

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



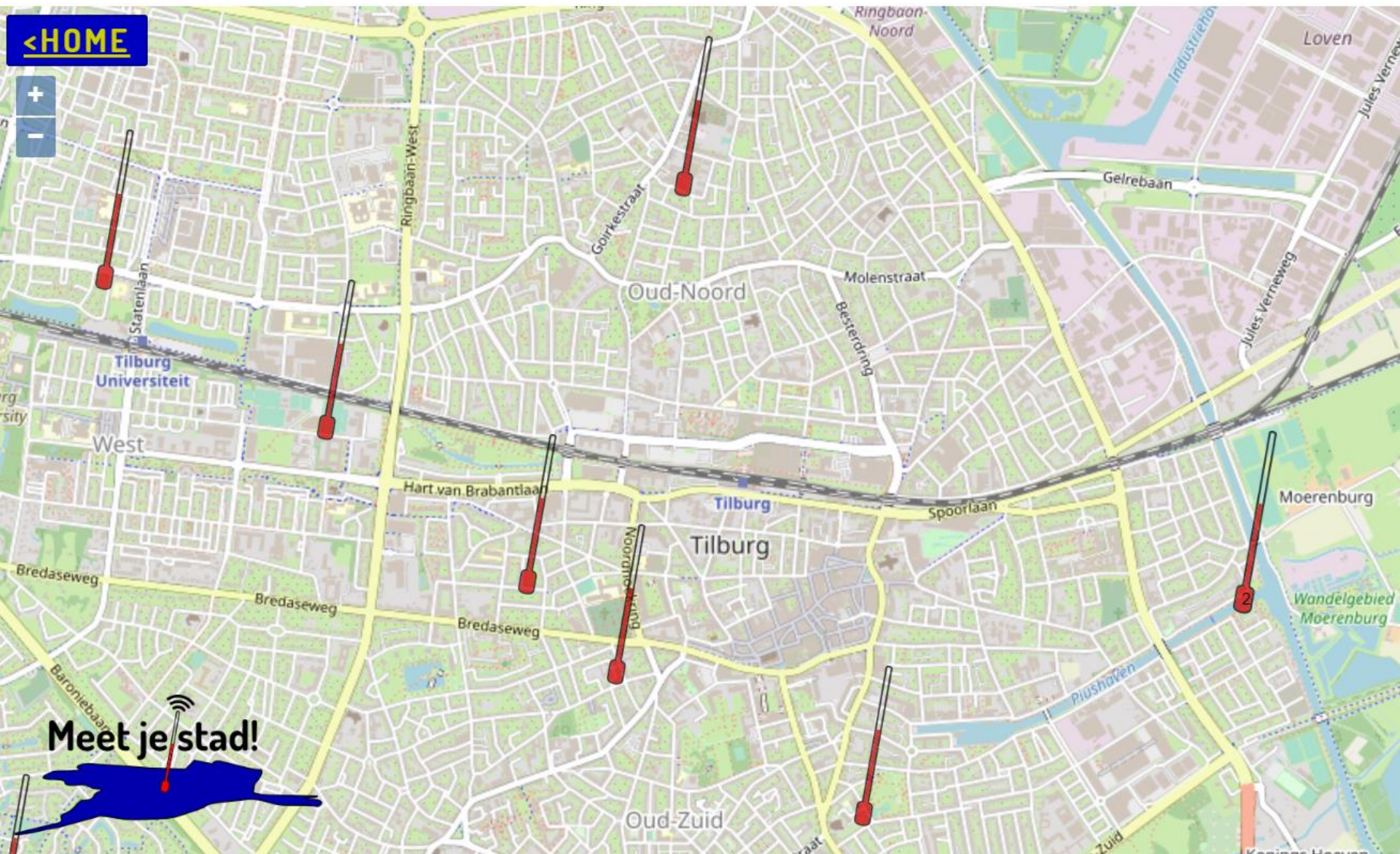
Time: 20:30



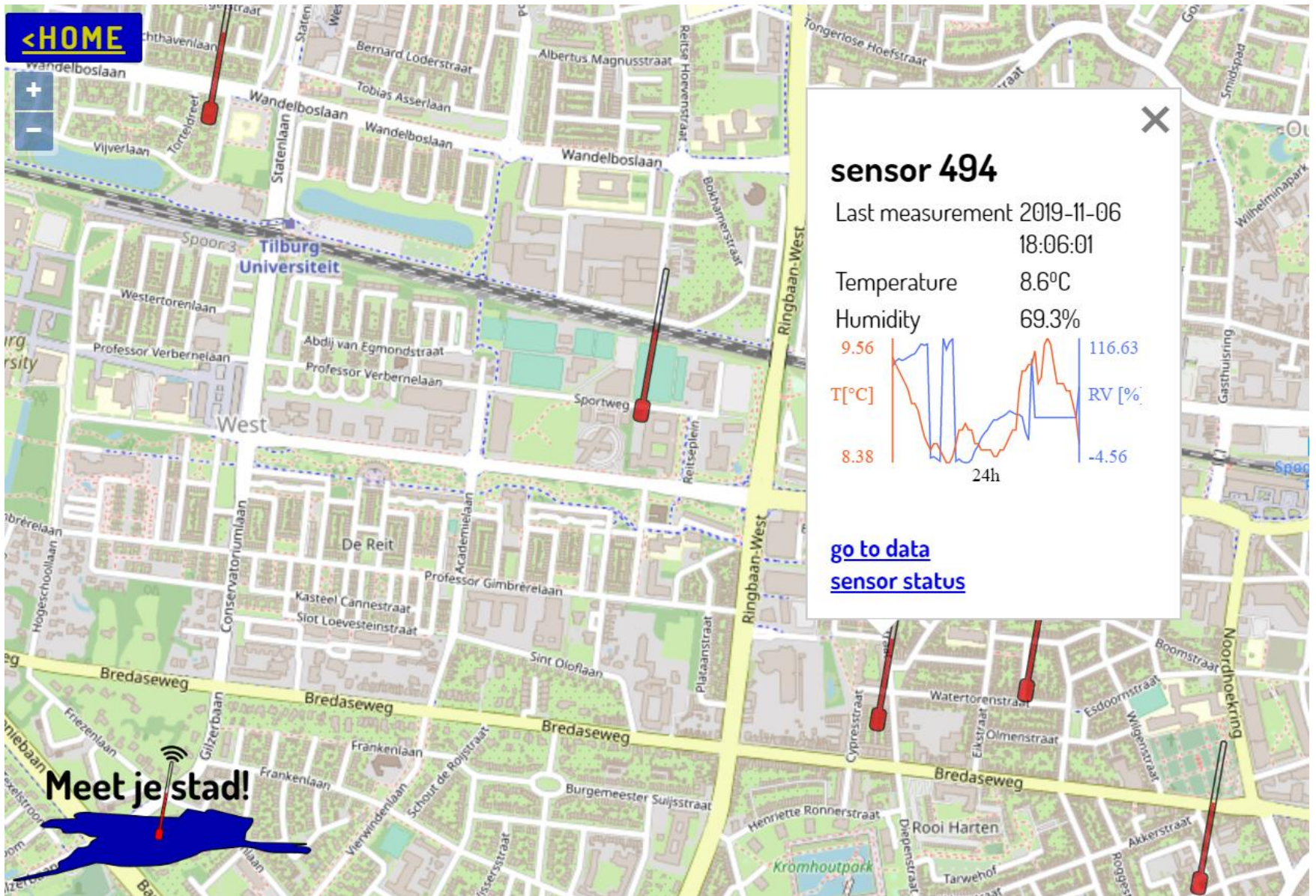
Location: [Cube 217](#)



Measure your city!



Citizen monitoring stations



Ongoing, *hyperlocal* measurements

ID	Time	Temp	Humidity	Light	PM2.5	PM10	Voltage	Firmware	Position	Fcnt	Gateways	Distance	RSSI	LSNR	Radiosettings
494	2019-11-06 18:06:01	8.5625°C	69.25%				3.34V	v2	51.5565/ 5.06766	9658	eui-aa555a0000088184	-	-96	8	868.1Mhz, SF9BW125, 4/5CR
											eui-aa555a0000088164	-	-111	3.5	868.1Mhz, SF9BW125, 4/5CR
											eui-aa555a0000088183	-	-111	-2.8	868.1Mhz, SF9BW125, 4/5CR
494	2019-11-06 17:50:32	8.8125°C	39.3125%				3.34V	v2	51.5565/ 5.06766	9657	eui-aa555a0000088164	-	-107	10.2	867.3Mhz, SF9BW125, 4/5CR
											eui-aa555a0000088184	-	-97	8.8	867.3Mhz, SF9BW125, 4/5CR
											eui-aa555a0000088183	-	-109	2.8	867.3Mhz, SF9BW125, 4/5CR
494	2019-11-06 17:35:05	8.9375°C	39.3125%				3.34V	v2	51.5565/ 5.06766	9656	eui-aa555a0000088184	-	-95	4.8	868.5Mhz, SF9BW125, 4/5CR
											eui-aa555a0000088164	-	-114	-5.5	868.5Mhz, SF9BW125, 4/5CR
											eui-aa555a0000088183	-	-105	-6	868.5Mhz, SF9BW125, 4/5CR
494	2019-11-06 17:19:41	9.0625°C	39.3125%				3.34V	v2	51.5565/ 5.06766	9655	eui-aa555a0000088164	-	-105	11.5	867.1Mhz, SF9BW125, 4/5CR
											eui-aa555a0000088184	-	-94	11.5	867.1Mhz, SF9BW125, 4/5CR
											eui-aa555a0000088183	-	-115	4.2	867.1Mhz, SF9BW125, 4/5CR
											eui-aa555a0000088184	-	-89	7.8	868.3Mhz, SF9BW125, 4/5CR

