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Cover Page Photo:

**The 30MW Magrath Wind Power
Project in Southern Alberta.
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Is Wind the Answer?

By: Francis Bradley, Vice-President, Canadian Electricity Association, bradley@canelect.ca

Reliability, cost, and environmental impacts consistently rank as priority concerns for Canadians in respect to the supply of electricity. Many Canadians are asking themselves whether more wind power generation could help address them.

The growing popular interest in wind was part of the motivation behind CEA's "An Assessment of the Prospects for Wind Power Development in Canada." This policy paper, available on CEA's Web site at www, canvasses the current state of wind generation in Canada and comments on the possible contributions of wind to the generation supply mix in Canada.

CEA member companies are amongst the largest owners and operators of wind-powered generation in Canada. These companies view wind generation as one of the suite of technology options available, and necessary, to maintain diversity in the nation's power generation fleet. Diversity is essential, as it helps companies deliver reliable, affordable, and sustainable supplies of electricity by balancing the strengths and weaknesses of various technologies in meeting power needs.

The ideal amount of wind in a diverse Canadian supply portfolio is subject to debate. The Canadian Wind Energy Association has set a target of 10,000 MW of installed wind power capacity by 2010. Given current installed capacity stands at approximately 439 megawatts (MW) or less than 1% of Canada's gross generation capacity, this target would require an

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LogicaCMG is a major international force in IT services and wireless telecoms. It provides management and IT consultancy, systems integration and outsourcing services to clients across diverse markets including energy and utilities, telecoms, financial services, industry, distribution and transport and the public sector. For more information, contact us at 1-800-334-7101 or see www.logicacmg.com/us.

SOLUTIONS THAT MATTER

annual growth rate of 60%. Achieving the target would result in significantly higher energy levels from wind than are currently available, and it would represent a significant wind technology economic opportunity for Canada. However, it would also present a number of technical challenges.

At the heart of these challenges, is the fact that wind cannot be turned on at will: it cannot replace the need for and availability of generating sources that can meet immediate demand. Short-term fluctuations of wind power require that other generation facilities be available to increase or decrease system production very quickly. Additionally, wind cannot contribute to load following requirements because of its intermittent nature – meaning that wind turbines cannot be ramped up or down to meet instantaneous changes in demand.
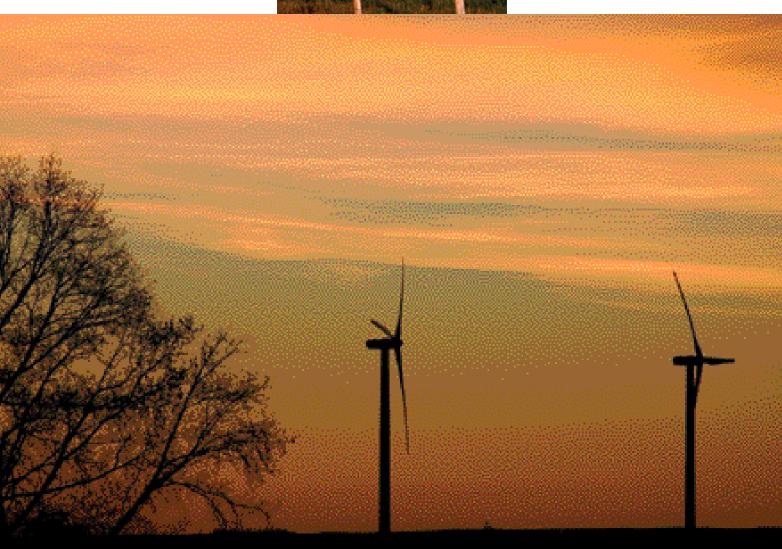
CEA members do not feel it appropriate to commit to a target for wind power, in part because these challenges are not well understood
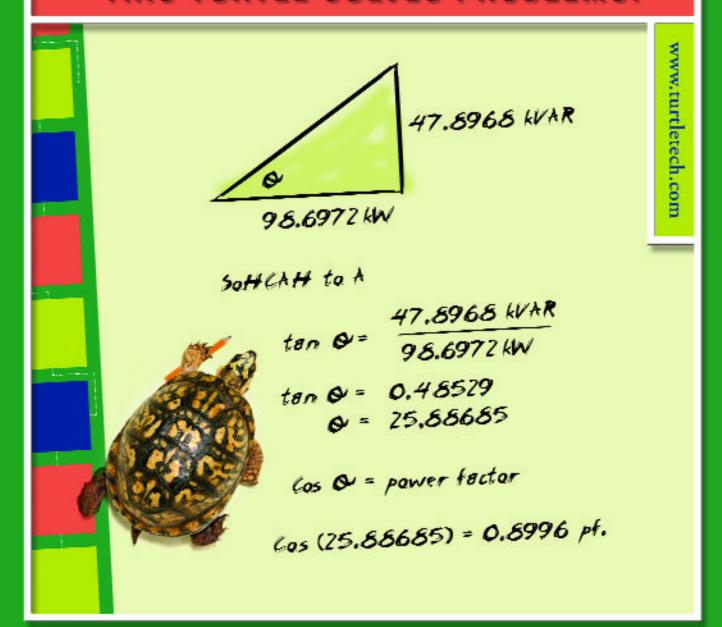
yet, but also because the amount that can be readily incorporated will vary by region, by power pool, and depending upon the mix of resources in that region. This means that the correlation between wind availability and regional energy requirements, and therefore the ability to incorporate wind generation into the regional systems, will not be uniform across the country.

CEA therefore recommends that industry and policy-makers focus on the continued development of wind generation – as with any technology – with a focus on the three fundamental concerns of improving reliability, reducing costs, and maintaining high environmental performance standards. Wind farms represent a significant development in energy infrastructure in Canada and CEA member companies intend to be leaders in the sector as they continue to meet the electricity needs of Canadians. ■

**Photos courtesy of GE Energy,
© 2005, General Electric Company.**

See more and do more with Matrox graphics hardware for industrial monitoring

Matrox Graphics Inc., an industry-leader in graphics solutions for professionals, has a full line of graphics hardware for enhanced industrial monitoring. Specifically, Matrox has AGP, PCI, and PCIe graphics cards to control up to four monitors at a time and to control very high-resolution monitors. Matrox, an innovator in multi-display technology, also supports multi-card configurations.

Examples of Matrox products include the QID LP PCIe, the industry's first _16 PCI Express graphics card to control up to four displays at a time. For high-quality, high-resolution, dual-link, digital monitors, the Matrox Parhelia DL256 PCI graphics card is an ideal solution.

Matrox products have features essential for mission-critical environments, including hardware with high MTBF (Mean Time Before Failure), long product life-cycles, and reliable, high-quality display drivers for Microsoft® Windows® 2000, Windows XP, Linux®, and Solaris™ x86 operating systems. To ensure system stability and compatibility, Matrox works closely with leading HMI software makers. ●
For more information, see the Matrox web site at http://www.matroxcad
or e-mail technicalsales@matrox.com.
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Partner and Origin GeoSystems Provide a Seamless Staking and Mapping Solution at Withlacoochee River Electric Co-op

Withlacoochee River Electric Co-op recently installed Origin GIS® and the Partner Work Management System. An important consideration in WREC's decision to buy Origin GIS and Partner was the interoperability between mapping and staking.

Located in Tampa, Florida, WREC has 183,000 meters and 10,000 miles of energized line covering 2,000 square miles. Historically, it addressed issues of mapping, work order, and staking automation with software developed in house. As its needs grew and technology changed, WREC realized that the need to purchase commercial software. Overworked stakers designed and staked their jobs, entered them into staking, work management, and accounting systems, and updated the system maps using an in-house AutoCAD mapping system.

By installing Partner and Origin GIS, WREC simplified the process. The two software systems work together using the MultiSpeak® 2.2 standard. The Partner Hub automatically generates the MultiSpeak XML file, and the Origin GIS system provides an interface that allows mappers to query and post jobs to their maps.

"We are very pleased with the relationship WREC has established with Partner and Origin GeoSystems," said Mike Walker, System Engineer. "Both systems fit very well into the overall project plan of data integration between staking, work order management, mapping, Àoutage management, and engineering analysis."

Map updates include adding, deleting, and moving lines, features, connectivity and data. The staker can access all map data in the field and make necessary changes to reflect the effects of a work order on the system plant.

The efficiency of the interface allows WREC's single mapper and an engineer to maintain the maps for 30 stakers. It virtually eliminates redrawing and data entry and allows the Àmapper to focus on validating the changes, addressing conflicts between jobs, and maintaining system connectivity. The entire organization has access to the system via the web-based Work Management System. ●
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Consumers Power Becomes First Co-op in Oregon to Fully Deploy AMR

PEQUOT LAKES, MN – Consumers Power, Inc., a Philomath, OR-based rural electric cooperative, recently completed full deployment of the Turtle® System, the power line carrier-based automatic meter reading system, from Hunt Technologies, Inc.

Consumers Power serves about 20,000 members in six counties, extending from the central Oregon coast east to the Cascades. It is the first co-op in Oregon to fully deploy an AMR system.

According to Brad Kunda, director of operations at Consumers Power, the utility initially began deploying AMR in 1998 to remote rural areas. In 2004, it deployed 11,000 Turtle endpoints to complete all of its residential and small commercial accounts.

Office Manager Traci Anderson said that in addition to daily meter reads, the co-op is looking for the system to improve efficiencies in other ways.

"A big benefit of the system for us is that we no longer have to shut off power when a customer moves out or send out a serviceman to read a meter when a new customer moves in. That saves a lot of time and money," Anderson said.

And from an operations perspective, the Turtle System has helped Consumers Power identify phasing and "get our mapping cleaned up," Kunda said.

According to Kunda, the only remaining step is to finish installation of AMR-equipped three-phase meters at irrigation wells and large commercial accounts. ●
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NEW SOFTWARE MAKES FIELD MEASUREMENTS SAFER AND MORE EFFICIENT FOR POWER COMPANIES

Laser Technology, Inc. (LTI), the leading manufacturer of pulse-laser measuring instruments and systems is announcing the release of T&D Pro ver. 2.0 for Pocket PC. This field software solution collects and calculates most critical measurements needed for transmission and distribution lines. T&D Pro integrates with LTI's reflectorless laser system and offers a safe and efficient method to perform complicated measurements in the field.

T&D Pro handles a wide variety of applications for the power utility industry, such as; verifying values for span, sag and tensions of multiple power lines. This can help determine upgrade capacity and power efficiency or can be used for accurate tensioning of newly constructed lines. The software also allows users to verify conductor clearances, attachment heights, distances between two points and more.

Collecting measurements safely can be directly related to LTI's reflectorless technology. Field crews no longer have to physically climb a tower or extend a height stick to a wire to obtain the measurements they need. LTI lasers have the ability to measure directly to the conductor without the need of any reflectors; therefore field crews do not have to occupy any dangerous areas.

The software's touch-screen activation and step-by-step graphical aids are both contributing factors to increased field productivity. Another time-saving feature T&D Pro offers is that it can calculate critical values right in the field. Field crews can now make immediate decisions without having to take data back to the office for post-processing.●

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Pulsar Technologies, Inc. Introduces Universal Power Line Carrier

Coral Springs, FL – As a result of continued demand for secure, flexible protective relaying communication channels, Pulsar Technologies, Inc. has released the Universal Power Line Carrier (UPLC).

UPLC is the most advanced, single function power line carrier available today. The major application for single function (narrowband) power-line carrier is on transmission lines for protective relay and direct transfer trip channels.

Pulsar's years of experience in design and application of power-line carrier, in combination with modern technology, has produced the next generation of Power-Line-Carrier in the UPLC. UPLC's platform is built upon digital signal processing and Power PC, technology.

As with our previous power-line carrier designs, UPLC is frequency programmable across the entire power-line carrier spectrum without changing any hardware. Every UPLC can be configured via software as either an ON/OFF or frequency shift keyed (FSK) power-line carrier unit without changing any hardware components.

