NETWORKS

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INSIDE

Another Successful Year for GITA on Numerous Fronts

by GITA President Susan Ancel, EPCOR Water Services, Inc.

PRESIDENT'S MESSAGE

This is my final article as the president of your association, and I would like to provide an overview of the key accomplishments of GITA over the last year in its two focus areas of education and research.

Education


Ancel

GITA delivers education through its conferences, chapter meetings, and scholarships.

Our Annual Conference in Tampa, Florida, which was notable due to the successful interoperability demonstration where our corporate members successfully simulated how their respective software solutions could communicate and support the rapid response to an emergency event. This demonstration was a true testament to the maturity of our industry and how GIS is a vital part of the communications in any community.

The GIS for Oil and Gas Conference, held in Houston, Texas, was another successful event and was notable for breaking previous attendance records for both participants (668) and exhibitors (62).

2006 also saw GITA partnering with Galdos to deliver GeoWeb in Vancouver, Canada. This conference, focused specifically on the impact of Web services on geospatial technologies, saw a tripling of attendance from previous GML Day events. The event was especially fortunate to have keynote addresses from Steven Lawler of Microsoft and Michael Jones of Google Earth. The keynote speeches are available as podcasts from the following link *http://geoweb2006.invokemedia.com/*.

Planning for the 2007 event is underway and it will be held July 23-27 in Vancouver.

Our various chapters across North America also sponsored regional conferences, In addition to all these conferences, the GITA chapters also hosted many luncheon sessions in their local communities—totaling 25 events.

All of the above education is focused on the existing practitioners. GITA also provides many activities aimed at expanding our future workforce; this includes the provision of educational scholarships to students studying in this field and the identification of internship opportunities within our member companies for students. In 2006 $14,500 in schloarships was givin out through GITA Chapters and GITA North America.

Research

The Geospatial Technology Report entered its eighth year. The report contains over 300 charts and graphs to allow you to benchmark your organization's investments in this technology. The 2006 survey results are currently being compiled with a record total of 386 survey participants, representing a 31% increase over the previous year. 2006 saw the survey format converted into a Web-based approach that will greatly simplify updating in future years for participating user organizations. For the future we are looking at the expansion of the survey with GITA's International Affliates to provide a global perspective of the industry. As in the past, all participating organizations receive a free copy of the results so I encourage all user organizations to par-

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ticipate in the survey next year.

The Return on Investment (ROI) Workbook project was completed in 2006 and is currently at the publisher, undergoing final preparations to have it available for purchase in the new year. This workbook will provide the practitioner with detailed instructions and multiple hints and tips on how to build a business case for geospatial investments in 12 different application areas. The workbook will also contain a detailed literature review to help identify other organizations that have implemented similar initiatives. Six detailed case studies will provide examples on how to use the enclosed MS Excel templates for calculating your financial metrics. In the coming months, GITA will be holding a number of seminars in various locations in Canada and the United States on how to utilize the templates and workbook. We continue to be grateful to our funding partners: the American Waterworks Research Foundation, GeoConnections Canada, and the U.S. Federal Geographic Data Committee.

GITA's ROI Workbook also led to us being invited to participate in a very interesting workshop in Europe on the justification of Spatial Data Infrastructures at an International or National level. This workshop was hosted by the Joint Research Council of the European Commission and featured presentations from organizations around the world discussing methodologies for justifying geospatial technology investments in a government environment. The presentations and final report from this exercise is available from the JRC Web site at the following address: *http://sdi.jrc.it/ws/costbenefit2006/index.cfm* The participants are continuing to communicate on a regular basis and supporting the individual efforts occurring around the world.

Another significant research project currently underway is in response to the U.S. Department of Labor High Growth job Training initiative. Previous issues of *Networks* have highlighted this initiative and the development of the *www.giwis.org* portal in the Denver area. The next phase of the project is to develop methods to expand this concept into other communities throughout the United States. I encourage you to explore the GIWIS portal, which has lots of information that is useful to individuals outside of the Denver area. GITA is continuing to work with the Department of Labor to explore other opportunities to support its high growth job initiative and expects to have more materials available to our membership in the coming years.

Closing Comments

GITA is will be 30 years old next year and we have a number of interesting initiatives in the planning stages for the coming year. The Board of Directors will be meeting in Banff, Alberta in early December to finalize the budget and resources for the upcoming year. I look forward to continuing on the Board of Directors as Past President and working closely with incoming president Brent Jones.

The Board will also greatly miss meeting regularly with Pete Gomez, our current past President, who will be leaving the Board in 2007. Pete has been an extremely active member of our Board, representing GITA all around the world and I am certain that we will continue to involve him in other research, education, and volunteer activities in the future. I also want to extend my thanks to the rest of the GITA Board for their service over the last year and am very pleased to report that all of the remaining Board members will be staying for the 2007 year.

Thank you to all who have supported my presidency over the last year.

Susan Ancel is General Manager Network Services and Operations for EPCOR Water Services, Inc. in Edmonton, Alberta. She can be reached at sancel@epcor.com.

GIWIS—A GREAT START

by GITA Executive Director Bob Samborski

FROM THE INSIDE

Since its launch at the GIS in the Rockies conference in mid-September, the Geospatial Industry Workforce Information System (GIWIS) has captured the interest of industry professionals, educators, and workforce system personnel in the metro Denver area.

Samborski

The Web site is the centerpiece of the grant awarded last year to GITA and our primary partner, the Association of American Geographers (AAG). While there has indeed been a lot of progress made, much more needs to be done. We are just now beginning to appreciate the potential of GIWIS in helping to address the looming shortfall in qualified, educated workers for the geospatial industry of the future—not just in the Front Range of Colorado, but around the United States and Canada.

As we near the end of this project—the grant expires on December 31—our efforts are focused upon making GIWIS as useful a resource as possible for the various audiences it will serve and providing for the sustainability of the system for the foreseeable future. Both are daunting tasks, with implications well beyond our formal commitment to the Department of Labor.

