

NIA Project Registration and PEA Document

Date of Submission

Apr 2015

Project Reference Number

NIA_SPEN0002

Project Registration

Project Title

Virtual World Asset Management

Project Reference Number

NIA_SPEN0002

Project Licensee(s)

SP Energy Networks Distribution

Project Start

April 2015

Project Duration

2 years and 11 months

Nominated Project Contact(s)

SPEN Technology Development Manager Geoff Murphy;
SPEN Senior Project Engineer Nicol Gray; SPEN Senior
Project Engineer Andy Wilcox

Project Budget

£3,500,000.00

Summary

The high level Scope of this project is to deliver the UKs first VWAM system, quantify its accuracy, performance, capabilities and the impact it has on several DNO work programmes, provide evidence and guidance to support the decision to adopt VWAM as Business as Usual (BaU).

To deliver this SPEN has identified several discrete Work Packages to be delivered under the project:

WP 1: VWAM Population

Focused on the provision of network data from SPENs corporate systems and LiDAR captures to create and populate the VWAM system over at least two vegetation growing seasons (at least 2 years).

WP 2: VWAM Evaluation

Focused on the validation of the VWAM information delivered and the quantification of the expected benefits achieved if adopted.

WP 3: System Integration

Focused on the identification and delivery of the optimal integration of a VWAM system into DNO corporate systems to maximise efficiency and benefits delivered.

WP 4: BaU Adoption

Focused on the identification and delivery of the necessary business changes required to adopt VWAM into BaU e.g. policy changes, associated VWAM specifications.

WP 5: Further VWAM Enhancements

Focused on the identification and evaluation of further enhancements in VWAM that can deliver additional DNO / customer benefits.

WP 6: Dissemination

Focused on the dissemination of the project learning to UK customers, DNOs and vendors of remote sensing equipment / asset management systems to stimulate the market.

Nominated Contact Email Address(es)

innovate@spenergynetworks.co.uk

Problem Being Solved

The distribution Over Head Line (OHL) network is manually inspected on a cyclic basis as part of vegetation and Electricity Safety, Quality and Continuity (ESQCR) management policies. Over the years these manual inspections have served the UK Distribution Network Operators (DNOs) well, however inherent to these inspections are a number of issues that it would be advantageous for DNOs to eradicate.

Manual Inspection Issues:

- It goes without saying that Manual Inspections are inherently labour intensive, requiring every km of OHL network to be inspected on foot. As a result they may not provide DNOs with the most financially beneficial and timely solution and the frequency at which they are undertaken is limited.
- Whilst inspectors are fully trained and competent, there is always an underlying risk that the severity of certain asset conditions are missed or misinterpreted as a result of the inspector's position and perspective relative to the OHL. As a result, for certain network issues manual inspections may not be the optimal solution for identifying and quantifying the severity issues such as vegetation intrusions to the OHL.
- With present inspection programmes there is a missed opportunity to gather further information about the OHL assets for the benefit other DNO work programmes, however as it stands this is prohibited due to the additional cost incurred by the lengthier manually capture of information.

In summary, given time the quality of the data recorded from manual inspections is likely to improve marginally, however it is very unlikely their cost will decrease, restricting their frequency and scope.

With recent developments in the affordability of remote sensing, big data processing and cloud based information delivery; there is now a real opportunity for UK DNOs to explore the use of Virtual World Asset Management (VWAM) for the delivery of inspection programmes. The expected benefits of VWAM being faster, more accurate and frequent inspections that provides the most pertinent information provided by manual inspections as well as additional advantageous information.

Method(s)

This project aims to deliver a precise Virtual World representation of a DNO OHL network through the use of remote sensing technologies such as Light Detecting and Ranging (LiDAR) that can be affordably refreshed and utilised in a VWAM system. In doing so reducing DNO requirements to complete cyclic manual inspections. At the same time providing additional and more quantified asset information that can be utilised for desktop scoping, planning, compliance reporting and addressing immediate risks, which in turn will have health and safety, financial and supply quality benefits for customers.

This project builds upon SPEN's previous Innovation Funding Initiative (IFI) 'proof of concept' project that helped to foster understanding into the viability of VWAM. However this project covered a small sample area of OHL network that was not of sufficient size or captured over enough vegetation growing seasons to truly evaluate the performance and benefits delivered from VWAM. With this NIA 'pilot' project SPEN will provide detailed validation and quantification of the potential benefits delivered in several ED1 work programmes through the use of VWAM and provide guidance to DNOs for the its implementation into business as usual. This will be achieved through the following methodology:

1. The creation, population and refresh of a Virtual World representation of the chosen SPEN OHL network using LiDAR surveys in the growing seasons of 2015 and 2016.
2. The collection and analysis of baseline information to allow for a detail comparison between the traditional Vegetation Management and ESQCR programmes and a VWAM based programmes.
3. A thorough evaluation/validation of the data presented in the VWAM system.
4. A detailed financial evaluation of the benefits VWAM likely to introduce when adopted across multiple DNO programmes.
5. The identification and delivery of the optimum integration of VWAM into DNO corporate systems, e.g. Geographic Information Systems (GIS).
6. Identification of further wider business benefits that can be realised through the adoption of VWAM.

Scope

The high level Scope of this project is to deliver the UKs first VWAM system, quantify its accuracy, performance, capabilities and the impact it has on several DNO work programmes, provide evidence and guidance to support the decision to adopt VWAM as Business as Usual (BaU).

