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Take a few minutes to complete a survey at www.deloitte.com/skillsgap

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I’ve been honored to serve as a member of the National Institute of Standards and Technology (NIST) Smart Grid Advisory Committee (SGAC) since its inception in 2010, and to be selected as vice chair when the committee was seated this year. While my time with SGAC has been very productive, I was dismayed by discussions that took place at our most recent meeting.

This month marks the two-year anniversary since NIST spun off its Smart Grid Interoperability Panel (SGIP) into the standalone, non-profit SGIP 2.0, Inc. With SGIP up and running, much of the June meeting centered on future initiatives and directions for NIST in Smart Grid. After discussing smart cities, the energy-water nexus, transactive energy, and distributed energy resources, our conversation turned to resiliency. I soon realized there were a variety of opinions about what it means for the grid to be resilient.

For NIST, utilities representatives, and several others, resiliency was described solely from the perspective of outage management. The big concern was the logistics surrounding out-of-state electrical crews who could help restore service. Meeting members failed to realize that off-grid solutions can be used to mitigate logistical problems.

In the wake of Superstorm Sandy in 2012, NEMA published *Storm Reconstruction: Rebuild Smart*, a guide full of member-provided suggestions for utility companies and homeowners to reduce outages, save lives, and protect property. When we examined the impacts of Sandy after the fact, it was apparent that a lot of the hardship was avoidable.

When residents in affected areas couldn’t get gasoline, it wasn’t a lack of supply. The real problem was no plan to provide backup power at storage and pumping facilities to move fuel through the pipelines or into transport vehicles. Other impacts were the inability of first responders to communicate, hospitals to provide adequate care, and waste treatment facilities to operate properly.

NEMA members are not waiting for disasters—they are manufacturing these solutions today!

Regular meetings between the White House and various federal agencies address critical infrastructure. (The Department of Homeland Security has identified 16 critical segments in the U.S.) The failure of these meetings is that they don’t include NEMA or any electrical manufacturers who can explain what technology is capable of doing today.

This is our first-ever connectivity edition of *ei*. Connectivity is a key ingredient to delivering resiliency for electrical services. As you read the articles in this issue, think about how connectivity—delivered through NEMA member company products and solutions—can be used to not only improve our daily lives, but also to mitigate the impacts of a natural disaster. 🌡️

Evan R. Gaddis
President and CEO

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**COMMENTS FROM THE C-SUITE**

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The committee was recently re-chartered and expanded from 40 to 45 members who are drawn from companies, organizations, and others involved in the U.S. supply chain, including manufacturers, transportation and logistics providers, ports, and academia. We have a high level of expertise and a diversity of perspectives.

Q: What’s in store for NEMA exporters under the World Trade Organization’s (WTO) December 2013 “Bali Package” Trade Facilitation Agreement?

A: Once the agreement is fully implemented, the Bali Package will be a great achievement for U.S. companies selling products in foreign markets. The purpose is for exporters and importers to have greater predictability and uniformity, as well as reduced costs for clearing their shipments with customs authorities. Along with making the system more transparent, governments will be required to accept electronic payments of import fees and to provide advance rulings on the classification of products. The Bali deal also encourages each WTO member to establish an electronic “single-window” system for submission of reports and data to satisfy customs and regulatory requirements. The intent is to reduce costs by enabling traders to make a single electronic report to the government, which will distribute the relevant information to appropriate agencies.

Q: How close is the U.S. to a single-window system?

A: President Obama issued an executive order in February giving Customs and Border Protection and its 47 partner agencies until late 2016 to complete this project. This is a complex and difficult task, but ACSCC members recommend that it be done by the deadline. These comments are from experts who have worked on massive programs that require flawless interfaces across entities and efficient processes. They urge the department to test this system along the way to ensure that it is working efficiently and that its rollout is not problematic.

Committee members have studied how other countries, including Singapore, have implemented single-window systems. They are big supporters of this initiative and encourage the U.S. to work with trading partners in Canada and Mexico to make all of our single windows more interoperable.

Q: What else should NEMA members know about the Supply Chain Team?

A: My team is here to help facilitate your members’ movements of goods and services and to make their supply chains more competitive. But we will need your members’ help, and we welcome their support, ideas, and input. Specifically, we need additional information—as supply chain stakeholders—to ensure that we can get the single-window system implemented efficiently and effectively.

We also need to hear from your members on border impediments in North America. We need input on how best to coordinate our freight infrastructure policies with Canada and Mexico to move freight seamlessly and competitively.

Mr. Harsh can be contacted at Bruce.Harsh@trade.gov
Now, more than ever, we are connected. All the time. Everywhere.

The connected grid enables innovation. Phenomena like telemedicine and remote classroom learning are occurring around the globe because of electronic communication. A digital economy allows consumers to make purchases without ever leaving the comfort of their homes, and investors to trade international stocks from their desks in small-town America. Digital imaging provides important security at our nation’s airports. Electricity powers more and more vehicles, which in turn, may supply electricity when demand increases.

The electric power industry serves a public good. The U.S. Department of Homeland Security has identified energy as one of 16 critical infrastructure sectors. On top of this, the electric power industry contributes to economic growth, spurs innovation, and is essential to national security.

The evolution of the grid over the last half-century has been nothing short of amazing. What began as a small collection of local services is now a complex system of interconnected providers who are increasingly reliant on one another. Today’s electrical grid delivers a variety of energy services and new technologies. These include basic services (low cost, reliable, resilient, and high-quality electricity) as well as enhanced ones (integration of renewable energy, energy storage, management of grid assets, and energy optimization).

Underlying all of this change are voluntary technical standards. Despite the systematic complexities of the grid, customer interface remains simple to use and consumer-friendly. The electric power industry literally invented “plug and play,” allowing consumers to simply connect their electronics and have them instantly come to life. Technical standards allow our large, nationwide, interconnected grid system to work in real-time and to provide reliable service to all customers through the use of new and evolving technologies.

What began as a small collection of local services is now a complex system of interconnected providers who are increasingly reliant on one another.

As in the past, standards will continue to play an important role in the transformation of the grid. They are quite literally the language used to define the evolving relationship between consumers and their electric companies. Every new development delivered over the connected grid must be standards-based and consumer-friendly. The scale, in terms of the raw number of consumer connections for an electric company, demands it.

It is clear that connectivity and interoperability delivered through products made by NEMA member companies and powered by Edison Electric Institute (EEI) member companies are increasingly important as a greater variety of energy options are delivered to consumers on a regular basis. Maintaining the standards that EEI and NEMA have worked hard to implement will remain important as the grid continues to evolve.

Each year the electric power industry faces new challenges—some technical, some regulatory, and some driven by the changing consumer market. Physical security and cybersecurity threats, electric reliability, fuel diversity, energy efficiency, and environmental issues are examples of the challenges EEI and NEMA together must address.

It’s important that electric companies and manufacturers remain engaged—not only with each other, but also with consumers and appropriate industry and government forums. EEI and NEMA have been very supportive of each other in the past, and will continue to work together on technical standards and solutions to industry challenges that are in the best interest of the customers we serve.

Mr. Owens chairs the National Institute of Standards & Technology Smart Grid Federal Advisory Committee.

What the industry is saying: Worldwide annual revenue from demand response programs will grow from $1.6 billion in 2014 to $9.7 billion in 2023, with North America remaining the largest market, according to a new report from Navigant Research.
Government Relations Update

› High Performance Buildings Council Rallies Support on Capitol Hill

Members of the High Performance Buildings Council visited with the staff of several House Ways & Means Committee members on May 19. The visit was to rally support for the Commercial Building Tax Deduction (179D) and reforms to it (179F) as Congress considers how to address more than 60 temporary tax policies (tax extenders) that expired at the end of 2013. From the left, Patrick Hughes, NEMA; Keith Cook, Philips; Steve Rood, Legrand; Jay Goodman and David Errigo, LumenOptix; and Joseph Eaves, NEMA. Photo by Jim Creevy

› Advocating for Open Trade in Energy-Efficient and Energy Control Equipment

NEMA Vice President for Government Relations Kyle Pitsor testified before the Trade Policy Staff Committee (TPSC), the inter-agency committee on trade matters, to advocate for inclusion of energy-efficient products and smart energy control/management devices within the scope of a new initiative to open trade through the elimination of customs duties, also known as tariffs.

Mr. Pitsor’s June 5 testimony to TPSC followed written comments NEMA filed with the Office of the U.S. Trade Representative in May. The Environmental Goods Agreement (EGA), which involves 14 World Trade Organization members, is an outgrowth of an earlier initiative in the Asia-Pacific Economic Cooperation (APEC) forum, and was called for by President Obama in his June 2013 Climate Action Plan. Negotiations on which products to include in EGA are underway.

Tariffs are assessed by government authorities on many imported products. While U.S. tariffs are generally low, many countries maintain tariffs of 7-18 percent on electroindustry products, which can disadvantage foreign products and raise customer costs.

In his remarks, Mr. Pitsor emphasized that NEMA member companies are leaders in providing demand management and energy-efficient products and technologies to the U.S. and global markets. These technologies, if deployed and utilized, lead to far more efficient use of energy sources and, in turn, reduce the amount of greenhouse gases across all sectors of the economy. Smarter use of electricity can significantly reduce consumers’ financial burden, which strengthens their purchasing power and the overall economy. An array of highly energy-efficient products and smart energy control and management devices should be included in EGA, Mr. Pitsor concluded.

