Russell Robertson

PQ Dashboard User's Group - 2021

What's new with PQ at GPA

Grid Protection Alliance

GRID PROTECTION ALLIANCE

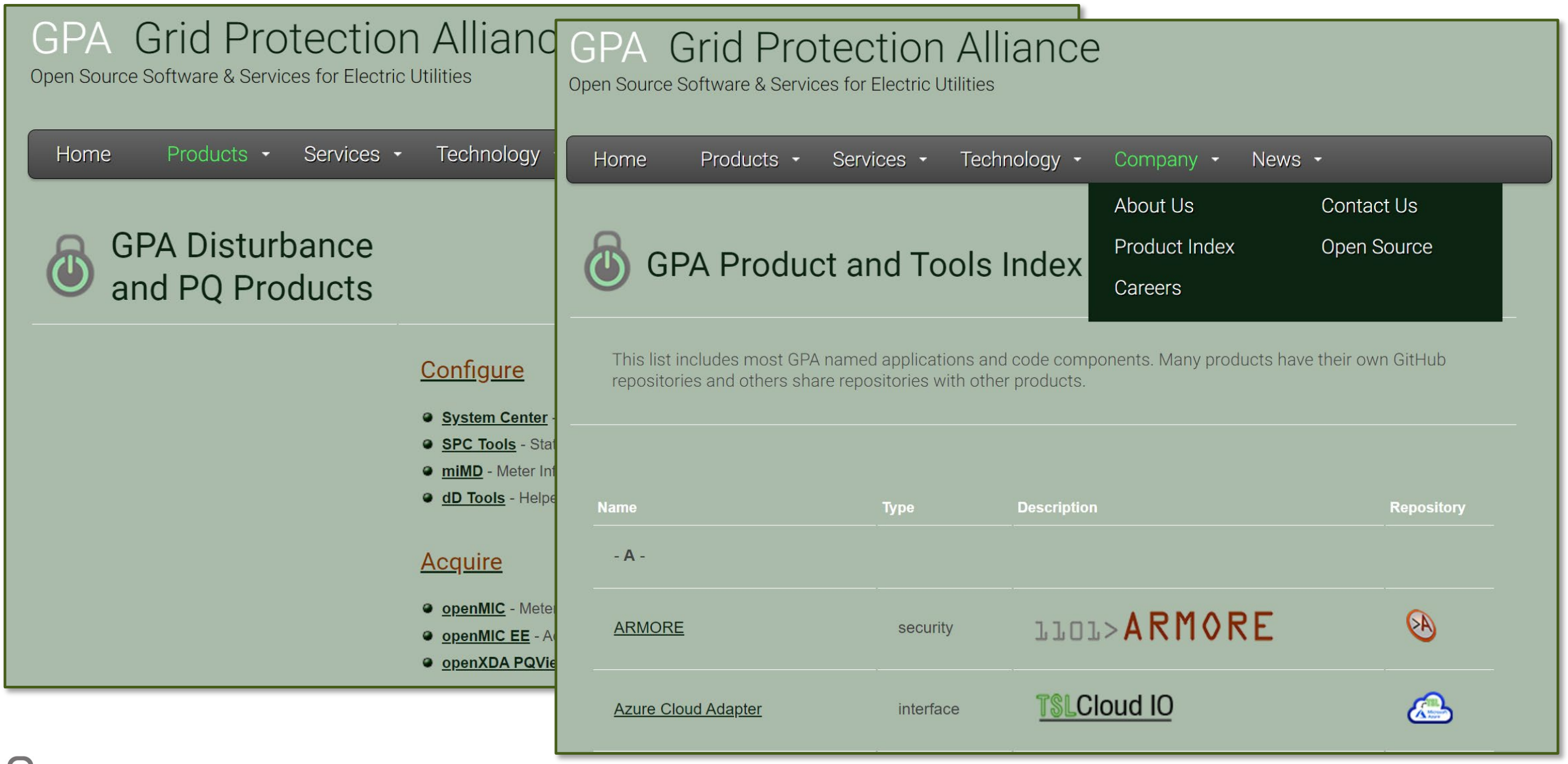
GPA is a not-for-profit corporation established in 2010.

