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Bringing energy to your door

NIA-ENWL018

Project Avatar Closedown report

A Network Innovation Allowance Project

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GLOSSARY

AI	Artificial Intelligence
CEP	Customer Engagement Plan
DNO	Distribution Network Operator
DPS	Data Protection Statement
ECP	Engaged Customer Panel
IOT	Internet of Things
MVP	Minimum Viable Product
NIA	Network Innovation Allowance
NMS	Network Management System
PSR	Priority Service Register
SE	Schneider Electric
SME	Small to Medium Enterprise
UAT	User Acceptance Testing

1 EXECUTIVE SUMMARY

1.1 Aims

The customer service landscape is changing. Wide spectrums of political, social, demographic and technological factors are accelerating a shift in customers' needs and expectations, with some sectors adopting more radical customer service solutions to match to their customer base. An understanding of functional and emotional service needs, by specific customer group, will be key in informing DNO policies and investment plans for RIIO-ED2 and beyond. This project developed that understanding alongside facilitating a comprehensive understanding of the future of customer service.

1.2 Methodology

The method encompassed six key phases of customer and stakeholder engagement culminating in a trial of a "virtual worker" to manage the Priority Service Register (PSR):

1. *Phase one - current trends:* a literature / desktop review to gain contextual understanding regarding the future of customer service from a range of different industry sectors.
2. *Phase two - expert thinking:* involved workshops and consultation with Electricity North West subject matter experts and a range of specialist organisations to understand potential new and future innovations in customer services.
3. *Phase three - exploratory research with customers:* qualitative research was conducted in the form of Engaged Customer Panels (ECPs) with a range of customers. Supplementary depth interviews were also conducted with representatives of specific customer sectors such as vulnerable customers.
4. *Phase four - pilot survey:* a draft quantitative questionnaire was piloted with the ECP and revised as necessary before being rolled out more widely in phase five.
5. *Phase five - quantifying customer needs:* a large scale statistically robust quantitative survey was conducted amongst Electricity North West customers to quantify customer service requirements. Analysis of the results identified how needs and expectations vary across different customer segments to inform the development of a blueprint for future customer service provision.
6. *Phase six - meeting customer needs:* Insight generated from phases one to five will be used to develop and test prototypes for future customer service provision.

1.2.1 Virtual worker trial

An intelligent automation platform was scoped and trialled to enable cleansing of the data contained in the PSR to support the welfare process.

1.3 Outcomes

1.3.1 Current trends and expert thinking

A series of workshops, facilitated by Schneider Electric (SE) and their subcontractors, DXC, were held and from these workshops three prototypes were developed: a smart home hub, a chatbot and a control centre hub. These prototypes were then tested with customers.

1.3.2 Exploratory research with customers

Impact Research recruited 40 customers spread across different demographics to attend three ECPs. The first session introduced Electricity North West; the second sought opinions about the changing face of customer service specifically, opinions on what constitutes good and poor customer service whilst the third session introduced the prototypes.

Prototype 1 – Smart home hub: this had general appeal and most participants liked the idea of being able to easily access data about how much energy they were using and how this had changed over time. Customers generally felt that data collected by the smart hub should only be shared with their DNO with their explicit consent.

Prototype 2 – Chatbot: this concept, based on Artificial Intelligence (AI) was also favourably received. The panel recognised the value of AI to both DNOs and their customers when tailored to the personal needs of the individual and understood the benefits to vulnerable customers.

Prototype 3 – Control centre hub: this was presented and understood by participants as representing the potential capabilities of the 'next generation' version of network management systems.

The prototypes developed during the project, specifically AI, were positively received during the focus groups which suggests that AI would be acceptable to customers. Based on this Avatar was extended to facilitate a limited trial of an AI platform within the existing welfare process. This provided an opportunity to assess the business and customer benefits and potential challenges arising from such a platform.

1.3.3 Virtual worker trial

Following an open procurement exercise Codebase8 were appointed to develop and integrate an intelligent automation platform to cleanse the data held on the PSR to support the welfare process. After extensive User Acceptance Testing (UAT) we were unable to successfully pass the required performance and exception levels. It was agreed at this point to stop the development and not to proceed to a full live integration as it presented too much risk.

1.4 Key learning

1.4.1 Current trends and expert thinking

This phase of research represented the first time that Electricity North West had conducted employee workshops for an innovation project. This proved to be extremely effective and the learning gained highlighted common themes which helped inform the development and refinement of ideas and shaped the conceptual solutions that were taken forward.

1.4.2 Exploratory research with customers

Bringing forward the prototype development and introducing these to customers at the panel sessions instigated more meaningful discussions rather than just asking customers to come up with ideas.

1.4.3 Virtual worker trial

With regards to the virtual workers some automated worker solutions are more suited to our on-premise architecture than others and the levels of security required for sensitive data in a regulated arena proved to be a significant constraint. This only came to light during the testing phase when we insisted on the same level of security as any other third party accessing our applications.

Whilst we were advised that the speed of the virtual workers would be slow, the magnitude was not clear. During UAT we observed that the virtual workers would not be fast enough to meet our requirements. However, we would however consider using virtual workers in future when our applications are more cloud based and we would choose a product more suited to our requirements with the required robust security.

1.4.4 Challenges arising from different methodological approaches

SE was appointed an Avatar project partner and SE appointed DXC Technologies as a subcontracted project supporter because of their expertise in digital transformation.