Specifically, NEMA recommended the following product types be included:

- premium efficiency electric transformers
- batteries and energy storage technologies
- smart electricity meters
- electric vehicle supply equipment
- programmable thermostats
- HVAC and ventilation controls
- solid state light sources, electronics, and lighting fixtures
- lighting controls and addressable ballasts
- premium efficiency and advanced technology electric motors
- variable speed electric motor drives
- premium efficiency electric transformers
- batteries and energy storage technologies
- smart electricity meters
- electric vehicle supply equipment
- programmable thermostats
- HVAC and ventilation controls
- solid state light sources, electronics, and lighting fixtures
- lighting controls and addressable ballasts
- premium efficiency and advanced technology electric motors
- variable speed electric motor drives

Mr. Pitsor pointed out that every country can benefit from more controlled and efficient use of electricity, since every watt saved is a watt that does not have to be generated. As many WTO members as possible should join EGA, he added.

To remain relevant, EGA must help facilitate tariff-free trade in environmental goods by adapting to the availability of new products and know-how. EGA should be subject to regular review by signatories, and open to new participating countries as well as new products and technologies he concluded.

Craig Updyke, Manager, Trade and Commercial Affairs | craig.updyke@nema.org
Planels, Trains, and Trucks—Transportation Committee Addresses Connectivity

The nature of connectivity provided by freight transportation networks was on the agenda when NEMA’s Joint Global Transportation & Logistics Committee met in May. Called to order by Vice Chairman Dan Trotter of GE Industrial Solutions, the meeting covered business and policy issues ranging from how products are classified for carriage by trucking operations to air cargo safety and security matters.

Bruce Harsh, of the U.S. Department of Commerce, briefed the committee on efforts underway to improve supply chain competitiveness (see page 4).

Martin Rojas, vice president at American Trucking Associations (ATA), explained his member companies’ current legislative and regulatory priorities.

ATA represents 50 state associations of trucking companies, which represent 34,000 companies.

Participants were briefed by NEMA staff on federal policy debates on transportation infrastructure; international market access negotiations for goods and services; and hazardous materials transportation safety policy matters, including regulation of lithium batteries in air transportation. Company logistics experts also discussed U.S. Customs and Border Protection, movement of freight by railroad, and possible port operation disruptions on the West Coast this summer due to labor-management relations.

The committee, which is funded by Industrial Automation and Low Voltage Distribution sections, also has participation from wire and cable companies. For 2015, its intent is to broaden sponsorship and participation to more sections with interest in the business and policy issues associated with moving inputs, components, and finished products around the country and the globe.

The committee plans to convene a teleconference meeting in September to discuss several air freight issues.

To get involved in the committee, contact Harry Massey (harry.massey@nema.org) or Craig Updyke.

EPA Power Plant Rule to Enable Energy Efficiency

Despite the controversy surrounding the proposed rule by the Environmental Protection Agency (EPA) to reduce greenhouse gas (GHG) emissions from existing electric power plants, NEMA has expressed its support for the proposed rule’s flexibility in allowing energy-efficiency gains to be used by states as a mechanism for compliance with GHG reduction targets.

This so-called “outside-the-fence” (outside the power plant) approach recognizes that technologies to reduce emissions are available for an entire electric system, not simply confined to power generation facilities. Energy-efficiency programs and technology investments are a widespread, low-cost option for reducing emissions through decreased energy consumption.

By giving states the ability to use energy efficiency as a means of compliance, the proposed rule may increase demand for efficient electrical products that support jobs in manufacturing. NEMA is gathering member input and submitting comments to the rule by October 16, 2014. A final version of the rule is due out in June 2015.

New York State Issues Proposal to Remake the Electric Grid

The New York State Public Service Commission (PSC) issued a much-anticipated proposal in April that seeks to restructure the state’s electric distribution system. CASE 14-M-0101, dubbed Reforming the Energy Vision (REV), recognizes an industry in transition with technological innovation and the competitiveness of distributed sources. It seeks to better align utility practices with public policy goals.

In a 66-page Staff Report, PSC lays out six policy objectives: retail market animation, system-wide efficiency, fuels and resource diversity, system reliability and resiliency, customer knowledge enhancement, and carbon reduction.

NEMA and several of its Smart Grid Council members initiated a high-level meeting with PSC commissioners and staff prior to the REV release, and continue to participate in this stakeholder-inclusive process. A staff report on the progress made by the stakeholder working groups in the areas of technology, business operations, and markets is due in August for comment; a second report on regulatory/rate reform is due in October. The Smart Grid Council / Power Equipment Division Government Relations Committee is leading NEMA’s efforts on this initiative.

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NEMA electroindustry ● July 2014 7
Brief History of Machine Communications

In IoT—or the “Internet of Everything”—“things” are expected to become active participants in business, information, and social processes where they interact among themselves and with the environment. Communication is accomplished by exchanging data and information sensed about the environment; reacting autonomously to real/physical world events; and influencing them by running processes that trigger actions and create services, with or without direct human intervention. Basically, it is M2M 2.0.

While the talk tends to be very forward and futuristic, it could be argued that IoT was born between 2008 and 2009 when the number of connected devices exceeded the number of humans on the planet. Since then, the number of connected devices has tripled. Since we are already living in the era of IoT, let’s look back to the less “sexy” precursor to IoT—good, old-fashioned M2M.

Of course, broad adoption of M2M technology didn’t truly take off until the 1980s, when, together with computers on every desk, wired SCADA (supervisory control and data acquisition) connections became the must-have technology for the factory floor as well as in-home and business security systems.

Fast forward to the wireless revolution of the 1990s. As cellular phones got smaller, less expensive, and more ubiquitous, M2M systems moved toward wireless technologies—enabling M2M’s first ever mobile applications including fleet and container tracking, and even consumer telematics like OnStar, which was introduced by General Motors in 1995.

M2M Means Business—A Primer on Connectivity and the Burgeoning Internet of Things

Alexander Bufalino, Outreach Committee Chair, International M2M Council

Most readers have watched the internet grow from its early days to the ubiquitous global economic engine it has become. Today’s children know nothing of the world in which information about any topic was not available instantly at one’s fingertips.

The internet grew to connect people to information—all kinds of information—and to one another. With the advent of email and social media, the internet is changing the way human beings interact and, more importantly, expect to interact.

Today, the growing buzz is the Internet of Things (IoT). Though many a pundit may consider this a new technological development, connectivity and information exchange between machines is in fact, as old as the internet itself, if not its precursor.

What is M2M?

Machine-to-machine communication, or M2M, is, as it suggests, the exchange of information between machines. With the rise of computer-driven equipment and as machines get smarter, M2M has become a critical economic driver allowing businesses to develop and deliver new services, enhance operational efficiencies, and monitor regulatory compliance. Leveraging a growing catalog of available sensors, M2M technology relays machine data (e.g., location, velocity, temperature, key operational status markers, etc.) to business systems that respond automatically based on triggers; allow histories to be viewed, processed, and responded to; or prompt a human response when necessary.

M2M connects business processes to the devices and machines on which businesses depend, resulting in tremendous benefits to the ways we live and work:

- transportation safety in moving people and products
- improved medical treatment and quality of life
- energy efficiency, reduced use of fossil fuels, and reduction of global carbon emissions
- performance optimization of building systems, industrial processes, and even athletic activity
Part of what makes M2M feel so new relative to its long history is that this broad collection of diverse applications weren’t commonly referred to as M2M until after the year 2000.

Where We Stand Today

Today, the M2M marketplace is making the transition from specific, purpose-built applications, to horizontal solutions applicable to multiple industries. It is no longer necessary for interested adopters to build an M2M application from scratch, soup-to-nuts. Today, new M2M adopters can benefit from the expansive experience of those who came before: applying their technical learnings to the development of new services.

Most recently, major telecommunications companies and IT powerhouses, for whom the early years carried too heavy an operational burden, have begun to take a keen interest in M2M—even establishing dedicated business units, commissioning major research efforts, and focusing marketing communications efforts toward capturing this marketplace.

Whether it’s called M2M, the Internet of Things, Industrial Internet, or Internet of Everything, projections for economic growth driven by this particular technology sector are immense. A quick look at affected industries gives an easy reference point as to why.

TRANSPORTATION

M2M technology has transformed transportation for consumers and businesses. By enabling real-time data from a vehicle to a control center, shipping companies, taxi services, and even public transportation have the ability to optimize routes, enhance fuel efficiency, improve on-time delivery, and encourage driver/operator safety as never before.

Similarly, consumer telematics have enhanced the driving experience for countless consumers with real-time traffic information, improved emergency response, and even simple driver assistance (Keys locked in the car? No problem.) Insurers can deliver better rates by accessing driver behavior data, and urban planners and managers around the globe are better able to manage congestion and plan for new infrastructure.

RETAIL

Shopping has never been easier or safer thanks to cellular technology at the point of sale. Vending machines can be placed virtually anywhere and process credit cards without a hard-wired connection. A restaurant server can scan a payment tabletop, assuring the customer that personal accounts won’t be compromised. Shop owners benefit from instant, Internet-connected signage that automatically updates to promote this weekend’s sale.

SECURITY

Physical security is better than ever at home, in the office, and in public spaces, with cellular connections monitoring everything from an in-home sensor network to building access control to foot traffic on a busy city street. The cellular-connected security system is rapidly becoming the hub of home and building automation, providing an access point to monitor everything from lighting and air conditioning to what time the kids get home from school.

UTILITIES

The Smart Grid is possible in large part because of cellular-enabled M2M applications. Benefiting from remote monitoring and control are utility meters; power plants; and even fossil-fuel mining, processing, and distribution.

M2M technology is changing people’s consumption behaviors through incentives not possible prior to real-time monitoring. Kilowatt hours and gallons of water could cost 20 percent less if dishes are washed at night rather than in the morning when local businesses are lighting up for the day. Cellular M2M has the opportunity to enhance “green” lifestyles and reduce or even eliminate rolling brownouts and unplanned blackouts in high density areas or those with inhospitable climates.

