Lafayette Engagement and Research Network (LEaRN)

University of Louisiana Lafayette · Lafayette · LEARN Lafayette Engagement & Research Network · CGI

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Topics for Discussion

- LEaRN Collaborative Introductions
- Project Overview
- Status Update Topics:
  - Sensor Platforms
  - Deployment Strategy
  - Data Management
  - Outreach/Community Engagement

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EPA Smart City Air Solution Summary

Guiding Principles from the Challenge

- **Deploy 250 to 500 sensors in a community**: Communities must describe procure and deploy 250 to 500 air quality sensors.

- **Community involvement in purchasing and using the sensors**: The community and its residents will provide funds for the sensors in order to ensure citizen engagement and better data quality.

- **Identification of partners and project sustainability**: EPA will provide prizes to the winning communities. The community and its residents will provide funds and establish partnerships to implement the strategy.

- **Be transparent in terms of making the data open and describing the data management plans**: The data from the sensors will be available for free and in machine-readable form. The data management plan describes how data will be managed in all parts of the information life cycle.

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Objectives and Expected Benefits

- Identifying best practices for managing big data within our community as we implement a comprehensive plan for growth in the Acadiana region.

- Learn how Lafayette will manage large volumes of Smart City data, including environmental, transportation and other sources

- Learn how to best engage citizens in collecting, understanding and using data within their community → increased civic engagement

- How can we use data from many sensors to better understand environmental condition and its relationship to human health

- Provide other cities, businesses, citizens and EPA with real-world lessons about data management through agile and experimental design
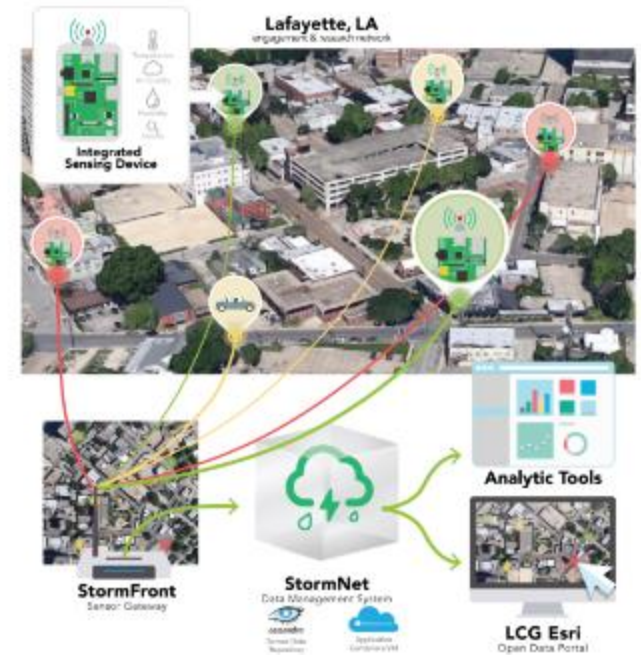
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The LEaRN Collaborative

