The new point-of-reference tool for Electricity Transmission Asset and Operation Management

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Briefly Presenting the Presenters

by Informi GIS

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  Energy & Utilities Industry Consultant at IBM Global Services

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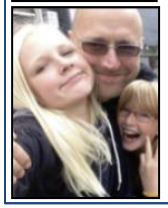
  IT Architect at IBM Global Services



- **Jens Dalsgaard**

  Solution Strategist and Smart Grid Specialist at Informi GIS

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The ELVIS Project Background and Objectives

by Fingrid

Existing system custom developed over 20-30 years

- Old legacy application that is difficult use (old technology) and not fulfilling todays business needs
- Lack of agility when responding to new requirements.
- Fingrid's IT strategy is to use standard applications

Prior to significant grid investments in the coming years
Fingrid has tendered a new solution for designing and managing the grid and projects.

Prior to European regulations (ENTSO-E) requirement for grid model management

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ELVIS High Level Objectives

by Fingrid

- **Increasing operative efficiency**
  - Increasing proactivity in calculations, monitoring and maintenance
  - Reduce on-going costs of asset/grid planning and maintenance system
  - Ensure efficient support of workflows and business processes

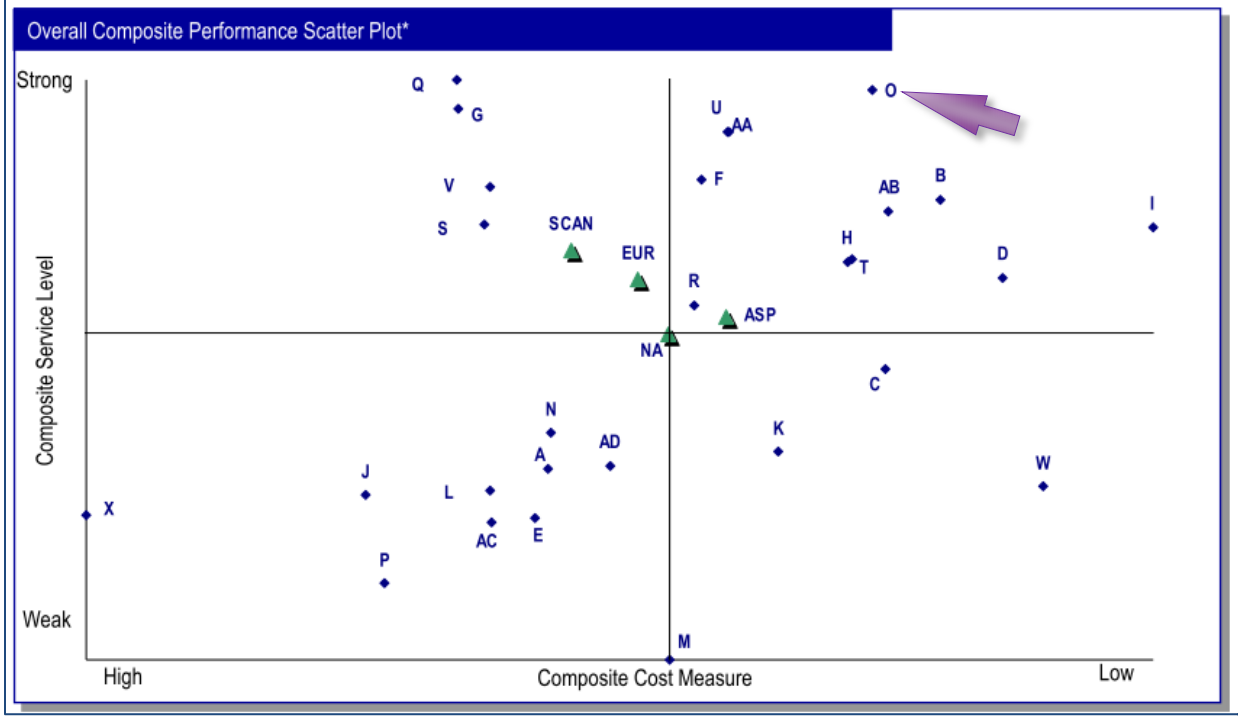
- **Single source for power system information**
  - Improving information access and usability within stakeholders
  - Allow integration with internal and external IT systems by CIM compliance
- **Adding cost aspect to operation and power system components**
  - Enhanced business planning through cost operational analytics
- **Implement solution based on standard systems with a minimum of customization**

