

CITI-SENSE consortium annual meeting (March 2015)

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CITI-SENSE lead

We need to provide an “umbrella” for all the locations and also provide a European dimension.

The communication plan has to focus on one single portal for the project. We need to brainstorm about a Citizens' Observatory Portal. What do we actually show to people?

Areas of special importance:

- good overview of the data flow;
- final open conference.

Work Package (WP) 4

Harmonization of Citizens' Observatories in a central web portal that integrates products and services.

- Define concept
- Protocols
- Assess success
- How to visualize data on central web portal?

Feedback of prototype at [http:// co.citi-sense.eu](http://co.citi-sense.eu)

WP2 (8 locations)

1. Barcelona

Engagement done: presentation at AEMET, Smart City Expo, PRBB Open Day, school community, mayor of Barcelona, press notes and social media.

Empowerment: same as engagement.

Deployment: static sensors deployment community workshop, trials and pilots in TAPAS project studies.

School community mapping data of their neighborhoods.

Quality control? Validation of sensors and calibration.

2. Belgrade

Map with points of static sensor locations. Lack of data for making base maps.

(My comments: my understanding is that these base maps show air pollution information in the background with colored areas)

3. *Edinburgh*

Testing static sensors.

Links with WP3 (schools), cyclists and local NGO *Friends of the Earth* for engagement and empowerment.

Involving local authorities.

Difficulties: uncertainty with data flow and sensors; lack of data for base maps; long period for ethical approval; not enough empowerment; financial issues.

4. *Technion (Haifa, Israel)*

Testing and calibration issues. Testing where to place the sensor pods.

Use Retigo for maps.

Base maps (heat maps using modeling)

Challenge: how to show people how to interpret the data.

5. *Ljubljana, Slovenia*

WP2 and WP3 together.

They only have one reference station for calibration.

Base maps involve data fusion.

Where they put sensors: individuals, public buildings, etc.

Local authorities are interested in Citizens' Observatories. Most important stakeholder: Environmental Agency.

Engagement strategies they use: Facebook, the more local the better. Promotional material for rewards. Events with schools, using bikes and posters.

She shares car ride and asks them about the portable sensor informally.

She suggests using the bike sharing system to monitor air all the time, to make a promo video and make videos for teaching the technicalities of using the sensors.

6. *NILU (Oslo, Norway)*

Engagement with city authorities, which his key for making the project a success.

Full deployment of static sensors in kindergartens.

Contact asthma-allergy association and NGO.

Press and social media.

Harmonization with satellite projects.

Working on visualization and mobile app.

Difficulties: location of pods, budget problems, accuracy of portable units.

To do: ethical approval and coordination and planning of campaign with other cities.

7. Ostrava (Czech Republic)

Test functionality of personal sensors.

Cooperate with NGO and monitoring campaigns for engagement.

8. Vienna, Austria

Empowerment: outreach to educational sector, meteorology department, cyclists. With primary schools and NGOs, monitoring their way to school. Facebook campaign and questionnaires.

Deployment of sensors.

Modeling and base maps: the authorities do not provide information or publications about it.

Questions and discussion time:

Stakeholders: Everyaware project.

Microsensors are not as accurate as we would like them to be. With higher levels of pollutants there is better quality of measures.

Develop sensor measurement applications other than regulatory: source location, no need so much accuracy, only range and categories of pollution. Suggestions: provide categories or levels that affect health instead of low or high pollution.

WP3 (Schools)

Edinburgh

He is not so worried about data quality because they want sensors for education and student involvement. They found out that the schools were concerned about their own image if they find a pollution problem.

Slovenia

Workshops. Social media groups. Technical groups developing apps and sharing them. They use Netatmo sensors for monitoring activities (not citi-sense because they are not ready). Give reflectors as rewards.

Even for teachers the type of data provided is too complicated.

In general, there are mix purposes within the project: education purpose versus health purpose.

Ibatuz and Tecnalía, Vitoria

Measuring noise.

- Questionnaire: what expectations they have.
- Fieldwork (workshops).
- Media and Facebook dissemination.
- Testing with sensors and apps.
- Measuring impact of project.

