GROUND TRUTH, TRUST, LEDGERS, WATER SECURITY

COMBINING DISPARATE BIG DATA & NETWORK GRAPH SCIENCE,
WITH BLOCKCHAIN TECHNOLOGY AND MACHINE LEARNING
TO DRIVE DEEPLY DESCRIPTIVE ANALYTICS &
INSIGHTFUL PREDICTIVE ANALYTICS

FOR MORE INFORMATION, PLEASE CONTACT:
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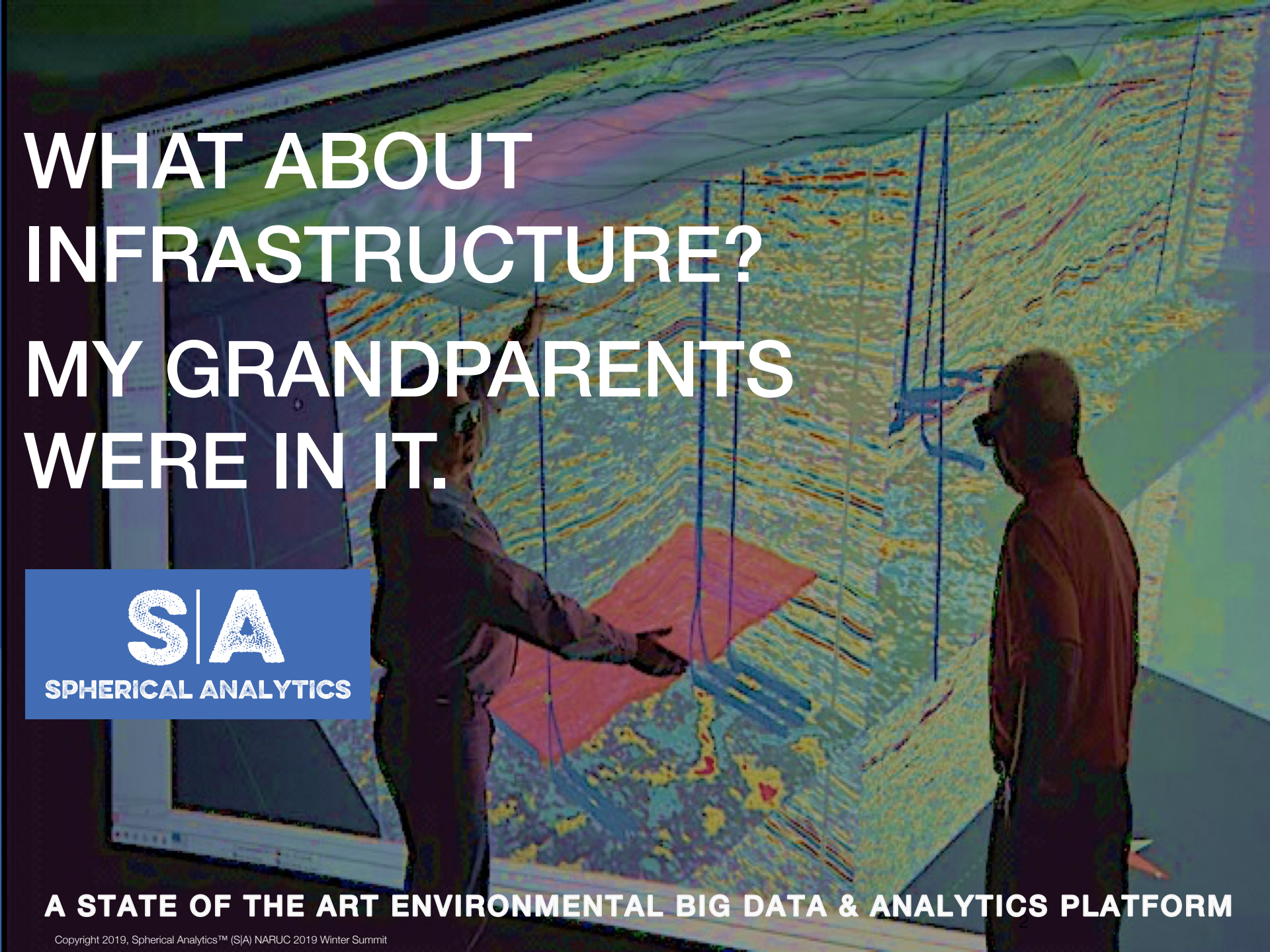
A CONTEXTLABS Company

S|A SPHERICAL ANALYTICS



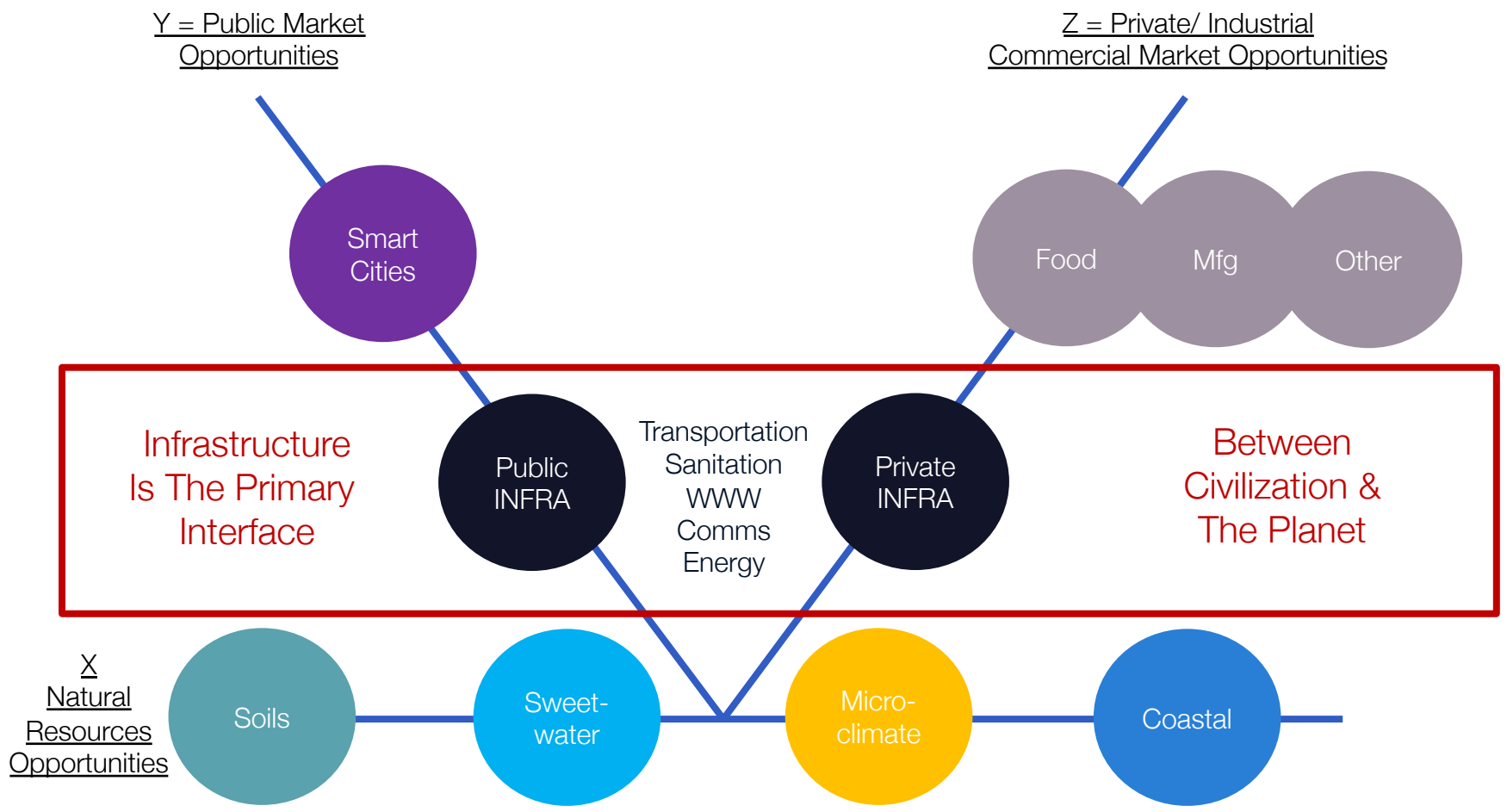
Resilience is growing as an imperative, especially in infrastructure. S|A can help stakeholders home in on the highest impact opportunities

