esri UK

OPERATIONAL INTELLIGENCE

How knowing **WHERE** enhances performance, efficiency and customer experience

CONTENTS

Infrastructure shapes our lives

"Transport links get us where we need to be, energy systems power our homes and businesses, and digital networks allow us to communicate. Infrastructure supplies us with clean water, takes away our waste and helps protect us from the elements. It is vital to improving our quality of life and integral to the creation of vibrant new places to live and work."[1]

Consumers and businesses rarely pause to consider how the energy, utilities, telecoms, transport or logistics industries provide the infrastructure we depend on. There is an expectation that it just works. This puts the onus on operations managers to deliver feats of engineering and logistics on a constant basis. Their extraordinary efforts provide us with uninterrupted power, ubiquitous communications, next-day goods deliveries or the timely mass transit of millions of people.

These economic and social benefits do not come cheaply.

The infrastructure industry depends on investments of £billions, with payback periods that run to decades or longer. Decision makers trade off costs, risks and performance as they prioritise asset investment. Upgrade expenses mean that assets are often sweated well beyond their design lifetimes, impacting reliability and service levels. Operations managers are under constant pressure to improve efficiency and the customer experience, whilst increasing resilience and protecting the natural environment.

UK Annual Infrastructure spend

£47.9bn per year[2]

[1] National Infrastructure Delivery Plan 2016–2021, UK Government, March 2016
[2] Funding UK Infrastructure, Policy Insight, ICAEW, July 2016

75%
of CIOs will invest significantly in business operations data analytics in the next two years[3]

Digital transformation is disrupting the status quo

If today's challenges are not enough, a wave of digital disruption is sweeping through the economy. As consumers become more connected and assets become more networked, the need to change is impacting all sectors, including infrastructure.

Fast moving sectors, such as retail and media, are driving up customer expectations for every type of service, even in sectors such as infrastructure where innovation and investment have traditionally followed longer timeframes. Customer engagement is increasingly data-driven and transactions are increasingly digital. As this wave reaches the back office, complete supply chains are being re-invented. Traditional enterprise IT was not designed to evolve at this new, rapid pace, so enterprises find themselves with two-speed IT.

The infrastructure sector also has its own drivers of change, some of which will overturn today's operating norms. Goals of sustainable energy at lower costs and reduced environmental impact, are re-shaping the energy supply chain and leading to increased use of renewable energy. Technology driven changes, such as electric and autonomous vehicles, smart grid, intelligent transport systems, and the Internet of Things all create additional pressures.

How can managers of infrastructure operations create our digital future whilst reliably delivering the services of today?

[3] 2016–2017 CIO Survey: UK edition, Deloitte University Press.

Operational Intelligence is critical to success in the new environment

Managers have a range of tools at their disposal for historical analysis and reporting, helping to make long term decisions based on previous experience. But the acceleration of change demands ever quicker decisions, often in close to real-time. Managers now need to build on their existing capabilities with greater insight into live operations to deliver effective tactical responses and build agility into the enterprise.

Organisations require the ability to assimilate, analyse and act on, an accelerating volume of data across a growing range of data feeds, whilst simultaneously addressing strategic demands. Operational Intelligence (OI) systems provide a set of event-oriented information and analytics processes operating across the extended organisation that enable managers to:

- See all operational information in a common view.
- Instantly assign resources and fixes.
- Delegate selected decisions to the system, based on defined business rules and criteria.
- Easily share relevant information with all stakeholders, internal and external.
- Automate routine tasks, reducing manual effort and improving accuracy.

7.3bn connected devices deployed in business applications by 2020[4]

[4] Broadzone analysis of Gartner research, November 2015.

Location information is a critical element of the mix

Leveraging location, OI can create connected, enterprise-wide operational processes and enable continuous improvement by embedding forward-looking capabilities. Built on knowledge of the status and location of customers, assets and their environment, OI systems aid both planning and execution.

