data collection in sparse sensor networks (O’Grady et al., 2016)
- Citizen sensing is a form of citizen participation in environmental monitoring and action which is bottom-up, participatory and empowering to the community (Woods et al., 2018)
Citizen sensor networks

- *sensing cycle* of observation, *perception*, and communication involving *both machine and human citizen sensors* (Sheth, 2009).

- *machine sensors* are good at continuously *measuring and reporting* encoded observations, *humans* can process those observations into *meaning* by adding available background knowledge and using their experience, common sense, and complex reasoning abilities, even with fuzzy or inconsistent data or inconsistent information (Sheth, 2009)

- So, how to design *socio-technical systems to make sense of the data*?
Why citizen science?

- Citizens can be *eyes and ears*
- Citizens can ask *interesting questions*
- Citizens can be influential *science ambassadors*
## A community informatics perspective on citizen science

<table>
<thead>
<tr>
<th>Research Stage</th>
<th>Actors</th>
<th>Problems</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research question framing</td>
<td>Academics, funders</td>
<td>Limited scope</td>
<td>Collaborative research partnerships</td>
</tr>
<tr>
<td>Data collection and analysis</td>
<td>Academics, few stakeholders (only as patients)</td>
<td>Fraud; sloppy science; lab ≠ world</td>
<td>Citizen researchers</td>
</tr>
<tr>
<td>Authoring</td>
<td>Academics</td>
<td>Content, form and participation</td>
<td>Digital storytelling; group report authoring</td>
</tr>
<tr>
<td>Review</td>
<td>Academics (peers)</td>
<td>Peer review system outdated, overloaded, biased; promotes conformity</td>
<td>More collaborative process; post-publication review; external stakeholder participation</td>
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<tr>
<td>Dissemination</td>
<td>Publishers, libraries, university departments, academics</td>
<td>Restricted access; no associated data and stakeholder voices</td>
<td>Open access; open data; community/social media</td>
</tr>
<tr>
<td>Impact assessment</td>
<td>---</td>
<td>Non-existent assessment</td>
<td>Social media; long-term collaborative partnerships</td>
</tr>
</tbody>
</table>

### Table 1. (Re)defining the academic research process

Empowerment

- the mechanism by which people, organizations, and communities gain mastery over their lives’ (Rappaport, 1987, p.122)
- helps people to take control of their lives, develop critical awareness and knowledge about their situation, as well as develop long lasting skills and capacities to participate and shape their own environment beyond the confines of a particular project (Zamenopoulos et al., 2019)
- the process through which individuals, organizations and communities develop power and that empowerment should be explicitly linked to the development of power (Speer, 2008)
Citizen sensing powers that be...

**SCIENCE**

*Validity and meaning of data*

**GOVERNMENT**

*Laws, policies*

Citizen sensing communities
Citizen sensing & government

- Help fill in the information gaps
- Make government more legitimate and accountable
- Citizen engagement in common agenda setting
Manifestations of empowerment
(Zamenopoulos et al., 2019)

Power over: the production of ‘transitive power’ that instigates a flow of power from one locus to another and realigns power over relations from the powerful to the powerless

Power to: production of ‘transformative power linked to the capacity to act so as to fundamentally alter social, political and community contexts

Power with: capacity to collaborate, connect and coordinate different resources and interests

Power within: development of self-knowledge and capacity of people or social groups to recognise and mobilise their own knowledge, skills and assets
But: many technology push / “politically neutral” citizen sensing approaches

Consequently, this approach will empower users by providing more informed and data-driven feedback for decision making. The citizens can move towards healthier and greener behaviours based on the recommendations received. The policy decision makers can have more clear spatial references linked to environmental and health data to better analyse the situation in the defined areas (e.g., neighbourhoods), in order to generate spatially targeted health-oriented interventions (e.g., health policies that prevent hospitalizations or better health recommendations)
From data to meaning to action to impact is NOT trivial

- Technology push view
  - “If you just supply data and tools then meaning, action, and impact will follow”

- Politically neutral view
  - “Just need to focus on individual behaviour modification instead of addressing institutional power structures”

- Community informatics to the rescue?
  - Cf. digital access versus effective use-debate
    - effective use - the capacity and opportunity to successfully integrate ICTs into the accomplishment of self or collaboratively identified goals (Gurstein, 2003).
Towards citizen sensing impact

Community Informatics

Citizen Science

Citizen sensing

Collective data

Collective meaning

Collective action

Collective impact
Common agenda setting

- **Common agenda setting**: the process of creating, using, and evolving a common agenda for collective impact for, with, and by the community network that owns the agenda.

- Common agenda as a **common knowledge base** driving wicked problem solving through integrating individual views (Weber and Khademian, 2008)

- But HOW?

- One approach: **participatory community network mapping** (De Moor, 2017; De Moor 2018)
Participatory collaboration mapping: capturing relevant community reality
Participatory collaboration mapping: making sense together...
Participatory collaboration mapping: community ownership is key
Participatory collaboration mapping: making the connections...
Conclusions

- Citizen sensing is (much) more than geeky stuff – a lot of potential for community engagement & empowerment
- Much citizen sensing work on data collection, a bit on meaning making, (far) too little on action and impact
- Working on collective impact requires the worlds of citizen science, citizen sensing and community informatics to co-evolve
- (Em)power(ment) issues must be confronted head-on
- Common agenda setting can help span community boundaries
  - What are the intersecting collective impact ontologies/conceptual models?
- No more time to lose to start working on the “hard wicked problems” for real:
Climate crisis: 11,000 scientists warn of ‘untold suffering’

Statement sets out ‘vital signs’ as indicators of magnitude of the climate emergency

- Most countries’ climate plans ‘totally inadequate’ - experts