

BIOGRAPHICAL INFORMATION

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Specific Responsibilities

Kevin joined Sierra Systems in 2000 and has provided expertise in strategic planning, business requirements gathering, feasibility studies, and project management relating to many GIS initiatives in Government and Oil and Gas.

Past Experience

Kevin has over 14 years of experience in the geospatial information technology industry in roles of Customer Service, Systems Analysis, Sales, GIS Analyst and Project Manager with Intergraph Canada Ltd. and TELUS Communications Inc.

Educational Information

IT Management Certificate, University of Alberta

Computer Technology Diploma, Southern Alberta Institute of Technology

Professional Memberships

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AFFORDABLE INFRASTRUCTURE MANAGEMENT

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ABSTRACT

The Municipal Infrastructure Management System (MIMS) initiative was a unique undertaking inspired by Government of Alberta, Alberta Municipalities and their associations to have an affordable, easy to use infrastructure management system. Developed with input from representatives of all levels of Municipal Government and Engineering Consultants, the MIMS Toolset is a turnkey system designed for a wide range of users and communities in Alberta. Over 50 communities composed of towns, villages, counties, cities, and engineering consultants across the province are now using a common data model and MIMS application to maintain inventory, condition, event history and value of their assets. GIS is the core powerhouse for this system that is continuing to evolve to support responsible infrastructure management for many existing and new users.



CONTEXT

The increasing quantity of aging infrastructure that is approaching its maximum life expectancy is a serious concern for many Municipalities. Moreover, the insufficient amount of quality data about the infrastructure prevents proper planning of rehabilitation or replacement of infrastructure components. Political leaders are increasingly aware of the growing 'infrastructure deficit' that threatens the future viability to sustain expected levels of safe drinking water, effective storm and sewer disposal and quality of road networks. These factors ultimately impact decisions by families as to where they raise their children as well as where business and investors search for their next opportunities.

The National Technical Guide for Infrastructure (1998) described the Municipal situation in Canada:

“Municipalities today are faced with increasing responsibilities that go beyond the basic water, sewer and road services. Difficult decisions are made daily to establish investment priorities. Municipalities must watch every dollar spent and

aim at the highest return on that investment. Municipal infrastructure, already undergoing its natural ageing process, is decaying at an accelerating rate owing, among a wide range of factors, to reduced funding, increased demand (e.g., heavier traffic loads), insufficient quality control resulting in poor installation, little or no inspection and maintenance, and a general lack of uniformity and improvement in design, construction, and operation practices”.

In response to this growing dilemma, the Government of Alberta in partnership with four Municipal Associations initiated the Municipal Infrastructure Management System (MIMS) Program to assist Municipalities, particularly those who did not have the resources to obtain and manage an infrastructure management system on their own. At the time, MIMS was envisioned as a tool for sound decision-making and capital planning.

THE BUSINESS PROBLEMS

There were several problems which lead to the need for an affordable infrastructure management system. The following are key issues that the Municipal sector faced:

Little to no inventory, condition, or event data – Public Works staff often have local knowledge of their infrastructure which is undocumented. This is of grave concern for those communities who lose staff through retirement or turnovers.

Short term planning horizon - Many Municipalities reluctantly adopt a reactive approach to infrastructure management and plan for the short term. Users reported that they have great difficulty reporting what they own and its condition in order to facilitate requests for funding assistance for capital projects.

Difficult to make the right decisions – The ability to make good decisions regarding long term alternatives related to maintenance, repair or capital replacement is hampered by the tedious, manual processes of gathering infrastructure information from various locations (if it exists).

Risk of liability - Municipalities are being held accountable and liable for missing or damaged road signs, physical hazards on sidewalks and slippery road conditions not resolved in a timely manner. Public Works Departments are constantly challenged with determining their priorities for managing their various assets and they are relying more and more on technology to increase productivity and efficiency.

THE CHALLENGES

The MIMS Management Committee established the following requirements for MIMS at the start of the initiative:

- Available to all Municipalities and the tools must be usable and affordable to acquire and maintain for small to medium sized Municipalities;
- Easy to use, maintain, upgrade and expand to include other types of physical infrastructure;

- Able to deliver the information requirements identified under the Provincial Capital Planning Initiative.

The intended audience for MIMS was made up of a diverse group of stakeholders with varying requirements, levels of capabilities/knowledge, readiness, and resources. This group was composed of villages with a population of 400 to small cities to rural counties with vast geographical coverage. There was an apparent lack of quality and structured infrastructure data in most communities and no georeferenced spatial files beyond a paper map on the walls in the Public Works Office.

