

# A National Infrastructure for Artificial Intelligence on the Grid

PingThings

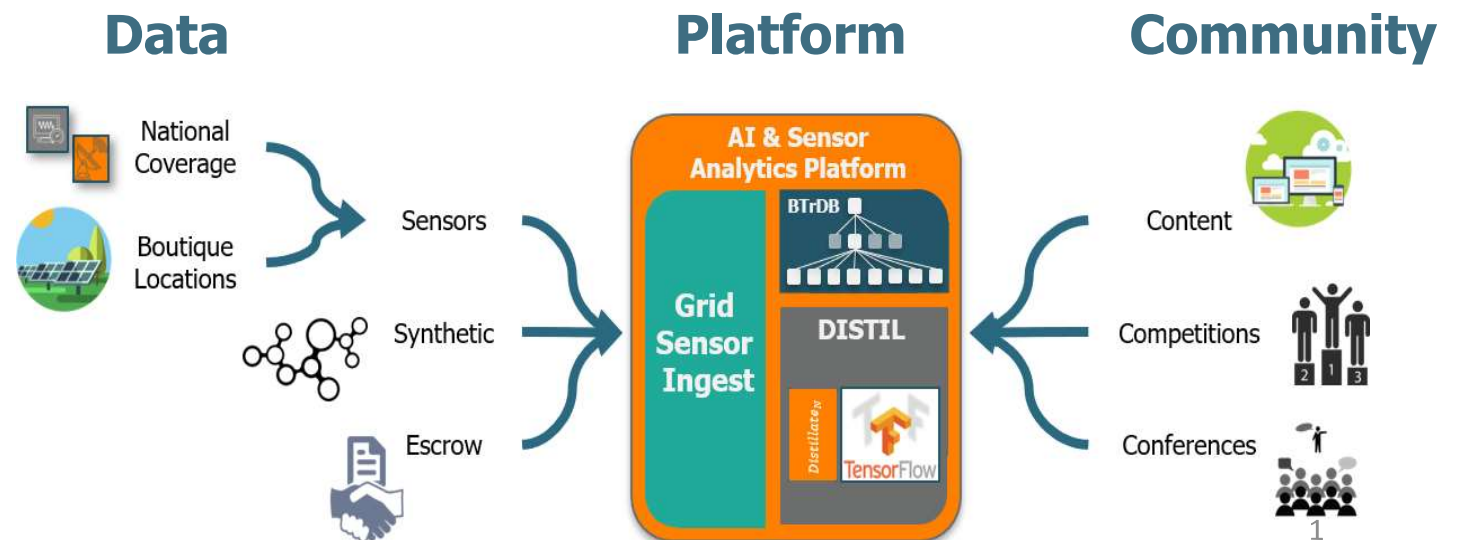
Berkeley  
UNIVERSITY OF CALIFORNIA

Laurel Dunn, PhD

Thanks to:

Sean Patrick Murphy

Kevin Jones, PhD



# NI4AI Project Overview

**Short for:** National Infrastructure for AI on the Grid

**About:** 3-year ARPA-E Open Innovation project (finishes 2022)

**Project partners:** PingThings, UC Berkeley, Dominion

**Goal:** Eliminate barriers to developing and deploying next-generation analytical tools

**Approach:** Provide widespread access to the platform and facilitate collaborations geared at demonstrating and deploying user-developed tools

# Project Pillars

- **Provide access to the Platform** – making it easier to:
  - Interact with data
  - Create value from data
  - Drive applications with data
- **Populate it with data** – enabling the community to:
  - Ingest data into the platform
  - Capitalize on data visualization & analysis capabilities
  - Deploy & share user-developed tools
- **Build community** – Engage researchers and stakeholders to:
  - Put your ideas into code
  - Deploy user-built applications on stakeholder data

