Location intelligence

making places smart

A joint publication by

Socitm inform

precisely

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Executive summary

Location intelligence offers many exciting opportunities to help deliver improved services in the public sector. But what does this mean in real terms?

This report was commissioned in recognition of the transformative potential of this emerging technology, coupled with a degree of uncertainty among our members about how best to leverage these opportunities.

Working in partnership with Precisely, we identify areas where location intelligence can add significant value to public sector service delivery. We also explain how to progress in order to reap these rewards.

In addition to evaluating the value of location intelligence to the sector, the report also provides case studies outlining how local authorities have utilised location services successfully.

We all know that the use of data is key to modernising operational practice and improving the experience for customers across the full range of public sector activities. Location intelligence is an increasingly widely used term that describes how geographically referenced data adds a new dimension to predictive analysis, using data to predict future behaviour.

This is not about re-packaging GIS. Location intelligence has its roots in big data management. Advances in technologies originally developed for use in defence mean they can now be used to address key challenges in the public sector.

It is Socitm's conviction that this intelligent use of data will become extremely prevalent in a short space of time. We want our members to be poised, prepared and ready to adopt a fresh and optimistic approach to the changes and chances to improve this next chapter represents.

This report is not an exhaustive account of the technical scope of location intelligence solutions. Instead it seeks to highlight how innovative organisations are already implementing the technology effectively.

We also wanted to showcase the potential of location intelligence solutions, particularly to readers who have never knowingly engaged with exploring the opportunities they afford.

Above all, we want to provide our members with food for thought that provides them with the sustenance required to discuss and collaborate emerging technology in the disruptive time. In partnering with Precisely, we are facilitating the opening words of an important conversation. One whereby we make consultation with an expert readily available and personal as we each progress to the next stage of this exciting journey towards a smarter place.

Sandra Taylor,
Socitm President
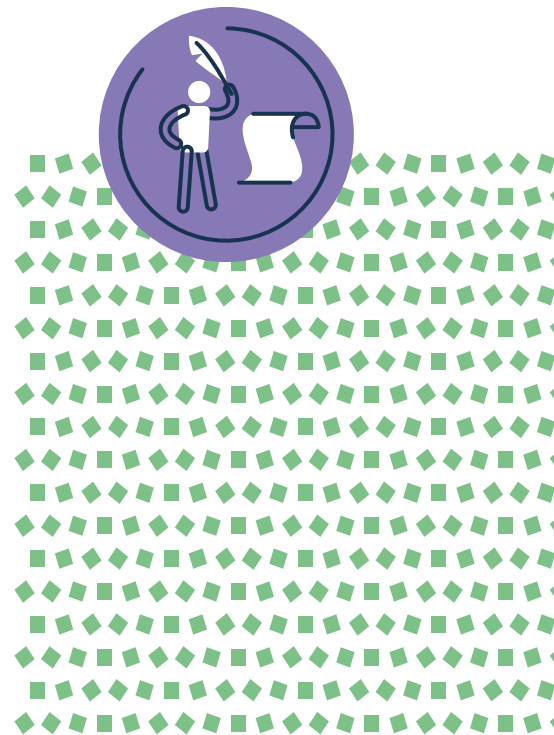
Section one: why is location intelligence important in the public sector?

Location, location, location. It's always been one of the primary drivers behind the services the public sector provides to citizens.

Planning, housing, highways, healthcare and emergency & environmental services are just of a few of the areas where people and places are inextricably linked. The quality of our provision is dependent on our understanding of the unique spaces service-users live, work and play in.

Only through such insight and interpretation are we able to continually improve our offering. In today's disruptive climate, it's never been more important to recognise that improving people's outcomes is a journey that begins with a single point of data: their address. However, these days, we're swimming in data. How do we employ effective solutions that make positive waves in a sea of big data, rather than drowning in complexity?

Only by making use of geospatial information innovatively can the public sector ride the wave of disruption. This report highlights a number of ways in which location intelligence is already making ripples in the world of public services delivery.

Beginning the journey

Becoming a location-intelligent government involves much more than simply updating technology from the geographic information systems (GIS) era. It requires the integration of location data into a broader realm of transformation.

