IEC e-tech
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SMART GRIDS, SMART CITIES

TECHNOLOGY FOCUS

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Cities getting smarter around the world

Smart Buildings
Going green – Cutting costs

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Providing real-life solutions

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Smart Grids, Smart Cities

In most countries in the world power distribution networks need to be upgraded to cope with the integration of renewable energy and increasingly decentralized power generation. Innovative storage solutions will be essential to level out the intermittent nature of power generation from renewables. Optimal distribution, storage and monitoring of electrical power resources, via so-called smart grids, smart buildings, electric vehicles and smart meters will be central to ensuring the best possible use of energy.

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Smart Grids, Smart Cities

IEC major contribution to Smart Grids worldwide

Claire Marchand
Managing Editor *e-tech*

Issue 09/2013 of *e-tech* focuses on Smart Grids and Smart Cities.

Upgrading power networks

In most countries in the world power distribution networks need to be upgraded to cope with the integration of renewable energy and increasingly decentralized power generation. Innovative storage solutions will be essential to level out the intermittent nature of power generation from renewables. Optimal distribution, storage and monitoring of electrical power resources, via so-called smart grids, smart buildings, electric vehicles and smart meters will be central to ensuring the best possible use of energy.

Many of these issues were addressed at the IEC World Smart Grid Forum 2013 which took place last September in Berlin, Germany.

IEC plays major role

From energy generation, transmission and distribution to electric devices, equipment, installations and systems to electronic components, and much more, IEC standardization and conformity assessment activities play a major role in national or regional Smart Grid projects.

The IEC Smart Grid Standards Mapping Tool offers easy and instant identication of any given standard in relation to its role within the Smart Grid. New standards are added on a regular basis.

The brochure *Electrical energy… the IEC helps keep the power on* provides a good overview of the work done by the IEC in the energy sector.

On the one hand, a great number of IEC TCs (Technical Committees) prepare International Standards that are relevant to the Smart Grid issue. On the other, IECEE, the IEC System of Conformity Assessment Schemes for Electrotechnical Equipment and Components, is developing a specific programme, based on a great number of IEC International Standards, for the testing and certification of devices, equipment, installations and systems that are essential to the development of safe, reliable and efficient Smart Grids.

This issue of e-tech *focuses on Smart Grids and Smart Cities*

Power distribution networks need to be upgraded to cope with the integration of renewable energy

Cities getting smarter around the world

IEC International Standards help meet the challenges faced by smart projects developers

David Appleyard

Smart Cities promise both to provide a sustainable energy solution to the challenges of the urban environment and improved quality of life for the millions of city-dwellers across the world. IEC work underpins much of the development of such cities.

View of Songdo International Business District, Incheon, Korea

It seems that the electricity distribution grid is getting smarter – and our towns and cities with it.

The drivers behind this transition are relatively well known. Some 75% of Europe's population already lives in cities and consumes 70% of EU (European Union) energy production. In Asia a rapid increase in urban migration added more than a billion people to cities between 1980 and 2010, making Asia home to 8 out of the world's 10 most densely populated megacities, including the top three: Mumbai and Kolkata in India, Karachi in Pakistan.

There is an overarching need to reduce emissions of greenhouse gases from cities in the face of increasing urbanization.

Naturally there are challenges, such as the need to maintain grid stability while integrating an growing body of intermittent renewable energy from wind and solar, being generated increasingly in small decentralized units. Simultaneously, there are other factors at work, such as the rise of the producer-consumer and the integration of electric vehicle charging. Meanwhile, large numbers of existing coal-fired and nuclear power plants are expected to be decommissioned in coming years. Addressing each of these issues will require the development of smarter technology.

However, while the need for this technological advance is well understood, its execution is still in its earliest phases nearly everywhere. That's not to say that the benefits are not recognized. Fully integrating energy generation and supply provides a clear route for sustainable use of energy and improved quality of life for urban populations.

Making European cities smarter

Acknowledging the long timescale implicit in implementing such fundamental change, the European Commission has been active in developing smart city support networks. Having launched its Smart Cities Initiative in 2011 and a European Smart Cities Innovation Partnership in July last year, EUR 365 million of EU funding has been allocated to the demonstration of urban technology solutions in 2013 under this programme. Furthermore, starting from this year, demonstration projects must cover and combine three areas: energy, transport and ICT (Information and Communications Technology).

Overall, the Smart Cities Initiative aims to support cities in achieving a 40% reduction of greenhouse gas emissions by 2020 through the sustainable use and production of energy. The cost of the programme is estimated at EUR 10-12 billion over the next decade.

In mid-October the Partnership members adopted a SIP (Strategic Implementation Plan), which is to serve as the basis for accelerating deployment.

As the SIP decision was being taken, the European Commission adopted a list of close to 250 key energy infrastructure projects that may qualify for EUR 5,85 billion of funding under the Connecting Europe Facility from 2014-2020. Including a small number of Smart Grid-specific projects, well over half of these developments are in related areas and apply to either the transmission grid or storage.

Demonstrating smart cities in action

The European Commission's latest announcement comes at the head

of a long line of Smart Grid and smart city research projects which have been initiated across Europe. The largest is another European Commission supported umbrella group GRID4EU. This is a multiple Smart Grid demonstration project launched in November 2011 and designed with wide replication and scalability in mind. It is due to run until early 2016.

Major R&D (research and development) challenges already identified by the GRID4EU project include MV/LV (medium voltage/low voltage) network supervision and automation and improving peak load management between the network and consumers through DSM (Demand Side Management), virtual power plants, storage and the like. Furthermore, one of the work groups, GWP4, is tasked with developing technology and communications standards for the six demonstrators.

Aerial view of Masdar City, Abu Dhabi, UAE (Artist rendition - Photo: Masdar City)

Asia, North America

It's not just in Europe that the idea of smart cities is taking hold of course. There are some interesting developments underway in Asia, for example, where rapid urbanization is placing greater emphasis on environmentally-friendly approaches to city development.

The Songdo International Business District near Incheon in South Korea is a new city built on reclaimed land over the last decade which officially opened in 2009. Serving as a model for smart cities around the globe, Cisco Networking and Gale International companies have invested more than USD 40 billion in ICT networks which connect every home, office and school through video. They also help to regulate electricity and water use in all the city's buildings and give residents the power to control their own energy use.

Commenting on the project, Casper Herzberg, Managing Director of the Smart+Connected Communities Advisory Practice at Cisco Systems, said: "the underlying technology infrastructure that links all of these buildings together allows some dramatic benefits of 30% energy reduction."

Another country with a rapidly expanding urban population, India is also recognizing the benefits of getting smart. In late February, India's Finance Minister, Palaniappan Chidambaram, confirmed that plans for seven new cities along the DMIC (Delhi Mumbai Industrial Corridor) had been finalized and work on two new smart industrial cities – at Dholera in Gujarat and Shendra Bidkin in Maharashtra – would start in the next financial year.