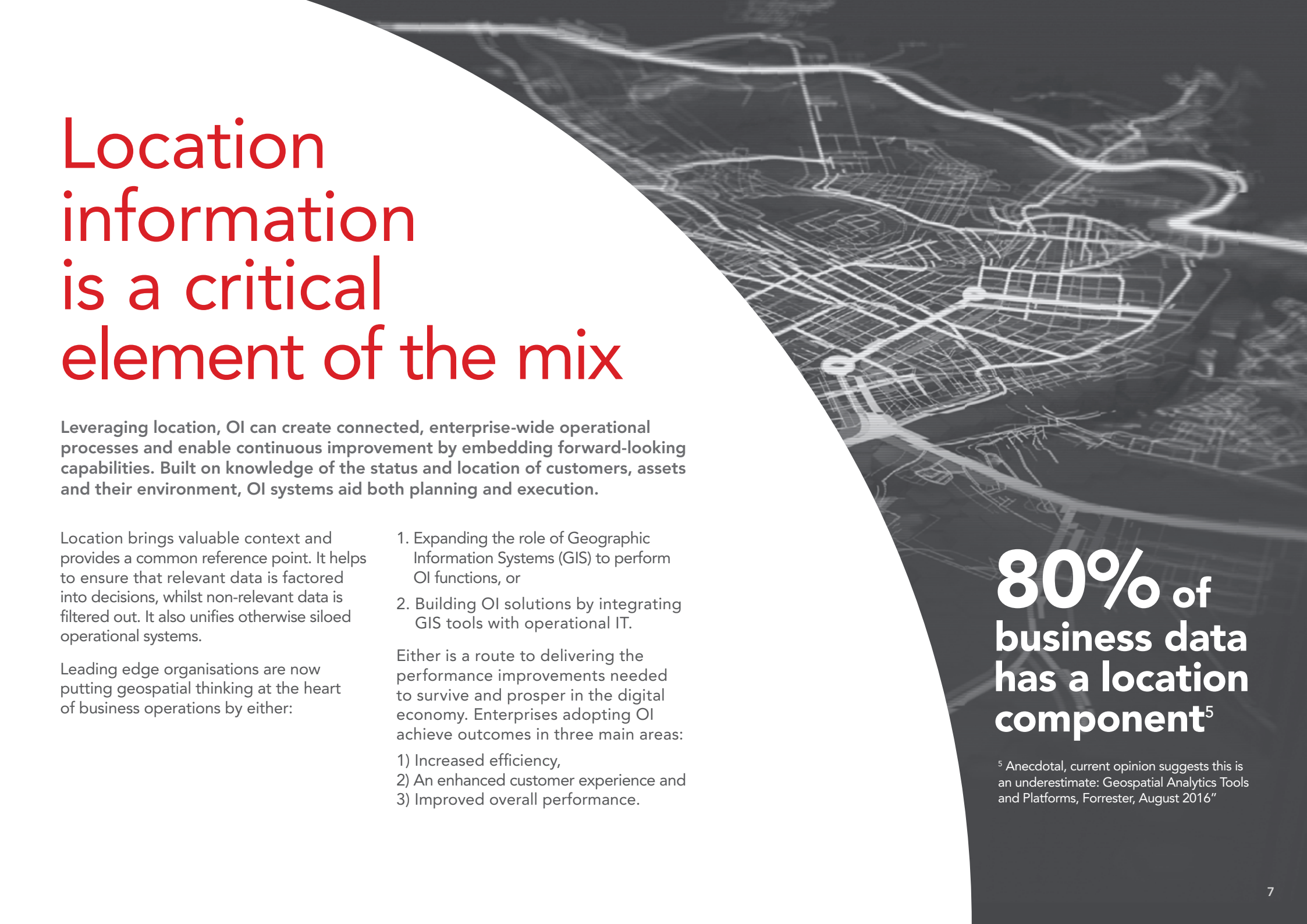
Location brings valuable context and provides a common reference point. It helps to ensure that relevant data is factored into decisions, whilst non-relevant data is filtered out. It also unifies otherwise siloed operational systems.

Leading edge organisations are now putting geospatial thinking at the heart of business operations by either:

1. Expanding the role of Geographic Information Systems (GIS) to perform OI functions, or
2. Building OI solutions by integrating GIS tools with operational IT.

Either is a route to delivering the performance improvements needed to survive and prosper in the digital economy. Enterprises adopting OI achieve outcomes in three main areas:

1) Increased efficiency,
2) An enhanced customer experience and
3) Improved overall performance.



80% of business data has a location component[5]

[5] Anecdotal, current opinion suggests this is an underestimate: Geospatial Analytics Tools and Platforms, Forrester, August 2016"

01 INCREASED EFFICIENCY

The drive to be more efficient is relentless. Whether the pressure comes from Government, regulators or from competitors pushing down prices, the need is the same. To do things more quickly and at lower cost.

