2023 Grid of the Future Symposium

Strategies for Voltage Conversion Project Success

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Outline

- Standardization
- Modeling & Automation
- GIS Workflow
- Summary
- Q&A

Background

One
Two
Three
Summary
Q&A

- System infrastructure age
  - Substation transformers
  - Distribution infrastructure
  - Reliability – Lower voltage systems historically are the oldest on the grid and have seen the least investment in reliability programs.
- Electrification future
  - Inability to support new load
    - House electrification
    - EV penetration
  - DER adoption and spread

Standardization – Step Down Transformers

One

Two

Three

Summary

Q&A

- Size Limitations
  - Overhead applications up through 833KVA
  - Pad Mounted applications up through 10MVA
- Existing Circuit Ties and in Circuit loops
- Area Source Redundancy

Standardization – System Rebuild

One

Two

Three

Summary

Q&A

- Circuit Consolidation
  - Load Distribution and Balancing
  - Load Islanding
  - Redundant Source / Back up Source requirements
- Reconductoring mainline paths as required
- Relocation of facilities
  - Moving out of rear lot easements
  - Converting to URD loops

Standardization – Conversion Sequence

One

Two

Three

Summary

Q&A

- Define Constraints
  - Outage Duration Window
  - Number of Crews / Quantity of locations in outage window
- Source locations and sequence path
  - Traditional Rebuild
  - Overbuilding existing system
  - Segment Conversion

Modeling & Automation

One
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Summary
Q&A

- Power system analysis is foundational to utility decision making & “Proof of Concept” activities
- Thousands of assets are reflected in a power flow model
- Each asset contains multiple parameters that inform load flow / short circuit / other analyses
- Editing said parameters via the graphical user interface (GUI) presents significant effort (**and tedium**) and human error risk

