NIA Project Registration and PEA Document

Date of Submission

Mar 2019

Project Reference Number

NIA_SPEN_0038

Project Registration

Project Title

System Health Map Phase 1

Project Reference Number

NIA_SPEN_0038

Project Licensee(s)

SP Energy Networks Distribution

Project Start

July 2019

Project Duration

2 years and 6 months

Nominated Project Contact(s)

Michael Eves

Project Budget

£354,000.00

Summary

SPT proposes to develop a 'System Health Map' which collates multiple existing separate data sources from the Transmission Network into one centralised platform. This platform use trending and analytics to allow early intervention and an overall improvement in asset management.

Nominated Contact Email Address(es)

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Problem Being Solved

As the Transmission Network Owner, Scottish Power Transmission (SPT) is obligated to facilitate new connections to the system efficiently and reliably, and maintain existing assets to ensure a secure and operational network.

Online monitoring has been recognised as valuable, however many of these datasets have no mechanism to collate the data gathered or to support SPEN engineers in processing or analysing this data. Many of these sets solely rely on man-power to import, analyse and generate outputs from the raw data.

As a result, there are three key growing issues which make the current business practices for network data management impractical:

- The volume of data – Monitoring equipment is increasingly being installed throughout the network to identify potential problems. This data includes:

    1. **Power Quality Data:** The large increase in LCTs in recent years has significantly increased the requirement for power quality data in order to maintain compliance with standards. As the number of LCTs continues to grow, this increases the volume of data, making it increasingly difficult to regularly and meaningfully assess the data extracted from assets and possibly allow non-compliant network conditions to continue undetected.

2. Condition Monitoring Data: With an aging and developing asset population more emphasis is being made on delivery of lifetime extension and the safe and efficient operation of these assets. This has led to an increase in the delivery of asset condition monitoring equipment producing a large and diverse data set with increased need to automate the collection, collation and analysis of this data.

- The diversity of data – The variation in the incoming data is extraordinary with the complexity of managing different sample rates, formats, supplier software and user interfaces being compounded by the fact that different disciplines have installed monitoring equipment to address different issues. The data also requires expertise to build analytics and understand outcomes.

- The diversity in user interfaces – As each supplier presents their bespoke hardware and software to address a specific issue, this leads to a number of issues. Firstly, the number of interfaces becomes unmanageable when looking to capture a system view, meaning technical staff will need to use each software package individually and build up a system picture manually. Secondly, the different software packages provide different levels of access; this ranges from full data access to web-based platforms which allow 'read only' access.

The overall impact of these issues is that critical assets are not being monitored effectively, and undetected faults are causing unnecessary asset damage, network congestion and network outages. This results in an ongoing preventable cost to the customer. Furthermore, these events cause unnecessary cost to the consumer in constraint costs.

Method(s)

The aim of the SHM is to develop, where possible, standardised approaches to integrating data sources into a single platform. This platform will then allow network and asset risk to be addressed as a whole system, with critical work being directed more efficiently.

The project team will be working with MicroStrategy/Eyecademy to develop the software platform utilising the software 'MicroStrategy' (a generic data visualisation and analytics platform). The platform will be able to pull in data from multiple permanent systems across the Transmission network.

This platform will be able to extract data from pre-defined sources (such as PI Historian) and display this on a graphical interface. This interface will include a system diagram with indicative system conditions (Traffic Light) and the ability to plot and export data.

The five use cases which have been defined for Phase 1 are:

- Power Quality (including harmonics, voltage flicker, and voltage imbalance);
- GIS Gas Density (SF6);
- Dissolved Gas Analysis;
- Partial Discharge; and
- Distributed Temperature Sensing.

Scope

The key project milestones will be:

1. Requirements Specification – The supplier will engage with the project team and stakeholders to prepare a specification which will identify the full requirements that the platform must contain to be counted as successful delivery by SPEN. It will allow for 1 round of comments by SPEN.

2. Functional Prototype – The supplier will demonstrate a functional prototype with at least one working example of each use case and the exporting functionality determined in the Requirements Specification.

