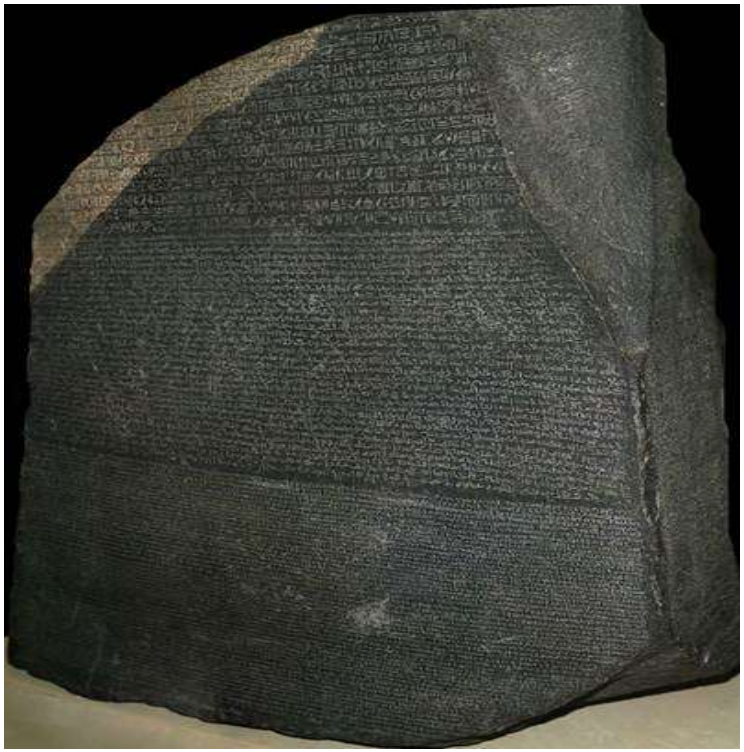
2016 PI System T&D Users Group Meeting

Unlocking Grid Analytics using AF, Maps and Rosetta Stones



Using OSISoft tools to manage the Power Grid

PEAKRELIABILITY
assuring the wide area view

Dayna Aronson

PEAKRELIABILITY
assuring the wide area view

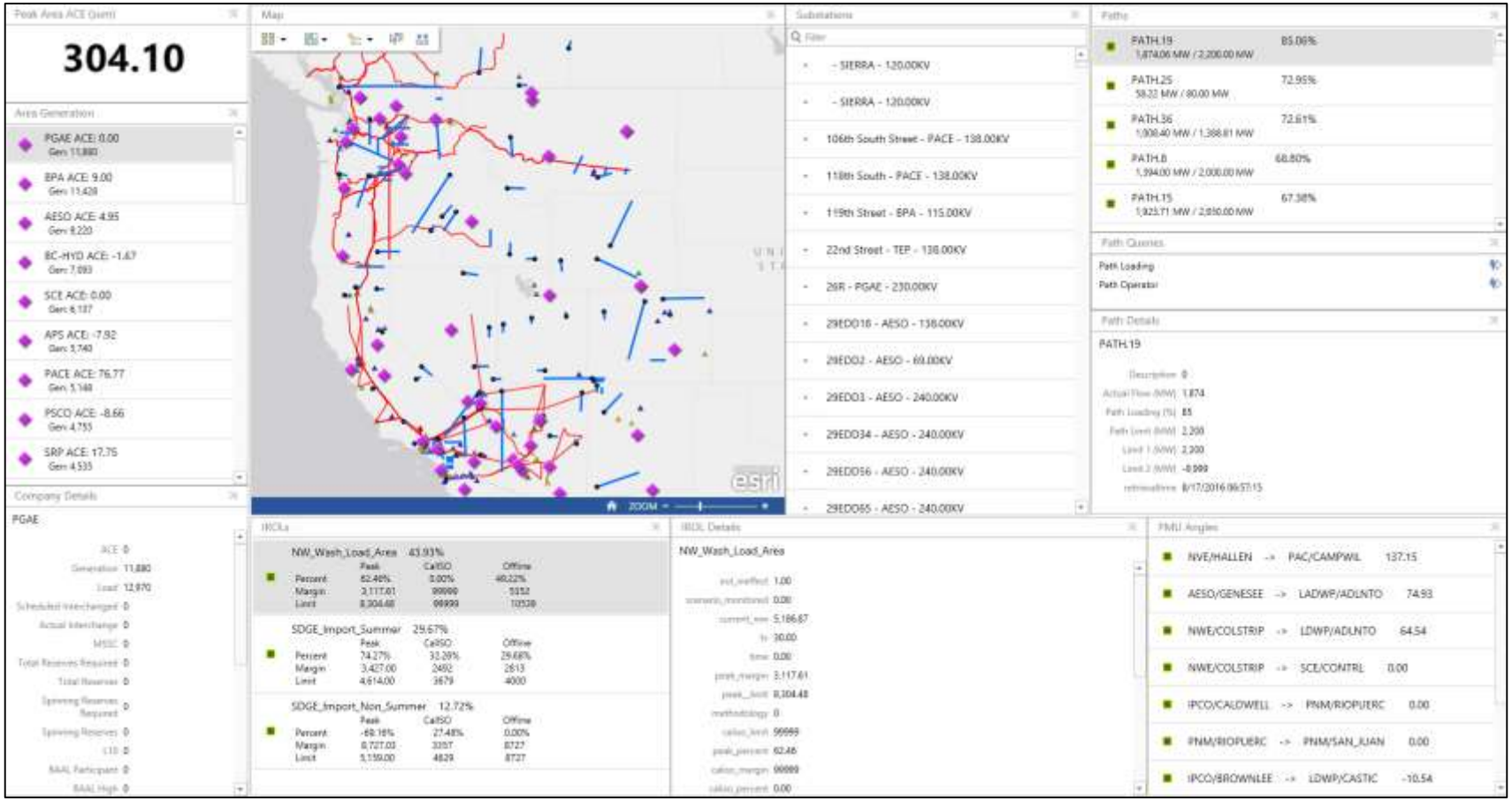
Enterprise Solution Architecture

Scott Stapels

Utilicast

- Control Room Visualization
- Difficult Data Integration
- Energy Markets

Peak Visualization Platform (PVP)



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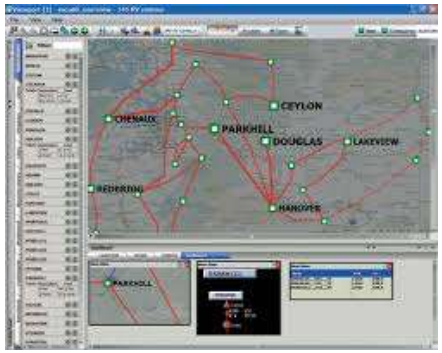
Same Problem – Different Control Room

- More and more data coming into the control centers responsible for larger areas than ever before
- Addition of PMU and other high definition data sources (even more data)
- Need to make it comprehendible by humans – turning data into information
  - allow the most important data to rise to the top and be understood by operations staff
  - Show how one set of data impacts other
- MUST be maintainable

- Alarms
- IROL
- Flow gate / Paths
- ACE
- PMU and wide area Voltage Angle
- Load
- Ace
- AGC
- RAS
- Systems / IT

Options Evaluated

- eTV
- WAV
- STI
- Macomber Map
- PowerWorld
- ESRI



Lots of solutions available – about best match

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"...Failure to Communicate"

- Systems that need to communicate with each other about the same Equipment / Grid speak different languages. They have different models, units, nomenclature, process and terminology.