Our project team was aware that DXC favoured an iterative, agile approach and based on its specialism in this field, believed this would deliver the best outcome. However, the extent and flexibility of the internal resource required to accommodate this agile methodology was not apparent to us. We had to manage both DXC expectations and our internal resource to achieve the optimum output and accommodate the agile approach. This resulted in a divergence from DXC's proposed methodology but ensured sufficient time was incorporated into the programme to provide an internal resource, at key stages of prototype development.

This project highlighted the benefit of entering a bilateral agreement with the organisation ultimately responsible for the delivery of goods or services, because of the challenges that can arise from a subcontracted arrangement. Future technology-based innovation projects should

consider the responsibilities of all parties and ensure these are fully defined prior to entering the contractual arrangement.

We also noted that the procurement process for services designed to integrate with existing secure systems, which hold extensive personal and sensitive customer data can be protracted and introduce time constraints in delivery.

1.5 Conclusions

This research project produced valuable learning on current and future customer service needs and how unmet needs might be addressed. It provided an appreciation of the variations in acceptability and applicability of innovative technologies and solutions across key customer segments and groups.

1.6 Closedown reporting

This project was compliant with Network Innovation Allowance (NIA) governance and this report has been structured in accordance with those requirements.

A version of this report is available via the Energy Networks Association's Smarter Networks learning portal at www.smarternetworks.org.

This fuller version of the report provides additional information that is useful in understanding the project.

2 PROJECT FUNDAMENTALS

Title	Project Avatar
Project reference	NIA-ENWL018
Funding licensee(s)	Electricity North West
Project start date	October 2016
Project duration	5 years 2 months
Nominated project contact(s)	Lucy Eyquem (lucy.eyqiem@enwl.co.uk)

3 PROJECT BACKGROUND

The customer service landscape is changing. Wide spectrums of political, social, demographic and technological factors are accelerating a shift in customers' needs and expectations, with some sectors adopting more radical customer service solutions to match to their customer base. Customers today are better informed and more empowered than ever before. DNO's need to understand and predict customers current and future needs to ensure they maintain and improve upon the level of service provided. Continuous investment is required in the right technologies and techniques that best meet the needs of different customers. An understanding of functional and emotional service needs, by specific customer group, will be key in informing DNO policies and investment plans for RIIO-ED2 and beyond.

To facilitate a comprehensive understanding of the future of customer service, the method will encompass six key phases of customer and stakeholder engagement:

Phase one: current trends

A literature / desktop review to gain contextual understanding regarding the future of customer service from a range of different industry sectors. This will consider existing data and literature on future needs and possible customer service concepts and / or known solutions from the UK and other international sources. Learning will be transferred from initiatives that have already and are expected to radically change customer service, such as online self-serve (financial sector) and 'on demand' services (transport, travel and tourism) and remote interactive services.

Phase one will culminate in the publication of the proposed project methodology statement which will be peer reviewed. The methodology will be refined as a result of consultation with key experts in phase two.

Phase two: expert thinking

This phase of research will involve workshops and consultation with a range of specialist organisations to understand in detail potential new and future innovations in customer services, building upon the knowledge developed in phase one.

Discussion with leading manufacturers of innovative technologies and relevant trade associations will identify developments that could if required be in production during RIIO-ED2 and beyond. The emphasis will be on technical innovations that hybridize commercial considerations with customers' service expectations, applicability and acceptability.

We will also consult with organisations, identified in the desk research, that are embracing new techniques, along with experts in the field of customer service e.g. Institute of Customer Service, to understand longer term strategies and visions of future service. Finally,

engagement with Electricity North West (ENWL) customer service staff, closest to the current issues and needs of the customer, will advise the project 'from the bottom up'.

Expert thinking in phase two will assist in evaluating the proposed approach and refining the research questions that will be explored with customers in subsequent stages.

Phase three: exploratory research with customers

Qualitative research will be conducted in the form of an ECP; a series of focus groups with a range of customers from target segments, including, but not limited to, domestic, commercial, urban, rural, and the young (18 – 24 years). Supplementary depth interviews will also be conducted with representatives of specific customer sectors such as vulnerable customers.

This phase will explore customer needs, both current and future, and reactions to specific customer service concepts identified and techniques evaluated in phase two. This will take place in partnership with experts in the field of customer service and technical innovation.

Initial discussions will evaluate short, medium and long-term macro customer service requirements. Subsequent discussion will focus on micro needs, with an exploration of future customer service expectations by DNO touch point (including but not limited to supply interruptions, connections and general enquiries). Reactions to potential new service and techniques, designed to improve standards and efficiency, and make customers lives easier or more enriched, will be assessed.

Phase four: pilot survey

A draft quantitative questionnaire will be piloted with the ECP. The instrument will be revised as necessary, based on ECP feedback, before being piloted with previously unengaged domestic and commercial customers. The survey will also be peer reviewed before it is finalised and rolled out more widely in phase five.

Phase five: quantifying customer needs

A large scale statistically robust quantitative survey amongst Electricity North West customers will quantify customer service requirements. The survey will be designed to test how existing customer service needs and expectations vary by customer segment and / or touch-point and how they may evolve in the future. The survey will also quantify which needs and expectations are most important in driving current measures of customer satisfaction and therefore warrant investment.

The survey will include psychographic, demographic, geographic, and behavioural related questions. Analysis will identify how needs and expectations vary across different customer segments to inform the development of a blueprint for future customer service provision.

Phase six: meeting customer needs

Engagement with Electricity North West customers to test solutions using delivery technologies identified in project that will inform a blueprint for customer delivery to address future customer service needs. Insight generated from phases one to five will be utilised to develop the design concepts for testing in phase six. The quantitative survey will be piloted before it is rolled out more widely.