Emerging smart places rely on rigorous and robust data management and analytics. Without embedding location data within a wider transformative strategy, the public sector will not be able to meet this demand.

We are working in partnership with Precisely to develop a roadmap to help public sector leaders use location intelligence in the most effective way possible. We are reviewing the history of location intelligence, beginning with the evolution of address data. This is the common point across all public sector data. From healthcare to education and housing and benefits, a postal address or some other point of physical location is the springboard from which services start rolling.

Spatial Awareness: answering questions

The race to gather location-specific data and utilise it intelligently gathers momentum as soon as smooth and efficient service delivery becomes reliant on answering essential place-related questions accurately and comprehensively.

These questions include:

› Where does traffic congestion regularly and most severely occur?

› Where will housing maintenance and repairs be most required net (in accordance with work undertaken most recently)?

› Where are there pockets of anti-social behaviour and at what times?

› Where do rough sleepers congregate and how do we most effectively ensure accessibility to outreach services?

› Where do we most effectively develop new build services, such as healthcare facilities and schooling?

› Where should we locate leisure facilities so that the most people possible have access?

› Location intelligence is key when determining the right answer to these spatial questions. Without accurate data, how can we answer these questions in a way that affects positive change for the people we serve?

The way we were

At the beginning of the GIS era, address data could rarely be used for anything other than its initial purpose. It wasn't digitised and often served as little more than a label on a virtual suspension file.

While GIS technology does apply geographic science with tools for understanding and collaboration, it does focus on visualisation by mapping data to inform decisions in GIS supported areas such as planning, public safety and targeted communications.

However, this data was typically stored in incompatible software environments and data formats. Aware of this fragmentation, pioneers began a drive to collect better quality location data and to standardise it.

While progressive, this still left much room for improvement. The data still didn't flow across different departments or give a broader picture of location and its vital importance in determining decision making.

Where we're going

Recently, the sheer volume of data the public sector collects has been accelerated by two primary influences.

Firstly, the rapid emergence and dissemination of technology as a commercial desirability has made it a far cheaper commodity. Even in times of austerity, tools such as GPS and mobile connectivity are no longer cost prohibitive to the public sector.

Secondly, emerging smart place approaches to digital service provision are necessitating that data be shared between multiple – and eventually – millions of connected devices.

The Internet of Things (IoT), increasingly serves as the cornerstone of public sector smart places initiatives. A transformative trend that will inevitably develop and grow. Early adopters in the public sector are sitting in the vanguard of the smart city movement and, by sharing their knowledge and experience, they are pivotal in helping others to streamline, improve and transform service delivery for the wider public good.

Intelligent infrastructure

The public sector is always under pressure to increase sustainability, adapt infrastructure to meet continual sociological change while improving services. Together with AI, Machine Learning, and IoT-enabled devices and services, location intelligence enables you to develop a comprehensive digital model of a physical environment. Intelligent infrastructures can be developed upon a secure and compliant cloud platform. Location intelligence data can be used to monitor all services in an open environment where it can be freely shared. This empowers leaders to be able to analyse massive amounts of data to create new policies. These location analytics enable the proactive maintenance of systems (including housing and infrastructure maintenance and repairs). This lowers operational costs while improving services for citizens.

Section two: the art of the possible

So, everyone's talking about location intelligence but what does it really mean? After all, you can collect all the data in the world and make charts and dashboards, but if people can't interpret it, what's the point in gathering it.

How does location intelligence use data to respond to and manage physical world or 'offline' service requirements? Will citizens truly benefit from public service investment in geo-spatial solutions and how quickly can you anticipate achieving ROI? When sensors and other technologies, became widely available and were connected to Internet Protocol (IP) networks using open protocols. The development of more mass market machine learning algorithms and systems has also made the opportunity for more automated physical incident response a reality. It also means pre-emptive action can be taken to avoid problems and predictively improve the free flow and accessibility of services. But how does that work in practice? The art of the possible is not about theory. Instead, it's about solutions that can actually be delivered.