The two months since GIWIS went live have offered us many opportunities to make presentations on GIWIS, explain the benefits of the Web site to various workforce investment boards (WIBs) in the metro Denver area, and participate in several job fairs at local middle and high schools. We have assembled a traveling display that highlights GIWIS and also features basic information about geospatial technology in general.

It's not as if students and their parents are totally unaware of geospatial technology. Just about every student we spoke with at the job fairs we attended knew what Google Earth is, and was somewhat familiar with GPS. Often their parents had mapping guidance systems in the family car, or the kids knew someone who had one. But students and their parents alike just do not connect these ubiquitous applications of geospatial technology with an industry, much less a career path.

Approximatly 4,000 eighth graders attended the Adams County Education Consortium Job Fair, where GITA exhibited.

At the annual meeting of the Colorado School Counselors Association in early November, we met many high school counselors who had never heard of GIS. These are the people who are charged with exposing high school students to various alternatives to pursue a career or choose a field of study in college. It seems obvious that this group is a great place to start to bring awareness of geospatial into the minds of high schoolers as they begin to consider options for their future. The reception we received from the school counselors was excellent. Many left with a better feeling for what the technology is about and with plans to share the information they had been given to geography, math, science, and other teachers in their respective schools.

In fact, the reception we've received wherever we have talked about opportunities in the geospatial industry and the resources contained in GIWIS has been universally positive. Our audiences have ranged from a dozen or so middle school teachers looking for ways to incorporate GIS into math and biology classes, to Denver area WIB directors, to county one-stop Center boards, to 4,000 eighth graders at a job fair sponsored by Adams County (CO) Education Consortium.

The Gap Between Supply and Demand

We have come to think of the GIWIS—in fact, of the entire project—as a way to bring together the three important parts of the geospatial industry workforce equation: the "three-legged stool" of educators, industry, and the workforce system. As increasing implementation of geospatial technology results in explosive growth in

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the number and type of applications in governments, utilities and the private sector, the demand for sufficiently educated and trained workers also increases. We are often told by GITA corporate members that they simply cannot find enough qualified people to fill jobs created by their expanding operations. We are told that there is a significant gap in what they need and what is being produced by colleges and universities—in some cases several years' worth of knowledge and experience. Where do these companies get their needed employees, then? More often than not, from other companies. Or, from expensive and lengthy internal training programs that are required to bring new hires up to speed. Or, the work is being outsourced and/or offshored.

The "supply" side of the equation also needs to be addressed, and that is a primary objective of our grant and GIWIS. The entire spectrum of educational institutions requires a re-evaluation of how educational institutions at all levels are training and preparing people for geospatial industry jobs. The pipeline between education and industry needs to be drastically shortened. How can that be accomplished?

An essential first step at middle school and high school levels is simple awareness. The "image and outreach" portion of our DOL project included the development of basic informational brochures on "What is Geospatial?" and links to excellent introductory Web sites like *www.Geospatial21.org* by Kidz Online *(www.Kidzonline.org)*. Such sites serve to organize the inherent interest in technology that exists in many teenagers and young adults and helps them realize that they can actually make a living being involved in such cool stuff. For more advanced college and university levels students, it involves making their education more practical and relevant to industry demand. Involving real-world practitioners in classroom education is not a new concept, but one that GITA's members, especially in local chapters, could contribute to significantly.

WIBs and the Web

To reward a person who has committed themselves to entering the geospatial worker pipeline, there needs to be adequate jobs at the end of it. That's where the involvement of the workforce investment system comes into play.

In 1998, the U.S. Workforce Investment Act (WIA) established a national workforce preparation and employment system to meet the needs of businesses, job seekers, and those wanting to further their careers or wanting to transition to another type of work. The WIA also authorized workforce investment boards at the state level and in local areas where population exceeded 500,000. State boards advise governors on ways to develop the statewide workforce investment and labor market information systems.

Local WIBs focus on setting workforce development policy. Board members are appointed by the chief elected official of the local area in accordance with criteria set by the governor of the state, who certifies the board. These board members are subject to conflict of interest requirements and sunshine laws. Also, these WIBs are mandated to be representative of all local area workforce stakeholders. They typically include representatives of local businesses (required to be the majority of the board), labor organizations, educational entities, community-based organizations, economic development agencies, and "one-stop" career center partners. As such, they represent the entire continuum of the workforce development system—the pipeline that we are trying to shorten.

At the onset of this project, we didn't know what a WIB was, much less what it was created to do. Now it is clear that the eight WIBs in the metro area that GIWIS was intended to serve are crucial to our success. We've spoken with several of the local WIBs as part of the outreach portion of the project, and have been received enthusiastically at every meeting. There is a great deal of interest in leveraging GIWIS into ongoing operations of these local workforce development organizations and that will help address the sustainability provisions of our grant. Moreover, we have also begun a dialog with the principals responsible for securing one of thirteen $15-million WIRED grants awarded by DOL this past summer for the Denver area. The goal of the WIRED—"Workforce Innovations in Regional Economic Development"—initiative is to transform regional economies by enlisting the skills of the numerous and varied players in those economies "to research and produce long-term strategic plans that prepare workers for high-skill, high-wage opportunities in the coming years and into the next decade." We will be working closely with our WIRED colleagues to explore ways to expand the geographic area served by GIWIS, as well as to potentially adapt its use to the other vertical industries that are the focus of the Denver-based WIRED effort—namely, aerospace, information technology, energy, and health care. The WIBs will meet the Web at GIWIS.

So What Do You Actually Do?

Have you ever tried to explain to relatives at the Thanksgiving table what you—a geospatial professional—do all day? Not too many people have an elevator speech sufficiently succinct and understandable that the eyes of their audience don't glaze over after an attempted description. You say that you "make maps with computers" and leave it at that.

