CASE STUDY

Sault Ste. Marie Innovation Centre

Leveraging geographic data for the betterment of the community

esri Canada

SAULT STE. MARIE INNOVATION CENTRE:
A MODEL OF EFFECTIVE INFORMATION SHARING
UNDERPINNED BY GIS

Civic co-operation & partnership through data sharing & innovation reap large rewards

Cities are comprised of numerous departments and divisions, each responsible for a key component in the municipality's operation such as water, fire and police departments. Each of these entities collects and controls reams of vital data that may not be shared with other departments.

The leaders of one Northern Ontario city have begun to show the world the spectacular improvements that can be realized when partnerships are developed between entities. The City of Sault Ste. Marie has mandated a special centre of innovation that takes various datasets from numerous civic departments and layers them to uncover patterns that can inform future decisions.

Esri's Geographic Information System (GIS) software transforms raw data into meaningful, highly visual maps, allowing leaders to see geographic patterns that numbers on a spreadsheet simply can't convey. This in turn leads to savings in areas such as infrastructure spending, costly information-gathering studies and labour costs, to name only a few.

SSMIC: A Model of Accomplishment

The Sault Ste. Marie Innovation Centre's (SSMIC) story is one of unparalleled civic cooperation and partnership, and is a model of accomplishment upon which other municipalities are basing their strategies. Its Community Geomatics Centre (CGC) is comprised of over 60 community partners (municipal government, utilities, health, social services, education, emergency response and economic development agencies) and thousands of data layers that support, amongst other things, community planning, development and investment decisions.

To facilitate data sharing, the CGC and its partners use a number of Esri solutions including ArcView, ArcEditor, ArcInfo, ArcSDE, and ArcGIS Server. These solutions have played a key role in creating improvements in public works, economic development, public safety and health delivery, reducing municipal liabilities and promoting a more effective use of budgetary resources.

Project History

In the heart of Northern Ontario sits Sault Ste. Marie, a city surrounded by a rugged and beautiful landscape that offers its population of 75,000 an endless array of year-round outdoor activities. These spectacular natural resources have also been the traditional driver of the city's economy, with forestry and steel being the main pillars on which "The Sault" was built.

By 1993, however, these sectors were in steep decline, causing unemployment rates to soar to nearly 20 per cent[1]. With the city quickly spiraling into a shadow of its former prosperous self, community stakeholders realized that a new plan of action was required. To stem further job losses and provide residents with fresh opportunities, new economic activity would have to be stimulated in other industries.

The information technology sector soon emerged as one of the most critical areas of interest and in 1998, the Sault Ste. Marie Innovation Centre was established to fuel its growth.

GIS: Advancing Quality of Life

It didn't take long for GIS to become a big part of the SSMIC's responsibilities. When it came to light that both the municipality and the Public Utilities Commission were planning to make their own individual investments in the technology, city leaders decided to use the newly created SSMIC to house and manage a joint set of GIS applications. It was the first in a long line of partnerships between Sault-based organizations, companies and agencies that has helped make the SSMIC a model of effective information sharing, underpinned by Esri's GIS technology.

Esri solutions are used by the CGC to advance community quality of life, strengthen the economy by growing existing businesses, attract skilled workers and new investment, improve information exchange, promote collaborative decision making and enhance government service delivery. The CGC model is currently evolving to become a Community Information Utility as it expands from utilizing primarily geographic data to leveraging the use of all public information, both geographic and non-geographic.

