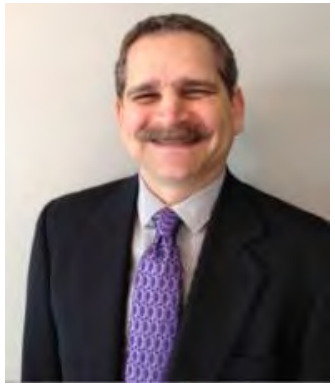
VIPC | VIRGINIA INNOVATION PARTNERSHIP CORPORATION

Connecting Innovators with Opportunity

State and Local Experience in Virginia Implementing IoT Sensors and Data Systems

Presented to: 7th Annual NRC PFHA Research Workshop



Author: David Ihrie, VIPC

Abstract: The Commonwealth of Virginia and local government partners now have increasing experience implementing IoT sensors such as flood and wildfire sensors, and their related data systems and user-facing applications. This talk provides a description of the journey, lessons learned, and a look towards the future as these increasingly ubiquitous sensors become a primary driver for situational awareness and delivery of services.

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UNCLASSIFIED

February 2022

VIPA | VIRGINIA INNOVATION PARTNERSHIP AUTHORITY

State Legal Authority

VIPA Operating Arm & Managing Nonprofit

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VIPC's Executive Office functions for VIPA and VIPC Divisions include: Finance & Administration, Human Resources, Policy, Communications and Government Engagement.

VIPC | DIVISION *of* ENTREPRENEURIAL ECOSYSTEMS

Mission

Support and connection for entrepreneurial ecosystems and stakeholders around Virginia, including startup incubators and accelerators

VIPC | DIVISION *of* COMMERCIALIZATION

Mission

Grant funding in support of tech-based research, development & commercialization to drive economic growth in Virginia

VIPC | DIVISION *of* INVESTMENT

Mission

Seed and early-stage funding for Virginia-based companies with high potential for rapid growth and significant economic returns

VIPC | DIVISION *of* STRATEGIC INITIATIVES

Mission

Leadership for strategic initiatives that explore and shape programs designed to attract and grow innovation and new industries

Strategic Initiatives Current Portfolio:

- SCITI LABS
- VIPC | Smart
- VIRGINIA SMART COMMUNITY TESTBED STAFFORD, VA
- VIPC | VIRGINIA INNOVATION PARTNERSHIP CORPORATION PUBLIC SAFETY INNOVATION CENTER
- Virginia Unmanned Systems Center at VIPC