That's a major part of what interested people will find on GIWIS—a description of the geospatial industry, what the technology is used for, and why it is important. Students can view videos of real geospatial workers, describing how they use the technology in their everyday jobs. Educators can find geospatial subject matter, lesson plans, and other resources to help them incorporate geospatial into their classes. Schools at all levels can be included on an interactive mashup, with click-throughs to their geospatial course offerings. Transitional workers can learn what kinds of additional skills they need to acquire to obtain a good geospatial job and where they can go in their area to get those skills. Geospatial employers can post their job openings and connect to one-stop centers in their metropolitan area. Students can get a glimpse of their future.

It has indeed been a good start. We realize that the importance of GIWIS—and the purpose of shortening the pipeline between the education system and industry—the supply and demand cycle—deserves continued support by GITA and our members. It is, after all, in our collective interest to ensure the well=being of the geospatial industry, now and into the next decade.

Bob Samborski can be reached at bsamborski@gita.org or by calling 303-337-0513.

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Annual Conference 30—Gearing Up for a Big Year

GITA 2007 to boast a drastically expanded program with *15 brand new seminars* and *99 technical presentations!*

Register now for GITA's 30th Annual Conference and Exhibition—the most highly regarded educational event for geospatial professionals—slated for March 4–7, 2007, in San Antonio, Texas. Annual Conference 30 will provide better ways to plan, design, manage, and maintain your geospatial systems and operations.

This year's conference theme—*Mission Possible*—reflects the idea that each attendee's path at the conference will lead to them to information and networking to assist in fulfilling missions that are indeed possible. You won't want to miss this exciting technical program, including in-depth seminars, educational sessions, user forums, panel deliberations, and networking socials.

Seminars Provide Interactive Learning

This year's lineup will include 16 seminars to help you kick-off your conference experience by taking part in one of GITA's half-day, preconference seminars. Be prepared to roll up your sleeves and get hands-on experience in the subjects of your choice! The seminars also offer you a great way to earn continuing education credits (CEUs). The fees for these seminars are separate from the conference registration; see the registration form for details.

See full seminar descriptions by visiting the links below:

Project Management Series
Spatial Databases Series
GIS and the Web Series
Mobile GIS Series
Solo Seminars

Speak Your Mind at Four Enticing Panels

These discussions cover topics that are sure to pique your interest. Here's your chance to express your thoughts on subjects that you're sure to have an opinion on.

New for 2007! Stick Around Wednesday Afternoon for Two Groundbreaking Power Panels

Harnessing the Momentum of Consumer Applications will feature a slew of non-traditional leaders in the industry—representatives from companies like Google,Yahoo, Microsoft, and more will talk about their role in the industry and the new direction of geospatial technology. During the last panel, *Extending the Reach of Geospatial Technology*, familiar industry leaders will respond to the first panel.

Enrich Your Mind with 99 Technical Sessions

To address the theme of *Mission Possible*, this year's conference includes a greatly expanded array of 99 paper presentations for you to choose from. The Internet & Web Services track has been greatly expanded, and four ROI case studies will provide in-depth ROI tips to help you justify GIS spending at your company. Also, the one-call track will return for the second year in a row. Visit the *Tracks and Sessions page* for full details.

Founding Executive Editor of *HotWired* to Keynote

Howard Rheingold has a proven record of accurate technology and social forecasting through more than two decades of syndicated columns, bestselling books, and pioneering online enterprises. Now he's on to the next and biggest thing: the marriage of mobile phone, PC, and wireless Internet, which is changing the way we meet, entertain, govern, and conduct business.

Rheingold was founding executive editor of *HotWired*, the first commercial Webzine, where the Web-based discussion forum and the online banner ad were invented. The *New York Times, Washington Post, San Francisco Chronicle,* and *Boston Globe* acclaimed his most recent book, *Smart Mobs*, and *The New York Times Magazine* named it one of the "Big Ideas" of 2002.

Rheingold has appeared on "Today," "Good Morning America," "ABC Primetime Live," "CNN," "CBS News," "NBC News," "MacNeill-Lehrer Report," NPR's "Fresh Air," and "Marketplace." He is a non-resident fellow at the Annenberg Center for Communications and a visiting professor at De Montfort University. Currently, he is teaching a digital journalism course at Stanford and a participatory media class at Berkeley, and he is working on a new book on cooperation.

Geospatial Career Expo to Make Life-changing Connections

Job seekers, be sure to **attend this free event** on Tuesday,

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March 6, from 1:00 to 3:00 p.m. It's our goal to place veteran GIS professionals as well as new-comers to the field with leading geospatial organizations that will assist in fulfilling your next dream job. Whether you are looking for a job or would like to hire qualified candidates, this is definitely an event you won't want to miss. The *Career Expo page* contains full details, and recruiters can sign up at the *Career Expo Recruiters page.*

GITA's Annual Conference 30 International Poster Session

GITA would like to invite you to submit your posters and maps for our International Poster Session competition. This is an opportunity to showcase your company's projects in front of thousands of attendees. So come on—show us your innovative ideas and your applications with new technology! Submissions will be displayed on the exhibit floor for the duration of the conference, where they will be judged by a panel in the five categories. See categories and more information on the *Poster Session page*.

Exhibit and Sponsorship Opportunities are Still Available

GITA's Annual Conference showcases the relevance and importance of geospatial information—and the many vendors that make geospatial solutions a reality. We view the importance of our event to the GIS industry as a major responsibility and take great care to manage the conference in a highly professional manner, attract the highest quality audience, and uphold the quality standard that GITA has earned over the past quarter century.

Why Exhibit?

GITA is the leading provider of high-quality, unbiased information for professionals who use geospatial information. We have a worldwide reputation for providing superior programs and services, and more than 80% of GITA's user attendees have direct purchasing authority.

Download the invitation to exhibit.
See the 100,000-square-foot exhibit floor.