A more efficient tool for Fingrid's asset and operation management by replacing existing tailor-made grid information systems by integrated best-of-breed standard software products

Fingrid Among the Best in ITOMS* Study

by Fingrid

Overall Composite Benchmark – Weighted Average**



- 28 participants delivering to 1/3 of the world population
- A highly respected study
- Very detailed

**ITOMS: International Transmission Operations & Maintenance Study*

ELVIS Business Process Support

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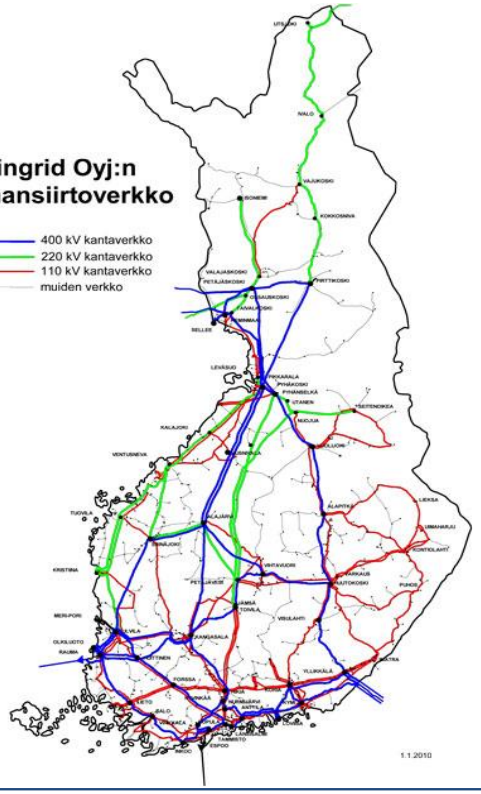
Project Management

Grid & Asset Modeling

Grid and Asset Calculations

Relay Modeling and Calculations



Electrical Grid Modeling and Calculations

Workorder and Maintenance

Growth Clearance, Crossing & Real Estate Management

Outage Management & Switching Planning

Disturbance Management

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An Overview of the ELVIS Solution

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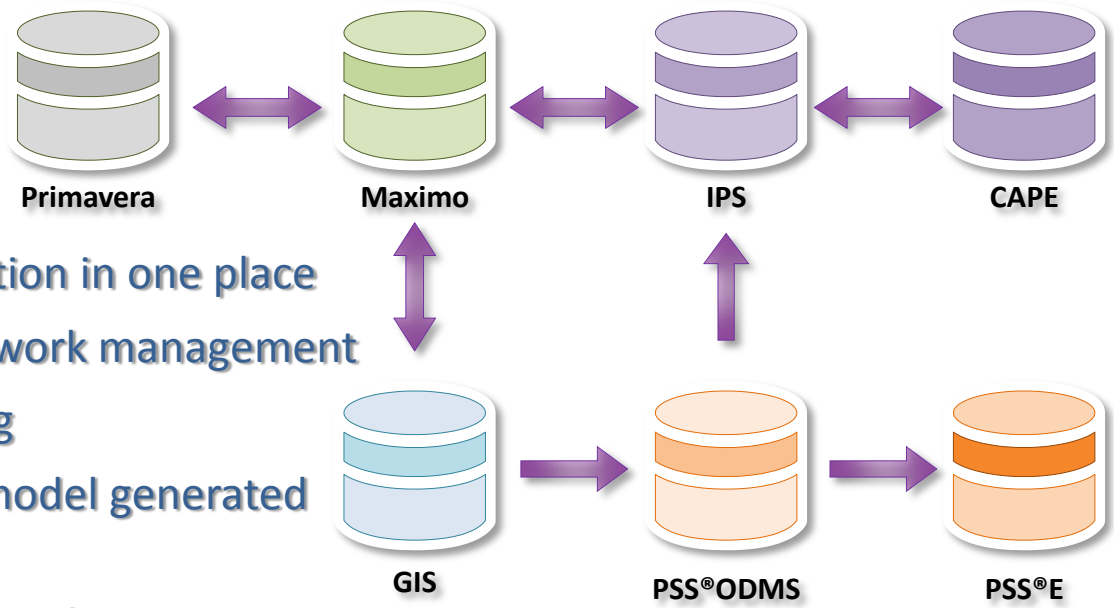