Credit: Parag Kahn, Sharjah Industrial Development/ Investment Forum, 2016

RESILIENCE INFRASTRUCTURE IS TABLE STAKES

S|A SPHERICAL ANALYTICS

We need to change the conversation about infrastructure because we need to change our approach to infrastructure



SPHERICAL ANALYTICS

CYBER, DISTRIBUTED, PRIVATE, PROFITABLE, ESG CERTIFIED

CORE PRINCIPLE: EVERYTHING IS CONNECTED

Cyberphysical infrastructure has:

1. Complex supply chains
2. High risk of stall, loss, damage
3. Heavily regulated, compliance risk
4. Fragmenting/ federating markets
5. IP challenges

Cyberphysical resilience demands:

- *Transparency*
- *Agility*
- *Veracity*
- *Velocity*
- *Trust*

Tools for baseline assessment/ as-is/ as-built (risk) conditions

RISK

Internal Value Propositions

- Operational impacts
- Financial impacts
- Verifiable social impacts (ESG)

Tools for enhancing on-going monitoring, management systems

External Value Propositions

- Access to customer $$$
- Access to capital/ debt
- Access to Insurance / reinsurance

Tools for engaging partners with new levels of trusted data/ proof

RESILIENCE

Tools for enabling, evidencing, new levels of operational, financial, climate resilience

S|A
A TRUST PLATFORM SOLUTION OVERVIEW

S|A
SPHERICAL ANALYTICS

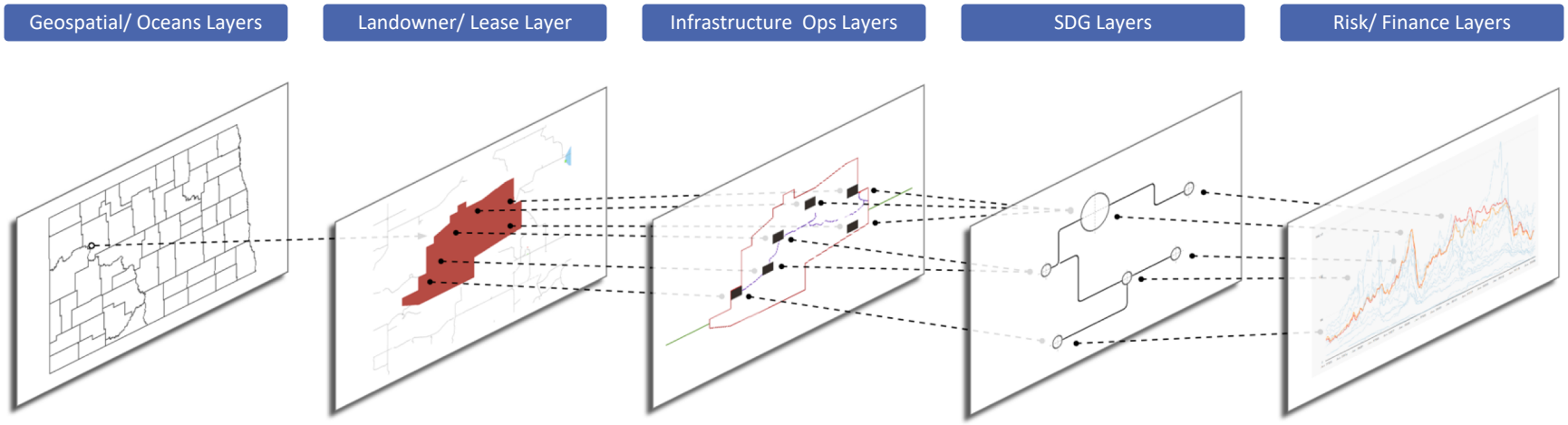
A STATE OF THE ART ENVIRONMENTAL BIG DATA & ANALYTICS PLATFORM

Water Data Current Realities

- Environmental & infrastructure data is highly fragmented and "noisy"
- Many data layers are not structured or standardized in a way to make it accessible/ shareable
- Many data sources are nodal and not Interconnected (edge connections)
- Few data sources are trusted
- Most data, ecosystems are thus *not being leveraged* to their maximum impact potential

S|A Core Strategic Principles

- Leverage our IP to radically ingest and interconnect widespread trusted climate data *(TCD Everywhere)* and climate analytics with infrastructure, industrial, related data sets
- Enable the "TCD Network Graphs"
- Leverage and scale analytics for a variety of stakeholders to accelerate climate-responsive/ regenerative outcomes, that scale, are profitable and persist
- We need a "ticker for the environment"



CORE PRINCIPLE:
Blockchain is sometimes necessary, always insufficient.

