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## **Municipal Government and Private Industry Work Together to Link CAD and GIS**

For many years now the field of municipal administration, as with all fields touched by technology, has seen significant change in the way support documents are produced and maintained. For municipalities, and the engineering firms from which they receive design services, the change is most significantly a result of Computer Aided Design and Drawing (CADD), and the Geographic Information Systems (GIS) CADD technology has made possible. This technology has forever changed the way survey plans and engineering drawings are designed and maintained. In this article we look at a coalition between municipal government and private industry that has adjusted to this new technology, and found ways to reduce their costs while more effectively managing municipal infrastructures.

GIS has become a way of life for most municipalities (cities, counties, and states) trying to manage their infrastructure, such as roads, signage, equipment, and structures. Service divisions, such as fire and police agencies, are increasingly using GIS to track related facilities, and to quickly identify available resources at or near specific locations. As this demand for digital information has increased, so has the demand for organization of the information that allows these systems to work.

Historically we see that databases were initially a partial solution to this demand for organization of data. Then came CADD applications like AutoCAD® that allowed drawings to be linked to these databases. Using CADD engineers, land surveyors, architects, urban planners, and other professional produce drawings which contain information in the form of what is now called ‘Spatially Referenced Data’. And, finally there came the technology that is known as Geomatics. This is the science of linking alphanumeric data (text and numbers) and drawing data, such as elements in an AutoCAD drawing. Through Geomatics we are able to not only link drawing elements to specific data, we are now able to have drawing elements contain their own information. They become intelligent, and they can share that information when needed. Today, drawings are able to contain a wide range of information in the form of their inherent layout, within drawing elements such as blocks and attributes, or as Objects.

Through a coalition between municipal government and private industry, the province of Quebec, Canada has taken significant steps in this direction of data management through the use of AutoCAD, and a new civil engineering drawing standard called ASCAD®. Taking the lead in the development and implementation of this standard has been Mr. René Soucy, ing. M.Sc, Director of Engineering Department at the City of Aylmer, Quebec; Mr. Marc Belair, GIS Manager at Metropolitan Gaz in Montreal, Canada; and Mr. Rémi Laprise, President of CADCOM-CADD Services Inc.®, a software development house and member of the Autodesk Developer Network®.

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The coalition began in 1993, when a group of engineers gathered to discuss the issues facing municipalities with regard to infrastructure management. Those issues included:

- Municipalities inherited responsibility for the management and updating of the topographic maps covering their respective territories.
- With the advent of CADD, municipalities were now receiving new and updated design drawings in digital format (CADD) from an increasing number of private consulting firms in the fields of land surveying, urban planning, architecture, engineering, and landscape architecture.
- These private consulting firms created their CADD drawings using different CADD systems, and using different drawing standards.

The result of their initial meeting was the formation of a working group that designed the ASCAD project. ASCAD, or Automated Standardization for Computer Aided Design, is a set of production rules governing the layout of civil engineering drawings. A simple concept, with profound impact on the ease with which municipalities and private industry are able to create and maintain digital data in both the CADD and GIS formats.

Phase one for the group was to establish that the ASCAD standard would cover all the relevant aspects inherent in the production of sketches and plans, land surveys, and engineering plans. This applied whether they were in traditional format (paper, page layout, scales, lettering and title block) or automated drawings (PCODS tables used in surveys, nomenclature of drawing overlays, screen line colors, printing techniques, etc.)

Phase two involved choosing an appropriate computer platform to develop the routines that will eventually enable the user to automatically produce a drawing, the reproduction of which, along with the digital format, will comply to the ASCAD standard. After a survey of existing technologies and software used by cities and consultants in the region, the working group opted to develop the automation tools as fourth party software, operating over AutoCAD® and the Softdesk® (now Autodesk®) Civil-Survey engineering series.

The first version of ASCAD was produced in French in 1995, and was known as NADAO®. It used the DOS 12 version of the AutoCAD applications. Technical support for the NADAO tools was provided by CADCOM which also was given distribution rights to the product. ASCAD (NADAO) included all the necessary routines for compliance with the ASCAD standard. Their current versions in English and French can be used with version AutoCAD 2000®, and AutoCAD Map and Land Development Desktop® (LDDT).

In his capacities with Metropolitan Gaz, and as the President of the Quebec chapter of Urban Regional Information System Association (URISA)<sup>1</sup>, Mr. Belair's mission has been to inform members and associates of standards that improve the implementation of both Geomatics and Spatial Information Technology.