1. Complete grid documentation in one place
2. Integrated with asset and work management
3. Integrated project planning
4. CIM based electrical grid model generated from GIS model
5. Electrical calculations and analysis
6. Relay management and calculations

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Our Focus in This Presentation

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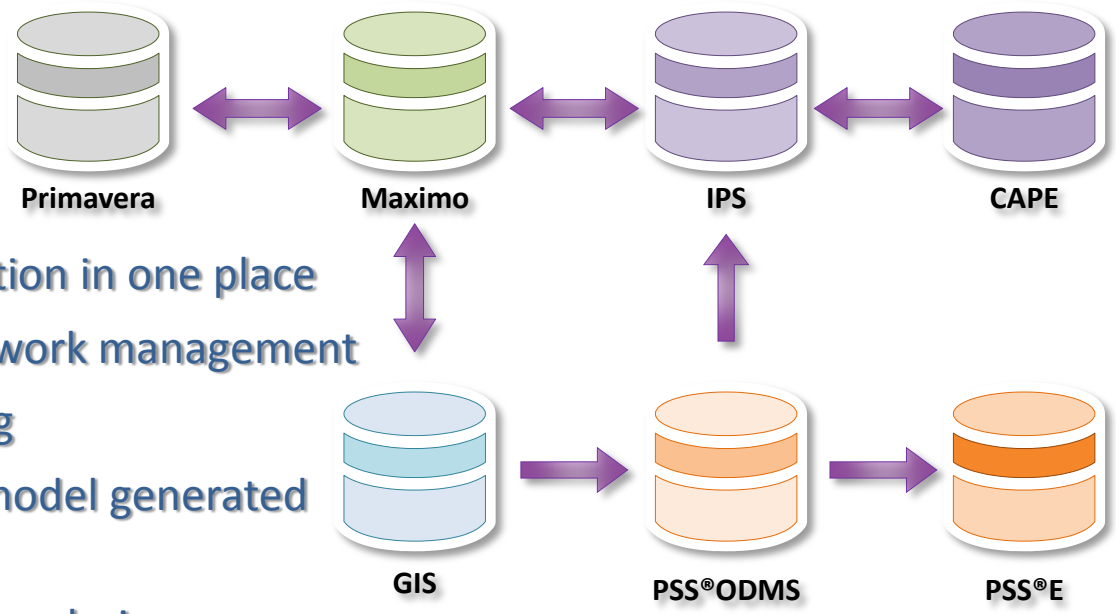

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The PowerGrid Data Model in GIS

by Informi GIS

The objectives / requirements behind the PowerGrid data model are:

- ✓ Must hold complete and topologically correct documentation of the grid
- ✓ Must support asset management in cooperation with Maximo
- ✓ Must support extract to CIM for subsequ[illegible]plex analyses
- ✓ Must support life cycles from planning till decommissioning
- ✓ Must require a minimum of customization compared to standard ArcGIS/ArcFM

The PowerGrid Data Model in GIS

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- **Inspired by the CIM standard**
  - ✓ Easing extract to CIM
  - ✓ Easing the dialogue with and use by power engineers

- **Supports consolidated documentation of the entire grid**
  - ✓ Towers, overhead lines, earth wires, spans, cables, phase sequence and transpositioning, grouping as transmission lines, line sections, branches…, loadability, pi equivalent data, mutual coupling, substations, bus bars, bays, circuit breakers, disconnectors, ground switches, capacitor banks, reactors, current and potential transformers, power transformers, neutral network…

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The PowerGrid Data Model in GIS