This research will identify how Electricity North West can satisfy / best serve currently unmet needs and tailor their services according to the bespoke future expectations of specific customer segments. Medium and long-term customer service concepts will be evaluated to establish the acceptance of a range of technologies and approaches to meet the future needs of Electricity North West's customers. Any variation in appeal and acceptability by key customer segment will also be assessed.

The survey will also identify the likely level of support and behaviour change required by DNOs to facilitate implementation.

4 PROJECT SCOPE

Engagement with Electricity North West customers, GB suppliers with learning applicable to all licensed operators.

Experts: consultation with a range of specialist service organisations and manufacturers of innovative technologies and relevant trade associations.

Customer engagement: research across the full range of Electricity North West customers: domestic and commercial customers with specific quotas on sub-segments including but not limited to urban, rural, the young (18 – 24 years) and customers who have made previous contact with their DNO.

Staff engagement: frontline Electricity North West customer service staff

5 OBJECTIVES

Delivering customer interactions in a technologically advanced seamless system manner will only impact on the costs and quality of a system operators operations if the customer responds positively to that interaction.

- To broaden the level of understanding concerning customer service needs and future expectations.
- To have a robust measure of anticipated future attitudes, behaviours and needs by customer segment.
- To integrate customer research with existing service provisions and innovative solutions to optimise a customer service approach, enabling a strategy for DNOs to meet the future needs and expectations of its customer base.
- To facilitate the creation of bespoke customer service solutions targeted at specific customer groups to meet their unique medium and long-term future needs.
- A blueprint for implementing bespoke customer service solutions incorporating a link to network control systems and data.

6 SUCCESS CRITERIA

The project success criteria are:

An understanding of current and future customer service needs and how unmet needs might be addressed.

Identification of a range of innovative solutions that best meet customers increased servicing expectations.

Reactions to mass customer contact capabilities and identification of the optimal strategy in terms of automation and interactivity.

An appreciation of the variations in acceptability and applicability of innovative technologies and solutions across key customer segments and groups.

A customer service blueprint, which incorporates data from existing network control systems, to best meet existing and future needs of specific customer groups and leverage higher levels of customer satisfaction.

A demonstration of how innovative technologies and solutions can assist DNOs to better plan their customer investment strategy.

7 PERFORMANCE COMPARED TO THE ORIGINAL PROJECT AIMS, OBJECTIVES AND SUCCESS CRITERIA

7.1 Phase 1: current trends and expert thinking

A comprehensive desktop / literature review was completed to gain contextual understanding of the trajectory of the future of customer service from a range of different industry sectors. Discussions were held with SE and DXC Technology (formerly Hewlett Packard Enterprise) to understand potential new and future innovations in customer services.

A methodology statement, which outlines the proposed project approach was developed and published. A copy of the Avatar project methodology was submitted to Ariel Bergmann, lecturer of energy economics at the University of Dundee for a peer review.

A series of workshops, facilitated by SE and DXC, were held with Electricity North West employees closest to the current issues and needs of customers, to advise the project from 'bottom up'. The workshops comprised four distinct groups representing relevant customer touchpoints and were designed to reflect an appropriate balance of age, seniority, expertise and experience from across the business. The groups were:

- Customer contact centre senior and team managers
- Operational / field-based managers and engineers
- Connections services colleagues – middle and senior management
- Millennials – keen and enthusiastic younger colleagues from across the business

The workshops successfully helped us to broaden our understanding of current and likely future customer needs and how unmet needs and expectations might be addressed.

A co-creation (Envision) workshop was held with SE and DXC to disseminate the findings from the employee workshops and also develop common themes into conceptual solutions. It was also an opportunity to showcase new techniques which combined commercial considerations with customers' service expectations, applicability and acceptability. The workshop helped us to identify bespoke innovative solutions which best meet customers' increasing service expectations.

7.1.1 Development of prototypes

DXC took the outputs of the workshops to inform the design of three prototypes which, could be used collectively to demonstrate the DNO's future customer service capability, from a customer's perspective.

DXC used a process called minimum viable product (MVP) which provides a scientific approach to developing new products and services and ensures inclusion of only those features that customers value. MVP is centred on understanding likely customer uptake and the features that a customer will value and is focused on embedding learning. MVP aims to provide the minimum product or service features that can be validated by real customers using that product and it will test the fundamental business proposition as well as product features, design and technical questions.

Using the MVP process DXC constructed three prototypes, which allowed customers to experience the conceptual network of 2027. Each prototype represents the same parties but from different viewpoints.

The prototypes provided basic visual, interactive tools for customers to gauge reaction to the vision of customer servicing for DNOs in 2027. The prototypes were designed to provide an aid for customers, initially convened in an ECP, in visualising their interaction with network operators in the future.

Prototype 1 provided a means to visually demonstrate (to customers) how they are consuming electricity and showed the monetary value of electricity used by specific appliances and areas of the home in real time. It also showed when and what capacity is available in terms of generation and storage. This allowed customers to visualise how they might self-manage their

own electricity in the future and sets a picture where independence from the grid can be achieved with relatively low cost or impact to the householders.

This prototype allowed the project team to investigate perceptions around whether the extensive adoption of smart home technologies is regarded as credible (via distinct customer segment) and explore customers' views about whether the changing demand and generation of customers, as envisioned, will materialise to facilitate more manageable energy networks.

Prototype 1 also introduced the concept of data sharing with the DNO, allowing the project team to test customers' acceptability to sharing data (such as energy consumption) with the DNO to inform better management of the distribution network.

