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 2015

Project Reference Number

NIA_SGN0078

Project Registration

Project Title

Utilisation of the Modular NIC Robotics Platform for Service Line Rehabilitation

Project Reference Number

NIA_SGN0078

Project Licensee(s)

SGN

Project Start

June 2015

Project Duration

0 years and 9 months

Nominated Project Contact(s)

Ryan Smith, Innovation Delivery Manager

Project Budget

£66,000.00

Summary

The project partner will:

- Review existing methods/products/technologies that can potentially be deployed from the robotic platform
- Analyse the potential solutions that these methods/products/technologies provide
- Create a matrix to assess how these methods/products/technologies compare to the specifications
- Submit a final report which details the conclusions from the project.

It is anticipated that the following criteria will be included in the consideration of these technologies:

- Minimise service interruption duration or relighting requirements
- Replacement capabilities from ¾" - 2"
- Services operating pressures up to 2bar max, 75mbar can be considered as a fall back
- Ability to seal the tee/connection to the main
- Potential to be incorporated into the NIC Robotics transport platform
- Cost of materials and installation.

Mains sizes 12" to 46"

Nominated Contact Email Address(es)

sgn.innovation@sgn.co.uk

Problem Being Solved

The current process of replacing or rehabilitating a gas service line which connects the gas main to a customer's meter can be highly disruptive. With larger diameter 12" – 48"mains the disruption caused is increased due to the locations of the mains being in inner city or highly populated areas. Service line replacement typically requires the excavation of a trench between the gas mains and meter, as well as shutting off service to the customer. At present, SGN is not aware of any products or technologies that are available to network licensees across Great Britain (GB) that will enable the rehabilitation of service lines from within the main remotely, reducing the amount of disruption caused by the activity.

The potential to replace a corroded service line without the need for costly excavation or disruption of gas flow in the main could lower the cost of asset replacement and decrease disruption to customers and the public. From experience gained by SGN through the use of the Large CISBOT (NIA_SGN0019) robotic repair system, it was noted that roughly 150 services were found over a 600m length of pipe.

SGN is currently working with ULC Robotics in the development of a modular robotic platform which has been designed to carry and operate a number of different payloads into tier 2 and 3 live gas mains through the Network Innovation Competition (NIC). This feasibility study will investigate into the potential opportunity to further develop an additional payload from the NIC Robotic platform to perform the task of rehabilitating a gas service line from within the large diameter gas mains expanding its capabilities.

Method(s)

A global search will be undertaken for technology that will be used with the existing robotic platform for service line replacement. In order to prepare for the search an extensive review of the existing relevant service line specifications and population will be performed. If appropriate, the project partner may travel to GB to perform site visits and to meet with key SGN personnel. A detailed service line rehabilitation specification will be generated which will be used to develop a refined set of search criteria to guide the global search.

Utilising the search criteria and specifications developed collaboratively with SGN, the project partner will perform a global search of commercial off-the-shelf (COTS) products and new technology that may be used directly, modified, or may be combined to provide a solution. The project partner will evaluate products found during the search for viability in order to determine if COTS equipment is currently available which may be used in conjunction with the NIC Robotics Transport Platform.

As part of the project, it is anticipated that investigations of products, services and solutions from around the world will be undertaken, including products from companies such as Radius Systems, Synthotech, and Steve Vick.

Scope

The project partner will:

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Objective(s)

Submission of a feasibility report to include:

- Results from the global search showing a matrix of potential component solutions
- Preliminary analysis of operational, procedural and safety considerations associated with the high potential method (s) selected
- Schedule and budgetary estimates for next steps (as appropriate)

The preliminary module specifications along with the conceptual designs generated.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Once the feasibility study has been completed, the project partner will deliver a detailed report containing:

- An account of the findings of the global search showing a matrix of products/components which have been identified for further evaluation
- Preliminary analysis of operational, procedural and safety considerations associated with the high potential method (s) selected
- Schedule and budgetary estimates for next steps (as appropriate)

The final report will be disseminated to all other network licensees

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The project has been designed as a feasibility study. It was deemed appropriate to limit this project to a relatively small scale study because of the low technology readiness level. SGN have not committed to funding further stages of research and development until feasibility has been established through this project.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

This research project will be a desk-based study.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

The total project expenditure will be £66,000, 90% of which is allowable NIA expenditure (£59,400)

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)

As this project solely focuses on the feasibility study of the technology it is difficult to quantify the potential financial benefits at this stage.

It is envisaged that deployment of this technology would lead to financial benefits in the following areas:

- Avoided Public Reported Escapes, and associated costs; including excavation and reinstatement.
- Risk reduction and risk management demonstration.
- Leakage reduction within the national leakage model.
- Avoided condition replacement.

Additional module will be added to the NIC Robotic project increasing its versatility.

Please provide a calculation of the expected benefits the Solution

N/A This is a research project

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

There are approximately 2,460 km of large diameter (Tier 2 and 3) metallic mains (>12") across SGN's Scotland and Southern license areas. As a result, based on a 4:2:1:1 split the total length of mains across GB that this method could ultimately apply to in future years can be estimated at approximately 9,480km.

It must be noted that these figures are roughly based on averages and a number of unqualified assumptions, and therefore subject to a large sensitivity margin. However these large diameter mains are high cost areas for all Network Licensees and the project has been designed to develop potential robotic solutions to clearly defined industry challenges. Therefore, this confirms how replicable the project is across the industry and how easily the technology could be rolled out.

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

There are no costs associated with sharing the conclusion and recommendations of this study with the other Network Licensees, which will be the first step towards roll out across GB. As stated above, the very early technology readiness level means that it is not possible to estimate the costs of deployment at this stage.

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

All network licensees will be able to use the learning from this project as the outputs will be presented in a clearly defined report that will be available to them. The learning from the project will benefit network licensees as it will provide them with a clear evaluation of the current techniques available to be used with the robotic platform. This will allow network licensees to make informed choices regarding their investment in the solutions found in the report.

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