Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form. The full completed submission should not exceed 6 pages in total.

NIA Project Registration and PEA Document

Date of Submission

Mar 2015

Project Reference Number

NIA_NGN_120

Project Registration

Project Title

Predictive Analytics Part Two

Project Reference Number

NIA_NGN_120

Project Licensee(s)

Northern Gas Networks

Project Start

February 2015

Project Duration

1 year and 10 months

Nominated Project Contact(s)

Tony Pearson, Predictive Analytic's Leader

Project Budget

£932,400.00

Summary

- To maximise learning and knowledge transfer, organisations invited to submit offers will cover a wide range of modelling types and approaches including open source, closed source, freeware, platform based and bespoke / custom modelling.

- Development of structured data analysis models for up to six opportunities covering a wide range of business activities (detailed above) using a mix of different approaches and engaging with a variety of external partners

- Transfer of knowledge and learning. Maximisation of this transfer is a key aspect of this exercise and so, rather than appointing organisations simply to develop solutions, NGN will dedicate internal resources to work alongside the selected partners, gain understanding not just of how the specific models function but also to gain deeper insights into structured analytics as a process, the strengths and weaknesses of various different approaches and how these vary across a wide range of business processes. Acquiring this learning, insight and understanding is the core of this project and will be shared on completion of the works.

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

Advanced Data Analytics is a group of techniques that use data mining, modelling and statistical analysis of historical and / or near-current data to understand relationships, forecast future events and model “What if” scenarios.

Data analytics has been used in a wide variety of industries but not extensively in the GDNs.

Under a previous IFI / NIA project NGN has confirmed that advanced analytical techniques may have the opportunity to deliver benefits for the environment, customers, GDNs and other stakeholders. A strategy / roadmap has been developed, a group of potential opportunities covering a wide range of business activities has been identified and an exercise has been carried out to “deep dive” the

available data and confirm, for the areas under consideration, that it is likely to be suitable for analytical techniques.

The remaining problem to be addressed is how to engage with external organisations, identify and develop models using real data, assess their likely benefits and transfer knowledge and learning which can then be shared with the other GDNs to allow for the future beneficial application of structured data analytics within a GDN environment

Method(s)

NGN will send detailed requests to a variety of external organisations and invite them to provide proposals detailing how they could work with us to develop analytical models, test their application and transfer knowledge & learning. The opportunities chosen cover a wide range of business activities and challenges common to all GDNs and include:-

- Vehicle replacement strategy (objective to develop an optimised asset investment strategy (opex / capex) taking account of criticality and required reliability, targeted at individual or groups of assets)
- Job scheduling (objective to develop geographically detailed short term forecasting of calls requiring 1 or 2 hour responses to optimise resource allocation between planned and emergency works)
- Leakage strategy (objective to develop an optimisation model that maximises leakage reduction (as calculated by the Ofgem model) given the balance of mandatory and discretionary investments in the network)
- Customer Complaints (purpose is to develop a model that objectively customer experience – both positive and negative – to specific drivers within and outside the control of the network and supports the development of strategies that maximise positive and minimise negative customer experiences)
- Pipe replacement (objective to develop specific asset performance and failure models to support the development of pipe replacement strategies)

Scope

- To maximise learning and knowledge transfer, organisations invited to submit offers will cover a wide range of modelling types and approaches including open source, closed source, freeware, platform based and bespoke / custom modelling.
- Development of structured data analysis models for up to six opportunities covering a wide range of business activities (detailed above) using a mix of different approaches and engaging with a variety of external partners
- Transfer of knowledge and learning. Maximisation of this transfer is a key aspect of this exercise and so, rather than appointing organisations simply to develop solutions, NGN will dedicate internal resources to work alongside the selected partners, gain understanding not just of how the specific models function but also to gain deeper insights into structured analytics as a process, the strengths and weaknesses of various different approaches and how these vary across a wide range of business processes. Acquiring this learning, insight and understanding is the core of this project and will be shared on completion of the works.