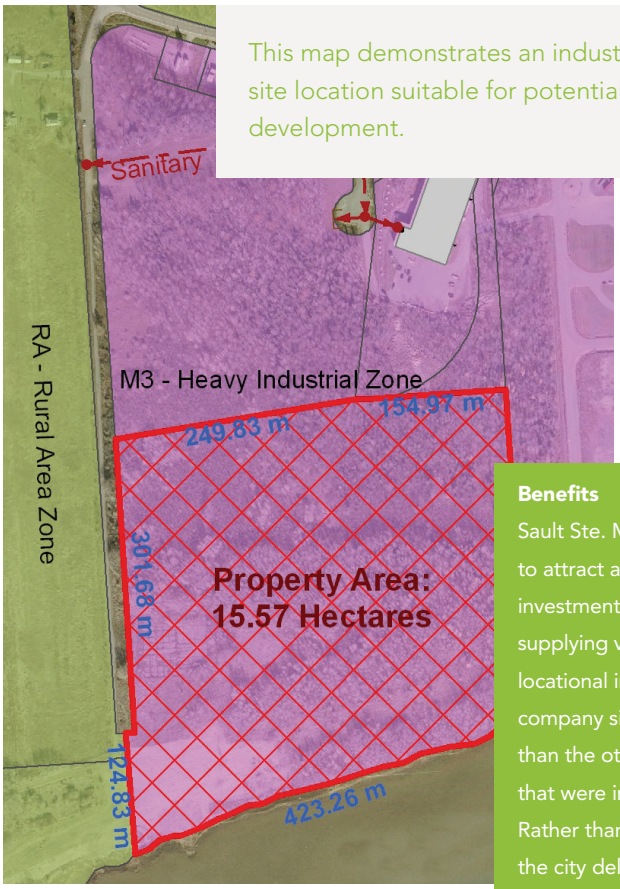
"The ability to access a wealth of municipal data directly through the desktop has eliminated the need for city staff to physically go to City Hall to obtain information. The end result is substantial savings in both time and effort."

Paul Beach
Manager, Community Geomatics Centre
Sault Ste. Marie Innovation Centre

1. Macklem, Katherine. 2004. Ten Lost Years: Sault Ste. Marie: A Steel City's Blues. Maclean's. June 21.

ECONOMIC DEVELOPMENT

Location attracts investment



This map demonstrates an industrial site location suitable for potential development.

> GIS tools can greatly benefit municipalities when trying to convince businesses to locate on their soil. Pod Generating Group, a developer of utility-scale solar power generating facilities, recently sent out requests to multiple Ontario cities for information on geographic and locational factors that were required to build a facility. These included proximity to the electrical grid, particular zoning requirements, soil type, degree of slope on a given piece of land, and clarity of view towards the southern horizon.

Using data supplied by multiple organizations and the data layering capabilities within Esri's ArcGIS, the CGC was able to provide Pod with six potential locations that met their criteria—within hours. Traditional data gathering methods would have taken months. Since Pod had a narrow window of time in which to make their decision, this quick turnaround of highly accurate and useful data played a crucial role in their ultimate choice of Sault Ste. Marie.

"Esri's solutions allow us to quickly gather critical information required by businesses that are considering locating in Sault Ste. Marie," explains Mr. Beach. "The ability to provide this information in a matter of hours or days rather than weeks or months has resulted in many of these businesses choosing The Sault over other cities."

Benefits

Sault Ste. Marie was able to attract a $400-million investment project by supplying vital GIS-generated locational information to the company significantly faster than the other communities that were invited to compete. Rather than taking months, the city delivered the data in a matter of hours, which helped bring business to the city, create jobs for residents, and ultimately, improve its economic health.

