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

Jun 2023

Project Reference Number

NIA_NGN_422

Project Registration

Project Title

Vulnerability Visualisation Tool Phase 2

Project Reference Number

NIA_NGN_422

Project Licensee(s)

Northern Gas Networks

Project Start

March 2023

Project Duration

1 year and 1 month

Nominated Project Contact(s)

sdacre@northerngas.co.uk

Project Budget

£129,360.00

Summary

There are currently several systems for capturing and measuring vulnerability for an area, each mostly bespoke by a partner or stakeholder. By building a single point of reference for all parties, we will be able to unlock knowledge held internally, assist other projects involved in improving and identifying vulnerable customers and areas, and ensure that stakeholders who work across geographic boundaries are able to take a more holistic view of their practices

A prototype Vulnerability Visualisation Tool has been successfully built and validated. Whilst the tool has been developed with Northern Gas Networks, there has been interest from a diverse range of networks and stakeholders, which have been involved in testing and validating the tool, identifying further development requirements.

Third Party Collaborators

Egnida

Energy Innovation Centre

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

A prototype Vulnerability Visualisation Tool has been successfully built and validated. Whilst the tool has been developed with Northern Gas Networks, there has been interest from a diverse range of networks and stakeholders, which have been involved in testing and validating the tool.

Subsequently, further requirements have been identified, including the development of a single point of reference that can be used

across a range of networks and stakeholders.

Method(s)

The public datasets identified in the previous phase one project all have individual refresh schedules which have continued to be observed throughout the project, in the intervening time and during the phase two project. The provenance of each dataset is shown to the user when applying it in the system including if the data requires a refresh. The project does not create any new datasets itself, other than data produced by the predictive models (see below).

The project will be delivered in the following work packages:

WP1 Identifying other partners and stakeholders
This will be an ongoing task throughout the project where teams within partner organisations, those businesses' delivery partners and external organisations can collaborate and access the tool.

WP2 Creating a secure method to view and share data

Each organisation will be able to access the public data delivered in phase one and have the opportunity to use their own data if their sharing and IT policies allow. This will require them to use the secure platform chosen for data hosting which will be an existing enterprise level provider with relevant data security policies in place. The organisation will retain ownership of any data on the platform.

At no point will they have to give their data to Egnida Innovation, only a view of the data with relevant fields for the tool to visualise. Their data will remain in their infrastructure. They can retract their data at any time and will not be able to share GDPR sensitive data. The tool is not able to consume or display personally identifiable data.

Egnida will remain responsible for maintaining the public datasets and each organisation will be responsible for the accuracy and provenance of data they visualise and share.

WP3 Creating predictive models for data

We will use the public datasets collected throughout the phase one and two projects and allow organisations to use their private data to create machine learning models to predict how data changes affect other outcomes. The models will be trained on a subset of the data and tested using a second subset of the same data. The data produced by the models will contain a health warning that they are estimates and not empirical data. We will work with businesses to help create bespoke models using their data which will have the same ownership, storage and authentication as their data.

As above no personally identifiable data can be used to produced by the ML models.

WP4 Embedding the tool within businesses

We will work with partner organisations to identify teams within the business who could benefit from using the tool. Bespoke functionality will be built where necessary for each team and data can be sourced and shared as needed.

Scope

This project will focus on the following key areas:

- Increasing partnerships
- Integrating additional data types
- Using machine learning to aid bespoke predictive modelling
- Embedding the tool in businesses' everyday processes

Objective(s)

- Stage 1

o Develop micro service routes and authentication process for data sharing.

o Produce API documentation for external projects.

o Identify partner specific data requirements and sources.

o Develop specific partner access tools.

- Stage 2

o Develop Microsoft Excel plugins which can convert Excel files into data which can be anonymised and consumed by the tool from a local source.

o Work with partner IT teams to develop appropriate storage for internal data sources which can be accessed by colleague browsers but not external sources.

o Develop routes for the tool to identify and consume internally held private datasets.

- Stage 3

o Identify eligible data which can be used to produce machine learning models.

o Process selected datasets into consumable format for machine learning platform including interpolating data where necessary and applicable.

o Implement and run machine learning training on selected data to create models.

o Test models with data in to help predict vulnerability.