HEALTHCARE

As medicine improves and baby boomers reach retirement, the elderly, infirm, and chronically ill can expect total lifespan, quality of life, and opportunities for independent living to increase thanks to cellular technology. Products on the market today provide healthcare professionals and family caregivers unprecedented information on the wellbeing of patients, spouses, and parents. Moreover, monitoring and remote control of diagnostic and treatment equipment can prevent equipment failures from becoming appointment failures while better protecting private patient information.

Where Are We Headed?

Expect your world to change. Whether it’s monitoring an elderly parent’s vital health statistics or saving your company millions on logistics, M2M is poised to reach into every aspect of our lives. The question is not whether we will reach 50 billion connected devices, but when. More importantly, how will this technology improve our businesses, our environment, our economy, and our individual welfare?

We find ourselves today in the shoes of IBM founder Thomas Watson, who has been quoted as saying there might be a total world market of maybe five computers. We simply cannot imagine the impact M2M technology is likely to have on the world. In fact, who would want to? As we settle into the 21st century, we shall have learned not to constrain the possibilities to the limits of our own imaginations. Instead, we look to the innovators of a new world—and enable them with the technology to make their dreams reality.

Mr. Bufalino is also chief marketing officer of Telit Wireless Solutions.
The world of information technology has seen seismic shifts in the last decade. Driven by the need to derive business value from ever-growing collections of data, and to affordably store and efficiently process massive data stores, a whole new class of technologies has emerged. Broadly known as “clouds” and “big data,” these technologies are rapidly entering the mainstream as they become more robust and barriers to adoption are lowered.

The evolving electrical power grid is also experiencing exponential data growth from new high-resolution data sources such as synchrophaser units on the transmission grid, advanced metering infrastructures, distributed generation, and storage. Exploiting all this data and deriving business value in terms of more efficient and reliable operations, as well as the evolution of the power grid, is a major challenge facing the industry.

**Cloud Platforms**

The term “cloud” has been diluted so much in the popular press that it has lost much of its meaning. In essence, cloud platforms provide pay-as-you-go (PAYG) access to shared computing and data storage resources. In a public cloud, a provider essentially rents you resources in one of its data centers.

Public cloud providers such as Amazon, Google, and Rackspace have built data centers throughout North America that contain tens of thousands of low-cost commodity machines and vast storage capacity. When you utilize their cloud infrastructures, you’re essentially sharing these data centers with many other organizations. This arrangement is called multitenancy.

If multitenant public clouds don’t fit your business model because of data security reasons or requirements for highly predictable performance, you can create a private or community cloud. Operating platforms like OpenStack enable organizations to set up their own data centers to provide shared computing and data storage for their applications.

Community clouds extend this arrangement to support a limited partnership of organizations, for example those that might participate in a smart city–scale cloud. Private and community clouds give more control over security and performance, but this comes at the cost of the upfront capital investments to create the data center, as well as the on-going costs of operations and maintenance. When you PAYG with a public cloud provider, these upfront costs are eliminated.

Moving to the cloud does have other upfront costs though. If you use an Infrastructure-as-a-Service (IaaS) model such as Amazon AWS, the effort of moving your applications and data to the cloud is low. The virtual machine-based environments that IaaS offers pretty much allow an organization to relocate their software and data “as is.” Creating the virtual machine environments takes some effort, but no expensive software changes are required. IaaS therefore reduces much of the friction involved in moving applications to the cloud, and not surprisingly, are currently the dominant model.

Platform-as-a-Service clouds, such as Google’s App Engine, offer many advantages. One is transparent auto-scaling as request loads grow, but this requires applications to adhere to the proprietary programming model they provide. This is straightforward and often extremely advantageous for new applications, but moving your existing ‘millions of lines of code’ applications to a new programming paradigm is a considerable cost and hence a barrier to adoption for many organizations.

**Figure 1. Dominant Cloud Models**

<table>
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<th>Cloud Clients</th>
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<td>Web browser, mobile app, thin client,</td>
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<td>terminal emulator, ...</td>
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<th>SaaS</th>
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<td>CRM, Email, virtual desktop, communication, games, ...</td>
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**Big Data**

In concert with the development of cloud platforms, the until-recently relatively stable world of data management has undergone fundamental changes. As data volumes commonly move into petabyte scales, the costs of purchasing “big iron” hardware and software needed to run relational databases have become prohibitive for many business cases.

In response, a new big data management paradigm, loosely coined as NoSQL databases, has emerged. These (often open source) databases spread massive data collections across many disks hosted by low-cost commodity computer resources.
This horizontal scaling approach can provide effectively limitless storage capacity, and the model of data distribution and storage is highly compatible with the resources available in cloud-based data centers. In this sense, big data and clouds are highly compatible partners.

Of course, the “no free lunch” rule applies with NoSQL database technology. A proliferation of different data models, query languages, and approaches to providing consistency and availability muddy a marketplace once dominated by the relational model and SQL query language.

Database adoption now requires great care on the part of a business or community to choose a big data technology that has the capabilities needed to satisfy an application’s requirement. It also requires software architects and engineers to confront the challenges of building and managing highly distributed systems.

Distributed data systems introduce complexities that have been hidden from mainstream software development until now, and hence have a created a void that needs to be filled in the software engineering profession (see visual.ly/cios-big-data for interesting survey results in this area).

**Clouds, Big Data, and Future Power Grid**

Cloud platforms and big data technologies seem, at least superficially, as highly attractive approaches for exploitation in the future power grid. Public cloud platforms can enable utilities to gain access to powerful computing and storage capabilities with low barriers to entry.

This is becoming increasingly true as the costs of cloud-based data storage drop precipitously (currently around $0.03 per gigabyte per month), making hosting massive data collections in public clouds affordable. If sensor data from grid operations could be hosted on clouds, sharing of data across utility boundaries for increased situational awareness, incident analysis, and planning could be significantly improved over existing, extremely primitive practices.

Clouds could also become highly attractive platforms for ventures such as smart cities and smart buildings, as they require zero capital investment to create custom data centers, and can offer straightforward interoperability compared to multitudes of private data centers built using proprietary approaches.

Moving substantial components of the future power grid to cloud-based platforms represents a software engineering challenge that should not be under-estimated. Many issues need to be carefully considered and appropriate solutions either adopted or built. For example, data sharing requires an industry-wide identity management and authentication and authorization approach so that data is shared securely and only with those who have rights to access the collections.

Issues of latency and scale also need to be addressed. Low-latency applications may not be suitable for cloud deployments due to the physical distances of data centers from utilities (e.g., it takes approximately 42 milliseconds for a round trip across the U.S. at the speed of light) and the overheads of networking and data access. As data volumes grow into petabyte ranges, adopting suitable database technologies that can rapidly serve and analyze time-series-based sensor data at acceptable storage costs will require trade-offs in system architecture and database design.

Exploiting the data tsunami to gain improved power grid operational efficiency represents a huge software engineering challenge. Clouds and big data are likely to provide large parts of the solution-puzzle as advanced operational systems are built and deployed. Developing these technologies appropriately and engineering software systems that exploit the strengths and avoid the limitations of clouds and big data will be a fundamental determinant of success of the future power grid.

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Figure 2. Contemporary Database Landscape

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Dr. Gorton leads work in the area of software architectures and technologies for big data systems.
At first glance, it may seem that the Smart Grid industry has no center. The grid’s fundamental nature is elusive. Its mandatory nature, not just for electrification in developed and developing nations, but its contribution to the evolution of other systems—transportation, healthcare, and cities—is not easily perceived.

Some markets are inhibited by shallow policy, disconnected regulatory requirements, insufficient standards, and competing architectures. Utility CEOs may feel pushed and pulled in opposing directions. Consumer apathy, confusion, and fear tend to be the norm.

Though these industry conditions seem likely to continue, we can learn how to more fully express our knowledge and holistically connect the dots across disciplines, organizations, and stakeholders. This is the role of systemic thinking and it relies on three synergistic capabilities—semantics, augmentation, and collectivity.

**SEMANTICS**

To interconnect more Smart Grid information, we need more taxonomies and frameworks. Simply speaking, semantics is a means of representing knowledge in patterns; taxonomy is the practice and science of classification that originated with Aristotle 2,400 years ago; and frameworks are information structures that embody solutions to a number of related problems.

**Systemic thinking ... relies on three synergistic capabilities—semantics, augmentation, and collectivity.**

Focusing on semantics moves us from implicit awareness of a few frameworks to explicit management of many intertwined frameworks. For example, the fundamental ways that NEMA manages its business could be used to systematically classify and pattern information.
us make sense of vast amounts of information and think more comprehensively.

COLLECTIVITY
The ability to respond to changing circumstances, share insights across disciplines and geographies, and seize hidden opportunities for research, growth, integration, and transformation is not a solo endeavor. The third aspect of systemic thinking is expanding collectivity. The goal is to go from individual interpretations to integral perspectives. Collectively, as we create and share personal views, we also widen the aperture by linking with others’ insights.

Boosting Collaboration in Smart Grid
Much of the power of systemic thinking arises from collaboration. When many individuals are free to fully conceive and express their ideas, then a bigger bigger picture emerges. Also, evaluation is quickened due to more comparisons, reconciliations, and learnings.

Systemic thinking can empower new frontiers for the Smart Grid if we deliberately craft multiple perspectives about concepts and technologies along with what is actual and what is possible. Focusing on semantics, intellectual augmentation, and collectivity will yield interrelated views for boosting cognition, communications, and collaboration. ☝

Mr. Wilson is an author and knowledge-management thought leader.
How Connectivity and Big Data Help the Traffic Industry

For the past 40 years, electronics have played an important role in modernizing the transportation network. Modern electronic traffic light controllers and intelligent transportation systems (ITS) help improve traffic, increase safety, and reduce delays resulting from accidents. Problems, however, remain. How will we improve the traffic in the future?