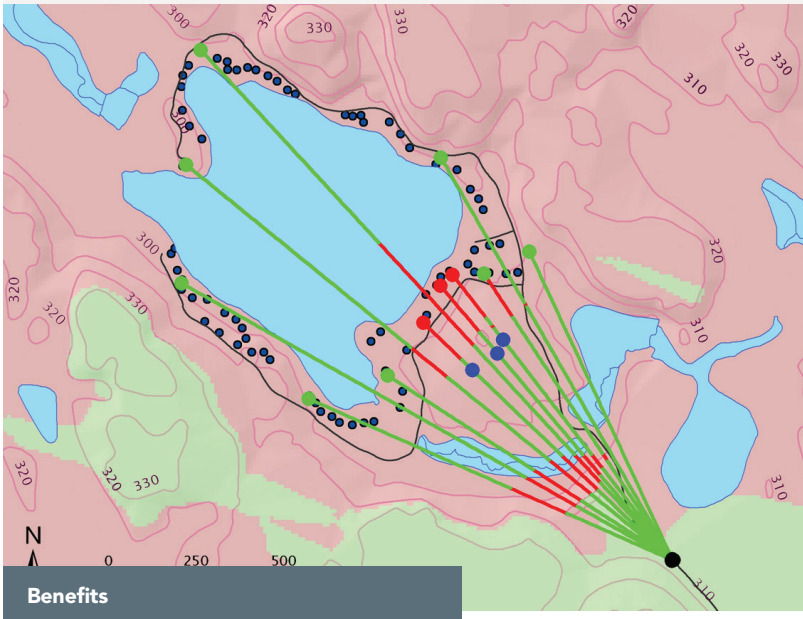
UTILITIES

Site analysis for smart utility infrastructure

> PUC Inc., (formerly the Public Utilities Commission) was recently tasked by the provincial government to equip all homes and small businesses with smart utility meters by the end of 2010. Smart meters record hourly electrical consumption statistics that allow utilities to charge different prices based on different time-of-day usage rates. This data is then transmitted by phone lines or wireless signals back to PUC Inc. However, it was proving difficult to equip houses located in rugged rural areas where there were no phone lines or cell coverage. To solve the problem, PUC Inc. considered erecting a tower that would sit between these remote properties and towers residing on their own property. This intermediary, or "repeater", tower would be able to receive signals from houses and retransmit them to the main towers.

Due to the rugged terrain of the area, options for locating the repeater tower were limited. PUC Inc. turned to SSMIC's Community Geomatics Centre (CGC) to help determine what locations, if any, would be appropriate for constructing the tower. Using Esri tools to generate a viewshed analysis—which identifies all areas of an input surface that can be "seen" from an observer point—CGC delivered a visual representation of potential wireless transmission lines within two days. As a result, PUC Inc. officials were able to see that it was in fact possible to erect a tower that could retransmit wireless signals and they could also identify the best locations to do so.

A line of sight analysis scenario indicating smart meter visibility from a signal repeater.



Benefits

Through the use of Esri's viewshed analysis and Line of Sight drawing tool, PUC Inc. was able to find out, within days, if their idea was feasible. The alternative option would have involved commissioning a study, the cost of which would have been very expensive and would have taken weeks to complete.

Getting the lead out

> Excessive amounts of lead in drinking water can pose serious health risks, particularly to pregnant women and young children. Fortunately, many newer homes are not built with lead pipes, but older dwellings, especially those built before 1950, are more likely to contain such materials. In 2007, Ontario's provincial government introduced stringent requirements for municipalities that required them to identify homes likely to have lead pipe services. For many communities, this is a time- and money-intensive exercise.

The SSMIC was called upon to layer various sets of GIS data from multiple providers to identify homes that were most vulnerable.

These datasets included Municipal Property Assessment Corporation data to locate homes built before 1950 and Algoma Public Health records to identify residences that housed pregnant women and infants. As with all uses of personal data carried out by the CGC, individuals' privacy rights were protected by using postal codes as primary identifiers—an input factor granular enough to be useful but not so specific that individuals could be identified. At-risk addresses were then ranked based on health risk criteria and their occupants were contacted and informed of the need for testing and installation of modern tap filters.

PUBLIC WORKS

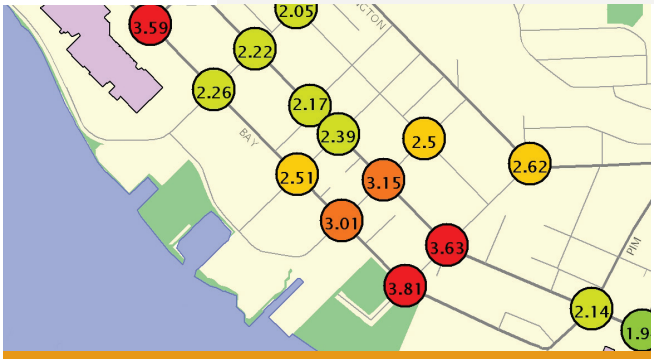
Siting audible crosswalks where it matters most

