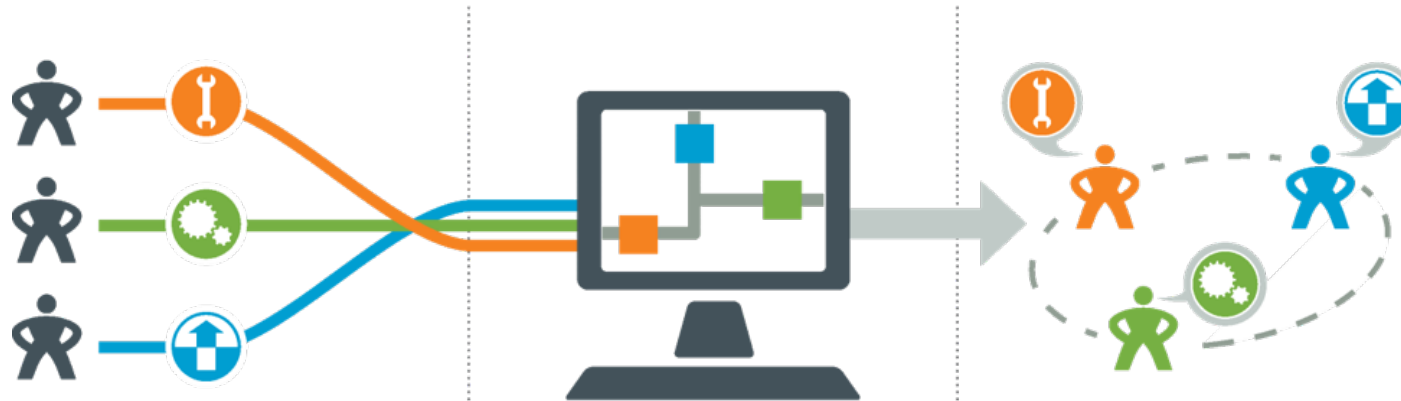Month Date

Making Conventional Treatment Cutting Edge Technology

PNWS-AWWA
Water 2023
Kennewick, WA • May 3-5

Process Optimization Using Advanced Data Analytics

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- PWB's Operations and Water Quality teams
- Tom Carrol, Riley Middlebrook
- Dave Hardy

Agenda

- What is a Smart Utility?
- Why Smart Utility?
- Using dashboards to optimize how you run your plant
- What's next
- Questions

What is a Smart Utility?

- Compiles existing data, analyzes it, and filters information based on individual user needs

- Allows utilities to adapt to changes in technology, growth, and regulations

Assess information and adapt response based on real-time data and objectives
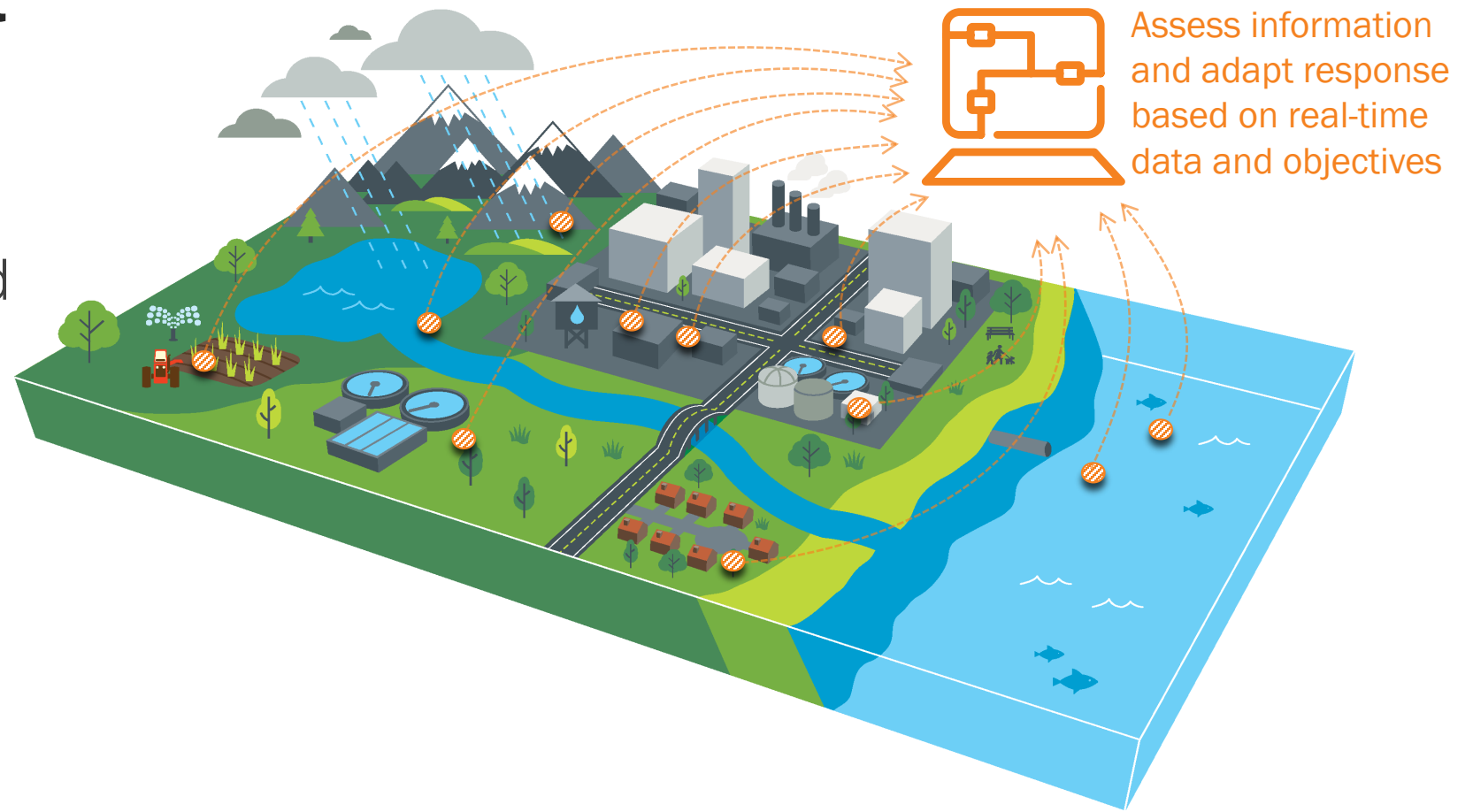
Why Smart Utility?