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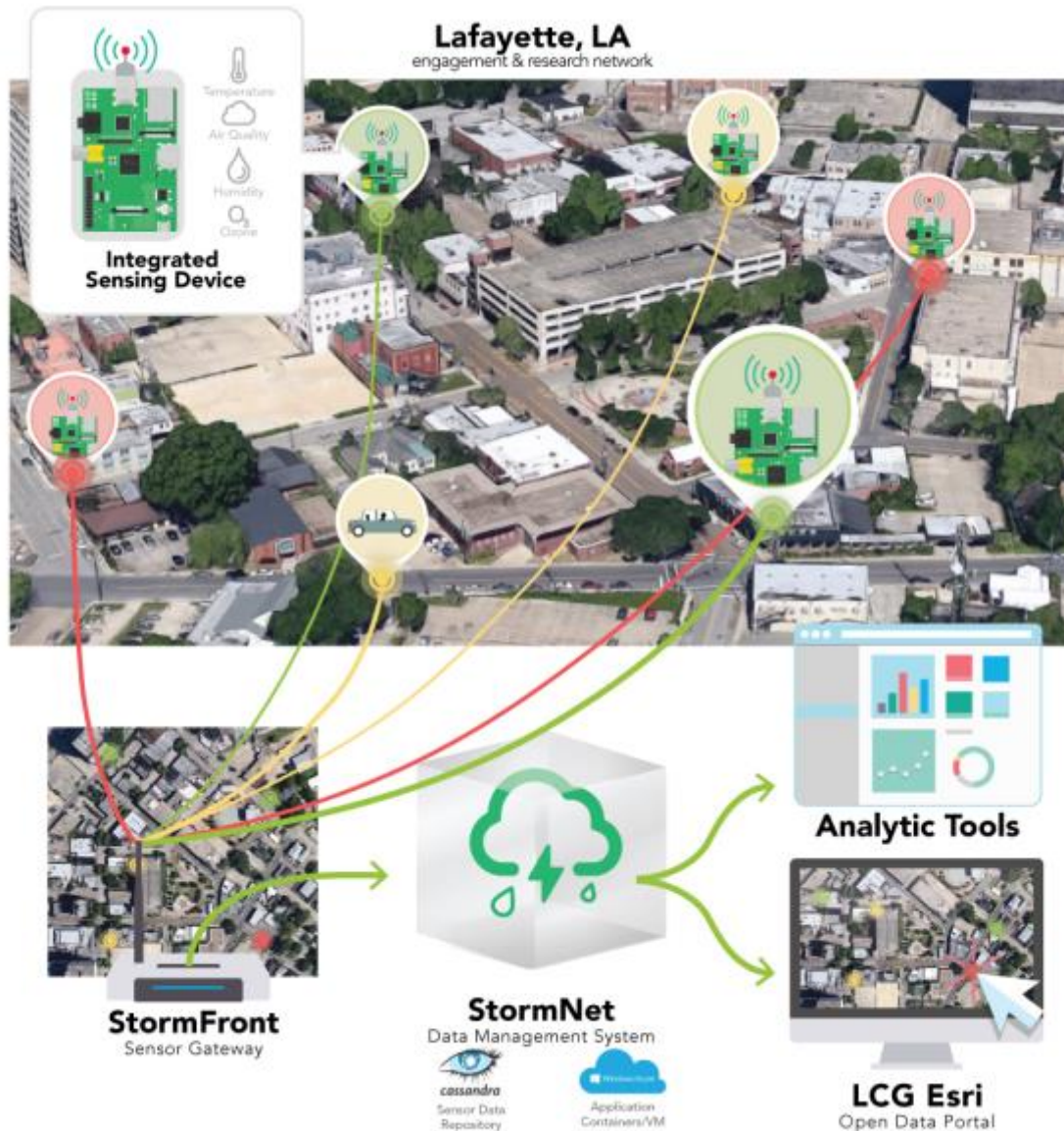
LEaRN Collaborative: Advisory Board

Providing subject matter expertise, best practices and project guidance

LEaRN Collaborative: Lafayette Consolidated Government

Commitment	Expertise and Resources
- Infrastructure for sensor deployment across community - Establish an Open Data Portal via existing Esri Enterprise License - Will utilize effort to inform & launch an Open Data Policy for LCG - LUS Fiber for Gigabit App connectivity for Sensor Network	- Has implemented IoT sensors for traffic congestion; will be cross referenced with air quality data - The Lafayette Comprehensive Plan sets forth objectives that lessons learned around Smart Cities will inform and accelerate - LUS Fiber accelerates deployment

LEaRN Collaborative: UL Lafayette

Commitment	Expertise and Resources
▪ Incorporating LEaRN projects into School of Engineering, School of Geosciences and School of Computing and Informatics ▪ Professors and students will assist in sensor development, calibration, O&M, outreach ▪ LITE Center for Sensor and Network Gateway	▪ UL specialization in IoT/Big Data ▪ NSF funded data analytics and research center ▪ US Ignite Community partner ▪ UL Researchers focused on Air Quality studies for sensor deployment