In addition, UPLC is programmed using a simple-to-use web browser interface, which is installed on most personal computers. Since the web browser is used for other applications, the user is familiar with its functionality.

Since UPLC is fully programmable, the settings can be uploaded via any of the communication ports. Settings may be applied from the factory-installed defaults, or customized as needed for the application. Setting files are in the Extensible Markup Language (XML) format, which can be easily modified as required. Transmitter and receiver self-calibration provides for ease of installation and maintenance. Accurate measurements for the transmitter output and the received signal level are displayed on the front of the UPLC and the user interface web page. ●

For more information on the UPLC, and to see our full line of substation communication products, including our FOCUS intelligent multiplexers, please visit our website at www.pulsartech.com.

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Patented Technology Puts a New Face on AMR

By Mike Smith, KLN Group

In the annals of AMR ("Automated Meter Reading"), there are numerous well-documented examples of the "traditional" approach to implementing a system, from feasibility studies through rolling out a system across the utility enterprise. While the AMR industry has evolved and matured, and is seeing many "success stories", there are still, unfortunately, many common, recurring, less-than-ideal themes: on-going reliability issues, infrastructure costs for a large-scale implementations, and the ever-present project cost and scheduling snafus.
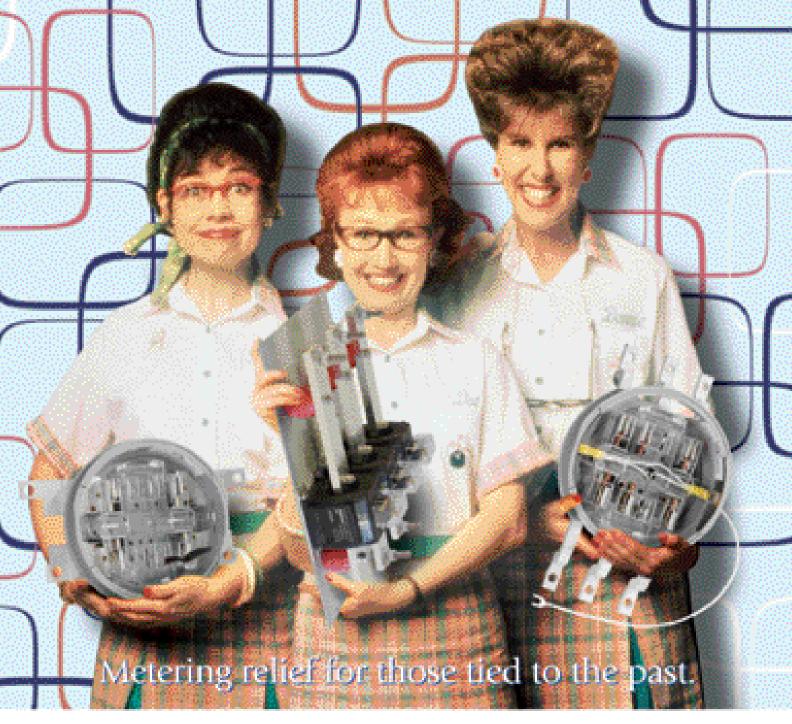
Clearly, there is room for improvement in the emerging AMI ("Advanced Metering Infrastructure") marketplace. Of particular need are solutions that are more reliable, less complex, and require less equipment and staffing (thus cost) for utility-wide implementations. One such approach that meets these criteria is from Advanced Metering Data Systems ("AMDS", at ww.amdswireless.com).

Figure 1. Hurricane Ivan hits landfall on September 15, 2004 (Source: Intellicast.com)

The AMDS approach provides secure, reliable meter data from a fixed based, FCC-licensed, patented wireless network. System reliability is achieved by expansive tower receiver coverage of metering end-points, data/message redundancy, proven fail-over backup provisions, and operation on FCC licensed exclusive-use (unshared) spectrum. Features and capabilities include one-way and two-way communication (remote disconnect/reconnect, load control), on-demand tunneling access to all meter information (including C12.19 tables), and time-of-use profile data for variable rate billing and consumption correlation.

One example of the reliable performance of this approach is found in last year's Hurricane Ivan. Rated as "Category 5" hurricane, Ivan caused devastating damage in the Caribbean, and then ripped through the southern United Sates. With heavy rains and winds topping 150 MPH, Hurricane Ivan left a swath of devastation in its

Figure 2. Chart from September 15-16, 2004 Indicating Continued Operation of AMI (Source: AMDS).

path, much of it well documented by national media. Initial damage estimates ranged from $5 – 15 billion.

Buried in this disaster were stories of success in the face this disaster, particularly in terms of utility infrastructure. Utility crews performed often-miraculous feats in service to their customers, working around the clock to restore power as quickly as possible to as many people as possible. Some utility systems also performed above even the most optimistic expectations, saving utility companies literally millions of dollars and facilitating the provision of utility services to thousands, if not millions, of customers. Among the systems demonstrating exemplary performance during Hurricane Ivan was the AMDS AMI solution being pilot-tested at several large utilities in the southern United States when Ivan struck.

Three of these utilities installed 500-site, next generation AMI pilots that leverage the industry's only FCC-approved AMR solution operating on an unshared primary-use licensed spectrum. This system, provided by AMDS, use this patented technology to provide an AMI solution that, because of its bandwidth and lean infrastructure requirements, is able to provide higher levels of reliability. The system also includes the Sensus Metering Systems (www.sensus.com) iCon meter, equipped with an under-the-glass AMDS meter module manufactured and marketed by Sensus under a partnership between AMDS and Sensus.

By relying on the primary-use licensed spectrum, the AMI system does not rely on third-party cellular or RF networks, which can default to busy signals and must first be reinitiated after a catastrophic outage, such as was the case during Hurricane Ivan for most cellular infrastructure.

Moreover, because the AMDS system controls all critical communications elements, it was able to keep operating throughout the storm, collecting valuable meter readings, power failure events, power restorations, and line voltage readings, even in Hurricane Ivan's hardest hit areas. The tower network remained 100% operational the during entire storm, even though some tower sites operated for 8 hours or more on internal back-up power.

Figure 2 (left) illustrates when power failures occurred and when power was restored.

The system's high availability throughout the storm is directly related to the simplicity of the system design, requiring only a few towers and minimal hardware. Systems based on cellular communications, distributed collectors and data bases, or other conventional media are far more complex and as a result, generally take much longer to restore. They are also much more likely to sustain damage to critical infrastructure simply because so much more of it tends to be affected, and must then be restored after a storm.

This lean yet robust infrastructure is apparent in these pilots by allowing a meter end-point to reliably communicate directly with tower-mounted AMDS base stations that are 5 to 10 miles away, rather than the much shorter distances that typify other systems. By eliminating hundreds (or even thousands, in large implementations) of complex, intermediate tier pole-top and/or roof-top mounted data collectors, installation time and costs; communications efficiency; maintainability, reliability and availability are all greatly enhanced.

The entire pilot area network installation required only three towers outfitted with AMDS base stations, yet it provides over 200 square miles of coverage in an unforgiving terrain marked by hills and valleys. The fact that the system is reliably providing synchronized hourly read interval data and demand reads with such a lean installation profile underlines one of the key benefits of the design.

As AMR comes of age and evolves into AMI, the need for reliable performance is becoming increasingly critical for utility executives to consider carefully when committing the enterprise to multi-million dollar investments in system reliability and customer service improvements. Solutions offering reliable communications, lean infrastructure requirements, and the ability to withstand even the most adverse operating conditions should be at the core of the future of AMI investment considerations. ●

Editor's Note: Mike Smith is Principal at KLN Group and can be reached at Michael.smith16@comcast.net

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Demand Dramatic Improvement Through Better Asset Utilization and Workforce Unification

Part 2

By: Chuck Drinnan, Executive Consultant, LogicaCMG

How can utilities make dramatic business improvements in productivity through better asset utilization and work force unification? This is the second of a two part series that identifies improvement strategies utilities are applying today.

Part I of this article (which appeared in the January-February 2005 issue of this magazine) discussed the state of the utility industry and suggested that utilities are asset intensive companies. It reviewed how utilities are changing their approach to asset management and implementing new systems to support asset management requirements. To manage assets effectively, utilities need to know the full life cycle history for each asset and base their asset strategies on Return on Asset Investment (ROAI) evaluations.

Traditionally, utilities have organized along capital and operations activities and further divided into office and field workers. This culture, reinforced with "best-of-breed" systems implemented for specific organizations and often only loosely integrated with other systems, has resulted in organizational silos that discourage cooperation and prevent employees from operating at their fullest potential.

These silos can be eliminated and utilities can operate more effectively as unified organizations. All the utility's employees and contractors can focus on common business objectives and become part of shared business processes.

This Part 2 of the two part series recommends strategies for unifying the utility's work force and systems in the office and in the field to reduce organizational silos. Cultural changes are required to achieve the unification and drive productivity improvements. Once the constraining silos have been removed, the utility can achieve long-term cost savings and dramatic business improvements.

Organizational Silos
Narrowly Defined Functional Areas
That Inhibit Enterprise Objectives

Automating the Field – The Last Frontier

Since utilities are asset intensive companies most of their work is done where their assets are located – in the field. However, most of the improvements in processes, procedures, and systems have emphasized the office worker and not the field worker.

The field may be the "last frontier" for increased effectiveness and reduced costs. Industry studies have documented that a 30% to 50% improvement in field productivity can be achieved by:

- Implementing comprehensive system capability on mobile devices
- Redesigning business processes to unify field and office work

• Developing and monitoring key performance indicators

• Providing field access to current data

The first steps toward field productivity improvement -- such as field map access and downloading work orders -- have been available for years. These capabilities offer field workers ease of use benefits and reduce clerical work. However, even greater benefits are achieved when the utility fully integrates the field into its business processes, accepts field updates, and provides wide system access to the field worker.

Poorly defined business processes have hampered achieving projected system benefits in both office and field operations. The culture of many utilities separates the field and office staff as well as the construction and operations organizations. In fact, within some utilities, there is a tradition of disrespect for the needs of each party. This culture constrains the benefits that can be achieved.

To achieve the next level of utility effectiveness, the utility must shift its cultural focus from the office to the field where the work is performed. Executive support for these changes, including the necessary organizational changes, is required to help ensure their success.

Moving the Office to the Field

Almost all the distribution utility vendors are turning to field applications as a source of new users and increased benefit. However, few field systems are integrated with one another and with other corporate systems. Many vendors are simply moving their desktop functionality to the field without implementing new business processes and integrating field and office functions.

At one time it appeared, in a comical way, that the fully enabled field worker would look like "an outlaw in a cheap western" – a person weighed down with different mobile units, PDAs, and cell phones in different holsters and ready for any situation, whether the application was mapping, dispatch or inspections. But this hasn't happened because mobile units provide enough capacity to support multiple applications, even if the applications aren't integrated. So the question becomes, how can the utility capitalize on the power of the fieldtop and integrated applications to support greater work efficiency?

Mobile Capability Evolution

Mapping was one of the first distribution field applications (customer service turn on / turn offs and outage/dispatch were other early adopters). Since maps are the only field source of network configuration, they are the lifeblood of the field worker. Map access on mobile units has replaced hardcopy map books that were time consuming and expensive to maintain, awkward to use, and always out of date.

**Southwest Gas: Breaking New Ground
with Office to Field Asset Management**

The phenomenal growth of Southwest Gas Corporation, one of the fastest growing natural gas distribution utilities in the United States, has put increasing demands on its workforce and IT solutions. Southwest Gas has controlled its costs and met its increased demands with LogicaCMG's Asset and Resource Management ARM product suite integrated in the office and the field with other corporate systems.