1. Ledger administration – adaptive ABAC, not rigid (goes for all services)
2. Private permissioned -- not public open access
3. All source ingestion – machine data matters more than social
4. Cryptographic proofs on source, data, models – no GIGO
5. State machines to model workflows/ dataflows – ground the ledger
6. Flexible consensus and reconciliation – not one size fits all
7. Distributed/ decentralized – hyperconcentrations are unstable

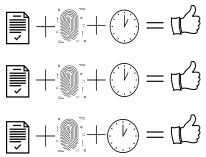
INGEST

Multiple Sources

- Client data
- Open source data
- Machine data
- Other data

ENRICH

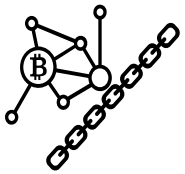
Trusted Data



- Configurable, cryptographic multi-point proofing
- Configurable state engines

LEDGER

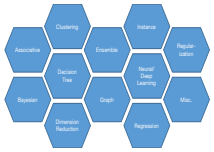
Blockchain DLT



- Configurable blockchain ledgers
- Multiple consensus and reconciliation methods
- Interoperable side-chains

ENHANCE

Descriptive/ Predictive Analytics



- NW graphic analytics
- Multivariate analytics
- Descriptive analytics
- Machine learning
- Predictive analytics

VISUALIZE

Network Graphs/ Custom Displays

- Industry-defined standard formats
- Customer defined formats
- Wall/ screen & mobile

DELIVER

Targeted User Experiences

- Highest true currency of information
- Provenanced data, pedigreed analytics
- Actionable intelligence
- Verifiable operational, financial, social impacts
- Across stakeholders

S|A SPHERICAL ANALYTICS

S|A DEPLOYMENT SNAPSHOT

S|A
SPHERICAL ANALYTICS

A STATE OF THE ART ENVIRONMENTAL BIG DATA & ANALYTICS PLATFORM

CORE PRINCIPLE:
Trusted data is the oxygen of the enterprise; from quantum (one person part time) to F50

Recent/ ongoing S|A implementations

1. Energy and emissions in PA with EDF
2. Sustainable fisheries and oceans health in MA with New Bedford Port Authority
3. Risk mitigation for inclusive OZ investment in US with multiple investors
4. Groundwater/ townwater monitoring in multiple communities
5. Surfacewater asset monitoring/ management in multiple communities
6. EP grid edge monitoring/ management with new P3 entities
7. Coastal resilience with multiple communities, P3 entities
8. New asset pricing models with high pedigree ‘E’ with a top 10 asset manager
9. New risk rating models with multiple ‘ESG’ factors with a top 10 credit agency
10. New distributed commercial ecosystem models with a F50 brand

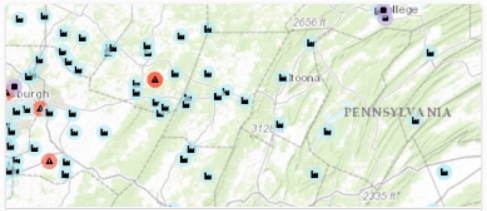
EDF ENVIRONMENTAL DEFENSE FUND
Finding the ways that work