The MIMS project team needed to focus the stakeholders on some common ground to obtain buy in and make progress. Regardless of the size and special needs of the community, there are six "What's" that Municipalities need to answer to successfully manage their infrastructure, as identified by researchers at the Institute for Research in Construction at the National Research Council Canada*:

Question	To answer the question...
What do you own?	<i>requires knowing where assets are located and what quantity exists. This requires the ability to create reports on infrastructure assets by type, material, vintage, etc.</i>
What is it worth?	<i>requires the ability to link financial data with your infrastructure inventory to calculate capital replacement costs.</i>
What is its condition?	<i>requires the ability to link your condition assessment data including inspections testing results, and past condition measurement indicators to your assets.</i>
What is the remaining service life?	<i>requires a municipality to perform trend analysis of utilization and capacity performance. Also compare the historical and current condition assessment curve with the anticipated life expectancy.</i>
What is the maintenance backlog?	<i>requires knowing what needs to be fixed this year or the future costs if the maintenance is postponed.</i>
What will you fix first?	<i>To answer this requires prioritization of rehabilitation and upgrades through optimization modeling. Knowing this assists with more accurate and readily available information for short and long term capital planning.</i>

* Vanier, D.J. (1999). "Why Industry needs Asset Management Tools", NRCC Seminar Series "Innovations in Urban Infrastructure", Ottawa, ON.

THE JOURNEY

MIMS was equally an initiative about collaboration, cooperation, and sharing as it is about the development of tools to manage infrastructure. This program brought several Government of Alberta Departments, Alberta's Municipalities, their Associations and partners together for the design and development of the MIMS Toolset.

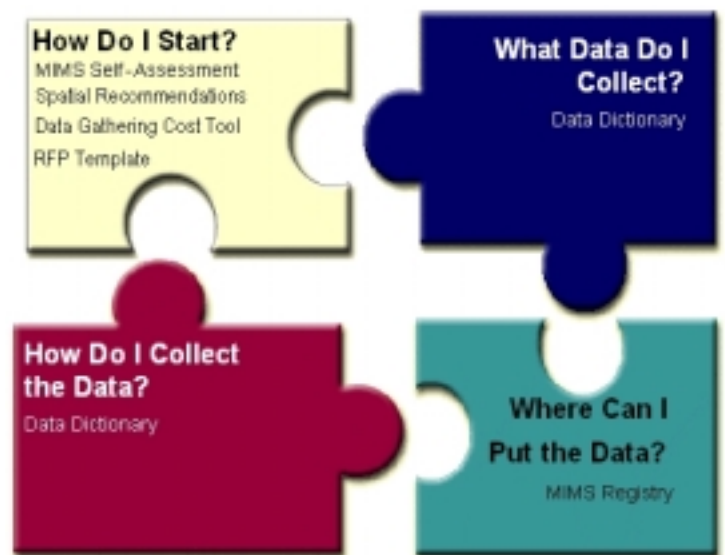
The MIMS journey began with initial workshops to establish a common vision, build a solid framework and set guiding principles. Additional workshops were conducted with various public works personnel and engineering representatives to gather requirements and validate early conceptual models and database design. It was determined that MIMS would be the environment and tool to assist Municipalities in managing essential inventory, condition, and financial infrastructure data. It would provide the foundation data to feed infrastructure optimization and financial modeling tools to help management and administration with long term planning.

Existing large infrastructure management systems developed for Alberta Transportation and Alberta Environment were contemplated as solutions for MIMS. Upon a detailed fit gap analysis, it was determined that these systems did not meet the unique needs of the small-medium sized Municipalities but components of the data models and features could be incorporated into the MIMS system design. Existing commercial infrastructure management tools in use by large communities in Alberta were also reviewed but revealed that they were either too complex or costly for the intended MIMS users. The users also needed a turnkey solution that could be installed and immediately operational by Municipal Staff with little training.

THE SOLUTION

In response to the needs identified, several deliverables were developed, collectively known as the MIMS Toolset. It incorporated roads and related structures; potable water treatment, transmission and distribution systems; sanitary sewage collection, transmission and treatment systems and storm water management systems.

Essentially, the MIMS Toolset provided a set of documented practices/standards and functioning system enabling data entry, analysis and reporting of inventory, assessment, and related activity information to support municipal business needs. The following components make up the MIMS Toolset:



How to Get Started

A “MIMS Self Assessment” document allows Municipalities to gain an understanding of their current situation with respect to existing infrastructure information. A “Data Gathering Cost Tool” help Municipalities determine the range of costs for capturing and collecting infrastructure information based on their current situation and what they want to achieve. An “RFP Template” is provided to assist Municipalities with obtaining data collection services. “Spatial Recommendations” are guidelines for creating or modifying existing CAD or GIS files.