To deliver this SPEN has identified several discrete Work Packages to be delivered under the project:

WP 1: VWAM Population

Focused on the provision of network data from SPENs corporate systems and LiDAR captures to create and populate the VWAM system over at least two vegetation growing seasons (at least 2 years).

WP 2: VWAM Evaluation

Focused on the validation of the VWAM information delivered and the quantification of the expected benefits achieved if adopted.

WP 3: System Integration

Focused on the identification and delivery of the optimal integration of a VWAM system into DNO corporate systems to maximise efficiency and benefits delivered.

WP 4: BaU Adoption

Focused on the identification and delivery of the necessary business changes required to adopt VWAM into BaU e.g. policy changes, associated VWAM specifications.

WP 5: Further VWAM Enhancements

Focused on the identification and evaluation of further enhancements in VWAM that can deliver additional DNO / customer benefits.

WP 6: Dissemination

Focused on the dissemination of the project learning to UK customers, DNOs and vendors of remote sensing equipment / asset management systems to stimulate the market.

Objective(s)

Each discrete Work Package has Objectives:

WP 1: VWAM Population

- To produce an accurate VWAM system in 2015 and a refresh in 2016 that is comprehensively linked to existing SPEN OHL assets.

WP 2: VWAM Evaluation

- To quantify the baseline volumes, costs, accuracy of existing programmes in the pilot areas.
- To validate the accuracy of VWAM representation of the OHL network and identified issues e.g. vegetation intrusions.
- To quantify the difference in volumes required, cost, benefits achieved by the adoption of VWAM for several work programmes when compared to existing approach.

WP 3: System Integration

- To map the optimal VWAM integration into SPENs corporate systems.
- Deliver the integrated solution.

WP 4: BaU Adoption

- To deliver the necessary business changes, documentation etc. required to facilitate VWAM adoption as BaU prior to the end of the project.

WP 5: Further VWAM Enhancements

- Identification and exploration with VWAM provider(s) of several further enhancements of VWAM that can deliver additional DNO / customer benefits.

WP 6: Dissemination

- Dissemination of project activities, scope, deliverables to UK DNOs, customers and vendors at several points within the project in order to stimulate the uptake and development of VWAM systems.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Each discrete Work Package has a Success Criteria:

WP 1: VWAM Population

- The delivery of an accurate VWAM system that is directly linked to the unique identifiers of >95% of SPENs OHL assets within the pilot areas.

WP 2: VWAM Evaluation

- Quantified comparisons of the BaU programmes with those based on VWAM. Including quantification of costs, volumes, compliance etc.

WP 3: System Integration

- A fully integrated VWAM system, e.g. integrated into SPEN GIS and SAP corporate systems.
- Production of a mapped VWAM integration for other DNOs to utilise.

WP 4: BaU Adoption

- The production and acceptance of revised work programme policies, the production of specifications required for the procurement of VWAM.

WP 5: Further VWAM Enhancements

- The publication of a detailed 'wish list' of further VWAM enhancements and the likely benefits they will deliver.

WP 6: Dissemination

- The planned uptake of VWAM by UK DNOs and vendors, quantified wherever possible during dissemination activities.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

SPEN has chosen to carry out the trial of VWAM over at least 2 growing seasons (i.e. 2 years) to ensure that the impact on vegetation work programmes can be fully assessed. Each year SPEN will fly geographical areas that are representative of UK OHL networks, with the areas accounting for ~30% of SPENs OHL network (<5% of the UKs OHL network).

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL9 Operations

Geographical Area

The 2015 flight programme encompassed the full network of two operational districts, namely Dumfries in SPD and North Wales in SPM. The 2016 flight programme encompasses sections of several new operational districts in both SPD and SPM.

Revenue Allowed for the RIIO Settlement

Until this project has been completed SPEN will not have full understanding of the potential savings to our ED1 programmes delivered by VWAM.

Indicative Total NIA Project Expenditure

£3,500,000

Project Eligibility Assessment Part 1

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

SPEN have undertaken Cost Benefit Analysis (CBA) utilising the Ofgem ED1 CBA tool and have identified a feasible rollout scenario and benefits achieved from VWAM in ED1 should it prove successful. The CBA identified a potential saving over an 8 year period for SPEN of £11.65M with an NPV of £2.63M.

Please provide a calculation of the expected benefits the Solution

Method Cost

Under the project ~13,000km of OHL network will be inspected as part of vegetation management programmes at least once in a three year period. This will be undertaken using LiDAR data captured from fixed wings flights and the processing of the data utilising VWAM algorithms. The true cost of this activity will be quantified under the project, but it is believed that this can be achieved for <£100/km, therefore the Method Cost = (13,000km x £100) x 1 Flights = £1.3M.

Base Cost

The BaU approach would be to do this inspection manually, with an assumed inspection cost of £30/km this equates to £0.39M.

Base Cost – Method Cost

£0.39M - £1.3M = -£0.91M

Whilst this figure is negative, SPEN expect to identify and quantify additional benefits from VWAM beyond replacing the manual inspection for vegetation management programmes.

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

As all UK license operators have an extensive tree and defect management programmes. Potential savings generated through this project will potentially have similar results.

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

Based on £100/km for VWAM, the UK cost would be 300,000km x £100 = £30M per data capture.

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 UK DNOs have a large volume of OHL network (>300,000km in the UK) therefore the learning will be very applicable to all licence areas in the UK. The work programmes SPEN is looking to unlock benefits in from the use of VWAM are common to all UK DNOs, so any benefits identified should be transferable.

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