Streaming Data at Scale

Constellation

µConference Series • 2024

Dominion Energy®

Josh Mellen

DATA OPERATIONS LEAD

Email: joshua.m.mellen@dominionenergy.com

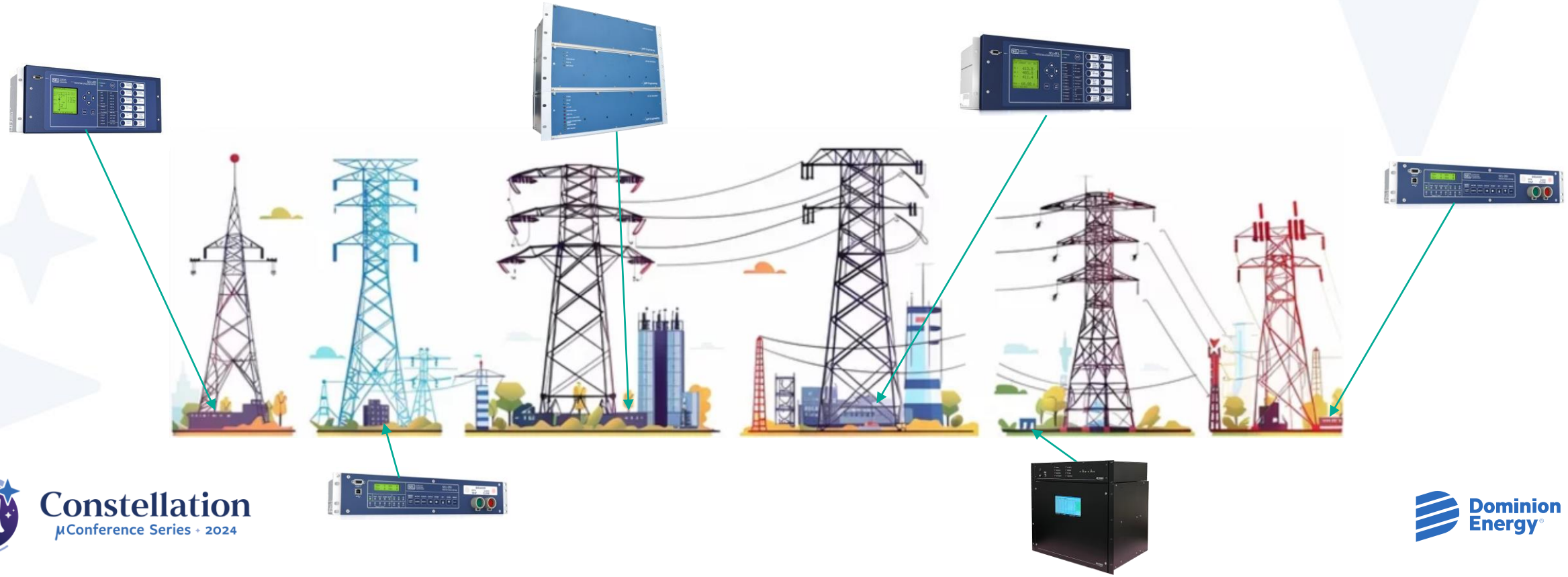
Phone: 804-773-1613

System Operations Engineering – 8 yrs

Engineering Analytics & Modeling – 2 yrs

Utilizing PMU Data

We have high resolution Phasor Measurement Unit (PMU) data available in the field. This data is crucial for monitoring, analyzing, and improving the stability and reliability of the power system.



