


MAKING THE CONNECTION

Electricity: How location information is improving stakeholder engagement



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DRAMATIC CHANGES IN ELECTRICITY DISTRIBUTION

Britain needs rewiring in a smarter way to ensure secure and sustainable energy supplies for consumers¹.

Until a few years ago, the UK electricity industry was operating on 100 year-old principles. Whilst the industry is a reliable backbone of the national infrastructure, it is slow to change. Although privatisation in 1990 radically altered the commercial model, it had little impact on the electricity supply chain. But now a collision of multiple, fundamental forces is overturning the old ways of running an electricity business.

- Environmental regulation is driving the introduction of renewable energy and the phasing out of coal fired power stations, causing much tighter capacity margins.
- Renewable sources generate power in more dynamic, unpredictable ways, leading to a need for a more flexible grid and a new emphasis on storage.
- Distributed generation from solar,

wind, biomass and other sources is reversing power flows and fundamentally changing the way the grid operates.

- Electric vehicles are creating a new type of demand, one that moves to different places and peaks at different times of the day.
- The smart meter rollout is providing new insight into electricity demand and driving consumer awareness of consumption and pricing.
- Whilst the industry is a reliable backbone of the national infrastructure, it is slow to change.

This is the beginning of a journey from a relatively static asset management operation, to a more dynamic and flexible business. It leaves Network Operators with a tough challenge. How can they respond to meet the future challenges brought by radical industry transformation?

¹Ofgem, 2015.



Organisations are facing an avalanche of information, in forms and formats and via devices that weren't even on the radar screen five years ago².

ENTERPRISE IT IS BECOMING A SYSTEM OF ENGAGEMENT

To deliver the change needed, electricity networks will rely heavily on their large scale information systems. But enterprise information systems across all sectors are also being transformed, by the wave of digital disruption spreading across the economy.

Enterprise IT has historically been a 'System of Record', designed to provide a single source of the truth so that managers and staff have the information they need to run and operate their organisations. But current trends are leading businesses to deploy a different breed of tools based on communications and collaboration capabilities. The consumerisation of Enterprise IT is changing employee expectations about usability and accessibility.

The drive towards outsourcing and partnerships³ is creating new needs for business collaboration.

Many of these new tools look more like services than software and are built around new content formats (video, wikis, chat, maps and conferencing tools) which can either be consumed in the moment or saved for later. These social business systems are now being deployed, enabling organisations to become more effective, more flexible and more customer-focused.

² Systems of Engagement and The Future of Enterprise IT, Geoffrey Moore, AIIM, 2011.

³ For example, the Smart Metering system connects energy consumers, energy suppliers, a data communications company, communications services providers, a data services provider and the electricity networks.



People have the right information to make smarter decisions, communicate more effectively, and work in ways that are healthier for the planet⁴.

GEOSPATIAL I.T. IS CENTRAL TO THE TRANSFORMATION

As the Network Operator is a geographic business with a widespread asset base serving customers and stakeholders over a distributed area, spatial information has a critical role to play. This is true both for information that is slow to change and for live operational data. Geospatial IT, has for many years, provided a System of Record for network assets, customer premises and the environment in which all those things are placed. Geospatial specialists who could not do their jobs without this technology, gain huge value. But in a more open, collaborative multi-stakeholder world, that geospatial information needs to be accessible to customers, partners, citizens, employees and others, in a form that is of use to them. In short, a system of engagement is needed.

Geographic Information Systems (GIS) are now a 'System of Engagement' as well. By including ready-to-use

apps, content, capabilities, and GIS infrastructure, the ArcGIS platform enables anyone to visualise, analyse, and collaborate using maps—anytime, anywhere, and on any device. Critical data still requires GIS professionals who build, maintain and analyse geospatial information, but they are no longer the only ones who can make, use and share maps. Now, all stakeholders can collaborate using maps hosted on web browsers and apps on whichever device they prefer. By empowering a whole organisation (and its community) business performance can be improved across the board.

This eBook shows by example how geospatial technology is enabling the transformation of electricity distribution and transmission, through better stakeholder engagement complementing its more traditional role of records management.

⁴Jack Dangermond, President, Esri ,2016.



KEEPING CUSTOMERS UP TO DATE

Helping customers to help themselves is an established way to increase customer satisfaction. Empowering the customer to get answers quickly when it suits them puts them in control. The benefit to business is a reduction in contact volumes in the customer contact centre which helps to lower 'Cost to Serve'.

It is important that network licensees engage with stakeholders and help address consumer vulnerability⁵.