Prototype 2 was designed to act as an intermediary communication platform between customers and DNOs. It demonstrated the potential for automated responses to customer enquiries managed via service desk knowledge repositories and learning machine technologies. The prototype provided the communication channel through which either party can relay a predefined narrative for reacting to certain events. For example, from a DNO's perspective: 'When there is an unplanned outage the communication channel does this…' or from the customer's perspective: 'When my local generation fails please revert to grid reliance'.

Given that the technologies involved will be digital and managed by operating systems, the prototype demonstrated how AI could be used to control the response to a given event, to ensure consistent performance. The prototype also provided a catalyst to discuss how AI will continually refine automated response, to continuously improve customer ease and satisfaction.

Prototype 2 demonstrated how the fully automated service desk will capitalise on the level of customer profiling, facilitated by engaging with device services and home system insights supplied by prototype 1.

Prototype 3 demonstrated a platform that the DNO might use to visualise event-driven network communications. It showed how such a system would be capable of integrating multiple data sources to facilitate real-time event mapping, through on-boarding 'edge of the network devices', which have the potential to extend the traditional grid boundaries. The prototype was designed to help customers see geo-visual data representations of system events.

It provided a vision for centralised communication and control for network management. It exhibited the in-depth data analysis that will be possible as smart devices begin to share their data profile to the energy network. It also provided a tool which helped to demonstrate how DNOs could capitalise on the level of data now being supplied for analysis, pattern and fault detection.

This prototype leveraged the data generated from prototypes 1 and 2 and it was explained to customers that this would provide every Electricity North West employee with real time visibility of all network events (or access to authorised levels of information).

7.2 Phase 2: exploratory research with customers

Phase 2 of the research comprised focus groups and depth interviews with a cross-section of customers to explore current and future customer servicing needs and reactions to specific customer service concepts and techniques. In accordance with sections 4.6 to 4.10 of the NIA Governance a customer engagement plan (CEP) and data privacy statement (DPS) were submitted to Ofgem for approval before we started any engagement with relevant customers.

Impact Research recruited 40 customers spread across different demographics: urban, rural, SMEs and millennials. This gave a cross-section of customers who are likely to interface with Electricity North West. The selection criteria ensured that the research was represented by different age groups to understand whether there are generational differences in attitudes to data sharing and use of new innovative solutions to help their customer experience.

Four groups of customers were asked to attend three panel sessions over a six-week period with each session lasting 90 minutes. The sessions were run by an independent professional moderator who asked participants semi-structured questions relating to a predefined list of topics. This customer engagement approach follows the successful use of similar techniques by Electricity North West in previous innovation projects.

During these meetings, information was shared and evaluated by the participants who were encouraged to provide feedback and share their unique experience in relation to the discussion topics. This format allowed the moderator the flexibility to question participants further on issues arising through open discussion.

The first session introduced Electricity North West and its role in the electricity supply chain. The role of the DNO was explained in a simple manner through a mixture of audio and visual methods that had been effective in previous projects (FAQs, showcards and video). It was apparent from this session that the relationship between the DNO and electricity suppliers remains confusing for the majority of customers. It is only when the distinct roles and responsibilities are explained and understood that it was possible for customers to contextualise the aims and objectives of the project. This first iterative stage of education provided an appreciation of how a DNO's role will change in a low carbon future and, as a consequence, how this will impact customer servicing requirements.

The second session focused on embedding an understanding of the evolving role of a DNO and sought opinions about the changing face of customer service across all business sectors and, specifically, opinions on what constitutes good and poor customer service. This session introduced examples of emerging technologies; introduced the idea of the 'smart home'; and presented scenarios around which to gauge opinions concerning data sharing. This meeting was successful in providing the foundations for introducing the prototypes in meeting three.

The third meeting built on the education delivered in the previous two sessions to introduce the prototypes developed by DXC. Prototypes 1 and 2 were interactive and accessible via iPads; consequently, the panel had the opportunity of working through scenarios designed to demonstrate the functionality. Prototype 3 was intended to demonstrate how the DNO can use data collected from prototypes 1 and 2 to visualise events occurring on the network, interact with other operating systems and use this information to generate customer communications. To assist customers in differentiating systems intended to be used or seen by them from those that would be visible only to the DNO, prototype 3 was demonstrated by the moderator on a large screen. This demonstration was also supported by a suitable narrative and a video which helped to convey how the technology could enhance existing network management systems.

The demonstration of each prototype was supported by suitable narrative, contextualising the circumstances in which they would be deployed and how they would interface with each other to provide a seamless fully autonomous platform to deliver exceptional levels of customer service. The ECP's reaction was noted and the panel was asked to provide their overall opinions, specifically if the prototypes were regarded as acceptable, relevant and credible. The session elicited important learning about perceptions relating to the general trajectory of customer servicing associated with AI and opinions around data sharing and where this is acceptable to facilitate autonomous customer servicing capabilities.

The panel attendees were well engaged and provided constructive comment and opinion which has enabled Electricity North West to start to form views on what customer service may look like in the future.

Prototype 1 - smart home hub: this had general appeal and whilst currently outside a DNOs licence conditions, was seen as an extension of how smart meters might potentially evolve to interact with smart technology platforms such as Hive. Most participants liked the idea of being able to easily access data about how much energy they were using, down to device level, and how this had changed over time.

In common with current considerations around smart meters, customers generally felt that data collected by the smart hub should only be shared with their DNO with their explicit consent, that data should preferably be transferred at an aggregate level and there should be clear understanding about what the data would be used for.