Environmental Data Initiative

Home | News | Explorer | Scenarios | Methodology | Analytics | Sources

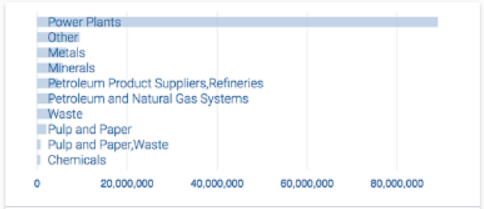
News

Latest News on EDF efforts



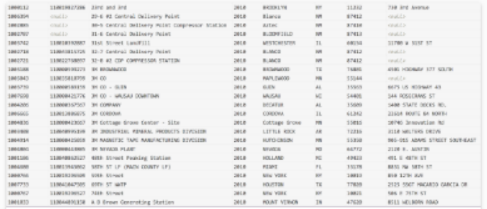
Explorer

See the data projected on the map



Analytics

Slice and dice the data

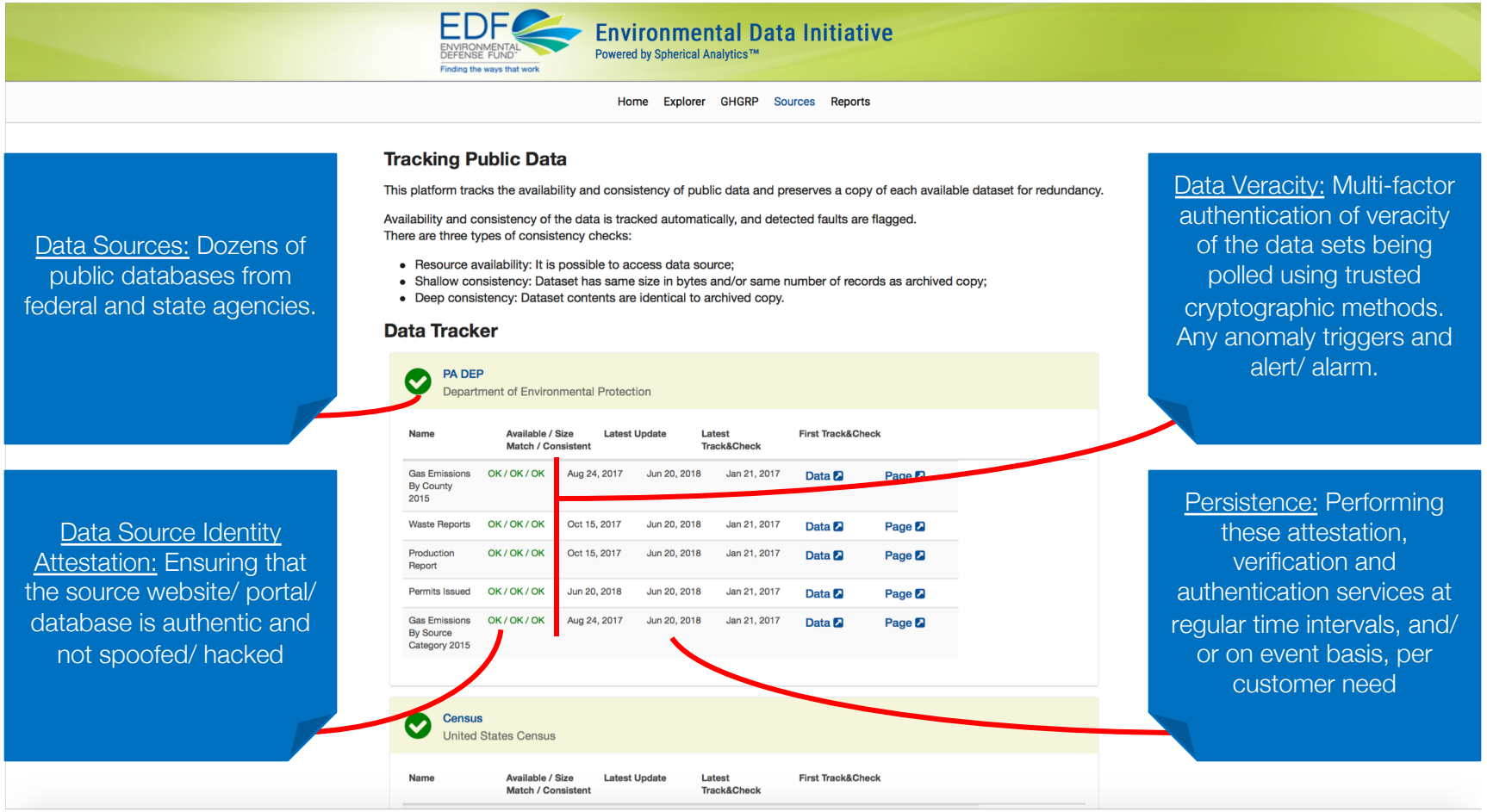


Sources

Track data availability and contents

Data Sources: Dozens of public databases from federal and state agencies.

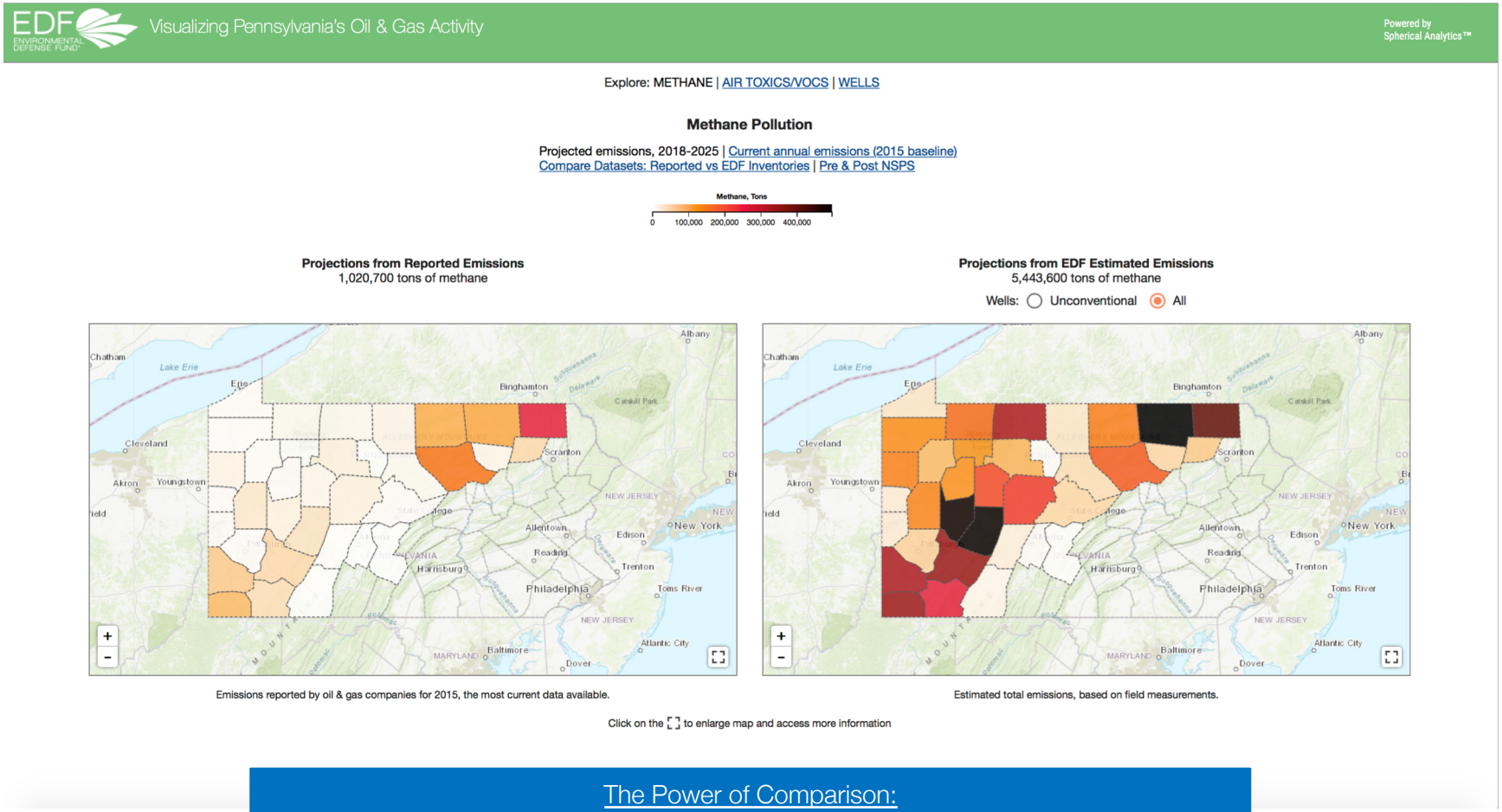
Data Source Identity Attestation: Ensuring that the source website/ portal/ database is authentic and not spoofed/ hacked



Data Veracity: Multi-factor authentication of veracity of the data sets being polled using trusted cryptographic methods. Any anomaly triggers and alert/ alarm.

Persistence: Performing these attestation, verification and authentication services at regular time intervals, and/ or on event basis, per customer need

Trusted Taproots Of Complementary, Critical Data Sets Enable Stakeholders To Posit Rational, Pedigreed, Alternative Scenarios



The Power of Comparison:

The map on the left displays color/ shade scaled emissions as reported by EPA, based on EPA requirements for monitoring only certain types of wells. The map on the right displays same scale, but this one rooted in a model of emissions if emissions from every well were captured accurately and reported.