Citizen sensing communities

meetup

Start a new group

30% OFF


Explore

Messages


Notifications



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:   

Citizen sensing “easy” case: local climate change *adaptation*

Hittestress, bouwavond deel 1 en status Ambasad



Hosted by [Marcel Meek](#)

From [LoRa IoT network in Apeldoorn](#)

Public group



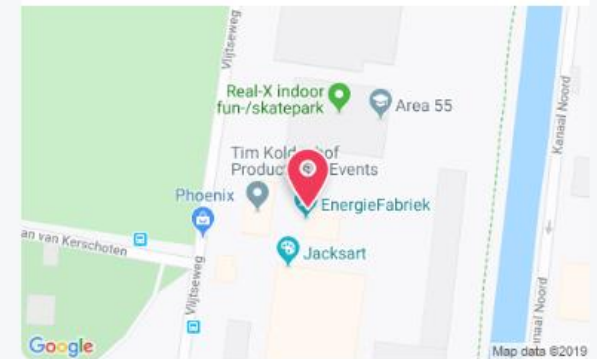
Details

Wednesday, September 4, 2019

7:30 PM to 10:00 PM

[Add to calendar](#)

Ondernemershuis Apeldoorn
Vlijtseweg 144 · Apeldoorn



[Report this event](#)

Wed, Sep 04 · 7:30 PM

Hittestress, bouwavond deel 1 en status Ambasad

Past event

Citizen sensing “hard” case: local (woodsmoke) air pollution *prevention*

VIDEO | CLEAN AIR FOR ALL

Doctors demand clean air act to stop thousands dying early

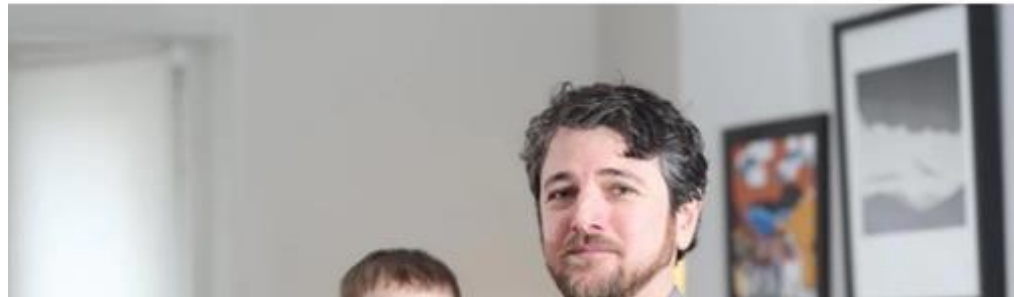
Air pollution is the health crisis of our age, so why are we still getting log burners and jogging in cities?

f share



Renewable and Sustainable Energy
Reviews

Volume 103, April 2019, Pages 515-528



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

Data reveals acute impact on people's health and the strain it puts
on emergency services

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*

Air pollution
why are you
jogging in



Scores m
on high p

Data reveals ac
on emergency se



Take Back The Air

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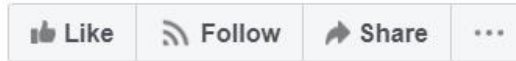
Photos

Videos

Posts

Community

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November 29, 2016 · 🌐

THANK YOU for your diligent effort to save our air. I'm in the Twin Cities and have said for years our inner city lots are too small for recreational fires.

