Target Model™

Combining Network System, Asset and Operational data to forecast Customer Experience

Introduction

The Target Model™ is a powerful simulation tool which combines network connectivity data exported from design tools or NMS systems with asset reliability data from CBRM models, individual feeder load data where this exists or can be estimated by MDI and profiles and operational information (e.g. times to restore).

The Target Model™ enables a network operator to analyse selected areas of the distribution network and to reveal the Quality of Supply at individual premises and collections of premises on that network, both current and forecast into the future. It identifies customers with a high probability of becoming worst served customers which have not yet been recognized by the network operator. Because while the relevant network states which will lead to that event are very likely to occur, they have not yet occurred.

The Target Model™ identifies the underlying causes which will lead to poor supply reliability (e.g. Asset failure in related feeders to those which directly supply the customers, both upstream and elsewhere at the same voltage level). This information can then be used by the network operator to identify how to mitigate the identified risk, either through network changes or asset changes. The model is also able to simulate the prospective network interventions in order to identify the most cost effective options.

Information from the Target Model™ can be used to optimise investment plans, identifying the relative benefits from investments to improve Asset Reliability, System Resilience in the presence of a fault and Operational Response to restore supplies.

Outputs

- Forecast customer experience (e.g. CI, CML and long interruptions) at each selected connection point (including identifying future Worst Served Customers),

- The underlying causes which will lead to poor supply reliability (e.g. Asset failure in related feeders to those which directly supply the customers, both upstream and elsewhere at the same voltage level)

- An explicit link between probability of failure of individual assets and individual customer experience)

- Ability to produce an auditable link between proposed investments and resulting network performance improvement

- The model can also simulate prospective network interventions in order to identify the most cost effective options

Benefits

- Providing the ability to produce an auditable link between proposed investments and resulting improvements in customer experience

- Consequently, an improved ability to compare the cost and benefits of alternative proposed investments, for load-, no-load-, "smart"-, and operational investment alternatives

- Consequently, better targeting of investment and hence greater reductions in CI, CML, worst served customers, overloaded circuits etc., for a chosen level of expenditure

- Consequently, better informed consultations with end customers and other stakeholders