Modeling & Automation

One

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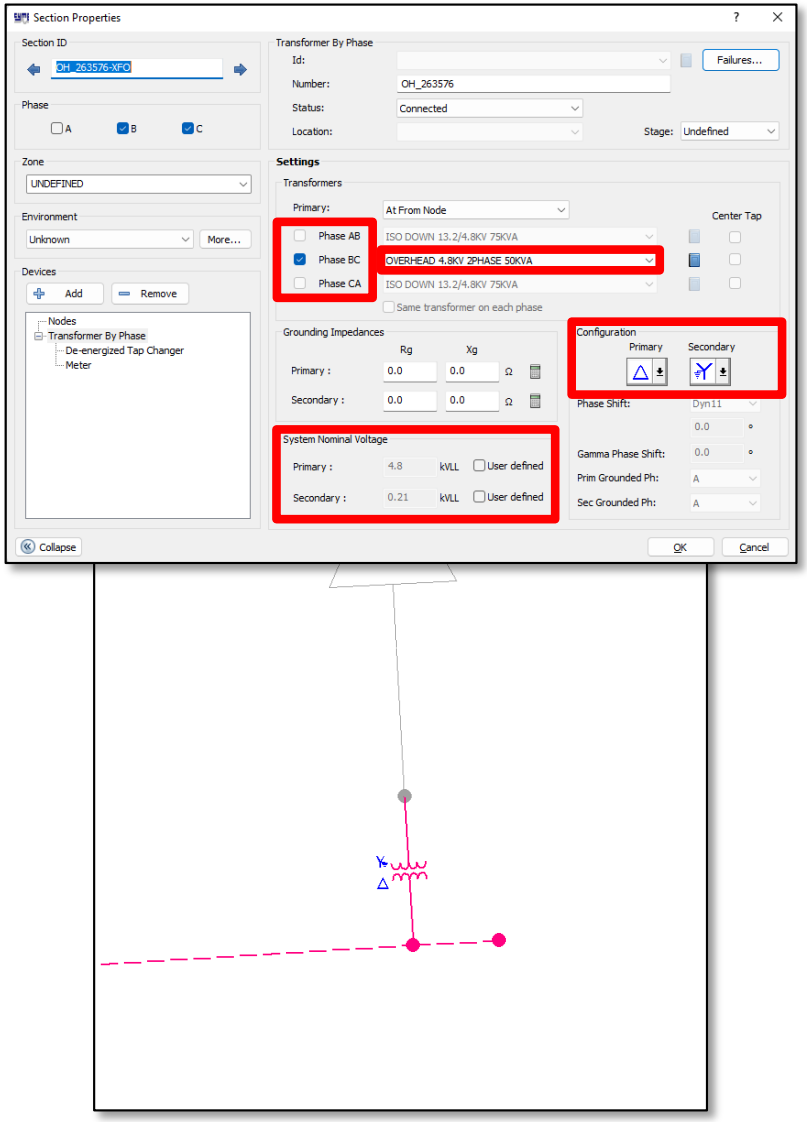
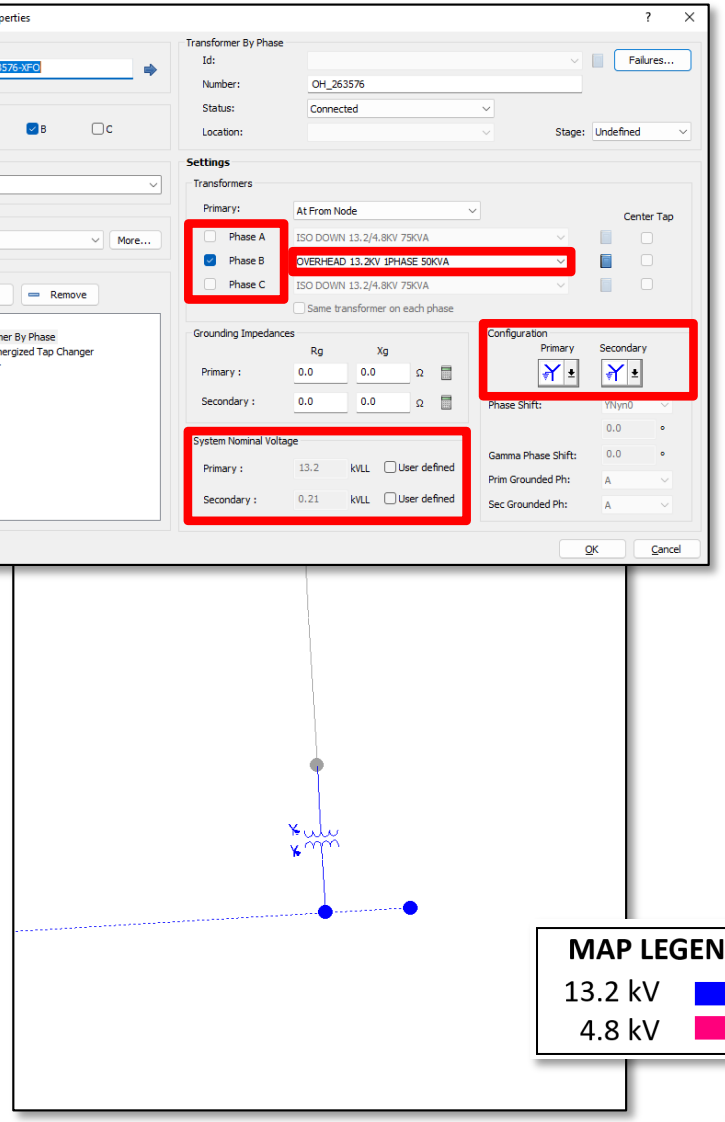
Three