Located some 110 km from Ahmedabad, Dholera is set to become one of the country's first smart cities with plans to be developed in six phases – the first of which could potentially start within a year.

The proposals envisage monitoring and integrating water management, road infrastructure, fibre networks and street lighting through ICT networks.

In Japan, the Yokohama Smart City Project targets three Yokohama-based areas with a combined surface area of around 60 sq.km and a population of more than 420 000 people in 170 000 households. The project will demonstrate energy management and DR (demand response) across a wide area with a goal of "building social systems targeting a 30% reduction in CO_2".

North America is doing its bit, too, with a great example coming from Iowa and the city of Dubuque where a Sustainable Dubuque Initiative was announced in 2006.

Smarter Sustainable Dubuque is a public/private partnership between the city, IBM Watson Research Center's Global Smarter Planet Initiative and other partners which was launched in September 2009. Started with USD 30 000 seed money from the Greater Dubuque Development Corporation it has grown to include

PRT (Personal Rapid Transit) System station at the Masdar Institute Campus (Photo: Masdar City)

over two dozen industries and eight state and federal agencies. Featuring smart technologies coupled with community outreach and implementation strategies it is designed to serve as a replicable, international model of sustainability for communities of 200 000 and under.

Programmes include the introduction of smart water and electricity meters and the Smarter Travel initiative. In this scheme 1 000 households have volunteered to let IBM and the city follow their movements via smartphone and RFID (radio-frequency identification) technology to help make the flow of people through the city less energy intensive.

IEC smart activities

Many if not most, services in cities and buildings are directly or indirectly dependent on electricity and electronics. The most obvious is the electric infrastructure that carries electricity to and within buildings and in transportation, medical facilities and factories.

The IEC is actively involved in developing new International Standards to support smart projects, including smart city development. The SMB (Standardization Management Board) has recently founded a SEG (Systems Evaluation Group) on Smart Cities. This SEG is now identifying the many electrotechnical systems that are found in cities, with a view to integrating and optimizing them. The Smart Cities Group is currently preparing a reference architecture and standardization roadmap in cooperation with different organizations, fora and consortia.

In parallel, the IEC Market Strategy Board, which brings together Chief Technology Officers of leading international companies, is preparing a high-level White Paper on Smart Cities. The goal is to outline how cities can move towards “smartness” and the new business models that need to be put in place, as well as identifying the value, cost and benefit of standards in these processes The core objective of the White Paper is to guide all relevant stakeholders towards integrated solutions that are going to be accessible, affordable and sustainable.

Many IEC TCs (Technical Committees) also enable the development of Smart Cities. A non-exhaustive list of these includes the following:

IEC TC 8: Systems aspects for electrical energy supply, which prepares and coordinates, in co-operation with other IEC TCs, the development of international standards and other deliverables focusing on overall system aspects of electricity supply systems. These include transmission and distribution networks and connected user installations.

Its recently-created SC (Subcommittee) 8A will develop standards for the grid integration of large-capacity RE (renewable energy) generation, which is set to play a central role in future energy supply and smart projects. Standards prepared by IEC TC 82 and IEC TC 88 in particular, which cover generation from photovoltaic and wind energy sources, form an integral part of the overall portfolio of Smart Grid Standards.

IEC TC 57: Power systems management and associated information exchange, set up in 1964, covers communications between equipment and systems in the electric power industry, a central element in smart buildings, cities and grids projects.

In September 2011 IEC PC (Project Committee) 118: Smart grid user interface, was established to develop standardization in the field of information exchange for demand response and in connecting demand side equipment and/or systems into the Smart Grid.

TC 65: Industrial-process measurement, control and automation, and its SCs, as well as TCs involved in storage (rechargeable batteries) and fuel cell technologies (TC 21 and TC 105, respectively), to name only a few, also form part of the overall IEC contribution to smart projects, without which Smart Cities would never become a reality.

Going green

Cutting costs with smart buildings

Peter Feuilherade

By 2050, according to current forecasts, about 6,3 billion people, comprising nearly 70% of the world's population, will be living in cities. This great surge of urbanization and the rise of megacities, each with a population greater than 10 million, will occur mostly in developing countries and boost demand for smart buildings and housing.

Evolving concept

The concept of a smart (or intelligent) building has evolved over the last four decades and now generally refers to the integration of a range of systems that improve the lifestyles of a building's occupants and the efficiency of its operations, especially its consumption of energy and other utilities. The automation of building operations, management and maintenance is integral to the concept.

In the words of the US-based Institute for Building Efficiency, "at the most fundamental level, smart buildings deliver useful building services that make occupants productive (e.g. illumination, thermal comfort, air quality, physical security, sanitation, and many more) at the lowest cost and environmental impact over the building lifecycle."

Smart buildings are often, but not exclusively, associated with the smart city, a term originally used to signify the roles of technology and innovation in urban development, but now increasingly linked with achieving sustainability.

Wide range of features

Achieving a smart building's aims, for economic and environmental reasons, involves the use of a wide range of features including adaptive lighting with occupancy sensing; smart meters that display overall use of electricity and help consumers to monitor and reduce their usage; sensors that gather and wirelessly communicate alerts or data about heat, light, movement and use of space; and the exchange of data between different systems. The cost of wireless sensors has dropped below USD 10 per unit and makes the installation of a smart building management system increasingly affordable.

With commercial buildings accounting for 40% of global energy consumption and contributing 20% of the carbon emissions, BEMS (building energy management systems) can help minimize energy use and cost. Smart buildings play a vital role in the effectiveness of Smart Grids, by helping to align energy generation with energy consumption. Buildings can receive requests to reduce demand when wholesale prices are high or when grid reliability is jeopardized. A smart building management system can also usually detect when an item of equipment is close to failure and alert staff to deal with the problem.

The main forces driving the smart building market are the ability to reduce carbon dioxide emissions, cut maintenance and operating costs and enhance the life of the building as well as improving the comfort and security of its occupants.

Asia and Middle East lead

Although Europe and North America pioneered smart cities in the 1980s-90s, more smart buildings are now being built from scratch in the Middle East and even more so in Asia, with its soaring rates of urbanization.

Smart buildings can be found in smart city projects such as Masdar City in the UAE (United Arab Emirates), Lusail City

Smart buildings in Lusail City, Qatar

in Qatar, King Abdullah Economic City in Saudi Arabia, Songdo in South Korea and Fujisawa in Japan. In China, the government has planned more than 600 smart city projects during its 12th Five-Year Plan (2011-2015), with an emphasis on water and energy infrastructure, energy-efficient buildings and traffic management. Asia's dynamic construction activity is expected to bolster its current share (25%) of the global market for building automation systems and controls, BEMS (20%) and intelligent lighting controls (17%).