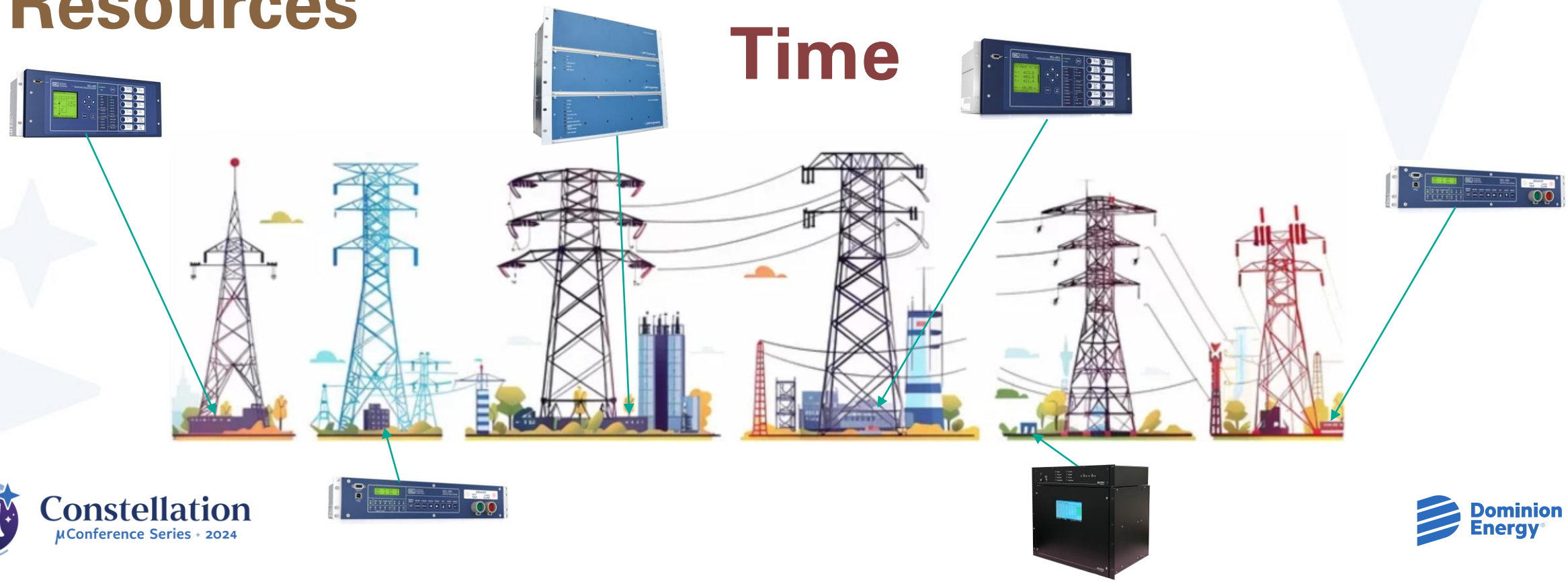
Utilizing PMU Data

Data Quality

Data needs to be moved to a historian, subject to a set of requirements

Resources

Time



Utilizing PMU Data