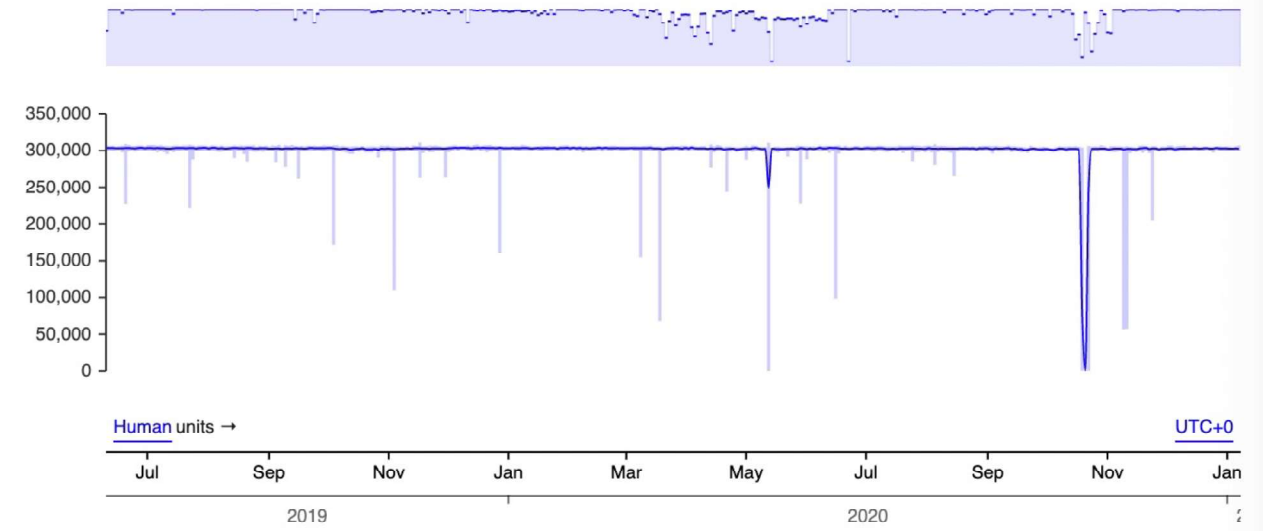


# Data Explorer Demo

## Selected Streams

COLLECTION	UNIT	UUID	ACTION
coatesville/savanahan/sava	VPHM	7c283223-5167-594b-981f-7	✕
georgia/atlanta/savanahan	VPHM	5a0b3210-dd96-50e0-bb68-1	✕