Virginia Smart Community Testbed

Smart Community IoT Flood Sensors

Homeland Security
Science and Technology

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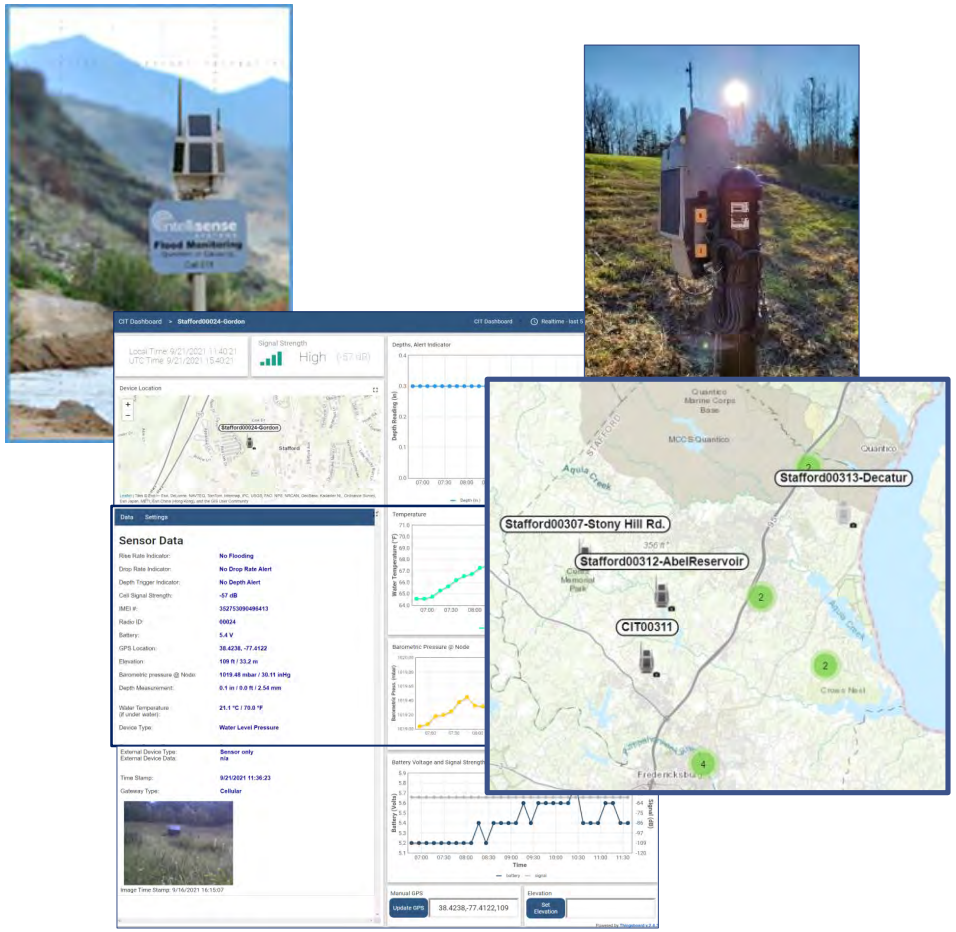
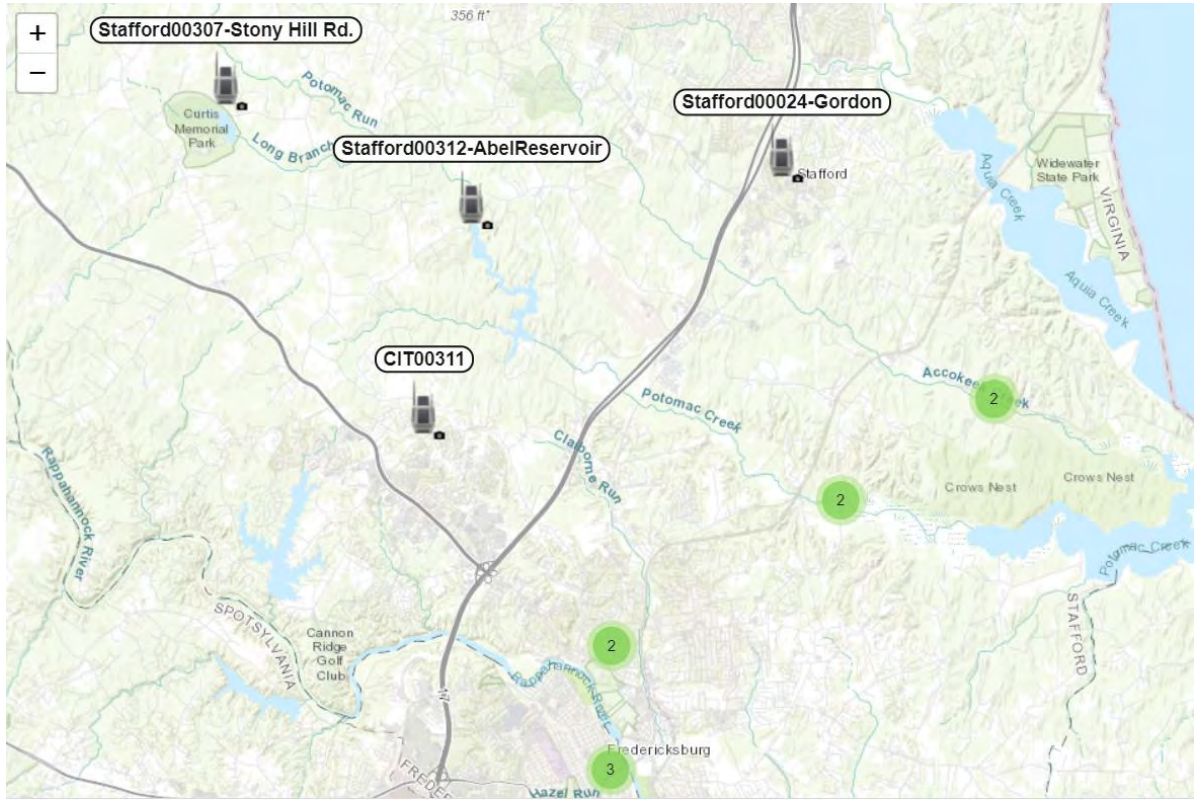
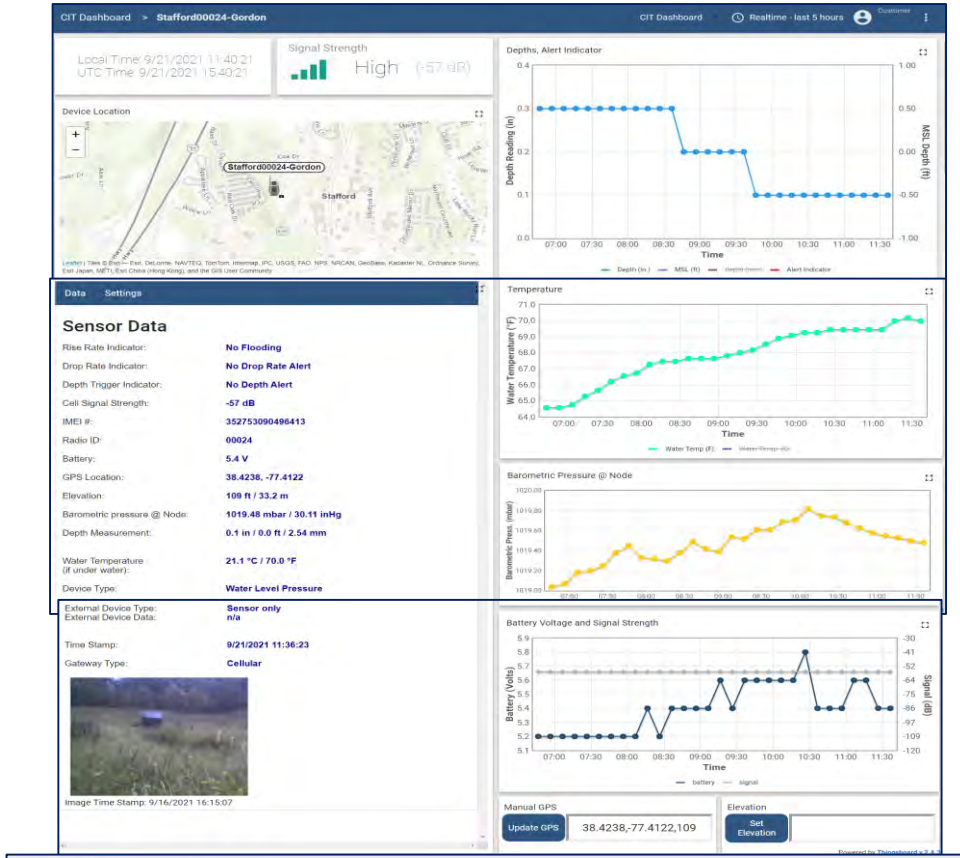
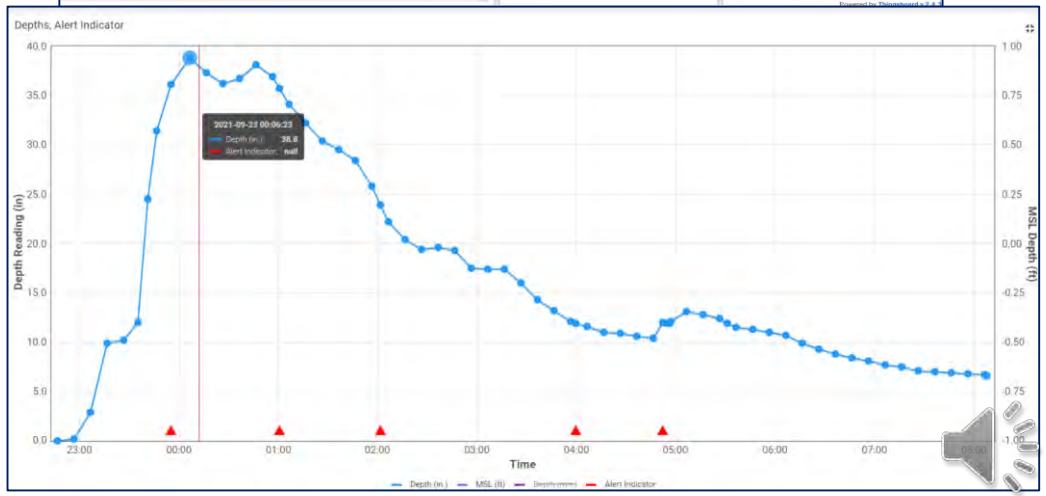