We all use the traffic network in our business and social lives. In reality, its performance is much more complicated than it seems. Some comparatively simple questions such as, “Which way should I drive to work to avoid the traffic?” and “Is traffic worse this year?” are very difficult questions to answer with today’s technologies. However, the future is looking brighter, with new technologies on the cusp of delivering real benefits to the traveling public.

The technology industry is buzzing with the potential benefits from the Internet of Things (IoT). This is where devices that we interact with on a daily basis connect to the internet to deliver a better, safer, and more efficient experience to the user.

The transportation industry is no different. More and more traffic devices are using wireless technologies that originated with the internet, such as security protocols that were developed to make banking safer and cloud computing, which delivers smarter, safer, and simpler ITS systems that link the right people to the right things easily and effectively.

How, then, does this connectivity help?

Traffic devices collect data at intersections, such as how many vehicles pass by on each road, and at what time of day. A device knows if the vehicles arrive at the intersection when the light was green (a good thing—the vehicle does not have to stop) or if the vehicles arrived when the light was red (a bad thing—the vehicle had to stop, and was delayed). In the past, these statistics went nowhere or were used on a very limited basis.

As traffic devices converge with the IoT, data is uploaded to the cloud in massive quantities. The next generation of analysis software converts this into information and then into deep insights that allow us to answer questions such as, “Where should we spend our available money for the maximum benefit?” and “Did last year’s projects deliver the promised benefits?” This new world of rich data-driven decision making will result in smarter cities, smarter freeways, smarter parking, smarter traffic, and greener transportation with reduced carbon dioxide emissions.

Most importantly, since these next-generation systems will share a common internet infrastructure for both communications and computing, they will be deployed at a fraction of the cost of the current generation of purpose-built systems. “Doing more for less” will become more critical as financial pressures in our economy increase, and thus will be an additional driving force to deploying these new systems.

NEMA Transportation Section member companies have been playing a crucial role for 40 years in:

• writing standards for this new world,
• developing and providing the products and services to make it a reality, and
• deploying traffic technologies that deliver the benefits of this new technology.

Connectivity and big data capability enable the next generation of the transportation network.

Mr. Mulligan chairs NEMA’s Transportation Management Systems and Associated Control Devices Section.
Summertime travel to coastal towns often means traffic, and lots of it. To help alleviate increased road congestion, one state has taken matters into its own hands.

The Massachusetts Department of Transportation’s (MassDOT) Real Traffic Time Monitoring initiative is aimed at relieving congestion on highly-trafficked areas of Cape Cod during the busy spring and summer tourist seasons.

As part of this project, SES America (SESA) recently partnered with Coviello Electric, Inc. to install 24 solar-powered, task-specific dynamic message signs (DMS) at strategic locations across Cape Cod. These signs inform motorists of travel time information at key locations along busy stretches of highway. The clever thing about these DMS is that information is updated via Bluetooth readers in conjunction with the travel time modules—all powered solely by the use of solar panels.

“We are thrilled to have worked with MassDOT on this unique project, and meet the specific needs for these solar DMS installations on Cape Cod,” said Brandon Tessier, regional manager for SESA–Eastern U.S. “SESA’s focus is always on customized solutions and innovation, with energy efficiency leading that charge.”

Signs are installed on northbound and southbound sides of busy Route 6, which is a major artery that runs the full stretch of Cape Cod. The most notable location is at Hyannis, the busiest and most populous town on the Cape. There is also a DMS installed in Plymouth along Route 3, the major highway used to travel from Boston. Other locations include Falmouth, Sandwich, Wareham, and Yarmouth.

Each sign uses advanced, high efficiency display boards outfitted with high-intensity LEDs (light-emitting diodes) and a patented tilting mechanism capable of refining the viewing angle to ensure the travel times are visible to all passing motorists. All of the DMS are permanent installations that will function for many years (the average life of DMS is 12 to 15 years). Solar equipment allows them to operate year-round.

“This project was an opportunity to use years of research and development to provide DMS that require an extraordinarily low amount of power so we could satisfy the autonomy requirements MassDOT laid out. To be part of this process of providing an environmentally-friendly solution that will assist travelers on the busy highways of the Cape for years to come has been very rewarding,” added Mr. Tessier.

Ms. George (chrissy.skudera@nema.org), is the editor of eiXtra. She received a 2014 Hermes Honorable Mention for her writing.
Vehicle to Traffic Infrastructure Interface—Will Vehicles “Talk” to Traffic Lights in the Future?

Jean Johnson, NEMA Technical Program Manager

Connected Vehicle, a multi-year, multimodal U.S. Department of Transportation (USDOT)-sponsored research program, aims to enable communications among vehicles, infrastructure, and traffic controllers. Infrastructure includes traffic management centers (TMCs), which monitor and control traffic in a “wider” geographic area. Traffic controllers govern traffic lights at an intersection and communicate with the TMC.

Since 2002, USDOT has conducted research on communicating data among vehicles, known as vehicle-to-vehicle, or V2V. Standards and protocols that allow vehicles to “talk” with one another were demonstrated under USDOT’s Safety Pilot Model Deployment program, which included a University of Michigan Transportation Research Institute effort that outfitted nearly 3,000 private cars, trucks, and buses with wireless devices to communicate information that can alert drivers to potential crash situations.

One function allows vehicles to transmit messages identifying their geographic location to nearby vehicles in near-real time. Put another way, one vehicle says, “Here I am—please don’t hit me.” Nearby vehicles can adjust route/speed accordingly.

Connected vehicle research recently turned to vehicle-to-infrastructure, or V2I. Approximately 350,000 traffic intersections in the U.S. are “signalized,” meaning that they have a traffic light with or without associated infrastructure (e.g., video cameras, radar, or other roadside equipment). V2I is of interest to NEMA’s Transportation Management Systems and Associated Control Devices Section because signalized intersections is where their equipment is installed.

Traffic management professionals were curious as to how V2V results might apply to V2I. A vision of that future was provided in April 2014, with an overview of Integrated V2I Prototype (IVP). IVP supports the collection, integration, and dissemination of data between vehicles and infrastructure, and includes provisions for:

- signal phase and timing that determines under what conditions and circumstances does a traffic light change from red to green
- mapping of an intersection, its lanes, and related road segments
- roadside equipment and other communication devices that transmit data (e.g., number and position of vehicles in a lane or weather conditions) to traffic infrastructure so that dynamic message signs (DMS) change their message, or signal timing is adjusted
- IVP mapping for how data might flow among different equipment for different purposes, including sensor systems, pedestrian crossing request sensors, and DMS that might recommend an alternate route or warn of reduced speed
- TMCs that monitor and control the timing of lights within a particular region

IVP also examines the direction and nature of data flow in unique situations, such as work zone or other reduced speed situations. To execute V2I functions, various entities need to perform in concert, including the IVP itself, TMC, equipment at an intersection, and the vehicle.

V2I offers a number of traffic management enhancements:

- red light violation warning
- road/weather motorist advisory
- weather-responsive variable speed limit
- signal approach and departure optimization (best deceleration or acceleration pattern to minimize fuel use)

Building the Future

To develop IVP, the readiness level of various technologies was assessed in terms of development status, availability, and performance capabilities. Many of the 350,000 signalized intersections were upgraded over the last 20 years. While a number of the technologies are sufficiently ready for IVP, evaluation of a number of deployed technologies—some represented by both NEMA and NTCIP1—may require additional work.

Traffic management professionals are trying to build a traffic management system for the future, while integrating existing traffic management legacy systems. Nonetheless, the future for traffic management looks promising.

For more information about NTCIP, see www.ntcip.org and www.standards.its.dot.gov. 

Ms. Johnson (jean.johnson@nema.org) manages designated NEMA technical programs and develops standards on transportation control devices, NTCIP, airport baggage and passenger security, cable trays, and insulating materials.

1 NTCIP (National Transportation for Intelligent Transportation Systems Protocols) is a family of standards that defines communication rules and vocabulary among traffic control devices. A joint effort among NEMA, American Association of State Highway Transportation Officials, and Institute for Transportation Engineers, NTCIP enjoys continuing support from USDOT.
With the advent of smart thermostats, control options for the electric heating market have reached a tipping point in connectivity. These systems are easy-to-install and allow for more efficient, hands-off operation. For the first time, controls for radiant heating applications have the ability to use weather data, adapt to homeowner schedules and a home’s heating history, and work in sync with traditional forced air systems.

The first step to smarter home heating—installation—is pretty straightforward. Electric floor heating systems can easily be integrated to any electrical system using a smart thermostat. Once the installation hurdle has been cleared, operation of the floor heating system can be customized to meet the homeowners’ heating needs and energy use requirements. After a short time, a smart thermostat “learns” to activate the heating system to match the household usage patterns. It looks at the current temperature and the system’s history and anticipates when to turn it on so that the room is at the perfect temperature when the occupant wakes up or returns home.

A home heating system does not operate in isolation; daily or seasonal variations in temperature affect the home’s heating needs. Weather sensing functions, such as a weather awareness feature, use a wireless local area network connection to monitor current and forecast weather conditions. Adjusting system operation to current weather conditions and seasonal variations enables it to become more efficient and helps reduce energy costs.

**TAKING HEATING TO THE NEXT LEVEL**

Radiant heat is different from other heating systems, such as forced air; the heat generated by the floor heating system is stored by the flooring material, gently warming the room and its occupants. With information from the system’s heating history, a smart thermostat can determine when to activate the system to raise the ambient temperature to the desired level. Once the temperature is attained, the system shuts itself off to avoid overheating the room and save energy, since the room is warmed by the heat stored in the floor.

