![SP Energy Networks logo]

NIA Project Registration and PEA Document

Date of Submission

Dec 2024

Project Reference Number

NIA_SPEN_0099

Project Registration

Project Title

X-FacTOR Stage 2

Project Reference Number

NIA_SPEN_0099

Project Licensee(s)

SP Energy Networks Distribution

Project Start

January 2025

Project Duration

1 year and 3 months

Nominated Project Contact(s)

Lara Cardoso

Project Budget

£450,000.00

Summary

The X-FacTOR project's aim is to digitalise training content via virtual reality, improving the quality and effectiveness of training for their operational field staff. Phase 1 of the X-FacTOR project identified two proofs of concept to deliver on two use cases identified during collaborative workshops between SPEN and DC. We will deliver, in collaboration with a leading UK immersive technology provider, two proofs of concept highlighted that present greatest value to new starts:

- OHL Inspection – Vegetation Management
- Damage Assessor Training.

The project will also deliver a road map for integrating generative AI as a methodology for quickly developing training modules.

Preceding Projects

NIA_SPEN_0085 - XR Facilitating Training and Operations (X-FacTOR)

Third Party Collaborators

Digital Catapult

Nominated Contact Email Address(es)

innovate@spenergynetworks.co.uk

Problem Being Solved

As the UK increases its electricity capacity towards net zero power, SPEN will need to increase the rate of recruitment and training of skilled engineers to manage and maintain the network. Through this phase of increased growth, it is important that SPEN is able to train their staff as effectively and efficiently as possible, ensuring that staff are trained to work efficiently, independently and most importantly safely.

To achieve that objective, the energy industry must not only create new technology, but also utilise the current technology in new, innovative ways, to support roll out of new infrastructure, such as smart grid elements, in an effective manner.

Method(s)

X-FacTOR will leverage Extended Reality (XR) Technology by applying it within the network distribution

industry, on the design and delivery of an immersive training program for and with expertise of the network field workers, with the objective of making the knowledge transfer a safer, more effective, and more efficien process, which will be translated in a more robust and resilient grid operation, making it more reliable for energy customers.

This project will focus on the development of training content for two use cases that have been identified by SPEN training staff as being incredibly impactful for new engineers and those looking to upskill:

1. Overhead line inspection - Vegetation Management
2. Damage Assessor Training

The training solution will be conceptualised using a user-centred design thinking process. This is to ensure the chosen scope and focus reflect the needs of the end users, who include the SPEN training staff, guaranteeing that skills crucial to the network resilience are addressed properly, translating into faster maintenance of the grid. The approach also acknowledges the tacit knowledge of experienced staff (e.g., cohorts near to retirement) and aims to use the technology to capture their knowledge for future use.

Scope

Following detailed scoping, the project will develop two virtual training experiences (up to 15 mins each) and validate these with user groups within SPEN. In addition to the creation of digital training content, this project will work to embed the training materials into the syllabus as well as utilise the information that is obtained through new technology adoption to support ongoing development of SPEN staff. Each trainee will have an individual account to track their progress and identify room for improvement during their training sessions, either in a VR headset or through a computer monitor.

In addition to collecting the data to support decision making and ongoing development of engineers, we will ensure that we encourage and enable responsible use of data within the training environment. This project will also explore using Generative AI to create future VR training modules without the need for the time and resources usually involved in the development of the creative environments needed for the training modules. It is expected that at the end of this project, these immersive training experiences can be utilised as part of BAU and the modular nature of the VR development process means that SPEN will be able to independently add additional training use cases and experiences.

Digital Catapult will deliver:

- A detailed technical assessment of the use cases in collaboration with the SPEN training teams and the technology provider
- Content development to deliver training programmes on the two use cases: the Overhead Lines Inspection and Damage Assessor training.
- Deliver of the training content in conjunction a full evaluation of the XR syllabus in collaboration with the SPEN team and creations of a lessons learnt report after each of the use case deliveries
- A road map for using Generative AI for the development of training modules.

Work Packages:

Work Package 1

- Key Activities: Workshops focussed on development of technical specifications and how VR training content is delivered and embedded into the existing training methods, facilities, and the organisation at large is a change management process in itself.
- Outcome: Solutions can be built to the requirements and deliver against KPIs determined.