Benefits

- Optimization – people, processes, systems

- Technology alignment

- Realtime or near-realtime decision making

- Organizational alignment and interdepartmental communication

- Efficient report generation
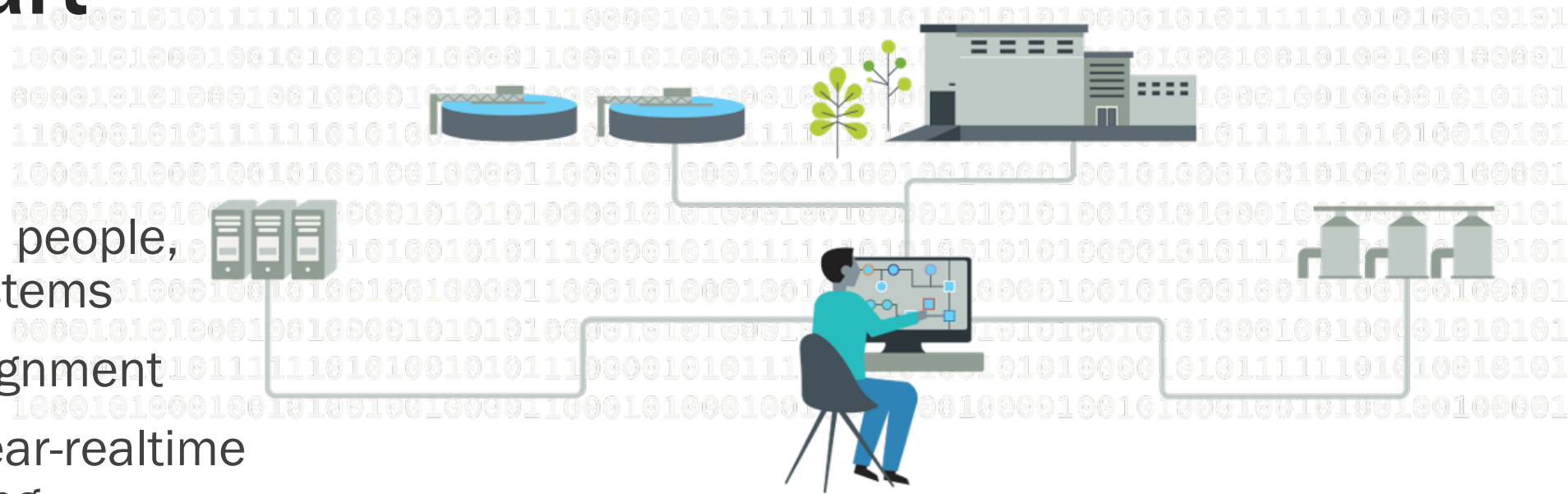
Case Study - Key Issues at PWB

Need to make efficient and informed decisions around
- Affordability
- Equity
- Stewardship

Lack of real time department levels of service

Insufficient or outdate technology

Lack of standards and data management practices

Our real time data is increasing by ~20x by 2027

Information isn't accessible and our data is siloed

Customer service accessibility