For DNOs a major driver of customer contacts is network status information including planned and unplanned maintenance and service interruptions. To make the information presented relevant, Network Operators can use location to show customers what is happening in their local area and at their premises, whilst filtering out areas which are not of interest. An

online web map showing maintenance activities and outages giving expected restoration timescales can answer many customer's questions without customers needing to get in touch.

Give the customer better access to the information that they need and your customers will be both more informed and less likely to pick up the phone.

⁵Ofgem, Stakeholder Engagement and Consumer Vulnerability Incentive Guidance for RII0-ED1, 2016.



Empowering customer service teams

When a customer does call customer care, they expect to speak to someone with answers, right away.

All too often, call centre agents spend too much time searching for information amongst multiple systems, increasing call handle times and reducing customer satisfaction. Whether it is a network outage, a construction development, or a query about charging electric vehicles, customer service teams need the right information at their fingertips. Again, location information can be used to improve engagement. A map based view of the critical information in a customer's area will allow customer service agents to answer questions with authority and confidence, reducing call backs and reducing average handle time.

Getting personal by using mobile

People want to engage with businesses on their terms, at a time and place that suits them.

The mobile device is becoming the major channel because it is personal and it is always there. That makes it particularly useful for reporting of faults, outages, street works issues or even graffiti.

By making it easier and more convenient for people to provide information and feedback to the business, Network Operators are able to increase their knowledge and insight. Provide an app that allows customers to easily report issues in from their mobile device with a photo and your team get to hear about issues faster and can also have an accurate location of the event or problem. With instant information and a map showing where to go, your responders will get there faster, reducing minutes lost and improving customer satisfaction.

CUSTOMER SELF-SERVICE FOR NEW SUPPLY POINTS

DNOs handle large numbers of queries from businesses and householders in relation to new electricity supply connections.

In October 2015 new Ofgem rules were introduced, aimed at increasing competition. The result is a labour intensive process taking up the valuable time of highly professional staff which must be delivered within timescale targets mandated by the Regulator. All this pushes up cost to serve, yet the majority of new connection quotations do not proceed to build, so in many cases the expected revenue benefit does not materialise.

However, many connections follow a standard pattern and in trials it has been found that up to 90% can be wholly or partly automated. Provide access to a map-based design and quotation tool online, and

engagement with prospective new customers can be improved. Such tools make it easier for prospective customers to request a new supply quotation and ensure a faster response. For the DNO this reduces the workload on engineers who would previously have had to handle large volumes of simple queries and standard designs. A further advantage is that the valuable time of trained experts is released to create winning proposals for bespoke major projects. Ofgem is well aware of the benefits, "We were very impressed with the Esri system ... this will be a very useful tool in determining points of connection. We would like to see all DNOs offering this solution."⁷



"The electricity connections market is worth over £500 million per year with hundreds of thousands of connections made every year, for example, to new housing estates and business premises"⁶.

⁶Ofgem

⁷David Overman, Point of Connection working group, Ofgem.



STAKEHOLDER ENGAGEMENT USING AUGMENTED REALITY

The transformation of the transmission and distribution networks means network growth and change. More assets will be required, in new places.

But planning hurdles have to be overcome and there are many stakeholders to be reassured that the environmental impact will be minimal. Geospatial technology has advanced beyond simply identification of the optimal location for an asset based on modelling of input variables. It is now possible to create a 3D visualisation of (for example) a new electricity pylon in situ to show stakeholders exactly what the visual impact will be.

Latest developments go even further. Augmented reality technology using a

geospatial database can take a visual representation of the pylon right into the field, right where the new asset will be located. Landowners can see the new electricity pylon in position. They can move around and view it from different positions and angles, providing feedback to the network planners and wayleaves officers. By enhancing stakeholder engagement in this way, DNOs will be able to improve stakeholder relations and achieve a faster planning process.

There are more than
88,000 pylons in the UK⁸.

⁸ National Grid, 2016.



PAINTING A COMMON OPERATIONAL PICTURE

Managers, employees and customers have a common need, to know what is happening where, at the moment it happens.

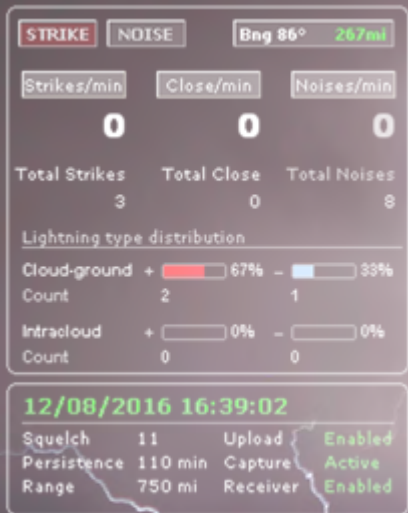
“Every day sees humanity more victorious in the struggle with space and time”⁹.