The Middle East, despite enjoying low energy costs, is also a prolific source of progressive smart building design. Qatar, Saudi Arabia and the UAE allocated more than USD 63 billion to develop smart city projects between 2012 and 2017. The aim of the developers of the USD 22 billion project in Masdar City, 17 km from Abu Dhabi, is to create the world's first zero-carbon, zero-waste city, with the emphasis on energy efficiency.

Huge developing market

The US-based market research and consulting firm Navigant Research forecast in July 2013 that the worldwide market for BEMS, driven by technology advances as well as growing familiarity among customers with the benefits they bring, will grow from just under

Centre courtyard and windtower at the Masdar Institute, Abu Dhabi, UAE (Photo: Masdar City)

USD 1,8 billion in annual revenues in 2012 to nearly USD 5,6 billion in 2020, a CAGR (compound annual growth rate) of 15,3%. The market will be concentrated in North America and Europe, although the Asia-Pacific market is where growth is fastest.

Meanwhile, global revenues from wireless control systems for building automation will reach USD 294,8 million by 2020, when annual worldwide shipments of wireless nodes for building controls will total 36 million units. And global revenues from networked lighting control equipment within commercial buildings will grow from USD 1,7 billion in 2013 to USD 5,3 billion in 2020.

According to Navigant, the trillions of dollars that will be spent on urban infrastructure present "an immense opportunity for new transport management systems, Smart Grids, water monitoring systems, and energy efficient buildings".

The smart buildings market, along with other "smart" sectors such as energy, water and transport, is a major contributor to the worldwide growth of the overall smart cities market.

A forecast by the US company IDC Energy Insights estimates that global spending on smart building technologies alone will grow from USD 5,5 billion in 2012 to USD 18,1 billion in 2017 (a CAGR of 27,1%).

Global technology research firm ON World predicted in September 2013 that 100 million WSN (Wireless Sensor Network) devices would be installed in non-residential smart buildings globally by 2019, an 11-fold increase from 2011.

Energy and electricity are key

The IEC develops International Standards covering a broad range of systems, equipment and applications used in the construction and maintenance of smart buildings, encompassing lighting, automation, access control, energy systems, appliances, elevators and escalators, among others. The work of IEC TCs (Technical Committees) plays a vital role in helping to ensure safety as well as interoperability.

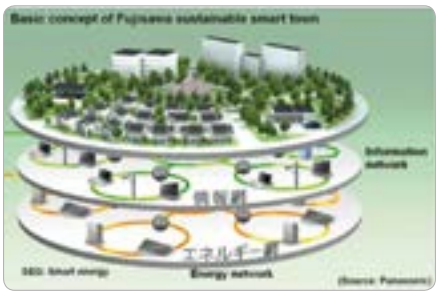
Some of the IEC TCs working in the smart buildings sector include TC 34: Lamps and related equipment for general, professional and emergency lighting; TC 59: Performance of household and similar electrical appliances; TC 82: Solar photovoltaic energy systems; TC 47: Semiconductor devices; and TC 72: Automatic electrical controls.

For Smart Grid applications, the IEC published a Smart Grid Standardization Roadmap in 2010 and has defined a range of Standards, among them Standards for substation control (IEC 61850), energy (IEC 61970) and distribution management (IEC 61968) and meter reading (IEC 62056). The CIM (Common Information Model) for Distribution and Energy Management provides a CIM necessary for exchanges of data between devices and networks, primarily in the transmission (IEC 61970) and distribution (IEC 61968) domains, and is a cornerstone of IEC Smart Grid standardization.

Integration and interoperability of smart building technologies

Smart building technologies such as wireless sensors are becoming increasingly interoperable. Several technologies are converging in building controls that will, for example, allow light sources to carry out a dual role as sensors and information nodes too in a distributed network, managing heat, air conditioning, and building security as well as office lighting. Cloud-based technology will have a growing impact on how intelligent buildings are run, linking them with power grids and multimodal transport systems.

There is a strong business case for strategic investments in smart building technologies which help to reduce facility operating costs over time. However, some property owners and investors still need persuading. In the view of Leo O'Loughlin, senior vice-president of Jones Lang LaSalle's energy and sustainability services business, "not everyone is aware that the tremendous advantages of today's affordable smart building management technologies easily justify the cost".



Basic concept of the Fujisawa sustainable smart town, Japan (Source: Panasonic)

Smart meters

Looking for smart users

Smart Grids, smart cities and smart buildings rely on the proper and reliable transmission, distribution and use of energy resources. This requires usage data to be exchanged between the power utilities and end users in real time to ensure proper and stable supply. So-called smart meters that use a communications network to send electricity consumption data to utilities form a central component of the Smart Grid.

Smart meter (Photo: E-Talk, CBC – SALU, Khairpur)

Measuring electricity consumption

Soon after electricity was introduced on a commercial basis it became necessary for utilities to measure their customers' consumption (in kWh) in order to be able to bill them. This meant the introduction of specially-designed meters, as early as the 1890s. Most meters in use today, whether electromechanical or electronic, fulfil the same purpose, although some significant improvements have been made. These include variable rate options, which allow utilities to charge customers according to their consumption during peak and off-peak (cheaper tariff) hours, or automatic reading that transfers consumption and other data to the utilities without having to resort to physical reading. A drawback of these meters is that customers are usually billed according to estimates based on past or predicted consumption.

Modernizing the grid infrastructure

There is now an urgent need to enhance existing or install new infrastructure for every part of the energy delivery system as well as to understand consumption patterns better. Reasons lie with an increase of electricity consumption in developed and developing nations, a growing concern regarding the security of energy access, the impact of fossil fuels on our climate, and the need to integrate more sustainable sources of energy. Smart Grids are the key to addressing many of these challenges. They will provide the automation necessary to manage all the resources by improving usage, minimizing waste and delivering real-time information to both providers and consumers. Smart meters, which electronically track and transmit real-time electricity consumption data and additional information to utilities, form an essential part of grid modernization in general and of Smart Grids in particular.

Two-way communication

Smart meters have many more features than traditional electric meters, in particular in-built two-way communication. They can transmit detailed information on usage constantly, and can also receive information remotely from utilities.

The two-way communication option is important for the future as many users become so-called "prosumers", that is both energy producers (for instance, via home photovoltaic installations) and consumers. Smart meters will help measure the amount of power these prosumers feed back into the grid.

Smart meters will also prove valuable as the share of intermittent renewable energies in our general energy mix increases and as EVs (electric vehicles) are introduced on a large scale. In addition they offer real time record and billing based on actual consumption rather than on estimates.

Smart meters can also be used to offer prepaid services, as many customers have become used to "pay-as-you-go" mobile phone credit and regard it as an efficient way of cost control. Prepaid solutions based on smart metering technology are the ideal solution for students or employees who spend long periods away from home and therefore may find long-term contracts impractical. "Eventually, you will be able to buy electricity credit using the ATM, just like you do for your mobile," says Steve Cunningham, CEO for UK and Ireland of Landis+Gyr, a major industry player in metering solutions for electricity, gas, heat/cold and water measurement.