Knowledge is retiring – how do we retain this institutional knowledge

Data System Fragmentation

Why Smart Utility and Dashboards?

- 49+ disconnected system
- Segmented business process data
- NO data management standards & practices
- 500+ reports produced across platforms
- Software functionality not maximized
- HIGH maintenance costs
- Current disparate systems are obstacles to efficient data driven decisions and reporting
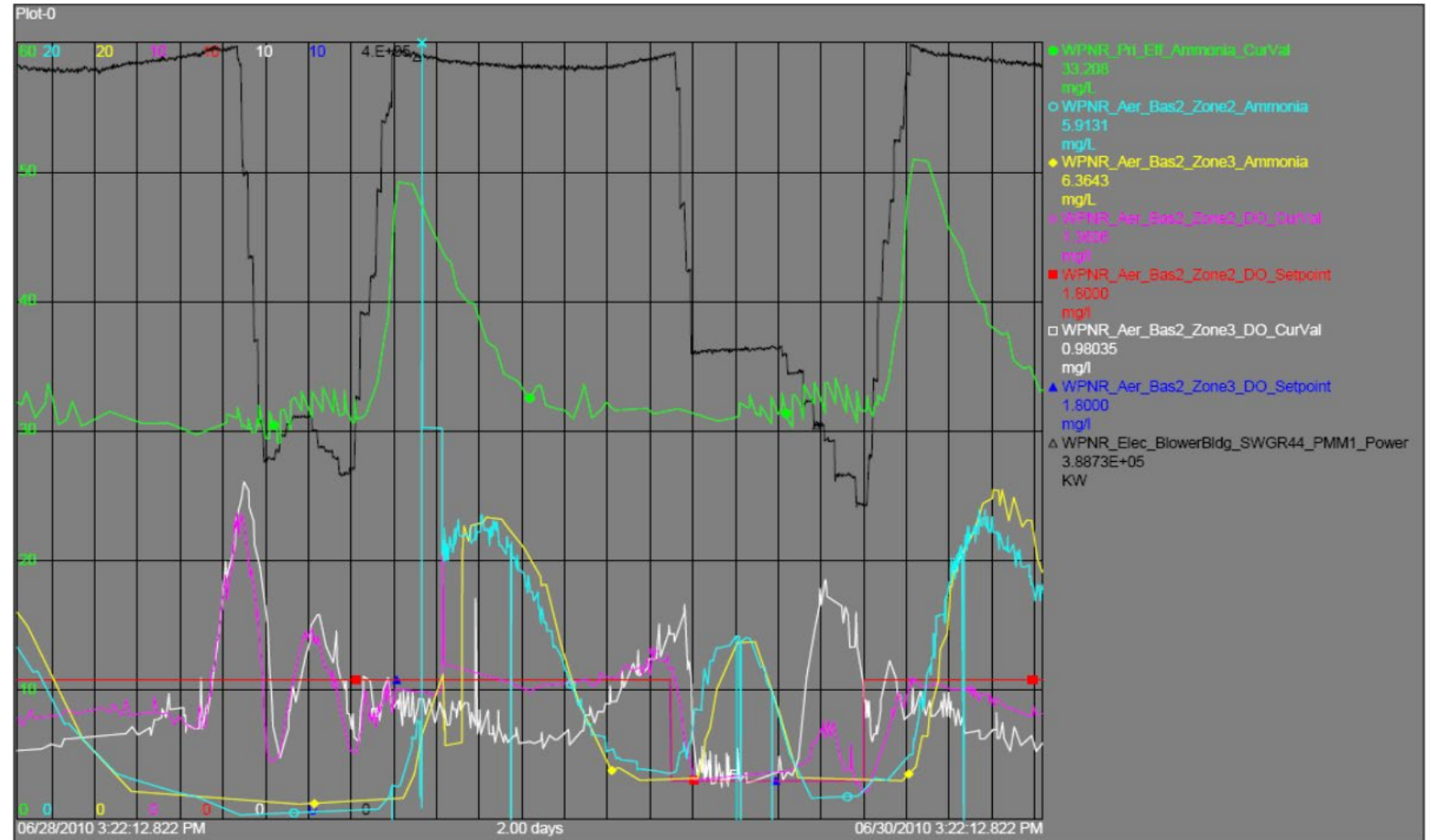
Connecting applications together with context creates a Smart Utility
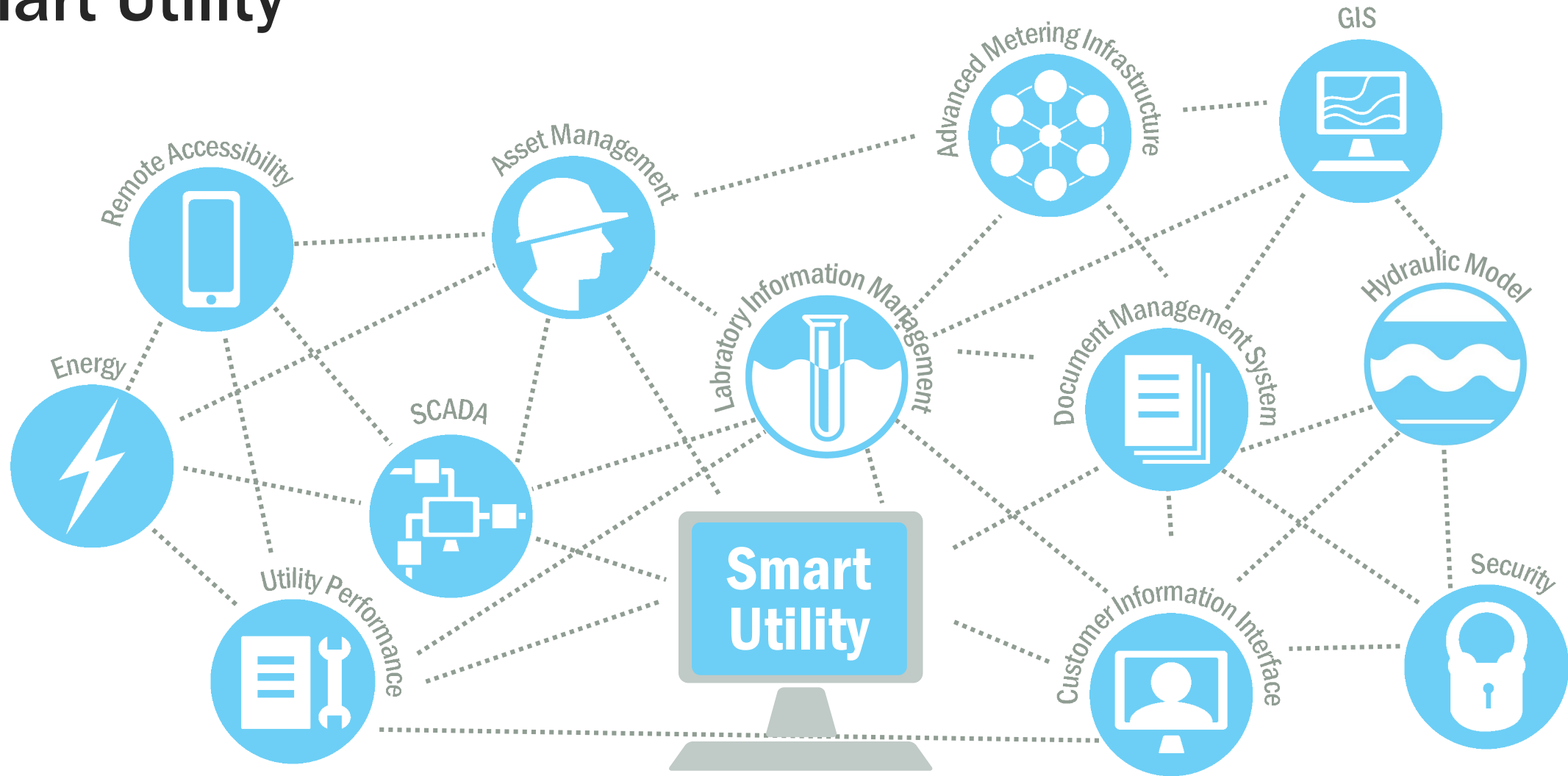
Dashboards for Better Plant Operation

