



Interoperable Watersheds Network

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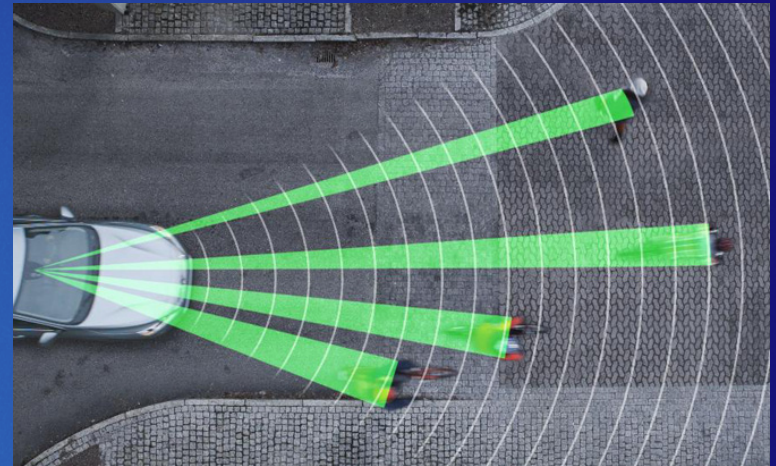
U.S. EPA, OFFICE OF WATER

Sensors are Everywhere

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▶ Sensors-

- ▶ reduction in price and size
- ▶ Increase in how and how often we use them and in the amount of data coming from these sensors
- ▶ We see this in everyday life- i.e. collision avoidance systems, Amazon Echo (listens to you, translates your voice into commands)



▶ Parallel expansion occurring in Environmental Sensing

- ▶ Water and Air sensing technology maturing
- ▶ Copious amounts of 'real-time' data being generated
- ▶ Data is incredibly useful, but in different formats, owned by different organizations, and available in many different places

Not a small Problem:

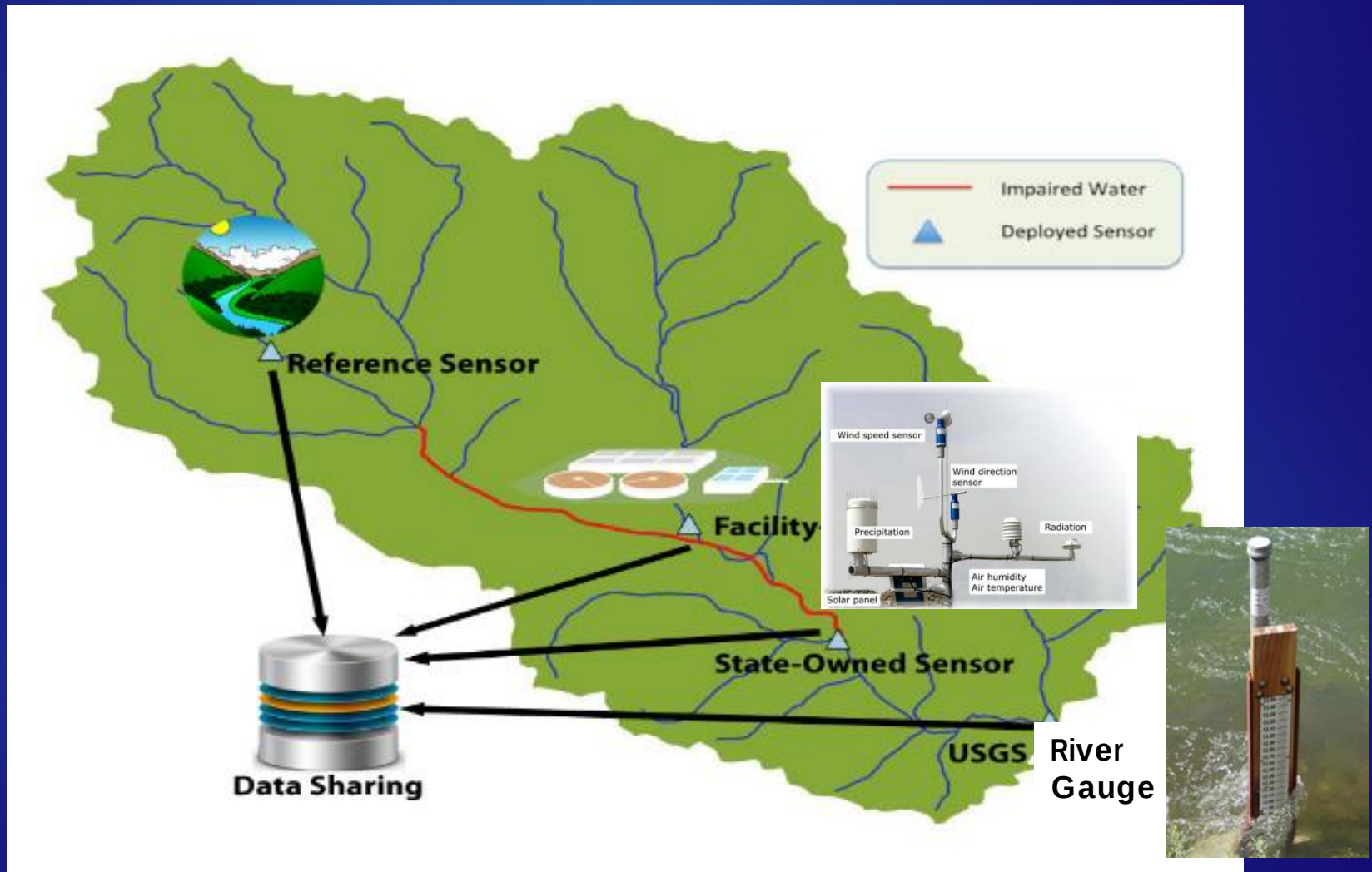
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**Data that people need is hard
to get and hard to use!**