> Through the use of audible tones and verbal messages, Audible Pedestrian Signals (APS) offer individuals with visual disabilities increased levels of safety when crossing at intersections. The City of Sault Ste. Marie and the Canadian National Institute for the Blind (CNIB) were interested in determining the placement of five new APSs that would be most beneficial to the visually impaired population within the community. The city's council traditionally spreads the installation of such equipment as evenly as possible across Sault Ste. Marie's six wards. Using Esri's Spatial Analyst Extension, the CGC set out to examine whether this would in fact deliver the most benefit to the community.

An impact analysis was performed using data from both the CNIB and the City to determine where the greatest need for APSs existed. Factors such as number of CNIB clients, number of bus stops and number of pedestrian collisions were considered and a visual representation was then produced.

"Esri's extensive capabilities allowed us to easily transform large amounts of data into a clear visual representation," said Jason Collins, Client Services Manager, Sault Ste. Marie Innovation Centre. "As a result, we were able to identify, and validate, intersections within the community where the allocation of resources would best serve our citizens."

This map shows high-risk intersections in Sault Ste. Marie, helping the City to prioritize locations for audible pedestrian signals.



Benefits

Significant time and labour cost savings were realized through the use of GIS. Additionally, a valuable service was established for individuals with visual disabilities in locations that provide the greatest benefit.

Many communities have to rely on a suitability checklist or point scale system to gather data—processes that must be done manually and require significant time and labour. The use of Esri's GIS tools enabled the City to decide where to install the new APSs based on need rather than the traditional approach of even distribution.

Benefits

The spatial overlay capabilities within Esri's ArcGIS software allowed Algoma Public Health to quickly identify homes most at risk for high lead levels in their drinking water, saving significant amounts of staff time and effort, while ensuring the health of thousands of residents.

PUBLIC SAFETY

Bear tracking for citizen safety

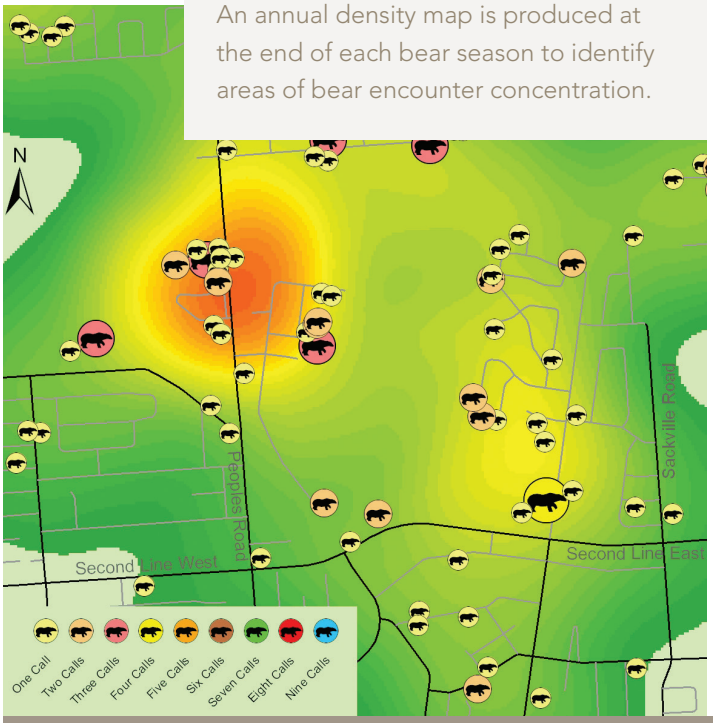
> Living amidst the natural and rugged beauty of Northern Ontario means that some of your neighbours are going to be wild animals, including bears. The CGC uses GIS to help ensure that bears do not pose any threat to citizens' safety.