But organisations have already made savings, sometimes repeatedly. Operations managers face a tough question – what more we can do?

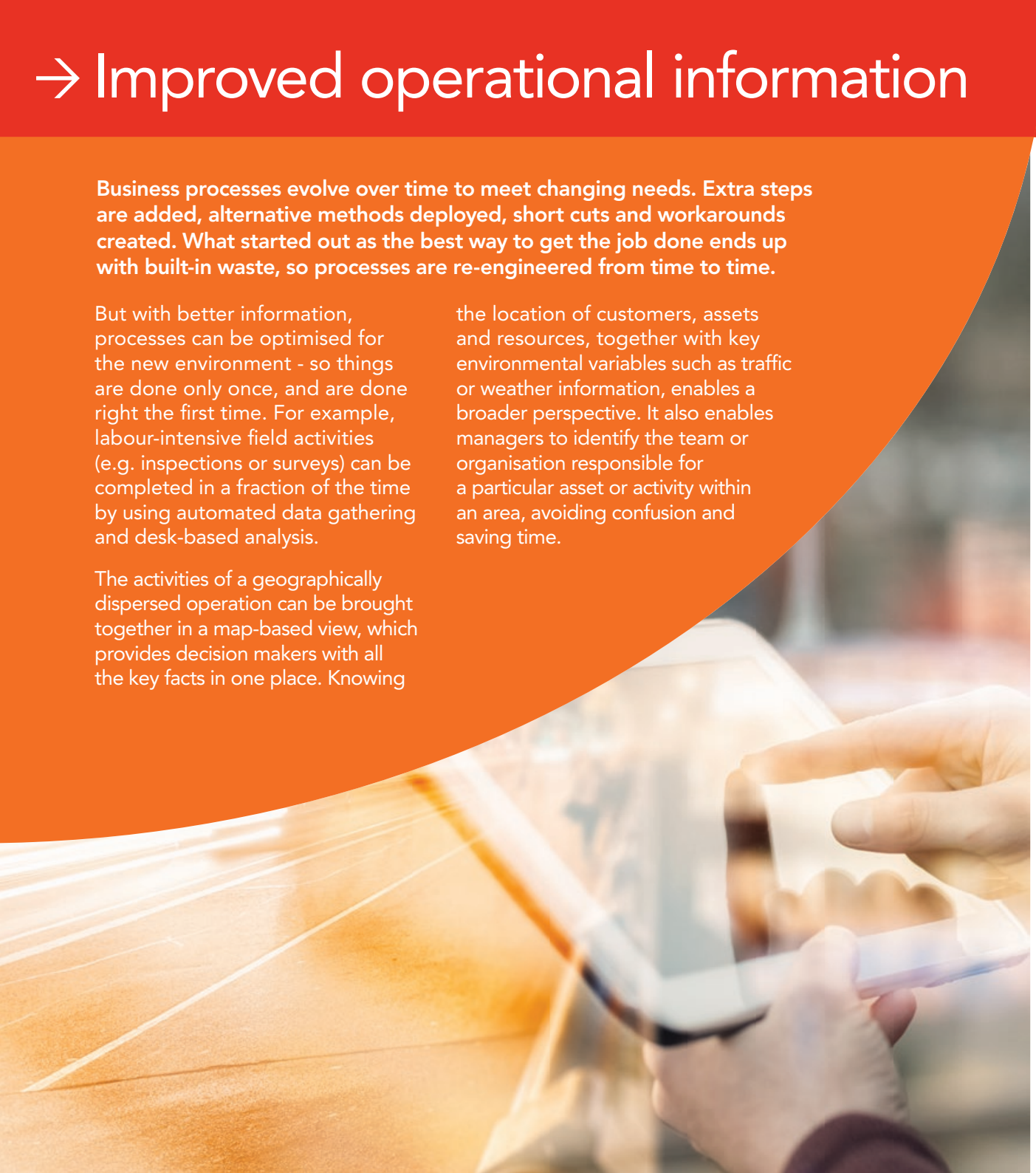
Enhanced OI, based on leveraging geospatial information, is a highly effective answer.

→ Improved operational information

Business processes evolve over time to meet changing needs. Extra steps are added, alternative methods deployed, short cuts and workarounds created. What started out as the best way to get the job done ends up with built-in waste, so processes are re-engineered from time to time.