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Model Consolidation & Normalization

Performed every five weeks

- Physical network topology: ETS (EMS vendor Tool)
- SCADA: In-house databases and scripts
- ICCP: In-house databases and scripts
- RTCA Contingencies: Home-grown CSV file and scripts
- Alarms: EMS vendor UI and scripts
- RAS: In-house databases and scripts
- Outages: 3rd party proprietary software

Peak RC spends significant resources to maintain models (meta-data)

Building the Rosetta Stone

Habitat EMS runtime databases

Outage Management System

Other Systems

SQL Server

AF

Model & Meta-Data Consolidation & Normalization

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Collaboration Kudos

- Three versions over two years of development, with at least 4-5 days/month dedicated to it.
- Over 15,000 lines of code

- Jeffrey Parker
- Tim Van Prooyen
- Cody Parker
- Brian Caserta
- Ryan Schoppe
- Michael Nuget
- Todd Chumley

Grid Reliability

- Reducing the amount of time it takes an RC to comprehend actionable information.

- 11:44 Loss of first 500kV line
- Over next 4 hours additional facilities are impacted as fire grows
- RC calls fire bosses to try and determine location and direction of fire growth and what additional facilities are about to be impacted
- It takes up to 1 hour for this information to get back to the RC
- No current method for analytic tools to geographically map

- Sub optimal gen dispatch
- Extended load shed exposure

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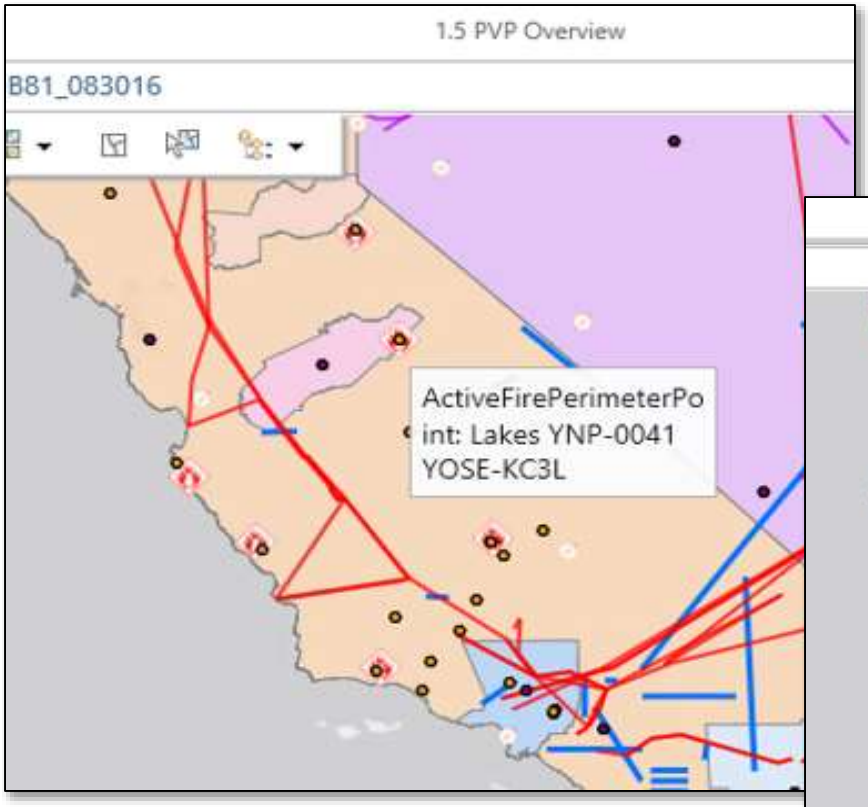
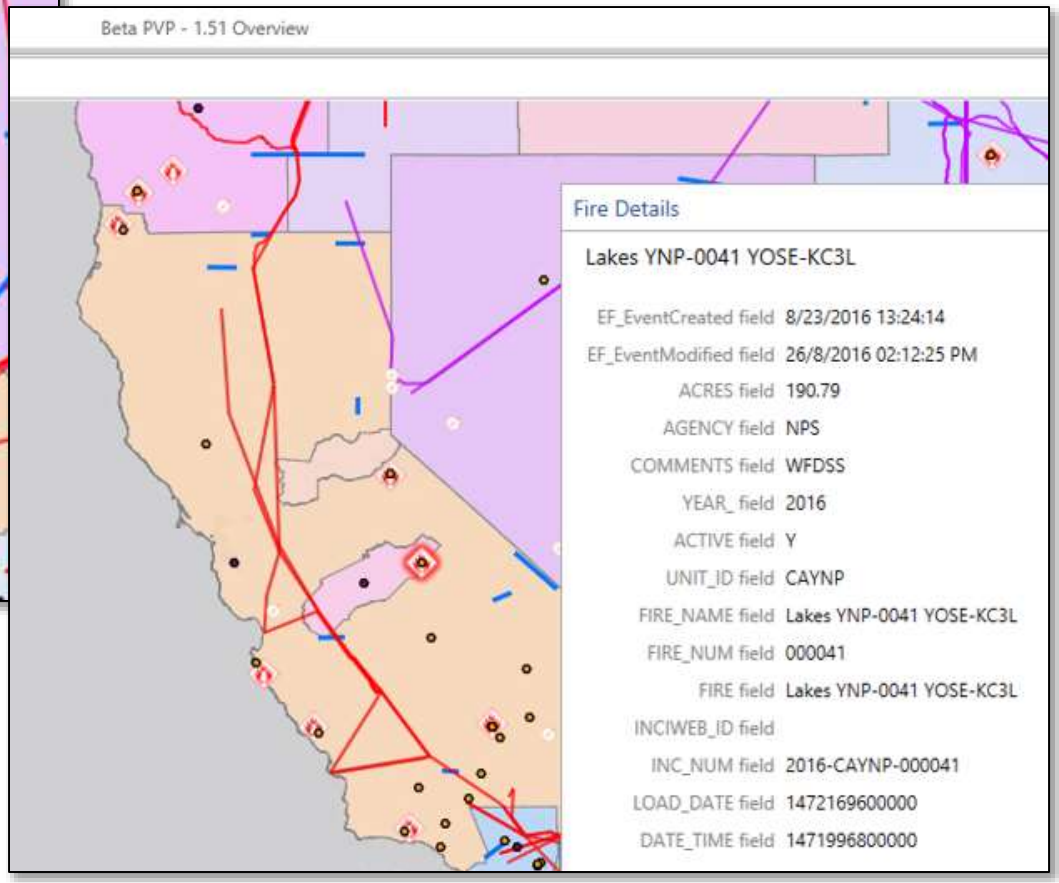
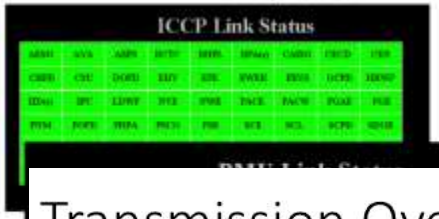
Real-time Fire Visualization