Why use dashboards?

- Separate data visualization/analysis from control and acquisition

- Expand access to data without expanding access to controls

- Reduce cognitive load

Source: Brischke et al, 2010

Why not just add SCADA screens?

- Modern data visualization programs (e.g., Power BI) have several advantages over traditional SCADA HMIs
  - Low barrier to entry for customization and expansion
  - Provides rich visualization of enterprise data
  - Enables self-serve data exploration
 - Brings silo'ed data together to create new insight

Examples of dashboarding concepts

1. Minimize cognitive load
2. Time series data trending
3. Advanced data trending
4. Correlation analysis
5. Automate process calculations
6. Automate monitoring and reporting
7. Predictive analytics
8. Compliance verification and reporting
9. Extending beyond treatment

Minimize cognitive load

- Utilize 'gauges' to provide quick visualization of key performance indicators

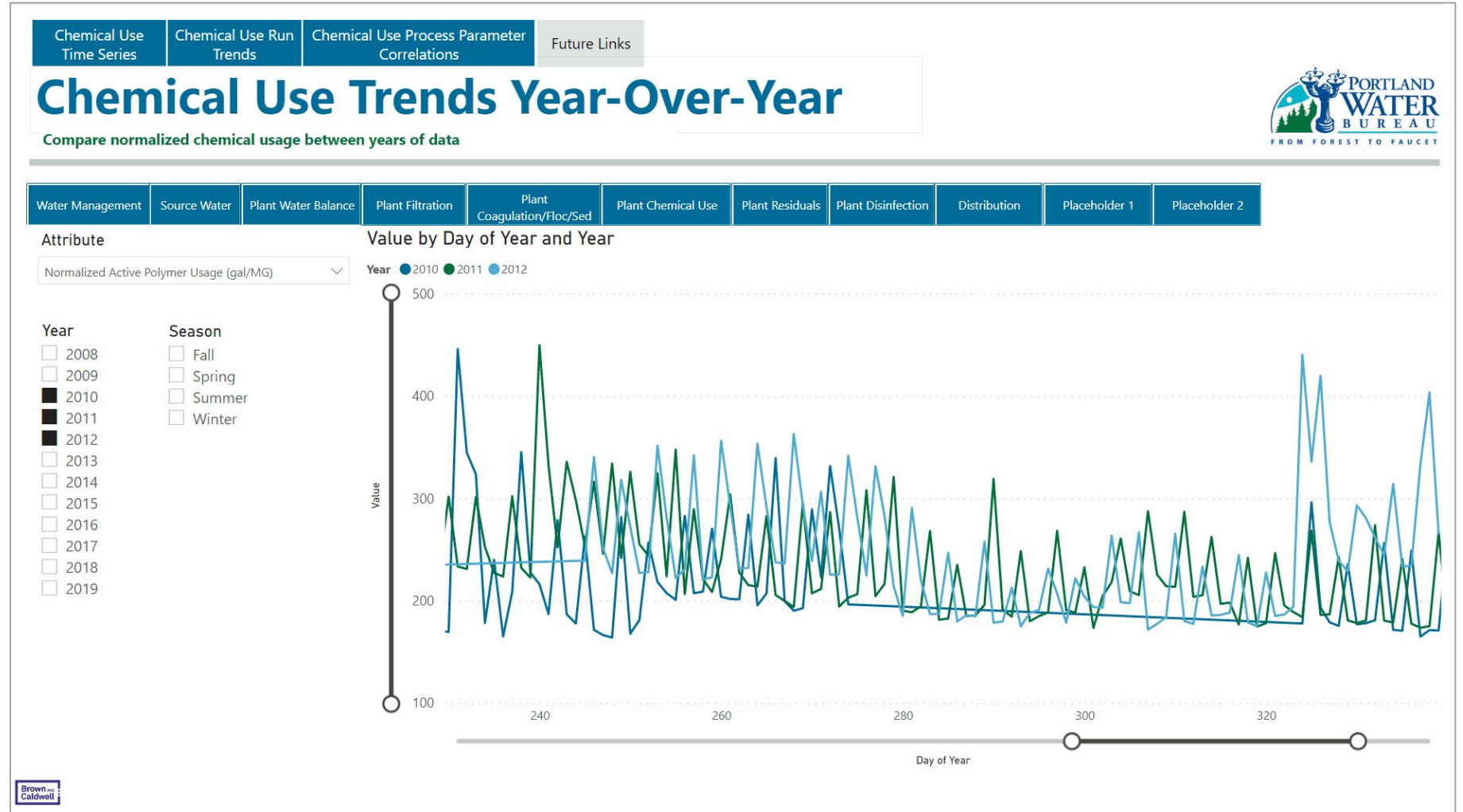- Presents data from SCADA in an form that can be rapidly interpreted
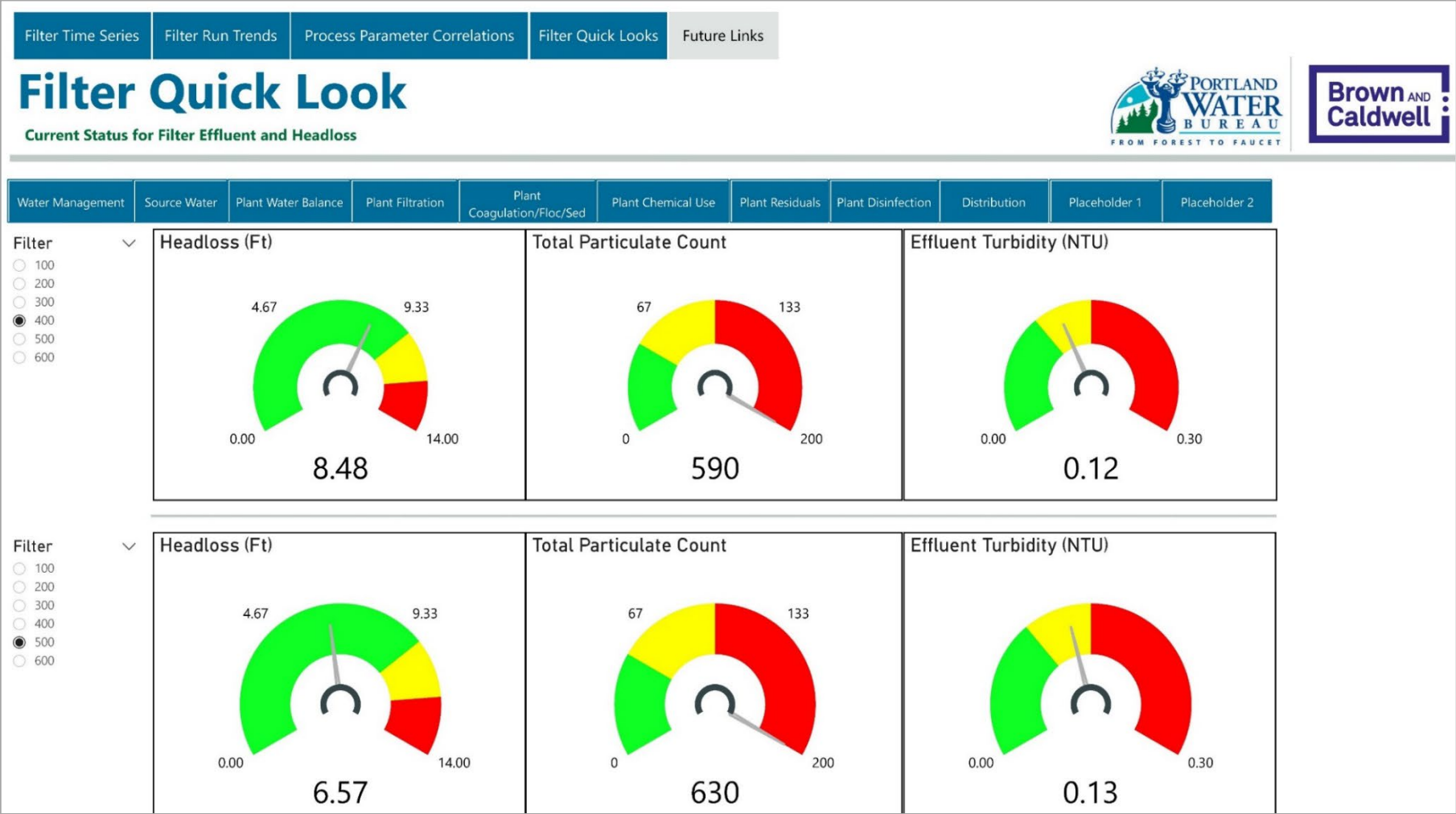
Time series data trending