Summary

Q&A





MAP LEGEND

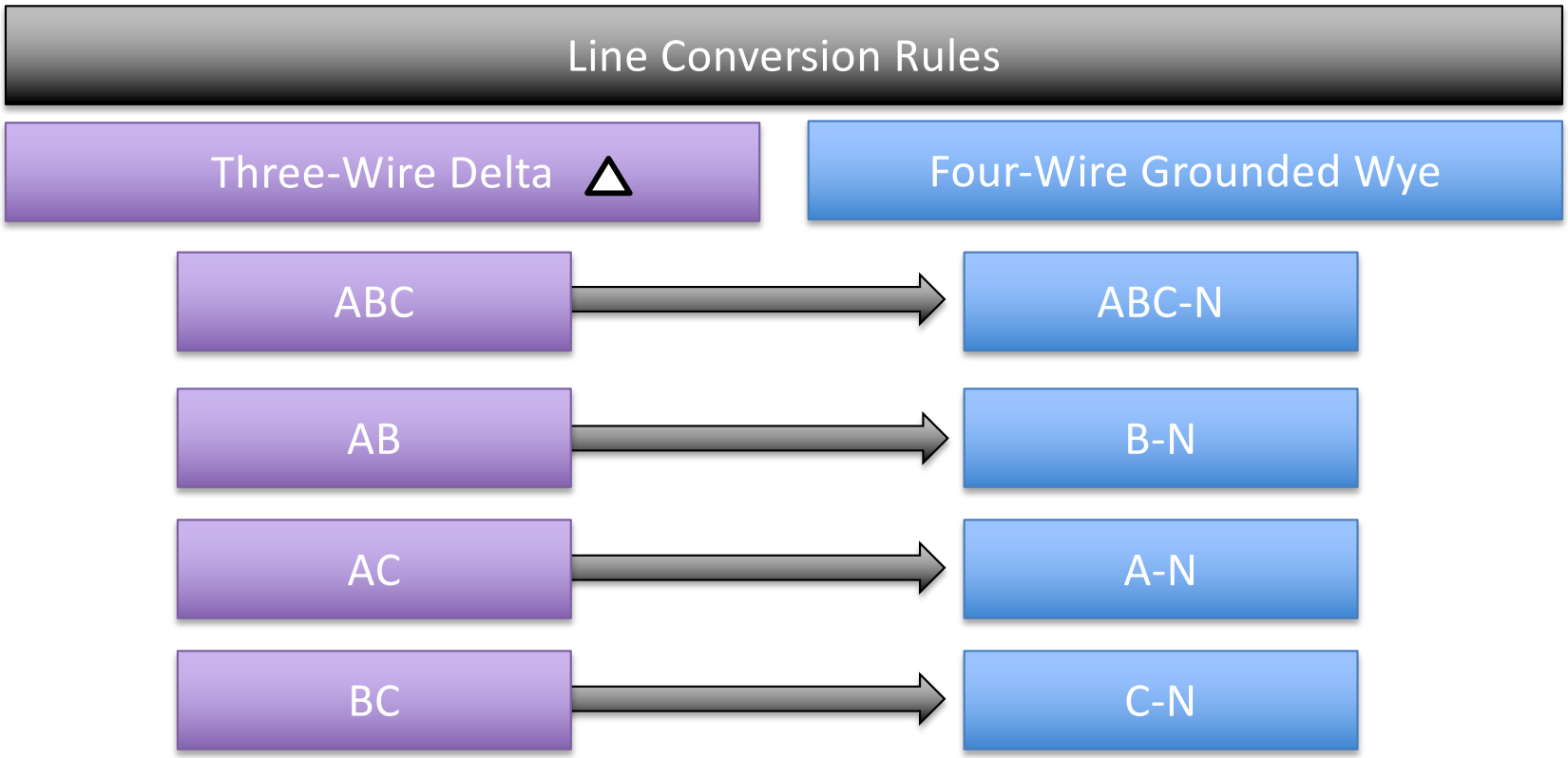
13.2 kV

4.8 kV

Modeling & Automation

One
Two
Three
Summary
Q&A

- A relatively consistent conversion “pattern” exists for each of these asset classes, for example:



Modeling & Automation

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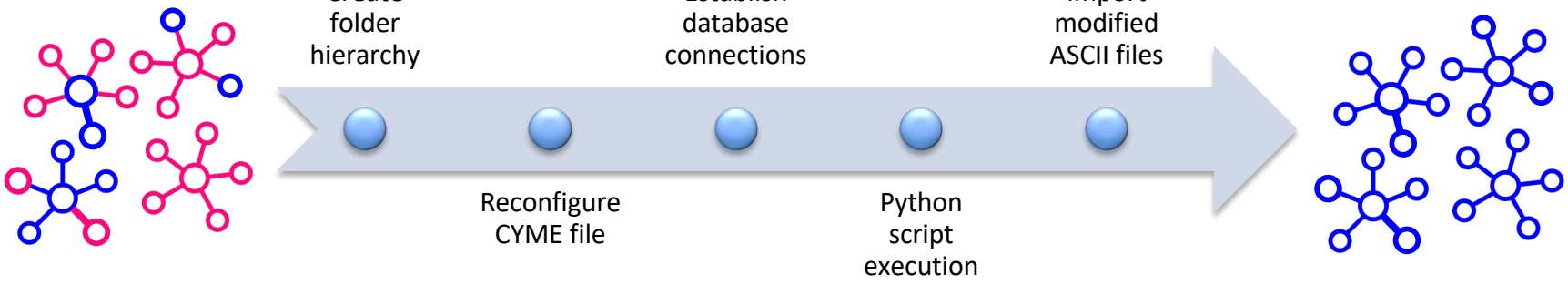
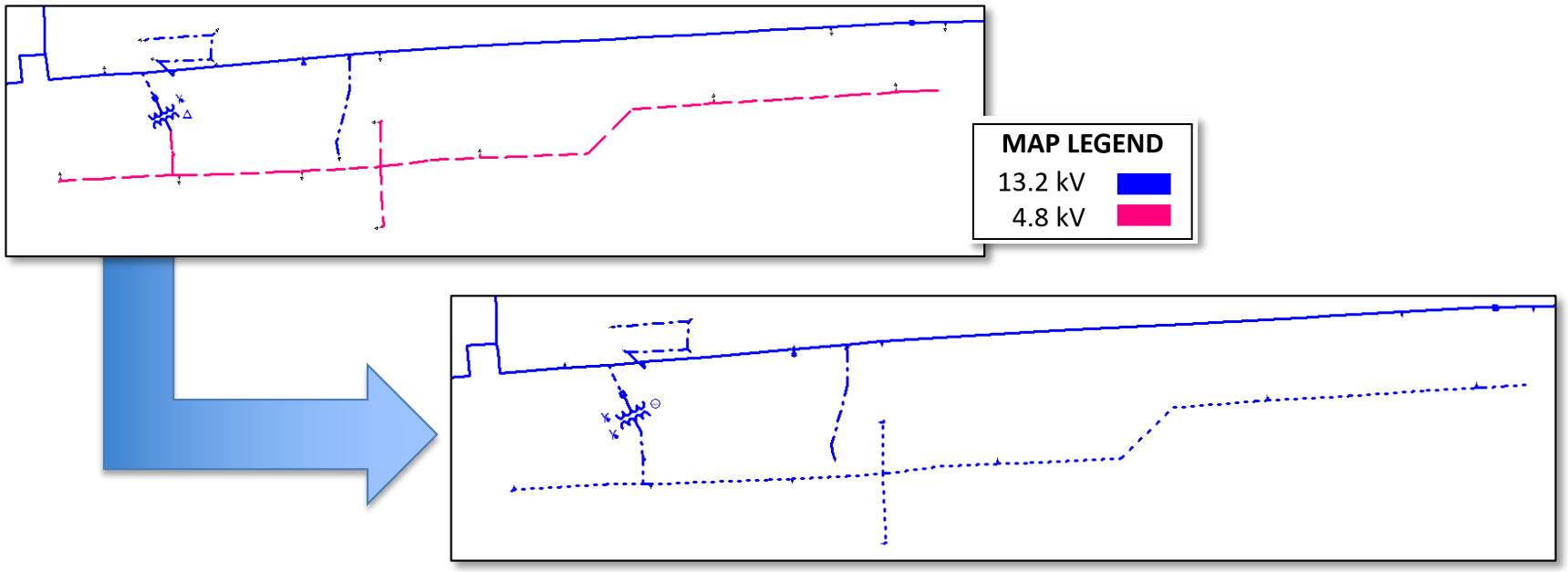
Summary