- Specializes in software and services for the electric utility industry
- All software is open-source, published under the permissive MIT license
- Focus is on a robust, reliable and resilient grid

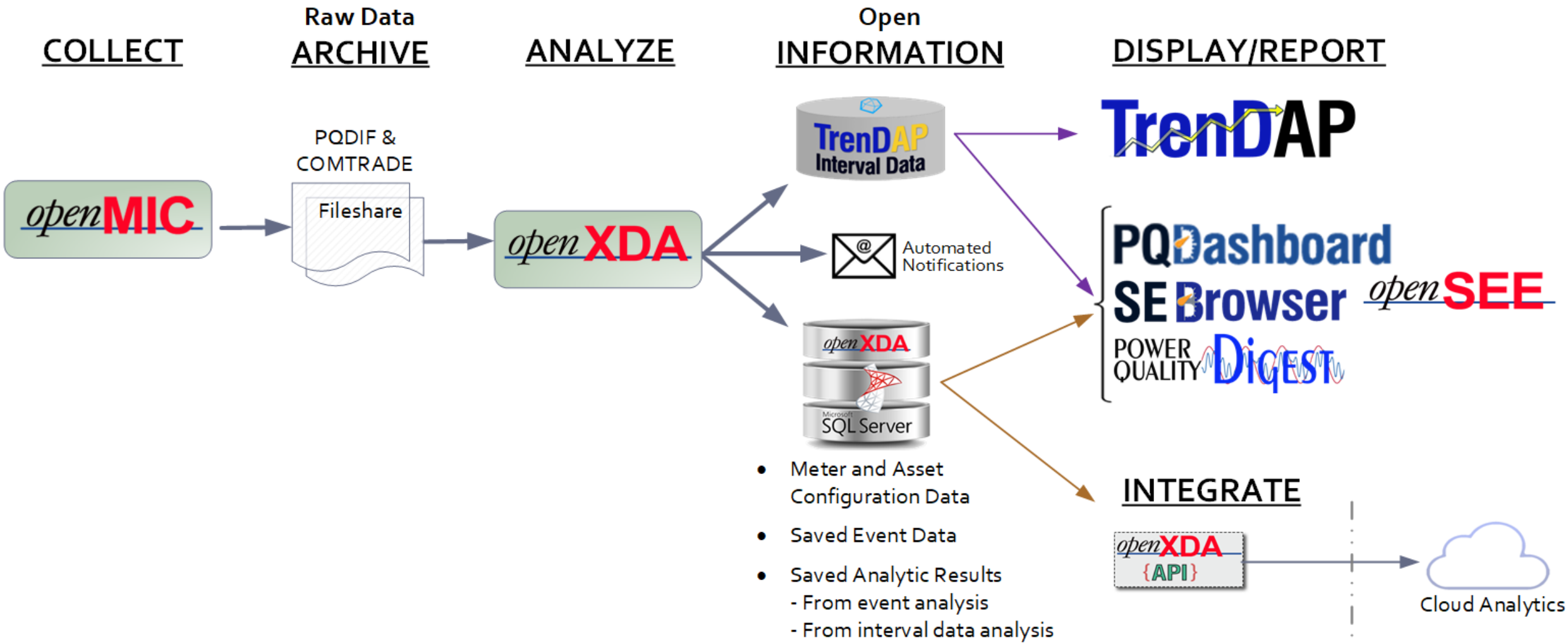
`https://gridprotectionalliance.org`