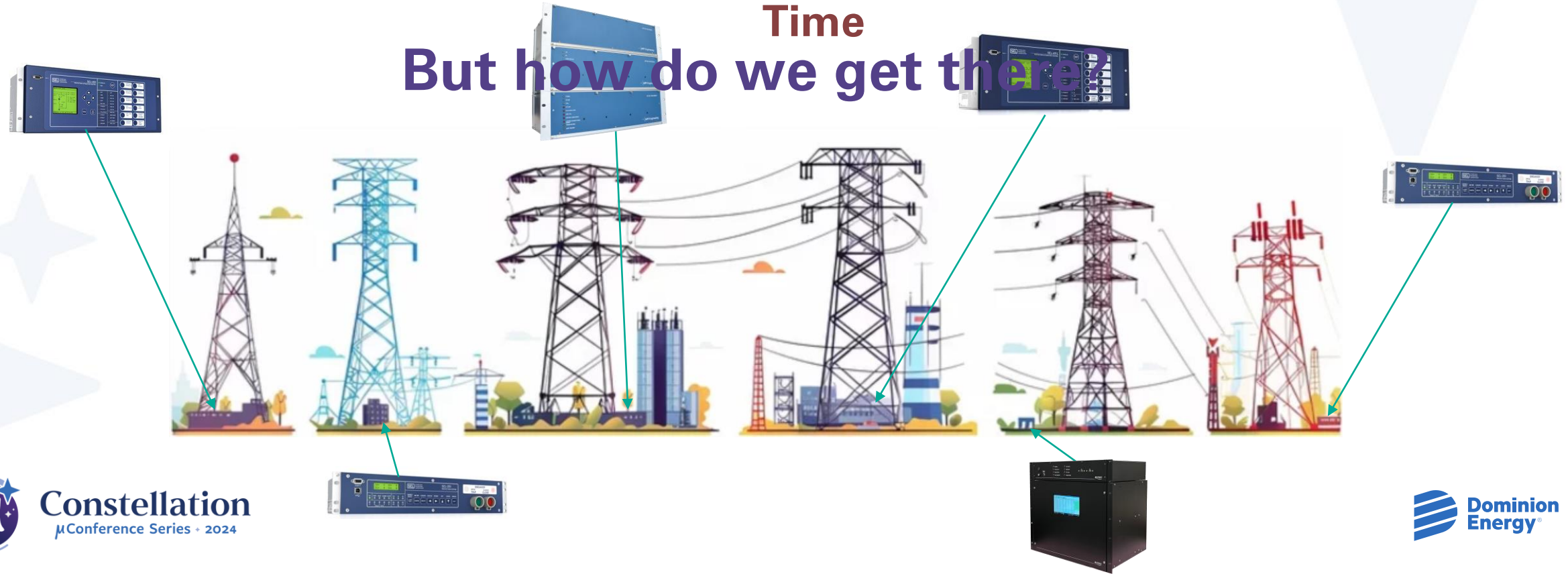
Data Quality

Data needs to moved to a historian, subject to a set of requirements

Resources

Time

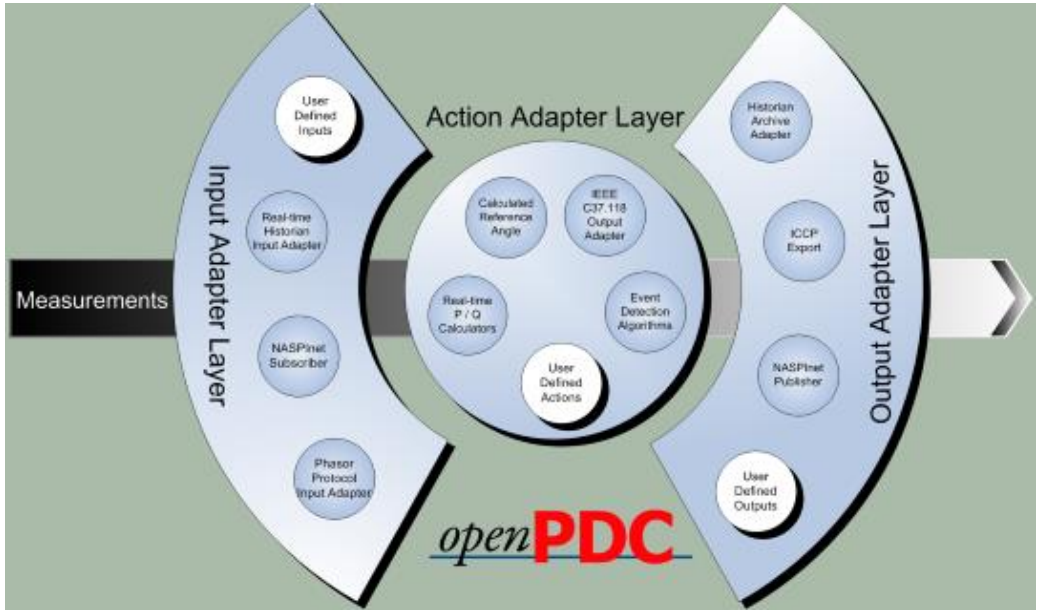
But how do we get there?