Oracle Spatial Users Conference

GITA invites you to attend the Oracle Spatial User Conference, Thursday, March 8, after GITA's Annual Conference 30. If you are currently a user, solutions provider, or systems integrator who depends upon Oracle's spatial technologies, or if you want to learn why thousands of organizations use Oracle's spatial database and application server capabilities, this is one event you won't want to miss. Learn about the latest Oracle geospatial technologies and the business and technical benefits they provide as users, solutions providers, and Oracle executives share real-world experience with the world's most widely used geospatial information technology platform.

For additional information visit the *Oracle Spatial User Conference page.*

Ten Sails Smallworld Symposium

Ten Sails and GITA invite you to attend the third annual Ten Sails Smallworld Symposium on Thursday, March 8, following GITA's Annual Conference 30. This will include a social networking event on Wednesday evening. The Thursday program will conclude by 3:00 p.m. Presentations and panels will focus on GE Energy and partner technology updates, plus customer projects, experiences, and benefits. The conference will include content of interest to users, management, and technical staff. Smallworld users, partners, and GE staff are invited to submit abstracts on this theme.

For additional information, visit the *Ten Sails Smallworld Symposium page.*

Smallworld is a registered trademark of General Electric Company. Ten Sails is a GE Energy Authorized Partner.

Welcome to San Antonio

San Antonio's newly expanded 1.3 million-square-foot Henry B. Gonzalez Convention Center enhances San Antonio's reputation as a premier meeting destination. Now the eighth largest city in the United States, San Antonio has retained its sense of history and tradition, while carefully blending in cosmopolitan progress. Sounds and flavors of Native Americans, Old Mexico, Germans, the Wild West, African-Americans, and the Deep South mingle and merge. Expect moderate temperatures, with an average high in March of 72° Fahrenheit. Close to twenty million visitors a year delight in the discovery of San Antonio's charms, and we hope you join us there for Annual Conference 30.

Congratulations 2006 GIS for Oil & Gas Speaker Award Winner!

Devon Humphrey, Texas A&M Spill Control School

"Using GIS for Disaster Drill Simulations"
Read the full paper!

GIS FOR OIL & GAS Conference 2006

Abstract: While GIS has been a mature technology for many years, a large number of organizations are still grappling with paper maps within their EOCs. GIS can make it much easier to communicate what is happening to high-level decision-makers, the general public, and the media. The use of GIS as a simulation environment during disaster preparedness exercises will be demonstrated using recent U.S. Navy oil spill drills as a case study.

GITA's Speaker Award program, established in 1992, recognizes speakers who received excellent ratings on their presentations at the association's conferences. The award is given to the top five percent of total speakers, as ranked by the conference attendees.

Deploying a Geospatial Resource Management Solution in a Large Enterprise

By Jean Beaulieu, Bell Canada

Bell Canada's Geospatial Resource Management (GRM) solution improves processes in network planning and provisioning and provides the foundation for future development and efficiency across the enterprise. With rapidly changing technology and the increasing complexity of deploying that technology to expand services, the need to increase efficiency, reduce deployment time, and reduce the average network repair time is driving the need to improve legacy systems.

Beaulieu

The requirement for a fully open relational database system was an important factor in Bell Canada's decision to define and configure NetworkX for Bell Canada's needs. The project faced challenges that included geographic separation between vendor and client, bilingual users, application scalability and performance, migration of data from multiple files in a proprietary database format, and the triple constraints of project management—time, cost, and quality. Challenges were overcome and the project has been completed successfully, but it's only the beginning for Bell Canada.

A Venerable History

Bell Canada Enterprise (BCE) was originally incorporated in 1880 as Bell Telephone Company of Canada. BCE is a holding company, which includes Bell Canada.

Bell Canada provides a full range of telecommunication services throughout the provinces of Ontario and Quebec in Canada. These services include local telephone, long distance, wireless communications, Internet services, data, satellite television, and a variety of other value added services to its residential and business customers. Bell Canada also operates in the two official languages of French and English.

Across Canada, Bell Canada and its subsidiaries—Télébec, Northern Tel, Aliant, Northwestel, and Bell West—service approximately 27 million residential and business customers.

USER PERSPECTIVE

Project Background: How It Began

Bell Canada maintained centralized Plant Locations Records (PLR) groups. These groups received all engineering work orders and updated large network drawings. These drawings were then distributed to all departments that required information about the network. Unfortunately these drawings were typically schematic and the presentation of network information was left to the creative of the individual users. This was further complicated because the original engineering work prints were also created manually and often required "interpretation" by the PLR clerk to properly update the main PLR drawings. Therefore, the presentation of network information was very dependent on the artistic ability of both the engineering clerks drawing the work orders and the PLR clerks that transcribed the engineering work prints to the master PLR drawings.

In 1985, a CAD system was introduced to improve the overall quality of the engineering work plans, but the corporate records maintained by the PLR group were still drawn manually. In 1989, as part of a process improvement effort, it was decided to move the responsibility for maintaining PLR drawings to the engineering groups to allow staff reductions, cost reductions, and to hopefully improve the turnaround time on updating the master PLR records. In some locations, the PLR drawings were more than a year out of date. As a result, most offices using these records had to maintain copies of the PLR drawings as well as copies of the engineering work plans stapled to the PLR drawings (engineering offices, network maintenance groups, and cable locate groups).

To improve the overall efficiency of the engineering work plan and PLR processes, it was decided to develop a CAD-based system to support managing the PLR drawings as well as the engineering work prints. In 1992, Bell Canada started development of a PLR drawing system based on the existing CAD application. This allowed retaining the existing engineering CAD application and eliminated the cost of a large software acquisition. Once the application was extended to support the PLR drawing process, the existing paper drawings were converted to digital records superimposed on a digital land base. The data conversion process, from 1995 to 1997, converted more than 450,000 large paper drawings (plats) into the system.

