WESTERN POWER DISTRIBUTION

INNOVATION

NEXT GENERATION NETWORKS

Data & Enabling Technologies

5.4 Telecoms, Smart Analytics and Smart Grid Architecture

LCNI 2016, Thursday 13th October 2016

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WESTERN POWER DISTRIBUTION
INNOVATION

Future Networks Programme

WESTERN POWER DISTRIBUTION PROTEUS NEW

WESTERN POWER DISTRIBUTION FLEXDGRID

WESTERN POWER DISTRIBUTION PLUGS AND SOCKETS

WESTERN POWER DISTRIBUTION SOLA BRISTOL

WESTERN POWER DISTRIBUTION LOW CARBON HUB

WESTERN POWER DISTRIBUTION OPEN L\ NEW

WESTERN POWER DISTRIBUTION NETWORK EQUILIBRIUM

WESTERN POWER DISTRIBUTION SMART ENERGY ISLES

WESTERN POWER DISTRIBUTION NETWORK TEMPLATES

WESTERN POWER DISTRIBUTION FALCON

Assets

- Telemetry
- Decision support
- Improved assets
- New assets
- Flexibility
- Automation
- Incident response

Customers

- New connections
- Upgrades
- Information
- Self Serve
- Products/Service
- Tariffs
- Communities

Operations

- Reliability
- Forecasting
- DSO
- DSR
- GBSO Interface
- Efficiency
- SHE and Security

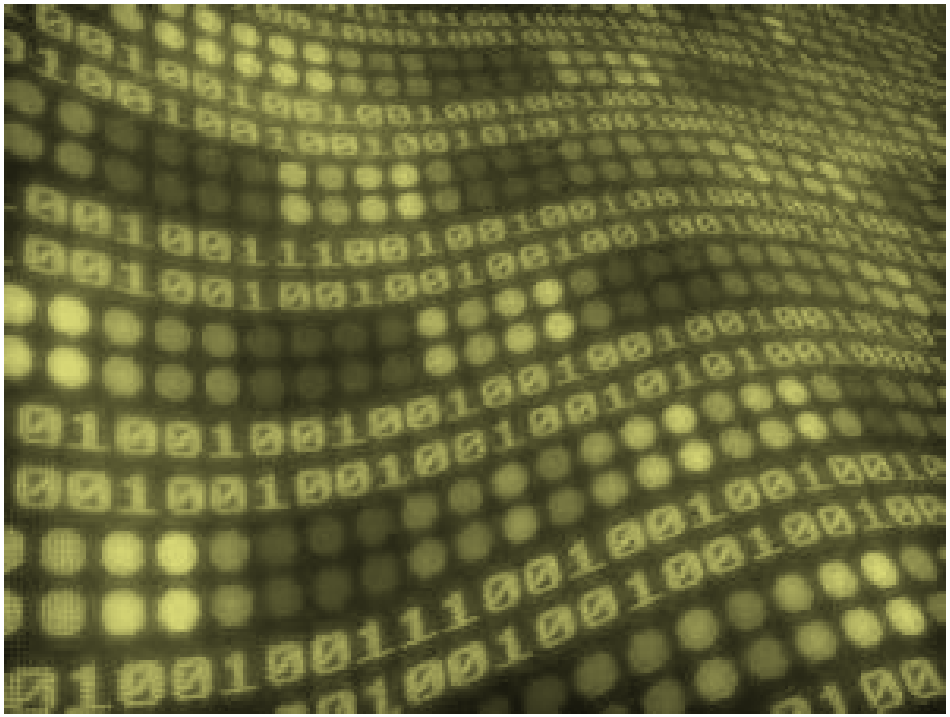
Network and Customer Data

- Airborne Inspections
- AIRSTART[1]
- Telecoms Analysis
- Superconducting Cable
- SF6 Alternatives
- MVDC Test Lab
- Smart Energy Laboratory
- Statistical Ratings
- Primary Network Power Quality Analysis
- Hybrid Heat Pump Demonstration
- Hydrogen Heat & Fleet
- Carbon Tracing
- HV Voltage Control
- Solar Storage
- LV Connect and Manage
- Sunshine Tariff
- CarConnect
- Industrial & Commercial Storage
- DSO/SO Shared Services
- Project SYNC
- Project ENTIRE
- Smart Meter data for Network Operations
- Distribution Operability Framework
- Times Series Data Quality
- Voltage Reduction Analysis
- LV Connectivity
- Smart Systems and Heat[2]