Yet dramatic cost reductions have not been achieved. One reason is that the mobile mapping capability serves a narrow purpose – delivering map information. The mobile device is being used as a digital clipboard. The work, defined by office based systems, is downloaded to the mobile device and results entered by the field worker are recorded on the mobile unit (digital clipboard) and uploaded to the office, typically for reentry into the office systems. Some implementations use redlining to record the construction details – a process that replaces the red pen on the paper design with a digital pointer recording redlines on a digital map for subsequent re-entry into the office systems by office staff. This approach duplicates the existing process and doesn't provide a unified, highly productive office and field process.

The next evolutionary step for mobile capability came from the asset/work management environment. Work packets defined in the office are downloaded to the mobile units. Some mobile vendors support recording of construction results and upload and automatic entry into the asset/work management systems from the field units. With this capability paper designs and work packets are eliminated, the effort to transcribe construction is reduced, redundant processes are eliminated, and the utility's databases are updated rapidly with accurate data.

However even today, many of the field worker's applications don't have the same look and feel and few of them perform in an integrated fashion with the corporate systems. In some cases, because of the limitations of field devices or communication methods, the field workers are offered "stripped down" applications that reduce the field's productivity as an enterprise contributor. For the utility to achieve real efficiencies business processes and cultural environments must be changed and both field and office systems must be modified to enable the new processes.

A Lesson from the Desktop

All of us have experienced how the value of our desktop systems has increased dramatically as the applications became more integrated and more user friendly. Then these systems became even more valuable when they moved from departmental silos into enterprise wide use. As we learned to "Google", we began to draw on the knowledge of the entire world at our desktop.

The modern desktop environment is a seamless environment. However, the field worker often has a hodge-podge of technology: a real time connection for dispatch, docking stations for construction and inspection work, and CDs for mapping.

RTARM Unifying the Office and the Field

LogicaCMG's new real-time asset and resource management product, RTARM, combines dispatch, inspection, maintenance, construction and mapping capabilities to increase the productivity of field and office work forces.

What if all these field functions were integrated as seamlessly as typical office-based desktop environments? Why not move the office to the field? Why not change the work process so that office and field work are much more transparent? To achieve real performance gains, why not provide access and update capability for most enterprise data to all users, whether in the office or the field? Recognize that the "field" can be many different places – a crew vehicle, a job site, an employee's home, a contractor's office – and make data access possible from all. What if the crew defined new work, requisitioned material, completed the work, and recorded the results from the field without returning to the office -- and the effort took a day or two instead of weeks or months?

Unified field and office work doesn't result from new technology alone; it requires cultural changes supported by senior management. As long as office workers are the only ones who can design the job and record as-built data; and as long as the field doesn't appreciate the office requirements or respect office developed designs and corporate records; then work will be performed redundantly in the office and the field and important office system records will remain months behind. Some utilities are actually perpetuating their unproductive behavior by buying additional systems to automate antiquated processes. They are incurring additional costs with little hope of achieving significant benefits.

The corporate culture should change to give greater emphasis and responsibility to the field worker until the distinctions between field and office workers are virtually eliminated. New processes must be defined and implemented so that the whole environment -- office to field and field to office -- becomes a single business process continuum. When this happens, utilities can reap their expected benefits and experience greater accountability from both office and field personnel. Utilities that adopt this approach can further flatten their organizations.

Harnessing Technological Change

The next generation of office and field systems will implement new system architectures that take advantage of increased communications capabilities. With the revolution called "Wi-Fi" and wireless networks, desktops and fieldtops can connect to corporate systems via the Internet from many locations. Often, wireless "hot spot" connections are either free or relatively inexpensive. As wireless coverage increases, Internet solutions proliferate, and communication costs decrease, utility workers in the field will be able to do everything that they now do in the office.

With new wireless system architectures, systems will be designed to operate seamlessly in both the office and the field. When a wireless connection is unavailable, the system will access data previously downloaded to the field unit. When the connection is re-established the system will automatically upload the work and refresh the field unit without the user taking any actions. This approach requires new system architectures. Enabled by this communications revolution, utilities will be able to achieve real benefits as field and office cultures and their business processes are transformed and the utility's combined work forces focus their efforts on enterprise-wide objectives.

Key Performance Indicators for the Field

Studies have shown that companies that implement performance measures for field activities achieve a much higher level of productivity. Virtually all top quartile companies implement performance metrics that help them substantiate their benefits and identify areas for additional study and subsequent improvement. These metrics – often called key performance indicators -- are designed to measure the improvements the utility is striving to achieve. Typical indicators for the field are: completed work orders per day categorized by type, average labor per work order per type, average duration of the work orders and productive direct activity time.

Work SchedulerPlus

Work SchedulerPlus is a component of LogicaCMG's ARM product suite. The constraint based scheduling system provides a "least cost schedule" for complex multi-day, multi-crew work. It sets and honors appointments.

Direct activity time is measured as the percentage of the workday spent working directly on an asset. It doesn't include travel, planning, approvals, record keeping, management, meetings, etc. – only the actual time spent working on the assets. "Productive" direct activity time is the time that an employee is performing work appropriate for the employee's skill level. Maximizing direct activity time is essential to keeping everyone busy – a good objective; maximizing productive direct activity time is the key to keeping everyone busy doing work they can most cost effectively perform – a better objective.

Studies demonstrate that when the cultural changes are achieved to make work in the field more effective, a dramatic increase in direct activity percentages results. Many distribution utility companies are performing at less than 20% direct activity time. This means that on average the utility's staffs spend less than two hours a day working directly on an asset and more than 6 hours a day filling out paper work, traveling, recording results, managing others, etc. By way of contrast, field workers for top quartile companies achieve 45% direct activity time.

Alternative Work Forces

In seeking to make productivity strides, utilities are re-examining who does what work and with what tools. Continuing a trend from the de-regulation era, asset intensive companies are distinguishing asset ownership from asset related service delivery. Service delivery can be divided into:

- Providing capacity, reliable service, and safety
- Performing routine work such as construction and maintenance

For some asset owners, capacity, reliability, and safety efforts are core capabilities for which they retain direct responsibility. Non-core activities such as construction and maintenance may be done by contractors and managed by the asset owners.

Contracting and Outsourcing

Utilities have been contracting their work for years – gas construction, tree trimming, and pole maintenance, for example. However, for some utilities, the paradigm is changing from

"contracting" to "outsourcing". With traditional contracting, the contractor does what it is directed to do by the company. With outsourcing, the outsourcing vendor accepts the risks and responsibilities for delivering specific processes and functions, as well as for performing the work. Outsourcing contracts include negotiated service level agreements (SLA's) that specify the outsourcer services, responsibilities, and performance levels to assure quality results.

Each utility is determining its own balance between company employees, contractors, and outsourcers with some utilities contracting everything except the core asset ownership responsibilities while other utilities are pulling most of their work in-house.

Using the Web to Empower Contractors

One of the barriers to effective contracting is the effort required to manage contractors and to record contractor work into the company's permanent records. This problem is not unlike the organizational silos, discussed earlier in this article, that prevent office and field workers from working effectively.

Most utilities rely on server/desktop systems such as work management, financial systems, and GIS to streamline their in-house work processes. But the utility often restricts contractor access to the systems for security reasons.

The barriers to effective contracting can be substantially reduced if the utility treats the contractor more nearly as a partner, increases the share of the work the contractor performs, and provides access to the company's computer systems through secure portals.

For example, the following procedure increases contractor productivity. Assuming the contractor has a standing agreement with the

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ARM Web Portal

LogicaCMG's ARM Web Portal expands corporate work management access to contractors and developers. Contractors perform more work, more effectively with less effort on the part of the utility.

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utility, the utility defines the work at a high level and makes it available in the contractor's office via the Internet through a secure portal. Contractor system access is limited to the contractor's needs (for example, the contractor can't view work assigned to others). The contractor accepts the work, does any design, permitting, material requisition, and construction, and then records the detailed construction through the Internet

portal via the same systems the utility uses. The contractor's involvement ends with the submittal of an invoice via the web.

Advantages of this approach include:

- Contractor performs more of the work, presumably at a lower total cost
- As-built records are updated quickly and accurately by the contractor
- Contractor management efforts are reduced
- Redundant paperwork and data entry are eliminated
- Asset posting backlogs are eliminated

Dramatic Improvements

Leading utilities are taking aggressive steps to manage their assets better, find new ways to reduce their costs, and provide better and more reliable service. Recognizing they are asset owners in asset-intensive companies, they are maximizing the effective lives of their assets and controlling total cost of ownership. They are implementing new systems and an asset repository with enterprise access including field workers. These utilities are changing their cultures, unifying their office and field workers, and instituting new business processes to improve performance.

The lines between "office" and "field" are blurring as the utilities recognize that work is the same regardless of where it is performed. Leading utilities are also re-examining such alternatives as contracting and outsourcing and transferring business processes and accountability to third-party entities to reduce costs and increase reliability.
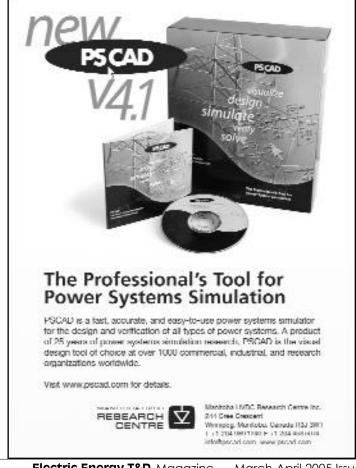
In a tough economic environment where many utilities have taken the easy benefits, utilities are finding new approaches such as these to move to the next level of effectiveness and achieve dramatic business improvements. ∎

About the Author

Chuck Drinnan is Executive Consultant for LogicaCMG's energy and utilities division located in Houston, Texas. He has over 30 years of experience in asset and resource management for the utility industry. Chuck can be reached at chuck.drinnan@logicacmg.com or call 1-800-334-7101.

LogicaCMG is a global IT solutions company, providing systems integration, consulting, products and services. LogicaCMG's Asset and Resource Management (ARM) product suite includes work management, mobile computing, asset management, compliance tracking, scheduling, and reporting capabilities delivered as a pre-integrated, seamless solution. For additional information visit the LogicaCMG web site at www.logicacmg.com/us.

Part 2
Trends in Mobile Field Information Management

By Jim Hargis, President, har*GIS Field Information Systems

This is the second part of a two-part article that provides a unique view into the fundamental technology trends that will shape mobile computing for those who use and deploy these systems for utility applications. Part I appeared in the January/February edition of this magazine, addressing the "hard tech" – or machine and product centered -- trends in base technologies such as wireless networking, GPS commoditization and ubiquitous mobile computing. Part II focuses on the trends in "soft tech," essentially human-centered aspects of go-anywhere computing, mobile GIS integration and field automation.

Part I, Revisited

For those readers who did not read Part I, the following bullets summarize the primary conclusions conveyed in last month's edition.

• Major new wireless network standards, particularly the new WiMax broadcast system to be deployed in 2005, will fundamentally reshape the wireless landscape by offering high-speed wireless access with the speed of local area networks and the range of 10 to 30 miles. When fully deployed over the next few years, the low-cost WiMax service will likely become an economically disruptive alternative to the existing high-speed services such as cable broadband, DSL, "hot-spots" and the "3G" wireless voice-data cell service providers, as well as to planned services such as "Internet over power lines." It will also provide the only economic alternative for high-speed services for rural areas.

• The commodization of GPS is essentially complete, with continuing improvements being made in accuracy and cost. Any mobile application should include GPS, but it must meet today's demands for accuracy and performance and ease of use. While easily available corrections such as differential GPS and Wide Area Augmentation Satellite signals can provide one-meter accuracy, survey accuracy (sub-meter) is available off-the-shelf from equipment provided by several vendors such as Trimble Navigation. Additional low-accuracy location

services are available from several wireless phone services, particularly Nextel.

• The explosion in low-cost, application-specific, high-performance, embedded-computing form factors will continue to force field application software away from the "Windows-Icon-Mouse-Keyboard" WIMP interfaces to field-friendly user interfaces including touch-screen input, voice recognition and prompts, and simplified point-and-shoot entry.