01

Case study: Aberdeenshire Council

The foundation of a smart city - Confirm helps Aberdeenshire better streamline and manage public works

Client profile:

Aberdeenshire Council
aberdeenshire.gov.uk

› Scottish council area spanning 2,439 square miles

› Resident population of more than 250,000

› Responsible for nearly half a million public works assets, including 3,400 miles of roads and 1,600 bridges

Technology used:

› Confirm and ConfirmConnect

Overview

Aberdeenshire is a vast rural council area in northern Scotland. Its rugged landscape includes craggy mountains, an extensive coastline, small towns, farmland, and Balmoral Castle (Queen Elizabeth II's summer residence). Aberdeenshire Council is responsible for managing all the public works assets in its council area. These include

45,000 street lights, 1,600 bridges, 3,400 miles of road, 70,000 drainage ditches, cemeteries and playground equipment. All told, Aberdeenshire maintains more than 422,000 assets.

Business challenge

The inspection, maintenance and repair of Aberdeenshire's public works is handled by staff from numerous departmental teams working in 30 maintenance locations. The council needed a way to consolidate the multiple software systems used in its asset management cycle. It wanted employees to be able to communicate easily across departmental teams, thereby streamlining work processes. It also needed to simplify resident reporting, such as when a resident finds a streetlight outage or new pothole. And Aberdeenshire knew it would eventually have to find a way to more effectively tackle flooding and other weather-related issues that affect roads.

Solution

Aberdeenshire Council deployed Confirm infrastructure asset management software solution from Precisely. This solution provides public bodies with the insight needed to make informed decisions on asset repair and maintenance.

The council uses the solution to improve employee collaboration, and to better track the status of its assets. The council also uses ConfirmConnect, a mobile asset management program that uses

smartphones and tablets to enable the real-time flow of information between headquarters and field workers. Seventy Aberdeenshire inspectors use ConfirmConnect in the field, recording any asset flaws they find and feeding that information into Confirm software. Finally, a public portal allows residents to log in, note problems they've found with council assets, and point out the problem area on a map – important because many roads in this rural area are unnamed. "With Confirm, we have a method for recording and sharing information on these assets," explains Dave Clark, Principal Systems Development Officer with Aberdeenshire Council. "That makes a big difference. Previously, we had all this information on separate systems and there was no possibility for approaches such as joint working and developing a single unified model of our assets."

Benefits

Confirm software has enabled Aberdeenshire to consolidate disparate inspection, maintenance, and repair software systems into a single solution. Hundreds of dashboards record the status of more than 90 types of assets, while improving workflow and communications, reducing inefficiencies and helping Aberdeenshire move toward a more holistic "street scene" view of its assets. This view allows the council to see not just its assets, but its assets in relation to each other, helping to build a smarter city.

Improved communications have helped to break down departmental siloes. When a problem arises with a bridge that affects nearby roadways, for example, Confirm promptly alerts professionals in separate road and bridge departments, enabling them to work in tandem to ease traffic conditions. Improved communications also affect the public at large. Using the corporate web portal linked to Confirm, residents can more easily report issues. The solution has worked so well that Aberdeenshire

"What we've been able to achieve using Confirm is to understand our assets, where they are and what state of repair they're in. Then we can apply this new technology and understanding of what's around us to provide better services to our citizens."

Dave Clark,
Principal Systems Development Officer,
Aberdeenshire Council

is now piloting a programme to integrate Confirm with GIS and IoT technologies to help coordinate and ease the effects of flooding in the region.

Aberdeenshire has more than 70,000 drainage ditches (known as gullies in the United Kingdom). Water from these ditches can spill over onto roads if the ditches become too full. The pilot programme employs IoT devices to trigger an alert on Confirm when water reaches a predefined threshold in the drainage ditches. This information helps Aberdeenshire understand which ditches need to be cleaned. It also helps Aberdeenshire determine where to deploy expensive drain-emptying machinery.

Dave believes this programme will be as successful as others tackled with Confirm. "What we've been able to achieve using Confirm is to understand our assets, where they are and what state of repair they're in. Then we can apply this new technology and understanding of what's around us to provide better services to our citizens," he says.