Finding smart users

Introducing Smart Grid solutions and equipment such as smart meters may sometimes prove difficult. Domestic users, unlike commercial or industrial users, often cannot see the benefits of smart meters. Some may even be downright hostile towards them, believing that smart meters might be used to spy on them or to switch off their appliances.

A September 2013 study for Smart Grid Canada found that filling the "knowledge gap" helped consumers become much more receptive to Smart Grid concepts.

Some countries, for example Sweden, have already achieved 100% penetration of smart electric meters in homes (in June 2009) through compulsory legislation.

Many users become "prosumers" – they are both energy producers and consumers

Others have chosen to encourage rather than force consumers to convert to smart meters.

In essence, smart meters will help utilities lower their costs by eliminating the need to physically check meters. Some utilities now charge monthly fees when employees have to come to the home to check a meter as a measure to motivate consumers to adopt remote metering.

Huge and growing global market

As many countries move to introduce Smart Grids the global market for smart meters is experiencing a dramatic growth. A 2011 MarketsandMarkets report forecast that the global smart meter market would expand from USD 4 380 million in 2010 to 15 260 million in 2016, growing at a CAGR (compound annual growth rate) of 20.8% over the period.

The trend extends to many countries. In the US smart meter penetration reached close to 25% by the end of 2011 and the target is to install 65 million additional units by the end of 2015. The UK announced plans to introduce 30 million smart meters at a cost of USD 18 billion starting in 2015. Germany, Spain and France, among others, have similar plans.

In Asia, Zpryme research and consulting estimates that the total installed base of smart meters in the region will exceed 467 million in 2020.

Smart Grids rely on the proper and reliable transmission, distribution and use of energy resources

IEC smart involvement

Many IEC TCs (Technical Committees) and SCs (Subcommittees) are involved in Smart Grid applications. With specific regard to smart metering, two IEC TCs are the main proponents: TC 13: Electrical energy measurement and control, which notably develops "Standards in the field of a.c. and d.c. electrical energy measurement and control, for smart metering equipment and systems forming part of smart grids", and TC 57: Power systems management and associated information exchange.

The accuracy of electric meters is obviously extremely important and is a parameter which manufacturers are keen to stress. Major meter producers, such as Landis+Gyr or GE use their compliance with the IEC 62056 series of International Standards as a commercial argument in their technical and marketing literature to promote the accuracy of their products. Other IEC TC 13 series of International Standards (IEC 62052, IEC 62053, IEC 62054 and IEC 62058) concern additional aspects relevant for smart meter features, such as *tariff and load control or general and particular requirements, tests and test conditions*.

For its part TC 57 has developed the IEC 60870-5 series that covers *Transmission protocols for Telecontrol equipment and systems.*

With increasing global trade, many of the elements of Smart Grids, including smart meters, are now sold beyond national borders. All major manufacturers use IEC International Standards to achieve interoperability and ensure that devices can be installed in a wide variety of markets.

Testing and certifying

IECEE PSC Working Group 2A on Smart Grid

Aliyah Esmail

IECEE has a working group that is trying to satisfy the needs of industry in terms of Smart Grid. It is looking to help industry ensure that its products are safe, of high quality and interoperable.

Smarter and more efficient

The Smart Grid is a way for information and communication applications to link to energy generation, transmission and distribution technologies.

Consumers and industries throughout the world are preparing for the Smart Grid by developing devices and pieces of equipment that consume much less energy than ever before and that can be integrated into the system.

IECEE, the IEC System of Conformity Assessment Schemes for Electrotechnical Equipment and Components, has been testing and certifying electric and electronic equipment for many years. It focuses on product safety and, when the Standards require it, it also provides services that help to ensure efficient performance. Now, in response to industry demand, IECEE is working on the Smart Grid.

"I think everyone sees the need to move to smart technologies but the word smart means so many things to so many people so it's hard to align it to a single definition," said Steven Margis from UL, the Convenor of PSC (Policy and Strategy Committee) Working Group 2A on Smart Grid.

Conformity assessment on the Smart Grid

The IECEE PSC Working Group 2A on Smart Grid was created in 2011 to explore the potential and practicality of conformity assessment applications in the fields of the smart home, smart building and smart industry (factory).

When the Working Group was created it started out by trying to leverage the work of the IEC and others around the world on Smart Grid, including SG (Strategic Group) 3 on Smart Grid, which has now become SEG (Systems Evaluation Group) 2. The Working Group went through the IEC Smart Grid Standardization Roadmap, created by SEG 2, and analyzed the Standards it contained to see which could be included in the IECEE System.

In 2009, SG 3 held its first meeting; since then it has provided strategic guidance to all IEC Technical Committees involved in Smart Grid related standardization work. The Systems Evaluation Group keeps abreast of the latest developments and technologies and provides recommendations to address future requirements. An updated version of the Roadmap will be published in 2014.

Standardization acts as the focus

Of the 296 IEC International Standards identified in the Roadmap, 91 have been incorporated into the IECEE and 54 were already in use. They include Standards for electric vehicle inductive charging systems, secondary batteries for the propulsion of electric road vehicles and electricity metering equipment.

"Thanks to the work of SEG 2, we had an excellent foundation to work from," said Margis. "We look forward to continuing to collaborate and leverage the outcome of work from SEG 2 to advance on the additional needs of the marketplace."

Industry needs for their products to be safe and IECEE helps to satisfy this requirement

Margis explained that when it comes to Smart Grids the Working Group is allowing standardization to continue to lay the technical direction and foundation for Conformity Assessment. This will allow Conformity Assessment to deliver a toolkit of services that aligns with industries' conformity assessment needs.

"IEC Conformity Assessment related deiverables are based on the use of Standards so the alignment makes perfect sense. We want there to be good cohesion within the IEC," said Margis.

IECEE Working Group on Smart Grids sees the need for technologies that can be tested and certified

Market driven systems approach

One of the imperatives for the Working Group is to have industry provide input regarding what the marketplace needs so that it can review the IECEE toolkit to ensure deliverables are adapted to meet these market facing requirements. Working Group 2A welcomes additional feedback on the deliverables that will most directly meet market needs regarding Smart Grid.

"The Smart Grid requires that we consider Conformity Assessment as it relates to a systems approach. With the work of IEC Systems Evaluation Groups, such as SEG 2 on Smart Grid, we will be able to more pricisely target the system-based conformity assessment needs of the marketplace," said Margis.

Standards adopted by IECEE include those on electric vehicle inductive charging systems

Global protection for the field of Ex

IECEx conference promotes safety

Aliyah Esmail

The IECEx General Meeting, held in September, created a space in which a range of topics including policy, operational, and technical matters associated with the running of the IECEx Systems and its Schemes could be covered so that global safety could be advanced.