- Provide snapshot of process performance prior to shift changes
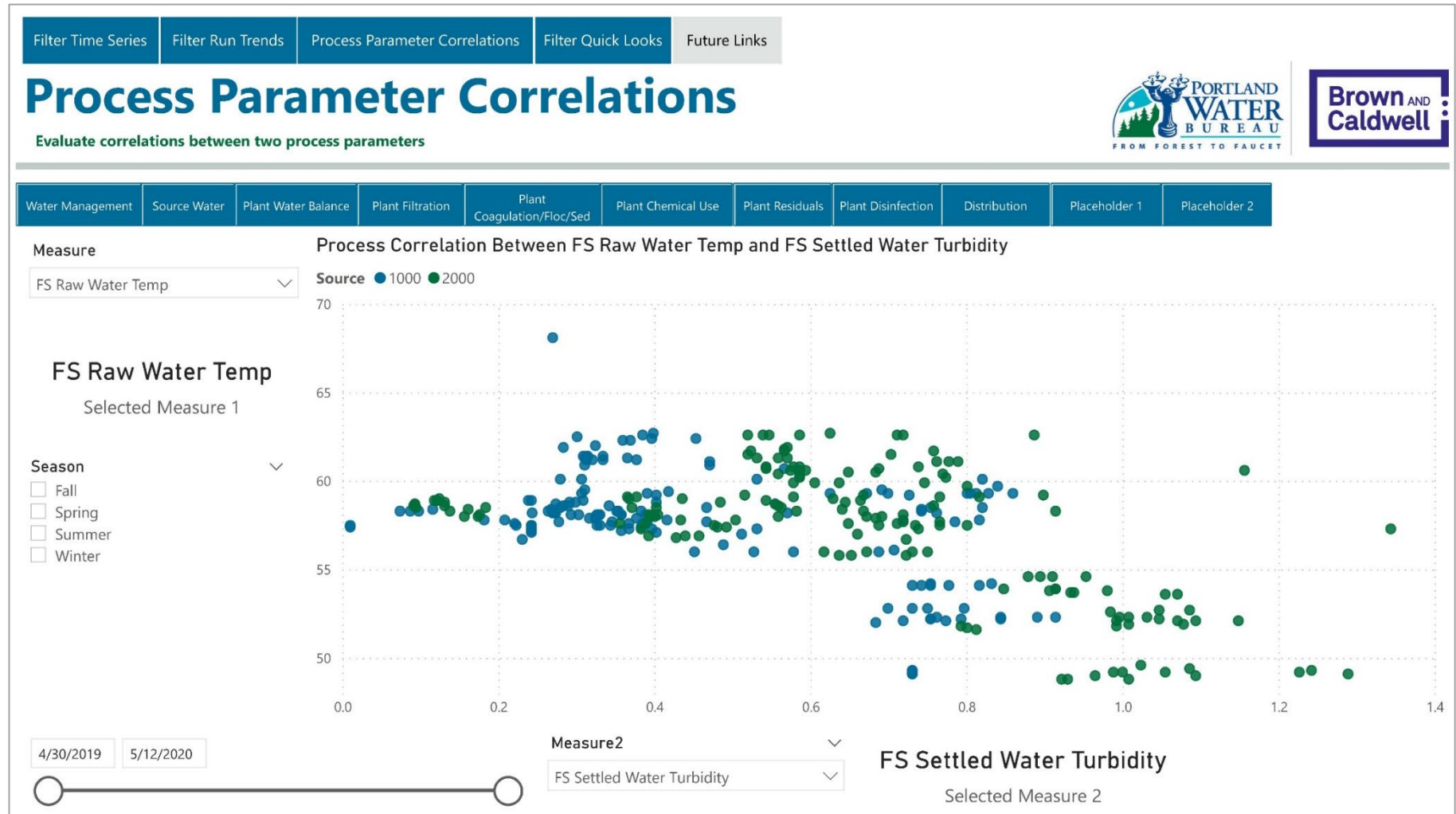- Allows data exploration outside of SCADA environment

Advanced data trending

- Comparing across multiple time periods identifies if trends are typical or anomalous
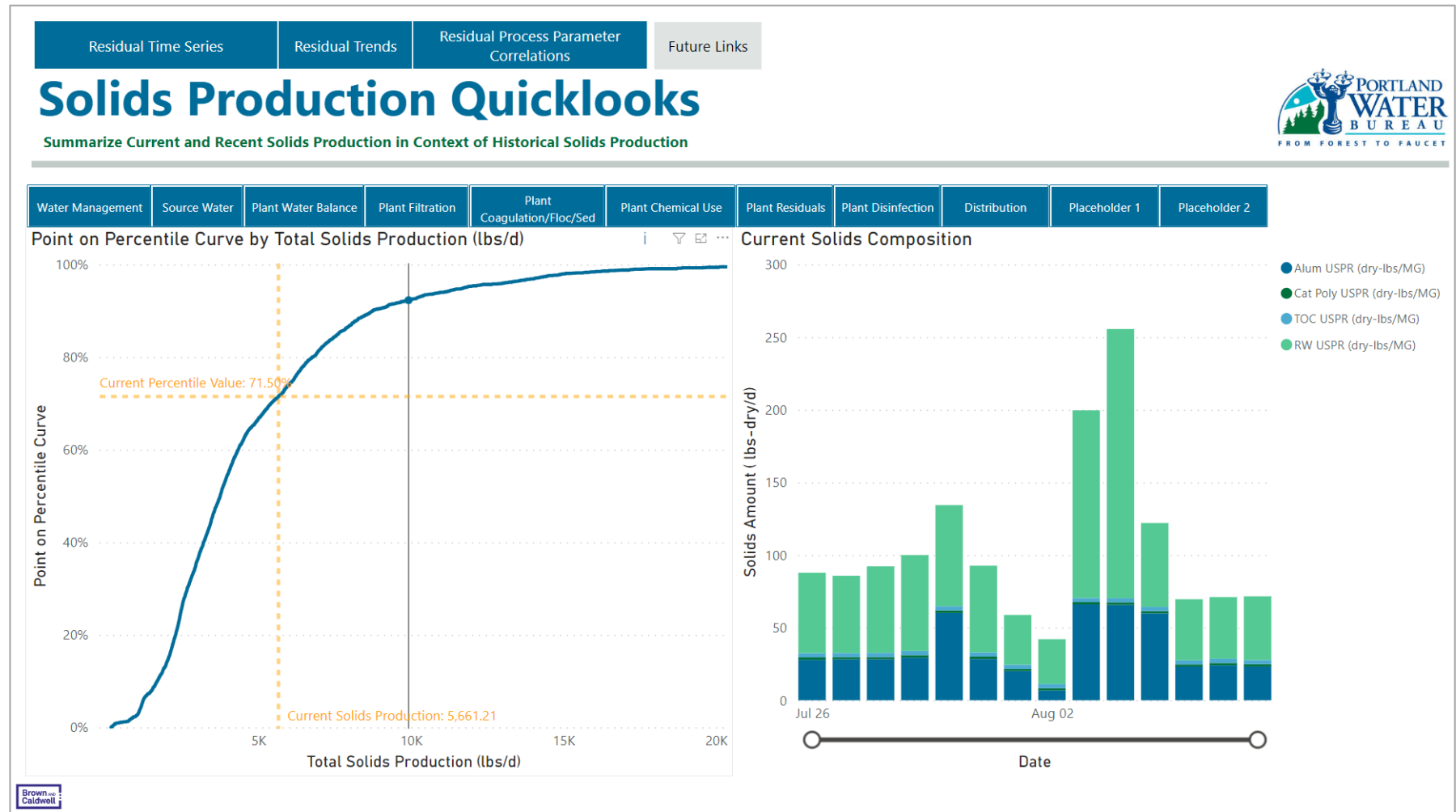
Correlation analysis