Stafford County Using Data for Emergency Management of Flooding

Smart Community IoT Flood Sensors







- Stafford lead site for statewide pilot
- Significant uptake from all communities – some buying their own supplements
- Low cost a primary factor
- Advanced uses in discussion for Stafford

Smart Community IoT Flood Sensors

Homeland Security
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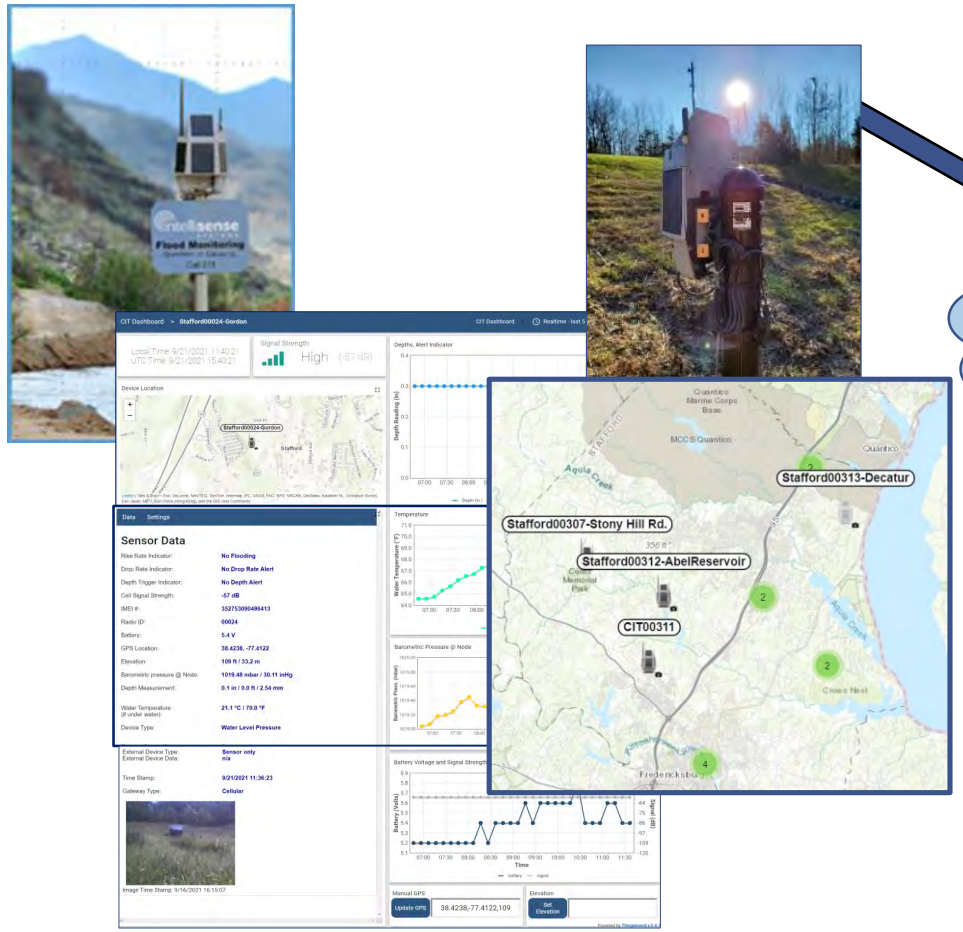
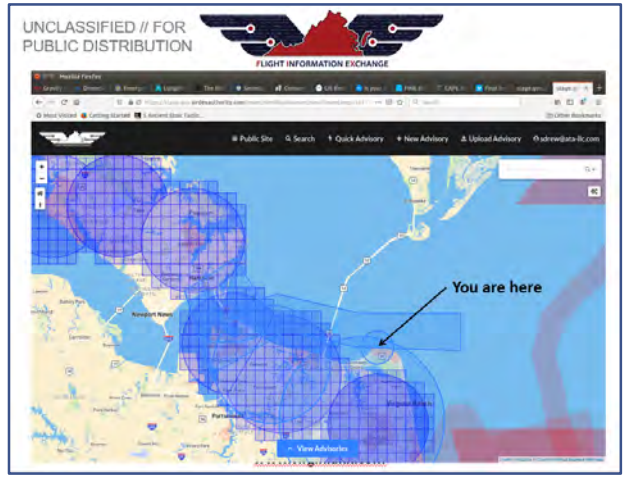
Commonwealth Investment