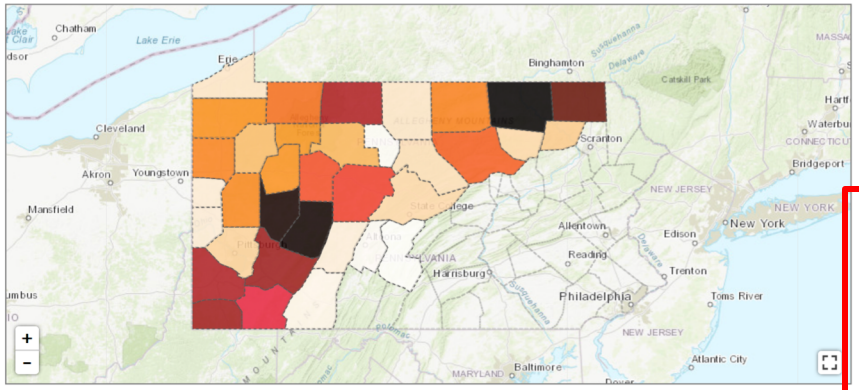
S|A SPHERICAL ANALYTICS

EDF ENVIRONMENTAL DEFENSE FUND — Modeling Tool: Evaluating Options for Reducing Methane Emissions

Powered by Spherical Analytics™

Predicted Methane Emissions for PA: 2018-2025

Baseline with NSPS reductions:	5,443,600
Modeled Scenario:	5,443,600
Reduced emissions:	**0.0% reduction of 0 tons**



Background Information

Methane, Tons
0 100,000 200,000 300,000 400,000 500,0

The Power of Action -- Industry-Expert Framed Scenarios: In order to define plans of ACTION, tactical response options must be identified, defined and their impacts modeled.

Explore emissions reduction scenarios

Select Timeframe: ○ Short-term 2018-2020 ◉ Long-term 2018-2025

Select Inventory: ○ Reported Emissions ◉ EDF Estimate

Include: ○ Unconventional only ◉ All wells

Well type applies to comprehensive controls only

Regulatory options

Select controls for all sources: NO STATE CONTROLS | MODERATE CONTROLS | COMPREHENSIVE CONTROLS

Or select controls for individual sources:

Source	Regulatory Option	Reduction Potential in tons
Pneumatic Pumps	◉ No state controls Est. emissions: 20,200 total (existing: 16,100 | new: 4,100)	
	○ Moderate controls: – No additional requirements over NSPS. Effect on emissions: 0%	
	○ Comprehensive controls: – Convert to zero bleed for new pumps. For existing pumps, achieve 98% control, if controls are available onsite (in effect in CA and WY). Info Effect on emissions: -82% on top of NSPS for new sources, -12% existing sources	
Pneumatic Controllers	◉ No state controls Est. emissions: 759,500 total (existing: 725,200 | new: 34,300)	
	○ Moderate controls: – No additional requirements over NSPS. Effect on emissions: 0%	
	○ Comprehensive controls: – Use zero bleed for all new controllers, Use low-bleed for all existing controllers (In effect in CA and CO). Info Effect on emissions: -21% on top of NSPS for new sources, -76% existing sources	
Well Completions Info	◉ No state controls Est. emissions: 1,500 total	

Note: The impact of proposed changes to Truck Loading requirements could not be modeled due to lack of available data.

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Using Private Wells to Complement and Extend Groundwater-Level Monitoring Networks, Build Stakeholder Consensus, and Facilitate Sustainable Management

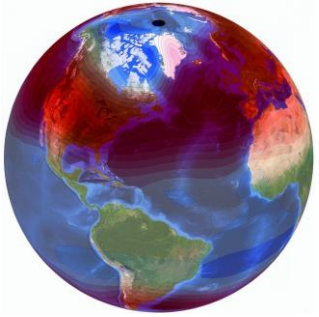
Joe Fillingham, PhD
Science & Information Manager, WellIntel Inc.
NARUC Policy Summit 2019

February 11, 2018

Communities need groundwater data to inform local decisions

- Sustainable Usage
- Development
- Permitting
- Infrastructure
- Conservation
- Fees

Regulators and policy makers need dense, rich groundwater data to meet growing pressures



Change
&
Risk

Costs
&
Budget

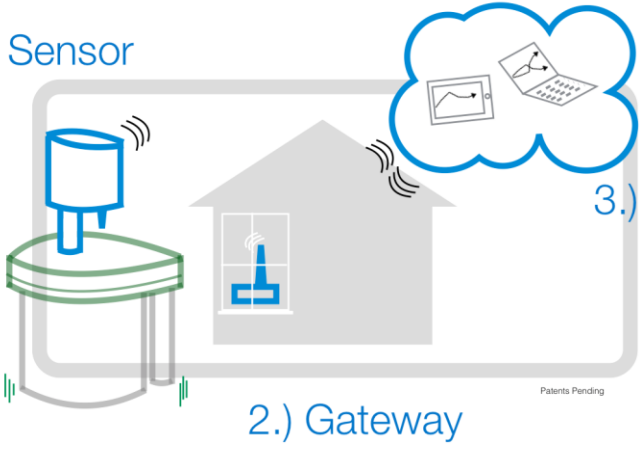
Management
&
Reporting

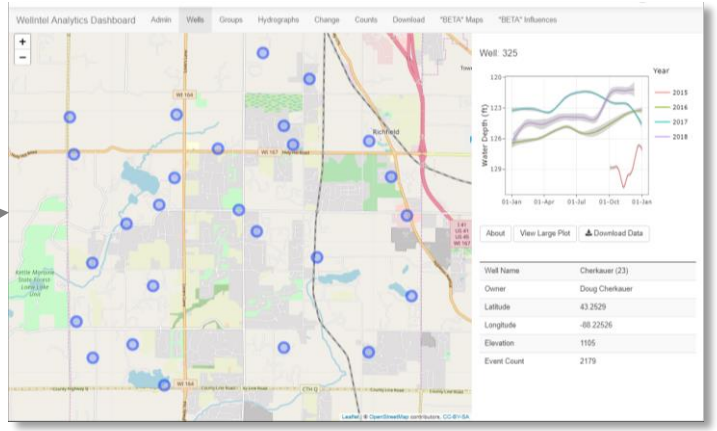
Engagement
&
Trust

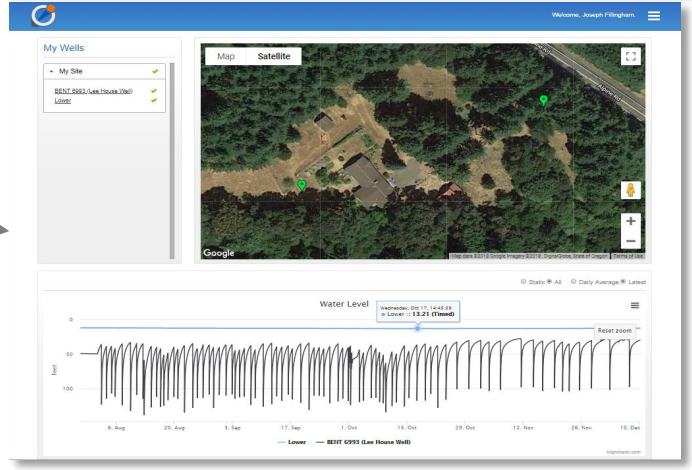
A new approach is needed, one that…

- Complements and extends existing monitoring efforts
- Leverages assets in the field (e.g. local internet)
- Enables real-time analysis to create meaningful metrics
- Engages community members
- Supports sustainable management and policy