Historically, map-based tools have provided relatively static views of networks and the environment they operate in. But advances in geospatial processing power have created the opportunity to bring together live operational data and multilayer geospatial data in a single view, for enhanced situational awareness.

Streamed data feeds from a wide range of sensors (GPS devices, mobile devices, even social media providers) can now be incorporated into GIS applications, transforming them into frontline decision-making tools. Live filtering and processing enables detection of critical events and their locations as they happen. By setting appropriate thresholds, operations can be monitored by exception and without interruption. Dynamic assets

that are constantly changing location (such as vehicles, people or aircraft), and stationary assets (such as weather monitors and substations) can be viewed in the same picture. When locations change or specified criteria are met, multiple activities can be triggered. Alerts to key personnel, map updates, event recording, and interactions with other enterprise systems can all be initiated. Alerts can be sent across multiple channels, such as e-mails, texts, and instant messages.

The result for stakeholders is a major step change in operational intelligence. Whether planning for the future or providing timely emergency coordination, live operational data embedded in geographic context, enables faster response times, saves money and possibly saves lives.



“During storms, ScottishPower monitor in near real time which transformers have gone down and which customers have lost supply”¹⁰.

ROBUST DATA FOR REGULATORY REPORTING AND ENGAGEMENT

Keeping customers' lights on is the ultimate measure of reliability and availability.

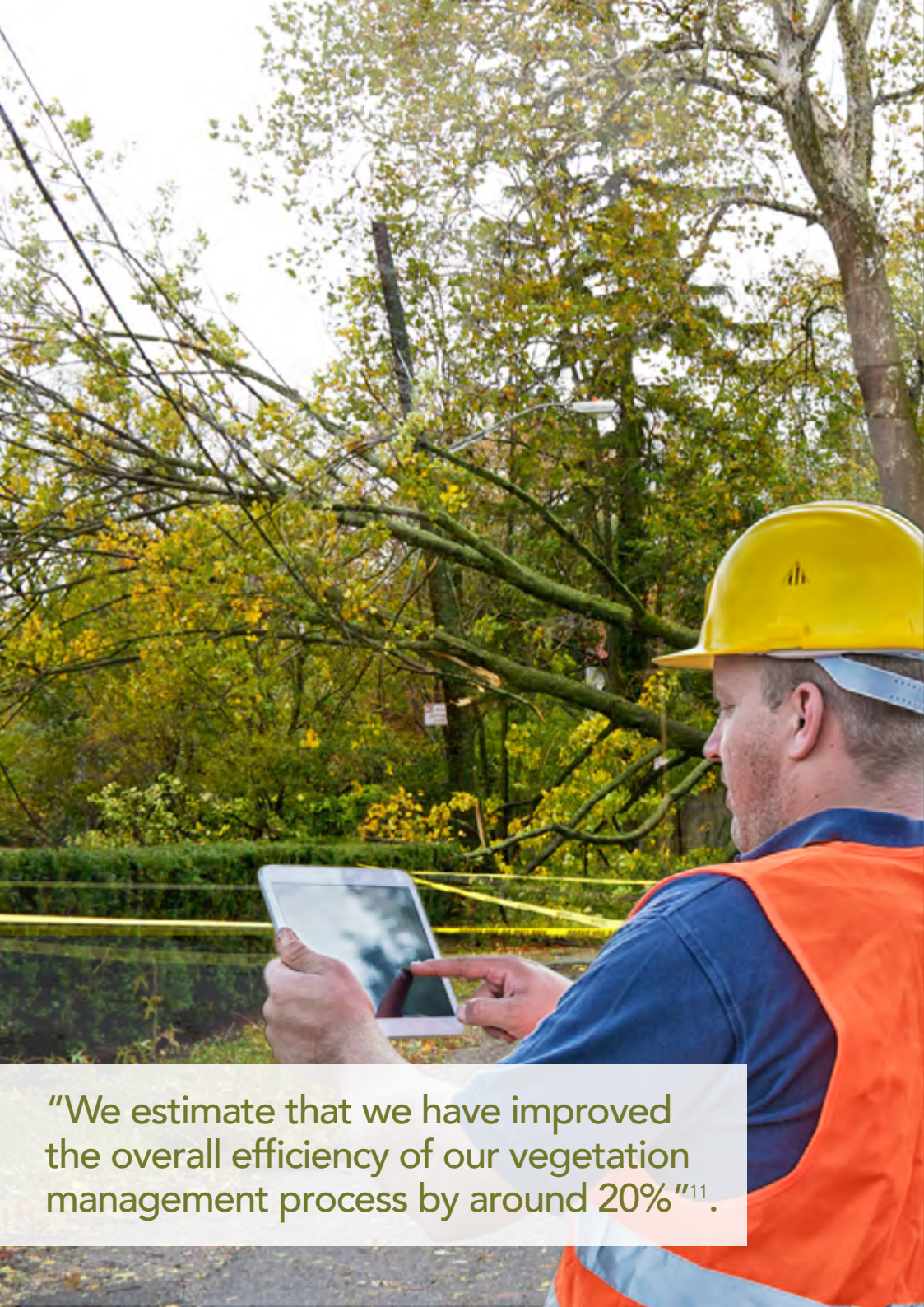
Network Operators face significant challenges in management of supply whilst ensuring environmental and social responsibilities are met. And regulatory fines add a further incentive to maintain supply. But Ofgem understands that extreme weather conditions can cause outages to even the most robust network and in such 'Force Majeure' situations the regulatory fines do not apply. But this exemption creates a new challenge. To avoid incorrect fines DNOs need to provide evidence that outages were caused by exceptional conditions.