Q&A





Modeling & Automation

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Summary
Q&A

- Automation via scripting “plug-ins” can yield significant efficiency gains in power system assessment

Edits via the GUI	Automated Database Edits
Hours	Hours
Mouse clicks	Mouse clicks
Risk of error	Risk of error
Tedium	Tedium

GIS Workflow

One

Two

Three

Summary

Q&A

- Representation of system improvements is a constant challenge on conversion projects
  - Require a high degree of organization and coordination throughout the team
  - Communication is key!
- Overview maps are helpful
  - Show high level strategy and key points
  - Great tool for communication with a client in a familiar format
- Overview maps require constant maintenance and consume review and development time from the project team that could be better allocated

GIS Workflow

One

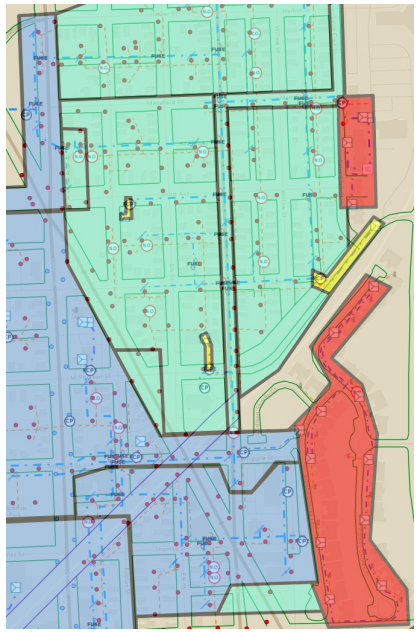
Two

Three

Summary

Q&A

- Transitioning to a GIS workflow allows the project team to build efficiencies and synergistically maintain the source of truth by virtue of doing already needed work
- Most GIS tools allow for enhanced sharing and co-authoring
- Depending on client standards, level of detail, and deliverable requirements, it is even possible to create the deliverable right from the GIS tool



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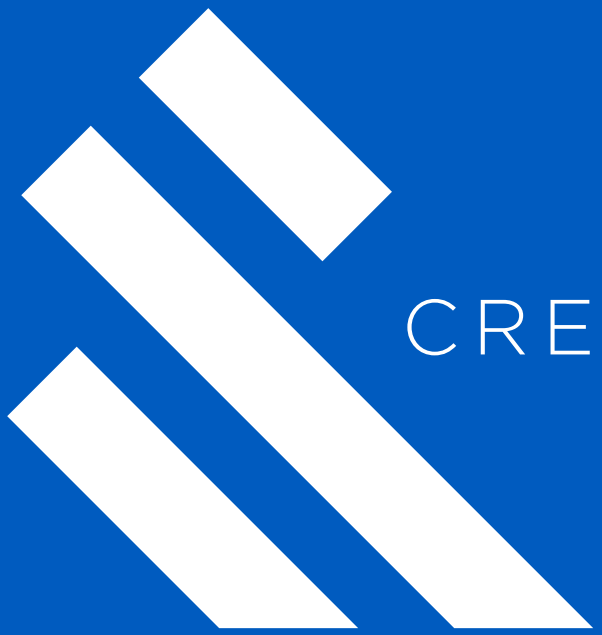

CREATE AMAZING.