How to show results to the people on the website. Subjective and objective values.

DATA VISUALIZATION (WP6)

Mapping data. Visualize current air quality in the city.

Interpretations from observations only does not work. We need data fusion with models (providing spatial variations due to roads).

The number of stations has a significant impact on accuracy. We need 30 to 40 sensors per city to operate at a statistically feasible level. After 50 sensors the improvement is not so big.

Station placement, wide range: urban, suburban and rural.

Towards personal exposure estimates.

Exposure while we walk.

Either measure exposure while moving or track path and compare with map of fused data.

Application: automatic route planning.

Discussion on air quality index versus actual concentrations.

EU standards for air quality or WHO standards, which are stricter.

WP5 > suggests to involve users in designing visualizations and what data to show (co-design).

Uncertainty

Error is key in Science: information is useless without uncertainty (error).

Uncertainty is needed for reliable science; include it in information to users.

Translate numbers into perceptions.

How to provide easy to interpret uncertainty for users.

Visualizing map uncertainty together with air quality too complicated for average users.

What is the desired outcome? Inform or persuade?

Some users do not want uncertainty information. What is the benefit for its use?

Layers of information, like hyperlinks.

DATA FLOW AND INFRASTRUCTURE

Data flow and data collection agreement. And GEOSS common infrastructure. The schema of the data flow is the following:

Data of human sensors > data validation > Snowflake uses an Amazon Cloud service in Ireland for the Spatial data services platform, which in turn serves:

- Citi-sense platform
- Mobile applications (pending)
- Visualizations (pending)

Platform use cases:

- Static sensors (now getting data into the server)
- Questionnaires (mobile application of U-Hopper)

Difficulties:

- No budget for storing so much data.
- In WP3 (schools) in Oslo, Slovenia, Belgrade and Edinburgh they are using commercial options, like Netatme.
- How long the data will be stored?
- Now NILU and SINTEF will push data into the server. Someone has to take responsibility to make the data out in visualization form.

U-Hopper (<http://citisense.u-hopper.com>)

Widgets that connect server with Snowflake API for mobile applications.

Others develop visualizations.

Please design consistent look and feel across sites and coherence of overall project visualizations.

Please co-design!

Citi-sense lends sensors to users, which requires a legal contract. Who is the sensor provider? What is the role of location officers?

Citi-sense owns the data, granting perpetual use.

GEOSS and Open Data contractual obligation.

Privacy. "Anonymize it". We need to specify what data will be collected and for what purpose. Privacy policy document.

To WP2 and WP3 asks to clarify what personal information will be collected.

SENSORS

Ateknea company on sensor pods:

Static sensor pods: GeoTech AQmesh platform with data files at www.envirologger.net

Portable sensor pods: internal geolocation + sensors + Bluetooth + battery.

They measure NO, NO₂ and O₃.

Sends data every 5 minutes (configurable). 4 to 5 minutes is what the chemicals take to react (sensors), so that is the bottom-line frequency.

Discussion: sensors degrade over time and need to be changed, 2 years approx.

Calibration problem: to calibrate to 0 we need an isolated chamber with no pollutants. But it is too expensive to introduce gases on the chamber for calibrating for non-0 measures. Calibration with local official stations is not ideal, because their frequency is one hour. Now they take several portable pods together and average them. They have to calibrate them every 6 months.

Other sensor pods measure PM, sound and UV.

Concerning the programming between the sensors and Bluetooth, the application is for Android.

Senseitnow includes subjective questions in addition to sound and temperature.

Software to change the calibration values made by Ateknea.

Discussion time:

ODEO > static pods with geolocation include Radon sensor and temperature. Editable name of sensor and location. Widget displaying values per hour. Also, provides a table of data that can be downloaded. All data is sent to a WFS server.

Vesna unit > portable sensor pod with Bluetooth smart for connecting to smartphone or tablet. Sends data to a server for storage using WFS and XML, to Citi-Sense platform. Include NO₂, O₃, temperature, Lightning (thunder), accelerometer and geolocation of table or mobile.

WP5 ENGAGEMENT AND EMPOWERMENT

Perception monitoring

Awareness and knowledge about air quality, how air quality is experienced, quality of life.