The Ontario Ministry of Natural Resources (OMNR) operates a phone-based reporting service known as the Bear Wise Reporting Line. All calls reporting a bear occurrence are recorded in a spreadsheet and archived. Since 2004, this information has been shared with the CGC on a weekly basis and they use Esri's ArcGIS software to perform geoprocessing and mapping procedures on the data. The caller's location is recorded, as well as any details regarding the bear encounter. The CGC geocodes the information to the location of the incident using existing base data and orthophotography for the city.

Areas of high bear encounter concentrations are identified and citizens in those areas are notified and educated about proper procedures to follow when a bear is sighted.

An annual density map is also produced at the end of each bear season to identify areas of concentration and to educate the public.

An annual density map is produced at the end of each bear season to identify areas of bear encounter concentration.



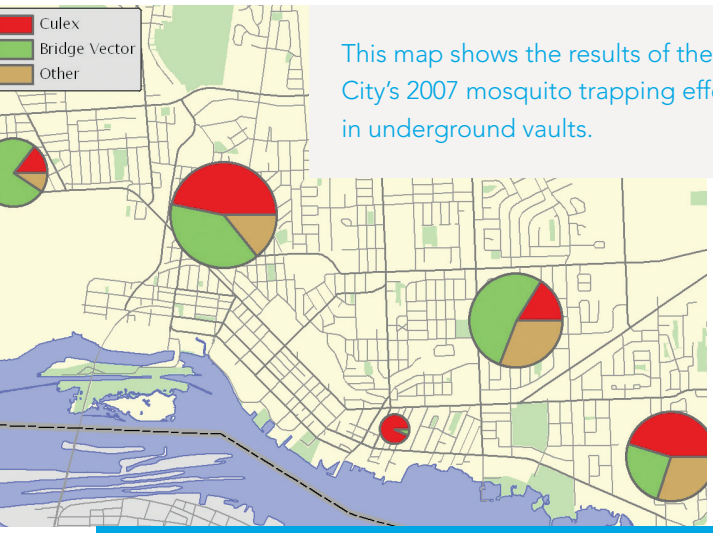
Benefits

Interactive maps and pattern analyses produced by GIS help reduce the number of bear encounters and allow OMNR staff to recognize patterns of bear movement within the city. This information helps raise awareness among citizens and allows officials to target their educational efforts on specific neighbourhoods, rather than spreading effort and money evenly – and less effectively – across the entire region.

"Esri's geocoding and spatial analysis tools have enabled us to effectively illustrate the data to quickly identify areas where high concentrations of bear encounters occur. This has not only allowed us to better protect our citizens, it has also led to a more efficient use of budgetary and staffing resources."

Chris Sambol
Manager, Health and Human Resources
Sault Ste. Marie Innovation Centre

Cause & effect analysis: Coordinated effort against West Nile



This map shows the results of the City's 2007 mosquito trapping efforts in underground vaults.

Benefits

Data sharing among municipalities coupled with the ability to analyze data using GIS helped to identify the root cause of the mosquito infestation. Subsequently, a potentially serious health threat to citizens was effectively mitigated.

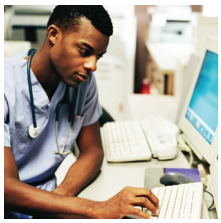
> The benefits of data sharing between municipal entities, and the visualization of data through GIS, was clearly exemplified by Sault Ste. Marie's mitigation of a serious health threat related to the West Nile Virus in 2006. The potentially lethal virus first appeared in North America in 1999 and quickly spread throughout the continent. It can be transmitted to humans by mosquitoes that have bitten infected birds. Any collection of stagnant water and organic matter, where mosquitoes tend to gather, thus becomes an area of concern.

While conducting an unrelated project to identify potential tripping hazards within the water and electrical infrastructure, the CGC noticed an unusually large collection of mosquitoes within transformer vaults. These vaults had been placed underground in the 1960's and 1980's to improve the aesthetics of residential neighbourhoods and had become the perfect breeding ground for mosquitoes as well as a potential West Nile threat.