Utilizing PMU Data

openPDC

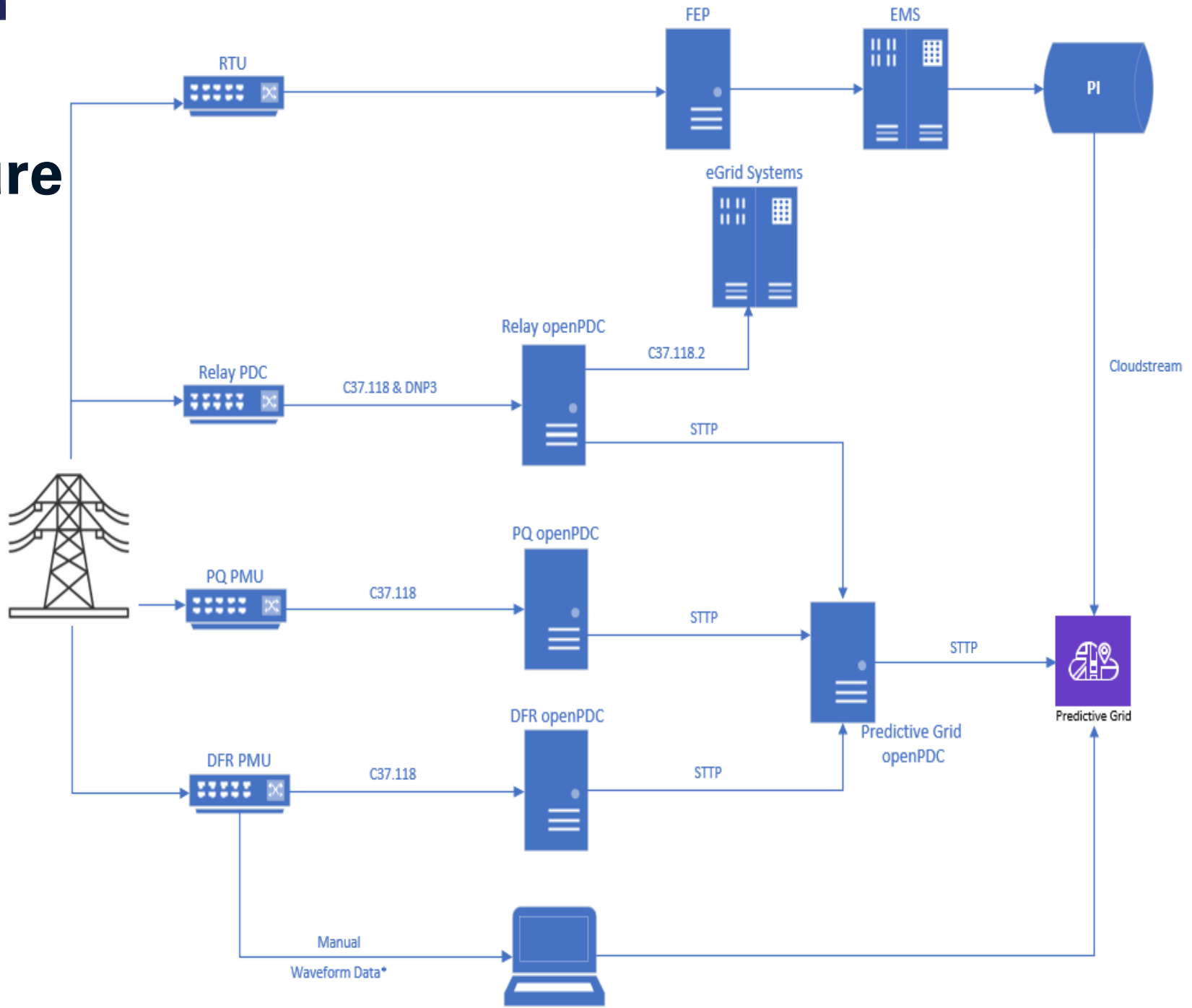
- A PDC (phasor data concentrator) is designed to receive streaming synchrophasor data from PMUs installed on power transmission lines and align this data longitudinally
- Output is a time-synchronized dataset that is forwarded on one or more software applications



Existing Architecture

Success over the years

- Relay Data Quality Project
- DNP3 Pilot
- DFR Expansion
- PQ Pilot + Wireless Connection
- Cloudstream



CloudStream - **WHY** did we create CloudStream?

PingThings

PredictiveGrid
SynchroPhasor data
No Telemetry

A user detects a disturbance in the PMU data. Did something switch in SCADA?