- Visualize correlations between data

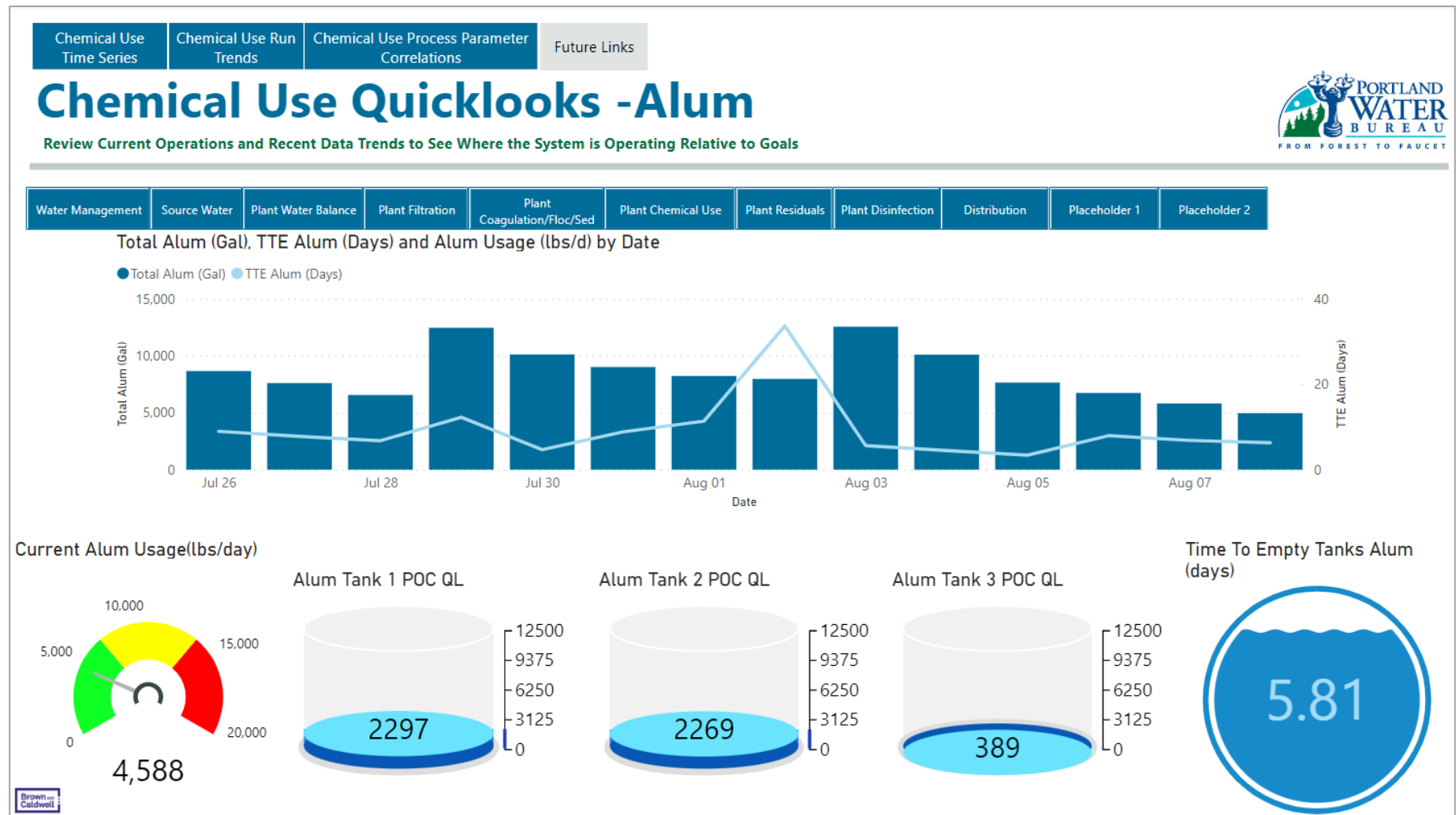- Expands analysis beyond single data sources
  - SCADA
  - LIMS
  - CMMS

Automate process calculations

- Transform/ manipulate data in near-real time to provide process insight
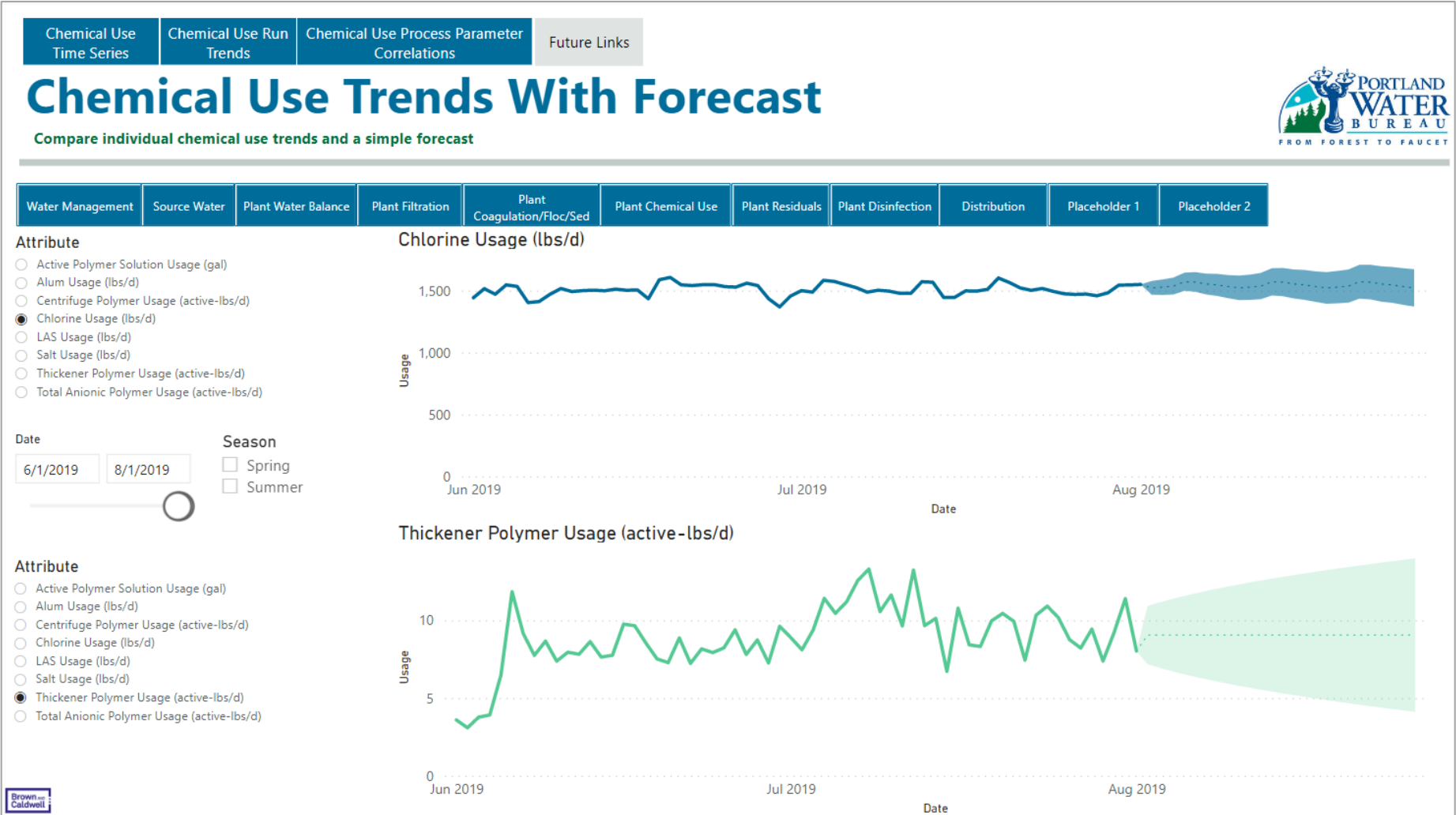
Automate monitoring and reporting