LEaRN Collaborative: CGI

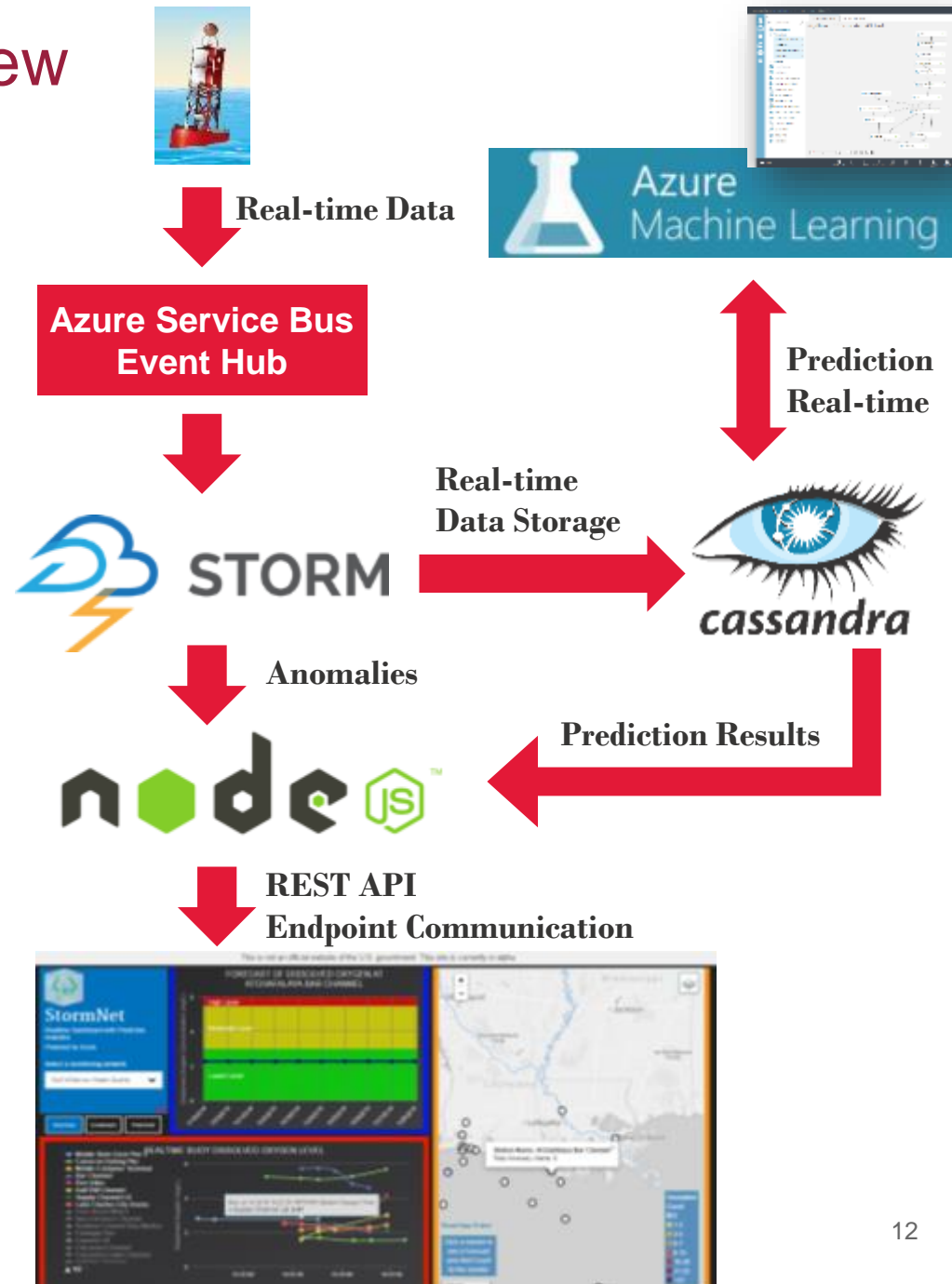| Commitment	Expertise and Resources
▪ Supplemental funding for up to 400 sensors ▪ IoT data management solution ▪ Technical data management and system integration consulting ▪ Assistance in community outreach ▪ Support for Open Data Portal	▪ Global IT solutions provider with proven experience in Smart Cities, IoT and complex data management ▪ Existing partner with Lafayette with over 350 members in community ▪ More than 35 years of mission support state, local and federal environmental customers