Note: 1 – Funded by Aerospace Technology Institution; Note 2 – Funded by the Energy Systems Catapult

Contents

- Why is data important?
- Challenges with data
- WPD data projects
- Telecoms update

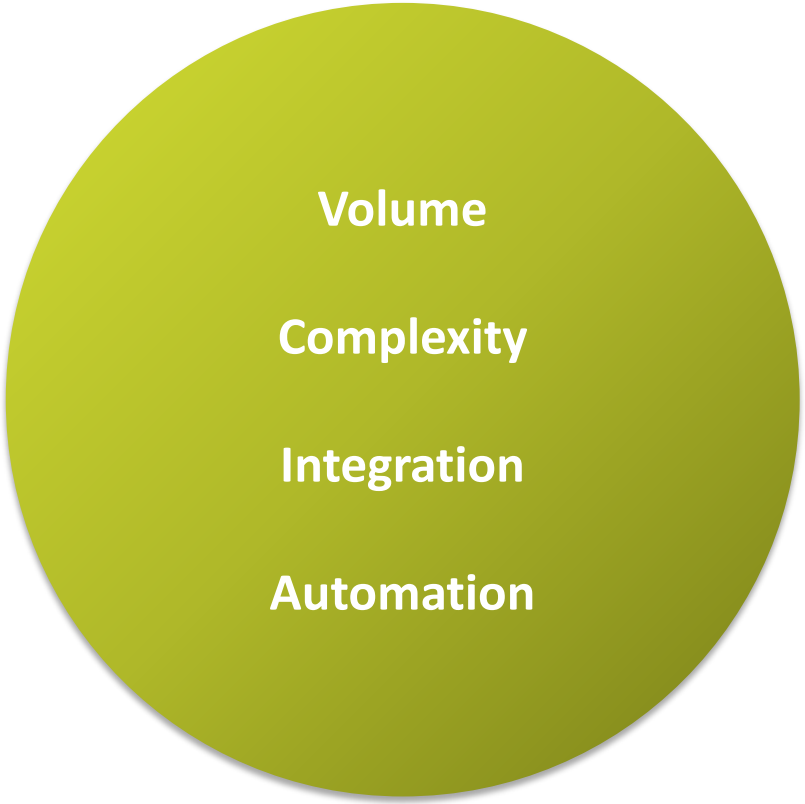


Why is data important?

Businesses have always relied on information to inform decisions.

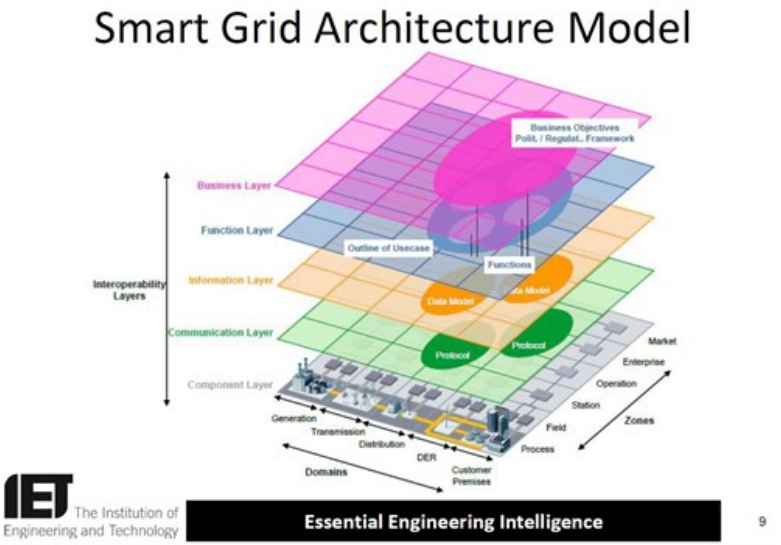
Drivers for change

- Smart networks
- DSO transition
- Smart meter value
- Stakeholder requirements
- Licence condition