Installing a thermostat that allows for multiple-stage heating gives the homeowner the option to not only use the electric floor heating system as the primary heat source, but also to activate an auxiliary heat source if needed. This new option is ideal for use during extremely cold outdoor temperatures or in rooms that require supplemental heat because of excessive heat loss due to design, insulation, or other factors. Smart thermostats seamlessly connect the two systems, detect when the secondary heat source is needed, and activate it automatically.

Taking advantage of features that best match a client’s needs keeps the home warm and comfortable while optimizing energy use.

Ms. Peterson manages and develops marketing and technical content for WarmlyYours. As a writer and editor, she specializes in home automation and control, energy management, security, aging in place solutions, and other residential technology applications.
The traditional way of doing business and interacting with consumers is changing for utilities. Technology advancements have given utilities more information about where and how resources are used, helping them map usage, balance loads, restore outages, and engage with customers. Smart Grid technologies have changed the way utilities operate and interact with their customers from a one-way transaction to a complex web of two-way energy transactions.

The Internet of Things (IoT) is similarly transforming the way cities interact with their citizens and the way utilities interact with their customers. Communicating sensors can enhance the lives of citizens by connecting the dots between their desires for a more livable city with achieving broader goals.

The idea of smart cities is similar to the Smart Grid—both leverage the power of collaboration to create new services that promote efficient use of resources. Utilities and cities share the goal of resourceful use of energy and water, and cities can extend the concept further to promote urban sustainability and livable communities.

Bridging Utility and Urban Networks

Leveraging common infrastructure is the first step to extending the Smart Grid to cities. Grid modernization typically involves deploying a tiered communications infrastructure across a utility’s service territory, including rural and urban areas. Utilities then overlay common services including security, data acquisition, monitoring, and control applications. Since these services are ubiquitous and focused on engaging consumers to better manage resources, it is logical to extend that infrastructure to cities.

Smart Grid communications are often required to be standards-based and extensible. In particular, low-power, highly-available IPv6-based1 wireless sensor networks are key enablers not only of the Smart Grid, but also the IoT. IPv6 networks based on open standards enable a common addressing scheme to many types of endpoints and extend the same layering of services and multiple applications to non-utility assets.

While the logic of using common infrastructure to solve urban resource challenges may seem obvious, there are often obstacles that prevent multi-service offerings over a common, utility-owned network. Data privacy concerns arise when different entities are transporting customer data over the same physical network and routing data through devices owned and operated by utilities. On the other hand, utilities have concerns about network bandwidth usage, and ensuring that their critical operations continue to work smoothly, particularly during outages or on summer afternoons when energy usage pushes beyond available generation. Utilities that own and operate field equipment and network management systems face increased costs with more network usage that must be compensated and planned for.

Cities and utilities often attempt to leverage common networks for simple operations, such as reading city-owned water meters with an electric utility’s network collectors and network management system. However, the issues raised above prevent true collaboration. While the IoT promises to solve this problem with open standards and the IPv6 addressing scheme for all devices, these alone will not address all concerns.

Three models for bridging utilities and cities identify the necessary components of network infrastructure to address these concerns, and enable collaboration through which the Smart Grid can be extended to the smart city. They are Embedded Sensing, Bring Your Own Interface, and Fog Computing.

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1 IPv6 is the next generation internet protocol (IP) address standard developed by the Internet Engineering Task Force to provide an identification and location system for computers on networks and routes traffic across the internet.

Illustration courtesy of Itron
**EMBEDDED SENSING**

Streetlights, parking meter monitors, and electric vehicle (EV) charging stations are examples of city-owned assets that could leverage a utility Smart Grid network. At the simplest level, enabling these devices to communicate involves embedding a network interface card (NIC) into the device. The NIC links the device to a city-operated server so that monitoring, control, and management of those assets can occur. While the device then shares the same network and physical layer of utility owned devices, the application used by the city can be different and can be completely transparent to the utility.

While direct NIC integration on an IPv6 network allows city and utility applications to share a network, they do not create collaboration between utilities and cities. Since both are managing use of energy and water, they could benefit from sharing a common subset of information. For example, cities may want downtown buildings to reduce energy consumption to avoid brownouts, and utilities may want to know the electric demand of city-owned EV charging stations.

To share data while maintaining privacy and formats of data, intelligence is needed in devices. An embedded sensing platform goes beyond communications via a NIC card. It also allows for data aggregation, local analysis of data and special formatting of data so that, for example, a building management system can understand utility load reduction signals, and EV charging station consumption can be measured and made available to existing meter utility data management systems. Thus, embedded processing which can be extended over time with new applications is an essential complement to a NIC card.

**FOG COMPUTING**

The ability to leverage the network routers and endpoints to process, store, filter, and analyze data is known as fog computing, since it takes place beneath the cloud. Utility concerns about data overload from distributed sensors are addressed by processing data locally in city devices and in network routers, such that the data burden to backhaul networks with higher operations and maintenance costs is minimized. Data privacy is maintained by local processing, and only critical data is exchanged between cities and utilities. System integration costs are minimized when legacy systems can receive data in existing formats, rather than needing to conform to standards from a different industry.

The IoT changes expectations about device connectivity, data accessibility, and convenient access to new value-added services. Those expectations demand that infrastructure investments will expand interoperability and connectivity while extending intelligence to all citizens and resource consumers. When combined with embedded sensing platforms, fog computing provides the missing ingredient to bridge utilities with cities, and transform Smart Grids into smart cities that provide valuable services to consumers and citizens.

Mr. Johnson is responsible for consumer energy management solutions at Itron.
systems installed today offer much more control capability than traditional lighting systems.

Below are two examples of LED lighting systems that provide expanded control capability—and energy savings and maintenance benefits.

**Auto Dealership Lighting**

Collection Auto Group’s Mercedes-Benz dealership in Fort Mitchell, Kentucky, is using LEDs in all indoor and outdoor fixtures to drive the client experience beyond expectations while reducing electricity use and maintenance. Intuitive lighting controls transform the franchise into an intelligent facility that can optimize energy savings throughout the day and at night, thanks to automatic dimming and daylight harvesting capabilities.

“Our goal was to build the greatest dealership in the world,” said Collection Auto Group President Bernie Moreno. “At the first meeting, our neighbors brought up three concerns—lights, lights and then, lights.”

Neighbors were concerned about bright, glaring lights and excessive light spilling onto their property and into their homes.
Office and Parking Lot Lighting

LED luminaires were installed in several locations at Marriott International’s headquarters in Bethesda, Maryland. Security and energy savings were top priorities when considering new lighting for the nearly two million square feet (45 acres) of parking and garage space.

Marriott also gained functionality to dim its new garage lighting by incorporating motion sensors. Light output is reduced 40 percent when the garage is vacant and adjusts to 100 percent when motion is detected. The control system will interface with Marriott’s video surveillance center alerting guards to after-hours movement in the deck and focusing the nearest security camera to where the motion is detected.

More than 230 LED area lights illuminate the outdoor lots, while inside the parking deck nearly 400 LED garage light fixtures and several LED tunnel light installations light the way for associates going to and from their offices. Inside the eight-floor, 900,000-square-foot headquarters, Marriott replaced 1,000 65W bulbs with 7W LED PAR20 lamps in all hallways. A total of 140 12W LED BR30 lamps improved the functionality of the auditorium, producing a fully dimmable system with higher light levels and more light uniformity in addition to $2,300 in energy savings.

Seventy-two new recessed LED troffers were next added to the building’s lower level. When illuminated, the chic and slim 2’x2’ fixtures produce a perfectly even glow, enhancing the elegant aesthetic of the employee space that includes a daycare and cafeteria.

RESULTS AND BENEFITS

Marriott’s comprehensive LED update will decrease annual electricity use by 66 percent (680,000 kWhs outside; 180,000 kWhs inside) at its headquarters, slashing energy expense an estimated $104,000. Maintenance mitigation will yield an additional $210,000 savings over the next decade for a total return exceeding $120,000 a year. Marriott will also receive more than $130,000 in utility rebates and EPAct commercial building tax incentive savings. All told, the anticipated payback period for the lighting project is slightly more than two years, based on combined electricity, maintenance, and labor reductions.

Mr. Howley is a past chairman of the NEMA Lighting Division and a recipient of NEMA’s Kite & Key Award.
Medical Imaging Industry—Proven Leader of Interoperability

Thaddeus Flood, JD, MITA Industry Director

The medical imaging community has been a leader in leveraging information technology (IT) and interoperability for more than 30 years. Well before other industries recognized the need for cooperative standards and compatibility, DICOM established a framework for making digital imaging independent of particular device manufacturer formats.

When the DICOM committee was formed in 1983, Apple had just introduced the first computer with a graphical interface (and 1 MB RAM), Microsoft announced that Word and Windows would be released (in two years), and networked systems were a vision of the future. The internet was still a federally-funded research project known as ARPANET.

Early solutions for replacing x-ray film were proprietary in nature and increased barriers for image sharing. The DICOM committee encoded information as a sequence of tagged data elements recognizable today by anyone familiar with HTML and XML. The first DICOM standard, launched in 1985, revealed the need for continued refinement and cooperation by industry through iterative versions.

By 1992, the U.S. military launched the first large-scale deployment of DICOM. A consortium of medical technology companies deployed the first picture archiving and communications system (PACS) at major army and air force medical facilities. PACS provides economical storage of and convenient access to digital images from modalities such as radiography. Electronic images and reports are transmitted digitally, eliminating the need to manually file, retrieve, or transport film jackets.

As DICOM achieved near universal acceptance on medical imaging equipment, additional layers of interoperable health IT were developed. The Radiological Society of North America established Integrating the Healthcare Enterprise (IHE) in 1998 to solve issues related to reconciling insufficient DICOM compliance between vendors. The IHE radiology profile greatly improved challenges created by the presence of non-DICOM data present on devices used for sharing diagnostic images.

With continued advancement throughout the early 2000s, imaging workflows and data handling became primarily automated, taking patient and order information from registration through to images and report. HL7 patient registrations and orders can be integrated with DICOM.