Stafford County Using Data for Emergency Management of Flooding

Commonwealth Data Trust



VA-FIX Supports Airspace Coordination For Drone Operators

Smart Community IoT Flood Sensors

Homeland Security
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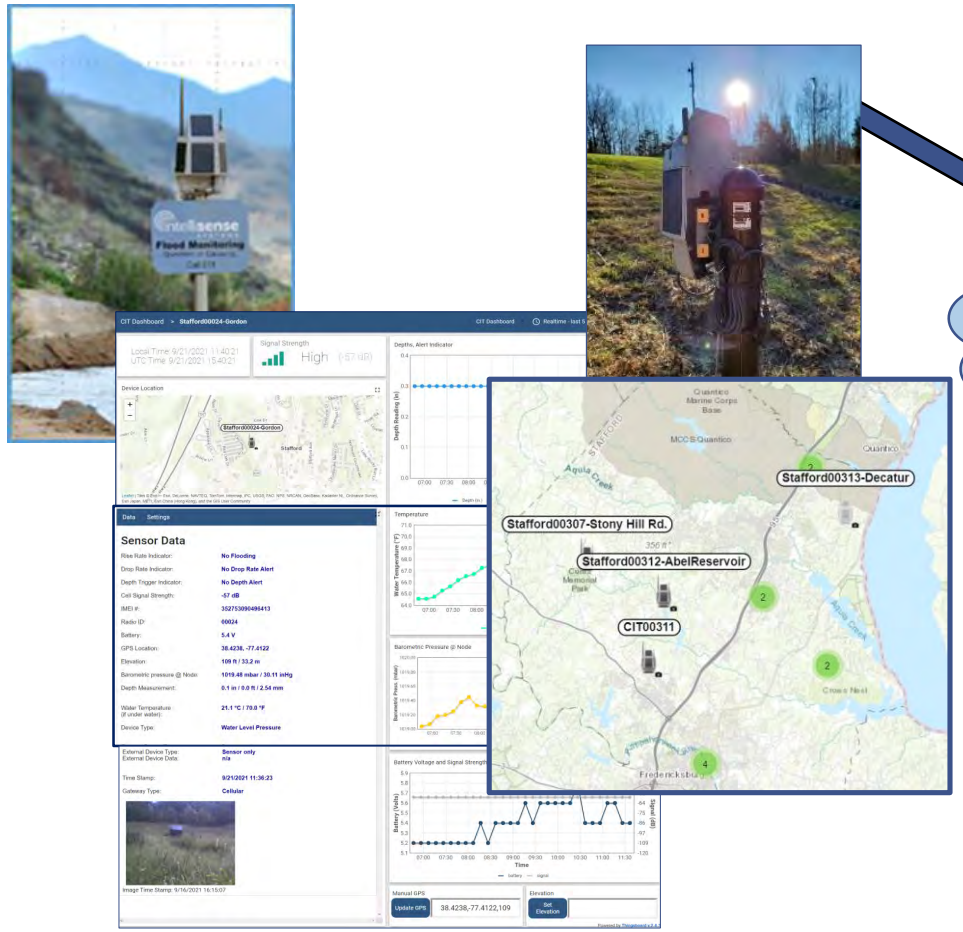
Commonwealth Investment



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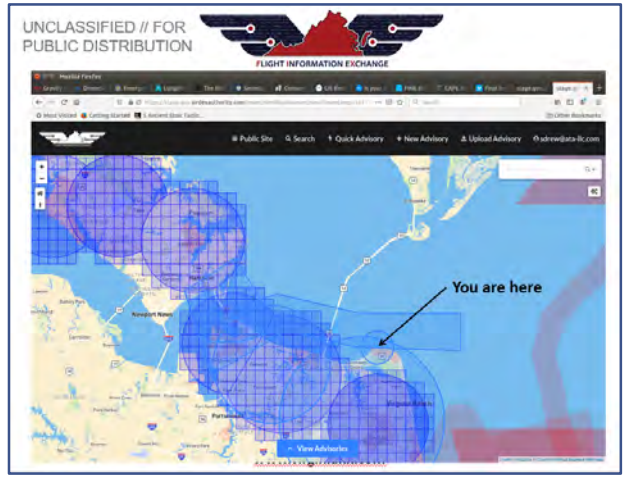
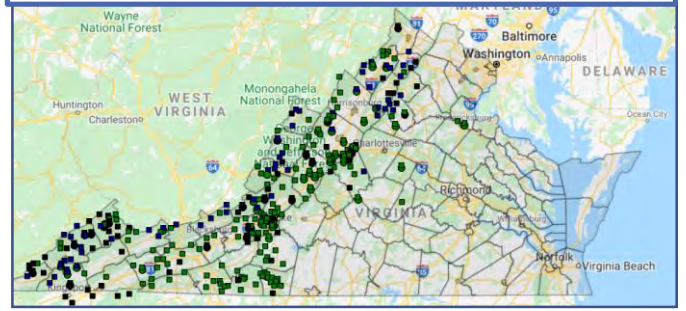