Safety in your neighbourhood

If you are a first time home buyer your real estate agent will hammer in a few truths: you can't necessarily get what you want (the eight room mansion with swimming pool and fountains), but you can still get what you need to live comfortably. Unfortunately, the house that you can afford may come with neighbours in the shape of noisy renters who throw parties on Monday nights. In another scenario you may have to move near an industrial area where Ex risks exist. Your real estate agent assures you that you will be safe. And you are, partly because of the work of IECEx, the IEC System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres.

Key role of IECEx in safety

Ex or explosive atmospheres are not restricted to oil refineries, offshore oil rigs, gas plants or mines. Almost every industry known to mankind encompasses explosive atmospheres

IECEx Management Committee in Fortaleza, Brazil

Attendees of the UNECE Regulatory Workshop at the IECEx General Meeting

through the storage and/or use of flammable and combustible materials, including transportation (every airport in the world is considered an Ex installation through the storage of fuel and fuelling of aircrafts) and of course the gas station where we all fill up our cars, plus many others including sugar refineries, flour mills, grain silos and the paper and textile sectors, to name a few.

From the smallest to the largest piece of equipment in industries in which explosive atmospheres may be encountered, all of them can be tested and certified by IECEx. An IECEx Certificate is like a passport for manufacturers of Ex equipment. It provides clear proof of compliance with International Standards.

IECEx meets

In September, IECEx held its General Meeting in Fortaleza, Brazil. Over 100 experts from 26 countries took part during the week with 30% of attendees coming from industry (manufacturers, end users, regulators and service facilities). This level of involvement by industry in the direct management and operation of the IECEx System and its Schemes is a major element of its ongoing success. The event covered a range of topics and the Management Committee dealt with a 21 page agenda that included 71 individual documents; it recorded 84 formal decisions.

One of the decisions announced at these meetings was that IECEx has the interest and commitment of seven countries that will be holding the IECEx General Meeting every year until 2020. The countries that have volunteered to host include the following:

- 2014: Netherlands
- 2015: Australia/New Zealand
- 2016: South Africa
- 2017: USA
- 2018: France
- 2019: United Arab Emirates
- 2020: Canada

IECEx Executive Secretary Chris Agius talks to attendees at the meeting

UNECE Regulatory Workshop

As part of the 2013 IECEx meetings, the UNECE (United Nations Economic Commission for Europe) organized a day-long regulatory workshop with over 100 participants and representatives from various parts of Latin America.

IEC President Dr Klaus Wucherer, who attended the General Meeting, gave a key note address at the workshop confirming the IEC's support for conformity assessment activities. Dr Wucherer said that the UNECE recommendation of the IEC and IECEx as the world's best practice model for the verification of conformity to International Standards was a positive partnership. This was achieved through the publication of the UNECE's *A Common Regulatory Framework for Equipment Used in Environments with an Explosive Atmosphere*. He also noted that the Framework was now available in English, Portuguese, Spanish, Russian, Arabic, and French.

IECEx will continue to support UNECE's work as it relates to equipment used in explosive atmospheres. At this meeting, IECEx committed to continue cooperating with UNECE in promoting the Framework.

Training Workshop

Every year at the IECEx meetings, there is a tradition of having a dedicated training workshop to ensure that participants are kept up-to-date with developments in the IECEx Schemes and the IECEx Online Certificate System. This year's workshop covered new and updated operational documents including those being developed to cover trade agents and local assemblers.

Safety in industry

Since its creation in 1996, IECEx has set out to create a single standardized way available internationally of conducting tests and certification for Ex areas, providing that this priority is shared by all stakeholders involved. From the neighbourhood gas station to flour refineries, IECEx provides the assurance that equipment has been manufactured to meet safety standards and that services such as installation, repair and overhaul also comply with IEC International Standards on safety. This helps to make neighbourhoods and industries safer.

Malaysia hosts a two day IECEx event in February 2014

To help educate interested parties about IECEx, the IEC National Committee of Malaysia, Department of Standards Malaysia, Ministry of Science, Technology and Innovation (MOSTI), the IEC and IECEx, in conjunction with UNECE, will be organizing the 2014 IECEx International Conference, which will take place on 19 and 20 February 2014.

The two day event will provide a unique opportunity for industries in the region to get better acquainted with IEC International Standards and Conformity Assessment Systems in general and find out how they can derive the most benefit from the IECEx services that cover Ex equipment and systems, repair and overhaul facilities, and certification of personnel competence.

For more information, please visit http://www.iecex.com/malaysia/.

IECQ past, present and future

The best tool for international electronic component certification

Aliyah Esmail

Since it first began, IECQ has been gaining worldwide recognition as the international system for providing independent verification that electronic components, related materials and processes comply with appropriate standards and specifications.

What would a world without IECQ look like?

Electronic components play an ever increasing role in our lives. At home, at work, on the road, in the air, whatever we do, wherever we are, we rely on electronics to make our lives easier and safer, provide better communication and operate in a world that has become global and interconnected.

Imagine if the components in electrical devices didn't work consistently? Equipment would fail or operate intermittently, communications would be unreliable and repair shops would grow exponentially. IECQ, the IEC Quality Assessment System for Electronic Components, helps to ensure that electronic components and associated materials, assemblies and processes work dependably.

"If IECQ had not been formed there would be no international certification system for components and no model for other such systems," said Dave W. Smith, Chairman of the IECQ Management Committee. "It was a first and it was created because nations and their industries wanted IECQ to facilitate trade."

In the beginning

In the early 1970s, electronic devices were just at the outset of their development. The Atari and the Merlin Handheld Game were marketed and people seemed fascinated by moving lights and little beeping sounds. Electronic calculators went from being heavy, large and boxy items that lived on the desks of the most affluent to smaller and more affordable items. Apple II was launched in 1977 and by the 1990s the personal computer was a standard item for most middle income households.

In a world, in which electronics industries were growing and starting to flourish, there was a need to have a global electronic component certification system. "At the time when IECQ was being developed, there was a European

system for electronic components but there was nothing on an international level. IECQ was trail blazing," said Smith.

In those early years, from 1971 to 1974, the IECQ Provisional Management Committee prepared the Basic Rules and Rules and Procedures of the organization. In September 1974 the IEC Council agreed to form IECQ. By 1976 IECQ had also developed a management committee, known as the CMC (Certification Management Committee), which was open to all IEC National Committees that chose to join the System.

IECQ was officially operational on an international basis as of 1 January 1982.

Merger between CECC and IECQ

To ensure that everyone was on-board and heading in the same direction, the CENELEC (European Committee for Electrotechnical Standardization) CECC (Electronic Components Committee) began to negotiate a merger with the IEC between CECC and IECQ. These negotiations started in 1998. In April 2003, at the CMC meeting in Guangzhou, China, a formal merger was agreed upon with the creation of IECQ-CECC. The name reflected the fact that it was a merger, not a takeover. In 2005 the Management Committee simplified the name of the System to IECQ.