- Provide snapshot of process performance prior to shift changes
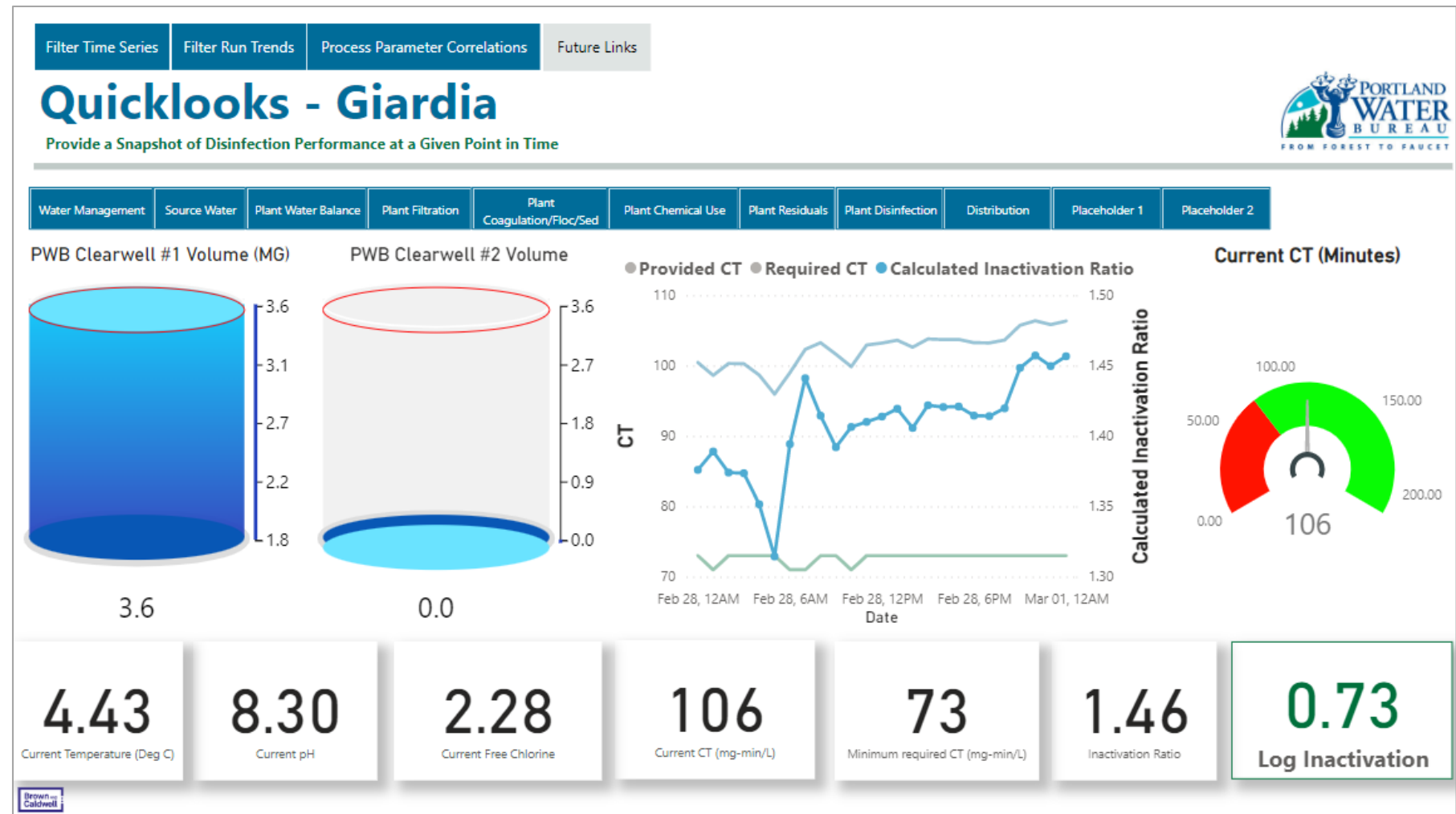- Allows data exploration outside of SCADA environment

Predictive analytics

- Utilize analytics to forecast operations based on historical observations
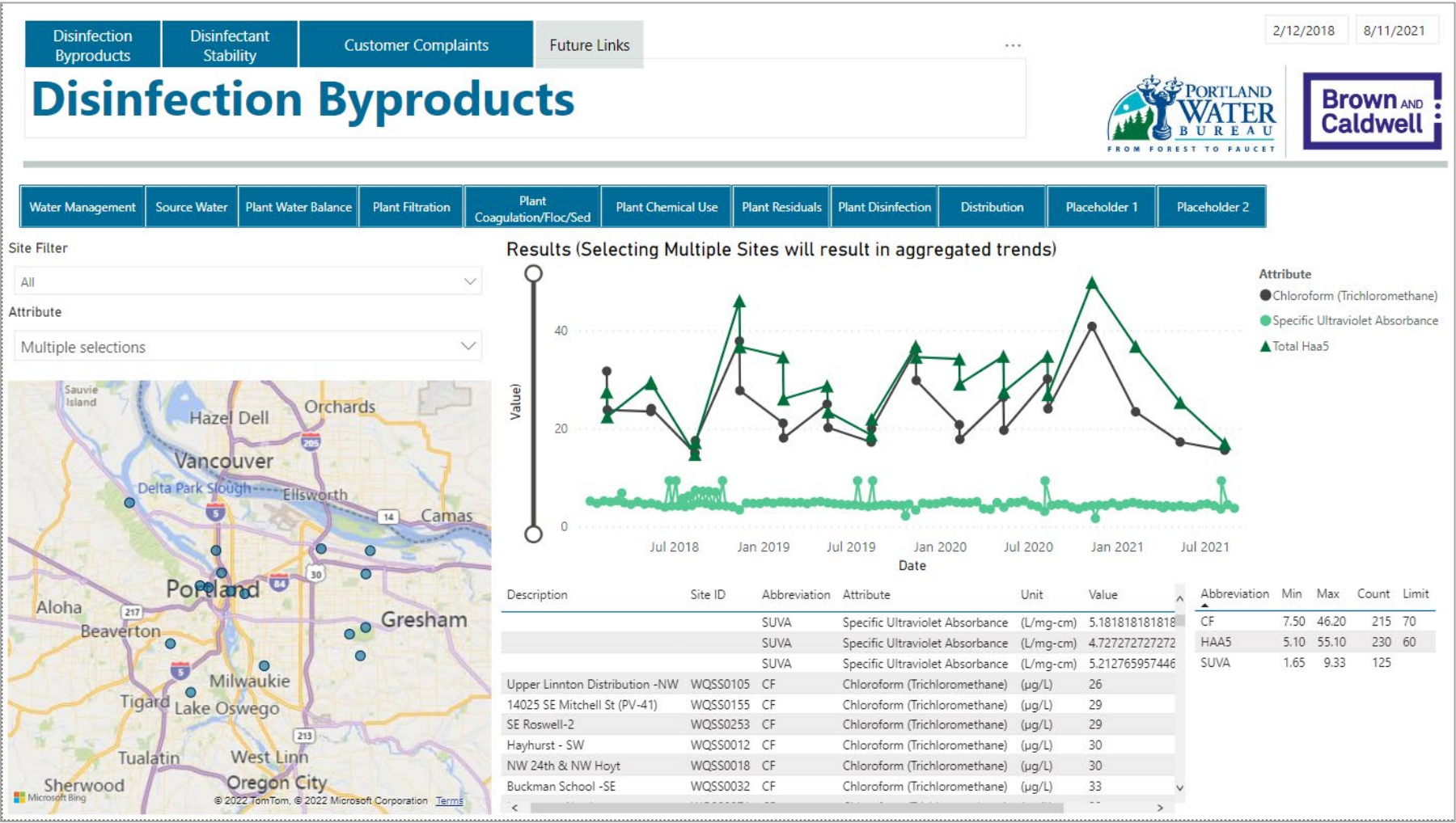
Compliance verification and reporting