- Consequently, better justified business plans

How it works

The Target Model™ is a network simulator. It combines network connectivity data exported from design tools or NMS systems with asset reliability data from CBRM models, individual feeder load data where this exists or can be estimated by MDI and profiles and operational information (e.g. times to restore). It uses Monte Carlo approaches together with Genetic Algorithms to calculate the most likely network performance over a user defined period (e.g. a Price Review Period). It is the only known system that can predict the impact of load growth, including impact of new LCTs, on future customer experience in terms of interruptions.
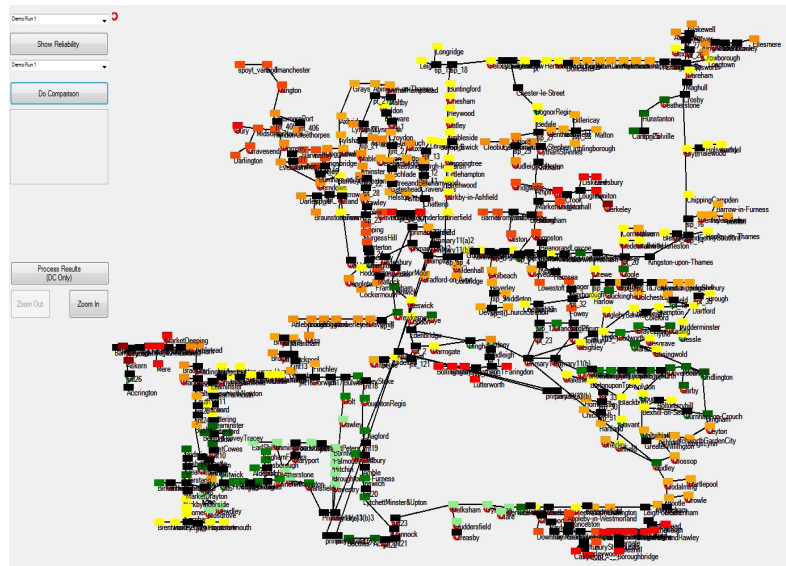
The Target Model™ can provide hitherto unknown insights into complex networks with smart grid technologies present. The Target Model™ creates model simulations of typical network operation: Faults occur on the network, are cleared by circuit breakers causing customer interruptions. The network is then reconfigured to restore supply to all customers that can be supplied while the fault is repaired. By repeating this process many times, simulating many potential network years, data can be generated representing the likely reliability outcomes for each customer on the system along with which asset failures affect each customer.
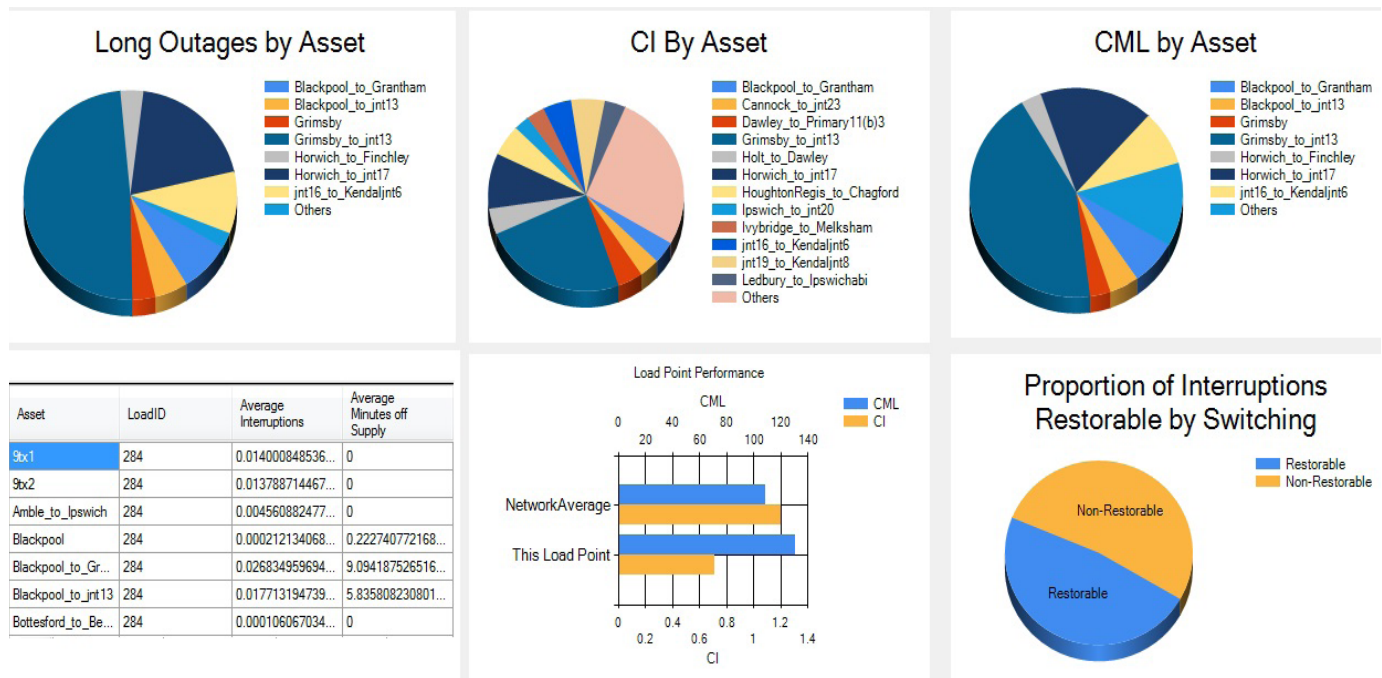
Outputs of the simulations include the predicted customer experience in terms of CI, CML, typical duration of interruptions etc. This can be done for individual customers or defined groups of customers. The Target Model TM also outputs the causes of the predicted customer experience. This can be displayed as a simple pie chart showing the contributors to poor performance. The power of this approach is that it enables DNOs to identify which of their assets, or operational practice, or load distribution choices are going to be the principle causes of the performance that their customers are going to experience, or have experienced (if modelling using historical data).

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