DICOM facilitates communication in radiation therapy by enabling the interoperability of not only images, but more importantly therapy treatment prescriptions, planning, dosimetry, and delivery specifications. Ophthalmology, dentistry, pathology, and surgery also use DICOM.

Industry-driven work significantly predates government-sponsored efforts to promote the digitization and sharing of full longitudinal patient health records. The HITECH Act of 2009 and subsequent “Meaningful Use” requirements for electronic health records and health information exchange have highlighted the difficulty in establishing true interoperability in the digital health space. Medical imaging, not generally covered by federal requirements, has continued to move with the leading edge of innovation and interoperability.

Reaching for the Cloud

Building upon the work of DICOM, IHE, HL7, and other standards, imaging is moving beyond increasingly networked systems to “the cloud.” Shared image repositories offer the ability to collect and store images from multiple hospitals and care settings where they can be accessed along the continuum of care—hospital to post-acute and primary care—avoiding the cost and risks of repeated exams.

DICOMWeb and other protocols will take image sharing to the cloud and allow doctors and acute-care facilities to send, search for, and retrieve DICOM medical images at the point of care. A secure cloud-based solution to image sharing means critical patient exam data is available at the right time by the right medical provider. Reliable access to patient data, whether in an emergency situation or a follow-up appointment, leads to better decision-making and improved outcomes for patients.

The medical imaging and radiation therapy industries continue to push advancements in interoperability and networked image sharing because reliable access to complete patient health information—without repeated exams—is essential for safe and effective care. Digital imaging places accurate and complete information about patients’ health and medical history at providers’ fingertips in order to improve accuracy, efficiency, and ultimately create better patient outcomes.

Mr. Flood (tflood@medicalimaging.org) is MITA’s industry director for x-ray and medical imaging informatics.

1 Digital Imaging and Communications in Medicine (DICOM) is a global information technology standard.

2 a set of international standards for transfer of clinical and administrative data between hospital information systems

3 The Health Information Technology for Economic and Clinical Health (HITECH) Act was enacted to promote adoption and meaningful use of health information technology.
For several years, a global revolution in international trade has been taking place. It isn’t a trade war, but instead a race among individual countries to streamline the processing of trading documents. In the modern age of increased globalization, the country that can process trade authorizations with the least amount of overhead burden for exporters and importers wins—and countries on virtually every continent have already joined the race.

Since 2003, the World Trade Organization (WTO), United Nations Economic Commission for Europe, World Customs Organization (WCO), and the World Bank have all produced research reports and case studies touting the success of what is known as single-window trade.

According to the WCO, “single-window systems aim to simplify border formalities for traders and other economic operators by arranging for a single electronic submission of information to fulfill all cross-border regulatory requirements, and it is thus preeminently a tool for trade facilitation.” In December 2013, all 159 WTO member countries committed, as part of a Trade Facilitation Agreement, to make their best efforts to establish and maintain electronic single window systems for imports, exports and goods in transit.

In February of 2014, NEMA welcomed President Obama’s announcement that the U.S. will accelerate implementation of its single-window system to facilitate international trade in goods that meet U.S. safety, efficiency, and environmental standards. The system is administered by U.S. Customs and Border Protection (CBP), an arm of the Department of Homeland Security. Through an Executive Order, President Obama set a 2016 target date for full implementation of CBP’s International Trade Data System (ITDS).

According to CBP, ITDS represents collaboration by 47 agencies to develop an automated commercial environment that will become the backbone for international trade transactions. Currently, traders must file reports with multiple agencies, often on paper. In development for years and now undergoing testing, ITDS will allow traders to make a single electronic report and the relevant data will be distributed to the appropriate federal agencies. Through the single-window system, administrative costs will be reduced for business; government and agencies will obtain data more quickly through electronic filings, making it easier to process cargo more expeditiously and set automated flags to identify unsafe, dangerous, or prohibited shipments. CBP is also cooperating with Canada on implementation of its single-window system, while Mexico’s system is already underway.

NEMA President & CEO Evan R. Gaddis is a member of the U.S. Department of Commerce’s Advisory Committee for Supply Chain Competitiveness. He frequently cites Singapore’s TradeNet as an example of a single-window system that works. It reduced the time to process trading documents from several days to a matter of hours. Singapore’s system has dozens of touch points for each trade authorization. Each is automatically notified based on algorithms that process the application for the kinds of cargo involved.

Mr. Gaddis said. “Modernizing our systems through the successful implementation of ITDS will have a positive effect on American competitiveness and the U.S. economy.”

Mr. Molitor (paul.molitor@nema.org) is the publisher of ei magazine and winner of a 2014 Hermes Platinum Award for a written article.
The world is becoming more complex with vast numbers of individual devices—from pipes to wires to specialized electronics for control and automation—interacting to perform innumerable tasks designed to help human activities flow smoothly and safely.

The International Electrotechnical Commission (IEC) defines system interoperation as “a group of interacting, interrelated, or interdependent elements forming a purposeful whole of a complexity that requires specific structures and work methods in order to support applications and services."

Up until recently and continuing as the focus of the majority of the IEC technical committees, emphasis has been on horizontal (i.e., generic) standards or product standards. The divergence of technological advancements and expansion of the global market has combined with the integration of widely connected infrastructure so that human activity is centered around and impacted by multifaceted systems. These systems may control lighting; heating and air conditioning; security; transport systems; water and cooking facilities; and other features of buildings, campuses, or even cities.

Nearly all aspects of public and private life, including environment, safety, and health, have become intertwined with the capabilities and frailties of these enormous systems.

The standardization community has brought attention to this vastness by taking a higher level approach to ensure interoperability and reliability. It is possible to accomplish interoperability through common methodologies, specifications on communication, interchangeability of products from different sources, and consideration of impacts between different levels of components within the systems.

This led IEC to develop a systems approach implemented by the Systems Evaluation Group (SEG), Systems Committees (SyC), and Systems Resource Groups (SRG).

**Systems Evaluation Group**

The purpose of a SEG is to evaluate work that covers a broad area of technology, normally covering the work of more than one technical committee (TC) and subcommittee (SC). A SEG will be set up to identify stakeholders, scope and propose architectures, and road maps to plan and organize standardization activities. Its task does not include ongoing technical coordination of work between TCs, but does include the identification of concerned TC/SCs. A SEG paves the way toward setting up a SyC.

Established SEGs include:

- SEG-1 Smart Cities
- SEG-2 Smart Grid
- SEG-3 (former SG 5) Ambient Assisted Living (AAL)

**Systems Committee**

Systems committees set high-level interfaces and functional requirements that potentially span multiple TC/SC work areas. A SyC does not have the authority to dictate to other TCs what work should be carried out, but works through collaboration and consensus with TCs to achieve a work plan followed by all. Official participation is through participating membership of national committees. Secretariat of SyCs is provided by IEC Central Office.

**Systems Resource Groups**

SRGs serve as a support and consulting resource to SEGs and SyCs, collecting and sharing best practices. They specify tools and guidance for functions such as architecture models, road maps, and use cases. While focusing on the science of system standardization, they will not engage in technical standards work. SRG members will be systems experts nominated by national committees and approved by the Standardization Management Board.

Ken Gettman, Director of International Standards  
ken.gettman@nema.org

Learn more: www.iec.ch/about/activities/systemswork.htm
ESFI Warns Public about the Dangers of Electric Shock Drowning

Despite being categorized as leisurely activities, swimming and boating are inherently dangerous. Safety behaviors such as wearing life jackets and maintaining safe boating speeds are commonplace. Electric shock drowning, however, is a serious hazard and a silent killer. It occurs in fresh water when a typically low-level current passes through one’s body, causing paralysis and drowning. Electric shock drowning deaths are usually recorded as drowning because victims show no signs of burns.

While a lack of awareness persists about electric shock drowning, strides are being taken to combat the problem. Tennessee legislators passed the Noah Dean and Nate Act, which aims to prevent electric shock injuries and drowning deaths near marinas and boat docks. Named in memory of 10-year-old Noah Dean Winstead and 11-year-old Nate Lynam who died from electrical injuries they suffered at a marina, the act mandates that marinas install ground-fault circuit interrupters (GFCIs), post notices about the danger of electrical leakage, and undergo safety inspections. A similar law was passed in West Virginia.

The 2011 National Electrical Code® (NEC) addresses dangers in marinas and boatyards by requiring main overcurrent protective devices be GFCI-protected.

Protect yourself and loved ones from the risk of electric shock drowning:

• Don’t allow anyone to swim near docks. Avoid entering the water when launching or loading your boat.
• Always maintain a distance of at least 10 feet between your boat and nearby power lines.
• If you feel a tingle while swimming, get out as soon as possible, avoiding metal objects.
• Have your boat’s electrical system inspected and upgraded by a certified marine electrician.

• Have GFCIs installed on your boat and test them monthly.
• Consider having equipment leakage circuit interrupters installed on boats to protect nearby swimmers from potential electricity leakage.
• Only use shore or marine power cords, plugs, receptacles, and extension cords that have been tested by UL, CSA, or Intertek.
• Never use cords that are frayed, damaged, or altered.
• Never stand or swim in water while turning off electrical devices.
• Electric shock drowning can also occur in swimming pools, hot tubs, and spas. Have an electrician inspect them in accordance with applicable codes.

Julie Chavanne, Communications Director, ESFI | julie.chavanne@esfi.org
Ryan Franks Selected as 2014 IEC Young Professional

Ryan Franks, NEMA Energy Storage Technical Manager, has been selected by the International Electrotechnical Commission (IEC) as a 2014 IEC Young Professional. Mr. Franks was one of three selected, and will participate in the IEC Young Professionals 2014 Workshop in Tokyo, Japan, this November.