> *"A centralized system, providing access to each business unit, would dramatically improve the accuracy of the network information, reduce duplicate effort, and provide opportunities to improve business processes through automation."*

In 1999, Bell Canada began looking at geospatial resource management (GRM) systems. Following extensive evaluation of vendor capabilities, a contract was signed with Intergraph Corporation for their G/Technology communications solution called G/Comms. The internal project was called NetworkX. It was determined that no solution met Bell Canada's performance and functional requirements for an enterprise solution, but Intergraph's centralized database solution and architecture had the greatest potential to meet Bell Canada's aggressive expectations. From

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December 2000 to March 2002, Bell Canada and Intergraph worked together to document the requirements, extend the capabilities of the product, and complete user requirements and acceptance. The pilot and performance testing was completed by May 2003. Full deployment was achieved in May 2004.

Making Business Decisions

Projects within Bell Canada BS&T must be profitable and are measured against corporate-defined economic parameters. Cost and benefit studies are completed and take into consideration a variety of economic measurements, the most important ones being net present value (NPV), discounted payback period, and profitability index.

Specific areas were targeted to recognize the benefits of the solution. Four specific areas were land base management, data extracts for project design, analysis tools and project design improvements. Land base management was a foundation for the technology. It was determined that for this project to be successful, a consistent approach to managing the huge geographic mapping across the provinces of Ontario and Quebec had to be implemented.

The existing process was awkward, time consuming, and involved a wide group of government at the federal, provincial, and local levels as well as local development groups throughout the provinces. The data extracts for project design in the CAD system created a complex administrative overhead to extract the engineering work order areas from the CAD system and then post the extracted areas back into the system and manage the conflicts created by overlapping projects or engineering design errors. It was also determined that system analysis tools could significantly reduce the manual engineering effort required to assemble network configurations, apply design or transmission parameters, and determine if specific communications technologies could be applied to the existing network. Finally, project design improvements could reduce the number of required design staff and provide the company with an opportunity for cost reduction and faster turnaround on engineering design projects, such as project approvals, design analysis, and work plan creation.

Many departments within a communication company are dependent on accurate records of the network to support their individual business processes. Without a centralized system, these diverse groups were maintaining their own copies of the network inventory records. As a result, there were many copies of the data maintained within each business unit, and each business unit was therefore required to maintain the administrative staff to continually update their network records with engineering changes. A centralized system, providing access to each of these business units, would dramatically improve the accuracy of the network information, reduce duplicate effort, and provide opportunities to improve business processes through automation.

The key advantages to Bell Canada's NetworkX enterprise network inventory system were:

- Resident in a centralized Oracle RDBMS.
- Client-Server environment (thin client) providing advantages to the IT group that administers the system.
- Allowed Bell to move off OS-2 to a Windows-based client configuration.
- Supported a multilingual (French and English) application.
- A single version of the application with enterprisewide access to the data.

PROJECT MANAGEMENT AND ORGANIZATION

Recognizing the scope of the NetworkX project, Bell Canada decided to break the project into five subprojects. These subprojects, although interdependent, could be more effectively managed. The subprojects were:

- G/Comms development, configuration, and testing
- Data migration
- Land base restructuring and import
- G/NetViewer and G/Mobile testing and deployment
- G/Net Export Server configuration and installation

The subproject teams could more effectively manage the unique milestones of their specific projects. The subprojects, although interdependent, typically did not have any significant "overlapping" deliverables that created risk during the project lifecycle. In most cases, the final deliverable from the subproject was in fact a unique deliverable. The key to overall project success was to manage the subprojects so the deliverable slid appropriately into the timeline for the NetworkX project implementation.

To assure success, it was essential that some basic project fundamentals were recognized. From a corporate perspective, the project had to have a corporate sponsor and executive support across business units impacted by the project. Due to the long project lifecycle this was essential for the project to survive typical budget and staff fluctuations that exist in any large organization over time. In this day and age, these fluctuations happen at much shorter intervals.

Functionality, Configuration, and Testing

The Senior Business Systems Analyst is responsible for delivery of the solution and assuring that it meets the original project expectations. This dictates close monitoring of the defined areas, including functionality, configuration and, ultimately, testing to assure the documented expectations of the system are met.

Within the NetworkX project, there were five functional areas defined and assigned to the project teams. These five areas were:

- Land base, infrastructure, and distribution cables.
- Outside plant, including feeder cables and equipment.
- Electronic equipment contained in the network, housings, and remotes.
- Work plans, plotting, printing, and SAP integration.
- Analysis tools, search capabilities, query functions, and reports.

Within the project teams, the system integrator and the vendor provided equivalent area resources with the expertise to support all aspects of the requirements within the five functional areas. The teams worked closely together and having skilled, knowledgeable members from Bell Canada, the system integrator and the vendor ensured excellent team dynamics, respect, and close teamwork.

Performance, Scalability, and System Architecture

Bell Canada's expectations for NetworkX as an enterprise solution were a definite challenge. The initial scope was the access of 1,450 users, in 50 different geographic locations, in two provinces, with two national languages, accessing the single corporate enterprise database of network information that was expected to exceed a terabyte of data. The user expec-

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tations, to meet business needs, were that the system would provide virtually immediate response in all aspects of functionality.

To assure that the expectations would be met, Bell Canada decided to establish test criteria that would assure that the vendor product and other required deliverables (data migration, system integration, land base management) would meet those expectations. Therefore, the data for the acceptance testing had to include 20% cross-section of Bell Canada's network data and 80% data fill to provide the full system load.

The evaluation also included the corporate client server configuration. Establishing the NetworkX application as a key enterprise enabling solution also meant establishing the client workstations with connections to the enterprise database on top of the existing Inter-Company Network (ICN). The final solution was a thin client implementation using CITRIX. This configuration minimized network traffic by moving the majority of data processing, application churn and application to data communication to the data warehouse. An additional benefit from this configuration was more effective IT management of the system implementation and ongoing system administration.

To achieve the performance expectations, Bell Canada made a major commitment to the team that would define and test the proposed system architecture. The team's focus included planning (user work flows and system load), preparation/logistics (schedules, scripts, hardware, data), execution, and finally measuring (monitoring, collecting, analyzing, concluding).