02

Case study:
City of Edinburgh Council

From road repair to smart lighting, the City of Edinburgh Council is driving cost savings

Client profile:

The City of Edinburgh Council
edinburgh.gov.uk

› The capital city of Scotland

› Responsible for community services and maintenance of public assets, including waste collection, street cleaning, parks and road infrastructure (including lighting)

› Serves a city of more than 500,000 people, with a population that almost doubles during major festivals

Technology used:

› Confirm Intelligent Infrastructure Management software with the following modules: ConfirmWorkzone and ConfirmConnect

Overview

As the capital city of Scotland and home to the Scottish Parliament, as well as three globally recognized universities, a World Heritage Site and the Fringe Festival (the world's largest arts and entertainment festival), the City of Edinburgh often finds its infrastructure pushed to the limit. The city's Place Management team is responsible for a wide range of public services and asset management, from roads to trees and waste management. They recently consolidated data on the assets under their jurisdiction within the Precisely Confirm Intelligent Infrastructure Management solution. Having a "single source of truth" for this information facilitates better decision-making, improves efficiency of inspections and asset maintenance, and is saving the council money.

> *"What you really want is a system that lets you see the whole picture and identify which asset is causing the problem."*
>
> Gareth Barwell,
> Head of Place Management,
> The City of Edinburgh Council

Business challenge

Since 2013, the Place Management team had been using the Confirm cloud-based solution to manage data on some of the assets for which it has responsibility, but other types of asset information resided in separate, siloed applications. "Traditionally, we chose best-of-breed individual systems to support many of the individual services we were providing," says Gareth Barwell, Head of Place Management at the City of Edinburgh Council. "Like many councils, we invested in a road system, a tree system, etc. We did not have a single view of our overall infrastructure."

This disjointed approach to asset management resulted in a repair backlog throughout the city. At the same time, pulling together information for necessary reports and one-off requests was a challenge. City Councilors preparing for upcoming meetings would enquire about all kinds of statistics, from meter usage to frequency of certain types of road repair issues. The diversity of systems storing asset data often made it difficult to retrieve this information in a timely manner.

Maintaining multiple systems was also expensive. Faced with the requirement to cut £41 million from the 2019-20 budget, the council looked to technology to lower infrastructure management costs and provide better service to the community. One area in which the Place Management team harnessed leading-edge technology was to address the nearly 29,000 resident complaints they received each year related to aging street lighting. The city decided to invest £16 million in upgrading to LED smart lighting.

Barwell and his team knew that consolidating more asset management data into the Confirm solution could cut costs. They also saw an opportunity to reduce the city's repair backlog and lower the number of complaint calls they were receiving. Staff

> *"The level of information we get from Confirm means we can better determine which investments or improvements we can pursue that will make us more efficient."*
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> Gareth Barwell,
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> The City of Edinburgh Council

needed to be able to centrally manage the new smart lighting system, and adding this functionality to the Confirm solution made sense, as well.

Solution

The council expanded their Confirm cloud-based solution to include street lighting and additional asset categories including bridges and council-owned properties. Now the majority of city assets utilized in waste collection, street cleansing, parks and cemeteries, road maintenance and road infrastructure (including lighting and structures) are managed through the Confirm system.

More than 250 council employees use the Confirm solution, which houses asset inventory, inspection and maintenance data. It holds records of both scheduled inspections and those conducted in reaction to complaints. It records defects uncovered in inspections and monitors the work orders resulting from those defects. It integrates with the council's customer relationship management (CRM)
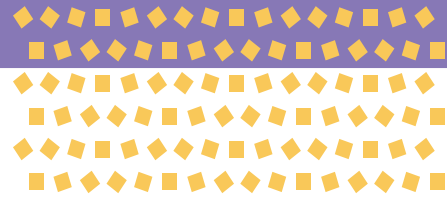
system to support more efficient responses to customer enquiries. And it offers the ability to analyze asset and performance data.