Geospatial technology has enabled a system that monitors power outages during storms and provides

auditable reports to the regulator identifying where storms have caused outages. This provides Ofgem with the confidence it needs. In addition, the system shows the location and numbers of customers off supply in near real-time. This helps operational management allocate emergency response units to priority areas, ensuring that the maximum number of customers have power restored in the shortest possible time.

This innovative application has been deployed by ScottishPower and was awarded Esri UK's "Real-time data and mobile award" at the Esri UK User Conference 2015.

¹⁰ Lorna Nightingale, Head of Marketing Esri UK, Esri UK Annual Conference 2015.



EMPOWERING FIELD WORKERS

Electricity cables and vegetation don't go well together. Transmission Network Operators have a statutory duty to ensure that trees and other vegetation do not come into contact with overhead power lines. Unstable trees can pull cables down, causing outages and risking public safety.

The traditional approach to vegetation management is labour intensive. Network planners, surveyors and vegetation management teams pass around marked up paper maps as they identify and schedule works and track progress. The process is time consuming and error prone, with data replication and re-work. Furthermore, field workers have to spend a significant percentage of their time in the office on administrative tasks when they could be focusing on the job in the field.

The process can simultaneously be streamlined and made more flexible, through automation and integration

of desktop and mobile geospatial solutions. Office-based planners electronically mark-up sections of network for survey. Field-based surveyors capture the location of trees that are close to power lines, together with distances, images and requirements for road closures or circuit outages. Increasing use of Lidar data is further streamlining processes.

The technology enables workers to produce more accurate and consistent surveys, faster. Surveyors are able to spend more time in the field. Administrators save time on data entry and job scheduling.

"We estimate that we have improved the overall efficiency of our vegetation management process by around 20%"¹¹.

¹¹ Nathan Caley, IT manager, Engie (formerly West Coast Energy).



“A paradigm shift in the way electricity will be produced¹³.”