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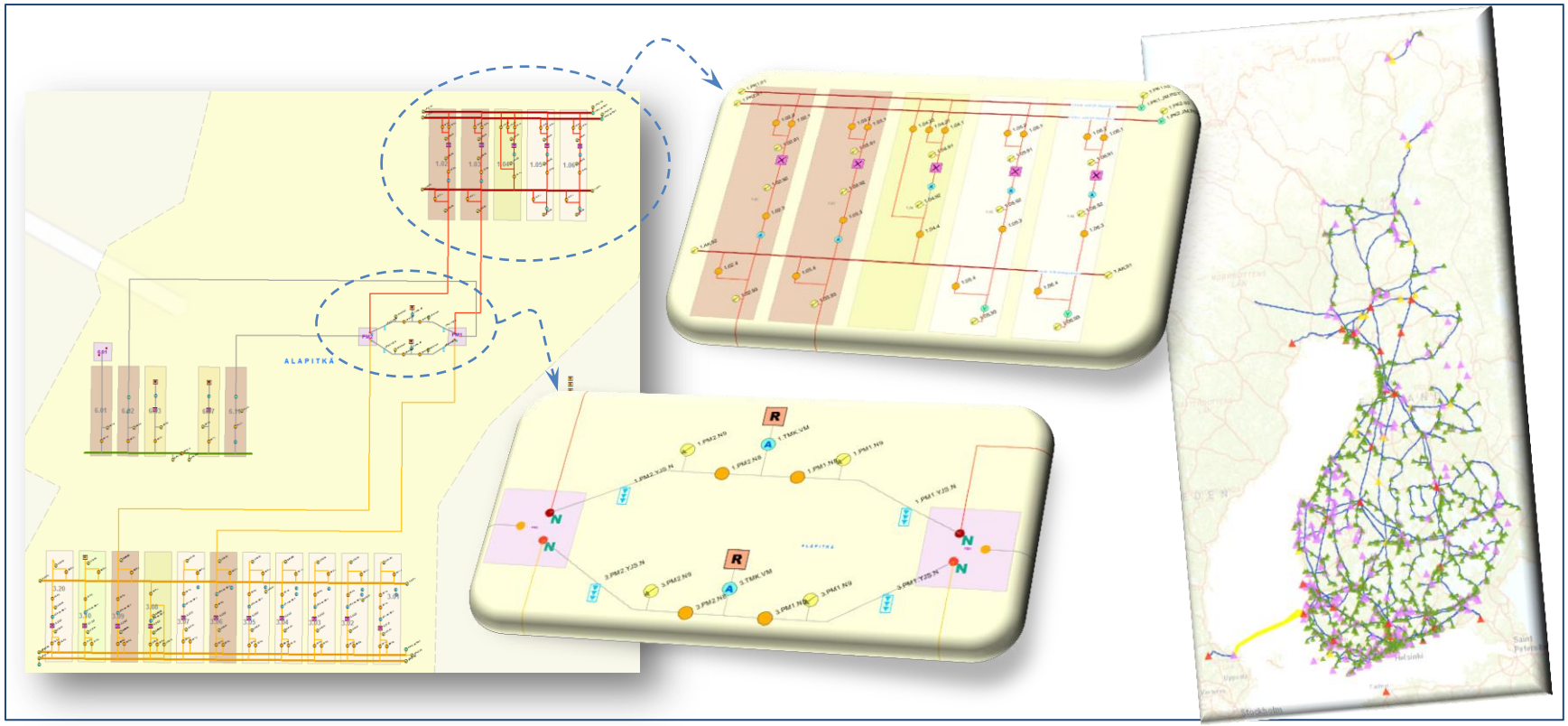

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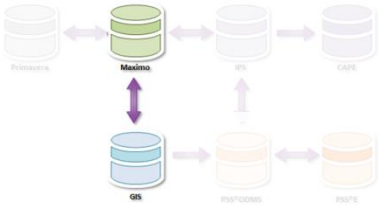
Critical Integration Points



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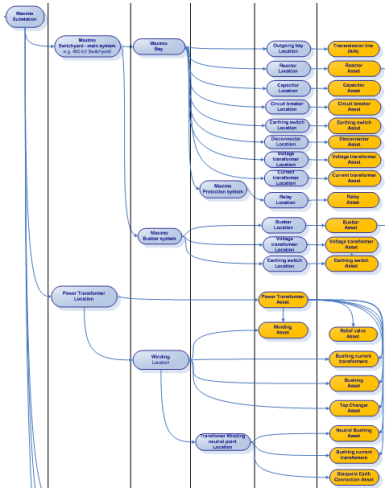
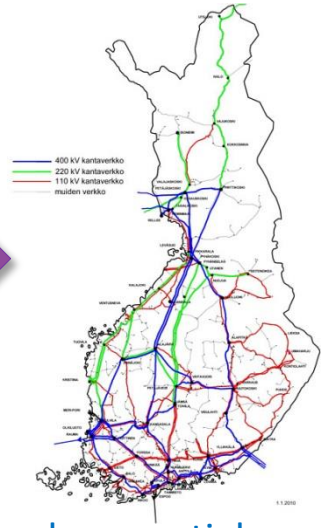
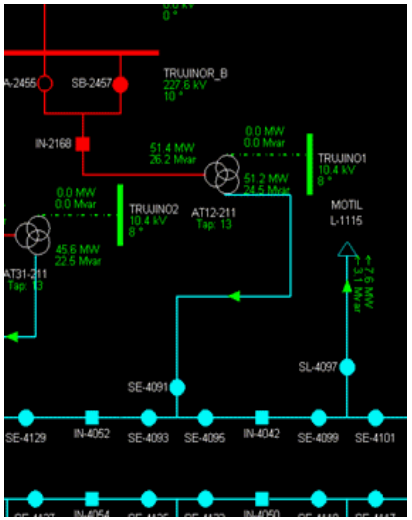