Barcelona is asked to align with the Oslo and Vienna survey. They translate the surveys from English.

Questionnaires: you are not going to get good responses after 5 or 6 questions. Use of google forms or mobile applications.

Ljubljana (Slovenia) has a quality of life survey.

Vitoria: public spaces quality of life. Harmonizing recruitment methods.

Participatory evaluation

Environmental decision support systems EDSS. Overview of potential success factors:

- Degree of citizen participation in the monitoring
- Degree of citizen participation in decision-making.
- Degree of engagement of public authorities.

These factors affect:

- Effectiveness of Citi-Sense in reaching the objective.
- System acceptability (Matthews et al. (2011)). Practical and social acceptability.
- End-user satisfaction with the tools (sensors, mobile applications, and web portal).

Evaluate:

- Expectations of stakeholders and needs.
- Interactions with the tools.
- How to empower citizens for policy-making.
- Usefulness of tools, social media, etc.

We need to determine what to evaluate and who do we want to ask.

Define evaluation indicators.

Seek harmonization. Coordinators of WP have to provide their goals, expectations and indicators that they consider important to evaluate.

How to involve users in the development of our methods?

Opportunities for involvement in: sensor data, perception data, evaluation data, data flow, user agreement, ownership, privacy policy, sensor agreement, communication with users, visualization of uncertainty, mobile applications and website.

Solutions should not be imposed.

Contact and talk with different groups in each location about these opportunities for involvement.

User groups:

- policymakers, researchers,
- citizens, citizens' organizations,
- participating citizens, schools and organizations.

Examples: cyclists and NGOs.

WP9 Communication and Exploitation

Engagement and Communication plan for fieldwork and recruitment.

Methodology for approaching the stakeholders: community; local authorities; researchers; the environmental protection agency, etc.

What happens after EU funding ends? Where to store the data? Will do we still have sensors? Look for funding for stakeholders.

Researchers should stay in contact with their local communities and continue providing support.

Can the users of sensors influence policy?

Citizen observatories could keep existing and growing and identify new issues beyond what it was envisioned originally.

Sustainability is connected to business plan and maintenance. Is the system reliable? How much the maintenance costs?

The power of this project should lie in building a community that keep it going.

WP2/WP3/WP5 discussions

Big question in WP2: How to convey the information and visualization of applications to users?

- Historical data?
- Uncertainty?
- Air quality index or concentrations?
- Scale and colors?

1. Perception monitoring

1.1 Understanding of air pollution.

- Survey on knowledge of air quality and governance.
- Assess knowledge of air quality.
- Seeking harmonization across locations for surveys (WP2).
- Protocol and procedures for how to recruit participants so the results can be compared across locations. Most effective recruitment? Facebook, street, online.
- Also, proposition: What public data is available and accessible about pollution and about public perception of it in each location?
- Include questions about public understanding of Science, for example, name of pollutants.
- Include a question about empowerment in the survey. How people wants to be involved in an initiative like this. Empowering citizens to do what?

- Seek for absolute comparison and relative comparison across locations, because different places have different priorities and problems due to their context.
- Representativeness of the group of participants is important. Are existing baselines sufficient? Social media users are not very representative. Diversity of respondents: students, parents, teachers, etc.
- The survey should focus on awareness, air quality information available, governance issues (do they trust the authorities? Do you want to influence the authorities?), risk communication. If having a polluting Industry, this might prevent actions.
- The survey should provide informative results about engagement and empowerment. What target group? Can we identify stakeholders (eg. Patients, cyclists, etc)? If they want to host a sensor, which neighborhood?

1. 2. Experienced air quality. Quick mobile perception, momentary sensory evaluation, and rapid response.

1.3. Quality of life. Survey on quality of life will be left out of WP5, just as local initiative aside of global project. Suggestion to include one question in the survey about having or not their basic needs covered, which affect the importance of air quality perception.

2. Participatory evaluation.

Input from WP2 and WP3. Put together what right now is a priority, in terms of time, the questions that need to be asked and participant groups.

For example:

- Baseline: needs, requirements, etc. Too late for some locations.
- Visualizations.