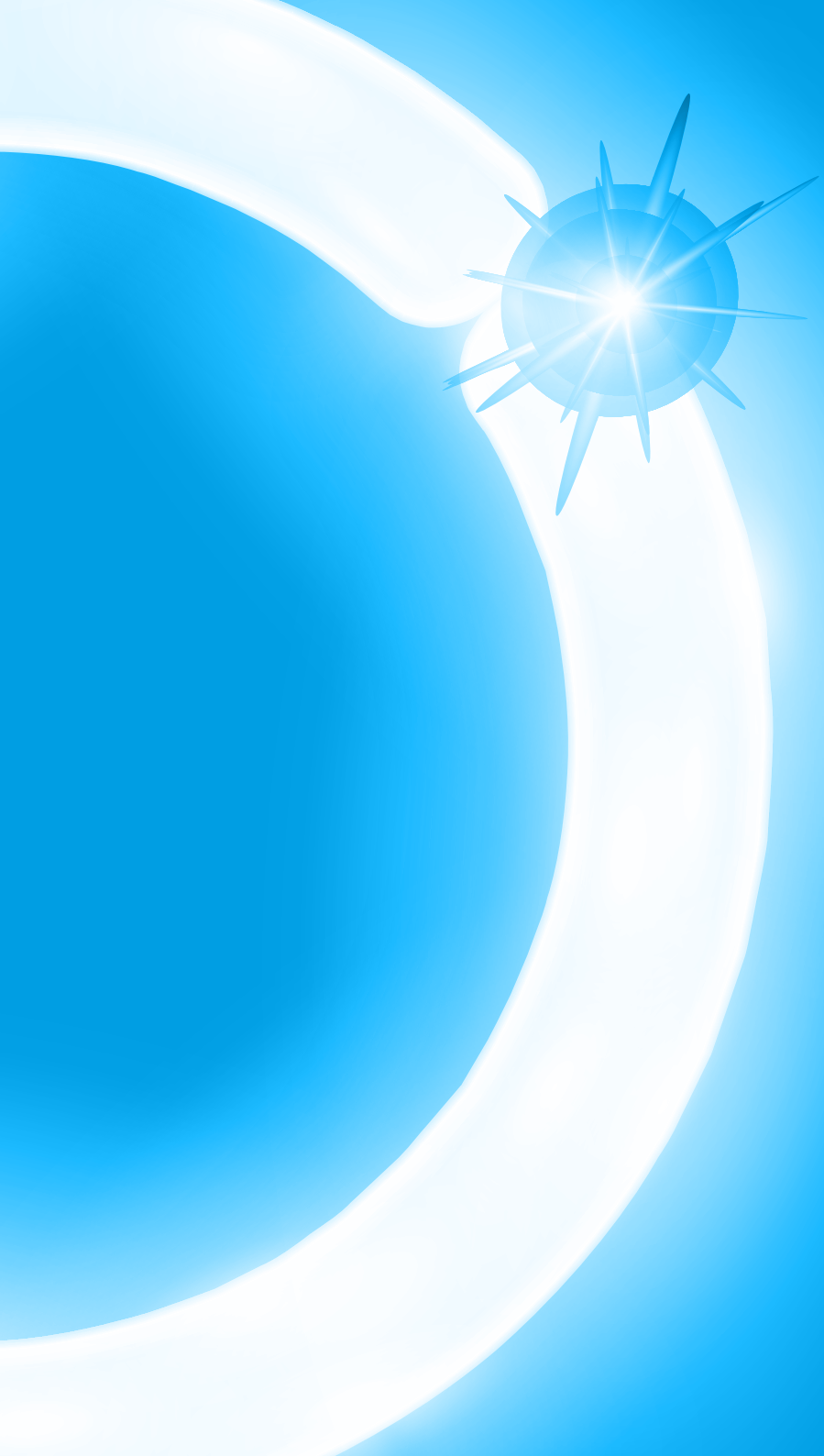
MOVING FORWARD INTO A TRANSFORMED WORLD

This eBook has shown how the emergence of increasingly powerful geospatial technology as a system of engagement is helping Network Operators tackle the many new challenges they face on the journey to a smarter, lower carbon, more agile world.

By making location information a key part of stakeholder communication and collaboration systems, these systems become more accessible, flexible and powerful. Geospatial technology will also allow improved operational management of the network. As transmission and distribution evolve from one-way flow to two-way Smart Grid, Supply and Demand become increasingly distributed and dynamic. Managers will require more precise and more granular location information for key processes such as demand side response and active network management.



¹³ Professor Roger Kemp, IET Expert Group: Power Network Joint Vision.



Bringing the field and the office closer together

Whether online or offline, field staff can access maps and view real-time information, making it easy to report problems, complete work orders, and update maintenance records.



Increased insight into assets

Workers can have an up-to-date picture of asset performance, maintenance history, improvement projects, and inspection plans. Integration with business systems enables tracking of the financial performance of assets.



Better Community Engagement

A map is a powerful way to communicate an idea, a plan, or what is happening now. The public can actively collaborate with maps that are quickly and easily created and shared.



Operational Awareness

A picture can be built up of services, deliveries, people, vehicles, weather events, and social media and then shared with a chosen group of people, inside or outside the organisation.

By applying innovative thinking and leveraging the power of location, Network Operators can rest assured that location technology is evolving with them and supporting them on the radical transformation journey that they have now embarked on.



To discuss how this thinking can be applied in your business, please contact Esri UK.



About Esri UK

Esri is the world's leading provider of Geographic Information Systems (GIS), providing solutions, technology and services. With the single, largest pool of GIS expertise, Esri UK is the technical authority on GIS in Great Britain. More than 10,000 UK customers across various industries and sectors use our solutions to gain enhanced insight and knowledge about their customers, assets and operations. Our customers are part of the largest GIS user community in the world, with more than one million users in nearly 350,000 organisations.

Esri UK supports electricity Network Operators with skills, knowledge and resources in:

- Mapping data
- Geo-processing
- Data visualisation
- Spatial analytics
- Data content services
- Big data aggregation

With these capabilities, Esri UK can help you improve stakeholder engagement by building geospatial knowledge into the core information infrastructure of your business.

For more information, please contact:

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