Products in GPA's Suite of Open-Source PQ Tools

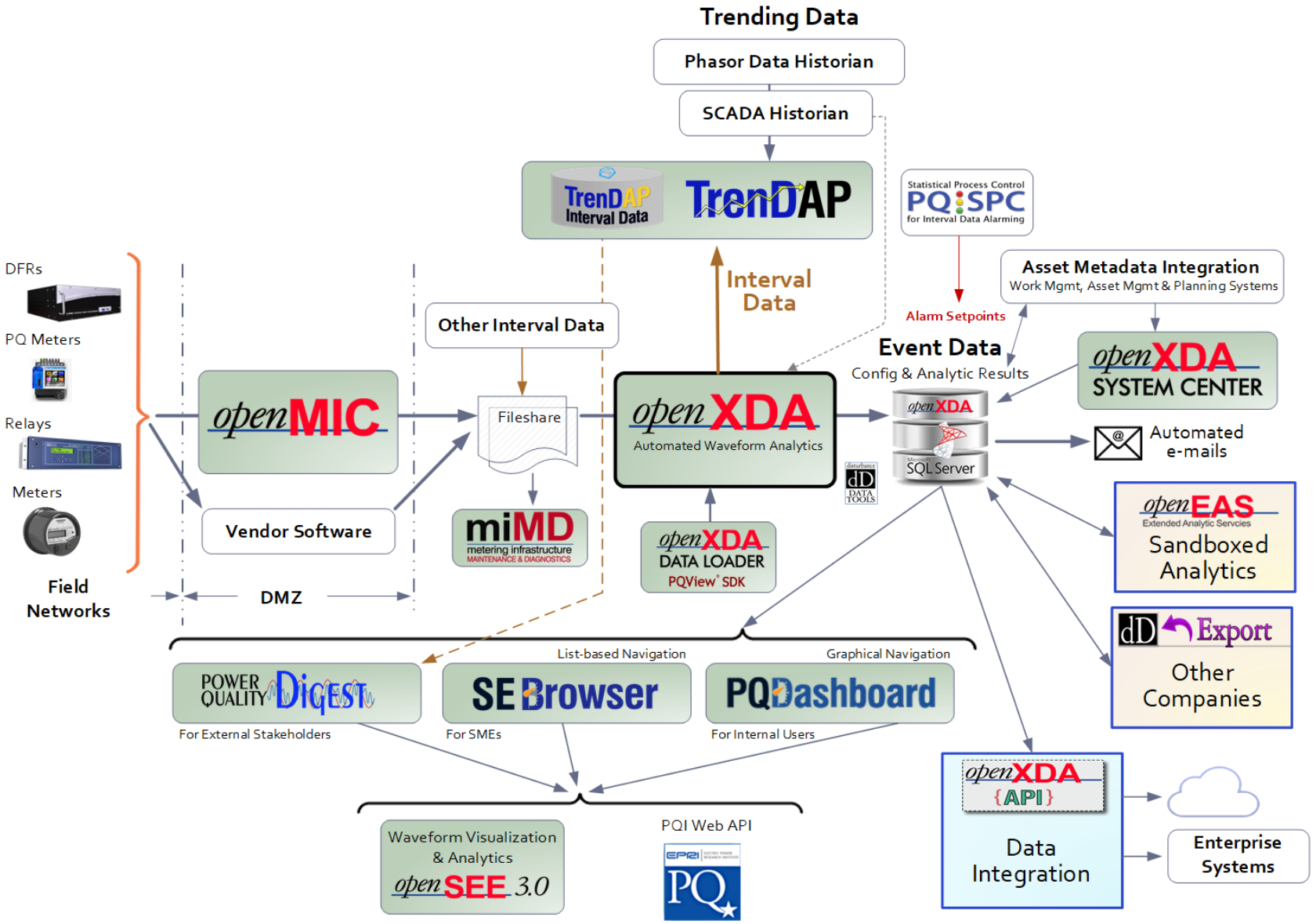
Product Index on GPA's Web Site



PQ Data Flows



More Detailed PQ Data Flows



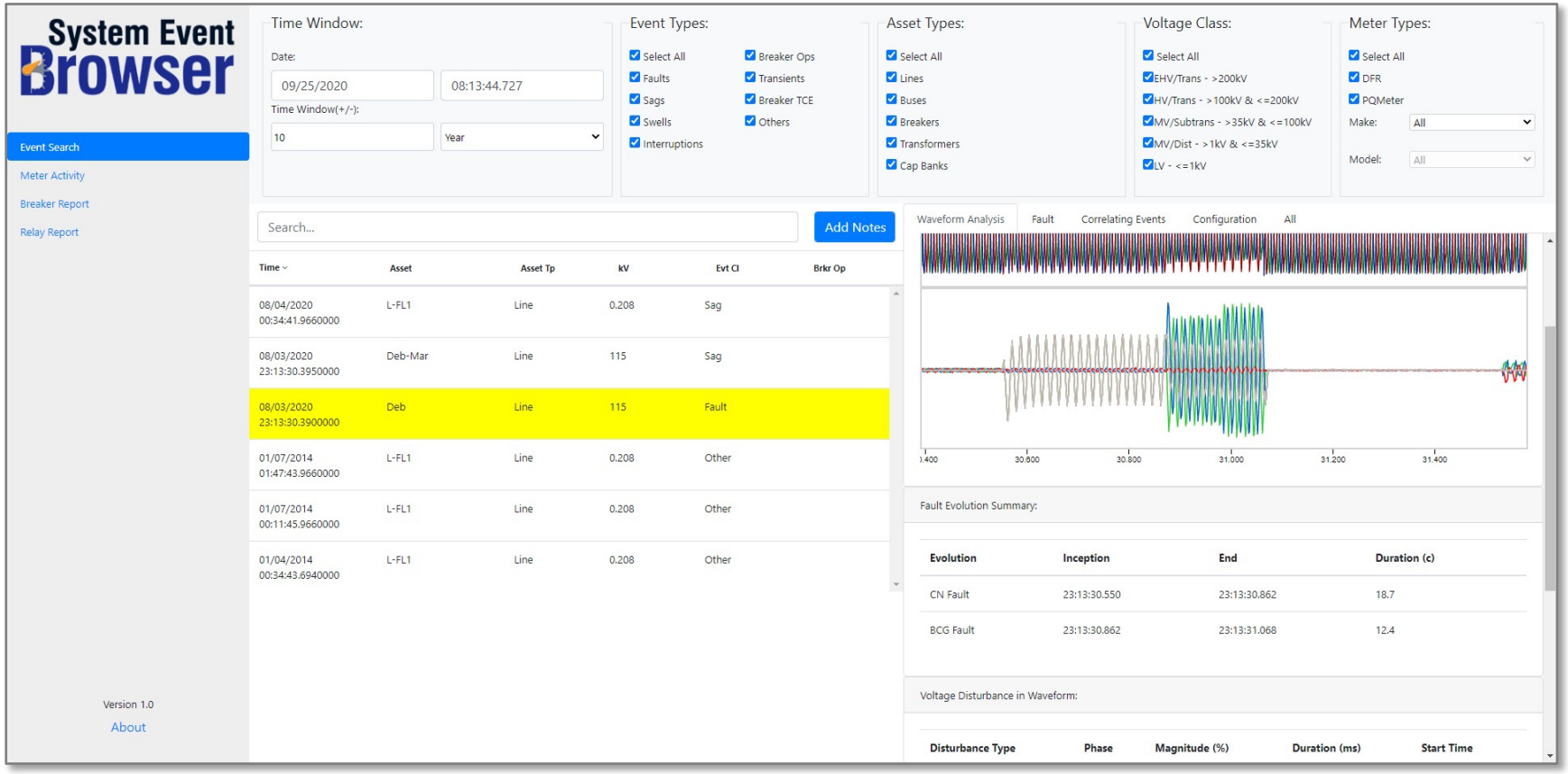
Summary of the Most Recent Feature Additions

- SE Browser 1.0
- TrenDAP database / TrenDAP Application (Beta – Summer 2021)
- EPRI SPC Tools
- PRC-002 Compliance Tools for MiMD
- openMIC EE
  - Multi-node capability
  - ION meter polling
  - Dranetz meter polling
- Event type in openXDA for metering errors
- Common navigation and filtering pattern across applications