Reset Zoom



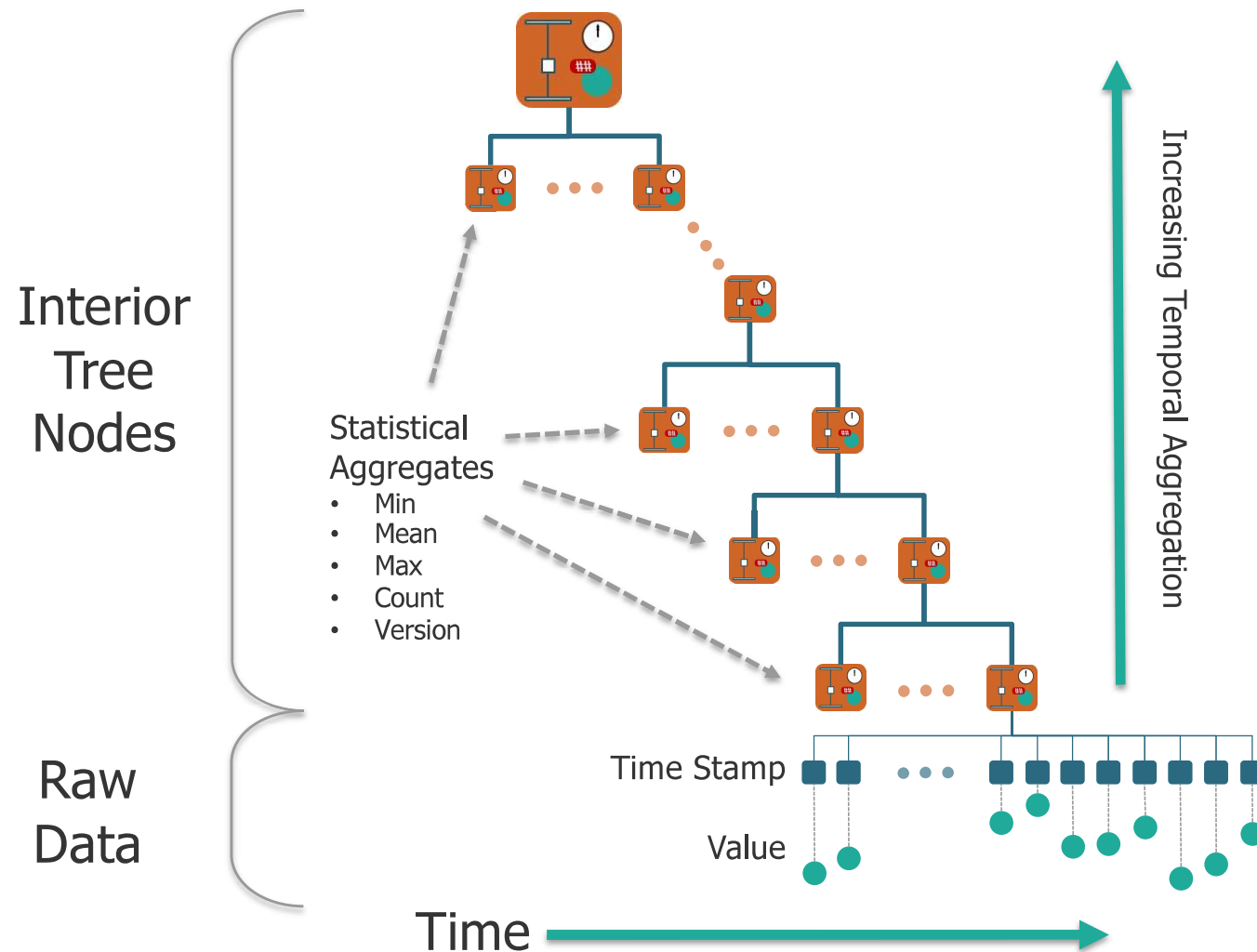
## All Streams

Edit Table Columns >

COLLECTION	UNIT	UUID	ACTION
atlanta/westchester/atlanta	A	471cda7f-29fb-59fc-b4a4-44	+
savanahan/westchester/sav	A	6cb6734e-4530-5910-9819-C	+
coatesville/atlanta/georgia	A	e87f04e2-7360-5519-b0fe-a3	+
coatesville/atlanta/coatesvil	digital	3dcd34ac-603a-545a-b073-8	+
georgia/savanahan/westche	digital	303fc2f5-7ad8-5e54-b942-19	+