But with better information, processes can be optimised for the new environment - so things are done only once, and are done right the first time. For example, labour-intensive field activities (e.g. inspections or surveys) can be completed in a fraction of the time by using automated data gathering and desk-based analysis.

The activities of a geographically dispersed operation can be brought together in a map-based view, which provides decision makers with all the key facts in one place. Knowing the location of customers, assets and resources, together with key environmental variables such as traffic or weather information, enables a broader perspective. It also enables managers to identify the team or organisation responsible for a particular asset or activity within an area, avoiding confusion and saving time.



nationalgrid

The use of ArcGIS on portable computers enables National Grid's mobile engineers to locate assets and jobs much more easily and work more productively. If the 'as-built' infrastructure differs from the network plan, data capture technicians can easily mark up any changes on the asset map while in the field. These changes are sent automatically to a central quality assurance team and, from there, asset updates are fed directly into SAP.

> "The whole process is much slicker and a lot more efficient."
>
> Pete Massey, Director of Gas Distribution Transformation Programme, National Grid

→ Reducing maintenance costs

An infrastructure failure can have dire consequences. Operations managers seek to minimise failures whilst keeping maintenance costs low. This requires a balance between early replacement (which may be costly and unnecessary) and asset sweating (with resulting risk of failure).

In a condition-based maintenance regime, survey activity can be directed by correlating variables such as soil type, weather, usage or road traffic with asset condition. In addition, the productivity of surveyors can be increased using tools that manage scheduling, data capture and storage and provide progress reporting information to management.

In a risk-based maintenance regime, geospatial information can be used to model the causes of failure and schedule maintenance using probability of failure rather than on simply the age of an asset. This reduces the number of unnecessary field trips, focusing resources where really needed.

Ports looking to streamline processes and become more resilient to onshore and offshore incidents use OI to monitor activities, identify patterns and model the impact of incidents. By narrowing the causes down to a specific vessel, business or type of goods, a targeted solution can be found.

BLACK & VEATCH

Working on behalf of UK Power Networks, Black & Veatch succeeded in surveying 30,000 assets, over an area of 29,000 km2, in just six weeks using a mobile GIS solution from Esri. The project led to cost savings of over £130,000, delivered high quality asset information and improved the tracking of surveyors in the field.

> “ArcGIS enabled us to do, in weeks, a project that might otherwise have taken years.”
>
> Paul Hart – information management specialist, Black & Veatch

→Improving collaboration

A constant challenge for organisations is coordinating activities between individuals, teams and partner organisations. Managers are frequently faced with issues such as a road being dug up within weeks of a previous excavation, or communications being issued twice to the same household, or essential communications not being issued at all.

The balancing act is to get all parties working from the same information and yet ensure the everyone has the personalised viewpoint they need to do their job. Geospatial data can be the 'glue' that brings together different types of information in one place, creating a single source of the truth. With a definitive, trusted source, staff can break down silos, collaborate more closely and focus on execution instead of manual data collection and validation.

Sellafield Ltd

Sellafield Ltd is the company responsible for safely decommissioning the Sellafield site on behalf of the Nuclear Decommissioning Authority. Sellafield Ltd has fifteen directorates and over seventy operational units. ArcGIS provides Sellafield Ltd with a central source of data and tools that facilitate closer collaboration between these groups.

> "ArcGIS is enabling us to improve planning efficiency and coordinate the activities of over seventy business units more effectively," says the CAE Leader. "It is helping us to achieve a much more collaborative way of working. We would find it difficult now to manage a project of this scale and duration without ArcGIS."

02

AN ENHANCED CUSTOMER EXPERIENCE

Excellent customer service leads to repeat business, lasting relationships and lower churn levels. Poor customer service leads to customer complaints and often to regulatory action.

In the Deloitte 2016–2017 CIO survey, customers were identified as the number one business priority by CIOs[6]. But historically, infrastructure organisations have often been oriented more towards their assets than towards their customers. How can the customer experience be improved?

[6] Navigating legacy: Charting the course to business value 2016–2017 CIO Survey, Deloitte University Press.

→ Better customer communications

Communication is a foundation of customer service. Proactive communications keep customers informed and reduce the need for customers to call in and raise queries. This increases satisfaction and reduces call handling costs. A useful tool for utilities or public authorities is a searchable web map showing live updates of current maintenance activities. The map itself can be a channel for resolution of service queries, via web chat, email or telephone.