“What separates Ryan from the crowd is his ability to effectively lead groups to identify and accomplish their objectives. It is very rare to find a young individual with technical training plus the talent to focus on important issues and complete the project,” said NEMA President and CEO Evan R. Gaddis. “Ryan is truly representative of the kind of individual IEC is trying to attract to the field of international standards through the Young Professionals program.”

“NEMA is very proud that one of its own has been selected to the IEC Young Professionals program and will have the opportunity to gain firsthand experience with the IEC process at the 2014 General Meeting in Tokyo, Japan,” said NEMA Senior Vice President of Operations Ric Talley. “We believe this selection provides further recognition of Ryan’s broad spectrum of work.”

His participation includes efforts to shepherd the activities of U.S. participation in IEC TC20 Electric Cables and TC120 Electrical Energy Storage Systems, along with NEMA efforts concerning personnel protection equipment, and wires and cables. He also coordinates activities related to energy storage and microgrids within NEMA and other organizations.

Also selected as a 2014 IEC Young Professional is Carin Stuart of Energizer Holdings, Inc., a NEMA member company. Ms. Stuart is an active expert in IEC SC21A, TC35, and TC100, and previously was a member of IEC TC105. She works in regulatory affairs covering safety, standards, technical marketing, and environmental affairs. Ms. Stuart is Energizer’s alternate representative to the NEMA Dry Battery Section.

Phallan K. Davis, Public Relations Specialist | phallan.davis@nema.org

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IDEA Announces New IDW for Manufacturers Support Program

NEMA manufacturers looking to increase sales and reduce time to market for new products can leverage motivated distributors who are investing heavily in eCommerce websites to grow their businesses. This online business expansion has generated new excitement and increased demand for manufacturer-supplied product content.

IDEA’s Industry Data Warehouse (IDW) is the industry’s preferred solution to meet the needs of manufacturers for efficient data content transfer to wholesale distribution. IDW now provides state-of-the-art tools to increase NEMA manufacturers’ return on investment. Creating end-user brand preference has also been a priority for IDW, and enhancements now allow manufacturers to also reach the end-user market. Authorized product data can be distributed to electrical contractors and specification developers via IDW’s new contractor estimating system integrations.

IDEA has created a services bundle for manufacturers to drive data quality, integrity, timeliness, and brand control. The IDW for Manufacturers Support Program, a NEMA-approved program for all IDW manufacturers, provides an array of services for a small annual fee. NEMA and IDEA believe this program will provide more service and value, such as dedicated IDEA support staff, data quality tools, new reports, and additional formats to leverage the IDW.

Progressive manufacturers have already seen increased efficiency and productivity improvements by using the tools and services included in this data management package.

The IDW for Manufacturers Support Program includes:

- **Application Access**
  IDEA will host, secure, maintain, and distribute product data based on each manufacturer’s unique requirements. These core services are enhanced with IDEA-provided data governance, and access to industry-approved eBusiness standards, events, and resources.

- **Data Management Service**
  This personalized and tailored service provides dedicated support time from our data management specialists who can help manufacturers quickly fix any product data errors they uncover, guaranteeing that their data in IDW is error-free. Manufacturers will also receive custom monthly reports to help prioritize data quality improvements.

  - **Analytics Tool**
    This on-demand assessment tool empowers manufacturers to evaluate the quality of their product data in IDW through the eyes of distributors and fix data quality issues at the source in a manufacturer’s business system to ensure accuracy in all future updates. See a demo of this tool and read about others who have used it to improve their data quality by up to 400 percent on IDEA’s website.

  If you have questions about the IDW for Manufacturers Support Program, contact Susan Streich at ssstreich@idea4industry.com, 703-562-4636.

Colleen Psomas, Marketing Manager, IDEA | cpsomas@idea4industry.com

IDEA (Industry Data Exchange Association, Inc.) was founded in 1998 through a partnership rooted in the collective leadership of NEMA and the National Association of Electrical Distributors.

NEMA Debuts New, Improved Online Standards Store

Last month, NEMA debuted its new online storefront for purchasing standards, making it easier for customer interaction. It features a more robust searching capability and different ways to package standards, such as multi-user PDFs and Print Plus PDF bundles.

New features include:

- **My Tracker.** Use this tool to stay up-to-date with changing codes and standards tracking.

- **Customer Rewards.** Earn valuable points that can be redeemed for coupons and gift certificates.

- **Interpretation Service.** Place your order over the phone using interpretation services available in more than 100 languages.

  “We’re constantly trying to improve the standards purchasing process,” said NEMA Assistant Vice President Paul Molitor. “Regular visitors to our standards store will notice the difference right away.”

To access the new standards web store, visit www.nema.org/standards-store.

RECENTLY PUBLISHED STANDARDS AVAILABLE AT www.nema.org/standards-store

NEMA C12.30TR-2013 Test Requirements for Metering Devices Equipped with Service Switches
Available in hardcopy or electronic format for $40

NTCIP 1209 v02 Object Definitions for Transportation Sensor Systems
Available in hard copy for $161 and electronic format for $80
DOE Revises Energy Conservation Standards for Electric Motors


The amended rule will continue to use motor test methods currently in effect. However, DOE did publish a revision to the test rule describing several additional steps or configurations that manufacturers need to follow in testing motors. Table I.1 from the amended rule shows product range and performance levels. Groups one and two will be required to meet NEMA table 12-12 nominal efficiency levels. Group three (fire pumps) will remain at NEMA 12-11 nominal efficiency levels.

This revision was accomplished through the traditional DOE rulemaking process assuring that all parties are heard and projected energy savings are substantiated. Members of the NEMA Motor and Generator Section worked in collaboration with the American Council for an Energy-Efficient Economy, the Appliance Standards Awareness Project, and leading utility and energy advocates to provide DOE with a comprehensive proposal.

To understand this revised rule and the effects on original equipment manufacturer (OEMs), distributors, and end users, Tables IV.2 and IV.4 review motor types that will be added to and excluded from covered product scope, levels of performance, and timing of implementation.

Table I.1 Energy Conservation Standards for Electric Motors

<table>
<thead>
<tr>
<th>Electric Motor Type</th>
<th>Horsepower Rating</th>
<th>Pole Configuration</th>
<th>Enclosure</th>
<th>Adopted TSL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air-over electric motors</td>
<td>1–500</td>
<td>2, 4, 6, 8</td>
<td>Open</td>
<td>2</td>
</tr>
<tr>
<td>Component sets of an electric motor</td>
<td></td>
<td></td>
<td>Enclosed</td>
<td>2</td>
</tr>
<tr>
<td>Liquid-cooled electric motors</td>
<td></td>
<td></td>
<td>Enclosed</td>
<td>2</td>
</tr>
<tr>
<td>Submersible electric motors</td>
<td></td>
<td></td>
<td>Open</td>
<td>2</td>
</tr>
<tr>
<td>Inverter-only electric motors</td>
<td></td>
<td></td>
<td>Enclosed</td>
<td>2</td>
</tr>
</tbody>
</table>

Table IV.2 Characteristics of Motors Regulated under Expanded Scope of Coverage

<table>
<thead>
<tr>
<th>Motor Characteristic</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Is a single-speed, induction motor,</td>
<td>Is rated for continuous duty (MG 1) operation or for duty type SI (IEC),</td>
</tr>
<tr>
<td>Is rated for 600 volts or less,</td>
<td>Is built with a 2-, 4-, 6-, or 8-pole configuration,</td>
</tr>
<tr>
<td>Is built in a three-digit or four-digit NEMA frame size (or IEC metric equivalent), including those designs between two consecutive NEMA frame sizes (or IEC metric equivalent), or an enclosed 56 NEMA frame size (or IEC metric equivalent),</td>
<td>Produces at least 1 horsepower (0.746 kw) but not greater than 500 horsepower (373 kw), and,</td>
</tr>
<tr>
<td>Produces at least 1 horsepower (0.746 kw) but not greater than 500 horsepower (373 kw), and,</td>
<td>Meets all of the performance requirements of a NEMA Design A, B, or C motor or of an IEC Design N or H electric motor.</td>
</tr>
</tbody>
</table>
UTCAL Summit in Brazil Offers Lessons Learned from Smart Grid Deployments

The first major event in support of NEMA’s Market Development Cooperator Program (MDCP) to grow Smart Grid products and services in Brazil occurred in April in Florianopolis, Brazil. Four MDCP panel sessions offering utilities and manufacturers perspectives on lessons learned from Smart Grid deployments took place during the Utilities Telecom Council’s Latin America (UTCAL) summit. It featured more than 300 attendees, including significant representation from Brazilian government and utilities.

The conference began with remarks by Maximiliano Martinhão from the ministry of telecommunications. He said that Brazil’s telecommunication sectors are experiencing $300 billion in real broadband growth with the heaviest concentration in the north and northeast regions of the country. Following his presentation was an opening panel session that included representatives from ABRADEE (Brazilian Electrical and Electronics Industry Association), ANEEL (Brazilian Electricity Regulatory Agency), and MME (Brazilian Ministry of Mines and Energy).

From ABRADEE’s perspective, the principle drivers to develop and deploy Smart Grids in Brazil are a reduction in technical losses, climate change, distributed generation, and quality of service. Key barriers identified by ANEEL included a lack of incentives toward power conservation, costs for the initial investments, and the need for a rate/tariff structure.

ANEEL recently approved an electricity prepayment regulatory arrangement that will allow consumers to voluntarily prepay their electricity, provided that it is offered by the distributor in its service area. MME reported that it is working on a number of pilot projects.

MDCP PANELS

NEMA Smart Grid Industry Director Steve Griffith organized two MDCP panel sessions. The first addressed the future of utility modernization from the manufacturer perspective and included in-country representatives from NEMA members Eaton Cooper Power, S&C Electric, and GE. Discussion focused on manufacturers’ experiences and lessons learned from previous Smart Grid deployments and how they can be applied in the Brazilian market. Nearly all of the attendees in this session were from Brazilian utilities.