Technical Solution Summary

Deploying 300 Air Quality Sensors

StormNet Solution Overview

- **Cloud based –** Industry standard big data platforms

- **Event Hub and Apache Storm** – Real-time capture and processing

- **Cassandra** – persistent secondary storage

- **Azure Machine Learning** – Quickly adopted to capture and display any number of predictions

- **NodeJS/Express** – Communication between multiple components

- **API-based live streaming data dashboard -** Leaflet/Bootstrap/ HighCharts
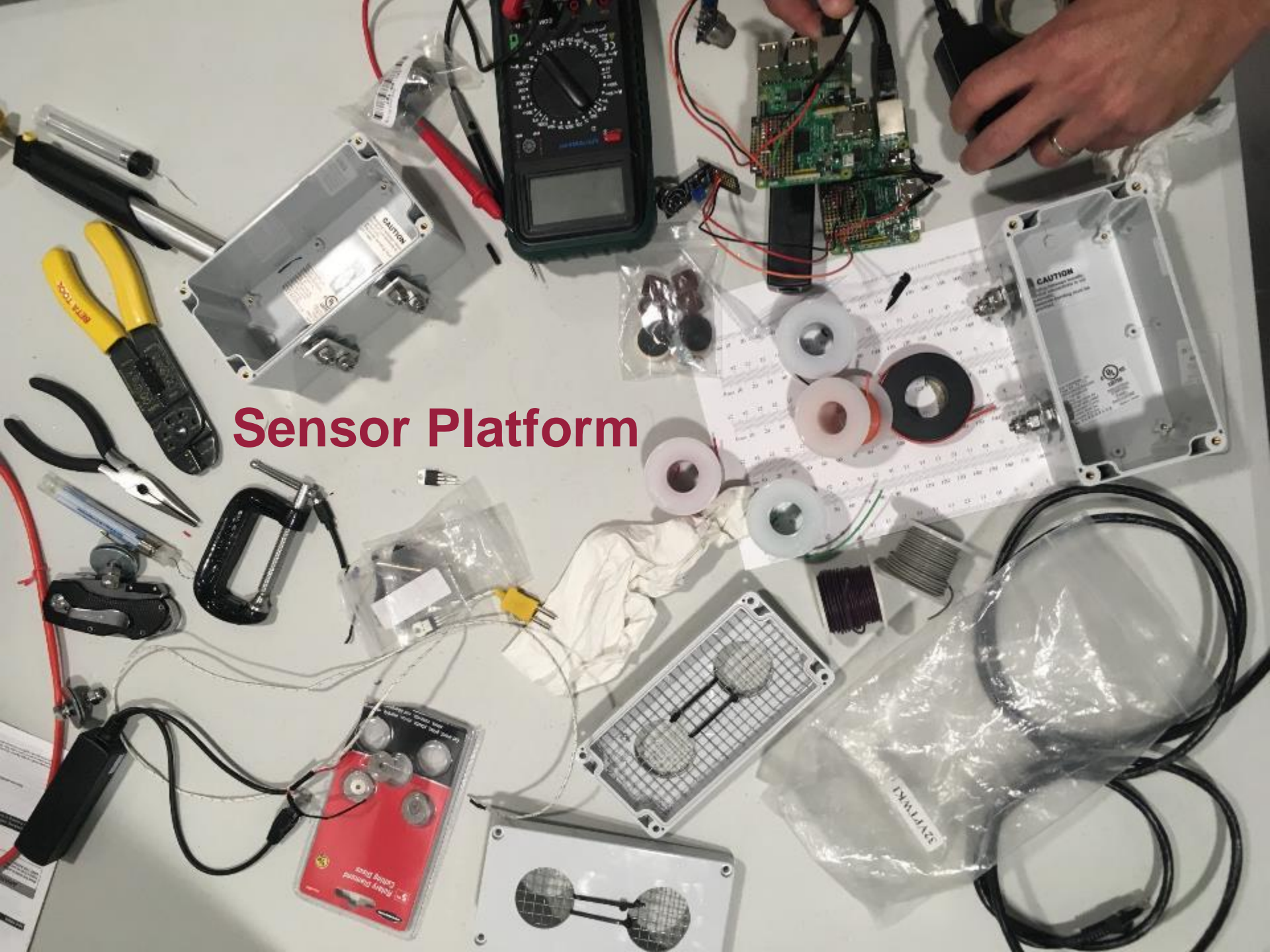
Real-time Data