System Event Browser

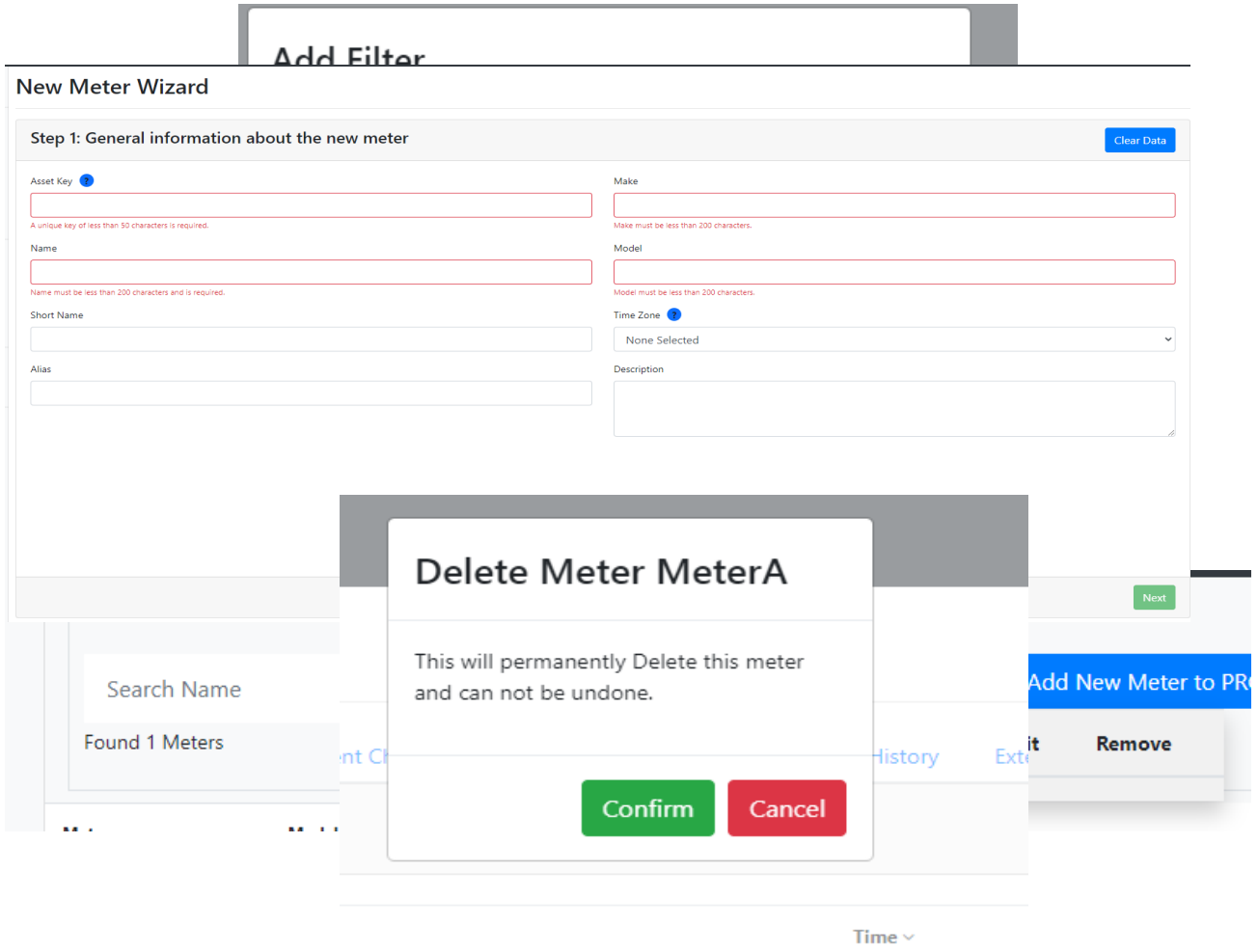
Features

- A power tool for PQ SME's
- Functions like an email client with a comprehensive preview window
- Allows quick navigation to events through multiple filtering options.
- Provides links to openSEE for detailed event waveform study
- The launch point for reports that aggregate historical event data



Common Navigation Features

- Improved usability
  - Additional error messages
  - Additional description on inputs
  - Convenient Search feature
- Simplified workflow
  - Various Wizards
  - Clear instructions
- Improved protection from accidental mis-configuration
  - Warning messages
  - Tooltips



What's Coming Soon

- openXDA 3.0
  - New asset model
  - Multi-node
  - Data conditioning/scaling
- PQ Dashboard 3.0
  - Works with openXDA 3.0
  - New "circle" display to replace heat maps
- PQ Digest 1.0
  - Event data
  - Interval data
- Device Summary Web Page
  - Device metadata
  - Device Comm Status
  - Device Configuration Status
  - Data Errors
- Data Maintenance Utilities
  - Event and Interval Data Rescue Tools
  - Event and Interval Data "Delete / Merge" Tools
- openMIC EE Additions
  - Dranetz Master Meter Capability
  - SATEC meter functionality
- openXDA interface with Elspec Sapphire system

The Progression of GPA PQ and Disturbance Monitoring Tools

		2017	2018	2019	2020	*(planned)*	*(planned)*	
openMIC	1.0	1.2	1.2	1.2	1.3	1.3	1.4	openMIC
openXDA	2.0	2.2	2.3	2.5	2.6	3.0	3.1	openXDA
PQ Dashboard	1.0.5	2.0	2.1	2.5	2.6	3.0	3.1	PQ Dashboard
openSEE	1.0	1.0	2.0	3.0	3.0	3.0	3.0	openSEE
SE Browser	-	-	-	0.8	0.9	1.0	1.1	SE Browser
System Center	-	-	-	-	0.9	1.0	1.1	System Center
miMD	-	-	-	-	0.9	1.0	1.1	miMD
PQ Digest	-	-	-	-	0.9	1.0	1.1	PQ Digest
TrenDAP	-	-	-	-	-	0.9	1.0	TrenDAP

