

"Citizen Science: Harvesting Data from the Commons"

Ted Smith, PhD
Louisville Metro Government
@tedsmithphd

With the advent of very low cost computing devices and sensors comes a new opportunity to participate in the solution of social challenges previously out of reach. For example, our city of Louisville KY put 500 GPS-equipped asthma, wireless rescue inhalers in the hands of citizens across the community and over 18 months was able to see nearly over 7,000 asthma attacks on a heatmap. In this way, citizens that suffer from a health condition were "donating" their very valuable place-specific health data to science. That project led to additional questions about the quality of the ambient air near and larger questions about whether there might be something to do at the community level for a disease exclusively treated with individual intervention. So the first crowd we have relied upon acted as an array of sensors with intelligence emerging from the array of individual events.

The second crowd that has become important is the group of over 100 citizens who want to connect with the possible issues and solutions that could exist if it could be possible to know more about the quality of ambient air at a level of spatial resolution that is higher than the five EPA-funded air monitoring stations in our community. This crowd is turning to very low cost air sensors that can be mounted in schools, bicycles and around your neck. Unlike the asthma inhalers, this kind of participation has included new dimensions such as crowd funding for these low cost air sensors (which has raised enough money to date to deploy 100 low cost internet-connected air sensors). The most controversial dimension though is how to connect data collected from these kinds of devices to "Big Science" and public policy.

It is tempting to tell citizens that Arduino boards with cheap metal oxide sensors are not to be taken seriously and that we appreciate their interest and the data they want to help gather and contribute about public space for public benefit, but that this is the kind of science that we should not confuse with large scale and large cost, quality-controlled measures of air quality or public health. This project rejects that framing in favor of exploring new ways to simultaneously learn and educate the citizenry and public leadership about how to effectively and responsibly collaborate for social good. This area is broadly referred to as "Citizen Science" which is commonly meant to describe lower fidelity measurements taken by a nonprofessional class of citizens that are often analyzed or post-processed by the same citizen effort and shared publically. Citizen science is simultaneously a kind of social capacity and form of community engagement that could lead to new kinds of collective social problem solving – or it could be marginalized by those who are concerned about the real cost of uninformed activity – which could include unnecessary panic or misunderstandings of actual climate or health data putting pressure on public policy. In order to find the best contribution, there should be intentional effort placed on creating quality assurance in the community efforts when possible.

Our project is looking for collaborations very broadly to:

- 1) Develop frameworks for integrating citizen data with more professional sources of data
- 2) Determine which kinds of social challenges are best met with this hybrid approach
- 3) Establish guidelines for education and "certification" of volunteers to provide assurance about data provenance
- 4) Finding reference projects where citizen science has ultimately improved a measure of social well-being.