Fire location, size and spatial geometry boundaries updating every 5 minutes from USGS along side of transmission assets

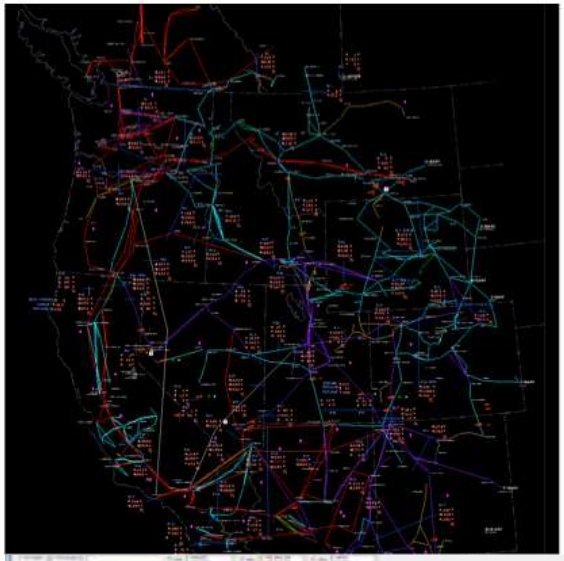
IT & Systems



RAS Status

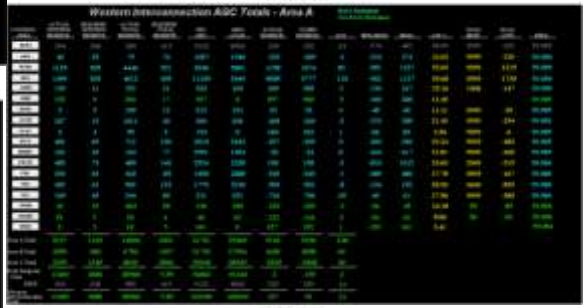
Voltage

Transmission Overview



Paths / Flowgates

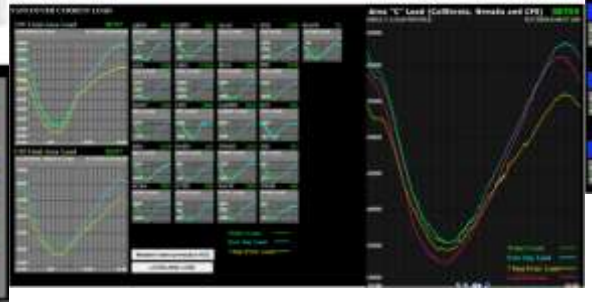