- Stage 4

o Design and deliver bespoke training courses for each distinct area of the business in each partner organisation.

o Hold regular (up to bi-monthly) individual contact sessions with each business area involved to understand current work, where the visualisation tool can help and identify areas of development for the tool to better serve the team's needs.

o Provide ad-hoc data analysis support for teams to help better understand what the tool can provide for presentations, reports etc.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

The anticipated effects of this project on customers in vulnerable situations are expected to be great by allowing effective support to be provided to communities in need. This could be increased communications around Carbon Monoxide if a 'CO Hotspot' is identified. We foresee using the mapping system, we will be able to identify areas of specific need / vulnerability and direct either VCMA project with community partners, or to deploy specific NIA solutions to help alleviate issues in communities. The system will help to identify areas of fuel poverty, potentially allowing the unlocking of additional support though Local Authorities or grants to improve energy efficiency and potentially other energy saving solutions which could be provided to customers most in need. This will also allow community partners to work closely with community groups identified through the system which could be overlooked without this system.

The system will provide the foundation for Networks and other partners to provide effective support, giving an understanding of the scale of need in communities which have never been fully understood before this project.

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Success Criteria

· The tool must manage access for a large number of users from different teams and organisations.

· The plugins developed must be able to convert data held in Excel into a format which can be visualised using the tool.

· The tool must be able to grant access to organisation-specific data and not share that data outside of the correct organisation and users.

· The tool must be able to load data from a local private storage and not load or display that data if the user does not have appropriate access.

· The tool must be able to provide assistance and insights to all identified business areas and be easy for use for those colleagues.

· There must be a complete set of data to use as training data for a machine learning platform.

Project Partners and External Funding

This project will be delivered by Egnida and facilitated by the EIC. Egnida Innovation is an award-winning digital consultancy, applying technology to energy industry problems with a particular focus on social issues.

Other parties involved are SSEN and NPg who are equal funding partners to NGN (Lead).

Potential for New Learning

The tool is designed to provide insights and new learning to teams across the partner businesses. The tool will provide data insights to other projects which will facilitate learning across multiple disciplines. We will also learn how machine learning can be used to identify and predict vulnerability and, through creating those models, which factors affect vulnerability the most

Scale of Project

Egnida has worked with NGN over the past 12 months to produce an innovative prototype visualisation tool and develop functionality with the potential to assist key areas of the business and help stakeholders deliver their services more efficiently when supporting customers and communities. The prototype has been well received by colleagues and stakeholders and the project has helped to surface a number of opportunities to work more with the tool and its data. There is now an exciting opportunity to further develop the tool to better serve NGN and its stakeholders and to widen the scope of the project to encompass more partners, more data and advanced functionality.

The opportunities to develop the tool fall into four main themes:

More partners

We have engaged with a number of other utilities during the course of the phase one project and there is opportunity to to develop the tool further to provide insights into water and electricity vulnerability, making a shared, one-stop-shop for utilities and stakeholders to measure, assess and help tackle vulnerability. We will also collaborate with other existing and emerging projects around Priority Service Register (PSR), fuel poverty and vulnerability to provide data tools to those projects and allow outputs to be shown in the visualisation tool. We strongly believe that an enhanced visualisation tool in phase two could leverage the outputs of a homomorphic encryption project to allow for data which would previously have been too sensitive to use or share and could provide data services to other projects around health and safety, planning and community resilience.

Other types of data

To date, during phase one, we have focused the tool on using a wide variety of public data sources which can be scored to produce filters, or mapped to create layers. We would now like to enable partners to use their own data in the system by mitigating the constraints of data protection and sharing agreements in order to crunch the data for use in the system. This will allow partners to process and host data locally within their infrastructure – making it visible to them when viewed in their browser, but not to any external parties. We will also work with partners' IT and Legal teams to create a framework so that data can be shared with the tool's central data store in an anonymised format and with a permissions system to limit access where required.

Predictive data

We have collated over one hundred data sets during the phase one project, providing insights on a wide range of metrics. These datasets now provide a complete view of an area to create machine learning models and predict where data is missing or unknown. For example, given the data now held about an area, we could potentially predict the number and types of Priority Service customers living in an area and the equipment and staff required to be deployed in an emergency, even if little data is known about the area or few customers have signed up to the PSR. These models have the potential to create a real impact – ensuring that vulnerable customers are proactively identified without the need for them to self-identify.

Embedding in Business

Creating a single point of access for partners and stakeholders is viable providing we are able to work with teams within businesses on an ongoing basis to help develop and refine functionality to suit their needs and to train staff on how to use the tool. The feedback from all our user testers during phase one is that the tool does an excellent job of displaying the data. For phase two we are focused on ensuring that the data is used to drive decisions and change across the industry.