👍 1

4 Comments

👍 Like

💬 Comment

➦ Share



Oldest ▾



Take Back The Air Thank you so much for your comment! I agree that the city lots are too small for fires - and our houses are simply too close together for wood smoke to be contained in each person's back yard.

Like · Reply · 2y

👍 1



Take Back The Air Terri, have you talked with any public officials who gave you hope? Most are afraid to act, though they have had many complaints about wood smoke.

Like · Reply · 2y



↩ View 1 more reply



Take Back The Air There are several of us who would like to call on each and all city council members, who do want to know what we expect of them in protecting the public welfare. We always make it friendly and can often meet them at a coffee shop in their neighborhood. Let us know if you're interested in doing this sometime in January.

act to



ntial
re

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

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

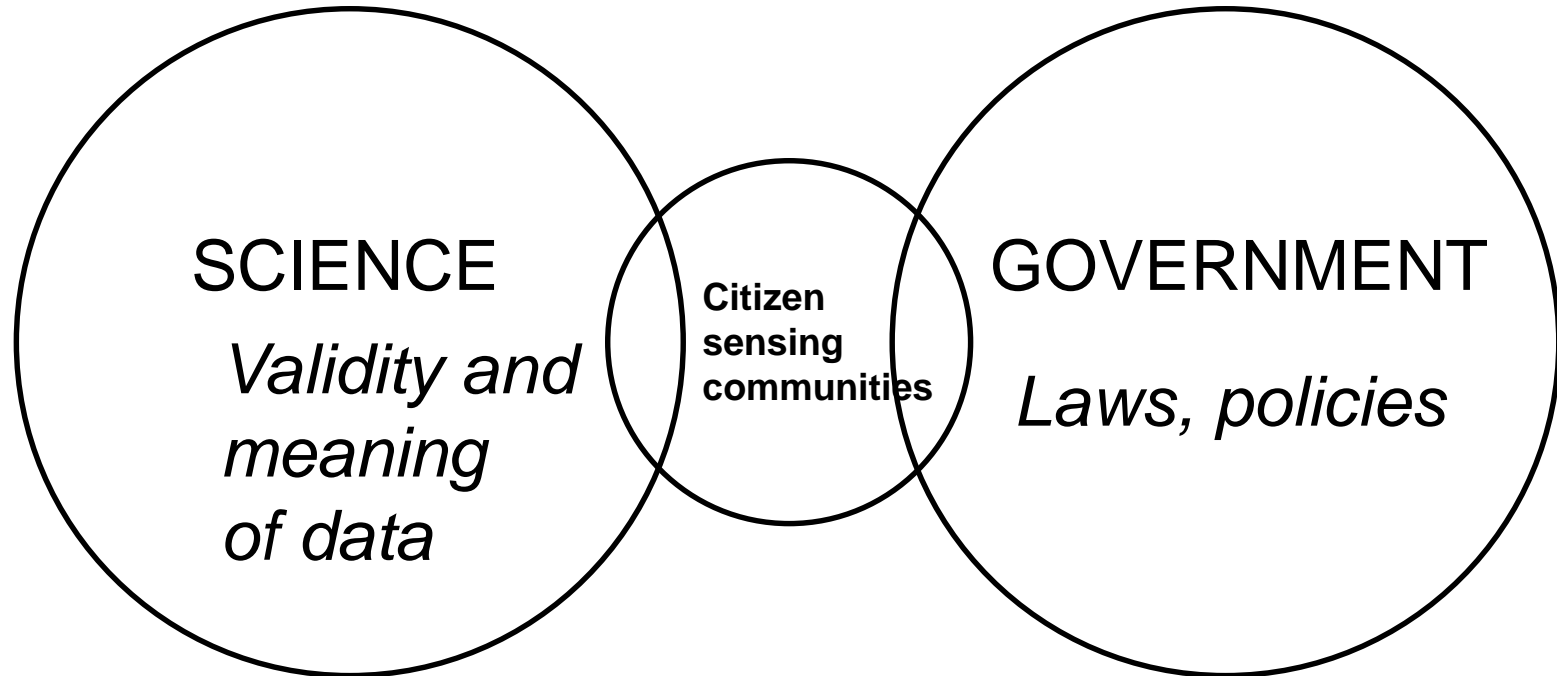
Table 1. (Re)defining the academic research process

A. de Moor (2014). Expanding the Academic Research Community – Building Bridges into Society with the Internet. In T. Denison, M. Sarrica, and L. Stillman (eds.), *Theories, Practices, and Examples for Community and Social Informatics*, Monash University Publishing, Melbourne. ISBN 978-1-921867-62-0.