Unversioned hierarchical model of logical locations and physical assets



Versioned geospatial representation of grid elements, master of grid connectivity



Versioned grid model of grid connectivity and electrical characteristics

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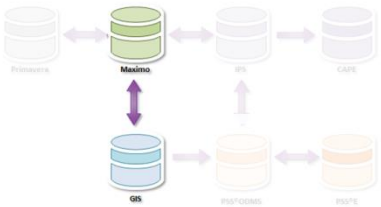
ArcGIS – Maximo Data Flow



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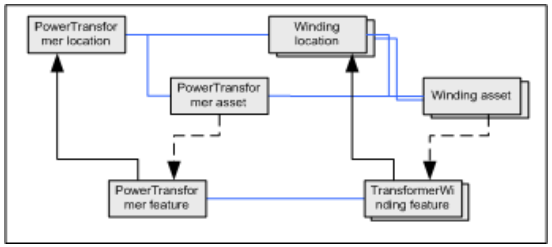
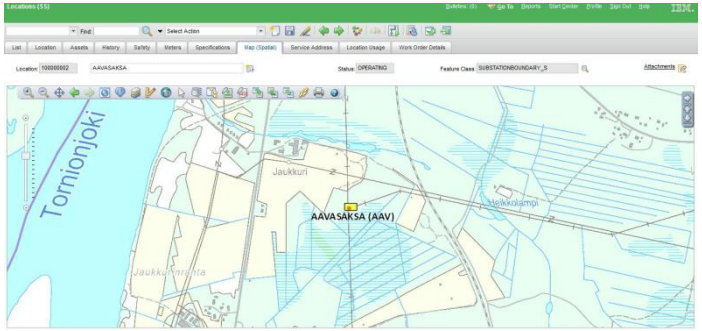
Maximo

WebSphere ESB

Maximo Spatial





ArcGIS

Data exchanged via web services, Features mapping to Locations, selected Asset attributes returned

Maximo Spatial ”Map Tab” through ArcGIS REST services, providing geospatial context of Locations

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Critical Integration Points

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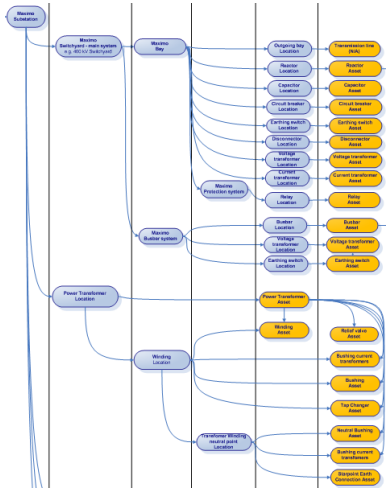
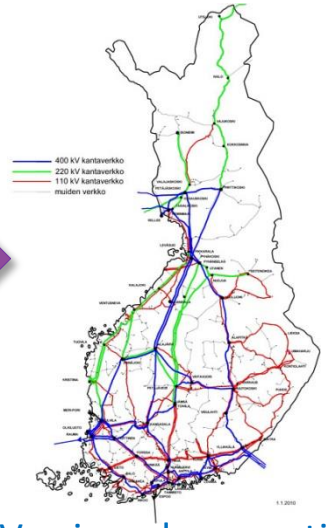
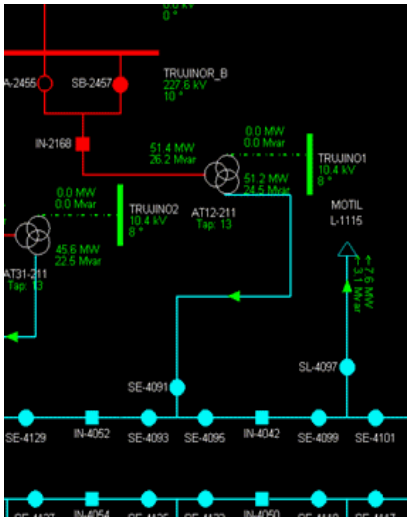