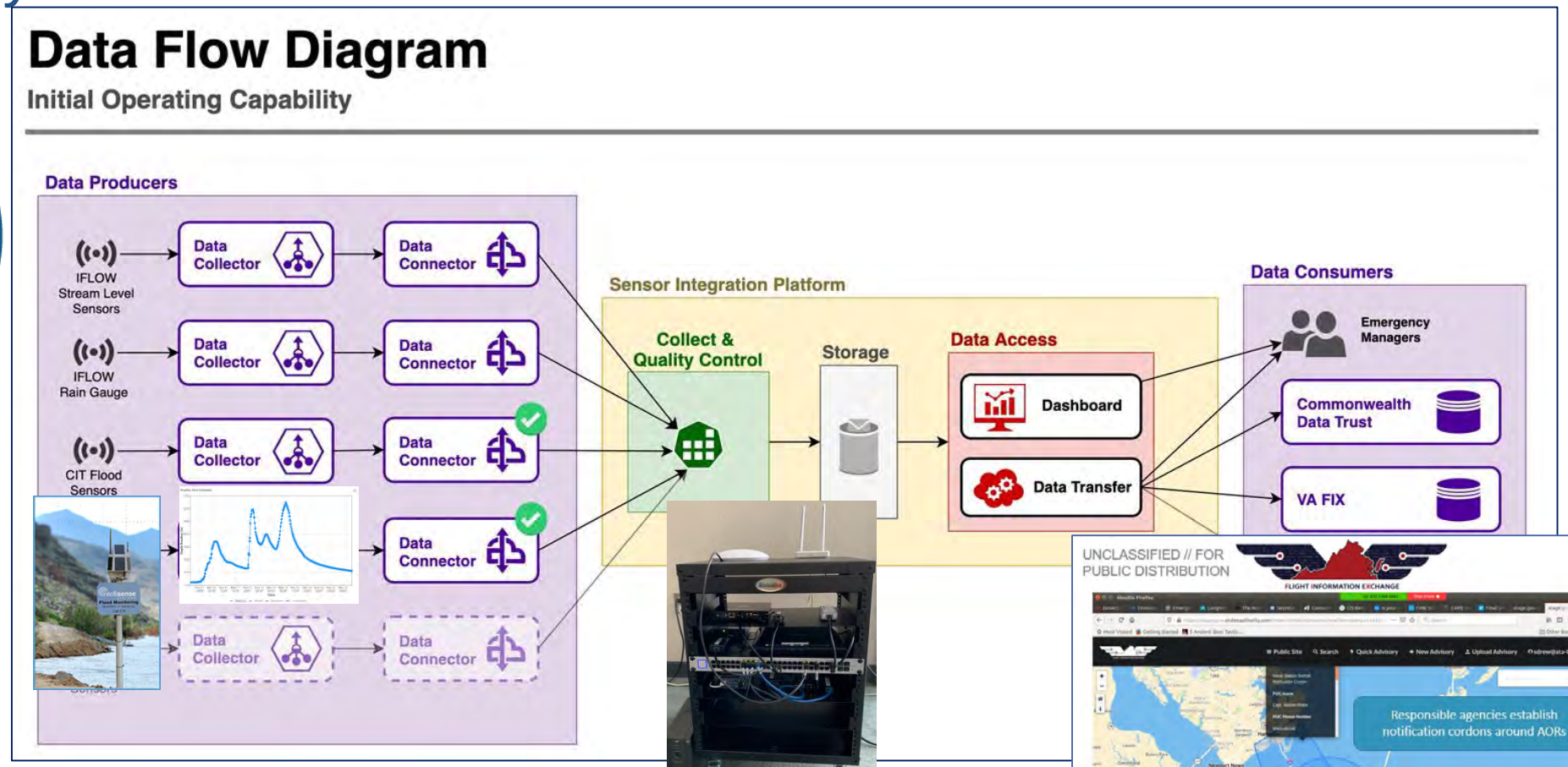
VA-FIX Supports Airspace Coordination For Drone Operators

Virginia Department of Emergency Management



Legacy IFLOWS Network Informs NWS Flood Alerts

Data Security and Governance



- Real-time IoT Data streams shared via Data Trust permissions and governance
- VA-FIX now registered user, VIPC as Data Trust Member can upload streams or provide metadata for access

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IoT Device Security

- "Zero Trust Security"
- Makes groups of IoT devices invisible to hackers
- In place for Stafford Security cameras
- Wider applications demo at Ft. Belvoir for power infrastructure