Council staff use the ConfirmWorkzone module to allocate work orders and schedule crews to repair defects. For work crews, inspectors and other council representatives working offsite, the ConfirmConnect module provides an efficient, two-way flow of asset information to and from mobile devices. Whether onsite or in the field, staff can view information on asset inventory, maintenance and performance through dashboards or a wide range of pre-built reports. "You can see key measures at a glance," explains Barwell. "And running the reports is easy; you don't have to be a specialist.

"The value of having all of our information in one place is huge for driving service improvement and for meeting our efficiency targets," he adds.

The Confirm solution is also playing a key role in the city's smart street lighting initiative. Now when a light stops working, it self-reports back to a system that's integrated with the Confirm solution. Through reporting on real-time light failures, the solution is able to quickly prioritize and expedite repair calls, significantly improving repair times.

The integration of the street lighting management system with Confirm is already delivering an improved repair function and will contribute to an estimated total energy saving of approximately £54 million over the next 25 years.

Benefits

Consolidating data on so many different asset types in one location helps the City of Edinburgh Council break down organizational siloes and focus on structuring work functionally. It also gives the Place Management team a unique view

of how assets and teams impact one another. For example, if tree roots are damaging roads or affecting drainage infrastructure, then analysis can be undertaken to identify existing or future defects where there are similar asset relationships.

"The automation of our processes, directly drawing on our comprehensive asset data, is helping us get our response to enquiries right the first time."

Gareth Barwell,
Head of Place Management,
The City of Edinburgh Council

"What you really want is a system that lets you see the whole picture and identify which asset is causing the problem," says Barwell. "Having all this information in one place helps us find opportunities to resolve multiple defects at one time, efficiently, compared with relying on more local and siloed knowledge."

Asset-related decisions have improved council-wide, as the Confirm solution has made the council's infrastructure more responsive to the needs of constituents. Anytime a complaint comes in, it is immediately clear which team has responsibility for the assets in question. The Confirm solution has also improved the efficiency of the Place Management team in prioritizing, scheduling and completing needed repairs and maintenance work for all types of assets.

"The automation of our processes, directly drawing on our comprehensive asset data, is helping us get our response to enquiries right the first time," Barwell says. "For example, street lighting electricians can show up quickly to the site of a work order with the correct stock on hand."

For the asset categories that were added recently, the Confirm solution has reduced repair backlogs by 90 percent and improved performance such that 95 percent of repairs are meeting or exceeding performance targets. Resident complaints are down as a result, and the city is also seeing an improvement in waste management metrics, with a reduction in missed-collection complaints down by more than 30 percent from 2017-18 to 2018-19.

The Confirm solution is also helping the city address its current financial constraints. With no capital investment required, the software-as-a-service system offers a transparent, predictable pricing model. And it frees up IT staff from managing and upgrading software and infrastructure, allowing them to focus on more strategic initiatives. All in all, the council has been able to substantially reduce tedious manual work related to asset management.

The integration of the Confirm solution with the city's new smart lighting system is already showing a significant financial return. Through remote problem identification and diagnostics, the city is reducing the number of times it needs to dispatch an electrician to a street light, saving a "conservative six figures," according to Barwell.

Finally, the solution is helping staff prioritize other initiatives. "The level of information we get from the Confirm system means we can better determine which investments or improvements we can pursue that will make us more efficient," explains Barwell.

The next asset management improvements the council will undertake involve using the new street lighting system to extend the smart infrastructure across Edinburgh.

"We will use the LoRaWAN network provided by the street lighting central management system to roll out smart waste litter bins for individuals and communities, gully sensors and air-quality sensors," Barwell says. "All of these technologies will integrate with our Confirm solution using Internet-of-Things [IoT] connectivity to bring defects to the attention of managers and to support scheduling of work orders. The Confirm software will be integral to our business case as we progress toward the consolidated and automated monitoring of all the council's assets and data in a city operations center."

"You can see key measures at a glance. The value of having all of our information in one place is huge for driving service improvement and for meeting our efficiency targets."