What Data to Collect

The “MIMS Dictionary” document provides a comprehensive listing of the infrastructure data elements, developed from engineering best practices and input from Alberta municipal representatives. This provides a common and consistent taxonomy of the information contained in the MIMS Application

How to Collect the Data

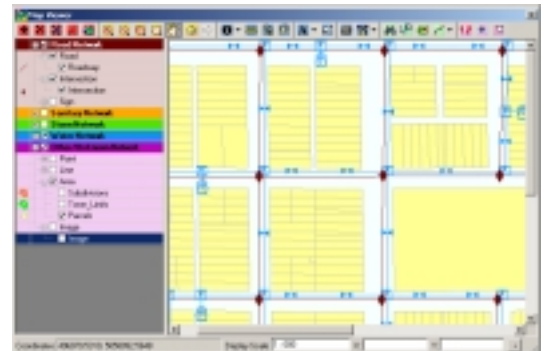
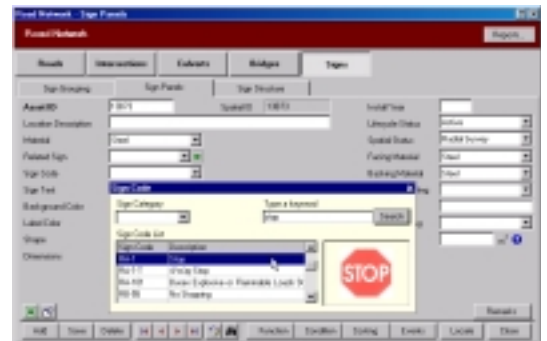
The “MIMS Dictionary” document also provides the parameters and recommendations to gather and organize the data collected so that it is stored in a standard and consistent way throughout all of the communities using the MIMS.

Manage the Data

The “MIMS Application” is the software program that a Municipality uses to store their inventory of infrastructure assets above and below the ground. It incorporates a scalable and robust multi-user database application with intuitive and consistent user interface for data entry, query and reporting. It supports four infrastructure networks from new installations to decommissioned assets.

Once an inventory of assets is established, each asset can be assessed to determine its condition and functional adequacy. Events such as visual inspections and testing can be recorded and linked with detailed electronic reports and photos for future reference. Costing information can also be linked to individual assets.

At the core of the system are a variety of GIS capabilities and functions, designed to be easy to use by staff unfamiliar with GIS tools yet powerful for those who are knowledgeable of GIS and want to integrate the MIMS Application into their organizations workflow processes. A map viewer presents the data together in a common viewer for spatial query/selection and analysis capabilities. Users can easily open CAD or GIS files and link the spatial graphics to their asset attribute data to create GIS ready features. Wizards guide the novice users step by step through a wide variety of functions.



Standard navigation and selection functionality is provided along with unique features that include:

- Import/Export capability – import Excel spreadsheets data, import CAD and GIS file data, export to Excel Spreadsheet, export to ESRI Shapefile along with metadata or view raster imagery.
- Reporting capabilities includes predefined reports as well as ad-hoc reporting by asset type. Users also can drill down into detail level from a summary report. Users are able to connect their existing reporting tools to the MIMS database to create their own advanced or customized reports.
- Help is available using animated illustrated videos to walk users step by step through application functionality and all MIMS documentation is stored and accessible within the application.
- Automated data loading tools creates GIS features from CAD graphics and also allow default attribute values to be applied to all features.
- Linear referencing ability to segment roads based on condition type, surface type, width and install year.
- A copy of the database can be made for field employees or partners to perform data entry and these changes/updates can later be synchronized with the master database in one easy step. This was particularly useful to users with laptops and also sending as-built data to an Engineering Consultant for updating new infrastructure.

While the MIMS Application does not enforce data integrity through a rules based application, the trade off of gaining ‘ease of use’ is still controlled using some necessary data validation checks, limited input using data lists through drop down boxes and network connectivity verification.

Along with the MIMS Toolset, MIMS Instructor led Training Courses are provided to Municipal Staff and followed with ongoing technical and user support via the telephone and e-mail.

THE RESULTS

The initiative has been successful in fostering positive working relationships amongst various Departments of Government and Municipal Communities at a number of levels. It has been grassroots-driven with participation and input from Municipal Representatives from Public Works, Engineering, Finance and Chief Administration Officers as well as Engineering Consultants.

As a result of continued collaboration and innovation, Alberta Municipalities who wish to obtain the MIMS Toolset can do so for *NO* cost but they do need to commit to using the Toolset, provide feedback to the MIMS Project Team and actively invest in gathering data to the MIMS standards. While the initial level of effort to use MIMIS is high due to

gathering and entering the data, the long term benefit will provide users with immediate access to information that will be easy to keep updated and reference.