Why is data important? - Smart Networks/ Metering

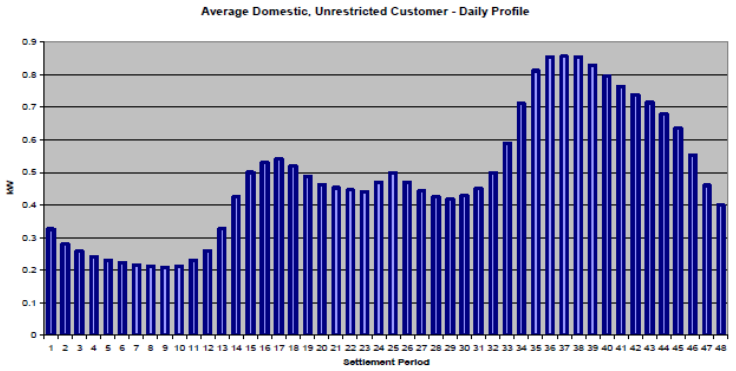
Can't have smart networks without data & communications infrastructure.

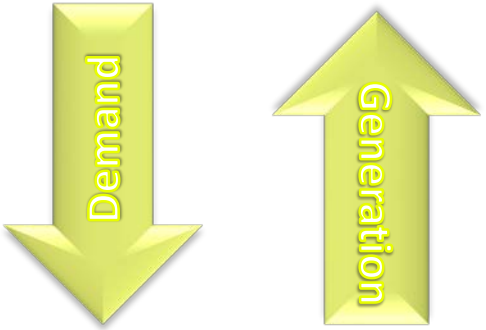


Getting value from Smart Meter data requires integration analytics and visualisation.

Why is data important? - DSO transition

- Greater ability to forecast future load
- Better real time power flow analysis
  Including operation of ANM.
- Optimisation of flexibility choices
- Exchange of data with third parties





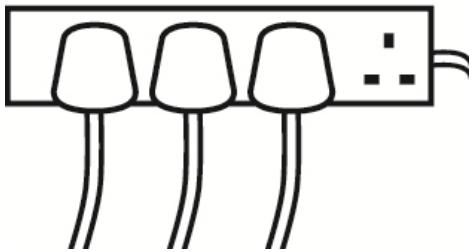
nationalgrid

Why is data important? - DSO transition

"Plugs and Socket" project in Cornwall

Platform for trading flexibility services

- Indicating requirements (short and medium term)
- Matching buyers & sellers
- Enacting instructions
- Validating delivery
- Financial settlement
- Data exchange



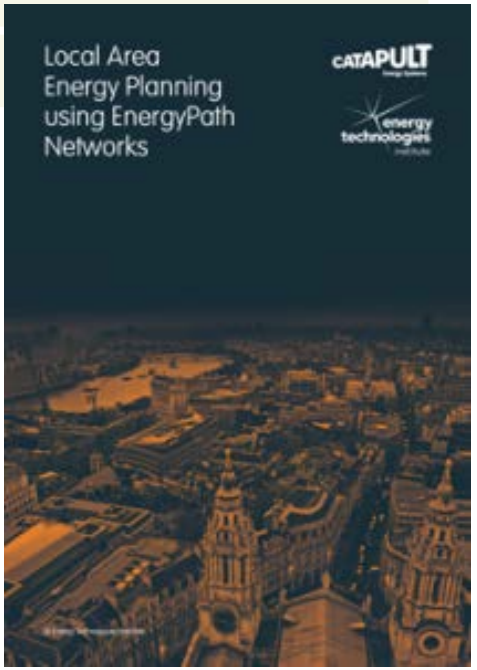
SIEMENS

centrica

Why is data important? - Stakeholders

Stakeholder expectations increasing

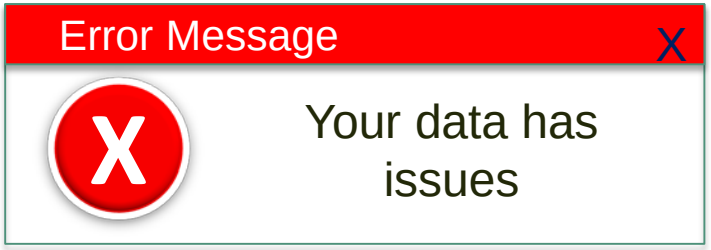
Third party network planning	DINIS network model available
Line search before you dig	Self serve, Additional data for other utilities
Research – beyond NIA/NIC	MK Data Hub, Universities, Utility software developers, Horizon 2020 projects
Supporting regional planning	Energy Systems Catapult, Bridgend



EnergyPath Networks

- Local Carbon Plan development
- Multi-vector analysis
- Optimisation includes Gas, Electricity, Heat networks, building upgrades etc.