Cloud based monitoring tech enables real-time analytics and provides new opportunities







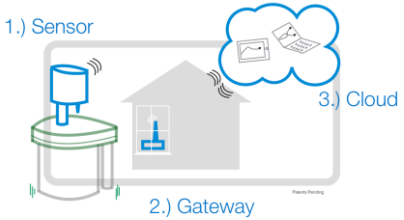
Wellntel

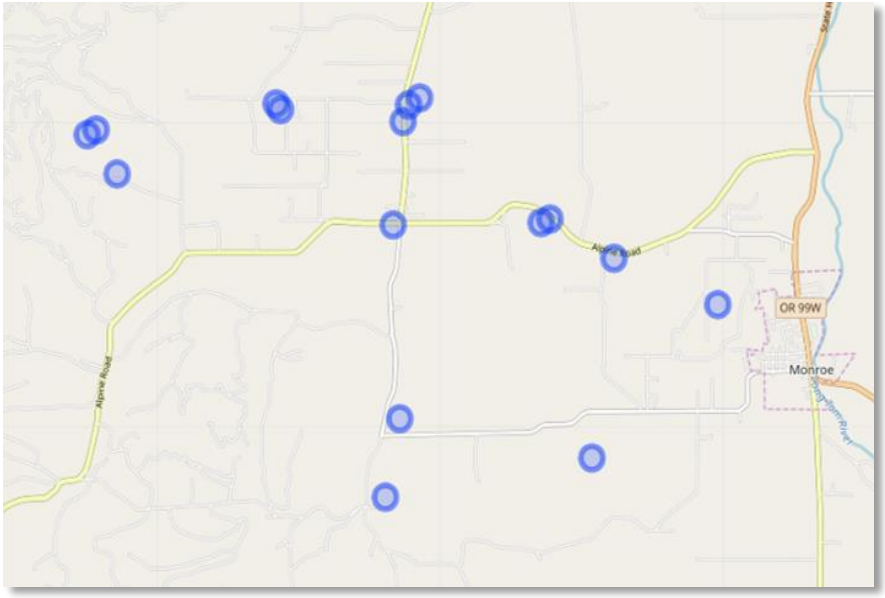
Case Study - South Benton County, OR

- Growing community
- Hyper-local hydrogeologic environments
- Community needs data density to support factual understanding, develop trust, and engage with resource managers
- Network Goal:

  Support aquifer boundary mapping with dense groundwater level data to inform smarter permitting