When unplanned delays or failures do occur, affected customers can be alerted with an automated SMS or email message advising them of the situation. This reduces both customer distress and the inevitable peak in inbound call volumes.

For those times when customers do make contact, customer service agents can be provided with live local maps bringing together all they need to know in one place. This enables more informed responses to queries, reducing handle times and improving customer satisfaction. Customers with ongoing cases can be kept informed with live updates that keep track of job status, via SMS or email.

Wessex Water leveraged Esri's ArcGIS technology not only to diversify its communications channels, but also to significantly improve the quality and timeliness of the information it shares. For customers, this means: easier access to up-to-date information, more timely notification about water supply issues, more helpful dialogues with the call centre and greater awareness of the work done by Wessex Water.

> "Together with the ArcGIS web map, our GIS-enabled messaging service has led to a 20% fall in calls to our Customer Service Unit reporting problems with 'no water'."
>
> Ryan Davies – Customer Experience Manager, Wessex Water.

→ A faster, more effective response

Whether the matter at hand is a minor complaint or a national emergency, customers will judge organisations on the timeliness of the response and on the quality of the solution. A successful result depends on behind-the-scenes operational activities which, although unseen by the customer, directly impact customer satisfaction.

With a current, 360-degree view of operations, managers and response teams can quickly understand which customers are affected by a problem and how they are impacted. By creating a linkage between asset and customer, OI systems can help operations managers to identify issues needing attention. Staff are then able to prioritise and simplify the action taken, helping exceed service quality expectations and minimise disruptions. Geospatial knowledge has a predictive role too, enabling decision makers to allocate resources where they will be needed in case of (for example) extreme weather or seasonal variations in demand.

SEVERN TRENT WATER

To help respond to over 140,000 incident reports every year, Severn Trent Water integrated Esri GIS technology into its customer relationship management (CRM) system. Call centre agents can now locate burst pipes and other faults with far greater accuracy, enabling field-based engineers to make repairs more quickly and cost effectively. Severn Trent Water uses the incident map to reduce the time previously required to produce reports for OFWAT.

> “We will be able to make this GIS available to potentially several thousand employees located across multiple sites.”
>
> Severn Trent Water

Better coordination with partners & stakeholders

A positive customer experience requires that organisations work together. Street works need coordination between local authorities, utilities, contractors and highways authorities. Logistics and transport services depend upon multiple connected transport operations. Service retailers must work closely with service wholesalers, contractors and partners. If this is not happening the gaps are all too visible to customers.

Location can become the common factor linking partners and stakeholders, making a seamless customer experience a reality. Cloud-based services help to get multiple organisations all working from the same information. A common user interface provides controlled access to shared information for multiple agencies and makes up-to-the minute status reports available to the public in emergency situations. Each participant can be provided a personalised view based on the information that he or she needs to do their job.

worcestershire county council

The ArcGIS app is now being introduced to partner organisations, starting with the Highways Agency. Eventually access will be extended to multiple third parties including district councils, the Environment Agency and the fire, police and ambulance services.

> “[This] will make the same ‘here and now’ picture available to everyone. We will be able to talk with confidence about the same location, avoid duplication and ensure we are all optimally deployed to minimise public risk in emergency scenarios.”

Elwyn Williams- Highway Maintenance Officer, Worcestershire County Council.

03

IMPROVED OVERALL PERFORMANCE

Targets are a key mechanism through which managers monitor and improve performance.

An organisation's goals may be outcomes for citizens, performance metrics set by a regulator, returns for shareholders or simply profits. In both public and private sectors, geospatial technology helps ensure that operational activity is aligned to overall goals.

→ Increase Revenues

All too often the relationship between operational activity and sales revenues can become lost in organisational complexity. Geospatial solutions bring that relationship back into focus, contributing to higher returns.

By understanding the market more deeply than competitors and responding faster to new trends, businesses can create unique advantage. For example, by developing insights based on analysis of changing patterns in travel, footfall or other behaviours.

Organisations undergoing lean transformation can use location information to help prioritise operational tasks based on the greatest financial impact. Asset-based organisations can perform root-cause analysis to determine why assets failed, identify patterns and trends to prevent repeat occurrences. Location-based monitoring can help to quickly identify where a change has caused an activity to become less productive, so corrective action can happen faster.