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{
  "annotations": {
    "description": "pocket",
    "latitude": "34.26172778",
    "longitude": "-79.35904444",
    "phase": "A",
    "substation": "broken",
    "type": "V"
  },
  "collection": "coatesville/savanahan/savanahan",
  "isHighlighted": false,
  "property_version": 92,
  "tags": {
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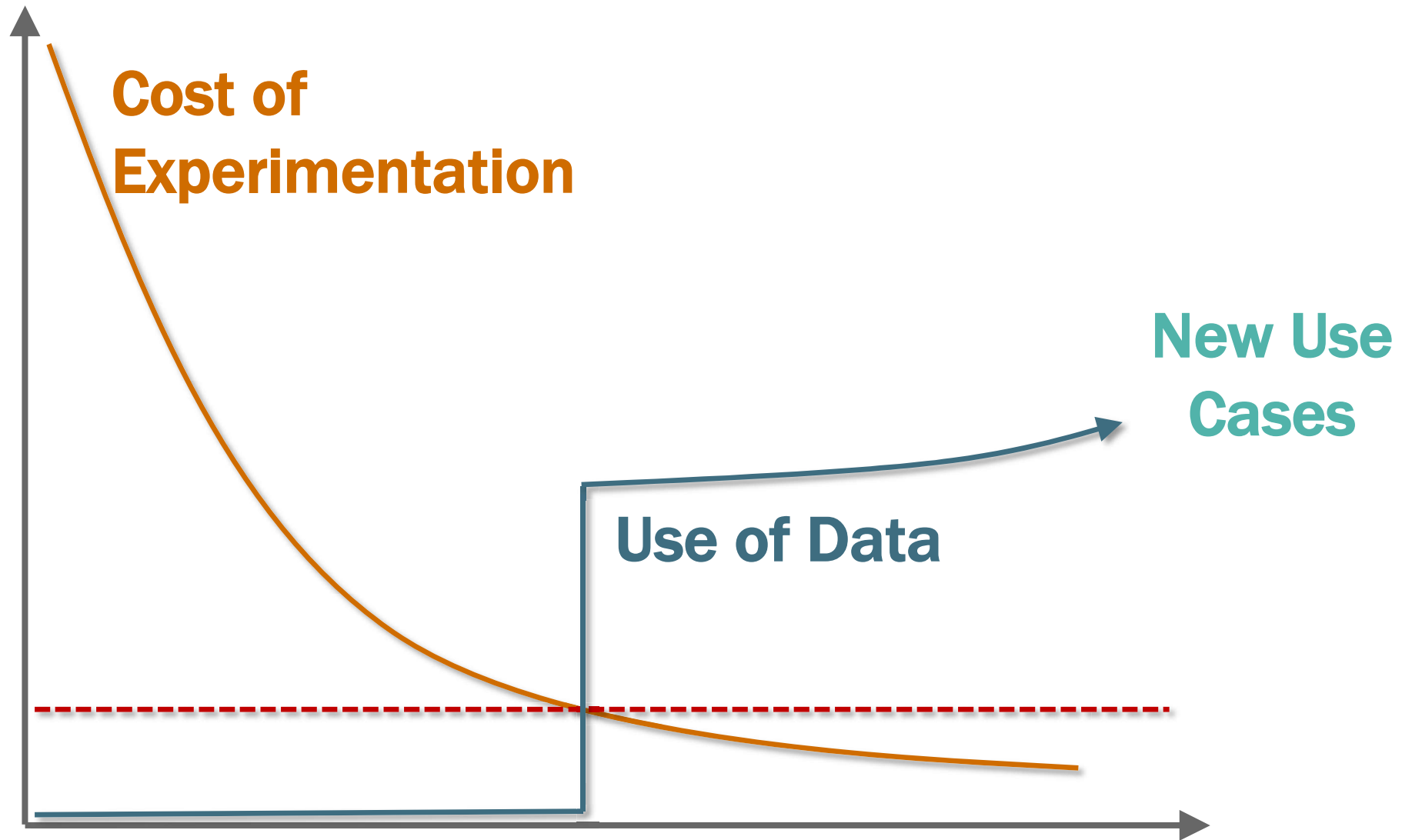
# A New Data Structure for Time Series



Natively supports:

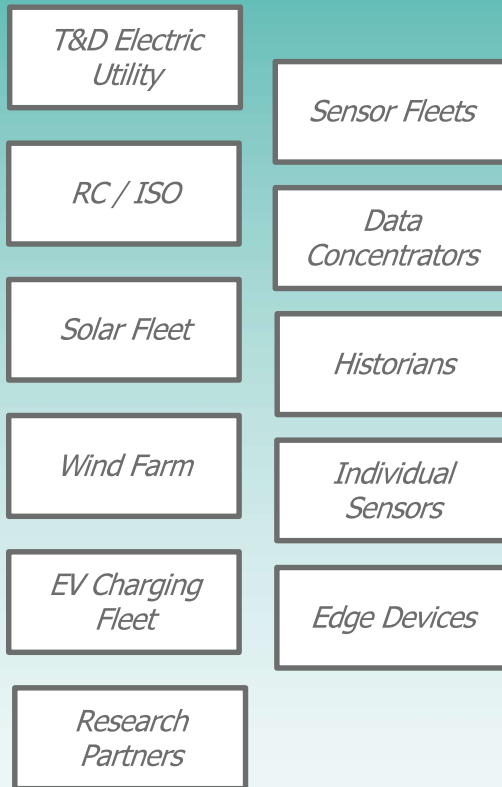
1. Nanosecond time precision
2. **Dynamic sampling rates**
3. **Multiresolution time series**
4. **Out of order insertion**
5. Data dropouts
6. Data versioning
7. **Data quality assessment**
8. **Compression at every level**