PI System
SCADA data
Telemetry

The user needs to use a PI tool for a deeper dive and look for breaker status and changes

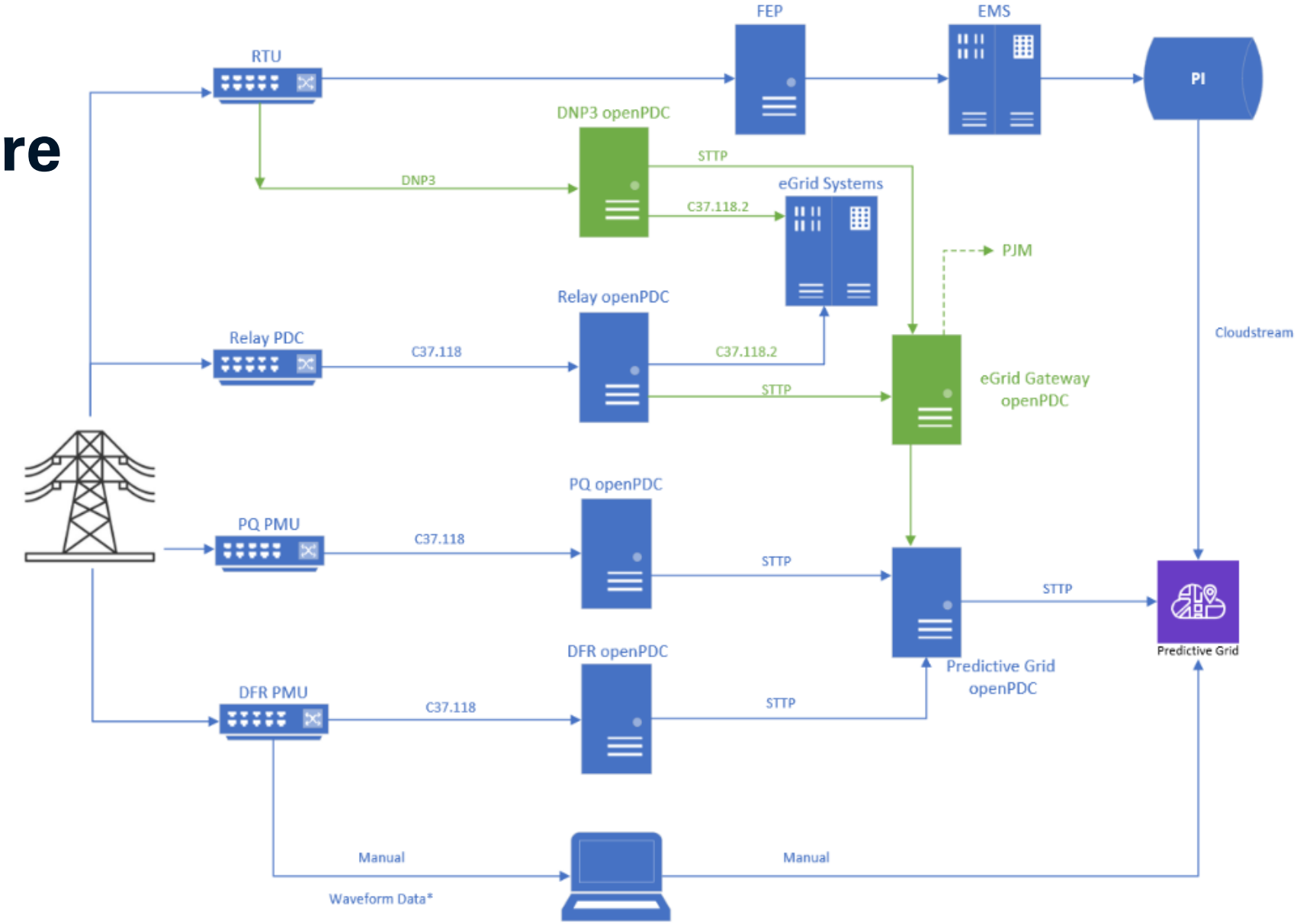
- Combine SCADA data from PI with fast data in PredictiveGrid
  - Explore both types of data in one environment
  - Allows to test a potential solution without high cost


Where do we go from here?


TO THE MOON?