• The inexorable drive to cheaper, longer-range RFID devices can eventually enable "self-reporting" and "drive-by-inventory" of equipment that otherwise requires tedious data entry to track field and office locations. The long-range mobile RFID reader with location-sensitive tags has the potential to radically simplify the life cycle management of critical facility assets, although this is severely limited by the lack of standards and high prices for the tags with these capabilities.

Soft Tech Trends

There are a variety of human-centered, soft tech trends that will create both opportunities and challenges for IS-IT groups struggling to deploy and maintain a new generation of mobile technologies. According to Hewlett-Packard Development Company, "The power behind mobility lies in the ability to change the way work gets done, so employees are more productive, and the business gets better results… business should demand from their providers: Simplicity, Security, and Seamless connectivity." The struggle to integrate embedded computing, universal communication, field-specialized systems and distributed data bases is creating a radically different alternative to traditional lap-top PC model. The evolution from the old to the new will likely echo the changes that occurred with migrating from mainframes to desktops in years past.

There's no question that mobile information systems will enable the next productivity leap in a wide variety of enterprises, utilities high among them, due chiefly to its ability to bring automation and efficiency to a new range of

processes, and deliver data wherever and whenever it's needed. Realizing the full potential of mobile technology, however, requires supporting a variety of complex standards as well as field-oriented design, development, deployment and support challenges.

The integration of mobile devices and on-demand connectivity to data residing on corporate systems is already resulting in strong ROI with paybacks in six months or less, limited only by the ease of use in the field and the (currently large) custom development and GIS system costs. The huge technology turnovers and the utility industry's need for proven and stable implementations is another driver to "product," rather than "custom" solutions.

What to Standardize?

To quote from the 1980s, "The nice thing about standards is that there are so many of them." The mobile landscape is complicated by a variety of competing standards and incompatible protocols. Palm OS battles Windows CE. Bluetooth is taking on 802.11b. While 3G is more and more promising, the 2G digital cellular networks that still predominate offer three different standards—Code Division Multiple Access (CDMA), Time Division Multiple Access (TDMA), and Global System for Mobile Communications (GSM). Wireless applications must work with one or more of these standards, but designing devices that can accommodate multiple standards may limit their field functionality.

A standards-based system will survive the constant technology revolutions, drive vendors to reduce costs and enhance value. On the other hand, the blind adoption of standards can lock IT groups into obsolete technologies. Standards-based solutions are built to a previously existing public standard that has equivalent solutions from multiple vendors, as opposed to a "vendor-standard solution," which by definition is self-limiting and not open.

The standards-based solution supports recognized official standards such as IEEE communication protocols, Windows embedded operating systems, SQL/ADO/ODBC database management systems and Internet standards such as XML.

On the other hand, if you allow hardware form factors, field user interface and other productivity-related factors to be specified functionally, rather than locked down, you allow a variety of approaches for implementation without major impact on the bedrock technologies. Using "vendor" or "industry" standards may be hazardous to the long-term economic health of your project because of the rapid changes; therefore vendor-independent solutions are much preferred.

For a free copy of selected communication, Internet and GPS standards, please contact info@har-gis.com

Ubiquitous Geo-spatial Data

In 1999, what's now called the Open Geospatial Consortium (OGC) and was then called the Open GIS Consortium, demonstrated the ability for a simple HTML-based Web client to transparently query, access and display GIS data from multiple, geographically distributed sources using its Web Map Service Interface specification. Since then, interoperable access and use of geospatial data has become common, marked by a shift from tightly coupled architectures like CORBA and OLE/COM to loosely coupled, highly distributed architectures

such as mobile wireless infrastructures and the Internet.

There is a strong need to find, bind and use geospatial content and services on demand. This includes a wide range of spatially related technologies, for example, surveying, GPS, photogrammetry, remote sensing, imaging, conversion, mapping, cartography, GIS, decision support, business demographics, mobile applications, location-based services, asset (facility) management, and Web publishing. As a result, organizations like OGC, working in tandem with standards organizations like ISO, OASIS and the W3C, are making great strides in the ability to integrate content and services from multiple providers, as well as to integrate legacy systems and content into new workflows.

Rapid advances in the mathematical field of "computational geometry" has enabled remarkable performance and efficiency gains for geo-spatial database systems, and enabled high performance, highly compacted geospatial data for mobile workers. It's possible today to view and manipulate a wide variety of complex geospatial data, such as the detailed road network and address database for multiple states, on low-cost field devices – data extending far beyond the limitations of simple map overlays. With their increasing low cost storage, even the smallest PocketPC® can store and process large databases given the correct software.

In fact, GIS is an increasingly limited terminology: OGC specifically called to replace it with the term "geospatial", in order to signify that standard applications and data sets now routinely use geographic data. With Oracle 10g, Microsoft's location-based SQL Server and initiatives by other mainstream technology leaders, this trend toward broader, deeper leverage of geospatial resources – both in and out of the field -- will continue to accelerate rapidly.

Democratization of Information

Supporting this trend toward "geo-spatialization" is the wide-spread availability of high-accuracy GIS data, both as the result of widespread adoption of GIS projects and data conversion efforts, and also from commercial land base providers. Accurate satellite imagery providers offer on-demand mapping data at low costs. "Outsourcing" of labor-intensive projects is moderated by security concerns and, most importantly, the lengthy quality control processes necessary to receive acceptable, high-accuracy deliverables.

Currently, tremendous amounts of corporate information and GIS data have been locked away on the desktop systems, for access and maintenance by specialized systems and highly skilled operators. The technology to unlock this

information and distribute it to the field users, who have access to "ground truth," is limited not by the hardware, but by the programming skills and field-usable software available to distribute and maintain this data in the field.

This calls for new approaches, such as integrating existing disparate data sources in the field, rather than constructing costly, massive and inflexible integrated systems. It makes no sense to deploy GIS data and ignore critical field documents including CAD drawings, site photography, video, CIS databases, asset records, work orders, real-time operations data, SCADA information and even email. This confluence of information in the field regardless of source is a fundamental trend. The trend is NOT to deploy limited "mobile GIS" solutions, but rather to implement field-usable "field information systems" that have geospatial capabilities, along with the ability to leverage a wide variety of additional enterprise data.

Field User Interface Requirements

To ensure widespread adoption of field technologies, field workers cannot be forced to learn to use multiple, different interfaces, specialized commands or even menus and tiny icons in order to use information from different data sources and systems. A common "gloves-on" field user interface is required, but poses a severe challenge to developers, who are accustomed to using keyboards and windows-icons-menus-pointer – or WIMP -- interfaces. Hands-on access, using touch-screen and voice input technologies, is a definite advantage for field usability. The user requirements are severe and include:

- Absolute reliability of re-usable software components instead of the constant debugging of custom applications for each customer. Re-booting is not an option.
- Durability of all hardware and intermittent wireless connection.
- Complete functionality for field operations applications. Work-arounds require reliance on paper bound processes.
- Incremental implementation and expandability into new areas without reprogramming. Initial success is critical to field adoption.
- Scalability from entry-level systems to hundreds and even thousands of users, across multiple platforms and networks. Hidden bottlenecks exist for most network-based and data-based platforms.
- Integrated field interface across multiple field applications and data sets. The field user requires simplicity.

Custom versus Product

Any mobile initiative that requires specialization of hardware and vertical applications will result in higher development costs. There is a strong need for standard components that can be re-used and are easily configured by IS-IT staff without the need for custom programming. These solutions provide the value-add and competitive advantages of custom products, without the high costs that come with acquiring and maintaining custom features. The components must be re-usable and integrated across a wide variety of hardware, including pocket computers, ruggedized systems, multiple communications and multiple enterprise applications. This has been the trend for successful systems in many other industries.

Although today there are very few providers of such products, the economics of product software will force many existing application vendors to change their systems and offer this architecture to their clients. Today's multiple single point field applications must give way to easily configured, reusable, integrated and extendable multiple mobile components. PC-level applications can be incorporated in hand-held platforms. One example is the ability to use handhelds not just for field inventory and alphanumeric forms entry, but to also use the same platform for GIS display, GPS navigation, vehicle tracking, dispatching, routing and custom forms-driven work management.
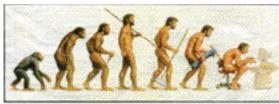

FIGURE 1,
Standard PocketPC display with the addresses for the entire state of Colorado and electric facilities database (gray) for 40,000 customers.

Summary

In conclusion, it appears that the increasing expansion in computer technologies is mirrored by a convergence of infrastructure, assimilation of GIS into geo-spatial applications and integration of multiple features into common simplified field interface. Single point applications, although easily implemented, must soon consolidate to true information systems supporting field users. The economics of reusable software products will collide with the custom vertical application requirements to produce innovative flexible and configurable products. Lastly, the revolutionary nature of impending changes in network communications, hand-held computing power and universal location services has the potential to obsolete many recently introduced mobile systems. ■
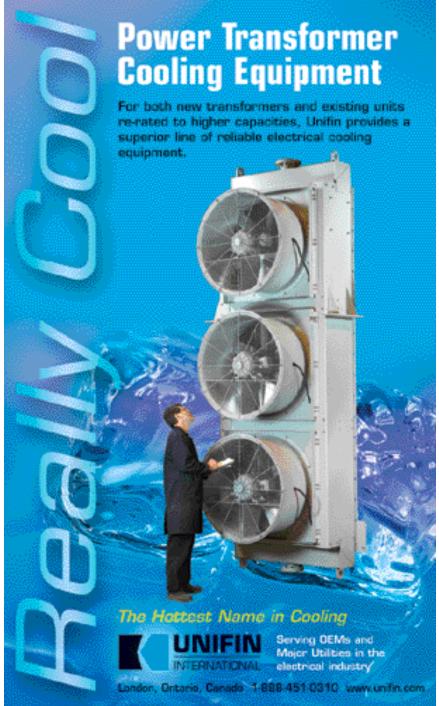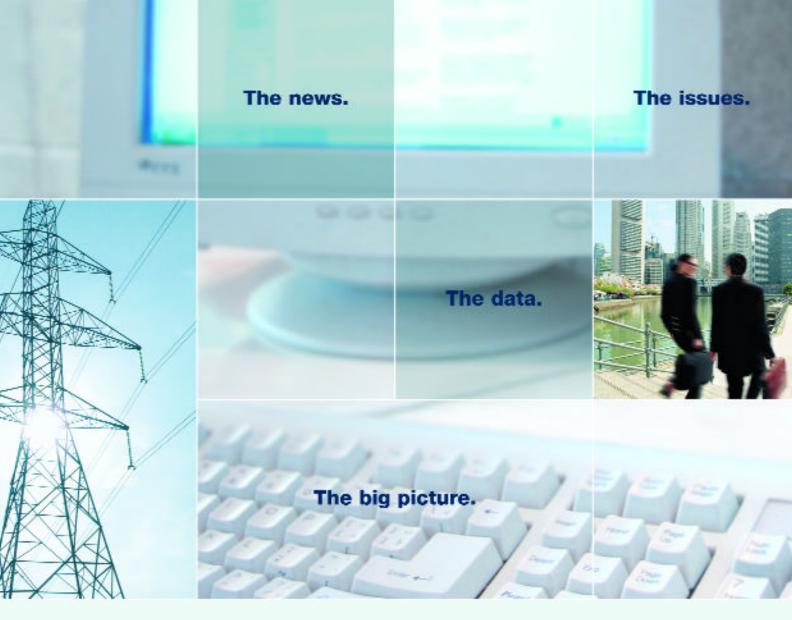
Somewhere, something went terribly wrong

Figure 2, Why Mobility is Essential

About the Author

Jim Hargis is president of har*GIS Field Information Systems, developer of the TruckMap* Field Information System™ (www.truckmap.com). His 30-year career has been dedicated to the innovation, design, development and imple - mentation of spatial and mobile technologies for more than 200 utility companies and local governments. Mr. Hargis holds a BS in Physics from Rice University and an MBA from the University of Denver. He is a past Board member of GITA and has contributed a dozen papers, presentations and seminars. Mr. Hargis has developed and patented essential technology for automated map generation from facilities data - bases. Part I of this article, along with an expanded glossary of terms for wireless and GPS technology are available from the author via email to info@har-gis.com or at www.har-gis.com.