# Interacting with Your Data Will Lead to Use Case Discovery

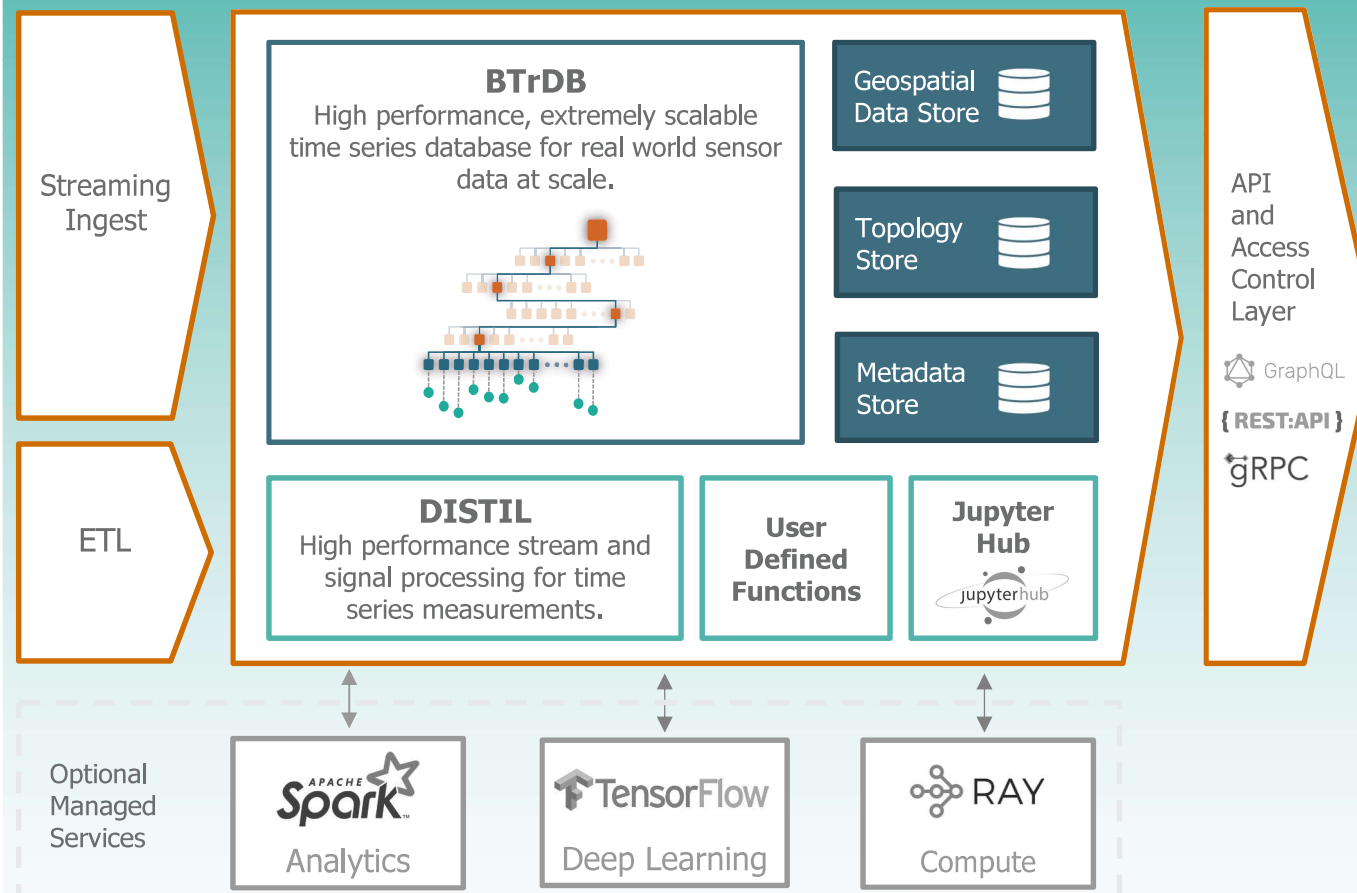


# The Platform

## Data Sources

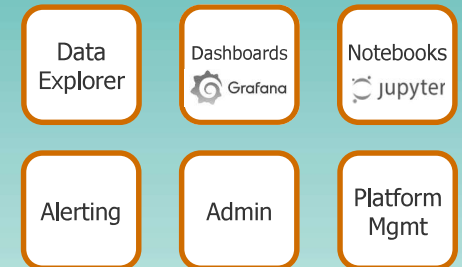


## PredictiveGrid™

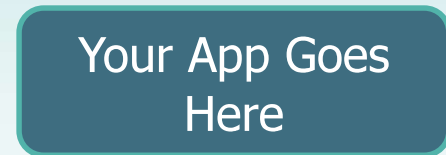
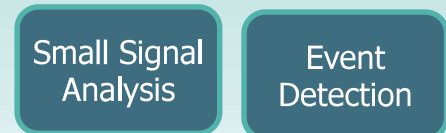