Unversioned hierarchical model of logical locations and physical assets



Versioned geospatial representation of grid elements, master of grid connectivity



Versioned grid model of grid connectivity and electrical characteristics

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GIS–ODMS Integration
IEC-CIM Mapping

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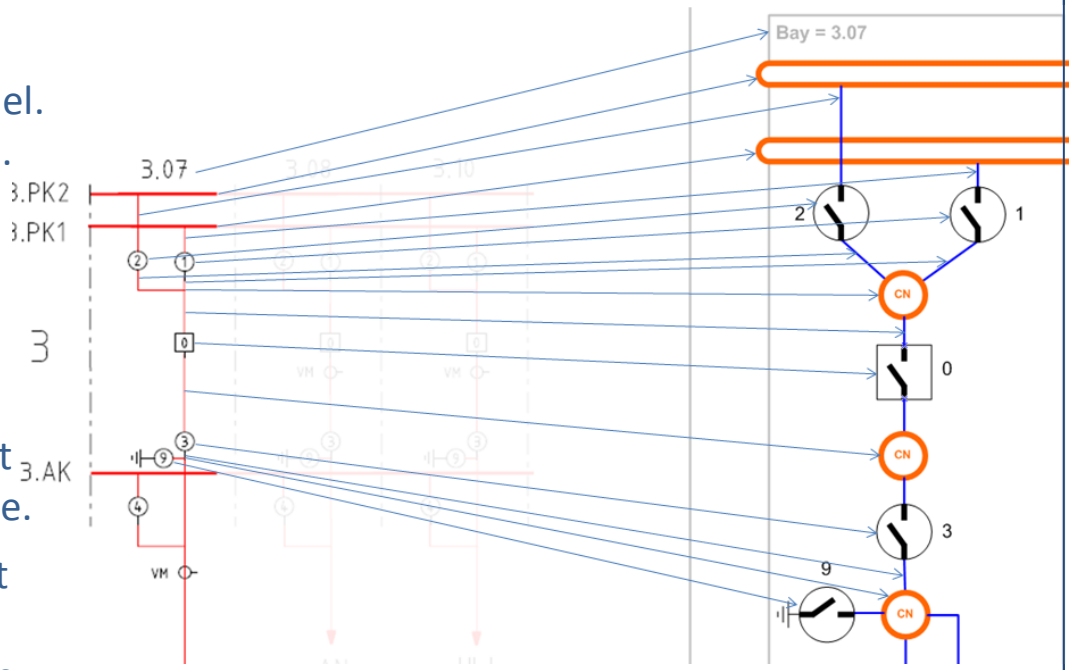
The GIS Powergrid model is a CIM adaption, but must still first and foremost serve as a GIS network model. By contrast, ODMS is pure CIM-based.

Mapping of the connectivity model is needed.

Particular complex details include:

- Mapping of switches from a point feature into a two-terminal device.
- The necessity of creating abstract elements (Terminals and some ConnectivityNodes) out of a more crude model.



Summary and Conclusion

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- In order to maintain its position among the most reliable and lean Electricity Transmission System Operators, Fingrid needed a robust, flexible and fully integrated grid, asset and work management system – data should be entered once and distributed as needed.
- The most fundamental data is the electrical grid model. Based on the PowerGrid data model ArcGIS provides the one version of the truth – both for the operational grid as well as the future changes. One model – designed and maintained in ArcGIS - is shared across applications.
- Integration between GIS and Maximo ensures optimized grid design and maintenance processes and ensures data consistency throughout the asset life cycle.
- Utilizing CIM, the GIS – ODMS integration provides a standard way of delivering GIS grid models to electrical design, analysis and calculation systems used throughout the industry - ensuring that electrical grid models are maintained centrally and distributed efficiently using a common format
- Any transmission or large distribution company looking at ways of optimizing processes across GIS, Enterprise Asset Management and Electrical Grid Calculation / Design should have a look at the Fingrid ELVIS solution.

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Thank You for Your Interest

The new point-of-reference tool for Electricity Transmission Asset and Operation Management

Please feel free to contact us after the session

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