Prototype 2 – chatbot: this concept, based on AI was also favourably received. Whilst most customers initially expressed a preference to speak to a person they realised its potential in certain circumstances, for example, allowing mass communication to large numbers of customers simultaneously ie updates during supply interruption. This was recognised as being a significant advancement for effective communication during large scale events and an

advantage over traditional telephone messaging systems. The panel recognised the value of AI to both DNOs and their customers when tailored to the personal needs of the individual and understood the benefits to vulnerable customers. Furthermore, millennials who tend to be more accustomed to technologies such as web-chat, reported that they are now more comfortable communicating in this manner than speaking to a person.

Business customers expressed concerns about the ability of AI platforms to provide an adequate response, with the level of detail required to address complex queries but recognised that AI is continuously evolving and that organisations, across all sectors, are investing heavily to extend its capacity to handle complex issues.

Prototype 3 – control centre hub: this was presented and understood by participants as representing the potential capabilities of the 'next generation' version of network management systems. The platform demonstrated how this would integrate real-time technical and customer data to improve customer servicing offerings, which would allow DNOs' customers to access real time data from prototypes 1 and 2.

The prototypes developed during the project were positively received during the focus groups. This learning suggests that AI would be acceptable to customers and there is a compelling business case and direct customer benefits from implementing a scalable digital labour force.

Based on this Avatar was extended to facilitate a limited trial of an AI platform within the existing welfare process. This provided an opportunity to assess the business and customer benefits and potential challenges arising from such a platform.

The key findings arising from the testing of the prototype with customers were published in the ECP final report.

7.3 Virtual worker trial

As part of customer vulnerability commitments, DNOs must maintain the accuracy of the PSR, which is used to identify customers' requiring additional support during an outage. This dictates regular contact with customers registered on the PSR database. Increased communication and focussed awareness campaigns have seen a significant acceleration in the amount of priority service registrations and the Electricity North West register currently contains over 844,000 records. The register requires enormous human effort to manage, and it is recognised that emerging technologies could provide a more efficient method to maintain the accuracy of our records.

We recognise that any new technology capable of improving the management of the welfare process is not solely focussed on solving the issues we face today but provides a future-proofed platform to sustain operational growth, without introducing concerns on operational impact. This trial was expected to highlight existing and future opportunities for extending a virtual workforce to automate other business processes to improve the efficiency of our workforce and ultimately enhance the services we are able to offer to our customers.

Following an open procurement exercise Codebase8 were appointed to integrate an intelligent automation platform to cleanse the data on the PSR to support the welfare process. The platform was based on the 'Thoughtonomy' product, and looked to integrate two virtual workers to automate the data cleansing operation and run the ongoing process.

During UAT, the virtual worker was tested to ensure that data was being cleansed as expected. We also reviewed the performance of the virtual workers and assessed the potential outputs and likely support resource needed to manage any exceptions raised by the virtual worker when running in a live environment. This phase took longer than expected and the virtual workers were much slower to process records than envisaged.

More testing, fixes and performance refinement were needed before the virtual workers could be moved to the live environment to ensure that the defined business rules worked as expected and no data was incorrectly deleted.

Following further rounds of UAT the virtual worker continued to be unsuccessful and we were unable to successfully pass the required performance and exception levels. It was then agreed to stop further development and not to move to live operation as it presented too much risk

and required more intervention than expected. Therefore, this element of the project was abandoned.

8 THE OUTCOME OF THE PROJECT

8.1 Phase 1: current trends and expert thinking

During this phase of the research DXC produced prototype solutions which illustrated the existing capabilities of current technologies and how they could be adopted and developed by DNOs to significantly enhance their customer servicing capabilities in the future.

The employee engagement workshops carried out in this phase provided information to allow DXC to produce a series of “user stories”, a set of user-centric requirements identifying:

- the persona that will benefit from the requirement
- the action created or generated by the requirement
- the value provided by the implementation of this requirement

Analysis of the user stories identified consistent themes and overlaps, which allowed DXC to group the requirements and ideals into nine broad, ‘high-level’ user stories described as ‘epics:

1. As a vulnerable customer, I want to receive extra support during an outage.
2. As a customer, I want to use backup power storage.
3. As an Electricity North West employee, I want to enhance business operations.
4. As a customer, I want my smart meter to offer services and integrate with other smart devices.
5. As an Electricity North West employee, I want an integrated system of partners.
6. As a customer, I want to interact with my DNO via an omnichannel experience.
7. As an Electricity North West employee, I want to make data-driven decisions.
8. As a customer, I want to receive Communication updates from my DNO consistently.
9. As a customer, I want to interact and receive services from my DNO.

From these, DXC constructed three prototypes, which allowed customers to experience the conceptual network of 2027. Each prototype represented the same parties but from different viewpoints.

- Prototype 1 established the customer domain and provided an understanding from this perspective.
- Prototype 2 acted as an intermediary communication platform between customers and DNOs. It demonstrated the potential for automated, robotic responses to customer enquiries managed via service desk knowledge repositories and learning machine technologies.
- Prototype 3 provided a view towards the evolution of network visualisation and real-time event/network management.

8.1.1 Prototype 1 – smart energy hub

To construct a view of the customer service demands for 2027, a realistic model of the domestic energy system must be created to understand the activities that the energy network will be supporting. The analysis of current consumption patterns shows a close relationship between the daily work/life-cycle for consumers. Peak demand times coincide with the standard patterns of life, morning time demands for heat, food preparation and showering, the mid-morning to late afternoon reduction in demand, and then the peak demand of evening time activities.

Prototype 1 modelled different house types; each house type is constructed from zones which mirrored the primary activity being conducted in that zone. Associated appliances supporting those activities provided the bottom level view of consumption metrics.

Prototype 1 visually demonstrated to customers how they consume electricity including the monetary value of electricity used by specific appliances and areas of the home, in real time, see Figure 8.1. It also showed when and how much is available in terms of generation and storage. This could allow customers to self-manage their electricity and sets a picture where independence from the grid can be achieved with relatively low cost or impact to the householders.