- Multiple fault location algorithms
- Breaker Timing
- dD Tools
- PQI Support
- openSEE

- Granular time filtering
- Add/edit event notes
- openAPIs & more ways to integrate info
- Data exchange capabilities

- PQView Data Integration
- File-watcher improvements
- Data storage reductions
- Fault detection improvements
- PQ-Mark

- Fault Cause Analytics
- openSEE Analytics
- SE Browser
- LSCVS and Voltage Reg Reports

- Asset Centric Data Structure
- System Center
- miMD
- openMIC EE - ION meters
- PQDS Format

- openXDA 3.0
- PQ Digest
- Device Summary
- openMIC EE - Dranetz - SATEC

- TrenDAP
- Continued product feature growth

GRID PROTECTION ALLIANCE

Extra Slides

GPA's Disturbance Monitoring/PQ Product Suite

https://github.com/GridProtectionAlliance

Daily updates available at https://gridprotectionalliance.org/NightlyBuilds/

Configure

- System Center
  for configuration of GPA's PQ Tool Suite
- Statistical Process Control
  PQ SPC
  for Interval Data Alarming
- dD disturbance DATA
  Engineering Helper Tools

Acquire

- openMIC
- openMIC EE
  Enterprise Edition
- XDAPQView
  DATA LOADER

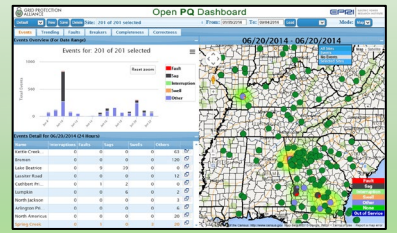
Analyze & Notify

- openXDA
  EXTENSIBLE DISTURBANCE ANALYTICS
- Microsoft SQL Server
- openEAS
  Extended Analytic Servcies
- TrenDAP
  Interval Data

Study

- openSEE 3.0
- TrenDAP

Display



- PQDashboard
- System Event Browser
- POWER QUALITY Digest
- SOE Tools

Report

- PQ Monthly Report
- LSCVS Large Sensitive Customer VOLTAGE SAG REPORT
- PQ Trending Data
  Votage Regulation Report

Share

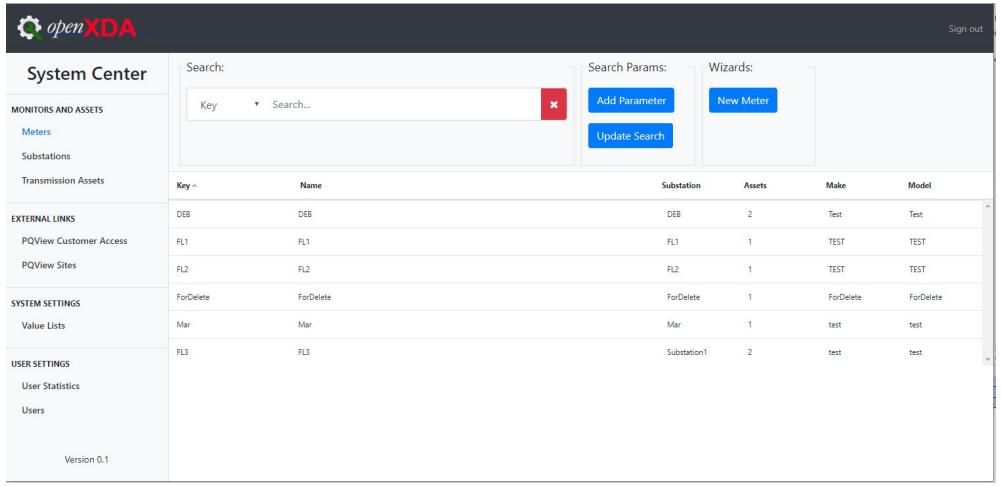
- PQio
  POWER QUALITY DATA CONVERTER
- openXDA {API}

