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

Dec 2023

Project Reference Number

NPG_NIA_047

Project Registration

Project Title

Storm Triage

Project Reference Number

NPG_NIA_047

Project Licensee(s)

Northern Powergrid

Project Start

December 2023

Project Duration

1 year and 4 months

Nominated Project Contact(s)

Andrew Webster
(Andrew.Webster@northernpowergrid.com)

Project Budget

£490,000.00

Summary

Maintaining communications with customers and operations staff, particularly during major incidents, can be difficult and can overwhelm systems. Storm Triage seeks to provide an additional IT enabled communications option to speed up responses reducing restoration times and contributing to reducing the impact of major outages on vulnerable customers. Improved response will also prevent customers becoming vulnerable.

Third Party Collaborators

Juice Immersive Ltd

Nominated Contact Email Address(es)

yourpowergrid@northernpowergrid.com

Problem Being Solved

During a major incident, IT infrastructure and Contact Centre operations can become overwhelmed due to the volume of customers who were trying to make contact. Website/powercut map can become unavailable and customers unable to report a fault. Network Control can also become overwhelmed and field engineers placed on hold for extended periods causing a bottle neck in restoration efforts. Recent storm events have identified a need to improve communications and sharing of critical information. Climate change has the potential to make such major incidents both more frequent and more damaging to the network. An increased reliance on the electricity system gives the potential for increased numbers of vulnerable customers being impacted under such circumstances.

Method(s)

A digital application will be developed which will allow field staff (craft and engineers) to take photos of damage they identify as they

survey the network. This platform could also be made accessible to various partners who assist NPg during a major incident (e.g., emergency services, local authorities, army etc.) as well as the general public. This could enable an appropriately trained and experienced field engineer on site to take over the restoration co-ordinator role rather than leave it to someone working remotely. This would enable faster, more dynamic and accurate ground level assessment of network damage during a storm.

Timely communication of operational instructions are essential in resolving issues during a storm event and ineffective communication directly impacts ETR's. Remote assistance functionality could be included to allow the onsite restoration co-ordinator to liaise as appropriate with colleagues working at different locations. A remote collaborative working solution would ensure greater control and organisation of key resource, and faster and more accurate assessment of network damage.

Machine Learning could also be integrated to identify, categorise and prioritise damage from photos and collate a supporting list of equipment which would be required to facilitate repair works. Various data sources (Internet of Things) could also feed into this platform (e.g., topological data, weather forecasts).

Scope

The project will deliver a pre-scale operational prototype mobile and web application, which will showcase and prove the value of the Storm Triage concept. The Storm Triage prototype will include the following key functionality:

· Storm warning API integration/push notifications

· User login

· Map location and geofencing

· GPS location data recording

· Photo and video capture

· User-guided photogrammetry capture

· Video call with on-screen annotation

· Session recording

· Secure server uploads

· Engineer version of app

· Damage type categorisation

· Expert assessor web application / UI

· Assessor note taking and recording

· Assessor damage ranking system

Assignment of case to engineer / interface with existing API

Objective(s)

The objectives of this project are to enable:

· Faster & more dynamic assessment of fault damage

· Visual damage spotting & remote assistance

· Multi-user capabilities

· Prioritisation of fault damage repair

· Utilise machine learning to assess type, severity, prioritisation of fault damage

· Engagement with wider stakeholders to report network damage

The digital application could be transitioned to support delivery of planned works and would be particularly useful in a handover

process as an engineer could quickly be ‘onboarded’ to a project

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

No mitigation required. Impact assessement attached.

Success Criteria

The project will be judged a success if:

· The digital application enables NPg to automatically collate and prioritise fault reports from site

· Notifications can be delivered to the stakeholder reporting the fault, so they are kept informed

· The physical location of the stakeholder is recorded when they are capturing storm damage reports

· Supporting pictures and videos can be captured with annotation functionality

· Video calls can be established with NPg expert panel of reviewers
Machine Learning engine effectively reviews fault reports and suggest type, severity and prioritization of fault damage

Project Partners and External Funding

None. Some pro-bono work has been undertaken by Juice Emersive, the key project developer and contractor, to establish the general feasibility of this approach and to establish a "look and feel" demonstrator.

Potential for New Learning

Storm Triage will deliver new learning in a multitude of areas including, but not limited to.

· the effectiveness of machine learning / artificial intelligence for identifying fault type, severity, damaged assets and safety critical scenes,

· the effectiveness of machine learning / artificial intelligence for supporting Front Runner data capture and suggestion of power restoration requirements to inform ETRs,

· the effectiveness of 3D photogrammetry in providing spatially cognizant visuals of a damaged network asset to Front Running Coordinators for fault assessment and triage providing increased situational awareness for decision makers,

· the effectiveness of panoramic and standard photos in providing 2D visuals of a damaged network asset and surrounding scene to Front Running Coordinators for fault assessment and triage to further support the immersive data captured,

· the effectiveness of AR-enabled (augmented reality annotations) remote assistance / expert video calls in facilitating Front Runner / Coordinator collaboration during scene assessment and triaging,

· the accuracy of in-app GPS-powered asset lookup and its usefulness in the damage assessment, fault mapping and triaging process,

· the usefulness of mapping Storm Triage / Front Runner data via the web app for Coordinators to spot clusters of network damage and collation of scenes into individual Storm Triage reports for dissemination,

· the usefulness of mapping Storm Triage / Front Runner scene data with Northern Powergrid live outage map / OMS for storm response coordination, triaging and restoration planning,

· the value of mapping Storm Triage / Front Runner scene data and cataloguing into time-boxed storm archives,

· the usefulness of in-app Front Runner live status setting for Front Runner Coordinators in their storm response coordination efforts,

· the ability of a near-fully offline mobile application to collect and submit essential field data in a timely fashion during a storm response – i.e. measurement of average lag time from data collection to web connection and upload,

· the ability of StormTriage to upskill non-skilled employees and third-party emergency services, to reliably increase the number of Front Runners able to be used during a MIMP, in order to increase the total amount of data reaching the coordinators and expert

decision makers.