The objective of Prototype 1 was to provide a basic visual, interactive tool for customers to gauge reaction to this vision for 2027. This prototype allowed us to investigate perceptions around whether the extensive adoption of smart home technologies is regarded as credible and explore customers' views about whether the changing demand and generation will materialise to facilitate more manageable energy networks.

Prototype 1 also provided a conceptual data of energy consumption in the home that can potentially be shared with the DSO.

Figure 8.1 Smart Energy Hub

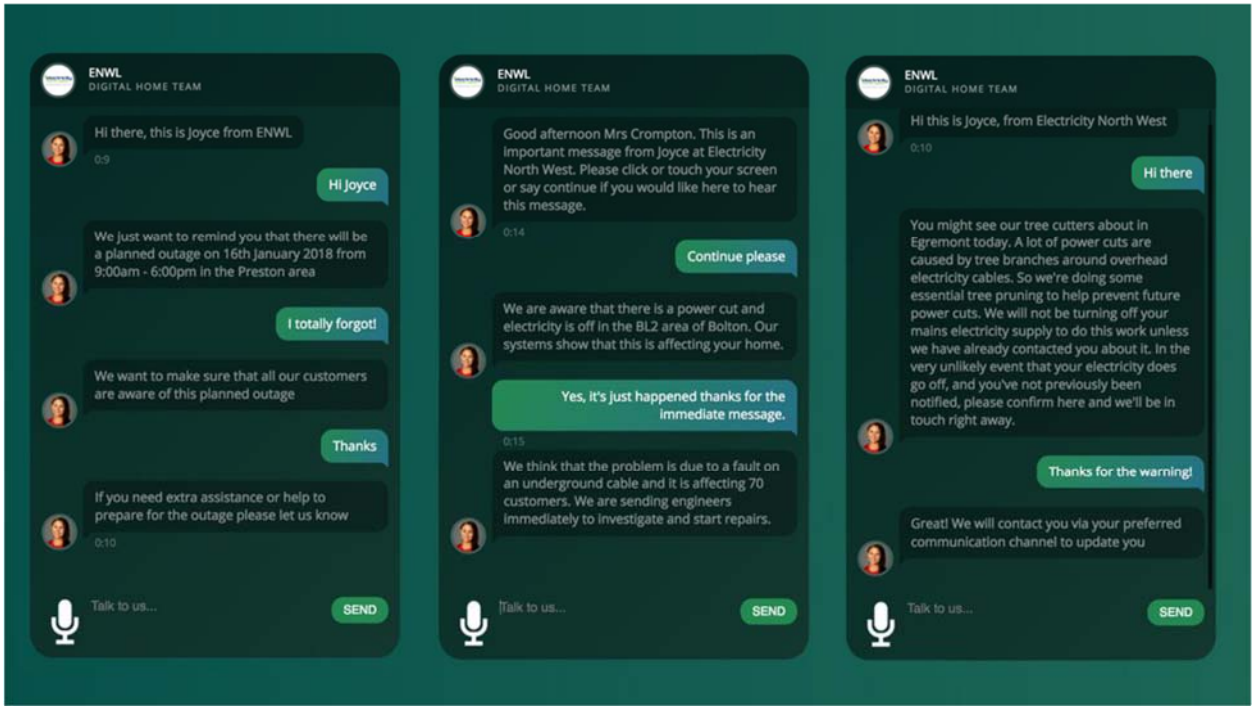
8.1.2 Prototype 2 – chatbot

Customer service must be empowered to move from being reactive to proactive. The ability to predict network events and how they will affect individual customers can be gained from the data generated in Prototype 1.

The automation of customer service through the use of chatbots, AI and the transformation of knowledge into consumable data services, offers DNOs a scalable and customisable solution for service development. The DNO can be represented by a constructed personality that consistently and accurately serves the organisation's policy towards customer service.

Where prototype 1 acted to demonstrate the level at which granular data can be acquired and critically, could be made available to the network operator; prototype 2 demonstrated how the fully automated service desk will capitalise on the level of customer profiling, facilitated by engaging with device services and home system insights supplied by the smart energy hub, as shown in Figure 8.2.