Location can also play a role in revenue protection. For example, the oil industry is sometimes faced with fraudulent claims from parties who exploit an industrial accident such as an oil spill and claim that they have suffered a loss. Such claims have successfully been invalidated using evidence generated by mapping drone-sourced imagery of the damaged area or coastline.

Regulated businesses can use location data to ensure incentive payments are made or to reduce fines. For example, in a regime in which regulated businesses are fined for service interruptions that are their responsibility, OI can be used to identify outages caused by events outside the responsibility of the business, such as severe weather. By correlating the location and timing of service outages and weather events, evidence can be built to ensure invalid fines are avoided.

MAG

During the renovation of its departure areas, Manchester Airport group employed GIS to model the new retail spaces created and demonstrate passenger flow through these areas. With this valuable insight, the retail team could identify the retail units with the highest 'footfall' and market these premium units to higher-end retailers. Manchester Airport group was able to optimise its retail revenues, as well as make cost savings by re-using the GIS visualisations for brochure illustrations.

> "We managed to free up office space that could be allocated to commercial, thereby improving our profitability."
>
> Vickie Withnell, Group GIS Advisor at Manchester Airport group.

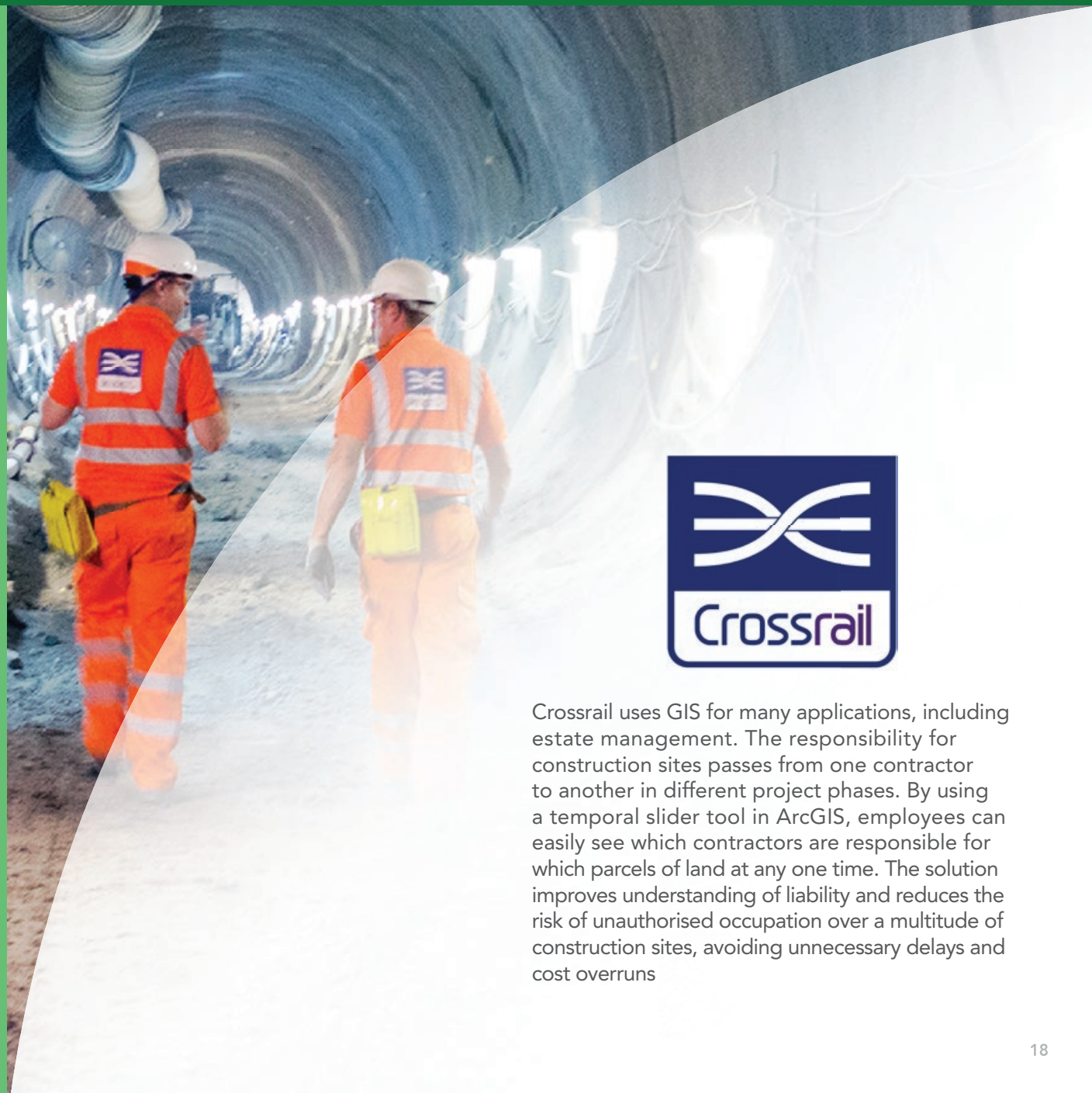
→ Reduce operational risk

Operational risks may be internal (people or process) or external (weather, natural or man-made disasters, supplier or partner failures). Today, organisations face new risks resulting from unexpected geo-political events (terrorism, cyber-attacks) and economic events (Brexit, industrial action).