Overall, the project will move from TRL 5/6 to TRL8. In terms of machine learning this will start at TRL 2 and complete at TRL7.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

The project will cover all of NGN's, SSEN's, and NPg's operational areas. Many of the public datasets which will be used in the project are England, England and Wales, GB or UK wide and will be included in their entirety.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

Total NGN External Project Costs: £39,200.00

Total NGN Internal Project Costs: £3,920.00

Total Overall NGN Project Costs: £43,120.00

Total NPg External Project Costs: £39,200.00

Total NPg Internal Project Costs: £3,920.00

Total Overall NPg Project Costs: £43,120.00

Total SSEN External Project Costs: £39,200.00

Total SSEN Internal Project Costs: £3,920.00

Total Overall SSEN Project Costs: £43,120.00

Total External Project Costs: £117,600.00

Total Internal Project Costs: £11,760.00

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:

This project has enormous potential to benefit all customers in vulnerable situations as it will provide accurate assessment of communities and all interested parties to provide suitable support to the area. This will enable network partners such as community groups to specifically target areas with relevant support, this will allow GDNs and DNOs to accurately provide information which will be bespoke to the specific needs of the area such as Carbon Monoxide awareness, Priority Services Register messaging, increasing awareness and registrations.

It will allow GDN's or other service providers to enlist support for VCMA projects directly addressing the needs of communities, rather than adopting a broad-brush approach which has been the traditional approach. This system will present itself as the very foundation for future years projects and investments, specifically as we progress through the energy system transition which will help address the very real and ever-changing needs of communities and vulnerable customers groups by putting data at the front and centre of future decision making for GDN's and partners.

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)

RIIO 1 Projects only, so N/A

Please provide a calculation of the expected benefits the Solution

· Financial

o Increased efficiency and customer service scores as Initiatives can be targeted not just on known vulnerability such as the PSR, but modelled vulnerability.

o Other projects can use the data to skip ahead of needing to research and source their own data and also use the visualisation tool as a presentation layer, saving the time and expense of producing their own.

· Customers

o Creating a single point of reference for vulnerability data will allow for greater visibility and sharing of information, reducing the likelihood of customers' needs being missed or replicated unnecessarily. Ultimately the system provides better insights into a customer's needs for almost all aspects of customer contact.

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

This system is entirely replicable across GB where datasets are available. Scotland and Wales have slightly different ways of reporting certain national statistics which would need to be accommodated and not all data is available for all regions however and so not all functionality would be available across GB.

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

The costs to roll the project out are uncertain at this stage and will be defined through the project and is subject to GDN, DNO and utility take-up.

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

This project will expand on existing learning driven by the success of NIA Funded Customer Vulnerability Mapping Tool Phase 1 (NIA_NGN_300). The project will expand the tool's capability to provide further insights from new datasets, whilst also increasing accessibility to additional network licensees. This tool will be immersive and provide accurate and real time data to allow speedy analysis for everyone in a visual format which is accessible and understandable.

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

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.

Whilst there is already very good data and mapping capability within the industry, there isn't a platform which can bring disparate groups of data into an easily accessible, user friendly environment which can solve complicated queries about the specific needs of an area. Data is often hard for non-technical staff to decipher or utilise effectively when presented in its raw form and without other data to provide greater context or depth.

Many organisations are developing systems which map or visualize where their vulnerable customers are. This project however goes further by augmenting existing customer data with a large number of external innovative datasets to produce a clearer, richer picture of vulnerability, allowing the Licensee to not only see where their activities are having an impact, but see gaps and opportunities in their activities and make better decisions before any activity takes place.

Feedback from external stakeholders including charities and Local Authorities on the prototype tool has been extremely positive and highlight a genuine need in the space for this capability.

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 as it will use many data sources and provide visualisations allowing the user to quickly identify needs of communities. Data is traditionally displayed as spreadsheets which to analyse and understand can be time consuming often requiring data analysts to provide interpretations of the data. This tool will be immersive and provide accurate and real time data to allow speedy analysis for everyone in a visual format which is accessible and understandable.

Relevant Foreground IPR

All IPR stays with GDN's and as such no change to exiting market arrangements, the project focussing on no regrets changes and the use of exiting processes / frameworks where possible in order to ensure that financial impacts on customers are kept to a minimum.

Data Access Details

For more information, please see https://www.northerngasnetworks.co.uk/wp-content/uploads/2018/03/Innovation-Data-Sharing-Policy.pdf

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

This project is innovative and new, using data sources to provide immersive user experience for the benefit of our customers in vulnerable circumstances and the public who may require additional support or local project funding directly addressing the needs of local or wider community groups. This solution will allow the 'levelling up' of service provision across the UK.

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

This can only be undertaken with the support of NIA as it is a novel concept which needs further development which is not factored into current business as usual allowances. This cannot be completed as part of NGN's BAU activities as there is still an element of risk involved as it has never been done before.

Using NIA will open the project outputs up to be shared with other GDNs and DNOs.

This project has been approved by a senior member of staff

☑ Yes