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Submission details

I am making this submission as
An academic/researcher

Submission type
I am submitting on behalf of my organisation

Organisation making the submission (if applicable)
NSW Smart Sensing Network

Your position in the organisation (if applicable)
Research Theme Leader - Environment and AgTech

Consent to make submission public
I give my consent for this submission to be made public

Share your experience or tell your story

Your story
The 2019-2020 bushfires were devastating to NSW. The NSW Rural Fire Service dealt with more than 11,000 bush and grass fires burning through 5.4 million hectares and 2,439 homes were lost. The entire state suffered from the physical and economic effects of the fires. Going forward, it is expected that the state will be directing resources into both remediation and the prevention of future bushfires at this level. Within the larger community, however, many have raised concerns about the effects of reduced air quality both during the fires and on long-term health outcomes for the residents of NSW.

My story is one about how people reacted to this situation and the steps they have taken to gather information and data for themselves, and how this data meshes in with data collected by official sources.
Despite the accurate air quality data available from DPIE, many with health concerns want real-time information and at a spatial resolution relevant to them.

As a result of these concerns, unqualified people set up low-cost (uncalibrated) sensors and have distributed this data freely within the community. Although their intention was to provide helpful data, the mismatch between the data gathered by uncalibrated and calibrated sources only added to the confusion.

The wide-ranging nature of the bushfires has raised community awareness of the importance of air quality but left them with no clear path to accurate local information. There is a clear need here for a NSW-led investigation on how to understand low-cost sensor data and incorporate it into reporting that will help the community.

This investigation would address the important issues of how to set up and calibrate the sensors, how real-time data needs to be interpreted and distributed to the community and would ideally identify the sources of uncertainties in data collection - and find ways to mitigate them. Already, there are highly experienced and credentialed researchers across NSW universities and citizen science groups that are successfully deploying low cost sensor networks (e.g. http://bluemountains.sensors.net.au/) to measure microclimates, point-sources of pollution such as traffic, and wood smoke burning.

Our request is for the NSW Government to leverage this research to help communicate the understanding of sensor data. Rather than a “low-cost sensor” versus “traditional monitoring station” competition, it should be viewed as an opportunity to link and augment (in a quality-controlled way) the existing monitoring network. There are well-established data analytics methods in the engineering sector that can combine these datasets carefully and quantify the effectiveness of citizen-deployed sensors. There is also a strong interest from the epidemiologists to access such data to analyse health impacts from microclimates of air pollution. This data is both wanted and needed by the scientific and health communities.

The key challenge is to combine the different types of sensors (a heterogenous network) to get a full picture of the real time air quality. This avoids sensor bias, allows cross-referencing, and correction for long-term drift and fouling. Such a network will then link to the existing calibrated network as the ground-truth and be enhanced by data fusion techniques. The NSW Smart Sensing Network (NSSN), the representing majority of research groups deploying sensor networks in NSW, is pursuing ways this can be realised.

The NSSN was established in 2016 to work at the nexus of universities, industry and government. It was designed to solve smart sensing challenges facing industry and society and to position NSW as a leader in smart sensing innovation. This network accesses the academic community to innovative and develop smart senses to a wide range of practical applications. The NSSN may also offer other solutions to issues identified through the inquiry.

Terms of Reference (optional)

The Inquiry welcomes submissions that address the particular matters identified in its Terms of Reference.

1.4 Any other matters
Setting up local smart sensor networks will enable citizens to access air pollution data in their immediate environment. In future, they will also be able to work with local government to install sensors, feeling empowered to contribute to their own local air quality. These sensors would be networked and made accessible (online or via apps) to communicate the results, including errors and uncertainties, and can make suggestions for response actions.

Regions that are particularly vulnerable to bushfires, that may not have directly access to information otherwise, could have this local network as a notice to respond better.

Supporting documents or images