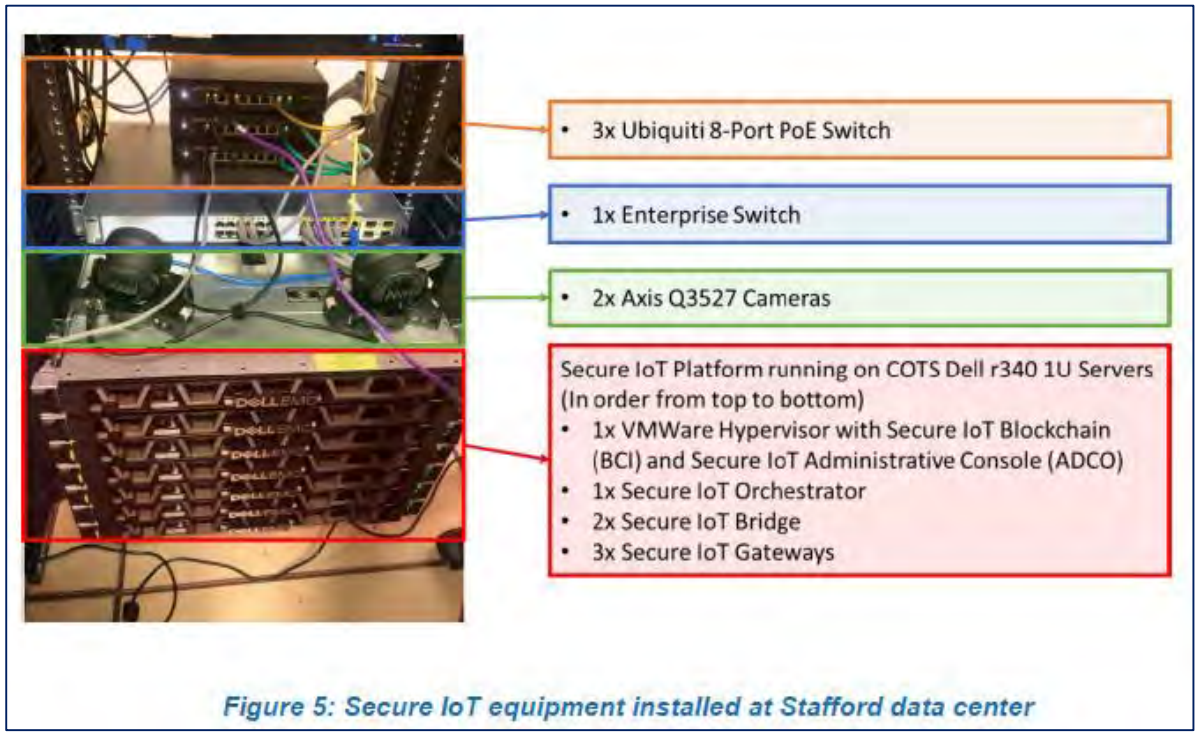
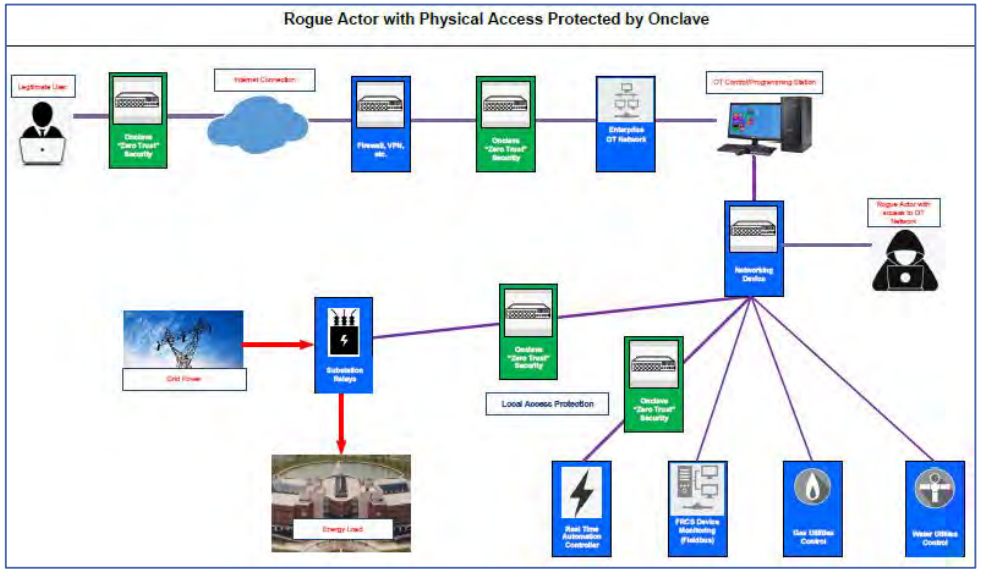