AGC



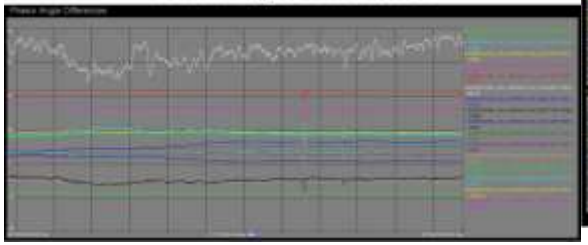
IROL

ACE

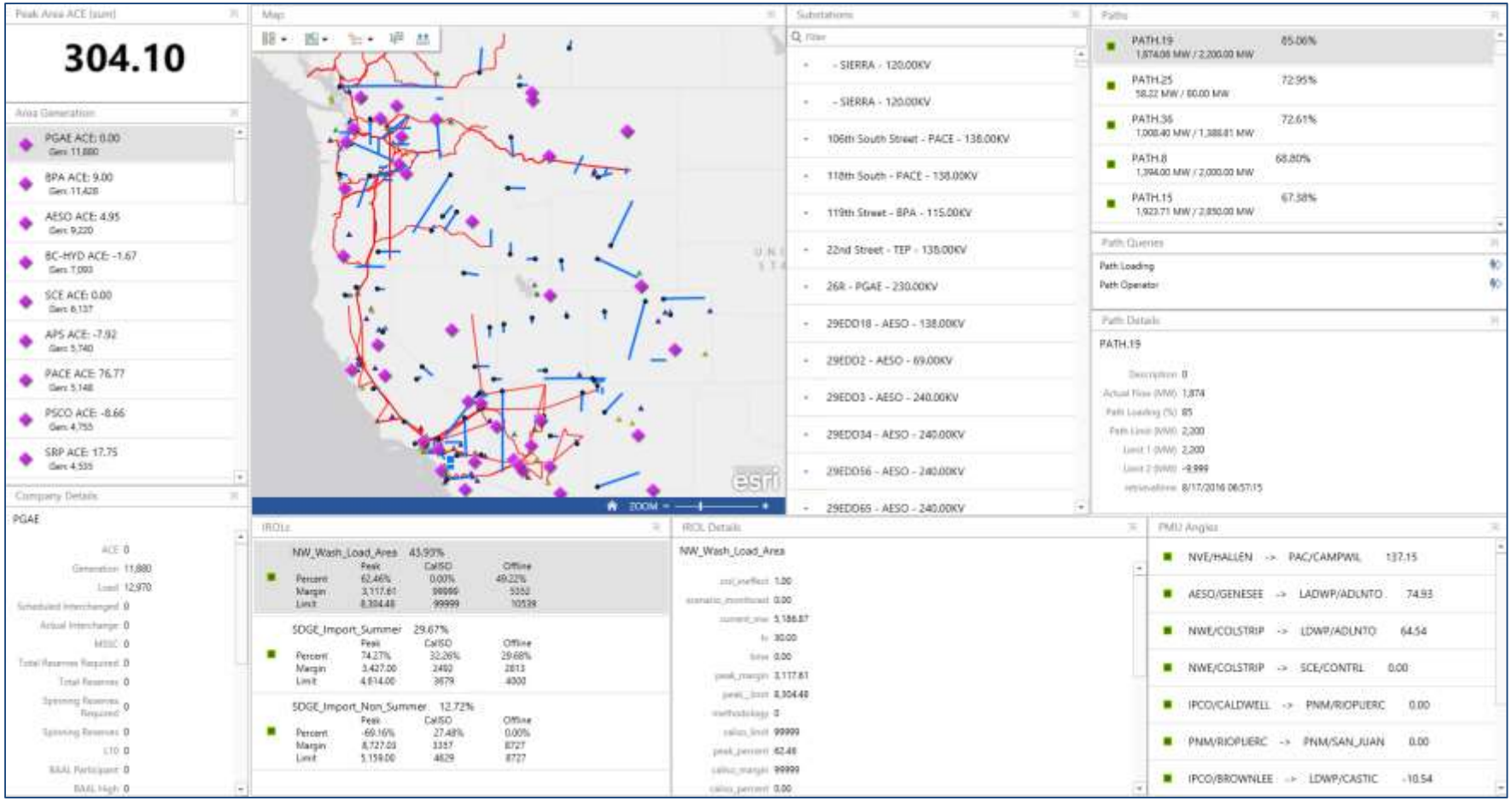
Load



PMU Angle Difference



Dashboard



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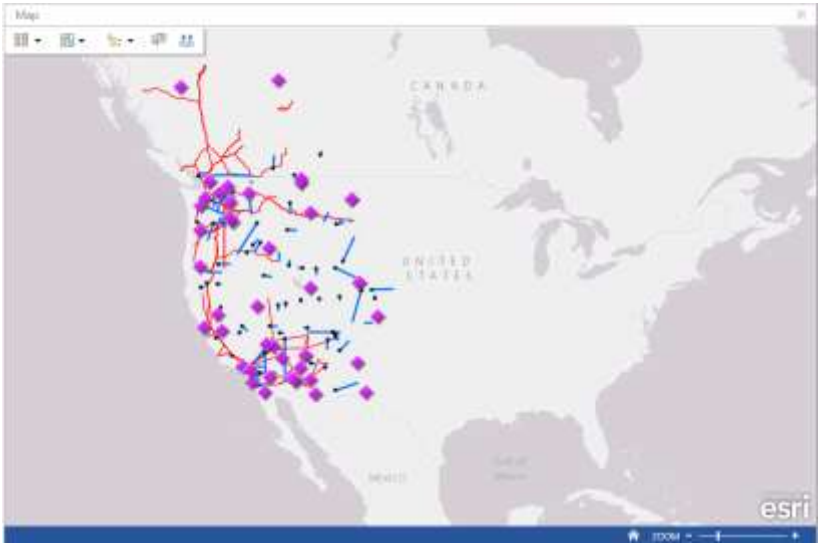
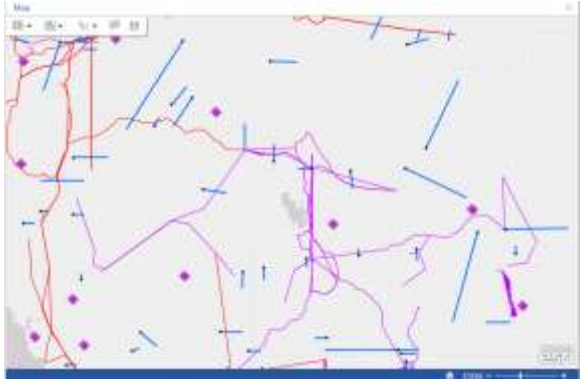
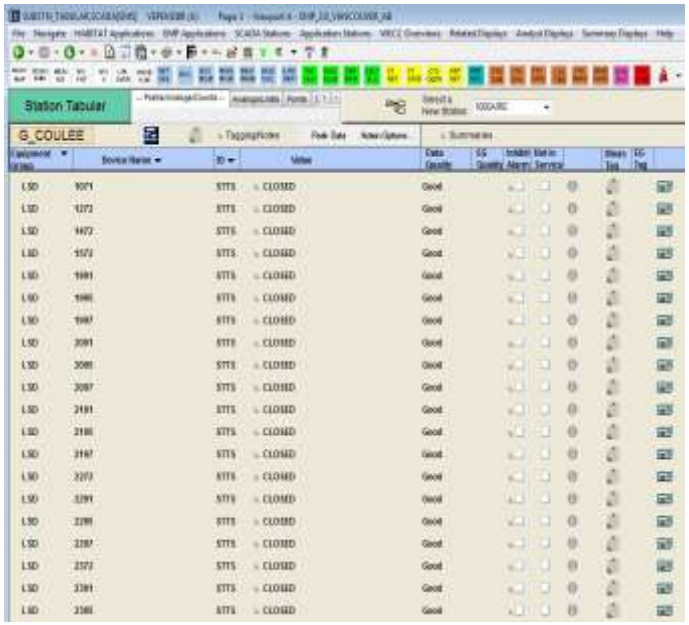
Navigation