Staff notified Algoma Public Health (APH), which subsequently conducted larval dipping tests and determined that the vaults required treatment with a larvicide. This was due in large part to the fact that the vault compartments were prone to filling with water, because there was an absence of drains within the structures.

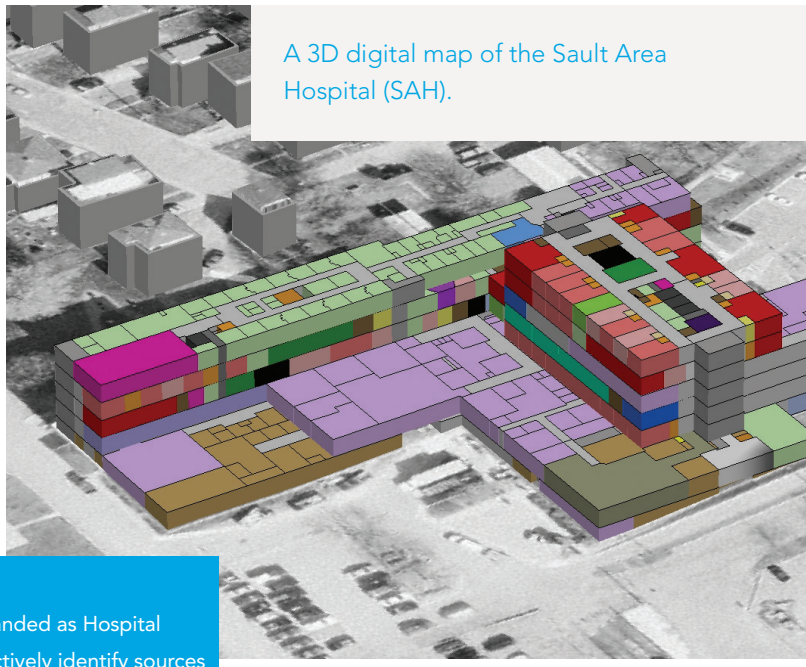
The City's Public Works and Transportation division quickly treated the vaults to eliminate the larvae. A month later, larvae were not detected in 94 per cent of the vaults.[2]

2. 2006 West Nile Virus AHU Annual Summary Report, Algoma Health Unit.



Facility disease tracking enables officials to mitigate impact

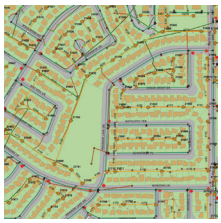
> In October 2006, an outbreak of the infectious superbug known as Clostridium difficile-associated disease (CDAD) occurred at Sault Area Hospital (SAH). An audit of 26 patients who had passed away since the outbreak began revealed that 18 had been victims of the CDAD. Algoma Public Health officials subsequently sought ways of better understanding how and by what means CDAD had spread throughout the facility. Data regarding the movement of patients and hospital assets was collected and then imported into Esri's software for analysis. This, combined with blueprints of the hospital, allowed CGC to create a digital 3D model to visually represent the movement of patients and materials.