Utilities

- PQDIF Explorer

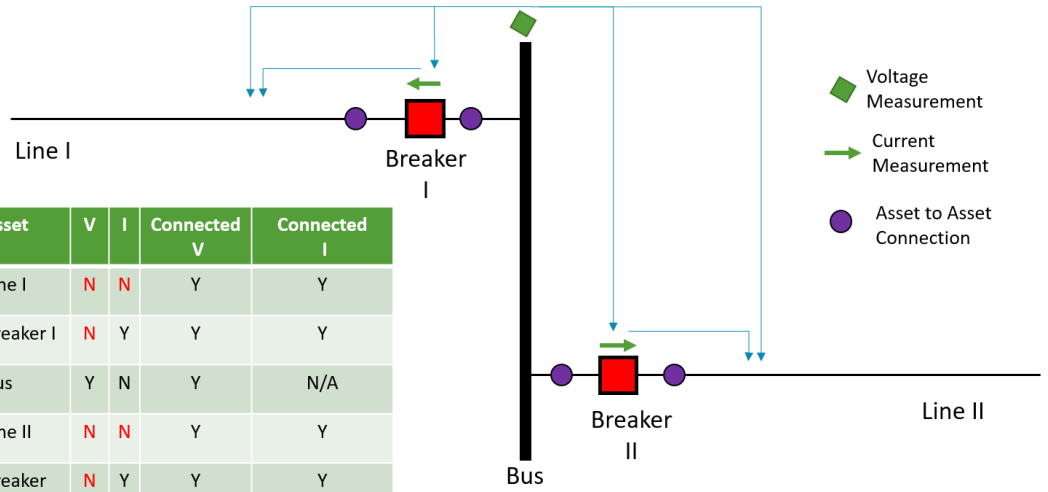
Highlights of 2020 Changes – System Center

openXDA SYSTEM CENTER



- For the integrated management of configuration for all applications in the openXDA suite of tools
- Includes a “configuration change” alarm for substation measurement devices
- Provides integration with other corporate tools to reduce configuration burden and improve configuration quality
  - Work Management (Maximo) for asset attributes (e.g., structure locations)
  - Planning (FAWG) for equipment electrical characteristics
  - Active Directory for contact management

openXDA 3.0 Improvement – Asset Modeling



Asset	V	I	Connected V	Connected I
Line I	N	N	Y	Y
Breaker I	N	Y	Y	Y
Bus	Y	N	Y	N/A
Line II	N	N	Y	Y
Breaker II	N	Y	Y	Y

Currently, these assets can be modeled:

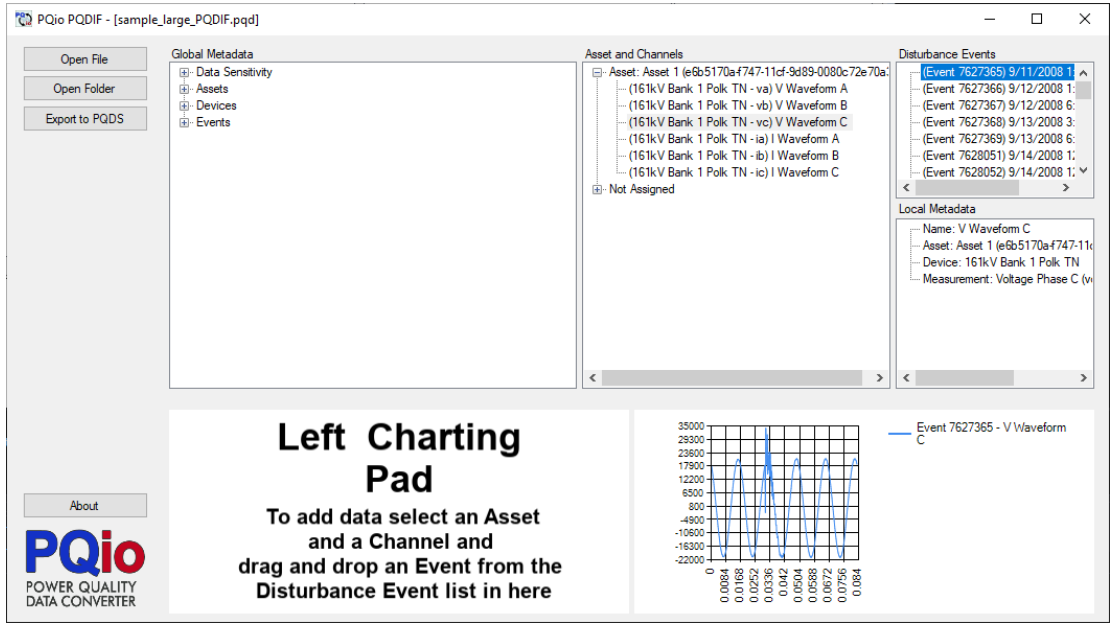
- Line
- Breaker
- Bus
- Transformer
- Capacitor Bank