Gareth Barwell,
Head of Place Management,
The City of Edinburgh Council

Section three: reading the roadmap

Now you've started your location intelligence journey, it's time to take a holistic overview of how you're going to get from A-B. Here are some important way-markers to make the ride a smooth one and send you safely on your way.

Shifting the mindset

As with so many aspects of digital transformation, using location intelligence to its full effect is dependent on full buy-in and belief in its potential.

It's essential that CIOs and other digital leaders move away from thinking of geospatial data as merely about mapping. It's important that they become 'context centric'. Location is much more than coordinates on a map. It's fundamentally concerned with integrating data about people's lives, their expectations and aspirations. It's about understanding the geocontext associated with this address so we can engage in a meaningful way in regard to their environments and suggest vital improvements .

It's crucial to see beyond the GIS silos of yesterday and to develop positive strategies. These need to be developed to ensure location data is integrated, processed, managed and made available to internal and external stakeholders in new ways.

Keep your eyes on the road

Even when you're travelling a familiar route, no two journeys are the same. They're even more different if you compare the experience of a driver with those of their passengers.

Different people within your organisation need to answer specific and varied spatial questions in order to determine the decisions they take.

Everyone looks for specific correlations and anomalies associated with place. That's how they can identify opportunities to apply analytics and improve services.

This process is about them monitoring the 'event horizon'. A vista comprised of four types of location specific events:

1. Routine events, such as repaving streets, where location intelligence helps mitigate impact

2. Planned events, such as festivals, requiring the anticipation of impact on citizens and associate planning

3. Predicted events, such as snowstorms or flooding, requiring planned response

4. Unplanned events, such as fires or natural disasters, where response needs to rapid and strategic

These four areas rely upon effective and efficient data sharing between agencies in both the public and private sector and that's what location intelligence allows.

Come together: right now

Integration is important to the public sector and most organisations are taking steps to move away from data in silos. Whether they are creating data lakes from which to pull disparate data or relying on more traditional methods of data interchange, the challenge transcends technology.

Digital leaders need to facilitate discussions with multiple departments in order to get everyone on the same page. Different departments often have their own cultures: they can use specific terminology that makes inter-departmental communication harder. Standardising terminology and phrases can be a good way of getting people to integrate. It also helps people to understand the need for data to be standardised.

This can be a slow process but it's an essential one. Take your foot off the peddle and be prepared for delays. When the breakthrough comes, it will be worth it.

Put your foot to the floor creatively

The public sector has to manage multiple location-based services, such as housing, transportation, healthcare and education.

Sharing information with and making the best use of third-party data (such as real-time traffic information from commercial providers or footfall data from retailers) can prove invaluable.

Environments are changing rapidly. The public sector needs to respond in kind. Standardising data is essential in this day and age when third party data can play a vital role in improving service delivery. It's, therefore, essential that third-party data is refreshed regularly so this benefit is maintained.

Section four: where next?

Harnessing the potential of location intelligence empowers public sector organisations to challenge convention, proactively address issues, focus efforts for future projects and finding opportunities to apply smarter planning. All in pursuit of transforming services for citizens.

They are equipped to ask complex geospatial questions yielding answers enabling dramatic improvements in services to citizens and other stakeholders.

As smart government technologies continue to mature, location-aware connected devices will process even more citizen data and the public sector needs to continually evolve in response.

By opening discussions with a location intelligence expert now, the public sector is future proofing its ability to provide consistently ground-breaking services, making a real difference not just to their own organisation but to the sector as a whole.

Written and produced by:

Socitm inform

Socitm is the society for innovation, technology and modernisation. Its vision is to be the preferred network for professionals who are shaping and delivering public services.

Socitm members benefit from being part of a growing community where collaboration is key. The organisation brings people together to share experiences and best practice while learning from each other. This promotes and nurtures personal and professional growth and development for individuals and improves service delivery across the public sector.

Established for over 30 years, Socitm continues to challenge convention, inspire change and power progress. Its core focus is on how digital strategy and innovation impacts positively on the lives of service users. It believes that the most positive outcomes for people can only be achieved through sharing excellence, collaboration and discussion.

Learn more at: www.socitm.net

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Better data.
Better decisions.

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