Challenges with Data



- Data quality
  e.g. Time Series data
- Change in usage
  e.g. Human interpretation vs computerised
- Data silos, custom formats

Challenges with Data – Data Quality

Time Series Data investigation

- Data set of considerable scale,
  many analogues per Primary, Half Hourly resolution, many years of data.
- Quality issues suspected but not known
- Initial analysis involve IBM's use of their SPSS data analytics tool
- Started in South West,
  expanded to all regions

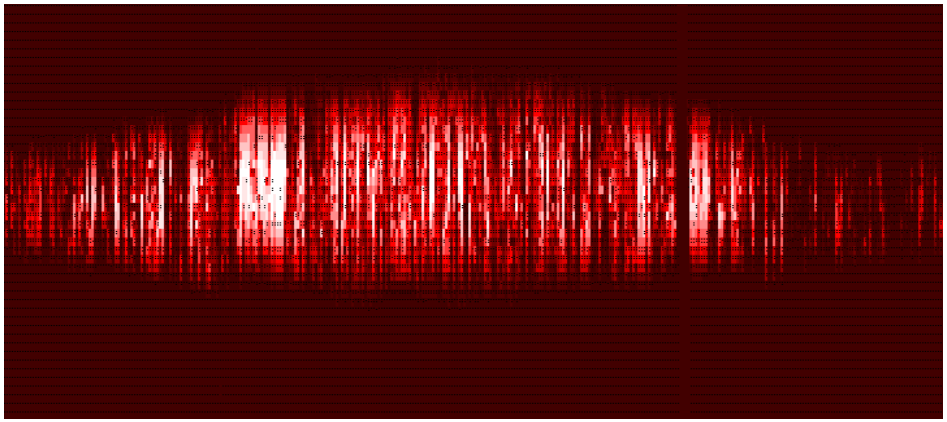
Aims

- Develop analysis & visualisation toolkit
- Quantify data quality issues
- Negative power flow detection
- Find sources of error and fix them

Time Series Data Investigation – Findings

- Not all data from control system stored in data historian
- Inconsistent naming of analogues between systems
- Policy on naming hard to find, one region only
- More zeros than expected, difficult to distinguish open circuit, comms error, monitor kit error, system error
- “Stuck” values
- “Limiting” values
- Inconsistent approaches to rounding
- Existing data quality issue resolution process insufficient

Time Series Data - Visualisations



Solar Generation output heat map

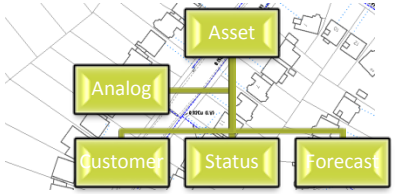
Sum of Outputs comparison

Challenges with Data - Extending use - LV networks

Paper Plans

GIS Representation

Enhanced data set
GIS + Connectivity
+ asset data



Very different in terms of

- Interpretation & ability to manage errors
- Integration with other data sets
- Ability to tailor datasets / visualisations
- Integration with planning tools, automated analysis.
- Supporting development of self-serve connections estimates