Figure 8.2 Chatbot



8.1.3 Prototype 3 – control centre hub

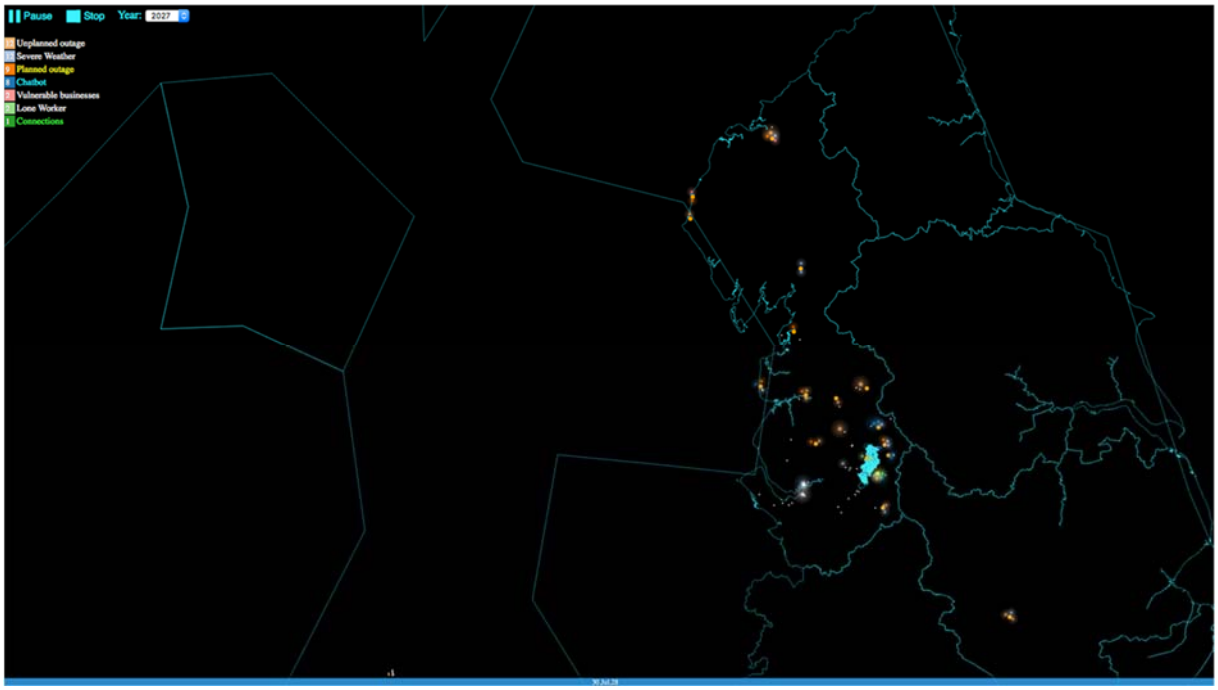
Prototype 3 demonstrated a platform that the DNO might use to visualise event-driven network communications. This is capable of integrating multiple data sources and real-time event mapping, through on-boarding 'edge of the network devices' to extend the traditional grid boundaries and produce a geo-visual data representation of system events.

System events are categorised and associated with the extended entity profile of the network. Access to real time, accurate data provides the network operator with infinite possibilities for mapping network events, conditions and external factors that might influence or impact on the network or the customer, for example IOT, smart devices, mobility team devices, weather services, network status, event timelines and network maintenance and employee tracking and coordination.

Prototype 3 provided a vision for centralised communication and control for network management. It exhibited the in-depth data analysis that could be possible as smart devices begin to share their data profile to the energy network. Prototype 3 is the tool which allows a DSO to capitalise on the level of data now being supplied for analysis, pattern and fault detection.

This prototype leveraged the data generated from the implementation of prototype 1 and 2 and could provide every employee with real time visibility of all network events, or access to authorised levels of information.

Figure 8.3 Network data visualisation tool



8.2 Phase 2: exploratory research with customers

This research found that customers currently expect access to multiple communication channels to contact DNOs. These include pull channels – such as the Internet, social media and radio – and direct contact methods – such as telephone, text/SMS, direct messaging and email. There are some notable differences in preference for communication channels from different customer types. This was linked to age, socio demographic and geographic factors; however, the availability of a range of methods was considered to be particularly significant for interactions during supply interruptions when it might not be possible to use mobile phones, landlines or computers.

Direct face to face communication was generally not expected; with the exception of a visible site presence during prolonged outages or to provide technical advice, concerning for example complex network connections.

When interacting with a DNO, customers expected to receive a consistent level of service on all channels, and for customer services records to be integrated across these channels. This ensures any information a customer has provided or received is available to contact centre agents, irrespective of which channels have previously been used.

In terms of content, its presentation and delivery, customers stated that they wanted concise, clear, relevant information about the issue or process in which they were interested, such as a supply interruption or a new connection. When exploring perceived acceptance of new innovative platforms, there was no appetite for information to be presented by augmented reality ie a hologram. Participants also did not want to be offered surplus material such as live video footage of activities related to the enquiry or process. If DNOs invest in technologies that can deliver enhanced, real time information that could be pushed to individuals through smart home hubs or other devices, the overarching view of customers is that they should be able to control the type and frequency of such notifications.

The ECP considered scheduling to be very important in situations where a DNO needed to visit them. Expectations were compared with those now routinely provided in other sectors. The minimum expectation was that, with the exception of emergencies, visits should be planned in advance and any changes or delay should be clearly communicated, in a timely manner via the customer's preferred platform.

When data about a customer's consumption is collected by smart meters or other devices, they expect to control whether it is shared with their DNO and understand the extent to which it should be aggregated, for example at local level, to enable the network operator to effectively

manage the network as opposed to property level consumption data. DNOs should be explicit and transparent about the data they collect and how they intend to use it.

Customers were also clear that they wanted to control how such data is used (eg turn off appliances automatically, to optimise energy usage).

The detailed outputs from the customer research is contained in the Avatar ECP Final Report[1].

8.3 Virtual worker trial

Codebase8 were appointed to integrate a virtual worker to cleanse the data on the PSR to support the welfare process.

The virtual worker was tested to review their performance and assess the potential outputs and likely support resource needed to manage any exceptions raised when running in a live environment. This phase took longer than expected and the virtual workers were much slower to process records than envisaged.

More testing, fixes and performance refinement were needed before the virtual workers could be moved to the live environment to ensure that the defined business rules worked as expected and no data was incorrectly deleted.

Following further rounds of UAT the virtual worker continued to be unsuccessful and we were unable to successfully pass the required performance and exception levels. It was then agreed to stop further development and not to move to live operation as it presented too much risk and required more intervention than expected. Therefore, this element of the project was abandoned.