How do we connect all of these data
to the people who need it and deliver
it in the same format?

The Interoperable Watersheds Network (IWN)

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Benefits to Users:

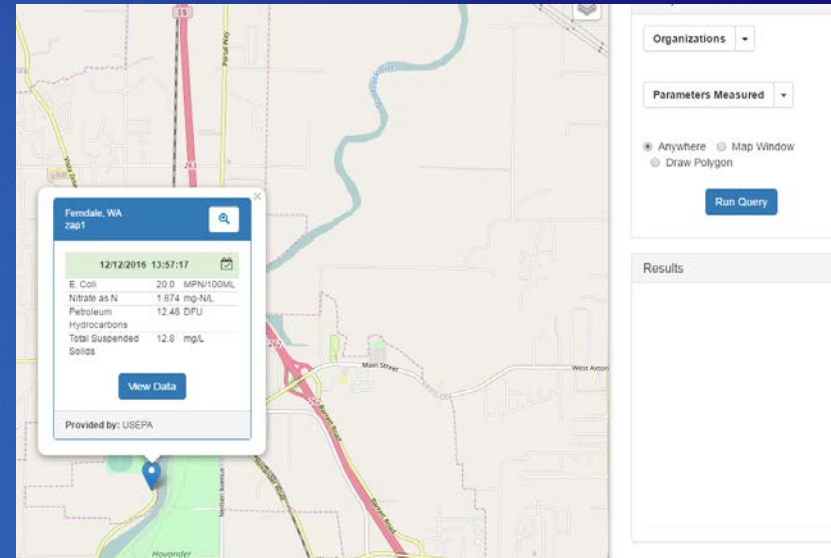
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- ▶ Public:
 - ▶ What is the river gauge reading? I want to go kayaking!
 - ▶ What are the conditions like near that waste water treatment facility outfall near my house?
- ▶ Local:
 - ▶ Drinking water intake shut off during flood event
- ▶ State:
 - ▶ Easier and better assessments of Ecosystem health
- ▶ Academic:
 - ▶ Application of ecosystem models to identify areas in need of restoration
- ▶ National:
 - ▶ Power in large data sets to detect trends and prevent problems

System Design Elements:

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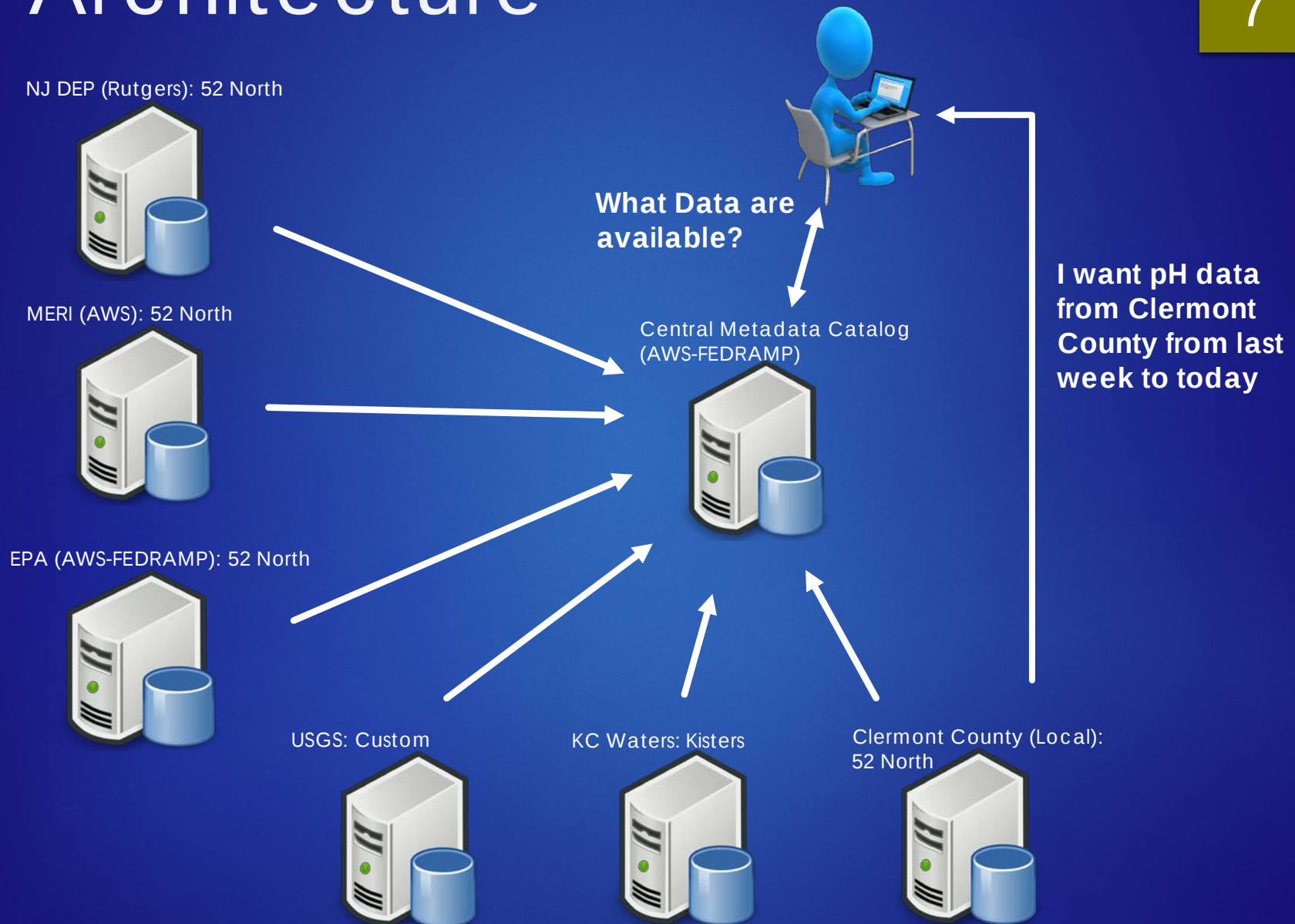
- ▶ System communication standards:
 - ▶ Open Geospatial Consortium
 - ▶ WaterML 2 and Sensor Observation Service
- ▶ Sensors Catalog (or Searchable Index i.e. google)
- ▶ Data Appliances: Open Source Platforms (52North and Amazon cloud) and Web Services based Design (anyone can connect)
- ▶ Demonstration Tool:
 - Map-based Data Discovery Tool
 - Displays data being measured in real time AND allows you to download data all in the same format



<http://54.210.62.171/>

Architecture

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Project Successes:

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Exceeded target of 4 local, state, and national partners!

8 Partners currently sharing data:

- EPA Region 1: 2 Sensors
- EPA Region 7: 18 Sensors
- EPA Region 10: 1 Sensor
- EPA ORD: 3 Sensors
- NJ DEP: 106 Sensors
- NJ Meadowlands: 3 Sensors
- Clermont County, OH: 4 Sensors
- USGS: 15,541 Sensors (nationwide coverage)