## Applications

### General Purpose



### Analytical Toolkits



### User-Built Prototypes



## Secure, Scalable, and Reliable Infrastructure

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# The Data



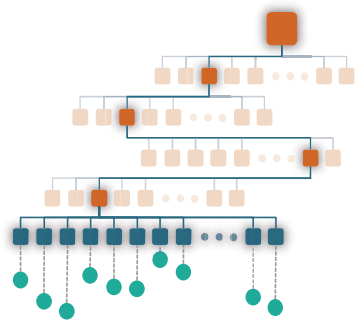
Type	Collection	Duration	Sample Rate	Features
Streaming	ni4ai/	streaming	120 Hz	Real-time; Continuous
Point on wave	EPFL/ signatures/ sentinel/ chief_joseph/	6 events 250 events 2 years 24 hours	20kHz variable 50kHz 4.3 kHz	Battery storage Faults and failures Wide area; continuous Oscillations; harmonics
Distribution PMU data	sunshine/ golden/	18 months 3 months	120Hz 120Hz	PV array Dense coverage
Anonymized PMU data	events/ monitoring/	3 events 1 week	30Hz 30Hz	Switching; Oscillation Oscillation; Solar data
Proprietary data	dominion/ comms/ <b>others/</b>	streaming streaming <b>TBD</b>	30+Hz 10kHz <b>TBD</b>	Oscillations; etc. Waveform anomalies <b>Stakeholder interests</b>





# Collaboration Workflow

## Intelligent Storage



## Easy Data Workflows



Visualize



Alert



Export



Explore



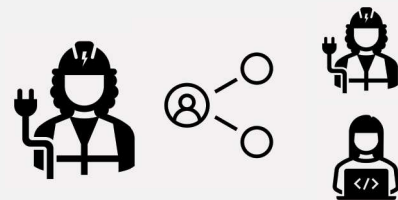
Show



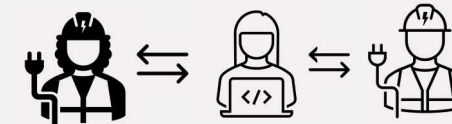
Prototype

## Knowledge Exchange

### Grant Access



### Deploy Code



### Administrators Control User Permissions



Add User



Remove



Owners



Internal

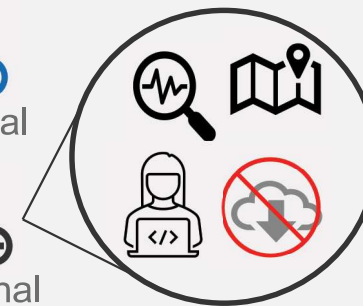


Collaborator



External

Restrict access by user group



## Secure Sharing



Anonymize



Educate



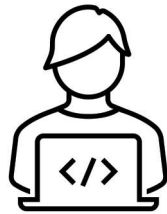
Discuss

# Join the Community

(not mutually exclusive)

## Option 1: Use Our Data

We provide open access data to support research & education



## Option 2: Share Your Work

Speak at a workshop, or meet stakeholders who could benefit



## Option 3: Collaborate

Work with real-world data by collaborating with our partners



# Resources for Working with NI4AI Data

## **Python API documentation**

<https://btrdb.readthedocs.io/en/latest/>

## **Datasets available to you**

<https://ni4ai.org/datasets>

## **Github repository**

<https://github.com/PingThingsIO/ni4ai-notebooks>

## **Project blog**

<https://blog.ni4ai.org/>

## **Workshop videos**

<https://blog.ni4ai.org/post/2020-10-31-workshops/>

# Contact and Questions

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