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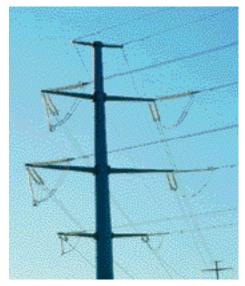**Association canadienne de l'électricité**

Transmission Line Operations and Maintenance

by Finn Rimmer, Technology Coordinator of CEA Technologies' Transmission Lines Asset Management Interest Group

Transmission lines have become a staple of our landscapes – they traverse an incredible range of environments, climates and terrains, leaving lasting images. Their longevity is at least partially responsible for this ubiquity. Many of the major systems currently in service were built in the 1960s and 70s, with lines installed at the turn of the century not uncommon. Due to the relatively old age of these structures, most utilities owning and operating high-voltage transmission lines encounter the same types of maintenance problems.

Maintaining reliability, extending the useful life of lines, increasing electrical energy transmission capabilities, preventing failures, and ensuring employee and public safety are all at the forefront of transmission line research and development. Wood crossarms are of particular concern as they are typically quite sensitive to climate. Likewise, climatic concerns are at the heart of the structural integrity of towers, as atmospheric corrosion affects the galvanization of the steel.

Utilities must also cope with unforeseen events that cause electrical system disturbances, such as tree-induced cascading line failures, failed electrical protection systems, major storm damage and other component failures. As was experienced during the blackout of 2003 and the ice storm of 1998, the loss of a major transmission line shows the point at which our society is dependant on a reliable electric energy source, underscoring the need for utility engineers and managers to find effective solutions in preventing these occurrences.

To deal with these concerns, leading utilities are examining the economic impact of these problems and revisiting their planning and operations practices. Many are also heavily involved in the establishment of equipment protection standards and regulatory guidelines in the ultimate goal of minimizing the combined cost of supply and use of electricity by achieving a high degree of transmission reliability.

To facilitate these efforts, CEA Technologies Inc. (CEATI) has organized a Transmission Lines Asset Management Interest Group (TLAMIG), bringing together electrical utilities from around the world to exchange information and to sponsor technology development with the goal of optimizing the management of transmission line system assets.

The Transmission Lines Asset Management Interest Group is currently financing several key projects, including:
- Condition Assessment Methodology for H-Frame Transmission Line Wood Crossarms
- Protective Coating Maintenance Strategy for the Above-Ground Portion of Galvanized Steel Transmission Towers
- Vegetation Management in Rights of Way

Condition Assessment Methodology for H-Frame Transmission Line Wood Crossarms
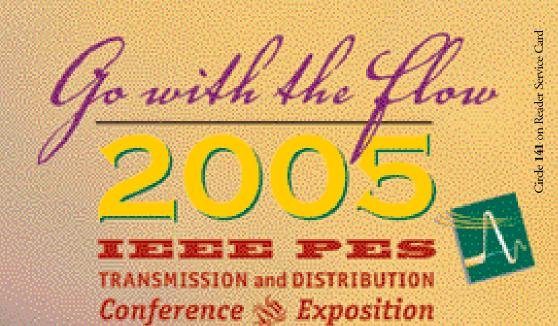
One of weakest links within the transmission grid is the wood crossarm. These structures have been used for over a century to support electric transmission lines. In-service crossarms are continuously exposed to a wide range of temperature and moisture conditions. Rainwater entrapment may cause the wood to lose much of its structural strength. Presently, the quantitative methods for evaluating the remaining strength life of in-service wood crossarms are

underdeveloped. This uncertainty may lead to premature replacement as well as late action on those crossarms requiring maintenance. It is likely that because of this, utilities will be misallocating funds.

The periodic inspection and replacement of wood crossarms is necessary to ensure the reliability of electric service to customers. However, it is difficult to assess the structural integrity of wood crossarms from the ground, meaning that, to make a qualitative assessment, it is often necessary to conduct aerial inspections. Using these visual assessments, conditions can be graded on a scale from 1 to 5. This method is however very subjective and quantifying the remaining strength and service life of crossarms remains problematic.

CEA Technologies' Transmission Lines Asset Management Interest Group has initiated a project to improve condition assessment and service life prediction for in-service H-frame crossarms by correlating the visual grading scale with results of detailed structural analysis and experimental evaluation of in-service crossarms. Through hydraulic actuators and pressure points, the structural analysis will identify the critical sections and potential failure modes of a crossarm

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structure. This will also lead to the development of an "end of life" criterion which will be an assessment of the level of wood deterioration – needed for the estimation of the remaining life. The ultimate goal is to develop a visual rating system which will be inspector-independent and will reduce the uncertainties intrinsic to the previous system.

Protective Coating Maintenance Strategy for the Above-Ground Portion of Galvanized Steel Transmission Towers

A large number of electrical transmission tower structures in North America are reaching an age at which the effects of atmospheric corrosion of the above-ground portions is now requiring significant increases in maintenance requirements in order to safely remain in service.

The degradation of the galvanizing is leading to corrosion of the underlying steel, thus reducing the structural strength of the towers, which if left unchecked will eventually lead to structural failure.

As atmospheric corrosion rates vary significantly with location and other factors, and towers were constructed over a large number of years, there is a need to develop a comprehensive evaluation and remediation strategy that will allow transmission utility engineers to make the most efficient use of their available funds.

In the light of this fact, CEA Technologies has launched a tower coating survey which will determine the current practices used by electrical transmission organizations worldwide for maintaining the above-ground portion of galvanized or coated steel transmission structures, with the ultimate goal of determining industry best-practices.

The second phase of this project will include both a qualitative assessment of the available inspection tools for determining the condition and remaining service life of towers and a tower coating test program. The test program will assess the application characteristics of each type of paint, the physical properties of each coating, the corrosion resistance of each coating and the weathering resistance of the coated panels.

In the third phase, cost analysis software to determine the exact cost of a tower coating project will be developed. This software will take into account many important variables in its calculation, including environmental standards, preparation and travel costs, paint cost, the number of needed coating applications, labor costs and drying times. This software will assist utilities in managing their funds and asset management activities.

Vegetation Management in Rights of Way

Transmission line rights of way occupy many types of terrain, with the climates encountered varying from tropical to arctic. These climates greatly affect the growth rate of the vegetation seeking to take root on the land beneath transmission line conductors. Transmission lines are designed, engineered and constructed to ensure adequate clearances between conductors and any activity being carried out below. Clearance requirements take into account conductor sags (due to electric loads or ice) and other live loads, such as those from linemen, encountered during maintenance. However, if the ground vegetation is not well-managed, this may eventually lead to an arc being formed between the energized line and the vegetation below.

There are many tools and techniques commercially available to maintain the required clearances. New tools are also being developed for areas where classical tools such as herbicides and tree trimming cannot be used.

It is in light of this that CEATI's Transmission Lines Asset Management Interest Group will be initiating a state of the art review on vegetation management. This document will contain a comprehensive resource of practices, products, equipment, materials and their suppliers that can be used for controlling vegetation. This will facilitate the application of cost-effective means of controlling vegetation while adhering to relevant regulatory requirements pertaining to the environment and safe work practices.
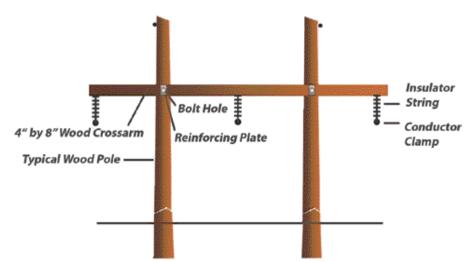
Joining Together to Fund Transmission O&M Research

The Transmission Lines Asset Management Interest Group was established as one of the many "interest groups" of CEA Technologies (CEATI). The TLAMIG participants jointly sponsor studies and research projects in the area of Transmission Line Operations and Maintenance that will benefit them, the electrical utility industry and customers at large.

Participation is open to all electrical utilities, power producers and government organizations that have an interest in transmission line operation- and maintenance-related issues. The group identifies areas of common concern and defines research objectives to solve those concerns. Individual Interest Group participants can then select to co-fund projects of interest that will be of benefit to their organizations. This flexible and collaborative approach provides substantial cost-benefit advantages to the participants. ∎

About the Author

Finn Rimmer is a professional engineer with over 28 years of experience in transmission line maintenance gained while working for Hydro One (formerly Ontario Hydro). His last position prior to retirement was Manager, Sustainment Programs, Lines. His experience includes high-voltage underground transmission cables of three types—high pressure liquid-filled, gas compression, and self-contained liquid-filled lead-covered cables. Prior to his experience at Hydro One, Finn was Plant Manager at a Canada Wire and Cable plant in Saint John, New Brunswick and subsequently Corporate Process Engineer for three manufacturing plants for Canada Wire and Cable in Toronto. Since 2000, Finn has been Technology Coordinator for the Transmission Lines Asset Management Interest Group (TLAMIG) of CEA Technologies Inc.
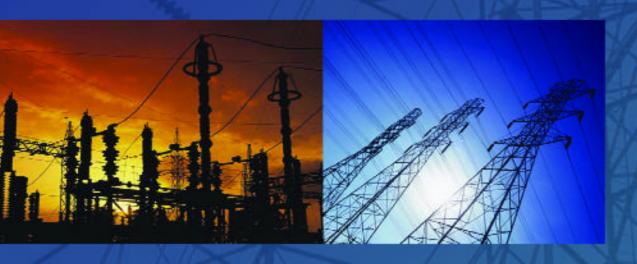
H-Frame Transmission Line Wood Crossarm

OMNISTAR, Inc. CORPORATE PROFILE

Corporate Description:

OmniSTAR Inc., is a sister company of Fugro-Chance (formerly John E. Chance and Associates) and part of the Fugro Group, one of the world's foremost survey service companies. OmniSTAR's involvement in precise positioning goes back over 20 years. In the mid-1980's, before GPS was fully operational, the pre-cursor of OmniSTAR provided North America with the World's first round-the-clock satellite positioning service.

With the advent of GPS, OmniSTAR, Inc. built on this expertise in satellite technology and precise geo-location to develop a truly nationwide Differential GPS service incorporating a proprietary "Virtual Base Station" (VBS) wide area differential solution which provided unequaled accuracy.

OmniSTAR VBS subsequently expanded to a global service and is the world's foremost wide area single frequency (L1) differential correction service.

OmniSTAR recently introduced the new HP (High Performance) service utilizing dual frequency carrier phase techniques to provide the user with true decimeter accuracy (< +/- 10 cms.) over entire continents and is planning to introduce an intermediate service during 2005.

Markets served:

OmniSTAR capable equipment is used for many survey, positioning, GIS and agricultural applications and is particularly appropriate where there may be a requirement to gather high quality positioning data in geographically diverse or remote environments.

In agriculture OmniSTAR VBS is used for yield monitoring, soil sampling, field mapping, chemical application control and machine guidance.

Additional applications include: forestry, utilities mapping, vehicle tracking, pipeline survey, airborne photo-grammetry, seismic layout, environmental monitoring, etc.

The new OmniSTAR HP service is particularly suitable for GIS/mapping applications where higher accuracy is required and is also being used in agriculture for machine control (auto-steer and steering assist).

Major Products:

As a service provider OmniSTAR is not primarily involved in hardware manufacture, instead concentrating on the quality control of data generation, transmission and processing for optimum performance.

By working in conjunction with GPS manufacturers the OmniSTAR service can be accessed and used by many different models of GPS receiver from several GPS manufacturers.