*“The fact that a majority of drawings in our region are now generated using the ASCAD standard environment (with AutoCAD and ASCAD) simplifies the translation of symbolology and*

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<sup>1</sup> URISA is an international non-profit association of professionals using information technology to solve problems in planning, public works, the environment, emergency services, utilities, and throughout state and local government. Part of their mission is the use and integration of Spatial Information Technology (SIT) to improve the quality of life in urban and regional environments. SIT forms the basis of Geomatics, and GIS. Organizations like Metropolitan Gaz work with URISA to share knowledge, and improve their own implementation of SIT and GIS.

*graphical representation of elements such as streets, facilities, fixtures, etc. It brings more productivity in the fields of municipal infrastructure design”. Says Mr. Belair. “AutoCAD and ASCAD are now almost exclusively used in the province of Quebec for drawing streets and specifying cartography information. Because almost every municipal and private engineering group is using CADD (primarily AutoCAD) and the ASCAD standard, we have seen significant productivity increases in all areas.”*

The ASCAD standard with AutoCAD has also been implemented in the city of Aylmer Quebec. In an interview with Mr. René Soucy, P.Eng, Engineer for the city, and Mr. Martin Dompierre, an engineering draftsman, the benefits of AutoCAD and ASCAD standardization became clear.

*“Globalization of information is an important concept for us”, says Mr. Soucy, “we need to share data on several different levels. Divisions such as phone, gas, electric, and transportation all use the same land. It is to our benefit if we can share information and data relating to this land.”*

The city of Aylmer uses AutoCAD Release 14, Softdesk Civil Survey from Autodesk, and ASCAD. They were one of the first organizations to implement the ASCAD standard, beginning in 1995. Although some design has been done in-house, the city typically out-sources most of its design requirements. This takes the form of civil engineering drawings for water works, sewer systems, and roads. The city of Aylmer also maintains a separate GIS system to manage the city’s infrastructure. Transferring data between engineering design drawings and the GIS system could be a monumental task without a universal drawing standard.

According to Mr. Dompierre, prior to adopting a universal standard, the city engineering department had to review every design drawing to make sure they conformed to the city’s standard. Inevitably different suppliers used slightly different standards, so the city staff had to manually change the drawing set up, drawing blocks, and even symbol names in order for the information to be easily transferred to the GIS system.

*“The main benefit of AutoCAD with ASCAD”, says Mr. Dompierre, “is that now all our drawings are set up the same way. Because every engineering company that provides us with drawings uses both the universal standard, and the same software, we know that every drawing we receive, regardless of source, will have exactly the same settings. When we transfer data to our GIS system to update our data, every drawing can now go through exactly the same translator. This has completely eliminated our manual checking process. Now we only set up our translation process once, and the information from every drawing transfers properly.*

*We estimate that we have reduced the time it takes to transfer drawing information into our GIS system by over 50% to 70% with the implementation of a universal standard. Having used AutoCAD and ASCAD, we know that the speed of drafting is also increased considerably.”*

*As experienced AutoCAD users, and as a software developer, CADCOM provided the final link to making the universal standard a reality. By creating the software application to run with AutoCAD, CADCOM provided the tool that allows these organization to easily implement the standard. “When a company adopts a universal drawing standard such as ASCAD”, says Reni Laprise, “as their internal drawing file standard they automatically benefit through:*

- *Internal standards that are being used by all engineers and drafters;*
- *A drawing file structure immediately familiar to all staff;*

- *A more highly automated drawing production process;*
- *Decreased production time;*
- *Reduces errors, facilitating quality control processes;*
- *Quicker and easier modifications to drawings;*
- *Simplified extraction of some or all of the drawing data;*
- *Easy linking with GIS databases;*
- *Aids in the implementation of ISO 9000 in the CAD department.*

*“The standard has provided benefits well beyond what we imagined seven years ago when we began this project.”*

What was once the impossible mission of tracking, and maintaining updated information on the infrastructure of municipalities, was brought one step closer to reality with the advent of CADD (specifically AutoCAD). The next inevitable step was for organizations to develop standards that would facilitate the link between alphanumeric data (text and numbers) with drawing data. Through this unique coalition of municipal agencies and private industry in the province of Quebec Canada, a universal standard has been developed and adopted.

The use of AutoCAD and ASCAD has allowed disparate organizations (such as municipalities, engineering companies, and contractors) to create engineering drawings completely independently of each other, yet with the complete confidence that their drawing data is compatible. Through the use of common drawing formats, and universal drawing standards, municipal government and private industry have come together to reduce drawing production costs, ease data transfer between CADD and GIS, and create a less costly and more time efficient infrastructure management system.

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#### EDITOR NOTES:

Information on AutoCAD can be obtained at [www.autodesk.com](http://www.autodesk.com)

Information on ASCAD can be obtained at [www.cadcom.ca](http://www.cadcom.ca)

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