July 16, 2019

Summary and Status of the 2018 Workshop on $PM_{2.5}$ and Ozone

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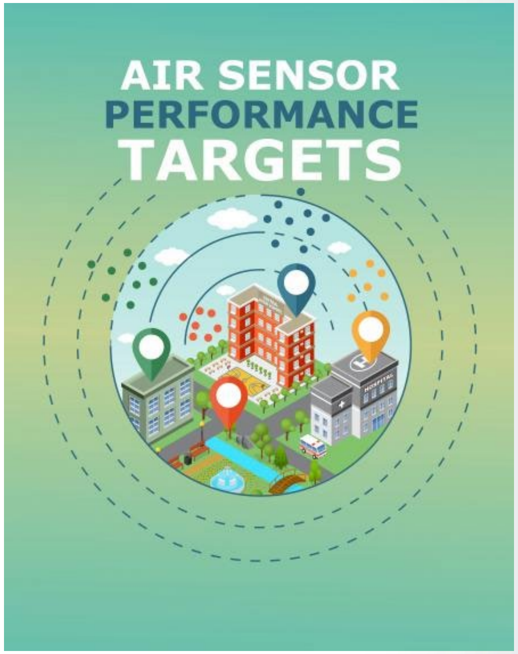
It has been a busy year!

- June, 2018 workshop
- Journal manuscript
- EPA research in progress toward *interim* non-regulatory $PM_{2.5}$ and ozone sensor performance targets report

2018 Workshop

Highlights

- Focus on $PM_{2.5}$ and ozone
- Approximately 700 attendees in-person and via webinar
- Included sensor manufacturers, systems integrators, other private sector, community groups, nonprofits, academic institutions, state/local/tribal air quality agencies, the federal government, and international groups.
- Topics included
  - Information on international efforts
  - Perspectives from state/local/tribal agencies, academics, manufacturers, community organizations
  - Review of peer-reviewed literature



2018 Workshop

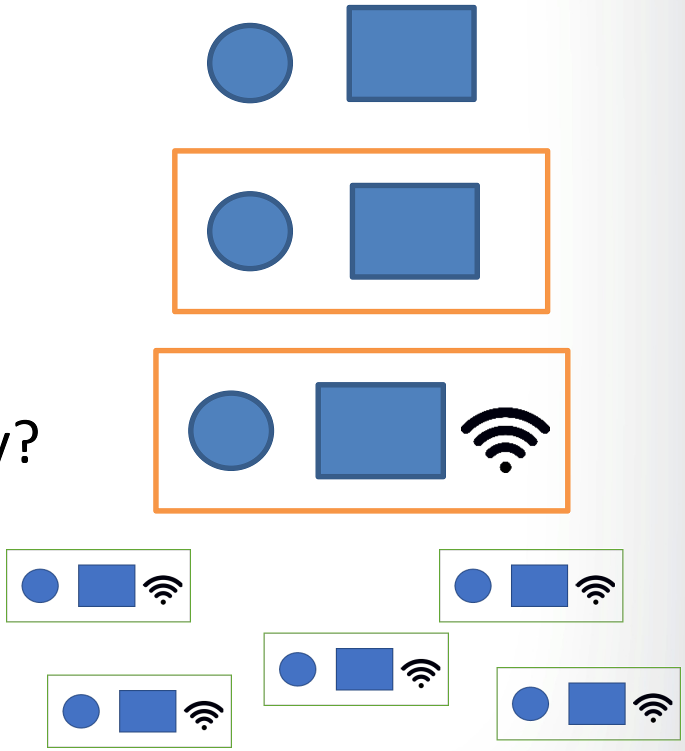
Points discussed and debated, without consensus sought but to capture a range of opinions

- Who needs sensor performance targets and official testing protocols?
- Should there be one or multiple performance targets (e.g., binary or tiered)? If multiple - would you stratify by customer segment? Measurement application/purpose? Other?
- Should performance targets be technology agnostic and focus on the measurement requirements of an application, or take into account current technology capability?

2018 Workshop

SME debate – should the performance target and test protocol focus on…

- The OEM sensing component?
- An offline device?
- A device with online connectivity?
- A network of sensor devices?



…and what would be the test protocol implications?

Publications

EM Article Overview

Air Sensors 2018:
Deliberating Performance Targets

by Ron Williams, Vasu Kilaru, and Kristen Benedict

A summary of highlights and outcomes from EPA's Air Sensors 2018 Workshop.

Low-cost, widely available air sensor technologies have the potential to make a dramatic impact on the state of air quality monitoring. While they are not currently as accurate as regulatory-grade monitors—which are certified to meet specific performance and operating standards—they can provide an understanding of local air quality, help identify hot spots, and provide continuous streams of data. This information can empower individuals to make personal decisions, such as choosing to take a different route to work or remaining indoors for exercise. The technology also can help a community work with their local officials to address an air quality issue. Sensor technologies continue to improve at a rapid pace and hold promise for greater air quality monitoring effectiveness and application.

Peer-reviewed science journal article

Atmospheric Environment: X 2 (2019) 100031

Contents lists available at ScienceDirect

ELSEVIER

Atmospheric Environment: X

journal homepage: www.journals.elsevier.com/atmospheric-environment-x

Deliberating performance targets workshop: Potential paths for emerging $PM_{2.5}$ and O_3 air sensor progress

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Table 6
Summary of $PM_{2.5}$ sensor performance attributes from the subject matter expert discussion on Day 3. (*Note: The listed sensor performance values should not be considered suggestive about any specific US EPA recommended means of establishing such a value*).

Technology Attribute	Minimum Acceptable Value/ Range (count)[a]	Estimated Minimum Acceptable Value/Range
Accuracy	10% (2) 15% (2) 20% (1) 30% (1) 50% (1) 20–50% (1) 20–30% (2) Factor of 2, 100% (1)	Range: 10%–100% Median: 25%
Bias	2.5% (1) 10% (2) 20% (1) 35% (1) 50% (1) 1 μg/m^3 (1) 3 μg/m^3 (1) 5 μg/m^3 (1)	Range: 1 μg/m^3 – 5 μg/m^3 or 2.5%–50% Median: 2 μg/m^3 or 15%
Correlation	r = 0.84 (1) r = 0.87 (1) r = 0.89 (2) r = 0.95 (1)	Range: r = 0.84–0.95 Median: r = 0.89
Detection Limit	1 μg/m^3 (1) 2 μg/m^3 (1) 4 μg/m^3 (1)	Range: 2–4 μg/m^3 Median: 2 μg/m^3
Precision	10% (1) 20% (2) 25% (1) 30% (1) 50% (1)	Range: 10%–50% Median: 23%

[a] Numbers (X) represent the count of SEs who suggested each metric.

What is next?

EPA Office of Research and Development leading effort to publish two EPA Reports:

- Interim Sensor Performance Targets and Test Protocols for Ozone Air Sensors Used in Non-Regulatory Supplemental and Informational Monitoring Applications
- Interim Sensor Performance Targets and Test Protocols for $PM_{2.5}$ Air Sensors Used in Non-Regulatory Supplemental and Informational Monitoring Applications

- Draft scope:
    - Applies to stationary, outdoor sensors
    - Single set of voluntary, non-regulatory performance targets by pollutant (not tiered)
    - Cast as "interim" and may be updated based upon feedback

- Timeline
    - Currently under development and internal deliberation.
    - Likely publication in 2020

And now, broadening the scope to additional pollutants!

Thank you!

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