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...



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



Article

Empowering Citizens through Perceptual Sensing of Urban Environmental and Health Data Following a Participative Citizen Science Approach

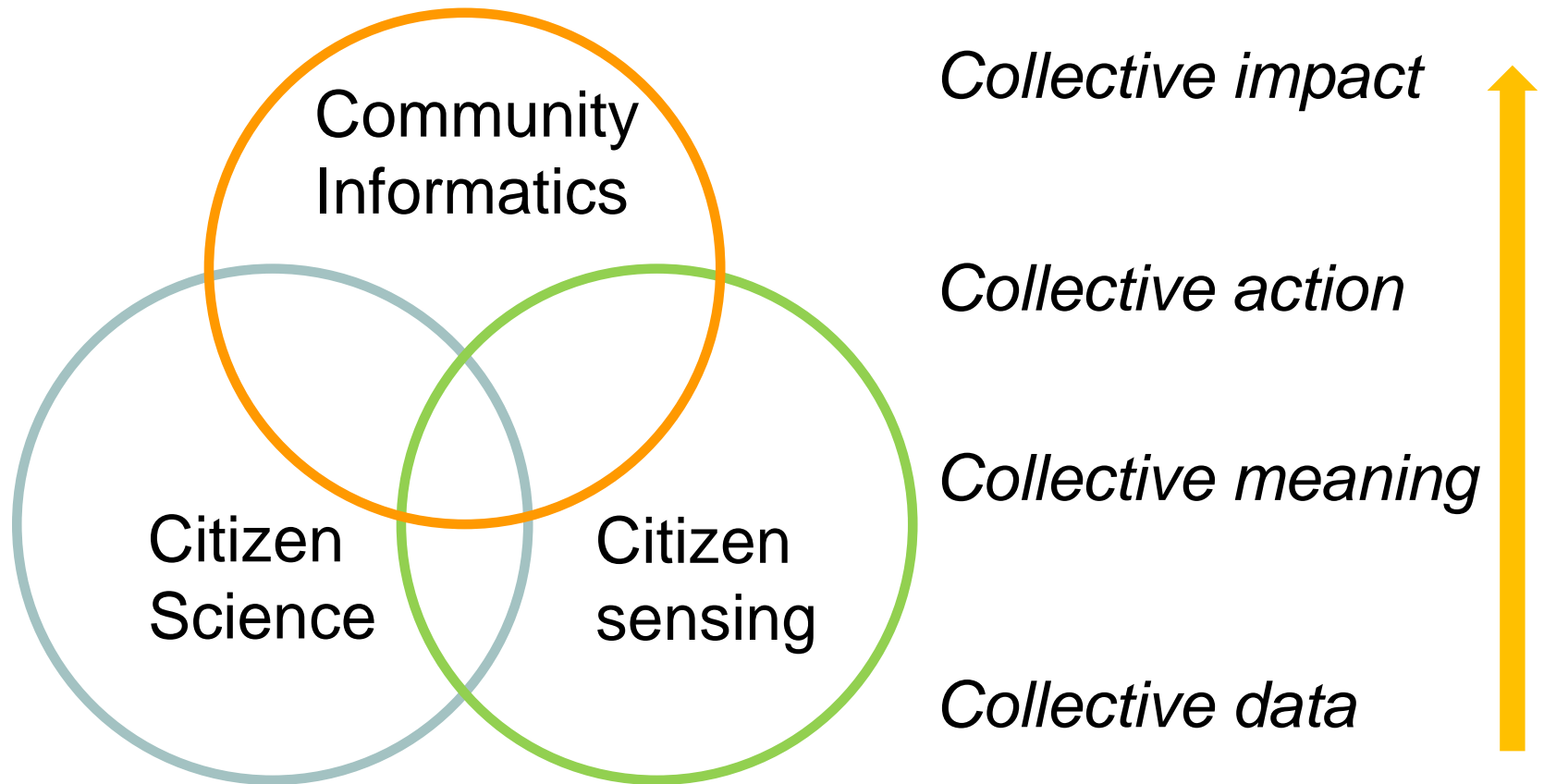
Manuel Ottaviano , María Eugenia Beltrán-Jaunsarás [†] , José Gabriel Teriús-Padrón [†] ,
Rebeca I. García-Betances ^{*,†} , Sergio González-Martínez , Gloria Cea, Cecilia Vera ,
María Fernanda Cabrera-Umpiérrez  and María Teresa Arredondo Waldmeyer

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



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: 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