9 REQUIRED MODIFICATIONS TO THE PLANNED APPROACH DURING THE COURSE OF THE PROJECT

We originally planned to undertake exploratory research with customers to evaluate and quantify their customer service requirements in the early phase of the project, before testing new innovative solutions using delivery techniques developed later in the project. However, it was felt that greater insight and more in-depth responses would be achieved if a prototype could be shared with customers earlier in the project. Therefore, the early prototype development was brought forward using feedback from the colleague engagement workshops.

As a consequence of this modification, the prototypes were tested on customers earlier in the project allowing greater scope for re-evaluation and further iterative refinement, based on customer feedback, throughout the life of the project.

Also, on the basis of the customer feedback, the customer team suggested a trial deployment of virtual workers to support existing welfare processes, which could advance our customer service offerings. The innovation team felt that this would be excellent additional learning which could be delivered within budget but required an extension of the project by 24 months to allow for the development and subsequent assessment of Virtual Workers. Our on-premise applications and overall architecture required a secure approved platform which provided robust and secure access for the virtual worker application. This led to some additional work to allow the virtual workers access into our IT estate to carry out defined simple transactions. The deployment of the virtual workers was not as simple as anticipated using the chosen product.

[1] https://www.enwl.co.uk/globalassets/innovation/enwl018-avatar/ecp-documents/avatar-ecp-final-report.pdf

10 PROJECT COSTS

Item	Category	Estimated costs (£k)	Final costs £k (rounded)	Variance
1	Project Management	£600,000	£345,027	-£254,973
2	Research & Development	£1,000,000	£541,082	-£458,918
	Total	**£1,600,000**	**£886,109**	**-£713,891**

As the project developed the estimated costs were much lower than the project was registered for (£1,600,000). By restructuring the project such that the initial prototype work was completed before engaging with customers we were able to streamline the process and avoid some of the initial work in mapping customer requirements. As customers were presented with an initial concept it allowed us to ensure that the discussions did not veer into other areas outside the scope of the project, and ensured that the time allocated was better focused on the project deliverables.

11 LESSONS LEARNT FOR FUTURE PROJECTS

11.1 Phase 1: current trends and expert thinking

Consulting with specialist organisations was extremely valuable and helped to develop and shape the concepts and techniques which were explored with customers throughout the project.

This phase of research represented the first time that Electricity North West innovation projects had facilitated colleague engagement workshops, specifically to elicit insight from colleagues across the wider business. Engaging with colleagues proved to be extremely effective and the learning gained from their knowledge and experience highlighted common themes. This helped inform the development and refinement of ideas and shaped the conceptual solutions that were taken forward, based on real customer experience.

11.2 Phase 2: exploratory research with customers

Bringing forward the prototype development and introducing these to customers at the panel sessions instigated more meaningful discussions rather than just asking customers to come up with ideas.

11.3 Virtual worker trial

The procurement process for services to provide new technologies, designed to integrate with existing secure systems, which hold extensive personal and sensitive customer data can be protracted and introduce time constraints in delivery. It is important to start engagement on these types of contracts as early as possible.

Some automated worker solutions are more suited to our on-premise architecture than others and the levels of security required for sensitive data in a regulated arena proved to be a significant constraint. This was not obvious at the design stage of the project and only became apparent when we requested the same level of security as any other third-party access to our applications and started UAT.

Whilst we were advised that the speed of the virtual worker would be slower, the magnitude was not clear and during UAT we observed that the virtual workers were not fast enough to be cost effective. We would, however, consider this type of product in future when our applications are more cloud based and we would select a product more suited to of the specific application whilst delivering the required security.

11.4 Challenges arising from different methodological approaches

We were aware that DXC favoured an iterative, agile approach and believed this would deliver the best outcome, allowing prototypes to be developed and modified in response to ongoing feedback and recommendations. However, the extent and flexibility of the internal resource required to accommodate this methodology was not apparent to us.

We had to manage a number of changes in the methodology to achieve the optimum output and accommodate the non-prescriptive agile approach. This was a challenging phase of the project which was exacerbated by the short-term fixed contract appointment of the DXC delivery team, which resulted in key members being replaced at critical stages of the development process.

A series of meetings were held and a compromise agreed to ensure further slippage in prototype development was avoided. A number of measures were instigated to ensure the direction of the project was appropriately managed going forward. This was facilitated via weekly meetings where ongoing prototype development was communicated and interdependencies, requiring Electricity North West input, were identified and mapped. This allowed us to schedule our time accordingly.

This represented a divergence from DXC's proposed methodology but ensured sufficient time was incorporated into the programme to provide an Electricity North West resource, at key stages of prototype development. This allowed conceptual solutions to be appropriately evaluated and ensured that the final prototypes were appropriate to present to customers.

This project highlighted the benefit of entering into a bilateral agreement with the organisation ultimately responsible for the delivery of goods or services, because of the challenges that can arise from a subcontracted arrangement.

12 PLANNED IMPLEMENTATION

This project was a research project with the aim of acquiring an understanding of functional and emotional service needs of customers, by specific customer group, to inform DNO policies and investment plans for ED2 and beyond. The learning gathered will also be utilised to inform our customer strategy to ensure we meet the future needs of our customers.

13 DATA ACCESS

Electricity North West's innovation data sharing policy can be found on our website.

There has been no data gathered during the course of this project. The project was purely gathering customers' opinions on the future of customer service.

14 FOREGROUND IPR

There is no foreground IPR associated with this project.

15 FACILITATE REPLICATION

This project was a research project which produced valuable learning about understanding of current and future customer service needs and how unmet needs might be addressed. It identified a range of innovative solutions that best meet customers increased servicing expectations. It demonstrates how innovative technologies and solutions can assist DNOs to better plan their customer investment strategy and DNOs are free to utilise the learning this project created.

16 APPENDICES

None