3. Functional Design Specification – Based upon success of the prototype, the supplier will provide a functional design specification for SPEN's review with an allowance for 2 rounds of comments.

4. Factory Acceptance Test – The supplier will demonstrate the functionality of the System Health Map including user interface, all use cases to the satisfaction of the Transmission Operations team. This will be assessed on the basis of the Functional Design Specification by SPEN.

5. Site Acceptance Test -   The supplier will demonstrate the functionality of the System Health Map including user interface, all use cases to the satisfaction of SPEN.

6. Reporting - Demonstrating a change in asset management behaviour and decision making by comparing traditional procedures to

new behaviours being informed by online data via the platform.

6.   Wider Business Workshop & Dissemination - Final Phase 1 product workshop to outline the methodology, architecture and functionality of the System Health Map at a high-level to the wider business.

Objective(s)

1. Development of a requirements specification to identify the full system requirements which will determine the successful delivery criteria.
2. To configure a general data analytics platform for hositng and using real-time transmission data in the above use cases in line with the technical specification.
3. Take sample data sets for each use case to validate a real-time output and alarms.
4. To roll-out the platform for the full dataset into all available SPT sites.
5. Reporting on demonstrated change in practice due to integrated data and visualisation with a key outcome being improved decision making

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The delivery of the above objectives, within budget and within agreed timelines, as is reasonable depending on the knowledge at this stage of the development phase.

The project will be managed within SPEN applying due diligence and best practices where appropriate.

Project Partners and External Funding

MicroStrategy/Eyecademy

Potential for New Learning

- New understanding of network behaviour - for example, through analysis of harmonic heat mapping
- Improved understanding of asset degregation forecasting
- Understanding of the requirements of the implementation of a general data analytics platform in a networks business.

Scale of Project

Five key use cases have been identified; this is smaller thanthe number of potential use cases, but represents the key areas of interest. The use of these five will allow the platform to be validated in a wide range. A smaller scale project could not cover the same breadth of use cases.

Technology Readiness at Start

| TRL5 Pilot Scale |

Technology Readiness at End

| TRL7 Inactive Commissioning |

Geographical Area

SPT

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£354,000

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)

The benefits from the project will be in four key areas:

Savings to the business
A reduction in carbon emissions
Savings to the consumer
Avoiding potential fines

Considering the savings to the business, we determined a range of possible savings depending on the possible faults that can arise on an annual basis. This primarily accounts for a deferral in network reinforcement, extending life time of network assets, and a reduction in penalties. This range was between £2.3m and £4.9m, and was taken from average saving for the specific sites we will target in Phase 1. To be conservative, we have taken the lowest value (£2.3m) as the annual cost saved upon deployment, with a shared benefit factor of 20%, therefore the annual savings would be £505k.

This would see the project achieving an annual business saving of £384k, accommodating an on-going project cost of £40k for licenses and support.

Only considering this shared business benefit, it is anticipated that the saving to the business would be £840k by 2021, with a cumulative benefit of £3.23m by the end of RIIO-T2 and £5.6m by 2030. This only considers the Savings to the business.

Please provide a calculation of the expected benefits the Solution

See previous.

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

Assuming business benefits can be proven through applied method, we anticipate uptake to be high as the solution can be replicated with a high benefit expectation.

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

The cost of the platform plus the licencing will define the cost per network operator. These costs can be defined through the project.

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 understanding of the data analytics use cases will be able to be applied to all network licencees. All licencees also have increasing requirements for data analytics and improved data management. All outlined learnings can be applied to DNOs and TOs.

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.

This project has not been previously carried out by other licencees; the use of a generic data analytics platform across a networks business has not been previously looked at.

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

This project is innovative in its use of a generic data analytics platform over bespoke supplier software.Previous data management has been incremental, but this BAU approach is no longer sustainable.

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

As there is a large portion of development work to be carried out in this project, it poses a level of risk too high for a business as ususal project.

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

The NIA funding is to be used due to the commercial risk as outlined above; there is also potential for the benefits and learnings of the project to be applied to other network operators.

This project has been approved by a senior member of staff

☑ Yes