Figure 5: Secure IoT equipment installed at Stafford data center



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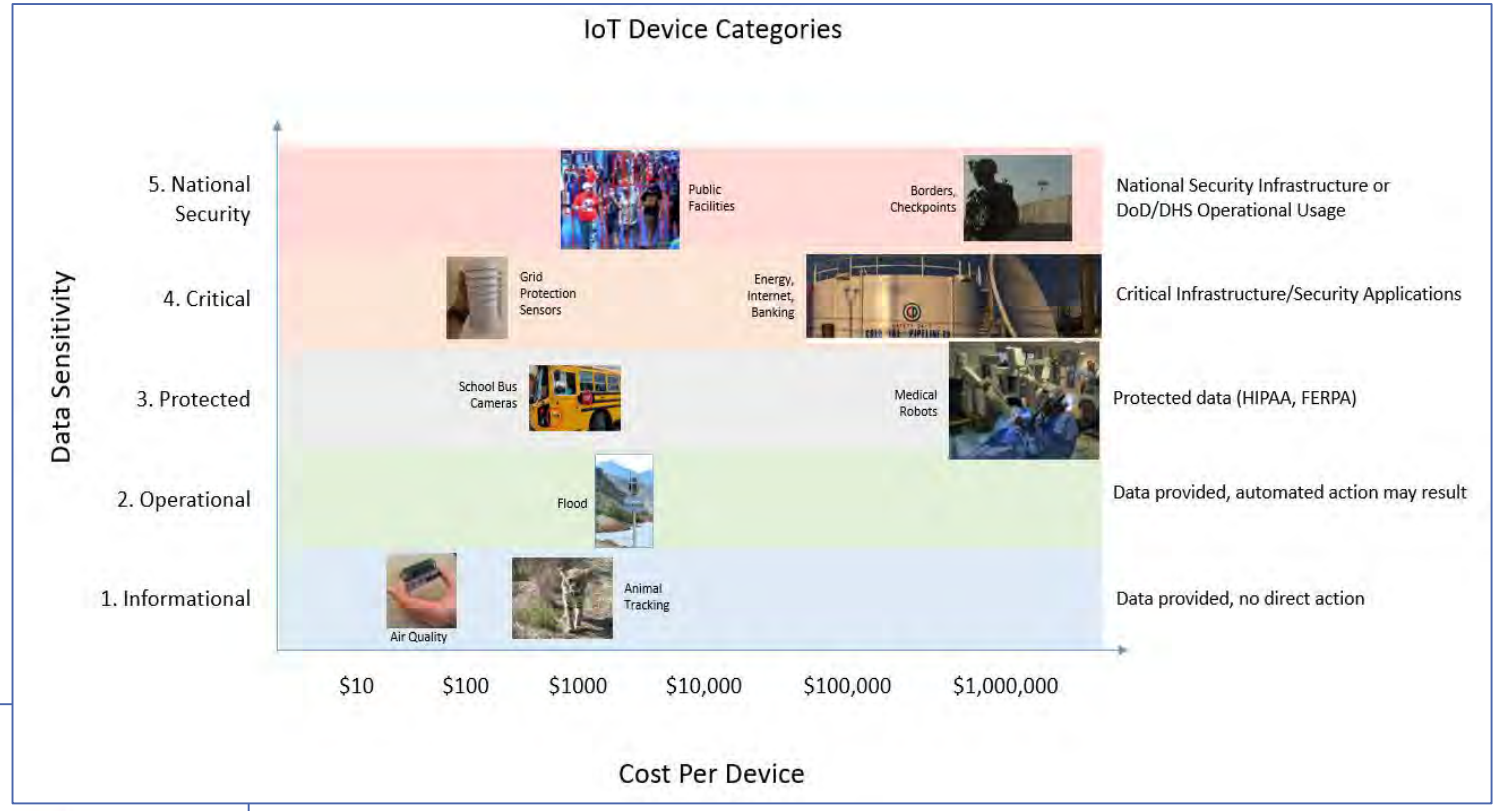
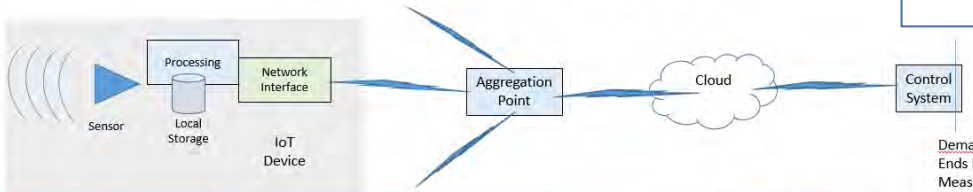
IoT Device Security



IoT Block Diagram and Threats
(Not all elements present in all systems)



Demarc Point – IoT Security Ends Here, Other Security Measures Beyond This Point

Point of Attack	Threat	Potential Solution	Applicable Device Category
Device	Data Skimming (Theft)	Device Storage Encrypted	3+
	Repurposed Infrastructure	Behavioral Controls on Data Flow	1+
	Bogus Commands	Data Diode	2+
	Corrupted Data	Operational Checks	1+
In Transit	Device Spoofing	Device Validation	2+
	Data skimming (Theft)	End-to-End Encryption	2+
System	Physical Access	Zero Trust	2+
	Data Leakage (Inappropriate Sharing)	Event-driven sharing	2+

- Assumes other security procedural controls in place (ie, personnel controls, training, response plans)
- Categories per prior diagram of data sensitivity

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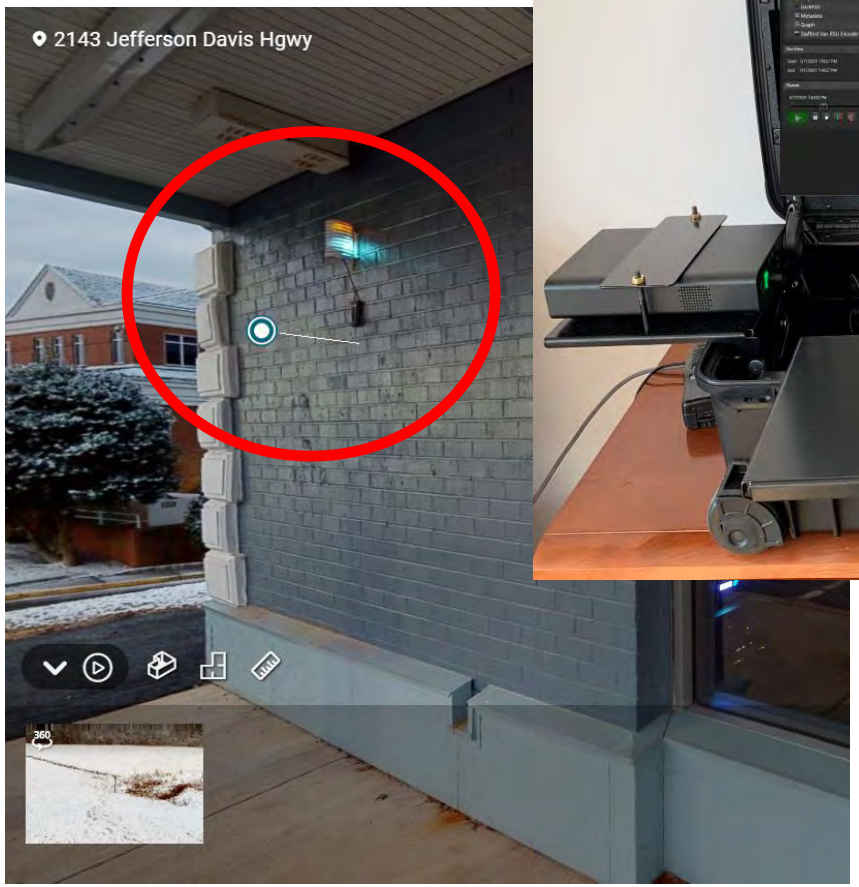
IoT Data Infrastructure Supports Many Types of Sensors



