

## Network Performance Optimisation through Applied Analytics

By Brendan E. Cahill & Donal O’Hehir – Trinity Horne

Building, maintaining and managing a network be that in the Telecoms, Water or Energy sector is both complex and expensive. The Capex and Opex spend involved can be immense. This spend is often undertaken based on experience, gut feel and intuition rather than any detailed scientific analysis of cause and effect. There will always be a place for experience; however it is now possible to make better decisions utilising quantitative management techniques which help ensure that our decision making is better informed. When determining spend of scarce capital against multiple and competing drivers this better informed decision making can equate to substantial annual savings.

The potential for failure and added cost within a network is everywhere – to use a water analogy, the potential for leakage in terms of cost and revenue is multi-dimensional and of course spread across thousands of square miles. In theory, a well designed, modern, well built and maintained network should generate minimal faults and/or outages. The reality is quite different. Even where the network is modern, its sheer scale, complexity and the impact of unforeseen and unplanned human and natural interventions brings its own challenges. The effects of these impacts crystallise to the detriment of a business in its bottom line and customer satisfaction ratings.

An effective, holistic network maintenance management system is essential to ensuring service disruption is minimised and that it is delivered in the most cost effective way possible. It should enable better informed decision making in the following areas;

- Investment strategies
- Propensity to fail models
- Fault reduction programmes
- Capital spend optimisation
- Resource requirements planning
- Network & resource performance management

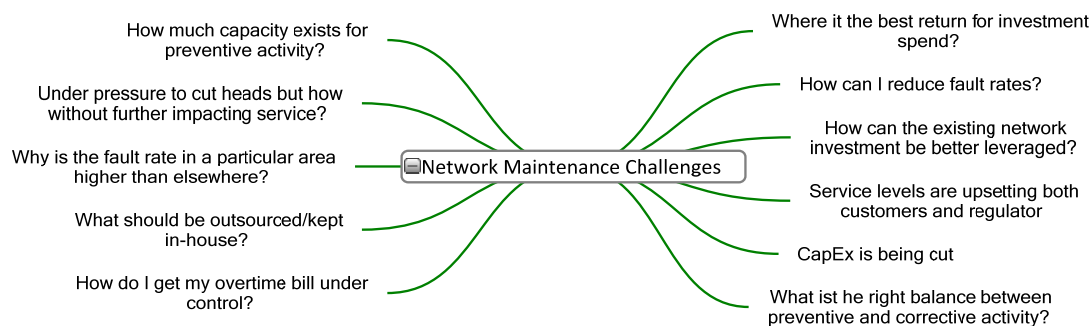
For every business the benefit of informed decision making manifests itself in four ways.

- Prioritised and/or reduced capital investment
- Reduced operating expenditure through less truck rolls
- Improved customer satisfaction
- Reduced regulatory intervention/ scores

Better investment decisions will result in increased network reliability, reduced capital investment (to maintain the network) requirements and will significantly cut operating spend through reduced faults and truck rolls. The impact of reduced service disruption will in turn result in improved customer satisfaction.

Poor network management is unforgiving. It cannot be viewed as an isolated activity and each of its interdependent components must be analysed, weighed and measured.

The advent of sophisticated data analytics can contribute greatly to helping managers manage this vicious circle most effectively. It is now possible to conduct detailed analysis of complex data quickly and as part of business as usual activity. It can provide critical input to the strategic and operational management of the network, ensuring better decision making and improved ROI and ROCE for shareholders.



The challenges in managing network maintenance are immense. It can be a constant balancing act between cost and performance. Take preventive maintenance activity; each preventive maintenance task should be justified based on how much benefit will be realised as result of completing the task (reduced downtime, less truck rolls etc.) in excess of the actual cost of conducting that task. Determining the optimum preventive maintenance interval and activity is essential if costly and avoidable faults are to be minimised. Using quantitative techniques, analytics can be applied to take the guess work out of preventive maintenance planning and help enable a more dynamic and balanced approach.

The network is at the heart of every utilities (Telco/Power/Water/Gas) company. It consumes a large proportion of the organisation's focus and resources – through management, provisioning, maintenance, repair, replacement and upgrading. In addition, its performance – as measured through the fault rate, service quality, operating cost, reliability, complaints, scalability, and flexibility – has a substantial, direct impact on revenue, churn/ retention, market share and profitability. In recognition of its importance, companies populate their network operations with highly qualified and experienced experts, and implement specialised data collection and reporting systems. As these controls develop over time and through various initiatives, they tend to become islands of data serving islands of expertise.

Many of these 'islands' make important contributions to network performance – but their richness is underexploited because they are poorly interconnected. At a macro level, this same problem arises when it comes to network investment strategies. Unless the consolidation of those micro decisions to conduct particular preventive maintenance activities takes into account the interdependent relationship between the competing demands, annualised spend will be unnecessarily inflated reducing the business's ability to invest elsewhere.

Having the appropriate level of data analytics to justify spend must be a requisite building block in any budgetary process. Traditionally, business analytics and sophisticated statistical methods are applied to large, well-structured datasets to uncover important relationships. Limiting the data sources in this way makes for easier analysis – but excluding the many poorly-formatted data islands across the network also excludes the possibility of a much richer and more insightful analysis.

A broad and deep analytics approach can exploit the full richness of the collected data and expertise. Three key resources are required – network SMEs, statistical analysts and a myriad of relevant and timely data sources. Each needs to be marshaled to create a multidimensional dataset that is, necessarily, incomplete and imperfect – but can provide a much broader, deeper and richer view than any prior representation of the network. This enables a quantitative exposition of the key network relationships i.e. which inputs (deliberate or otherwise) really impact network performance, and by how much.

Whether the organisation is seeking insight into specific inputs (e.g. maintenance activity, investment programmes, technology changes) and outputs (e.g. faults, cost, service quality, and churn) or an unbounded answer to the question “what *really* drives the network?” The use of a broad, deep, multidimensional dataset ensures that the findings are much more reliable than could ever be drawn from traditional analysis of a few well-structured datasets.

This approach is ideal for answering questions like:

- Which maintenance activities really reduce the fault rate? Once the effectiveness and cost of these maintenance activities are really known and understood, how should the maintenance schedule be restructured?
- Which measures are the best predictors of faults? Can they be exploited to develop a more effective early warning system, or better targeting of investment programmes?
- What is the true impact (both short and long term) of selected programmes (e.g. replacement, service rollouts, capacity expansions) on network performance and cost?
- How has performance changed over time? How does it vary across regions, technologies, services, customer types, managers? How much of this is explained by other factors?

Having established a robust economic basis for preventive maintenance activity you would have thought that those responsible for network maintenance could rest easy. Not a bit of it! Having justified, designed and implemented a systematic planning, scheduling and reporting mechanism for managing preventive maintenance activity, the opportunity now arises to add a further layer of sophistication. What if you could predict which network components will fail and when that failure is likely to occur?

Under the collective term ‘Predictive Maintenance’, a programme of statistical alarms can be established to dynamically analyse and predict potential component failure. Armed with the knowledge of impending failure, tactical (and even strategic) plans can be made to either minimise or eliminate the failures before they occur, or minimise the effect when they do occur.

## Want to know more?

The *Network Management Analytics Methodology* described can be applied to many different network problems. For an initial discussion about its potential application and benefits for your organisation, please contact Trinity Horne on +44 870 3665800.