· The ability of Front Runner Coordinators to control and triage high value, real-time data via a purpose built back-end solution to increase operational efficiencies during a MIMP.

Scale of Project

The project is designed to dermonstrate the concept can be developed into a fully usable application and to identify and overcome any barriers to broader-scale implementation.The digital application that will be developed will be entirely scalable, by design, but will require additional server space to accommodate additional users in BAU roll-out.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

Applicable to all licensed entities and geographies. Pilot to be undertaken with data/information from the NPg network.

Revenue Allowed for the RIIO Settlement

None.

Indicative Total NIA Project Expenditure

£490k

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:

Major incidents have the potential to have large impacts on vulnerable customers as preparation and communications can be difficult prior to unplanned and large scale network impacts.

Further, under long-term outages customers can become increasingly vulnerable.

Both of these problems are likely to be further exacerbated by increasing electrification due to the net zero transition.

This project seeks to reduce the impacts and duration of these incidents. This is benenficial to all customers but especially thoe who are veulnerable or have the potential to become vulnerable.

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

Please provide a calculation of the expected benefits the Solution

Benefits are not quantitative but social and public service. As such quantitiative assessment of such benefits in monetary tyems is not possible.

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

Entirely replicable.

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

Costs are difficult to calculate and the largest long-term costs is likely to be server space to hold large-scale data-sets. That costs will depend on how individual operators want to use this technology. however an estimate of initial set-up costs is in the range £2-£3m per network. This estimate will be refined as part of this 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

Where successful the technology will be made commercially available, in line with the requirements of NIA.

NPg will share use-cases and operational information on extracting the maximum value from this technology.

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.

Checking with public search engines and with other licensed entities indicates that this work is innovative and has not been undertaken previously. Some previous DNO work was identified with elements of similarity but on further in-depth investigation this was deemed superficially similar.

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

· Increasing frequency of global warming related weather events, including Storm Arwen, have driven the demand and prioritisation for an innovation solution to storm damage response now, rather than in previous years. These events are becoming

more frequent and increasing in their destructive nature, driving this increased need today.

· A dedicated Front Runner mobile app and Coordinator web app have never been developed before (across the industry) for use during storm response.

· The selected technologies used within StormTriage have not been previously combined to directly tackle a specific industry challenge, with a tangible purpose and outcome.

· Artificial intelligence and machine learning has never been used before to assess network damage and capture vital visual data from the field during storm response.

· Artificial intelligence and machine learning has never been used before to suggest restoration requirements or inform ETRs.

· 3D photogrammetry has never been used before to assist in network damage assessment, during storms or otherwise.

· Remote expert / assistance video calls may have been trialled elsewhere in the industry previously, but never, to our knowledge, specifically by Front Runners during storm response, and unlikely to have been trialled with augmented reality annotation functionality.

· GPS asset lookup is unlikely to have been utilised out in the field before, especially working offline (without internet connection) and via a mobile app.

· Mapping network damage data to live customer outage maps is unlikely to have been done before due to the extreme lack of field data during storm response.

· Mapping visual network damage data and cataloguing into time-boxed storm/MIMP archives to build up a picture of network vulnerability and weather impact patterns over time is new and innovative.

· Provision of rich visual data to Coordinators to help inform the triaging of faults and prioritisation of restoration is a wholly new and innovative approach to DNO storm response.

Relevant Foreground IPR

· As ideates of the Storm Triage concept / solution following pro bono Capture & Consult phase work (under Juice's AppliedXRÔ methodology) with NPg Innovation, Juice Immersive retain commercial IP ownership, both foreground and background IP.

· The combination of technologies for the distinct purpose of the Storm Triage solution for electricity DNOs is exclusively licensed to Northern Powergrid for the period of the NIA project – March 2023 – May 2024 inclusive.

· In the latter phases of the project an Expansion and Exploitation Plan will be developed collaboratively with NPg if there is appetite within the business to carry the project and Storm Triage solution forward to a BAU product within the NPg Operative (Front Runner / Coordinator) toolkit. This will also cover the potential for other DNO Storm Triage adaptation / adoption and the commercial IP exploitation opportunity for Juice.

· The innovation learnings from the Storm Triage project as the solution relates to DNO storm response and visual field data capture more widely will be shared between Juice and Northern Powergrid and taken forward together and/or independently.

Data Access Details

Data availability issues are not yet resolved. Data is likely to consist of a range of pictures of fault conditions - some taken by NPG staff, potentially some taken by customers. Whether these casn be easily made available and who has the ownership rights to such pictures, many taken on and of private property, will need to be determined in the project. Arrangements will be detailled in the close-down.

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

The project does not return funding to the business where the outcome is successful. Outcomes are mostly social and societal in terms of the protection of the vulnerable, the prevention of temporal vulnerability and more general support for the lives of the broader mass of customers under a more general trend of electrification in support of net zero.

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

Risks are technical, economic and societal.

It is not clear whether the Storm Triage application can be made to work on in-field technology nor whether the back-office operations to enable the technology to be appropriately exploited can be made to work.

The economics are not clear. Operating costs are unknown and the cost of a final rolled-out solution is also unknown (although a target estimate is available).

Much of the value will come from later developments of this applkication when we can make it available for the use of other utilities and services as well as the general public. The acceptability of this and arrangements to deliver are, at this time, unknown.

This project has been approved by a senior member of staff

- [x] Yes