Creation of Schemes

The work of IECQ is based on its five schemes and their programmes.

- IECQ HSPM

The first scheme was created in 2005. The IECQ HSPM (Hazardous Substances Process Management) Scheme was designed to evaluate equipment manufacturers' and related organizations' processes for compliance with QC 080000, which is an IECQ specification.

IECQ HSPM provides the requirements used to demonstrate to the international market-place that the organization has developed, documented, and implemented processes for managing the production, selection and use of electronic components, assemblies, processes and related materials in accordance with customer, local, national and international hazardous substance-free requirements for its scope of activity.

- IECQ ITL Approval

IECQ ITL (Independent Testing Laboratory) Approval is available to independent testing laboratories required to carry out tests in support of IECQ activities within the IECQ System. The approval covers the type of tests to be carried out, the component ranges to be tested and the facilities available, and exceeds the relevant requirements of ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories.

In order to gain approval, an independent testing laboratory must demonstrate that its organization and facilities comply with IECQ requirements for the competence of staff and adequacy of testing facilities, and for performing their functions under the IECQ System.

- IECQ Avionics Scheme

The Scheme is designed to evaluate commercial, military and aerospace (avionics) equipment manufacturers' and related organizations' processes for compliance with IEC/TS 62239-1, *Process management for avionics - Management plan - Part 1: Preparation and maintenance of an electronic components management plan*, as well as IEC/TS 62647-2, *Process management for avionics - Aerospace and defense electronic systems containing lead-free solder - Part 2: Mitigation of deleterious effects of tin,* IEC/TS 62668-1, *Process management for avionics - Counterfeit prevention - Part 1: Avoiding the use of counterfeit, fraudulent and recycled electronic components,* IEC 62396-1, *Process management for avionics - Atmospheric radiation effects - Part 1: Accommodation of atmospheric radiation effects via single event effects within avionics electronic equipment*, and IEC/TR 62240-1, *Process management for avionics - Electronic components capability in operation - Part 1: Temperature uprating.*

- IECQ AC Scheme

The AC (Approved Component) Scheme may be applied to electronic components, products, related materials and assemblies for which a technical standard or specification exists or a client specification has been accepted for use in the IECQ system. This may cover, but is not limited to: silicon wafer slabs, integrated and discrete electronic components, connectors, printed wiring boards and components / products / materials that assist in the construction, installation and use of electronic components.

Organizations that hold IECQ Approved Components Certification demonstrate to the international market place that their organization and facilities, through testing and other verification criteria, comply with the requirements of the IECQ System and the relevant declared technical Standards and Specifications for their scope of activity. Components, products, related materials and assemblies produced within the defined scope of activity of the IECQ Approved Components Certification are recognized as IECQ certified, and can be released with a Declaration of Conformity, providing confidence that the components are produced using manufacturing processes that have been successfully assessed and are under the constant scrutiny of an independent, internationally accepted IECQ Certification Body.

- IECQ AP Scheme

The AP (Approved Process) Scheme may be applied to any process which affects the conformity or compliance of electronic components that relate to assemblies or services. This may cover, but is not limited to: product engineering, printed wiring board manufacture, electronic component manufacturing, printed circuit board assembly, electro-static discharge controls or even supply chain management.

Additionally the electronic components industry relies on, as a part of its manufacturing infrastructure, a supporting industry of organizations providing a wide range of specialized services, processing and manufacture of piece parts and material. The IECQ AP Scheme permits such organizations to certify their specialized services or processes under the IECQ Approved Process Scheme.

IECQ future certification opportunities

The IECQ Schemes help facilitate trade, reduce industry costs and eliminate duplication of assessments because certificates are recognized globally in the member countries. This means that once a device is tested under a recognized certification body the certificate is valid everywhere, making it highly valuable. It also provides those components, processes and materials that are certified potential to access international markets.

Today, IECQ is expanding its offerings through CAP (Counterfeit Avoidance Programme), AQP (Automotive Qualification Programme) and anexpansion of the Avionics Scheme.

In the future it is possible that IECQ will have an AQP-equivalent for railcars or that other existing Schemes will be allowed to include components that are not used in electronic devices.

"We now have new certification offerings which were never on the horizon when IECQ was born," said Smith. "Initially, it was purely electronic components and certification testing that was offered but as the System has matured and developed we are considering a broader scope."

New Chairman and Vice Chairman of IECQ

New Chairman of IECQ

Marie-Elisabeth d'Ornano has been the Deputy Director for Certification at LCIE France Bureau Veritas since March 2013. She joined LCIE France in April 2005 and was responsible for the following markets: transportation, aeronautics and defense. She has a Masters in Engineering from ENSEEIHT, the University for Electronical Engineering, Electronics, Computer Science, Hydraulics and Telecommunications in Paris, France and a Masters in Management of Technology and Innovation from the University Dauphine, Paris, France.

She will be starting as Chairman of IECQ on 1 January 2014.

Marie-Elisabeth d'Ornano will begin her term as Chairman of IECQ in January 2014

Dr Young-Kwon Chang will being his term as Vice Chairman in January 2014

New Vice Chairman of IECQ

Dr Young-Kwon Chang has been Vice President and Director General of the Planning and Coordination Division of the Korea Testing Laboratory since January 2008. He started with the Korea Testing Laboratory in 1999 and has worked in a number of senior and managerial positions including Manager for the Industrial Facility Safety Analysis Team, and Director of the Reliability Evaluation Team. He has a Masters in Mechanical Engineering and a Ph.D. in Mechanical Engineering and Material Science from Kyung Hee University in Seoul, Korea.

He will be starting as Vice Chairman of IECQ on 1 January 2014.

Dave W. Smith steps down as Chairman of IECQ

Dave W. Smith will be ending his 10 years (three three-year terms + one extra year) as Chairman of the IECQ Management Committee on 31 December 2013. Since 2004, the year Smith began his tenure, IECQ has developed its activities tremendously to become a truly global certification system recognized by the electronic component industry. As Chairman of the Management Committee, Smith represented IECQ at many events, conferences, and trade shows. He also has regular contact with IECQ members, customers and suppliers. He was instrumental in establishing the IECQ CAG (Chairman's Advisory Group) which was the predecessor of the IECQ Executive Group of which he will remain a member.

Dave W Smith will finish his last term as IECQ Chairman on December 31, 2013

The move to Systems Engineering

Transitioning from component to system thinking in the standards and conformity community

Manyphay Viengkham, IEC 2012 Young Professional Leader

The need to evolve

There is no question that technology is rapidly evolving and with it comes the growth of existing and new systems. The way we think, design, develop, build and maintain the infrastructure and systems around us has to evolve with the technology. This calls for a transition from a component to system mentality, especially in the standards and conformity assessment community.