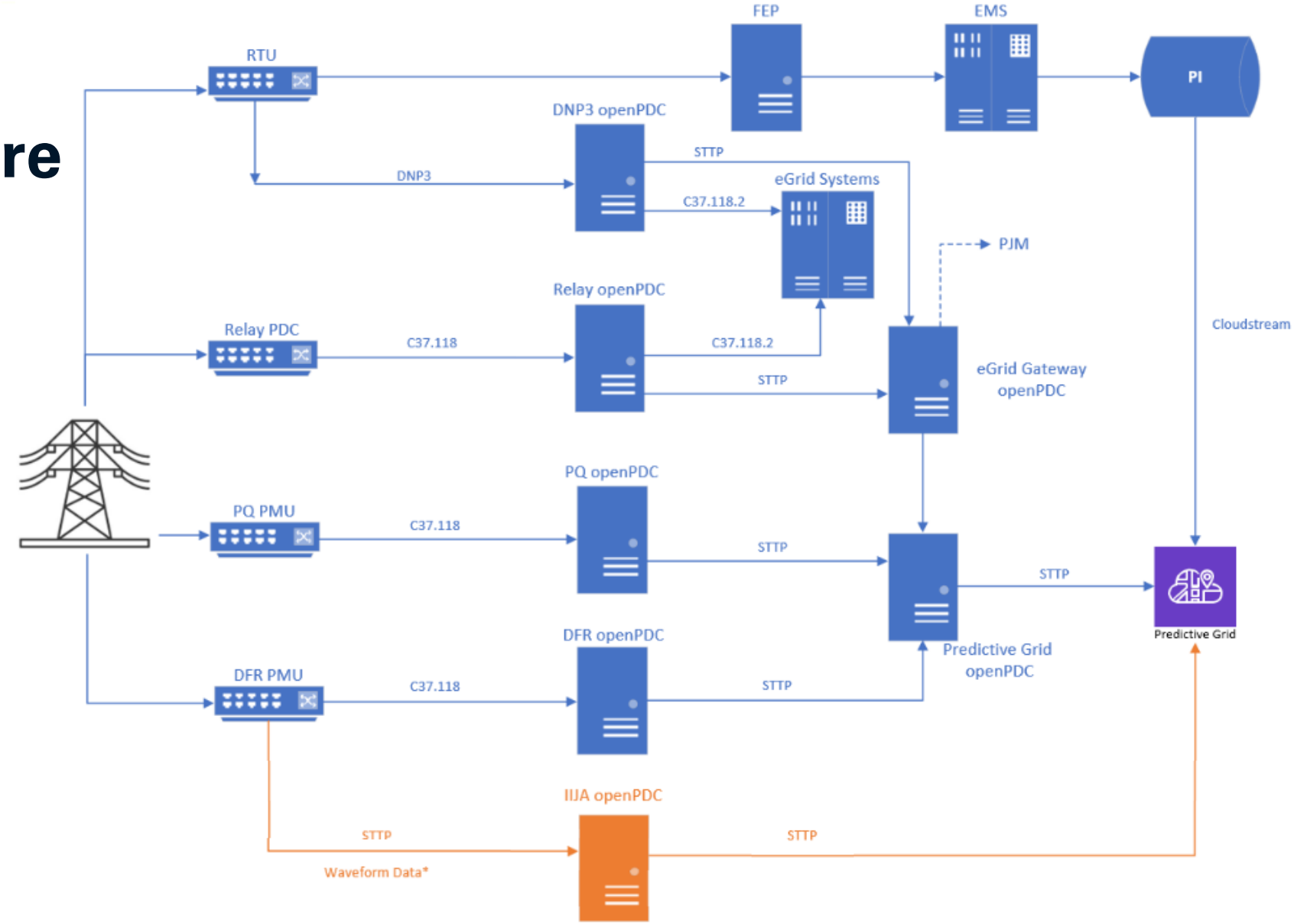
Future Architecture

- **SOC Projects**: Redundancy, DNP3, and PJM



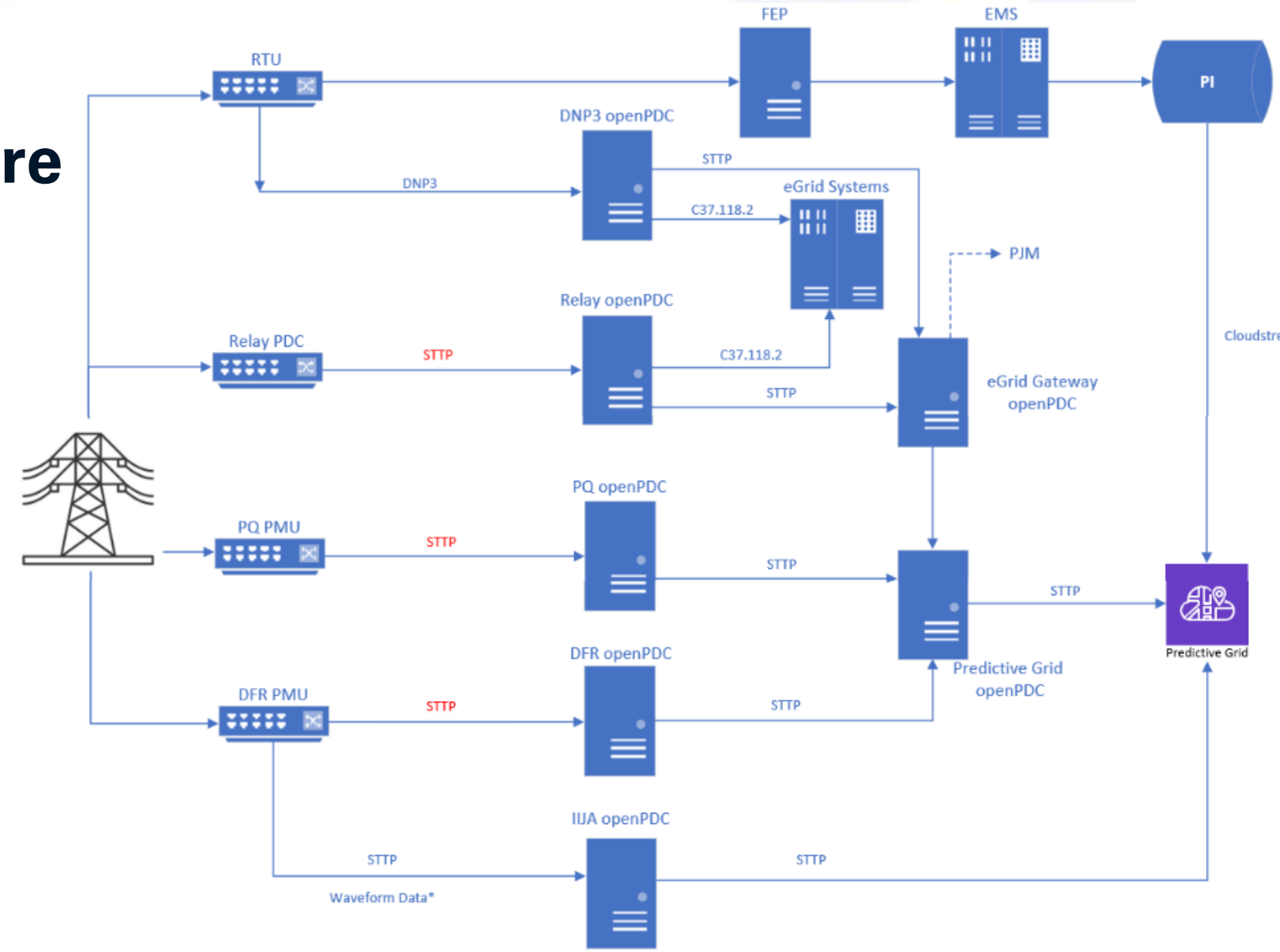
Future Architecture

- **SOC Projects**: Redundancy, DNP3, and PJM
- **IIJA Project**: High resolution data stream*



Future Architecture

- **SOC Projects**: Redundancy, DNP3, and PJM
- **IIJA Project**: High resolution data stream*
- **STTP Project**: Incorporate STTP all the way to the substation



Recap

More Devices	Higher Resolution Data	New Protocol
• Better grid observability • Support business needs	• Network upgrades • Supports analysis	• Transfer more data securely, efficiently, and accurately • Metadata