- Provide near real-time visualization of compliance data

- Automate reporting

Extending beyond treatment

- Data from any of the utility's data acquisition systems can be visualized and analyzed

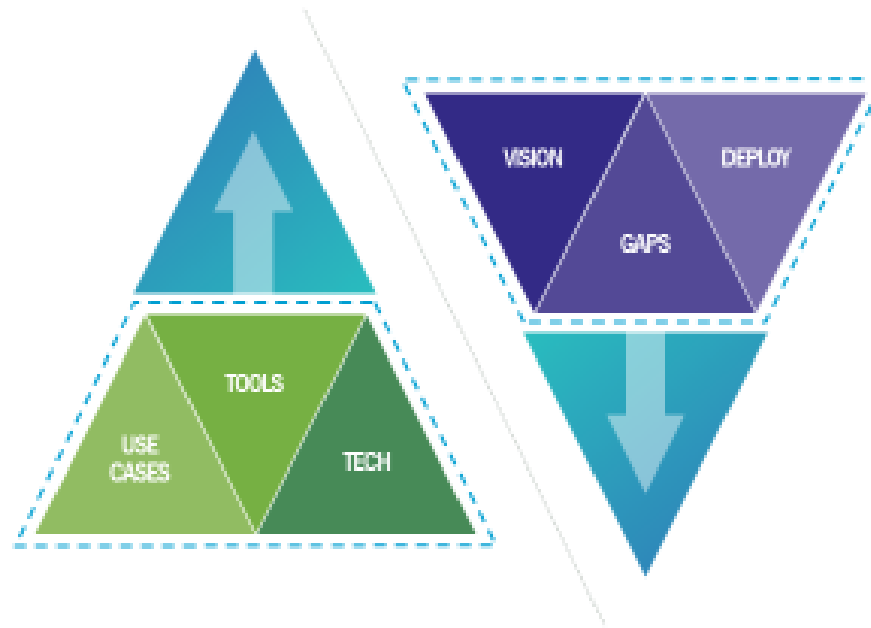# Lessons Learned for Implementing Solutions

Putting it all together

Implementation Approaches

Two distinct approaches to implementation:

Bottom up

Develop use cases, tools, technology and solutions as you go – focus is on the use cases (good ideas and problems to be solved)

Top Down

Roadmap Document – start with vision, identify and prioritize UC deployment, correlate to technology needs and gaps, create implementation plan with schedule and budget

Bringing a utility together through digital transformation

1 Bringing departments and data together

2 Transforming the work

3 Effective utility wide decisions
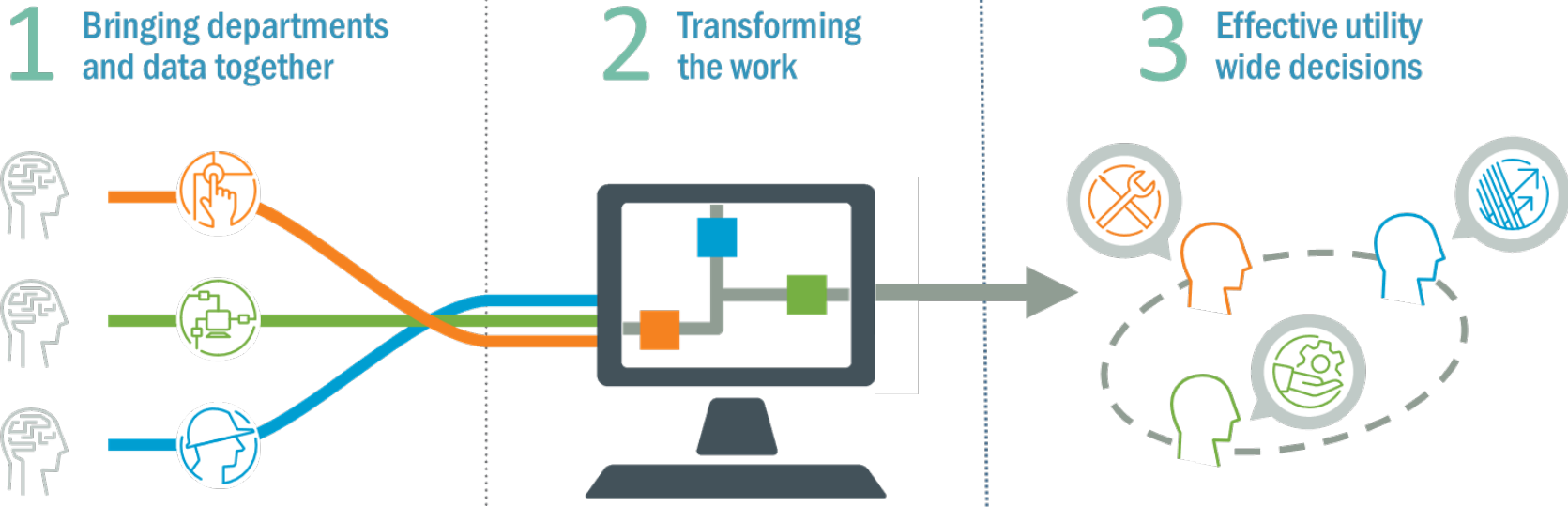
Phased Approach = ✓ greater levels of adoption
✓ acceptance across the organization!

Final thoughts

- You need to be thoughtful and strategic for success
  - Think about the end game from the beginning
  - There is not unlimited $$, the roadmap helps you zero in on what you need
  - Smart Utility means integration of systems, optimization of resources (including people)
- Benefits of Smart Utility Dashboards (rather than programming in SCADA)
  - Screening criteria
  - Avoid additional programming, data export, and manipulation
    - Right format, right math, right quick!
  - Visual flexibility
  - Predictive analytics

Thank you!

- Questions?

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