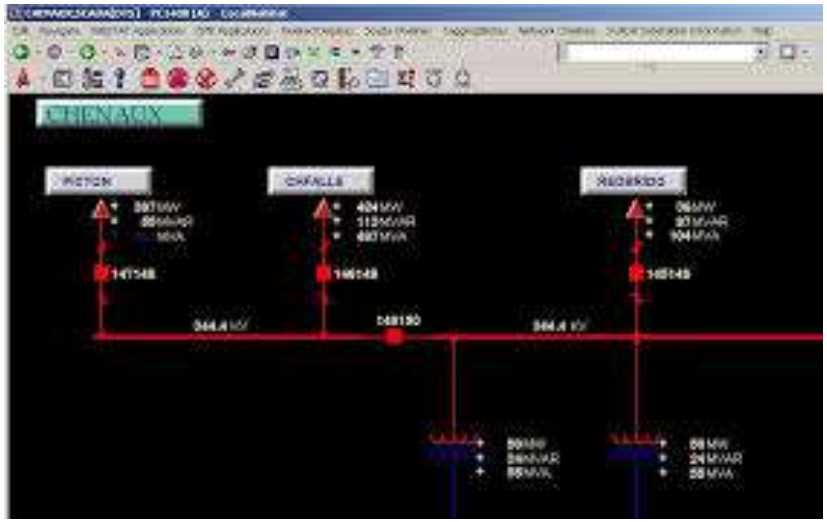




Context specific App launch

- Any URL





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Technical details

Operation Dashboard

CoreSight

Context Launching

Portal

Manages GIS assets and user security

GeoEvent Processor

Real time data feeds

Geo Database

PI Integrator

- Substations
- Paths (Flowgates)
- IROLs
- Lines
- BA / TOP

AF

Historian

SQL Sources

- Alarms
- RTCA

ArcGIS Desktop

Model

SPP Southwest Power Pool

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Decision Drivers

- Leverage Peak Investment in OSIsoft PI
  - Staff Knowledge and Comfort
  - Relationship
  - Infrastructure
- OSIsoft and ESRI are the “best in class” in their core technologies
- Data driven solution

Solution Highlights

- Easy display creation and modification
- Rosetta Stone data Philosophy
- Whiteboard philosophy (can build anything – not limited)
- EMS vendor Agnostic
- Eye toward secure external tablet and mobile use
- Quickly reconfigure based on input from users
- 6 months from vendor selection to available in the control room

What value was achieved

- Organization of data to the operation staff
- Empowered operations staff to control their environment
- IT focuses on making data available
- Better decisions in less time

Contact

- Dayna Aronson
  - Peak RC
  - daronson@peakrc.com
  - 360-448-2655

- Scott Stapels
  - Utilicast
  - sstapels@utilicast.com
  - 248-760-1058

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