Integration

The integration requirements involved both upstream and downstream systems. A custom interface had to be developed to the circuit assignment system. The key systems that required the most effort were SAP and GIMMS.

The circuit assignment system

Some specific items such as phone number, cable pair number, etc. are replicated directly from the circuit assignment system in the table of NetworkX for direct reference.

The interface with SAP

The SAP module produces an extraction of material and work plan activities that is downloaded to an external file (DAT file) that can be uploaded to SAP PS and PM module.

The SAP interprets each activities identified in the NetWorkX work plans according to the contract with our contractor Expertech (placement, removal and modification of material as well as splicing operations on new and existing facilities).

The deployment of a GRM solution is probably one of the most complex deliveries to an enterprise. It is not just the fact that this technology has the added complexity of a dataset that includes a geospatial component. It is the extent of user interaction with the application toolset.

For each activity, a line describing the activity is produced for the extracted file and is referenced with the activity code (SKU), reference to the plan number, and work location.

An interface is also available to review and edit the SAP Extract output before it is saved in a file to be uploaded into SAP.

The interface with GIMMS

When a new subdivision is being built or revised, the project is submitted to the NetworkX Landbase Support team. The file is then upgraded to Bell Canada standards and saved into the GIMS environment, where a nightly incremental update export file is created.

GIMS is a central repository for spatially enabled data with a geospatial management component for the input and maintenance of data. GIMS Geospatial Manager controls all input and maintenance of the data while a gate controls all access to the repository for delivery of data products and services.

Export files are created nightly using NetxExport, which is a stand-alone application that is used to perform automated, unattended exports of data from the GIMS database. Data is retrieved from GIMS based on database activity since the previous export, and exported in the format required by the NetworkX application. NetworkX then publishes the new data on a biweekly basis.

Deployment and Data Migration

The deployment of the solution involved the synchronization of the subgroup deliverables. The highest-risk item was the data migration of more than 1,100 separate CAD files from the original CAD-based system. These files had to be migrated from a hierarchical, proprietary database. To provide some risk mitigation, Bell Canada decided to use two vendors for the data migration. However, one of the vendors was unsuccessful and the complete load was transferred successfully to the other vendor, who successfully delivered the complete data migration effort.

The deployment had to take into consideration the day-to-day operations of the company. A flash cut was not practical due to the huge data volume and number of users. In the active environment of a typical engineering district, the potential for a huge backlog of work orders across the company made a progressive rollout the safest solution. This allowed the company to strategically plan for user training, data migration, quality validation, and all the other aspects of such a large project implementation.

Involving the Customer

Based on past experience, Bell Canada recognized that user involvement was essential to the success of the project. The deployment of a GRM solution is probably one of the most complex deliveries to an enterprise. It is not just the fact that this technology has the added complexity of a dataset that includes a geospatial component. It is the extent of user interaction with the application toolset.

A GRM solution requires users to work within a GUI environment that will test their ability to design complex communications networks that are superimposed on a geographic land base map. They are required to artistically create a view of the network that can be easily understood and utilized by other business units to provision services or maintain the network and its infrastructure. The designs must also recog-

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nize a variety of structural as well as transmission design requirements. Next, the designers have to provide all the information required by the construction teams to build the network and then to be able to support the cumbersome accounting requirements dependent on the work plans and database to properly account for all the financial aspects of capital, expense, and associated productivity measurements. This was a significant challenge to the NetworkX project team that would be impossible to achieve without the direct participation of the end user community.

The user community was involved at virtually all phases of the project, including:

* Functional definition
* Testing
* Training
* Migration
* Deployment

Developing Project Support

Project support was provided by a variety of participants depending on the particular activity.

Local subject matter experts (SMEs) provide valuable input during all stages of the project and in many aspects of the project as identified earlier. A "point of contact" person, established in each area, participated directly with the team.

A corporate help desk, Integrated System Support (ISS), provides functional support and coaching. The help desk is staffed by project members have experience in the project and understand the user application and business requirements.

CGI, Bell Canada's NetworkX system integrator, provides the help desk for system and database issues.

Intergraph Canada provides the NetworkX application support.

Intergraph Corporate provides core technology support and address Bell Canada's need for specific core capabilities.

What Was Planned Vs. What Really Happened

The NetworkX project was originally defined as an 18-month project. However, due to many factors the project ultimately spanned 48 months. A major contributor to project delays was project creep. The scope of the project changed three times over its lifespan.

The next contributor to delays was continuous changes in project resources. Bell Canada experienced a variety to of resource changes that were both within and beyond its control. The company went through strategic downsizing during the project. As a result, there were five senior project manager changes, six project manager changes, 12 business analyst changes and 10 SMEs from operations that changed. These had significant impact in the overall project schedules. In addition, there were seven amendments to the original contract.

To add a human perspective, within the project team there were five children and four grandchildren born, and one team member retired during the course of the project.

Planning for the Future

The NetworkX project implemented a key enterprise business solution within Bell Canada that spans multiple business units. As such, it must evolve and adapt as Bell Canada's business needs change. In the immediate future, NetworkX will include full network resource management capabilities with the addition of inside plant (ISP) equipment.

To more effectively respond to business needs, NetworkX will be more tightly integrated with the circuit design system and the circuit assignment system. This will allow us to refine the service provisioning processes and improve our response to customer service requests.

Network information is fundamental to so many business processes across a communication company's business units. At the beginning of NetworkX, the implementation was focused on the planning engineering and maintenance business units. Then, the data was made for consultation only directly available to all business units that require information about the network. This involves deploying in 2005 the Web and mobile viewers to more than 3,000 managers, associates, and technicians in various business units across the organization.

Challenges were overcome and the project has been completed successfully at Bell Canada, but it's only the beginning for the NetworkX national model. The next challenge is to expand the NetworkX system to the rest of Bell Canada Enterprise (BCE) nationwide within the same database to include Bell West, Northern Tel, Télébec and Aliant without any degradation of the performance.