The transition is not a simple, overnight change; rather it is a culture change that involves the way individuals think, organizational strategy and approaches, guiding leadership, understanding emergent properties, having the appropriate supporting system tools, and lastly, an organizational structure that is adapted for these changes.

Defining systems thinking

Implementing a systems thinking organization starts at the individual member level. Systems thinking has varying definitions but ultimately it comes down to the same core concepts. As Peter Senge defines it, "Systems thinking is a framework for seeing interrelationships rather than things, for seeing patterns rather than static snapshots. It is a set of general principles spanning fields as diverse as physical and social sciences, engineering and management." [Peter Senge, The Fifth Discipline]

Manyphay Viengkham during the IEC Young Professionals workshop 2013 in Delhi

In standards development it means understanding how the components of interest fit into the big system structure. It requires understanding the interrelationship between other components from a physical/electrical point of view, as well as information flow and system behaviour change. From a conformity assessment perspective, it also requires understanding how the life of a standard evolves as changes occur at the component and environmental technology surroundings levels. Most importantly, system thinking is the understanding of emergent properties which is described in more detail later.

Developing standards and ensuring conformity requires not only system thinking but a Systems Engineering strategy which provides a systemic and holistic approach across the complete lifecycle of a system.

A Systems Engineering approach

The first step in a Systems Engineering approach is to develop a defined set of objectives and road map. What does the system need to accomplish or fulfil? Typically the second step is to break down the goals into granular and tactical system- and component-level requirements. From a standard development perspective, it means understanding what standards are required to enable such system goals. During the design and development stage of creating a standard it becomes important to understand how the standards impact the system as it evolves over the life of the system. This includes analyzing the expected use cases and non-use cases.

Testing the new approach

After design and development, standards and their application should be tested in various scenarios at a component/interface level and from an end-to-end system perspective. Once these systems are tested they go through a deployment and conformity stage which plugs the system into a larger system of systems and hence the emergence of new system properties. These new system properties are typically unexpected during the design and development stage of the standard development. As mentioned previously, it becomes essential that the standard community identifies these emergent properties and understands the relationship between the set of standards that were put in place and how they are interrelated with the emergent property. This systems approach becomes an iterative process that involves constant feedback between the different processes.

Leadership's vital role

Within every organization, leadership's role is crucial in this change process. As mentioned, the initial step in systems engineering is understanding the desired system goals and objectives. Typically this is the role of the leadership team who develops the system objectives and roadmap with a defined strategy. They also provide the vision and concept of operation of the system which includes the defined scope of the system. Clearly identifying the boundaries of the system and its internal components is just as critical

The component approach needs to evolve to a systems approach...

as defining the system goals. A system that is either too widely or too narrowly defined can lead to a team working on standards where the objective is lost in the system – because it is too large or the desired system property is not obtainable because the system is too constrained.

Big data and emergent behaviour

The value of a system is in its emergent behaviour or property. These emergent aspects are not characteristics of any one component but arise from the combination of one or more components. Emergent properties are not easily predictable especially with large complex systems that are also exposed to other systems. Component or small system behaviour is easier to predict because the variables and scenarios are manageable. With large complex systems there has to be a new means of analyzing huge amounts of data and understanding the relationship between the data points.

This new computing approach is commonly referred to as "Big Data". Microsoft describes this as "the process of applying serious computing power—the latest in machine learning and artificial intelligence—to seriously massive and often highly complex sets of information." Large technology and data companies like Google, Oracle, and IBM have practiced this concept for years. They have the resource and understanding to mine out valuable information about systems which include human and machine behaviour data points.

Tools of the systems trade

In order to support a "system focused" organization, the right tools also need to be in place. The tools should provide system thinkers with means to collect and analyze system information down to its granular component level but also provide holistic view of the larger system. In order to provide a holistic view that cuts across multiple components and verticals, there needs to be a system library which contains a common set of definitions whether it be components, requirements, functions, architecture, etc. The tools should enable collaboration between multiple component focused groups.

Structural support

Last but not least, an organization transforming into a systems thinking entity needs to have the proper organizational structure, a structure that embraces system thinking across the various silos. In some organizations there are centralized system teams that provide the complete end-to-end system requirements and guidance to the different component teams. There are also de-centralized system teams that are embedded within the different teams and provide such guidance within the team itself. There are various pros and cons but in either approach it is important for every member to have the systems thinking skills.

In summary, transitioning to a "system focused" organization is not an easy overnight task. It requires a big culture change initiative that is implemented over the course of years. Changes in the way individuals think, the strategic approach, leadership, understanding, tools and organizational structure.

About the author

Manyphay Viengkham, from the United States, is a senior systems analyst at General Electric Energy. Her current role is to develop and analyze technical requirements for Smart Grid software as a service for customers, and to architect solutions based on technical requirements and stakeholder needs. She has undergraduate degrees in computer science and biochemistry, an MBA and is completing a Masters in Applied Systems Engineering. Viengkham was elected as an IEC 2012 Young Professional (YP) Leader at the IEC YP – 2012 workshop in Oslo.

...which looks at how the various elements are interrelated, to give the big picture

Standardizing Supply and Demand Management

A multidisciplinary challenge in a complex context with many options

Frens Jan Rumph, IEC 2012 Young Professional Leader

Coordination of distributed generators, loads and storage – also called supply and demand management – can play a key role for the challenges that the power system is facing. As this ecosystem is complex with many different types of entities which need to collaborate, standardization has clear benefits. However, in order for it to be a success, it must be embraced – that it is an effort which requires a multidisciplinary approach. Moreover the standards must be designed to be robust against changes in the laws and regulations structuring the power utility sector. Finally they must be built for change, to cater for innovations in this still rapidly evolving field.

Supply and Demand Management, a key piece in the energy puzzle

Climate change, growing populations and electrification of energy use, cost efficiency plus many other factors cause decision makers, engineers and researchers to rethink the power system. It has to support generators with random output, distributed energy resources and new loads such as electric vehicle chargers, electric heat pumps, etc.

Frens Jan Rumph during IEC Young Professionals workshop, Oslo

In this new era, keeping the balance between demand and supply, as well as using transmission and distribution capacity as economically as possible, without overloading, are major challenges. One potential piece in this puzzle is intelligent management of (distributed) supply and demand – or in other words: the integration of these new users of the power system into power markets and schemes for balancing and protection. International standardization of aspects such as interfaces, performance and safety in this field can provide many benefits. However, this endeavour is not without challenges. Understanding and recognizing these is a step towards success.

Embrace a multidisciplinary approach

The fundamental challenges to be solved with SDM (supply and demand management) are electrotechnical in nature. However, managing loads and generation at locations which are several orders of magnitude greater than today, requires massive online distributed optimization systems and communication infrastructures. Moreover, the flexibility used in SDM deployments originates from commercial buildings, homes, industries and other 'grid users' that do not have power system operations as their main task. This requires careful design of control and compensation strategies.

