Air Sensors – An EPA Perspective

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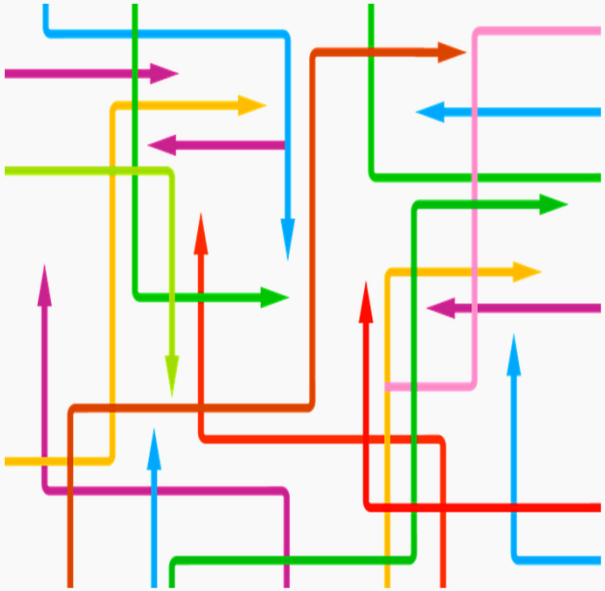
Disclaimer: Material presented is for informational purposes only. EPA does not recommend nor endorse any particular sensor product or data management platform.

Big Data: Volume, Variety, Velocity, Veracity

Current Landscape

1. Data Generators

2. Data Integrators



3. Air Quality Information Systems

Using machine learning and AI to combine:

- Observational data
- Satellite data
- Modeled outputs

Other data (traffic, weather, health etc)

4. Air Quality Information Outputs

Web and mobile applications
(often part of weather packages)

Data Quality

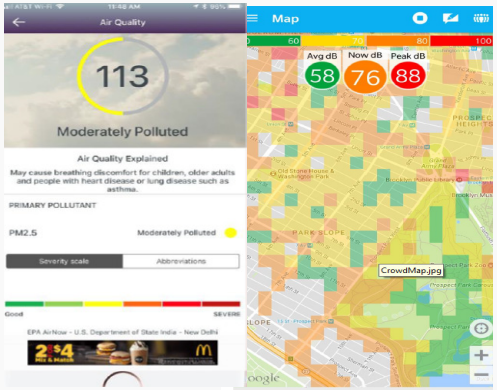
– Current Work
  - EPA's First Workshop on Deliberating Non-Regulatory Performance Targets for $PM_{2.5}$ & O_3
    – June 2018 workshop completed*
    – September 2018 literature review publication*
    – April 2019 journal publication of workshop discussions*
    – Developing ORD EPA interim report with performance targets, evaluation protocols, and best practices for sensors
  - EPA's Second Workshop on Deliberating Performance Targets for Air Sensors
    – July 2019 workshop on additional pollutants - NO_2, SO_2, CO, and PM_{10}
    – Developing ORD EPA interim report with performance targets, evaluation protocols, and best practices for sensors
  - Coordinating public/private partnership in evaluation of sensors

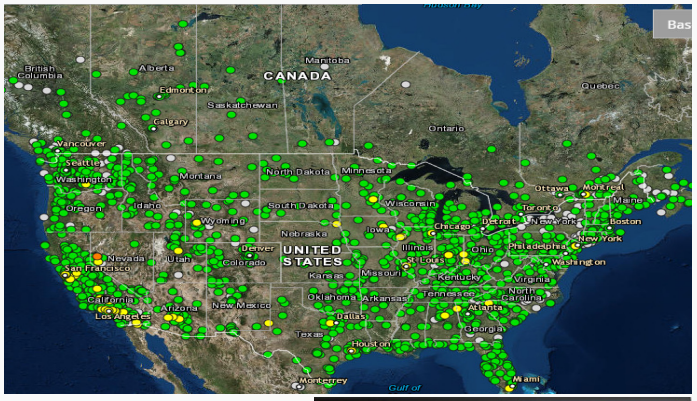
*https://www.epa.gov/air-research/deliberating-performance-targets-air-quality-sensors-workshop

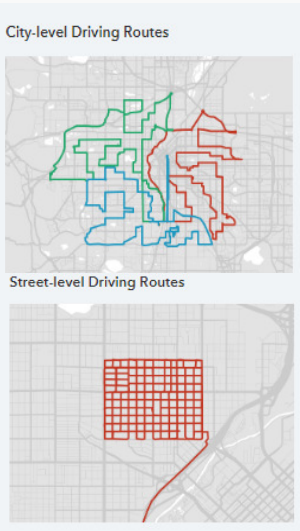
Data Interpretation

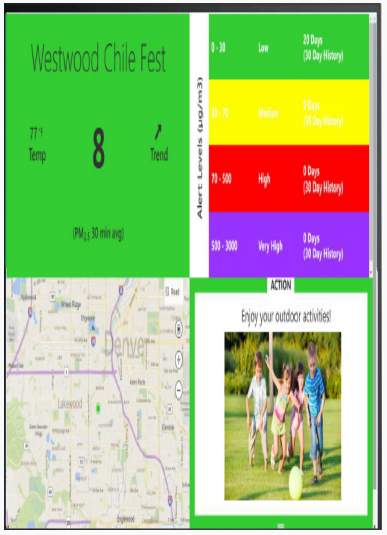
Examples of Data:

- On different spatial and temporal scales
- For different purposes, needs, and users
- Communicating real-time, local conditions
- Resulting in similar “EPA AQI” look









Emerging Evaluation Complexities

- "Learned environment" prior to evaluation
  - Algorithm adjustments during and after testing
- Ownership of non-regulatory monitors and data
  - Ongoing operation and maintenance concerns
- Data Security - Hacking online sensor networks
- Real-time data versus published health studies over longer time periods
- Who is verifying assertions or outputs?

Other Sensors Projects

- EPA developing outreach materials (e.g. short video clips, FAQs, and factsheets) to promote understanding of regulatory vs. sensor data – Late 2019 release
- Responding to requests from Local, State, or Tribal agencies to submit sensor data to EPA
- Facilitating responses to public inquiries on why AirNow conditions differ from weather applications on smartphones
- Examining data algorithm adjustments and assumptions, including published verification of claims
- Intensive study of air quality websites in late summer 2019