Work Package 2

- Key Activities: Two Immersive PoC experiences, delivered for use in WP3, VR headsets for SPEN, preloaded with content. The two PoCs will contain content specifically created for SPEN.
- Outcome: VR Content is ready to be tested with SPEN staff

Work Package 3

- Key Activities: Facilitate end-user testing in collaboration with the supplier.
- Outcome: Deployment of the PoC and extensive user testing in collaboration with SPEN to ensure that the use case definition has been met with the PoC delivered.

Work Package 4

- Key Activities: An evaluation report including trainer and trainee satisfaction to the tech requirements. An evaluation questionnaire and interviews with the trainers and users to establish how successful the PoCs were and identify any changes needed. Includes a feasibility assessment on the use of Gen AI to develop future training modules. Lessons learned will be incorporated into PoC development. Rigorous evaluation of the PoC to de-risk further investment and gather learnings of future implementations of VR.

Work Package 5 (throughout project)

- Key Activities and outcome: engage the key training staff members into the co-design of the training concept from early on. This, hand in hand with participation into testing the content during development, builds ownership to the content, so that it is easier to adopt into the training curriculum.

Objective(s)

- To demonstrate the viability of XR training for the two use cases discussed
- To test the XR training environment with trainees and validate the new curriculum

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

This project has been assessed as having a neutral impact on customers in vulnerable situations.

Success Criteria

Successful PoC's developed and tested with trainee engineers working with overhead lines and at height.

Project Partners and External Funding

Digital Catapult

Potential for New Learning

This project will develop and demonstrate new use cases for the application of existing Extended Reality (XR) Technology by applying it within the network distribution industry, on the design of an immersive training program for and with expertise of the network field workers.

In addition the project will allow training staff to understand how these solutions can be embedded into BAU practices and engage trainees in working with overhead lines.

Scale of Project

The solution will be developed and modelled on UK energy systems and a successful outcome can be scaled across within SPEN (through the addition of new training modules) as well as to any UK energy network operator.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL6 Large Scale

Geographical Area

N/A

Revenue Allowed for the RIIO Settlement

0

Indicative Total NIA Project Expenditure

450000

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:

The industry is experiencing the loss of expert staff through retirement and attrition due to increased demand of those skills. Technology has advanced exponentially, creating an increased necessity of adding of high-tech, dynamic equipment and systems to our grid, improving the journey towards Net Zero. To achieve that, the energy industry must create new and utilise the current technology in innovative ways, supporting effective asset delivery and management.

This project will allow new field staff to be trained faster (other industries that have adopted XR training have seen improvements in training time of up to 60%) as well as a reduction in accidents, significant risk mitigation and the ability to retrain without having to attend in person sessions.

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)

N/A

Please provide a calculation of the expected benefits the Solution

Considering a person taking 2 technical courses per year with X-FacTOR as opposed to the current scheme, there would be the possibility of reducing those training costs in 30% per year.

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

The method should be replicable across GB.

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

Roll out costs will be quantified throughout 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 learning generated can be utilised by relevant Network Licensees by funding and implementing XR into their own operational onboarding processes, since all research is being made in line with UK requirements.

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.

Previous market research shows that X-FacTOR will be the first of its kind in GB, and with this project, utility sector experienced staff will be able to maximise knowledge transfer through the design, implementation, and maintenance phases of projects on the network.

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 is an innovation proposal. The outcomes of this project will not be deployed to BaU directly and will require a follow up project for that. This project will allow SPEN the possibility of training with "impossible scenarios", otherwise not replicable in site, via VR training. The use of Generative AI for developing training material has not been investigated to date within the energy sector and this will be a first of its kind project.

Relevant Foreground IPR

The project will leverage existing, background IP (code, assets) as part of the production of the two immersive PoCs (which will be

relevant foreground). The project partners will also collaborate to design the final content for each use case and will tailor the content to SPEN's needs.

Data Access Details

Access to this data must be requested by contacting innovation@spenergynetworks.co.uk Please provide the following information in your request:

- Affiliation, position and contact details of requesting party
- Relevant project and type of data required
- Reasons for requesting this data and evidence that this data will be used in the interest of the UK network electricity customers
- How data will be shared internally and externally by the requesting party Any data request deemed unsuitable for sharing will be highlighted to the appropriate requesting party.

After receiving the request we will provide the estimated date for completing the data provision based on other requests and our team workload at that time. All requested data remains the property of SP Energy Networks.

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

There is no allowance within the SP Distribution RIIO-2 business as usual funding that is appropriate to fund this innovation 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 project has both technical and commercial risks, such as the availability of data from key stakeholders, and the non-existence of appropriate business models to address the specific needs in this project.

This project has been approved by a senior member of staff

☑ Yes