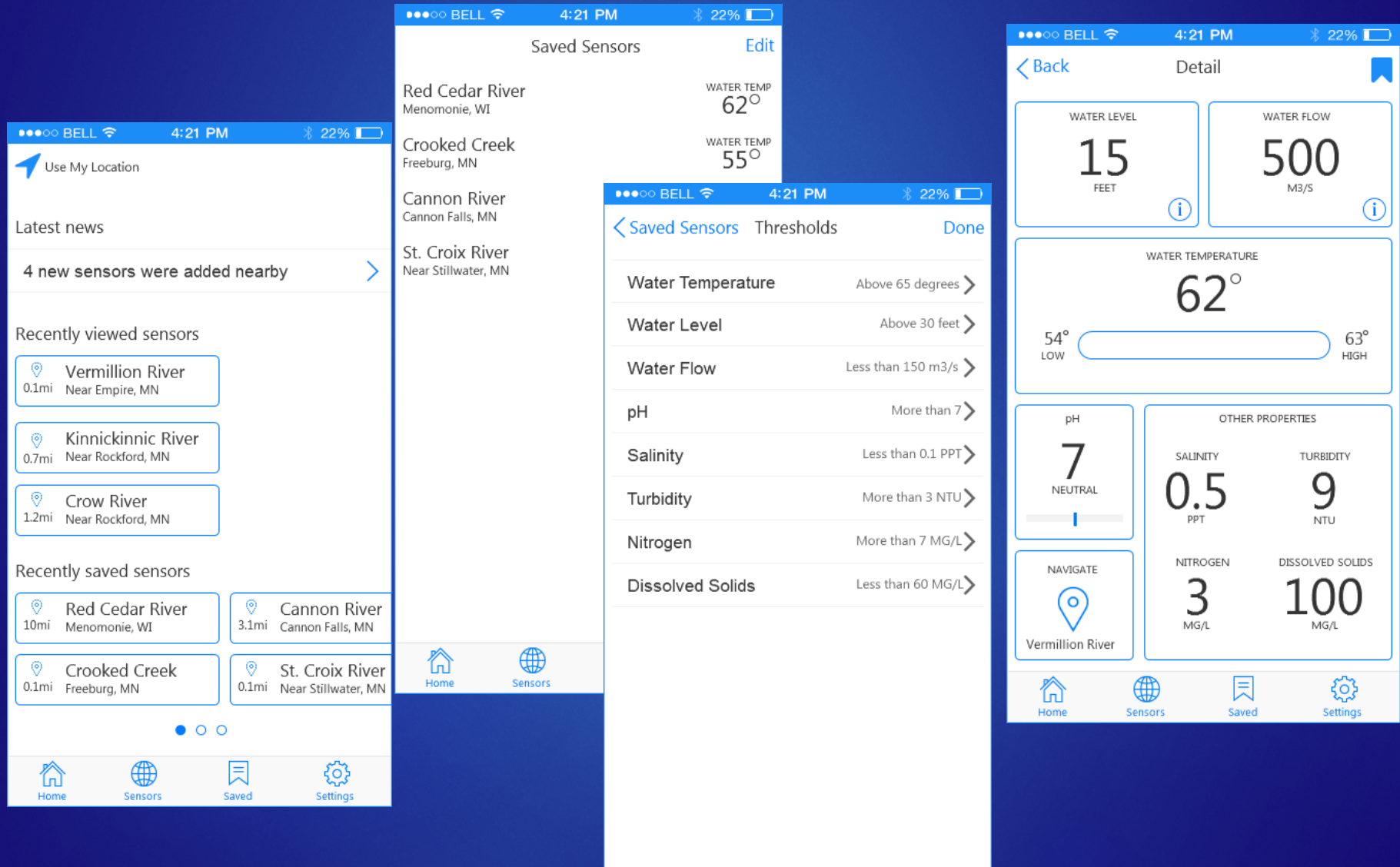
Ready to Move Forward:

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- ▶ Demonstration project complete December 2016
 - ▶ Lessons Learned Report is available
 - ▶ Demonstration tool (Currents) will continue to be available
 - ▶ A mobile app is being developed that leverages the services/API developed as part of this project
- ▶ Demonstration proved to be very successful
 - ▶ Services worked better than expected
 - ▶ Ease of setting up a data appliance was simpler than anticipated
 - ▶ Ready to move to a production-level system
 - ▶ Advanced Monitoring Team is exploring if the services and standards would work for Air data as well

Coming Next: Mobile App

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What We've Learned

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- Metadata needs to be simple enough that it's not a burden on the data provider, but readily available to the user
- Cloud options for the 'Data Appliance' will be an important part of the solution
- Different entities have different comfort levels with publishing provisional data
- Integration between sample data and sensor data will be critical
- A lot has already been done in this space, we don't need to reinvent the wheel
- Off-the-shelf software supports these services well

Questions?

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