Manufacturers of OmniSTAR capable receivers include: CSI/Satloc, Novatel, Raven Industries, Sokkia, Topcon, and Trimble.

Technical Services:

To generate the VBS solution OmniSTAR operates a network of precisely located reference stations. After applying corrections for atmospheric effects, data from these stations is compressed and broadcast over the North American continent from a dedicated transponder on a geo-stationary satellite. The user's receiver takes this data, makes further local corrections, and generates an RTCM-SC104 correction 'tailor made' for its location.

Using satellite re-broadcast overcomes the range limitations of ground-based transmissions and OmniSTAR's proprietary wide area solution corrects for errors, such as multi-path, associated with a single reference station solution. The result is consistently high quality differential corrections available anywhere within the continental United States plus much of Canada and Mexico.

OmniSTAR VBS generally provides the highest level of accuracy achievable using single frequency (L1) code-phase differential GPS techniques.

To further improve accuracy the new HP solution has been implemented by establishing dual frequency receivers at all the reference locations. 'Raw observables' from these receivers are transmitted over the satellite link. These data are processed using a proprietary version of float solution to generate an absolute position in real time of better than +/- 10cms (4 inches) horizontal.

To achieve these levels of accuracy over wide areas all the reference sites are regularly re-surveyed to ITRF coordinate standards to take into account the now measurable effect of tectonic activity.

Facilities:

OmniSTAR's facilities comprise the head office and the Master Control Site located in Houston, Texas. In addition to on-site technical support and repair capabilities, there are comprehensive monitoring and analysis systems which ensure the OmniSTAR signal and data quality is maintained at full specification 24 hours a day. Phone lines are manned 24 hours throughout the year.

New for 2005:

Building on the technology of OmniSTAR HP and the Fugro group's experience in providing system redundancy to the offshore oil market OmniSTAR is planning to introduce an intermediate level of service during 2005.

This service is expected to provide consistent horizontal accuracies of < +/- 20cms (8 inches). Although not quite as accurate as OmniSTAR HP this new service will be significantly more accurate than any single frequency solution and represents the logical next step for sub-meter DGPS users who are looking for higher accuracy at an affordable price.

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Preventing an Energy Crisis – One Customer at a Time

by Mark S. Martinez, manager of demand response program development, Southern California Edison, and by Joe Polaski, Assistant Vice President, Products, for Hunt Power, L.P.

Business owners and homeowners alike know that summer and winter months are hard on the electric bill. Cost-conscious entrepreneurs and business managers are always open to new ways to cutting costs via energy conservation or efficiency improvements. Behind the scenes, the much larger issue for utilities is load conservation; that is, keeping tabs on overall energy consumption in order to preserve costly T&D equipment while maintaining a high level of customer satisfaction.

One popular solution offered by utilities to help small businesses comes in the form of energy management programs for commercial accounts. The most successful programs utilize energy monitoring tools to provide both utilities and customers with valuable energy data. These are energy feedback programs designed to educate commercial and industrial customers on the many hidden sources of inefficiency.

By leveraging energy data management experts to install and manage these tools, utilities can determine the causes of peaks in energy usage and expand their management of overall energy

usage during high demand seasons. Meanwhile, business customers can keep their energy costs under control. With this valuable information about energy usage available on a daily basis, both utilities and businesses can now manage their resources more effectively, and also solve problems that before went unattended.

Hidden Costs of Karaoke Night, Cotton Candy & Bingo

Sources of energy inefficiency or excess usage are often hidden in the day-to-day details of running a business. The process of finding these hidden costs requires both insight and the information that can identify the sources of waste. With the right tools and a bit of knowledge, utilities can make the largest difference in customer understanding, and the biggest dent in the customer's energy operating costs. Here are a few examples.

When a nightclub in southern California saw huge spikes in energy usage and energy costs in their monthly electric bill, the management turned to its utility to investigate the cause. By analyzing the daily data collected from the recording electric meter installed at the site, the contractor collecting the energy data determined that a large spike in power usage only one day a week was causing a substantial increase in energy usage.

At the club, managers were leaving the patio door open during the nightclub's regular Wednesday karaoke night for outdoor patrons to hear the on-stage antics inside. The open door caused the bar's air conditioning to work double-time each night it offered karaoke. Once the cause was determined, the nightclub closed the patio doors, regained control of its energy usage, lowered its overall electricity bill and developed a better appreciation for both the energy data metering system and the utility looking out for its best interests.

While using energy data management meters to research specific energy usage is often a cost-reducing proposition, the process doesn't always result in cash saved. Sometimes it just shows us how expensive it is to run a particular business or program.

In the next example, a South Texas community gathered for a weekend festival at the local sports complex. The free event included, among other items typical of a carnival, cotton candy machines, and carnival rides to create a fun, family-focused atmosphere. Since most of the focus was on the organization of the event for a successful turnout, not much attention was paid to the "hidden costs" of the energy being used.

When the sports complex received its utility bill at the end of the month, the amount due was unusually large. Upon investigation, it was found from the advanced meters that had been installed at the complex earlier in the year that the festival set a new, very high demand charge for that month, a result of the coincidental energy loads from the festival's participants. The cost of energy for the carnival was a hidden cost not considered in the overall budget, and certainly not expected by the sports complex.

In another example, Bingo Night is universally viewed as a guaranteed revenue generator for non-profit organizations. But one church in southern California found out recently that the hidden costs of making the evening special significantly impacted the church's energy usage, reducing the net income from the event.

Event managers found that total energy usage (and the electric bill) increased after each Bingo event. Research into the daily energy usage data collected from the advanced metering by the utility and its data management partner revealed the true cause – Bingo Night, with its bright lights, extra air conditioning for the participants, and kitchen-prepared foods.

Without the availability of utility data management programs to provide organizations with insight into their energy usage, most organizations would have difficulty determining the causes of the extra charges. Those groups would have no idea that events like Bingo Night aren't necessarily the cash cow that was envisioned. After this, the church raised its cover charge to pay for the extra costs.
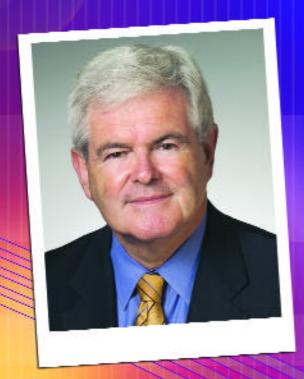
Immediate Program Verification

While utilities use advanced meters and energy data management tools to identify specific billing problems with business accounts, as mentioned above, these tools can also help paint the bigger picture for utilities. Larger research projects – those used to test utilities' existing demand response programs and plan for future energy resource needs on a statewide basis – call for similar tools and resources.

Southern California Edison (SCE) began using the benefits of an energy data management system to validate one of its load control projects since 2003. Currently, SCE is completing the study, the goal of which is to validate the effectiveness of its SCE Energy$mart Thermostat℠ program. The objective of the program is to remotely control small business air conditioners to reduce electric load in times of

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electrical emergencies, which would ultimately provide a more secure energy future for the state.

In this program, smart thermostats at approximately 3,000 small businesses are remotely controlled by the utility to raise the temperature by 4 degrees Fahrenheit. The energy data management system measures usage data on a daily basis and confirms the magnitude and timing of reductions in consumption during control periods. The desired result of reducing electricity demand during the control period, with little noticeable impact on comfort at customer facilities, is thus measured.

To begin the process, SCE partnered with a meter data management expert, Hunt Power, L.P., to install advanced recording meters in parallel with the utility billing meter to collect daily energy data on a continuous basis. The parallel meter arrangement eliminated the need for a potential service interruption during a meter replacement, and customer's the telephone line was shared by the meter, reducing communica-tion costs to the utility for the retrieval of timely metered data. The meter data management partner also managed the data collection, processing, analysis and reporting services, as well as display the results for SCE on the Web.
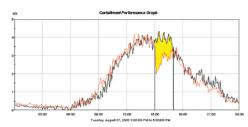

Figure 1: Estimating the Impact on August 27

Figure 1 also shows the estimated impact, i.e., the difference between the actual and baseline load. The graph shows that initial impact was about 2 kW per air conditioning unit, but the impact diminished to nearly zero by the end of the two-hour period.

Program results for the summer of 2003 were available immediately as a result of this partnership. The data proved that the project had already doubled early projections, showing an immediate 10MW demand reduction. Prior to the first round of data collection, SCE had estimated a 4 MW reduction in demand

consumption for the program. These results gained from the advance metering validated the program's effectiveness, and paved the way for program expansion in 2004.
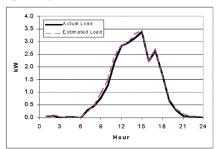

Figure 2: Actual vs. Estimate Average Hourly Load of all sixteen BBP Units on August 27

Figure 2 compares the estimated and actual average hourly load of all sixteen BBP units on August 27. These results demonstrate that the run-time data pr ovided by the thermostats yields a very accurate estimate of the average hourly load, at least in a relatively small set of smaller, one-stage units.

With Energy Information, Everybody Wins

In summar y, timely knowledge about energy usage is the common denominator in understanding how to lower both utility operating costs and customer energy bills, as well as verifying programs to prevent the next energy crisis. In each of the examples mentioned abo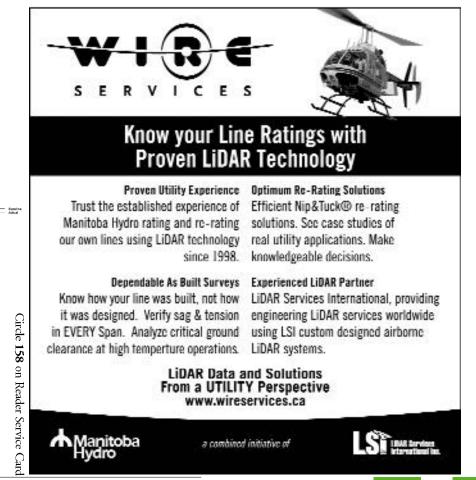ve, the utilities and their customers had specific questions to answer about the impact of operations uniquely related to energy usage. But getting the answer to the question was the same – you first gained detailed knowledge about the customers' energy usage through an energy data management system, and then implemented the corrective action to remedy the problem.

In all cases, everyone came out a winner, armed with the specific knowledge about energy usage and knowing how to avoid future "heartaches" when it comes to excessive energy costs, unexpected power bills, and potential energy shortages for all customers. ∎

About the Authors

Mark S. Martinez is the manager of demand response program development with 20 years of demand-side management experience at Souther n California Edison, one of the United States' largest investor-owned electric utilities.

Joe Polaski is Assistant Vice President, Products, for Hunt Power, L.P. and has more than 20 years of industry experience, working for energ y management service providers and utilities.

Electric Energy Industry Feels the Power of M2M

By Jeff Smith, SensorLogic CEO

The electric energy industry is on the cusp of experiencing something that will revolutionize its business processes – machine-to-machine (M2M) technology.
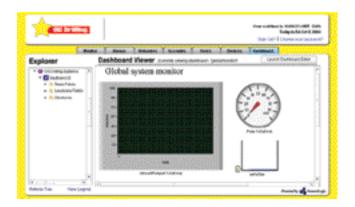
So, what is M2M technology? It is a system that enables autonomous applications to "talk to," monitor and control intelligent machines that are connected to the physical world with data-collecting sensors and action-causing actuators. These central coordinating applications and talking intelligent machines form a "machine-net" similar to the Internet, which is, itself, a broad network of machines (computers). The radio frequency identification (RFID) tags discussed so much lately are a good example of an M2M technology, but they are just one facet of the technology.

The ramifications of a system that enables the world's six billion intelligent machines to communicate and adjust automatically are astounding, but most readers here probably want to know how it's going to change the electric energy industry.

M2M and GIS

There's an ongoing effort underway for utilities to make services more efficient by monitoring and tracking vehicle location and dispatching them based on that location information. In addition, there are initiatives to have trouble tickets entered online. That will eliminate the waiting and paperwork typically associated with filing trouble tickets. M2M technology can help these processes enormously.