Monitoring Network Deployment

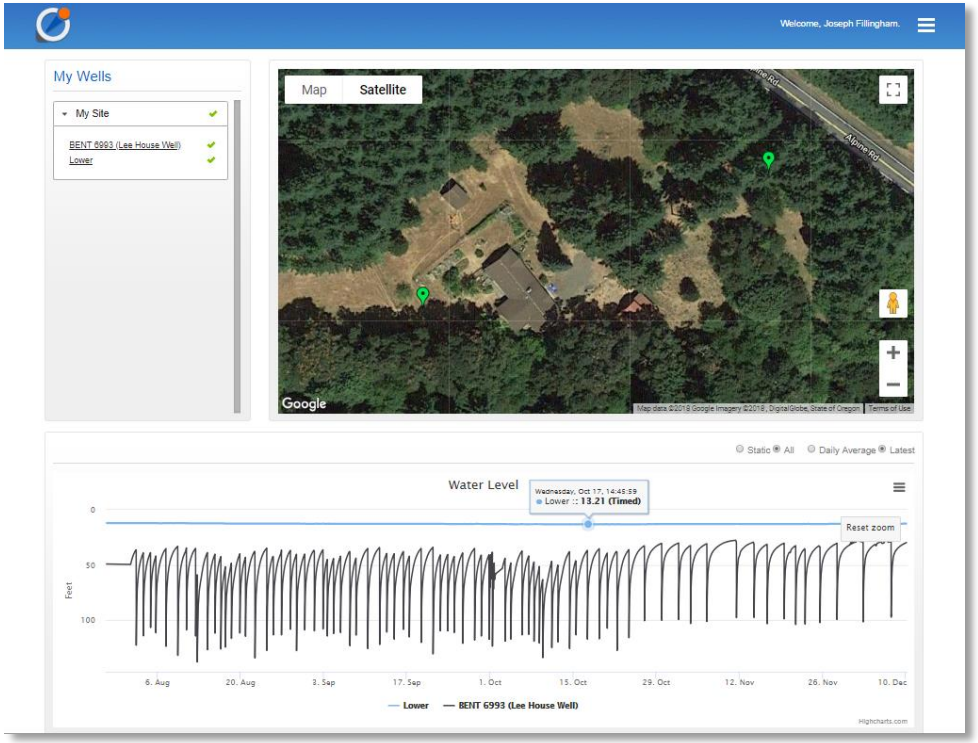


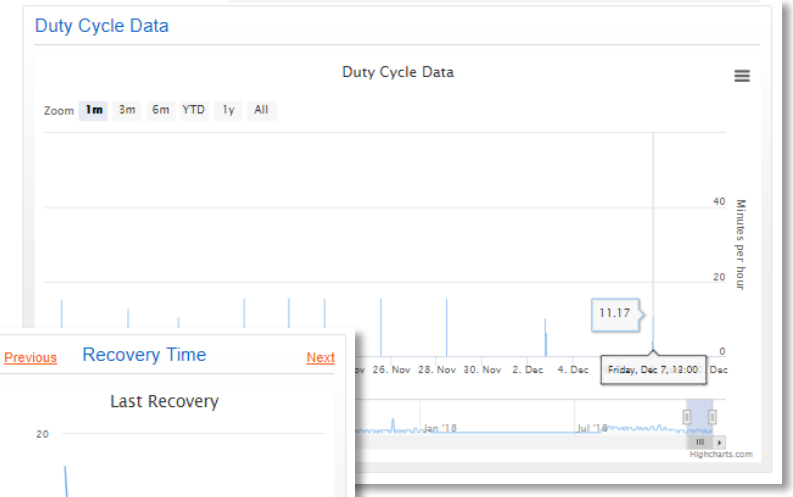


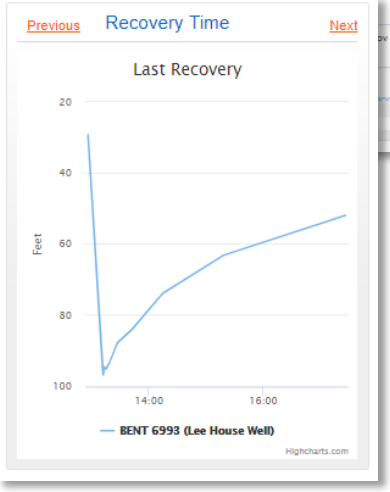
- 15 monitoring points (wells)
- 10 square miles
- Domestic & irrigation use wells
- Wellntel w/ “Standard” Telemetry
- Sensor Settings:
  - 4-hour timed readings
  - Pump start, stop & recovery tracked and readings tagged

Source: SBC Network, January - November 2018

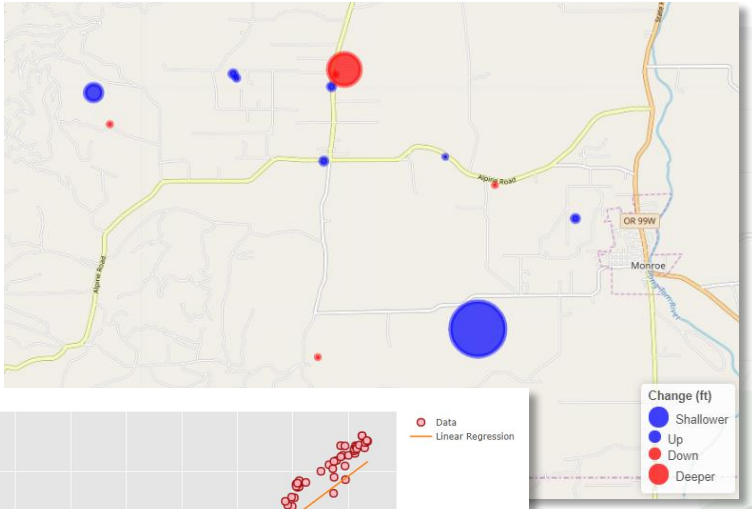
Well owners learn about trends and basic dynamics