Azure Service Bus Event Hub

Azure Machine Learning

Prediction Real-time

Real-time Data Storage

Anomalies

Prediction Results

REST API Endpoint Communication

Sample: Real-time Data Visualization in Browser

Demonstration of sample data visualization

Status Update Report

Sensor Platform

Deployment Strategy
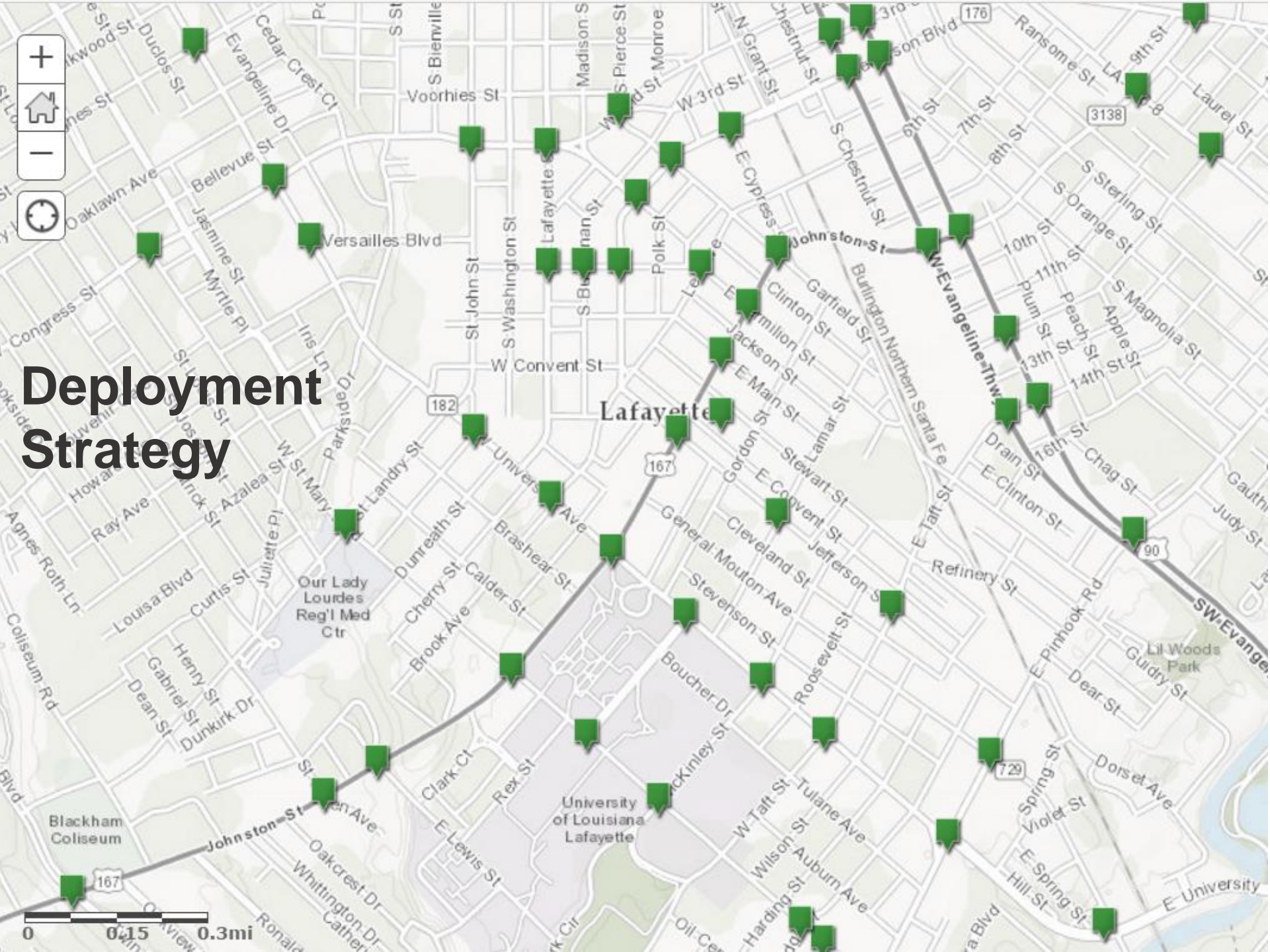
Data Management and API Strategy

