Standards Based Data Integration at Scottish & Southern Electricity Networks

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Scottish & Southern Electricity Networks (SSEN) owns:

- Two electricity distribution networks
- One electricity transmission network
- +100,000 substations
- +130,000 km of overhead lines and underground cables
- +100 submarine cable links
- SSEN serves 3.5 million customers across one third of the UK’s landmass.

Consultancy and software company based in Glasgow, UK

- Provide service and software including consultancy, applied research, and commercial software development
- Work with a number of utilities and vendors
- A lot of our work has been international, primarily North America and Europe.
- 25+ different clients in 12 countries
- Involved in IEC standards work regarding software and data modelling including IEC TC57 Working Groups 13, 14, 16 & 19
- Work focussed on Model Driven Architectures, Open Standards and cutting-edge technologies
Combining Datasets

- SSEN want to improve the **management** of their networks through using **modern**, but proven technology.
- Emphasis is on **mobility**, and **analysis** of collected data.
- A **single** dataset has a **limited** use.
- **Combined datasets** can provide useful information.
- **Field Team Support Tool** – Staff only.
- **Lightning Strike Visualisation** – Control Room and Field.
- **Network Damage Reporter** – Customer and Staff.
Field Team Support

- Need for crews to **access** data and submit **configurable structured reports** to support a variety of field work.

- The application had to be **scalable** and capable of dealing with the **full, detailed** electrical network models **including LV**, scaling with device storage.

- Had to be **secure**, both for **online** and **offline** access with remotely **revokable** user access and **encrypted** communications.

- It had to work **offline** including:
  - Full access to **network data**
  - Create and store **reports**
  - Ability to securely log-in even without a network connection.
Integrated Data Entry

- The client supports multiple form-based data entries to create reports
- Schema-driven forms allow the server to dynamically push new forms to clients
- Different forms can be added for different purposes or to meet new requirements
- These reports are then tied to the CIM network model element
- This links any reports (e.g. maintenance, inspection) to a unique, persistent element with useful structured data
- Real-time communication with control room leads to faster diagnosis and restoration
- Improved data quality of asset health assessment leading to pro-active maintenance for even better network resilience
- Can be integrated with a customer application so updates in the field are automatically reflected in status updates to the customer improving the customer experience
Real-Time Lightning Strikes

• Control room operators and field crews needed to see real-time lightning data

• For control room engineers this lets them identify potential lightning strikes on network equipment

• For field crews it highlights potential safety issues where lightning strikes are occurring nearby

• A study-mode for historical access supports post-fault analysis and asset health diagnosis

• A real-time feed of lightning strike data comes from a third-party provider within a few seconds of a strike being detected

• The strike is defined as being somewhere within a specific area with a margin of error

• The server then uses the CIM network model data to find any equipment within the strike area

• Control room operators and field crews see the alert less than 10 seconds after the strike occurs
Network Damage Reporter

- Network Damage Reporter is a smartphone application to allow customers to submit reports relating to:
  - Power outages
  - Damage to Network Equipment
- The users is asked to take a photo (for downed lines or damaged equipment) and then verify the location of the incident
- Network Matching is based on the user’s position (and for photos, heading) and intelligent server-side processing
- This matches the damage or outage report to the CIM network element

- The server takes the heading and location of the user to identify potential associated equipment using the full network model covering MV and LV in <1ms
- Confirmation from the user regarding the estimated location of the equipment is sought
- This intelligence and social information gathering can lead to faster identification of damaged equipment without revealing sensitive data to the public
Conclusion

• Data Integration has allowed SSEN to develop mobile and web based apps that will provide business benefits over the years to come
• No individual project required a common network model in CIM
• The use of this CIM data means SSEN will be able to correlate the data and analysis from multiple applications
• Customer reports can be linked to outages with lightning strikes on equipment and field crew reports
• The more applications use this data moving forward, the more value is gained