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The U.S. National Grid

by Talbot Brooks, Director, Center for Interdisciplinary Geospatial Information Technologies, Delta State University

EDUCATION

Two days before Hurricane Katrina made landfall in Mississippi, several students and I volunteered through the Bolivar County Emergency Management Agency to serve at the Mississippi Emergency Management Agency's Jackson Emergency Operations Center. This initial response rapidly expanded with the help of GITA, URISA, and many others to field a team of more than 60 geospatial professionals. Our original mission was to assist with answering telephones and completing paperwork, but Assistant Director Mike Womak quickly had other ideas when he found out we could help with geographic information technologies and had brought along computers and printers.

Brooks

The evening prior to landfall we were tasked with producing 250 large-format laminated maps for use in search and rescue. The maps were to show the areas of Hancock, Harrison, and Jackson Counties between Interstate-10 and the beach, have streets clearly marked, and contain 1-mile by 1-mile-grid squares for use in conducting searches. Each grid was to be uniquely identified, so a graticule was placed along the border. The resulting map (Figure 1) was similar to what one might purchase in a gas station with letters across the top and numbers running down the sides. The general idea was that after a grid was searched, it could be marked as such and resources focused elsewhere. Likewise, if widespread problems were encountered in a particular area, the general location could be quickly described.

After landfall, the search area was expanded to include interior counties as well. We were tasked with adding Stone, Lincoln, Pearl River, and Adams counties into the mix as well. Further, the U.S. Coast Guard asked that we add population density as a background layer.

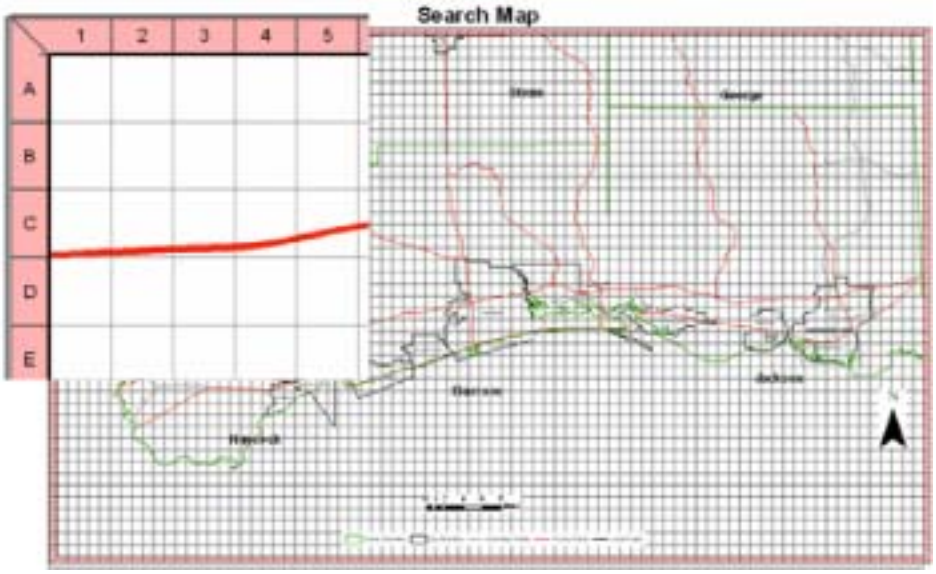

Figure 1. The first search and rescue map produced on August 28, 2005.

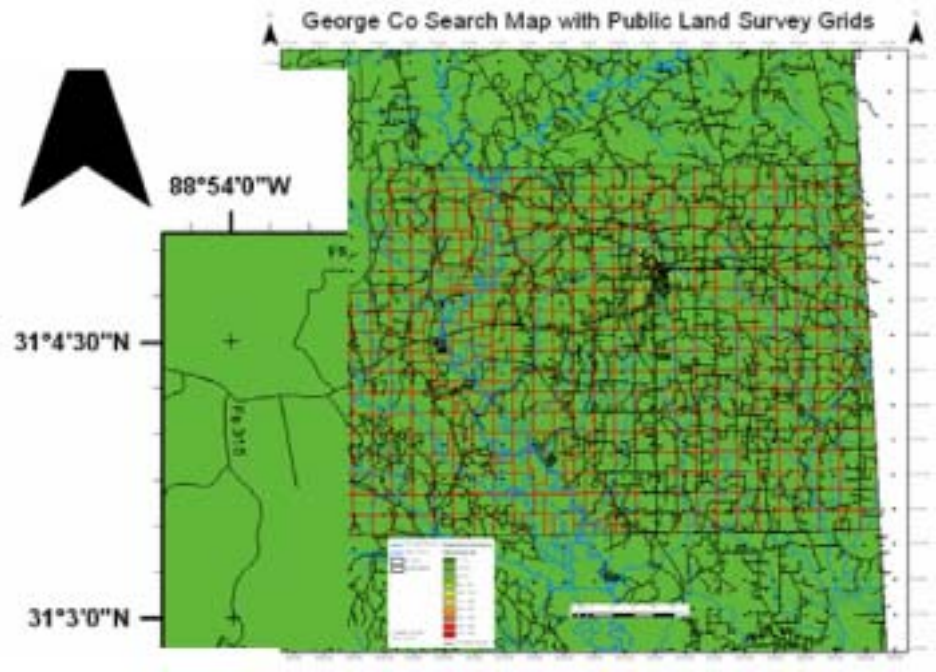

Figure 2. The expanded search and rescue map using PLSS and population density.