Methods: questionnaires or focus groups. What are we trying to construct and in what timescale? Either we ask about their perception and tools before they use them, or we ask retrospectively about their expectations.

3. General questions:

- Registration of participants online, consent forms, privacy. What type of information we want to gather as WP5 in terms of user registration? Request some demographics.
- Language issues: web in different languages or local webs?
- Capture of our learning process: minutes, deliverables, recorded meetings (privacy concerns).
- Comparative analysis, harmonization across locations.

Brainstorming for CITIZEN OBSERVATORY WEB (WP4)

- The prototype website meant to be citizen observatory is co.citi-sense.eu
- Start with value proposition.

- Purpose: gateway to bring people to all the services. Unclear who is the audience.
- Zoomable interactive map with the different locations.
- Engagement? Not a discussion forum with registration required.
- Counters of use and engagement.
- Show, don't tell.
- Editorial boards for selection of products that are finalized.
- Make it technically feasible for phones and tablets.
- Channel for complaints of people about air pollution, call "Your voice". Administrator needed. Enable login through Facebook.
- Discuss social media links, different in each country and for different stakeholders.
- Visualizations with time and context, not on front page. Comparisons, historic data for policy makers, maybe not with maps.

Visualizations

Pollution levels: percentages, categories or colors.

Colors related to WHO standards.

Map divided in grid. Each grid can show information on different times by clicking on it

Time scale to see less polluted times.

Use of predictive models.

Alternative maps to Google maps

Alternatives for map illiterates: click on postal codes.

Scope: providing gradients instead of health advice.

Look at what pollution information is already offered by official authorities and how it's visualized.

Alberto (Barcelona) has volunteered to work on visualizations.

TAG (Technical Advisory Group) evaluation

- Not enough citizen focus in the development of tools, it's coming late.
- Project afterlife, what's going to happen to the data.
- What is a successful project in 18 months?
 - Change people's behavior?
 - Inform them to protect their health?
 - Build social capital?
 - Understand the risks?
- Privacy and ownership:
 - Open data and how to disseminate.
 - How to harness individual data to model.
 - Data ownership.
 - After project access data and use.
 - Harmonization of Ethics.
- How to communicate uncertainty and risk?

- Communicate this complex information to lay people and people with disabilities (color blind).
- Comparable data across locations
- Papers soon!

Post project phase:

- Citizens need time to understand the benefits.
- How to keep the system running.
- Scientific usage and data analysis.
- How to leverage this project for new projects? There are already expressions of interests.

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Next steps WP2/WP3/WP5/WP9

WP2: develop engagement plan and perception questionnaires into the mobile applications with WP5. An outstanding issue is recruitment.

WP3: will share fieldwork results in summer.

WP9: Going public. Communication plan to support engagement plan (WP5) Dissemination plan beyond local level. Community plan instead of business plan? It is important to build community at the last part of the project.

WP5: Defining the next steps:

Awareness rising

1st a campaign to create awareness among the general public about the problem and the project. We need more information and materials.

Stakeholder engagement

Who are the end users and target groups? Assessment of needs and requirements of stakeholders. For example: in Edinburgh they have a small advisory group, including the Environmental Agency. There seems to be common stakeholders involved in each location: schools, cyclists, patient groups, etc. Decide how to approach them in a harmonized way, because they are similar across locations.

Co-production and visualization for empowerment.

For some instruments is too late for co-design, like the survey of perception and governance. For others, there is still time: end-of-project evaluation, visualization, user agreement. Ideas:

- Ask people where to put the sensors.
- Channel to feed ideas for visualizations.
- A basic prototype is needed to engage with stakeholders and ask for opinions and advice.

List of priorities:

1. The mobile application with basic visualizations of model data and sensor stations for feedback in a couple of weeks. Testing in teaching sessions, talks about CITI-SENSE, with existing advisory groups.
2. Gather information of the process and learn from it.
3. The list of applications with map visualizations and surveys needed by location officers. The user manual of sensors also needs user feedback. People usually prefer to be explained the use of the sensors, rather than reading it.
4. Prepare a publication plan for WP5.