With a deeper understanding of spatial relationships, organisations can identify, evaluate and mitigate risks. Predictions can be made based on knowledge of past events and alternative scenarios mapped out to assess the enterprise's ability to respond. Business continuity can be improved by identifying supply chain bottlenecks or single points of failure and creating alternative partnerships or routes.

For example, a product's journey can be traced from key component supplier locations through to manufacturing plants, distributors and ultimately to the customer. Events independent from a company's facilities can be identified and impact assessed. Monitoring the operating environment of the supply chain removes any dependence on suppliers self-reporting of disruptions.

Health and safety can be improved by providing clear operational boundaries, for example by separating the public from operational hazards or construction works. Organisations can be sure where lone or field workers are working and that they are correctly equipped for their environment.



Crossrail uses GIS for many applications, including estate management. The responsibility for construction sites passes from one contractor to another in different project phases. By using a temporal slider tool in ArcGIS, employees can easily see which contractors are responsible for which parcels of land at any one time. The solution improves understanding of liability and reduces the risk of unauthorised occupation over a multitude of construction sites, avoiding unnecessary delays and cost overruns

→ Make Better Decisions

The quality and quantity of operational information available to managers continues to grow and so decision-making is increasingly based on fact and analysis. Enterprise intelligence now depends heavily on location analytics.

A study by Ventana research showed that 85% of organisations using location analytics improved the results of their activities and processes[7]. But location information remains relatively unexploited. The same study found that whilst 54% of organisations used location in the analysis of customer data only 34% used location in the analysis of asset data.