The immediate problem was to create a new search grid, something I loathe to do because it would create two distinct search map sets that did not share the same reference coordinate system. However, the system of numbers and letters would just not work clearly as we quickly reached zzz123-type grid squares. I

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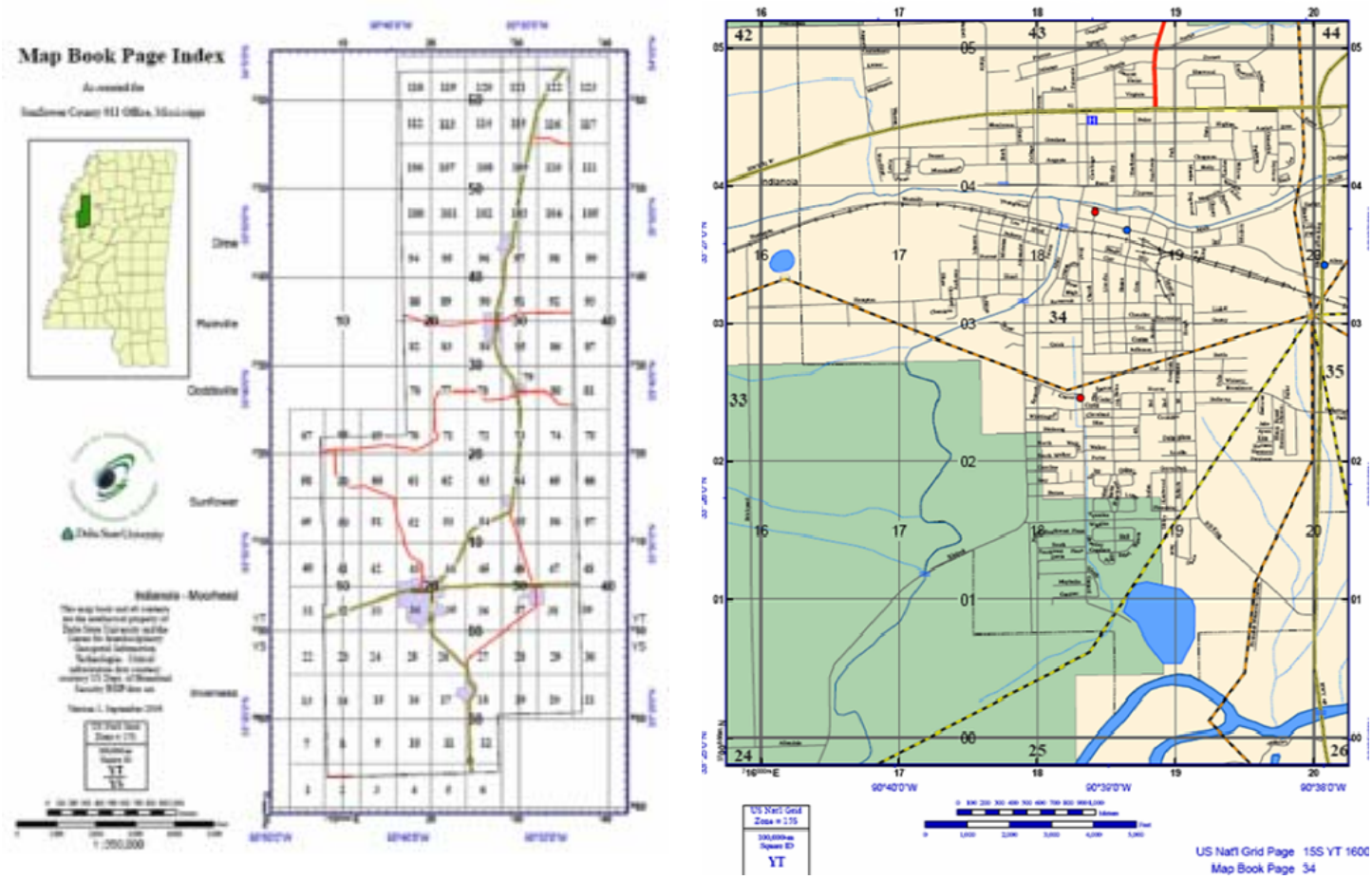

Figures 3 and 4. Sunflower County, MS map book index page based on the US National Grid. Each map page represents a 4 x 5 km area printed on an 8.5" x 11" page at a scale of 1:24,000 for easy use with standard compasses and grid readers.

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struggled with what might work. Using latitude and longitude was out of the question. Try to figure out how far apart two lines of longitude are or determine the number of decimal places to report a position within a few meters and the problem should become apparent. Further, this was not the time and place to explain 2.5' grids or the way to understand the differences between DMS and DD. In the end, the Public Land Survey System was used because it natively contains 1-mile by 1-mile grids and each grid is unique within a county (Figure 2).

While all of these efforts were at least somewhat useful, they did consume a great deal of time and served to highlight a fundamental problem. What was in fact needed was the application of a standard coordinate system, which any responder could use regardless of the map in hand or the GPS unit in use and which would work well with the largest group of responders, the US military. Not known to us at the time, such a standard already existed, but was not being used by any responding agency—particularly FEMA. It is called the U.S. National Grid *(USNG, http://www.fgdc.gov/usng)*.

The critical lesson learned is that every search and rescue team member, firefighter, medic, and police officer needs to learn fundamental map-reading skills and the USNG. When Katrina blew through, it stripped the land of recognizable landmarks such as street markers, house numbers (and the houses as well), and signage. The ability to navigate in this environment is crucial to providing emergency services and a map with the USNG is the most effective means to do so. Further, geospatial professionals need to know how to make standard map products with USNG overlays as they might someday find themselves in a similar position.

The USNG is a ground-based coordinate system that uses the meter as the basic unit of measure. With minor exceptions, it is the same as the Military Grid Reference System (MGRS), the system every recruit must master if they want to graduate from boot camp. It may be found in most all newer model GPS units and can be easily used if placed on a paper map. It is readily sectioned into 1-km by 1-km grids and may be used to report positions with 1-meter accuracy (Figures 3 and 4).

Beyond the search and rescue community, this issue is important. The fundamental concept in play is the creation of a common, spatially-based operational framework using interoperable maps. As geospatial professionals, we have become accustomed to the seemingly endless choice of projections, coordinate systems, and map scales at our disposal—sometimes at the expense of the end-user in the field. By dropping a

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