Vehicle tracking for utilities involves geographic information systems (GIS). Remote assets are outfitted with a GPS device, sensors and some form of wireless transmission capability – most likely a telemetry device. The remote asset systems communicate with the GIS central information/mapping portal. In many cases, a fleet manager monitors this portal and directs vehicles from location to location, depending on the proximity of a vehicle to a problem or incident site. In addition, utilities can display many static items in their GIS – transmission lines, depots, transformer stations,
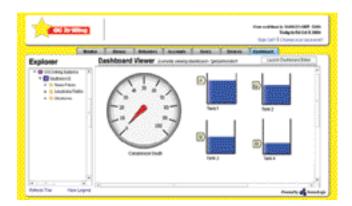

etc. Utilities can use all of this information to plan the management and maintenance of their distribution networks. With M2M, they now can also manage mobile assets and direct them to places that need service.
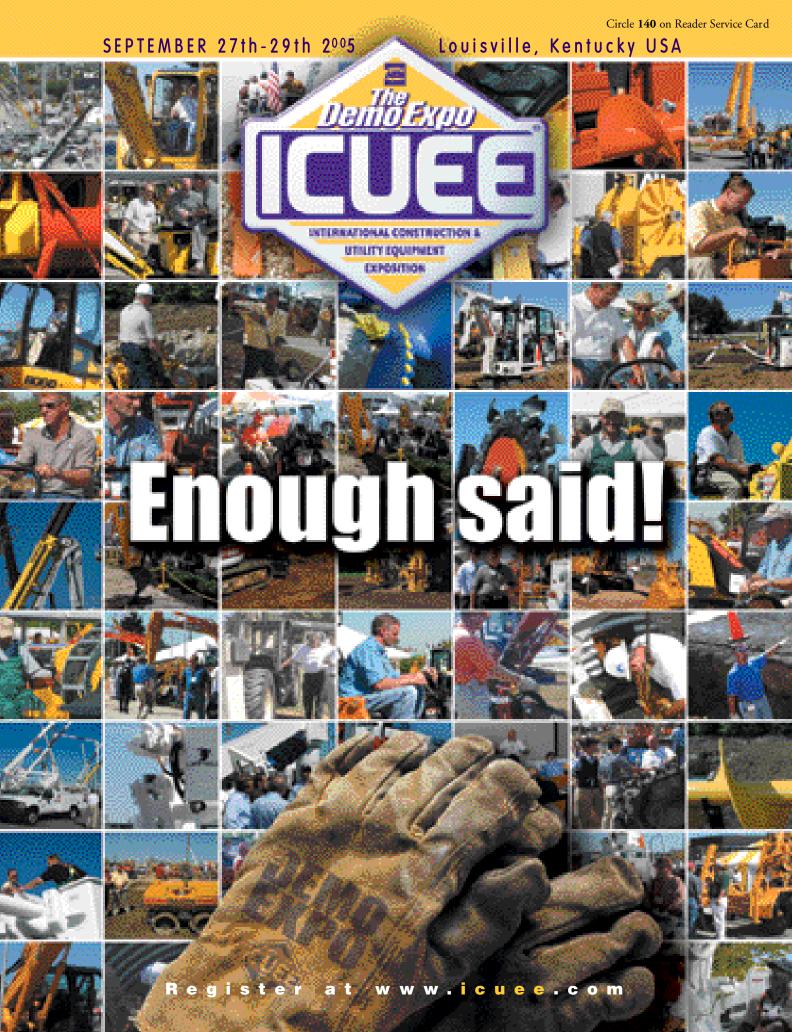
Because the fleet manager is able to view a screen with a map of the vehicles' locations, he can route them efficiently. The only problem is that a fleet manager can't spend all day in front of a screen. By automating the process, M2M technology can address that issue and improve business processes further. The following scenario illustrates how that works:

An outage occurs in a small section of a subdivision. Even before residents begin calling in to notify the utility company about the problem, a sensor on one of the transformers registers that a system failure has occurred. That information is relayed via telemetry to the utility company's central information M2M portal. Based on a set of parameters entered into the portal, it accesses the GIS information on its fleet of repair crews. The M2M portal system locates the nearest available repair crew vehicle with the necessary tools and equipment to address the outage in the subdivision. The system then automatically files a trouble ticket and sends a pre-programmed text message via mobile phone to the crew in that vehicle. The crew receives the message, which offers details on the location of the outage and which component of which transformer has failed. This information will save the crew time in trying to identify the location or cause of the problem. The crew then heads over to start making repairs.

The entire above scenario, save for the actual repairs, is registered and managed automatically with an M2M system. The time saved through the use of an M2M system is significant, and the system is virtually unlimited

in its potential to improve business processes. Going back to the scenario, the system could automatically order reserve replacement parts for those that had failed. Those parts can be on their way to the restocking warehouse before the repair truck even reaches the outage location.

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"MDS radios enable mission critical communications, increased safety, improved revenue, and greater efficiency in tough industrial climates for customers in the oil and gas, water and wastewater, electric utilities, telecom, and public safety sectors," notes Frost & Sullivan research analyst Miriam Nagel.

Frost & Sullivan presents its Excellence in Technology of the Year Award to MDS for pioneering industrial wireless networking technology into the market and for continuing to make significant contributions to the industry.

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Taking this even further, the M2M system can be set up so that equipment sensors detect broken components before a failure occurs. These sensors can trigger an alarm that updates the central system that routes a repair crew to thwart an outage. The alarm message can be programmed so that it is sent via a chain of command to the appropriate individuals on a variety of receiving devices – everything from a mobile phone or laptop to a wirelessly enabled PDA.

These uses are merely those that have been thought of, at present. The beauty of an M2M system is that any machines that have data-collecting sensors can be integrated, and their data can be used to develop new and different applications that will govern the behavior of still more machines. At some point, it is feasible that any business process involving intelligent machines can be automated with an M2M system and managed from and by the portal.

Load Shedding and Automated Meter Reading

There are other more specific examples of M2M technology at use in the electrical energy industry. In particular, tasks such as load shedding and improved meter-reading procedures can be accomplished through the use of an M2M system.

The load-shedding service is becoming quite popular as an offering from many electric utility companies. While most do not have an in-house operation to handle load-shedding activities, they do contract with companies that can offer the service to their customers.

M2M technology can play a crucial role in the load-shedding service. In a typical scenario, for example, in a large grocery store, the electric utility company will go into the store and set up devices that will measure the power consumption of individual machines or systems in various sections of the store. These devices will be set up on the freezers and refrigerators, HVAC systems and any other significant power consumption systems.

The monitoring equipment contains sensors that measure and collect data to determine the level of power consumed by each of the systems, at what times of day they are using the most power and how much they are contributing to the overall power consumption of the building. If the power company finds a machine that is a significant cause of the peak energy consumption or is a major cause of consumption during the

most expensive rating period, the team can inform the store of the situation so the store can go in and adjust the operation of some of the units. This enables them to shed the load and cut some of the peak usage, which is good for everyone. Customers save the money they would have spent on peak charges, and the electric power company is not faced with the challenge of too much energy demand during peak hours.

Where M2M features prominently in the equation is in the collection of sensor data. With an M2M system in place, the power usage data collected from the machines is transmitted via telemetry to a central point, where it can be monitored through a portal. Depending on the sophistication of the system and the parameters set up by the electric company, if a machine begins to reach an excess level of power consumption, the M2M system can register that information and send out an alarm to a technician to address the situation. Or, if the system is advanced enough (featuring two-way units that can send alarms and receive commands), the M2M technology can make the adjustment to the machine based on the parameters outlined by the company.
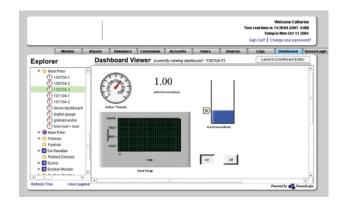

A prime example of this technology in action would be sensing units installed on the freezer cases at the grocery store. The sensors monitor temperature and can help the store regulate the temperature so that less energy is used during peak power consumption time. With M2M, the entire process can be automated with a kind of "set it and forget it" mindset for the store. The M2M system monitors the temperature as well as the power consumption rates and adjusts the freezer temperature controls accordingly. A more traditional system might set the freezer units to cut back on power consumption at a specific time each day, but, because peak usage is variable, the M2M system helps the freezer units to adjust fluidly. That way, they remain cool, but they do not over tax the power supply for the store.

For automated meter reading, many utilities already have systems in place that conduct remote meter reading activities efficiently. Integrating this system with M2M technology would enable the power company to link meter reading with other business processes monitored by the M2M system. This could help to increase efficiencies further. Utility companies could find that an M2M system linked with meter reading capabilities for commercial industrial applications would be particularly effective. Because meter reading for such applications provides a near-constant stream of data, the monitoring capabilities of an M2M system could help to automate some peak usage management and load shedding initiatives for commercial industrial applications.

Endless Possibilities

The important thing for electric energy utilities and other companies to remember is that M2M technology has few limits. The applications that have been conceived to date for this technology are merely a drop in the bucket. M2M is designed to allow all intelligent machines to talk to each other and adjust themselves to improve efficiencies. The resulting improved business processes are not restricted to the utility industry. They cross virtually all industries.

Eventually, it is feasible that M2M technology will filter down to the intelligent machines the average person uses on a daily basis. At that point, it will reach beyond business process improvement, and it will enter the realm of life improvement. True success in M2M will happen when it becomes pervasive – so pervasive and so integrated that people cease to notice that it's even there. The possibilities opened up by this technology are endless, and it's all being born and incubated in industries like electrical energy.

About SensorLogic

SensorLogic makes it easy for companies to develop what normally would be very complex machine-to-machine (M2M) applications. Based in Dallas, Texas, SensorLogic provides an integrated M2M solution that bundles all necessary components and device management capabilities with the most effective wireless data communications service. SensorLogic is the first provider that doesn't force developers to spend huge amounts of capital or require a lengthy time-to-market to deploy private-label commercial-grade M2M services. More information on the company can be found at www.sensorlogic.com. ■

About Jeff Smith

Jeff Smith founded SensorLogic in 2002 to answer the question, "Can't we all just get along?" Except that the "we" here is machines and the "getting along" is machine-to-machine (M2M) communication. After leading OnRamp Technologies, one of the industry's first Internet service providers, to a $5 billion acquisition by NTT, Smith recognized a need in the marketplace to deliver M2M solutions that make telemetry easy.

Will Your Implementation Deliver Business Success?

By Elizabeth Russell
Solutions Delivery, Southern Region

We've all heard the horror stories - those implementations that have become legends in their own right: 25 minute call center wait times, bills that didn't go out for 9 months, full-page ads apologizing for service delays, overwhelmed staff yearning for the old system. Hopefully, such events are only remembered internally, but often they are recalled by the media or the regulators.

What makes the difference between those implementations that are viewed as seamless and smooth from a customer standpoint and those that make headlines? While some differences can certainly be the strength of the technology and the depth of the testing, the quality of the management of the transition is a core component.

As noted in a study by Market & Opinion Research International (MORI), over 80% of the time projects fail it is due to some type of human factor including communication/ perception issues, people (i.e. job definition) issues, or project/ program management1. Technical integration and other factors accounted for failure only 19% of the time. As you begin your CIS (or other) project, have you included enough focus on these factors?

Do You Know Where You're Starting From?

As proven recently in a CIS implementation project kickoff, longer-term employees vividly recall what it was like the last time the CIS was changed out. Particularly when there is "baggage" from prior CIS (or even non-CIS) implementations, team members need to understand how this time it will be different. Projects rarely begin with a true "clean slate." For example, a recent ERP implementation at your company may have soured the employee base against large-scale system implementations. Or, recent organization changes may have sapped the energy of the workforce to respond to the next big challenge. Often there is simply too much "noise" to muster the singular focus required to achieve a successful CIS implementation.