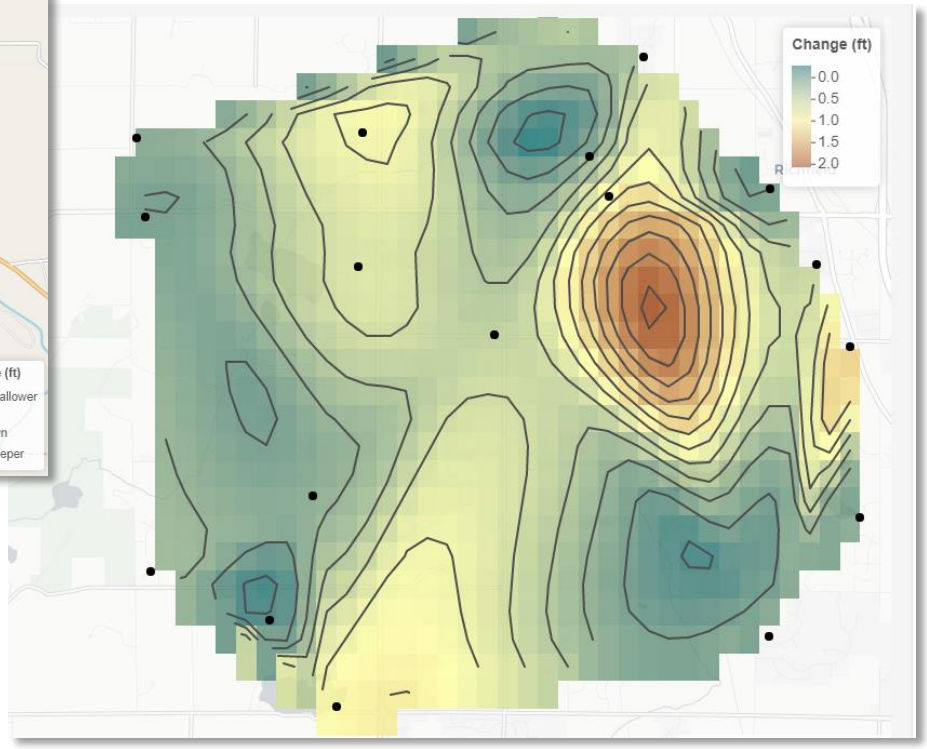


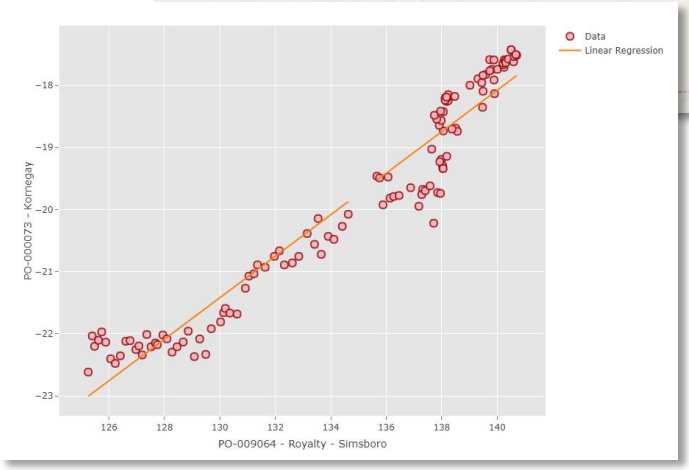




Managers evaluate and analyze data at network scale…

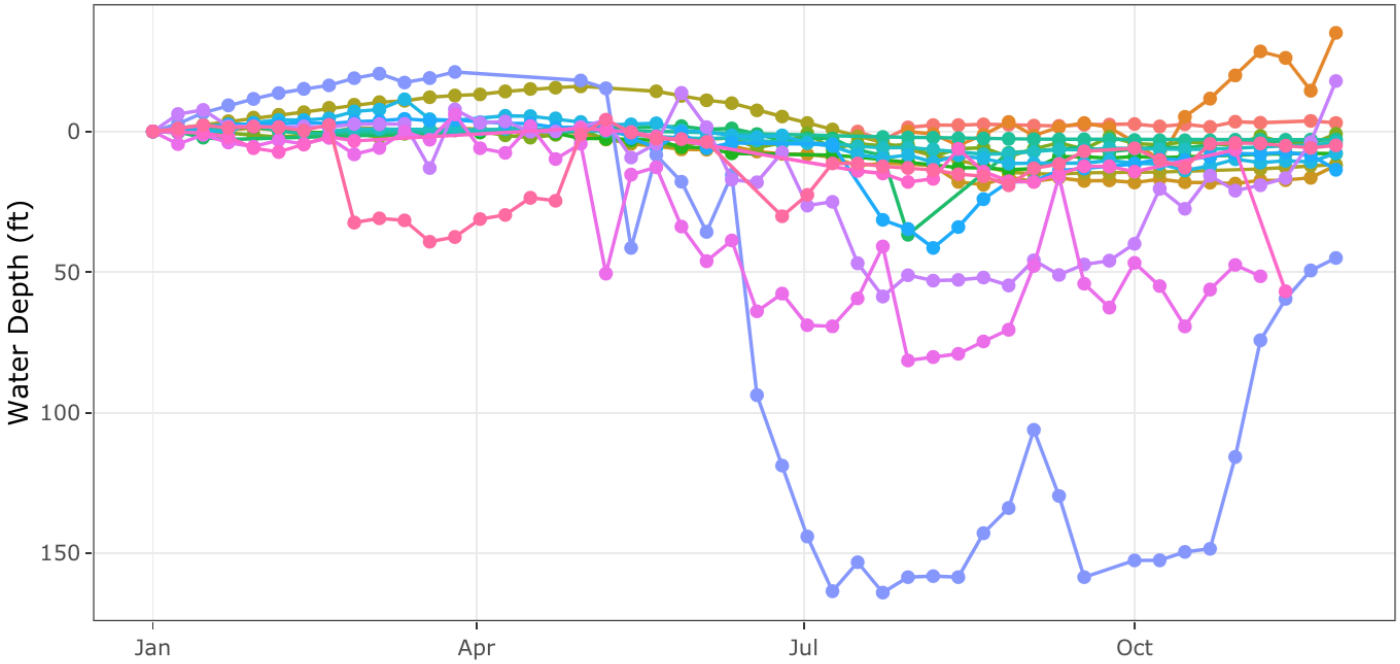






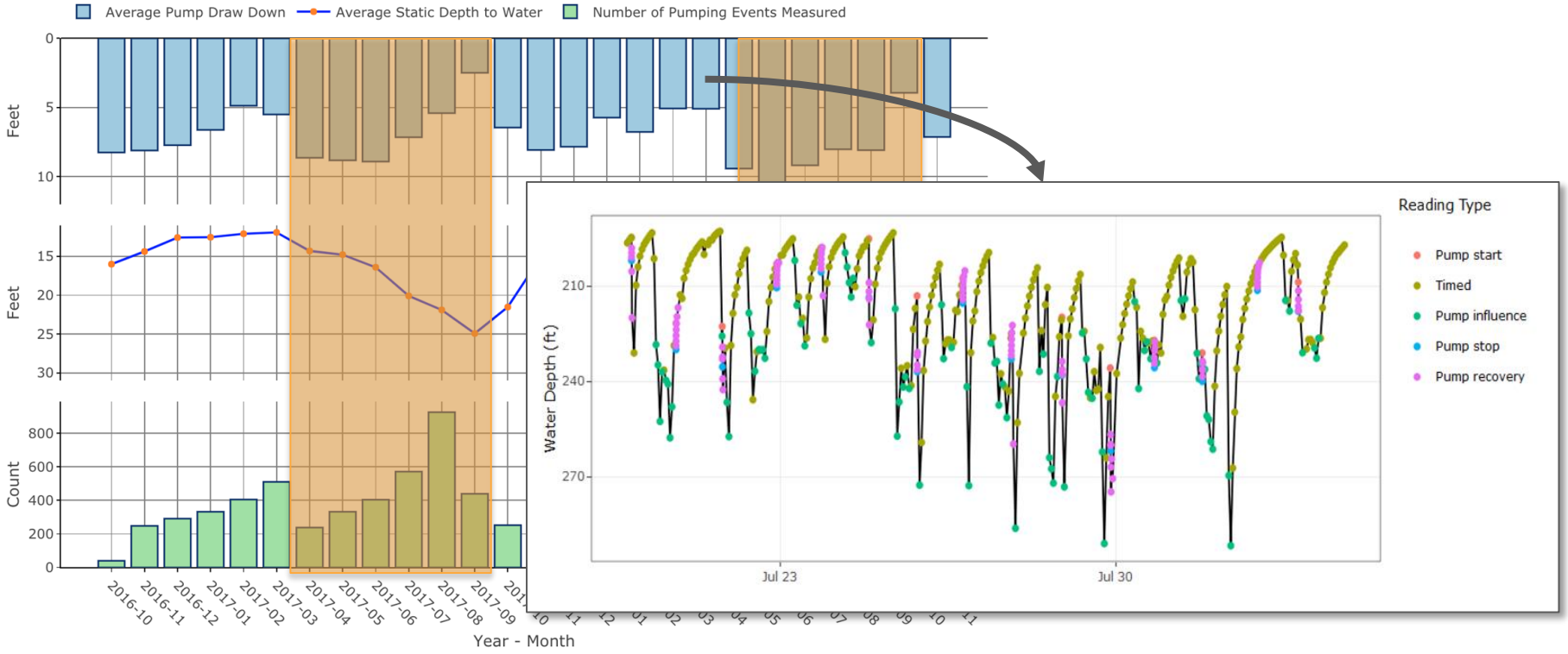
Sources: SBC Network OR, Richfield Network WI, Post Oaks Network TX

… with tools to see change and variability …



Source: SBC Network, January - November 2018

…and analytics to understand use, risk, and influences



Source: SBC Network, January - November 2018

New and Expanding Networks Informing Sustainability

Network/Sponsor	Goal	Resulting
Tri-Counties County conservation districts in partnership with state of WI and USGS	25 year time study to understand impact of dewatering from mining	15 sites in 3 counties Growing to 25 sites in 4 counties +1 USGS site

To Learn More About WellIntel, Cloud-Based Groundwater Monitoring and Real-Time Analytics: www.wellntel.com

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