- An asset-centric model has been implemented in openXDA
- Provides the ability to designate spare breakers and switch out breakers serving lines
- Allows voltage measurements to be associated with all equipment attached to the bus
- Also includes modeling of line segments – each with their individual impedance characteristic
  Each segment can be connected:
  - To another segment
  - To 2 other segments (a tap)
  - To the substation

GPA Helper Tools – PQio, PQwdp and PQDIF Explorer

PQDIF Explorer

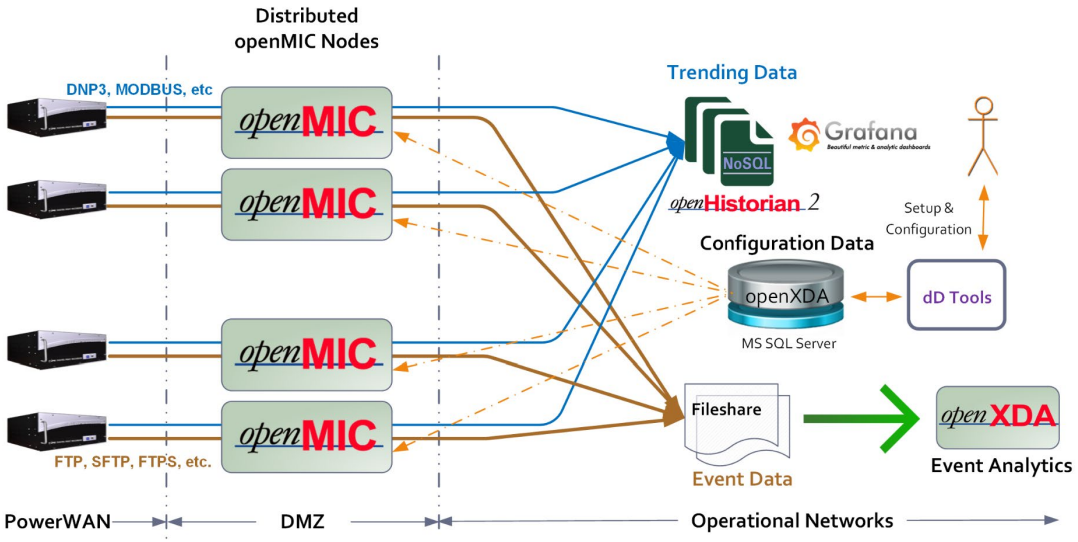
PQwdp



- PQDIF Explorer
  - Verifies PQDIF Files
  - Displays Meta-data in PQDIF files for investigation
- PQ waveform data parser
  - Can read COMTRADE, SEL and PQDIF files
  - Displays waveforms for visual analysis
- PQio
  - Converts data from PQDIF to PQDS format
  - EPRI PQDS format is easy to read, csv-like file format for PQ data

Highlights of 2020 Changes – Data Acquisition

openMIC EE
Meter Informaton Collector
ENTERPRISE EDITION



- Ability to interrogate substation devices using vendor specific, proprietary protocols
  - ION meters
  - Dranetz 61000s
  - SATEC

  FTP-based polling is included in the open-source version of openMIC.
- Ability to horizontally scale into a high-availability, load-balanced system
- Ability place devices in a substation where there has been a breaker operation at the top of polling queue
- Available at the cost of standard maintenance for openMIC

Supported Substation Devices

- Devices where data can be downloaded via FTP in standard PQDIF or COMTRADE format.
- Non-standard files that openXDA can parse:
  - EMAX event files
  - APP trending data files
  - SEL CEV and SEL EVE -- for most relay models
  - SEL Trending Data Files
- openMIC EE
  - Dranetz 61000s
  - ION Meters
  - SATEC
- Plus, openMIC also supports real-time protocols
  - DNP3
  - Modbus