The second panel addressed the importance of aligning Brazilian smart technologies with global standards. Presenters on this panel included Everett Wakai from the U.S. Commercial Service, who talked about the value of global interoperable standards; Ron Melton from the Pacific Northwest National Laboratory, who gave an overview on lessons learned from SGIP deployments; Luiz Fernando Rust from Inmetro, with an overview of his role in accrediting electrical products that meet Brazilian requirements; and Jefferson Marcondes representing ABNT, the Brazilian National Standards Organization, with an outline of its duties as the normative body responsible for technical standards in Brazil.

The next event in support of this project is an educational webinar intended for U.S. companies who wish to do business in Brazil, which will be held in July. Please contact Steve Griffith directly for more details.

Steve Griffith, PMP, NEMA Smart Grid Industry Director | steve.griffith@nema.org

If you are a small manufacturer and want to attend a webinar on doing business with Brazil, contact Steve.Griffith@nema.org
International Roundup

› Electrical Installation Codes Bridge New and Different Technologies

The foundation of an effective system for electrical safety is an electrical installation code with language that accommodates consistent and objective enforcement.

This message has been delivered throughout the Americas for the past five years or more by a troop of missionaries for electrical safety led by NEMA, the National Fire Protection Association (NFPA), support staff in Mexico, and others. The result has been definitive action by a growing number of countries to establish formal electrical codes, many for the first time.

In the vast majority of cases, the codes adopted are based on NFPA 70 National Electrical Code® (NEC). The decisions to adopt a NEC-based code have been controversial. Those who object argue that the NEC-based code is biased toward traditional North American standard product technologies and against other globally-relevant standards, some of which are IEC standards. In the end, proponents presented a compelling argument that at the outset, the code must reflect the existing installed electrical distribution infrastructure, which undeniably is North American.

**FACILITATING TECHNOLOGY**

An effective electrical installation code establishes objective criteria for selecting a wide variety of options when designing and maintaining an electrical distribution system. In order to be effective, the code must clearly relate safety objectives, but it also needs an appropriate degree of prescriptive requirements that establish the basis for consistent and objective enforcement.

Some might argue that an objective-based code is all that is needed, especially when a trained, independent inspection authority is not available, and that prescriptive requirements in a code can limit acceptance of new and different technologies. Safety objectives alone are insufficient for making important design and acceptance decisions for most electrotechnical system equipment. While it is true that overly prescriptive requirements can limit choices among safe design options, recording of known limitations and the objective means for assessing suitability for use is essential.

Establishment of a formal code enforcement system should be a priority in any developing market. Whether or not such enforcement exists, however, the code provides a very essential foundation and metric for both training and self-regulation. Once established, it will almost immediately improve safety consciousness, influence specifications, and shape installation methods. When coupled with a portfolio of relevant product safety standards, prescriptions in the code can be minimized—effective standards help define compliant products in accordance with the code.

Codes and standards facilitate, not block, new and different technologies. Experiences in Canada and the U.S. provide evidence to this claim. The processes that regularly review and update codes and standards need to be dynamic with active participation by a balance of industry stakeholders. A balanced, consensus-based process provides an appropriate measure of safety for the society it serves as well as the necessary technical forum for efficiently evaluating proposals for safely assimilating new and different technologies.

The panel discussion “The Five Top Code Differences Inhibiting Further Standards Harmonization” was moderated by Bill Bryans, Electro-Federation Canada (far left), with participation by Abel Hernández Pineda, ANCE, A.C.; Arkady Tsisserev, EFS Engineering Solutions; and John Thompson, UL.

*Photo by Joel Solis, Secretary General, CANENA, and NEMA Conformity Assessment Manager*
EFFICIENCY THROUGH TRANSPARENCY

For more than 20 years, CANENA has evolved a transparent process that increases the efficiency of reviewing and changing regionally-harmonized safety standards to quickly and safely address new and different technologies. While no such forum presently exists for direct collaboration on installation codes, significant harmony exists between NEC and the Canadian Electrical Code Part I. Both processes are open to technical proposals and their processes are reasonably transparent through public review. The three-year review and publication cycle of both codes has proven quite suitable in serving the safety of the markets and stimulating investment in new technologies.

It is disconcerting that at this time in history, where technological innovations seem to come at mind-boggling frequency, there are influential factions in the U.S. promoting the extension of the NEC revision and publication cycle to six-years from its longstanding three-year cycle. They argue for short-term cost benefits based on reducing the need for training. But the long-term impact would be a slower introduction of truly lifesaving innovations, and even significant stunting of investment by manufacturers for innovation—ask any innovative manufacturer.

Codes are essential to ready market acceptance of new and different technologies, and time-to-market is an important financial consideration in decisions on technological investment. Doubling the time between code revisions would adversely affect process continuity and stakeholder engagement.

In this unprecedented era of rapidly developing markets and globalization, the promise of choice and the free flow of electrotechnical goods and services across borders must be met with processes that ensure safe assimilation into established infrastructure. In developing economies, investors/sellers share responsibility with governments and other local stakeholders to ensure that safe products are delivered and installed.

Establishment of a formal foundation consisting of an installation code and safety standards provides investors with important metrics to promote and distinguish their products and services, to act on the front lines to identify illicit and non-compliant products, and to assist in the training of installers and others. They will be motivated to do so in order to reduce the risk to their investment and naturally will be encouraged to then present their latest innovations to the markets. Stakeholders and process owners for codes and standards—even in well-developed markets—cannot permit deterioration of established levels of safety for the sake of foreseen short-term benefits.

Timothy P. McNeive, Manager, Technical Liaison, Thomas & Betts, A Member of the ABB Group | tim.mcneive@tnb.com

NEMA electroindustry • July 2014

NEMA Recognized at 2014 CANENA Annual Meeting

CANENA President Pierre Desilets, Leviton Manufacturing of Canada, (left) presented NEMA Board of Governors Chairman Christopher Curtis with an award of special recognition and appreciation at the CANENA Annual Meeting.

In making the presentation, Mr. Desilets noted that NEMA was instrumental in the founding of CANENA in 1992. Through the individual product sections, NEMA and its member companies provide substantial funding for technical committee secretaries and expenses related to carrying out their harmonization work programs.

“NEMA has heavily invested in CANENA’s administration since the beginning through funding of the Secretary General. This has, and remains a vital contribution to CANENA’s success,” he said. “NEMA’s investment is more than matched by the hours of volunteer commitment from CANENA’s officers. Together these investments form a very lean administrative structure.”

He also praised NEMA’s direct efforts in Latin America through a program partially funded through a U.S. Department of Commerce grant, and most recently through direct funding by NEMA product sections.

“This is the essence of the complementary affiliation between CANENA and NEMA,” he concluded.

Photo by Joel Solis, Secretary General, CANENA, and NEMA Conformity Assessment Manager
Mixed Performance for NEMA’s Industrial Controls Indexes

Shipments of industrial controls products and systems, as measured in NEMA’s Primary Industrial Controls Index, increased 0.2 percent on a quarterly basis (q/q) during the first quarter of 2014. The index registered a larger gain of 1.9 percent compared to the same period a year ago.

A more comprehensive measure of demand, NEMA’s Primary Industrial Controls and Adjustable Speed Drives Index, showed mixed results during the quarter. The index decreased by 2.3 percent q/q, while year-over-year performance posted a gain of 1.3 percent.

Stacey Harrison, Director, Statistical Operations | harrisons@nema.org

Motors Shipments Show Robust Growth

Motors shipments climbed sharply during the first quarter of 2014, as measured by NEMA’s Motors Shipments Index, posting an increase of 9 percent on a quarter-to-quarter (q/q) basis. On a year-over-year basis, the index is up 2.8 percent, and has more than regained territory lost during the previous three consecutive quarters. Shipments of fractional horsepower motors led the way with an increase of 37 percent q/q, while integral horsepower motors grew at a more modest rate of 7.6 percent q/q.

Stacey Harrison, Director, Statistical Operations | harrisons@nema.org

Lighting Systems Index Contracts

NEMA’s Lighting Systems Index declined 1.7 percent on a quarter-to-quarter basis during 1Q 2014. Despite the quarterly contraction, shipments of lighting equipment increased 0.9 percent on a year-over-year basis. Emergency lighting, fixtures, and miniature lamps registered gains in sales value while ballasts and large lamps declined compared to the first quarter of 2013.

Stacey Harrison, Director, Statistical Operations | harrisons@nema.org

See www.nema.org/ebci for the June 2014 report.
What is Connectivity?

When we hear the word, we may first think of the internet, local area networks in our offices, cell phone networks, or electronic devices that we use daily.

Just a few short years ago, “connectivity” might have suggested the electric power grid, our highway network, or the landline telephone network. With a critical eye toward the meaning of “connectivity,” we can better appreciate that our networks now overlap, interconnect, and mutually support one another like never before.

The evolution of network connectivity over the past two millennia track the technical progress of mankind—from Roman roads to standard gauge railroads; from steam pipes to electric grids; from telegraph offices to the digital mesh of today’s data networks.

NEMA member products build these networks, connect networks to users, and remotely manage the operation of these networks. There are innumerable overlaps, similarities, parallels, cross-connections, and shared purposes. Furthermore, standards and initiatives define, measure, and enhance these networks.

We connect. We interconnect.

Got a question? Ask the experts at ei@nema.org

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How can cities integrate existing buildings with goals related to sustainability?

Listen to Kimi Narita, Outreach Manager, City Energy Project, Natural Resources Defense Council discuss the City Energy Project.

www.nema.org/HPB-Week-2014-Part-3

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