- OGC SensorThings API Strategy and Update
- Azure Cloud Hosting Status
- Open Source License
- Open Data Portal
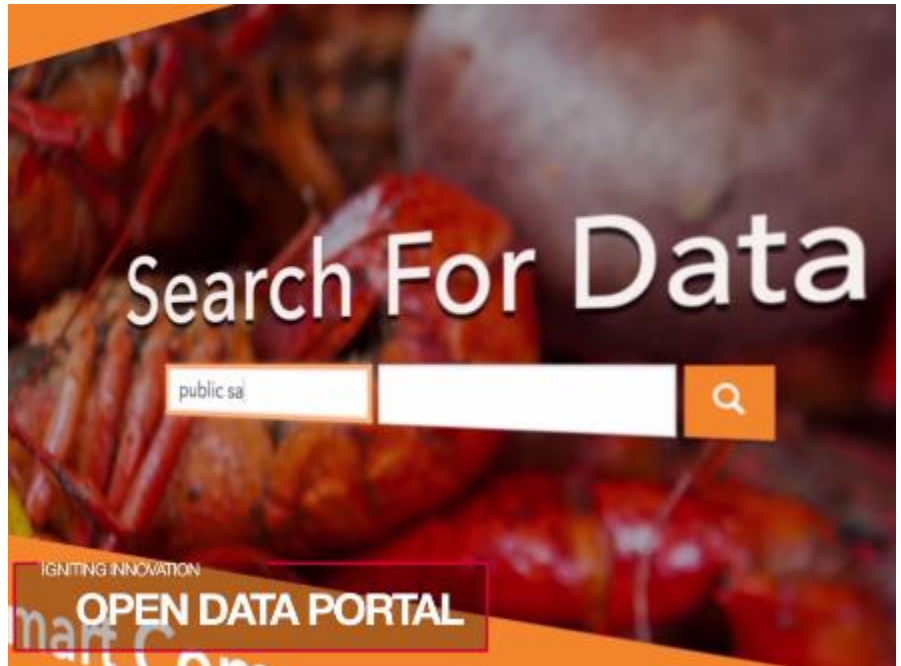
Community Engagement Activities

- Educational sessions with LPSS students from K-12 to engage in LEaRN Collaborative activities related to Air Quality

- Educational/outreach sessions with general public hosted across the library network.

- University and Community College: Student engagement activities on project topics such as sensor assembly, software/application development, data visualization and citizen science

- Social Media via Twitter, Facebook and Instagram