Objective(s)

The objectives of the project are as follows :-

- Development of analytical models covering a wide variety of business activities
- Understanding of the strengths and weaknesses of the available data and how this impacts on a variety of modelling approaches
- Understanding the potential improvements in output benefits that a structured analytical approach can deliver compared with a “traditional” approach across a wide variety of business areas (including developing an understanding of where a structured analytical approach is unlikely to deliver significant improvements)
- Compare and understand the strengths and weaknesses of a range of modelling approaches and techniques
- Develop understanding as to how to effectively and efficiently engage with specialist external providers of modelling solutions
- Transfer knowledge, learning and experience

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The success of the project will be measured across Technical Success and Learning & Knowledge Transfer.

Technical Success

Across the opportunities explored:-

- Were successful analytical models developed (i.e. a model developed using “training” data was able to model relationships using “test” data previously unseen by the model)?
- Was their “success” at providing forecasts and insights able to be measured?

- Were confidence intervals able to be produced for the models developed?
- Were a variety of technical approaches tested and were the advantages / disadvantages of these assessed?

Learning & Knowledge Transfer

Was learning and knowledge successfully transferred to allow / improve the following:-

- Improved technical understanding of structured data analytics
- Appreciation of the different techniques, approaches and methodologies that can be employed
- Ability to identify areas where structured analytical models and solutions could potentially deliver improvements compared with the traditional approaches
- Ability to select the approach that best matched the opportunity, data and potential benefit.
- Ability to engage with expert external providers in an informed, effective and efficient way.
- Successful transfer of knowledge and learning to other organisations through the NIA process

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

Models will be developed using a wide variety of internal and external data sources which may be structured or unstructured. Data and transactional volumes will be assessed in an ongoing way through the project

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

The project will cover the whole geographic area of NGN.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

Total Project Cost - £932,400

£700,000 – External costs

£232,400 - Internal costs

Project Eligibility Assessment Part 1

There are slightly differing requirements for RIIO-1 and RIIO-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RIIO-2 / RIIO-1).

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations (Please complete sections 3.1.1 and 3.1.2 for RIIO-2 projects only)

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

n/a

How the Project has potential to benefit consumer in vulnerable situations:

n/a

Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

Please provide an estimate of the saving if the Problem is solved (RIIO-1 projects only)

N/A – research project and excludes implementation

However, where implemented successfully, structured analytics projects typically demonstrate positive ROI levels of 15% + and / or high levels of other beneficial outcomes.

Please provide a calculation of the expected benefits the Solution

Research Project

Please provide an estimate of how replicable the Method is across GB

NGN believe this is fully replicable across all GDN's and will share the results of our development with other GDN's.

Please provide an outline of the costs of rolling out the Method across GB.

The cost to roll out across other GDN's would be in line with those incurred by NGN.

Requirement 3 / 1

Involve Research, Development or Demonstration

A RIIO-1 NIA Project must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

☐ A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).

☐ A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)

☑ A specific novel operational practice directly related to the operation of the Network Licensees system

☐ A specific novel commercial arrangement

RIIO-2 Projects

☐ A specific piece of new equipment (including monitoring, control and communications systems and software)

☐ A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven

☐ A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)

☐ A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology

☐ A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution

☐ A specific novel commercial arrangement

Specific Requirements 4 / 2a

Please explain how the learning that will be generated could be used by the relevant Network Licensees

The specific opportunities chosen are common across all GDNs and so, where the models are shown to be beneficial, these will be shared and could be implemented across all GDNs. Additionally, the knowledge gained regarding the general applicability of structured analytics, the advantages / disadvantages of various approaches other lessons learned will be generally applicable and will be shared..

Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

n/a

☑ Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

Is the default IPR position being applied?

☑ Yes

Project Eligibility Assessment Part 2

Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed.

Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

n/a

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

n/a

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

n/a

Relevant Foreground IPR

n/a

Data Access Details

n/a

Please identify why the Network Licensees will not fund the project as apart of it's business and usual activities

n/a

Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks(e.g. commercial, technical, operational or regulatory) associated with the project

n/a

This project has been approved by a senior member of staff

☑ Yes