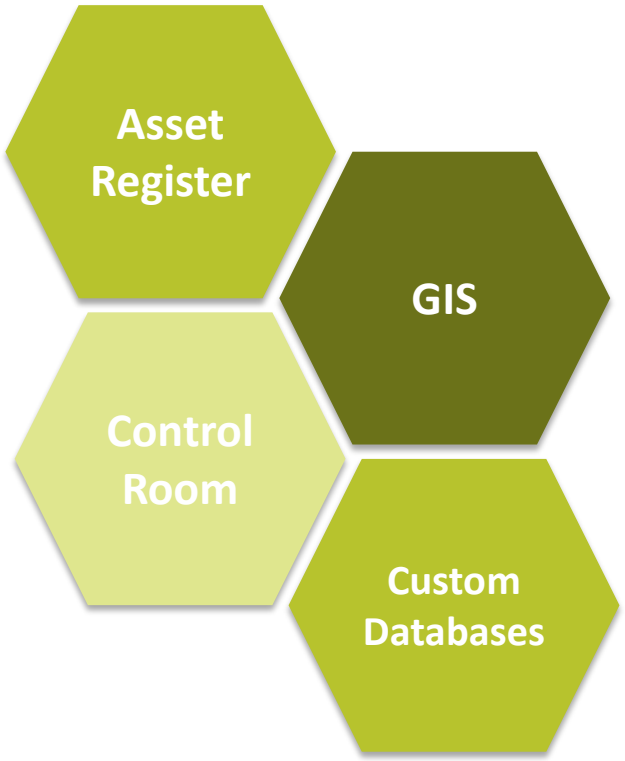
Challenges with Data – LV connectivity project

NIA project in scoping phase

Generate LV connectivity data from GIS data, etc.

- Take more than one approach
- Develop confidence / quality metrics
- Compare with old Midlands connectivity model
- Focus human effort where most valuable
- Automation where confidence is high

Challenges with Data – Structure & Format

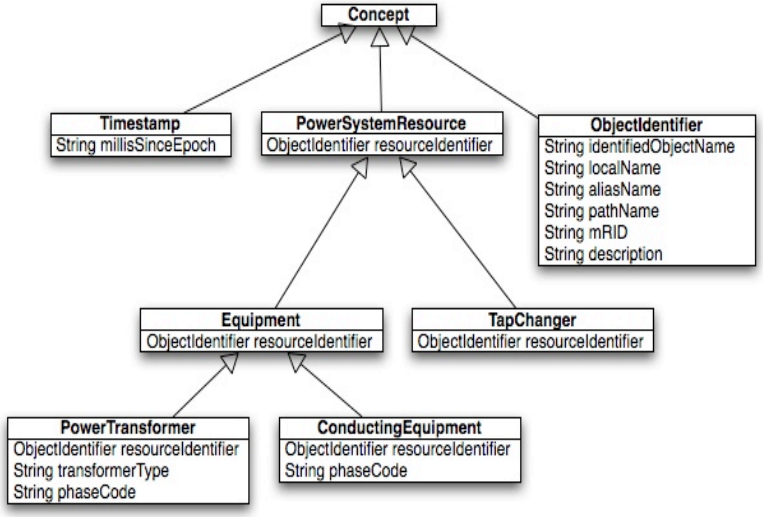


- Key systems designed for different needs and have different data, even different assets.
- Can be difficult to link data together between systems.
- FALCON created Authorised Network Model for 11kV networks

New project to;

1. Combine data for Primary and 132kV networks.
2. Explore the benefits of the Common Information Model

Challenges with Data – Common Information Model



- Import of data into new software tools
- Merging network models
- Data exchange with third parties. Plus their evaluation
- CIM message based system interface

Telecoms Update

Project Nexus

- Current projects adapt existing or implement bespoke solutions
- This approach is not scalable to deliver smart grids, expect a template approach will ultimately be required.
- Global review of existing & planned smart grid telecoms networks to classify them

Telecoms Classification criteria

- Smart Grid site types
- Smart Grid Layers
- Smart Grid Architecture
- Smart Grid Services
- Smart Grid Data flows
- Smart Grid Security (Physical and Cyber)
- Applicable Telecommunications and IT solutions

Projects Summary

Project	Focus	Project Status
Local Energy Market	Market platform for flexibility services	NIA in preparation Completion expected Summer 2019
Bridgend Carbon Plan development	Supporting stakeholders using our data	In Progress WPD work completion Nov 2016
Time Series Data	Develop toolkit, resolve data quality issues	In progress Completion Feb 2017
LV Connectivity	Connectivity model from GIS with confidence metrics	NIA in preparation
Common Information Model	Create and test CIM dataset	NIA in preparation Expected Project duration 18 months
Nexus	Smart grid telecoms review and categorisation	In progress Expected Complete Mar 2017

THANKS FOR LISTENING

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Serving the Midlands, South West and Wales

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