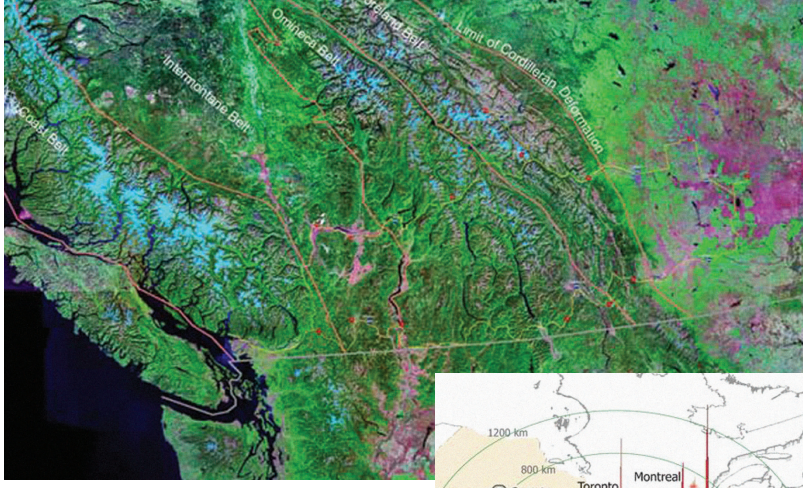


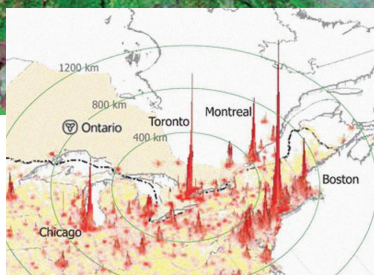
A 3D digital map of the Sault Area Hospital (SAH).

Benefits

A co-developed geospatial tracking solution, branded as Hospital Watch Live, allows hospital officials to more effectively identify sources of infectious diseases within a facility. This takes the guesswork out of the containment process and eliminates the need to continually disinfect large areas, while not knowing where CDAD is actually located. After receiving the GIS-based analysis from the CGC, and recommendations from Algoma Public Health officials, there was a significant drop in CDAD cases at SAH.







Geography matters

Whether it's choosing the best site for a new facility, targeting a specific market segment, planning a distribution network, zoning a neighborhood, routing vehicles to respond to emergencies, monitoring land use planning, or locating a power outage, geography plays a role in nearly every decision made in the world today.

A geographic information system (GIS) uses computers and software to leverage this fundamental principle of geography— that location is important in people's lives. With the vast information sources available today, GIS is a key tool in determining what it all means. And with so much information tied to a location, GIS helps find patterns we might not see without a map.

Simply put, GIS takes the numbers and words from the rows and columns in databases and spreadsheets and puts them on a map. The use of maps to convey information adds an extra dimension to data that might not jump off the page in a simple list or spreadsheet. It allows you to view, understand, question, interpret, and visualize your data in ways previously not possible. The visual aspect of a map provides you unprecedented insight and knowledge into your organization's assets and workflows.

Putting geography at the heart of your organization enables an enterprise-wide analysis of operational performance, reduces risk and drives business strategy. It allows you to tap into an entirely new level of intelligence from existing data sources, what we call Geographic Business Intelligence (GBI). When integrated with existing asset management, logistics, marketing, sales, customer service, workforce and work order management operations and applications, it brings new insights that improve operational efficiency which impacts the bottom line.

At the forefront of GIS technology is Esri. Esri offers a market leading GIS solution that helps users make mission-critical decisions, keep communities safe and create a more sustainable world.

Key benefits include:

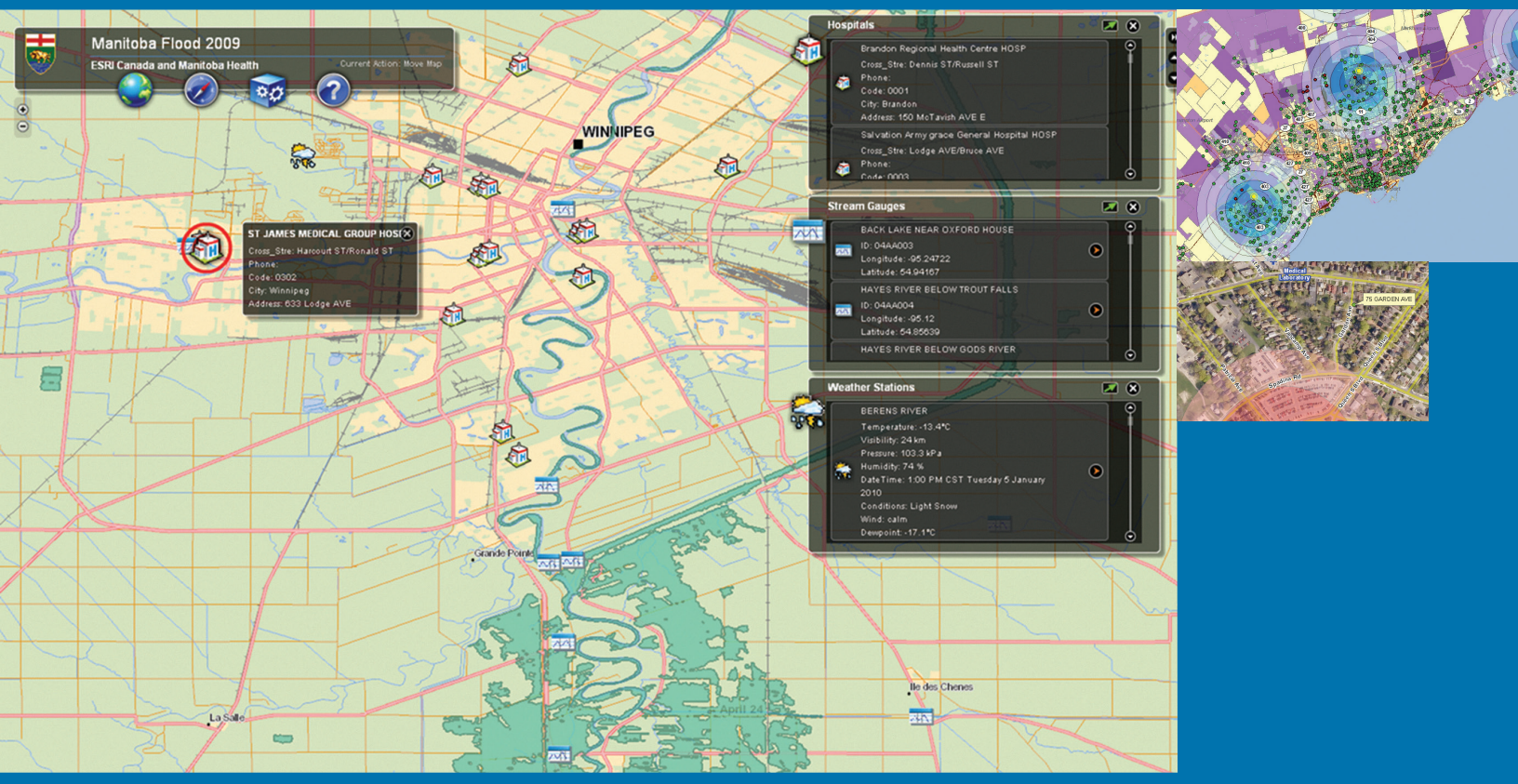
- **Cost savings resulting from greater efficiency**
- **Better decision-making**
- **Improved communication**

Esri's GIS solutions are robust, scalable, open and built on a platform that provides a foundation to span the enterprise. Esri is committed to innovation and reinvests 20% of revenues in Research & Development (R&D) to address the fundamental challenges organizations face. As a percentage of revenues, Esri far exceeds industry peers in R&D expenditures.

Strength in numbers

We serve over 10,000 customers from 16 locations across Canada. Our customers are part of the largest GIS user community in the world: more than one million users in nearly 300,000 organizations rely on Esri to provide answers that matter. Diversity in our customer portfolio gives us a broad perspective and tremendous base of experience.

With 25 years of consecutive revenue growth and profitability, we have the depth of resources to sustain excellence in solution delivery and customer support. While many of our competitors have merged, changed ownership or simply vanished, we have remained focused on providing comprehensive GIS solutions and enhancing relationships with our customers.



Esri Canada
12 Concorde Place
Suite 900
Toronto, ON M3C 3R8
T: 416-441-6035
F: 416-441-6838

Customer Care
1-800-447-9778
customercare@esri.ca

Technical Support
1-877-441-0337
support@esri.ca

esri.ca

Founded in 1984, Esri Canada provides enterprise geographic information system (GIS) solutions that empower businesses, governments and educational institutions to make timely, informed and mission-critical decisions by leveraging the power of geography. The company distributes the world's leading GIS software from Esri, along with a comprehensive portfolio of complementary GIS products and services. Headquartered in Toronto, the company serves over 10,000 customers from 16 regional offices across Canada.

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