Air Quality/Wildfire

Drone Video/Data

Micro Weather Stations

The MWS®-M625 includes all the same great features as our line of proven line of Micro Weather Stations (MWS®) and adds cloud height measurement and two-way Iridium satellite for more accurate and reliable meteorological reporting.

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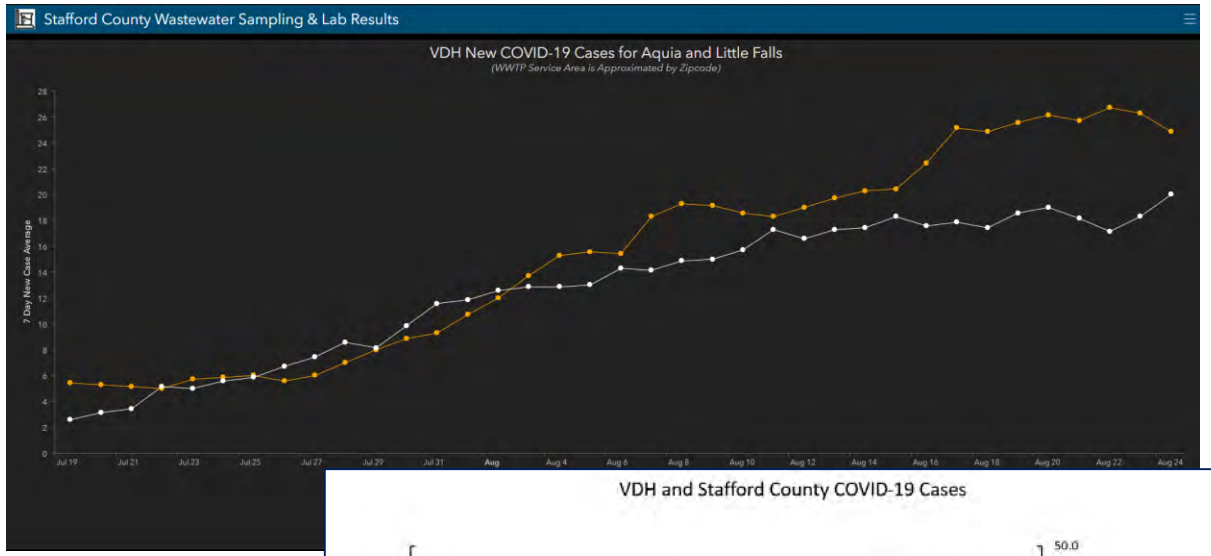

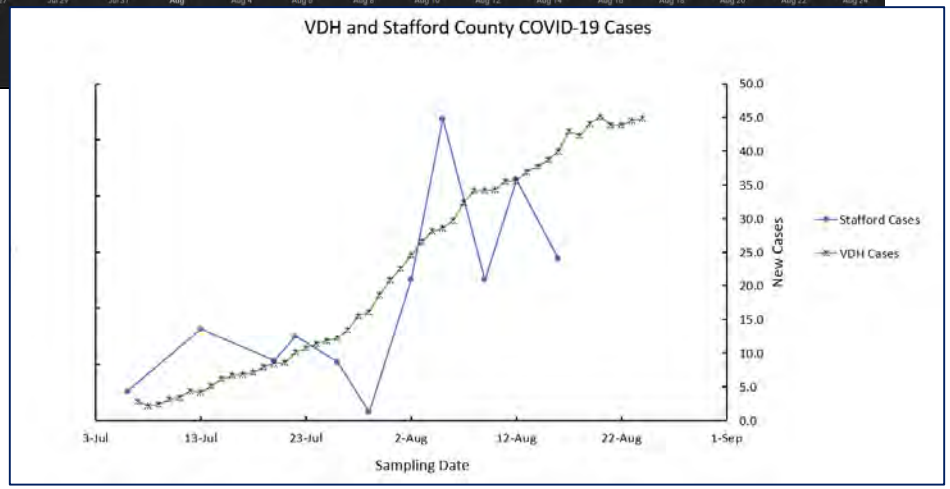

- Wastewater data more accurate than VDH, presents earlier, enables passive monitoring
- Identifies both asymptomatic and pre-symptomatic cases
- Allows potential for more targeted response
- First of its kind testing in U.S.

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Lessons Learned

- Get Started!
- Cost Matters
- Users Are the Best Innovators
- A secure, integrated architecture is critical for successful adoption
- Commonwealth Data Trust Provides a Model for Data Governance and Information Sharing

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