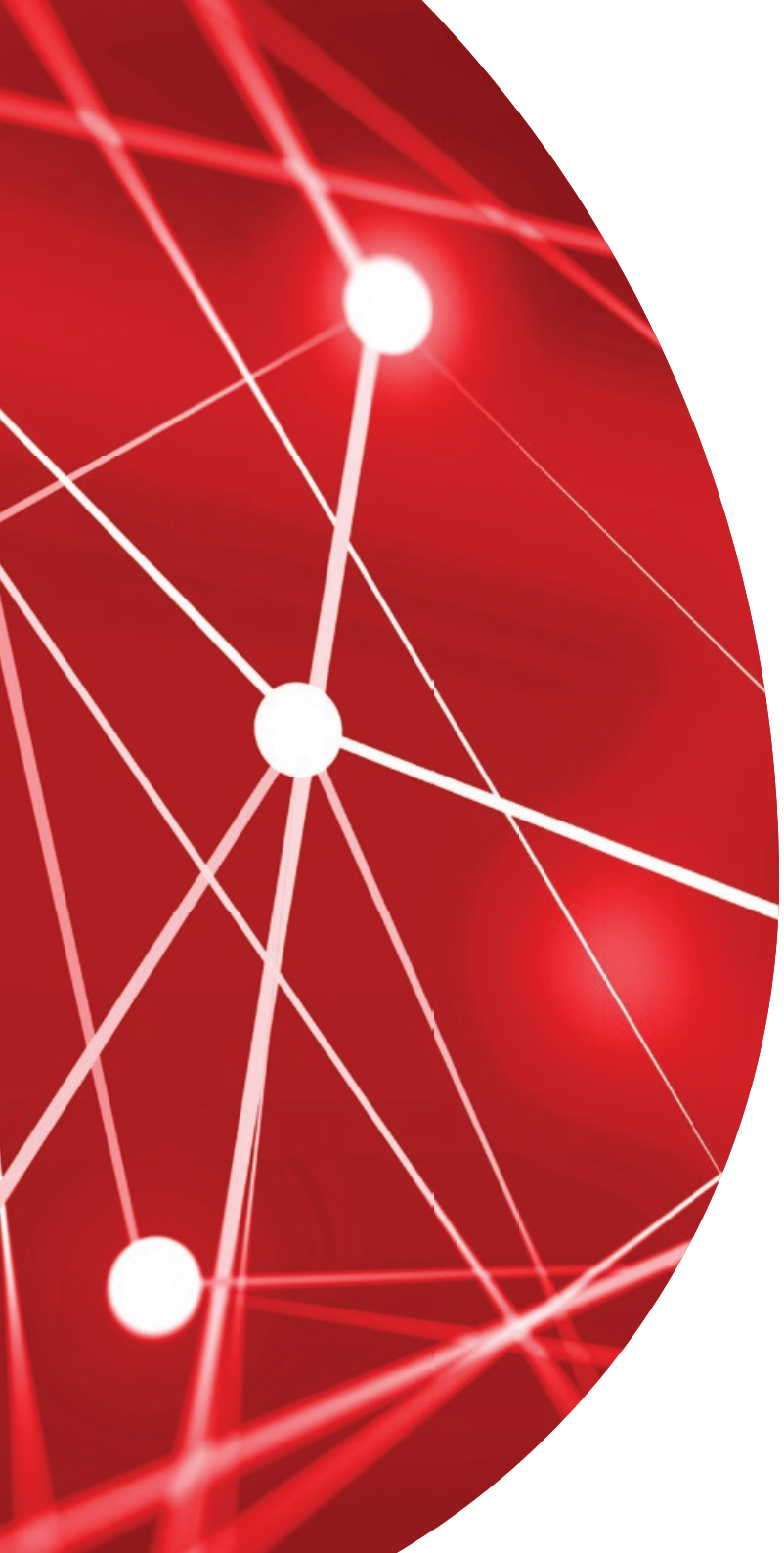
Knowledge of the location of key factors helps decision making at the macro level (where to do business or to locate facilities) and the micro level (optimisation of a site layout or locating individual assets and resources). For example, operations can accurately match variability of customer demand with available capacity, optimise travel routes and better schedule a field workforce. Co-location of assets can drive cost reductions. Telecommunication operators are using location intelligence to share mobile phone masts whilst ensuring reliable network coverage. Police and fire authorities are sharing station facilities to minimise costs.

[7] Business Trends in Location Analytics - Exploring the Impact of Geographic Context on Business Processes, Ventana Research, 2013.

ARGENT

In the heart of London, adjacent to busy King's Cross and St. Pancras rail station lies 67 acres of brownfield development. Argent is responsible for the development and asset management of this ongoing transformation. ArcGIS Online provides a complete, accurate record of all assets involved in the King's Cross development […] includes a 'phasing tool' that enables users to look forward and see how the site might look at different points in time. This feature plays a critical role in helping Argent to make high-level business and financial decisions, as well as project-level decisions.

> "The asset information that is accessible via ArcGIS Online influences many decisions we make, from how to plan on-site logistics to when to start marketing new homes, offices and retail outlets."
>
> Lilia Wydra, GIS Manager, Argent.



Building a smarter operation

The opportunity for location-based Operational Intelligence extends across public and private sector organisations that manage, or provide services over, our national infrastructure.

By adding context, location adds value, elevating raw data from across an operation to become actionable intelligence. For the enterprise, this provides the agility required to respond to the challenging consumer, competitive, and regulatory demands of today's increasingly disruptive environment.

To discover more about how the power of location can be used to increase Operational Intelligence in your organisation contact Esri UK.

About Esri UK

Esri is the global market leader in geographic information systems (GIS), offering the most, powerful mapping and spatial analytics technology available. Since 1969, Esri has helped customers unlock the full potential of data to improve operational and business results. Today, Esri software is deployed in more than 350,000 organisations including the world's largest cities, most national governments, 75% of the Fortune 500, and more than 7,000 colleges and universities.

Esri UK's team of experienced professional services consultants have delivered hundreds of projects, deploying the most advanced solutions for digital transformation, operational intelligence, IoT and location analytics. To learn more about our products, services and customers visit www.esriuk.com/about.

Esri UK supports infrastructure operations with skills, knowledge and resources in:

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

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