Bridging the Gap

Synchrophasor Technology in Realizing the Smart Grid

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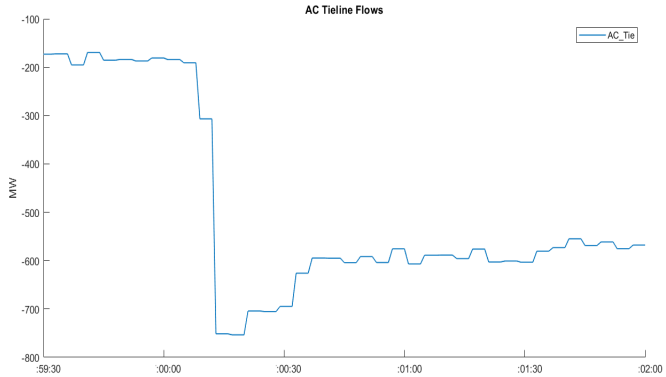
AN EXAMPLE

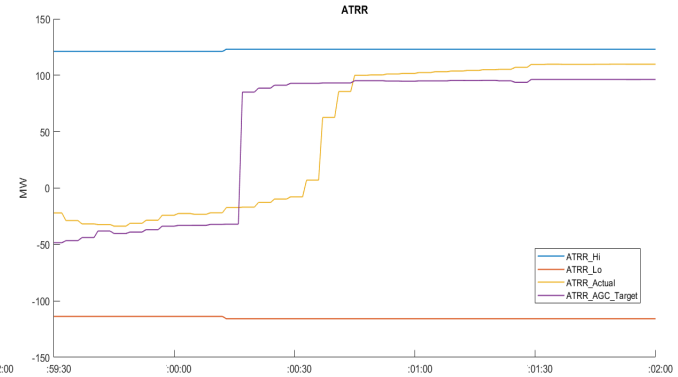
How Much Source Was Lost?

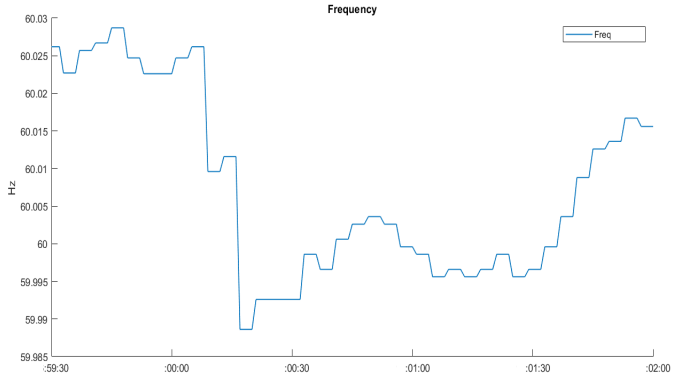
ACE Tabular Display

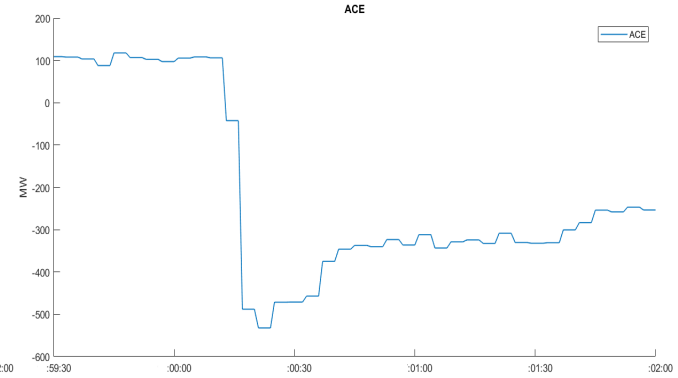
ACE: 100

ACE: – 300









IDENTIFYING THE GAP

Between R&D and business users

What Can Each Party Provide – In Abstract?

R&D		Business Users
Technologies and New Tools		Problems or Daily Tasks/Tools
Analytical Skills		Past Experiences
Development Capabilities	Gap	Scenes and Scenarios
Industry Experiences		Entity-specific Needs
Possibilities		Challenges
Nice to Haves		Things to Avoid
Cool Things to Do		Works or Not

Common Disconnects – In Reality?

R&D		Business Users
You know what we can do?		This is what we need.
We have technology limitations.		We have other tools and means.
This is the scientific way.	Gap	This is how we do things.
Others are doing these.		We don’t care those problems.
We can do a lot of things.		We only have these challenges.
What about this for the future?		We can’t do it that way.
You know what would be cool?		Does it work?

BRIDGING THE GAP

Start with a Conversation

- Key Actors
  - Technology leaders or pioneers in the business domain
  - R&D
- Conversation
  - High-level technology introduction to the business users
    - Highlight the uniqueness and competitive edge
  - Understand current business practices and current/future needs
  - Avoid (if possible)
    - Presenting imagined or artificially created use cases
    - Making false promises
    - Burying into technology details

Develop Compelling Use Cases – Good and Bad Oscillation Management

- ✓ Detect, Analyze, Locate
- ✓ Present Only Key Characteristics
  - ✓ Frequency, Magnitude, Location, Status
- ✓ Clear and precise OP/TOG with Pre-defined Mitigation Measures

- x Detect and Alarm
- x Present Rich Characteristics
  - x Mode shape, waterfall, etc.
- x Ask Operators to Investigate and Make Engineering Judgment
- x Ask Operators to Provide Mitigation Measures

BEST PRACTICES

What Helps and What Does Not?

- ✓ Processed Information – True SA
  - ✓ Provide conclusions
  - ✓ Eliminate the need for investigation
- ✓ Tap into Current Processes / Tools
  - ✓ Improve the current performance
  - ✓ Add a new function
  - ✓ Add new information
  - ✓ Update the Operating Procedure
  - ✓ Merge PMU Data with SCADA Data
    - ✓ Cross backup
- ✓ Handle Data Quality
  - ✓ Isolate it from the end users
- ✓ Standard Operator Cycle Trainings

- x Raw Information Only
  - x Needs further analysis and/or crosscheck
- x Requires a New Process / Tool without a Clearly Defined Operating Procedure
- x A Completely New Function without Clear Benefits
- x Ask Users to Call Out False Alarms Caused by Bad Data
- x Expect Operators to be Engineers or even SME on New Technologies

Visualization – Dos and Don'ts

- ✓ Data Tips and Tags on the Curve (when possible)
  - ✓ Besides legend bar
- ✓ Add PMU Data to Existing Displays (based on SCADA)
- ✓ Dynamically Updated
  - ✓ Signal, window and info based on events
- ✓ Added Analytics
  - ✓ E.g, magnitude difference or change, duration of an event

- x Legend Bar Only
  - x More than two curves
- x Standalone Displays
  - x Not completely new info
- x Predefined Steady-State Trends
- x Raw Data Only
  - x Requires visual inspection and mental calculation

Takeaways

- Think Both as An R&D Engineer and an End User
  - Speak The Same Language as End Users
- Neither Purely Problem Driven, Nor Purely Technology Driven
  - Hardware store shopping
- Change Ourselves
  - Not Others
- Provide Benefits
  - Not Increasing Workload
- Think Outside the Box!
  - And case by case

Questions