Ultimately, organization leadership must instill a sense of urgency that the project is not only good, but that not succeeding would constitute a true crisis.

While not frequently included in a vendor's implementation plan, taking time to assess the change history and the target audiences' skills and motivation can make or break your project's ability to chart a successful course. This article examines many of the key factors for successfully managing the various impacted workforces (IT and business) during a utility CIS implementation.

Are there hidden expectations?

Changing out a CIS is rarely a simple "replacement" initiative. The investment is too large and the project touches too many stakeholders to not get saddled with other stated, subtle or tangential expectations. These can include ideas to "empower the workforce," "raise the bar of accountability," "make the X department self-sufficient," or "rid us of the mainframe." Such expectations will color the views of senior executives who not only review the budget status of the project, but ultimately determine whether the CIS project is considered successful.

> ### Don't be surprised when:
>
> - The "footprint" of new system (i.e. functional capabilities) doesn't match the old
>
> - The flexible software forces choices that have never been options before
>
> - The list of project stakeholder departments is longer than the list of interfaces (or at least feels like it)
>
> - A project with a focus on a fast and "little modification" implementation creates a higher number of process and organization impacts
>
> - Employees get stymied thinking that more has changed than it actually has

What are the risks?

One of the best ways to guard against a negative outcome is to define specifically the which could occur. For a CIS implementation, the outcomes tend to focus on delivery of service and collection of revenue. Impediments to either of these factors can prove damaging to the organization. These risks can not be wholly mitigated through the right software choice, leading edge technical architecture, thorough testing, or seamless data conversion. The following scenarios have been seen at CIS implementations around the world, regardless of software chosen and length of implementation project. These can be directly linked to human factors.

Revenue Slowdown

Utilities with poor CIS implementations have experienced temporary slowdowns (or, actually, stalls) in their revenue streams due to delayed billings. Root causes of delayed billing can be data, technology, or staffing related. Even with clean data and smooth operations, the surge of exceptions to be addressed can overwhelm a staff more accustomed to "steady state." The issues commonly encountered in a recently converted system can be unique and short-lived. At stake may be both skills and issues.

Employees who end up being good at solving billing or metering exceptions typically possess a deep understanding of both the realities of the current data and the processing of the new system. They have developed the necessary "wisdom" of seeing the causes and effects of system activities. Classroom training usually only prepares these employees to practice. Without experience in all of the realities of nightly batch runs (e.g. in a production readiness, parallel, or simulation environment), employees can be limited to the scripting of predictable and "perfect" scenarios. Issues in data that stem back months or even years can prove problematic when stricter data integrity rules are applied in a new system. Some of the issues that these employees will deal with will be short term and

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directly linked to the implementation while other issues will become the "new normal" and require time and practice to establish new norms and practices.

At the heart of performance is, however, both skills and motivation. Slippage in motivation can occur either before or after an implementation. Typically, the project team declares victory when conversion is completed. The reality, however, has just hit for both the call center and the back office. Jobs that had a known degree of decision-making and intensity may have changed without real notice or preparation. Staffing levels that were comfortable in the old system may not be appropriate for the initial transition or even possibly for steady state. The project team may have expected and prepared for certain issues but may not have fully prepared the user community for any "bad news."

With redefined business processes, work and judgment calls that were previously made in one department (i.e. Customer Accounting or Quality Assurance) might transition to another department (i.e. Meter Reading). Without job and organization analysis, utilities may find themselves short-handed in some areas that really matter and are surprised when the critical processes that ensure the revenue stream collection are stalled.

Slippage in existing service levels

Either by regulation or by choice, utilities frequently have published service levels such as speed to answer, time to complete vital services, etc. Your CIS project needs to ensure that there is a clear baseline analysis of the current factors of such service levels. Capturing relevant months of data such as call volumes and patterns, service order volumes, meter reading/ billing exceptions, and billing accuracy percentages, and average call handle time is a good start. Several factors will influence these numbers after implementation: user proficiency, process changes, system response time,

etc. Are executives in your company prepared for any of your service levels to slip even temporarily? What is the definition of a successful implementation? 60% adherence to service levels? 99%?

As you review your project budget, you see a line item or two for training and perhaps for process/ procedure documentation. You may even see some plans for user practice. All of these activities can support the building of user skills, but do nothing for building and supporting user motivation. Group leaders must be engaged to both "set the bar" for the users' performance, listen to issues, and communicate expectations. If fully engaged, they will ask project management for data and predictions that help them answer questions like:

- Exactly how proficient will my staff be?
- Have process changes made certain transactions longer or shorter? By how much?
- What kinds of exceptions will be generated? At what volume?
- What are the mission-critical items that must be made top priority (i.e. perhaps those that stall revenue or erode service)?
- How are external partners impacted? How have they been prepared for different processing schedules or process requirements?

Knowing the answers to such questions and conveying them to relevant staff builds confidence that 'no stone has been left unturned,' that management truly cares about the impacts to the business, and that both the ways and the means of performing well with the new software have been provided.

The question will emerge of whether service can or should be relaxed during the implementation. Clearly, the answer would depend on regulatory and business climate. If they cannot be relaxed, the project and all of the relevant stakeholders must be convinced that the appropriate level of investment and measurement are in place to ensure that the service levels are indeed achieved.

If you do choose a "honeymoon" phase for specific existing service levels, ensure that there is a clear path back to full performance. The honeymoon or transition state may include unique responsibilities that aren't really necessary after the conversion aftermath is over. And, it may include some revised priorities i.e. where some tasks are ranked lower (i.e. launching new marketing campaigns) than others (i.e. reach out to commercial and industrial customers to ensure they understand their new bill format and rate calculations). Employees may need both a set of "transition period" role descriptions and performance management and a set of "steady state" expectations.

Decreases in Customer Satisfaction

Whether your service levels are formal or informal, how well you meet your customers' expectations will determine your future success. You may have been convinced to change out your CIS to "enhance customer satisfaction." Do you know specifically how this is to be done? Is it linked to customer communications, i.e. bill format? Is the system (and the supporting processes) supposed to improve timeliness? Do you have a clear baseline of satisfaction before the process changes and a means to measure satisfaction point-by-point afterwards? Such approaches need to be clearly specified in your implementation plan.

In today's world, your "customers" may include a broader cast of characters than simply your residential and commercial users. You may have service agreements with other business partners (i.e. billing services) or commitments to transmit transactions in a deregulated environment. Third party satisfaction and collaboration during a key transition may prove to be a milestone in your relationship.

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Surprises take a greater toll than necessary

As individuals, we are all better able to respond to surprises or crises when we are healthy – mentally and physically. The same is true for the organization of individuals you rely on in your company. Minimizing surprises is one way to keep your team's trust. Communicating proactively – particularly the issues and troubling news – is a key component.

In one example, the utility issued large-scale public apologies for service after the CIS conversion. Executives were scrambling to understand why they had previously only heard the 'good news' regarding the implementation's expected outcomes. Dysfunctional behavior at all levels was observed during the chaos. In contrast, another utility (who implemented the same software) reflected back with comments like "we had expected a hurricane that never really hit. We were ready. We had some issues but they were manageable."

Preparing "for the worst" has almost always proven to be a winning strategy. Multiple utilities have termed their pending implementation as a potential "hurricane." This stirred a culture where extraordinary effort is frequently required and that new, urgent, tasks are taken on without question. The level of planning that goes into hurricane preparation (i.e. in southern U.S. states) should be a minimum for a CIS implementation.

Whether or not your organization finds issues "manageable" is directly related to its "mental health," sense of urgency, and confidence that it has prepared for identical or at least somewhat similar issues.

Planning for Business Success

Does your plan account for these risks? Your management team (which may include business sponsors, technology sponsors, system integrators, and software vendors) needs to staff the team with individuals skilled in managing organization change. You may also want your integrator to facilitate discussions for you with other utilities that have made similar changes. Your network of "change agents" (i.e. credible formal and informal leaders across your organization) need to hearrelevant lessons learned from other implementations.

Besides the inevitable configuration, testing, conversion, reporting, and technical architecture tasks, your workplan needs to also reflect the myriad of activities that create the required skills and ensures the needed motivation of many different players. Consider the needed time and skills for business impact analysis, communica-

tion management, organization/ job alignment, education/ training, sponsorship/ leadership support, and readiness measurement. Including the right people is equally important as including the right scope. Such managing change activities will most certainly fail without the right executive sponsorship. CIS projects tend to be run by either IT or the call center. To be successful, you need to make sure you have active involvement from the beginning from all key parts of the business that will be impacted. This will make the job analysis, process design and business impact assessment more effective. Otherwise, it is IT people trying to predict the impact on field operations with possibly low accuracy and even lower buy-in.

Such activities should not be isolated to a remote and part-time HR person. Nor can they be relegated simply as "training issues." They are best integrated with all of the other workstreams and managed as part of the overall program. No one but your core project team can project the workload impacts of revised processes.

Additional Strategies for Bolstering Required Skills and Motivation

Best practices to mitigate risk and integrate approaches across your project include:
- Early in the project (i.e. during Analysis):
  - Qualify and quantify business impacts that stem from process and technology changes
  - Prioritize and address impacts through appropriate combination of interventions (i.e. performance management, education, communication, go-live procedures, permanent policy/ procedure change, etc.
  - Root out issues through scenario planning and simulation
- Throughout the project
  - Create a 'no surprise' culture which
  - Fosters relentless communication – ideally equipping front-line supervisors with key messages (direct supervisors are always the most trusted source of information by employees – not CEO videos)
  - Encourages and rewards issue identification and proactive resolution
  - Maintain high awareness of other projects and activities impacting your target work-force. Encourage sponsors to move or defer non-essential activities that will prove to be distracting of company time/ resources.
  - Prepare yourself that the new system may enable you to "count" things that previously were off the radar screen (no-bills, meter reading errors, etc). You've probably had many of these all along, but

they were hidden on someone's desk and not glaring at you from an executive status report).
- At implementation:
  - Create multi-disciplined go-live criteria. Go live only when readiness (and corresponding risk) reaches acceptable level.
  - Ensure preparation for post-conversion support and transition to "steady state"
- Beyond implementation:
  - Avoid "collapse" of communication and leadership activities
  - Don't release knowledgeable project team members as the project gets close to implementation. This is a common cost-cutting mistake, but these people (either utility, vendor, or integration partner personnel) can be invaluable in "the field" after implementation to help users resolve new system exceptions, filter technical issues back up to the project, etc.
  - Measure and improve service metrics, particularly those that impact business case realization
  - Reevaluate stalled projects – balance with ongoing enhancement needs that may impact workforce
  - Take stock and adjust processes and organization if necessary
  - Declare victory when success criteria (i.e. housed in business case, service levels, or organizational metrics) are achieved

The Real End in Mind

Such a point of view certainly expands the "horizon" of your implementation plan.

If your plan ends with the data conversion or when the software warranty period is over, you may have missed the measurement of customer satisfaction, the stabilization of service levels, and the confirmation that key success metrics were indeed achieved. While these principles do essentially apply to any large-scale business project, they have been repeatedly proven at the "ultimate" in complex projects for a utility – the CIS Project. ∎

About the Author

Elizabeth Russell is a Director with Alliance Data Systems. During her career, she has focused on the change management issues in utility CIS change management initiatives over the last 14 years in 3 countries and at over 10 clients. She can be reached at Elizabeth.Russell@alldata.net.
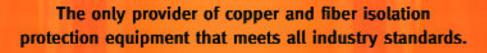
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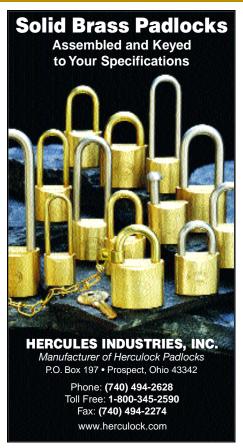
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