As of the time of this writing, more than 50 Communities and Engineering Firms are using the MIMS Toolset and are realizing benefits of maintaining a current inventory and condition assessment. The benefits these Municipalities have already received include:

- Providing staff, authorized outsourcing partners and other stakeholders with direct access to up to date infrastructure information. This has developed a better understanding within and between Municipal Departments of what is owned by the Municipality. MIMS users reported improved communication and awareness of issues facing the management and staff with regards to effectively maintaining and sustaining the infrastructure. For example, summarizing total lengths of road and pipe by category, age, material, etc. as well as total counts of items by type such as valves, hydrants and signs. Presenting thematic maps of infrastructure vintage or condition has sparked discussions to begin prioritizing work requirements and allocating funds to achieve overall goals and objectives.
- Increased effectiveness of resources by determining the right treatment at the right time. Optimizing expenditures among various physical infrastructure components or types to get the best overall value.
- Establishing practical budgets that reflect lifecycle costing of roads, pipes, and other capital facilities required to sustain or improve existing quality standard levels and allow Managers to monitor established performance measures for physical infrastructure on an ongoing basis.
- Ability to record and report due diligence with respect to maintenance conducted and inspections / testing performed to assess infrastructure condition in order to reduce risk of liability for damages.
- Communities are revisiting their existing processes to properly maintain an up to date, current inventory and educate staff about the importance of the information.

They are also using MIMS in a variety of ways beyond what was anticipated. A Director of Engineering at one of the communities who has worked with MIMS since its first release had the following observations of MIMS:

“It is so user friendly. The Town’s Operations Staff can use the MIMS application even though most of them have no computer experience or formal computer training. It has been very useful for me because most of the information is right at my fingers tips in the office, all of the infrastructure information is centralized and accessible. The Town’s Facility Locator uses it when checking answers for First Call inquires. As well, the Operations Staff has found MIMS very useful in answering all of their inquiries about the infrastructure details and location. Things are clear and easy to understand when discussing infrastructure matters with others. For instance, MIMS is very quick to go through and create developments plans. If consultants are working for the Town, I send off prints of maps from MIMS and Microsoft Excel Spreadsheets on the attribute data. It

provides value to Municipal Land Developers because they get accurate information right away about the locations of existing infrastructure and its details. This makes the process faster and saves the town money.

We have improved communication between the Administration, Engineering, Planning and Public Works within the community of what they own and what shape it is in. We can communicate Capital Project recommendations to Council to achieve their understanding buy in.”

Communities now have more documented information about their infrastructure in a sustainable format that enables querying, analysis and reporting capabilities. The MIMS Toolset will enable better decision making when used to its potential. It will also assist with the identification of the location of missing or forgotten assets (i.e. underground water valve location)

FACTORS OF SUCCESS

Some of the elements that significantly contributed to our success include:

- Partnerships between Government, Vendors, Engineers and Consultants were all vital to the projects success. Municipal Associations and Engineering groups need an early understanding of what is being accomplished and how it will benefit them directly.
- Acknowledge the diversity of user needs but deliver the common requirements early. Demonstrate early and often with core group of knowledgeable supporters.
- Continued persistence to obtain user feedback and validation.
- Communicate frequently and maintain an open and proactive dialogue with the project's Project Sponsor.
- Emphasis on sharable data in a common format, with documented standards and metadata.

CONCLUSION

Once disadvantaged Municipalities in Alberta short on resources, are now armed with both knowledge and a tool to improve their infrastructure management and capital planning capabilities. Above ground and underground infrastructure assets are being inventoried and recorded in a common format and in a centralized location for controlled access by all Municipal staff. By having timely access to accurate data, users are now able to make better decisions with a great degree of confidence. Long term capital planning is now possible for those communities who desire to be more proactive and reduce their infrastructure deficit.

The MIMS Toolset continues to expand its capabilities and is being chosen by more communities who recognize the benefits of responsible infrastructure management. An additional module for managing gas distribution networks is in development along with

the integration of Land Title parcel information. MIMS provides the necessary foundation of information that a majority of the small to medium sized communities need to begin their infrastructure management journey. For many, MIMS will serve their needs for several years while others may use it as a step towards a comprehensive, optimized and integrated infrastructure management program.

The project web site can be consulted for more information about this valuable initiative: (www.albertamims.org) .

ACKNOWLEDGEMENT

This initiative has been a joint effort of four municipal associations and three provincial departments:

- Alberta Association of Municipal Districts and Counties (AAMD&C)
- Alberta Rural Municipal Administrators Association (ARMAA)
- Alberta Urban Municipalities Association (AUMA)
- Local Government Administration Association (LGAA)
- Alberta Environment
- Alberta Municipal Affairs
- Alberta Transportation

