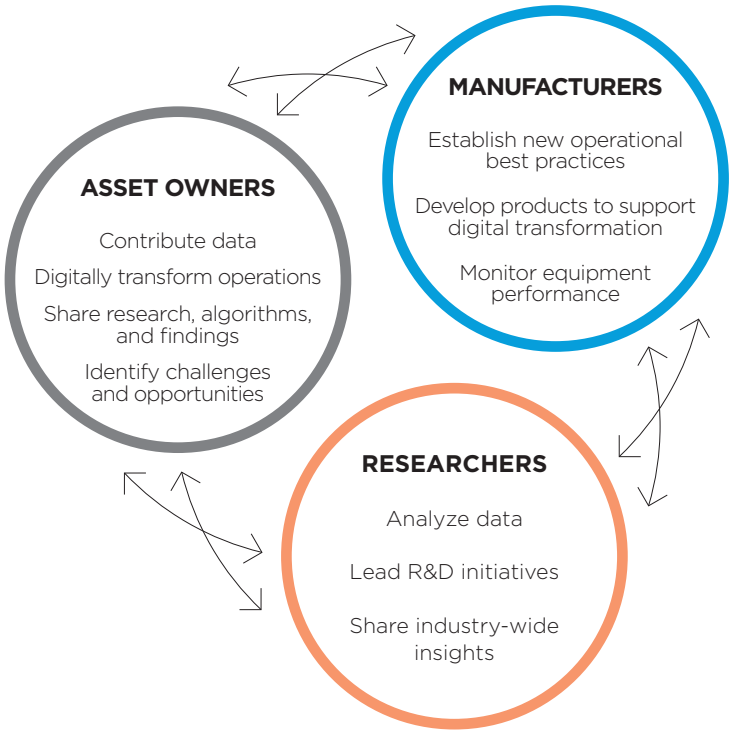
HYDROPOWER RESEARCH INSTITUTE

RESEARCHERS

FUEL YOUR RESEARCH

INDUSTRY CHANGES & DIGITAL TRANSFORMATION

The energy market and landscape is evolving rapidly. With the rise of low and carbon neutral energy sources, there is more pressure on the hydropower industry to change how it utilizes its assets. In order to remain competitive, hydropower asset owners are finding ways to reduce operational costs while improving reliability, availability, and quality. As compared to wind and solar, hydropower offers the benefit of service as renewable storage. This capability will require hydropower to become an on-demand resources drastically changing today's more predictable operations.



As with other industries, digital transformation is the best means to addressing hydropower's changes and challenges. By leveraging the data the industry has already collected, researchers can predict how changes to operational strategies will impact equipment, the environment, and the industry as a whole. Operators can predict and avoid outages using deep and machine learning. Manufacturers can create the next generation of equipment and sensors.

WHAT IS THE HRI?

The Hydropower Research Institute (HRI) is a data-driven collaborative formed by and designed for industry leaders to drive the digital transformation of hydropower. The HRI's goal is to benefit all participants—asset owners, manufacturers, and researchers—by:

STREAMLINING how data is classified within a hydropower plant, amongst manufacturers and different types of units. HRI staff work with every contributor to ensure data is classified consistently using our standardize classification system. HRI data can be easily compared across plants, regions, and continents.

ENHANCING the data set by ingesting data on a regular and ongoing basis. The current dataset dates back to 2002, and is dynamic and expanding with every new contributor and upload. The dataset is assessed for quality upon ingestion and regularly thereafter.

CONNECTING the asset owners, equipment and sensor manufacturers, and researchers to share, discuss, and discover. The HRI facilitates communicating challenges, collaborating on solutions, and driving change in the industry.

The HRI aggregates operational data across the hydropower industry using a standardized classification system, allowing researchers to get right to the task of analyzing data instead of spending countless hours collecting and preparing it. With permission, the HRI can facilitate conversation between researchers and contributors, allowing the two parties to identify and analyze anomalous behavior, and share and confirm valuable findings.

The HRI will aggregate and standardize hydropower operational data, driving R&D efforts. Specifically, researchers will greatly benefit from:

- **A CONSTANTLY GROWING, DYNAMIC DATASET**
- **DATA THAT IS CONSISTENTLY CLASSIFIED AND GENERATED**
- **REPORT OUTPUT IN A TOOL-AGNOSTIC FORMAT**
- **THE ABILITY TO SHARE REPORTS AND FINDINGS WITH OTHER HRI USERS**
- **THE ABILITY TO SPARK COLLABORATION WITH DRIVERS OF INDUSTRY CHANGE**

THE HRI FUELS YOUR RESEARCH

Data from across the industry is shared, enabling researchers to access what they need from one place—the data itself, the ability to work with the entities who collected it, and the groups that will impact the industry in the future. The HRI's data set will continue to expand as membership grows and as new data is ingested over time. To streamline research, the HRI can output data in the units of your choice or their original units. All data output from the HRI is provided in a consistent, comparable, and tool-agnostic format so researchers can use the tools with which they are familiar. There is no better place to access operational data for the hydropower industry.

According to NewVantage Venture Partners, **Big Data** is delivering the most value to enterprises by **decreasing expenses** (49.2%) and creating new avenues for **innovation and disruption** (44.3%)

SOURCE: NEWVANTAGE VENTURE PARTNERS, BIG DATA EXECUTIVE SURVEY 2017

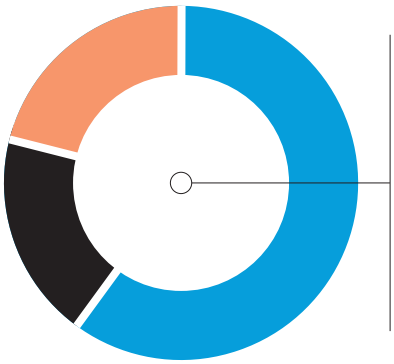
HIGH QUALITY DATA

Before a dataset can be analyzed, it must be standardized so that is is comparable across different variables and sources. The Hydropower Research Institute does this work for you. With input from each contributor, the HRI identifies the origin of tags within the hydropower plant, translates tags one-by-one, and ensures that all tags are appropriately mapped to the standardized, hydropower-specific classification system. This system includes the specific component, detailed location information, and the specifics of the measurements, such as units and material. This allows HRI users to analyze precisely what interests them.

21%
ANALYZING DATA AND OTHER ACTIVITIES

60%
CLEANING AND ORGANIZING DATA

19%
COLLECTING DATA SETS



THE 80/20 RULE

Data scientists spend 60% of their time on cleaning and organizing data. Collecting data sets comes second at 19% of their time, meaning **data scientists spend around 80% of their time on preparing and managing data** for analysis. And over three-fourths of data scientists view data preparation as the least enjoyable part of their work.

SOURCE: FORBES.COM, CROWDFLOWER SURVEY 2016

The HRI recognizes that data quality is the difference between a valuable data set and useless information. We are committed to reviewing all aggregated for quality to ensure data integrity and comparability. All data ingested passes through our quality assurance process. This process starts during data discovery, during which the HRI communicates directly with the contributing asset owner. At any point, if data is deemed "bad" or not understood by the HRI, it will not be visible to HRI participants or included on reports. Data in the platform is regularly tested for numeric quality, and any questionable data is flagged for review. The QA and mapping processes allow HRI participants to create reports that are delivered quickly and securely in a consistent format without worrying about the quality of the data.

HOW DO I SIGN UP OR LEARN MORE?

If you are interested in becoming a participant in the HRI call us at **509-866-4475** or email **Join@HRIData.org** to have someone contact you.