While there is no fundamental incompatibility between electrotechnical, ICT, and socio-economic design principles, those who practice them, clearly have different backgrounds and 'languages'. When developing standards in this field, all these different viewpoints need to be covered – from the business processes and services which need to be supported by the system under consideration, to the information exchanged, the electrotechnical behaviour, etc. More importantly, their interrelationships should be clearly defined.

Cater for variations

While from an electrotechnical perspective, the energy conversion chain shows large similarities throughout the world, the way the power utilities sector is structured varies greatly between countries. It ranges from vertically-integrated government-owned power utilities, to very liberalized markets with possibilities for competition on a range of services.

SDM and Smart Grid

Moreover, SDM is a Smart Grid application area which causes shifts in which organizations take on which roles, the introduction of new roles and the entrance of new players. As such, it has the potential to fundamentally change the structure of the power utility market/sector. As SDM can be deployed in various use cases, from local grid oriented optimizations, to commercial portfolio optimization, its standardization touches many elements in the power utility vertically. A major challenge in the standardization of SDM is its robustness to changes in the market structure.

Modelling the most fundamental roles (stereotypes of parties) in the context of SDM is a key tool in ensuring this. As an example: introducing a simple single interface between the power system and buildings is a major barrier for adoption that is waiting to happen. In practice there will be market structures where many different parties aim to use SDM but 'sharing an interface' is not straightforward, if possible at all.

Intelligent management of distributed supply and demand is one potential piece in the puzzle

Large solution space, design for change

Standardization, setting a norm, requires consensus on subject matter. In the case of SDM it is not necessarily clear what this subject matter is. Even if the requirements (from the various viewpoints mentioned before) are clear, there still is a tremendously large solution space.

Introducing a time-dependent tariffing system or direct load control are straightforward options. However, many new techniques are being developed and experimented with, some more mature than others. Examples include introducing trade mechanisms (transactive control) to smaller consumers and producers, (simplified) power services being provided by new players, etc. Bear in mind that these are just categories in the solutions space

SDM and design for change

All in all, the SDM application area shouldn't be considered mature. At the same time, the need for SDM solutions is there and waiting for the best solutions to emerge simply does not suffice. Two things need to be balanced from this perspective: 1) standardization of those types of solutions which are promising on the short term; 2) without hampering the uptake of future innovations.

On this point an important anti-pattern is tight-coupling. For example tight-coupling between the SDM approach (from a conceptual point of view) to lower layer communication protocols. Another example is the tight-coupling of the interactions between 'actors' in the SDM approach (e.g. expressing a bid in transactive control) and the actual operations of the energy resources (loads, generators, storage).

In other words, simply put, design for change.

SDM is a Smart Grid application which can cause shifts in roles

About the author

Frens Jan Rumph is a researcher and consultant in the field of IT and Smart Grids at TNO with a background in computer science. His main expertise is in architecture, algorithm and protocol development for ICT intensive service delivery architectures and data infrastructures. Supply and demand management systems, new energy services and their operation and management is the application area he focusses on. He participates in national and international standardization of communication and information specifications for Smart Grids and Electric Mobility. He is a member of the Dutch national mirror committees of IEC TC 57 and TC 69, CENELEC TC205 and also of the 'methodology' working group of CEN, CENELEC and ETSI's Smart Grids Coordination Group. Rumph was elected as an IEC 2012 Young Professional (YP) Leader at the IEC YP – 2012 workshop in Oslo.

Profile: Dr Bronwyn Evans

CEO at Standards Australia

Dr Bronwyn Evans talks about why standards help industry

Aliyah Esmail

In a world that is technologically fast paced, Dr Bronwyn Evans, the new CEO at Standards Australia, is focusing on standards that can help innovation thrive.

The decision to become an engineer

e-tech: When you were in high school, what made you decide you wanted to be an engineer?

Evans: One of my motivations for the career that I chose was that it was the best match for my interests in math, physics and chemistry. I was the only woman in my class so things have become better since then. Now I have a BE (Elec) and PhD in Electrical Engineering from the University of Wollongong in the field of industrial automation.

e-tech: Why did you decide to support Robogals?

Evans: In Australia, which is similar to other developed economies, the number of women in engineering is in the order of 10 to 12 percent. In the Australian education system young women drop out of science, math and engineering fairly early in their secondary [high school] education. So I am the Chair of the Advisory Board for Robogals [an international student-led organization that aims to encourage more girls to make engineering their career].

Robogals has two significant objectives: one is to excite and encourage girls from 10 to 14 to continue with their involvement with math and science to understand just how much fun it is; and the other is linked to opportunity for young women in university to take up leadership roles in the Robogals organization. I see them as such an inspirational group of young people who set up a scheme out of an idea, out of a dream and made it real. To the extent that I can support them in what they want to achieve and help them continue to do the fantastic work they are, I think it's absolutely worthwhile.

When I was in school the number of women was around three percent and now it's 10 percent so there have been small changes. It's a puzzle for everyone why girls are not more interested. I don't think there is any good reason. I think part of it is that engineering has an image problem. It's seen as not a very glamorous place to be, if you pick glamour as an important criterion.

It's a range of things that affect girls' choices. I think it is within the education system. Young peoples' parents may not understand what engineering is. Engineers can be quite shy of taking public positions so they're not in the media and they're certainly not in any television shows that people might watch for entertainment. I think knowing that engineers are involved in all of the cool apps that we use would be a surprise to a lot of people.

Impressed with global reach

e-tech: Tell us a little about your work with the IEC, especially the work that you did in the early days of Conformity Assessment.

Evans: When I was with Standards Australia as a Project Manager in the late 1990s, I had the opportunity to attend a number of IEC CAB [Conformity Assessment Board] Council meetings as the Australian Delegate and to attend the IEC plenary meetings in Delhi and Singapore.

At that time, we were setting the framework for that whole scheme. It was a great opportunity to work with leading economies to figure out what was the right way to set-up the conformity assessment scheme and the conformity assessment board. It was a very important time to be a part of the development phase.

I recall being impressed with the expertise and depth of commitment of the delegates from all over the world.

Keeping up with advances in technologic innovation can include partnering with research institutions to stay on top of the trends

This experience inspired me to become an active promoter of the importance of standards.

Standards are the seed

e-tech: How long have you been working with International Standards?
Evans: As an engineer I have been using internationally aligned standards right from the start of my career with the Electricity Commission of NSW. At the Commission the specifications for new equipment included performance and testing requirements to international standards. More recently at Cochlear Limited we complied with the requirements of IIEC 60601-1 ed3.0, *Medical electrical equipment - Part 1: General requirements for basic safety and essential performance*, as well as many others.

Innovate freely

e-tech: Given your background as an engineer, what do you hope that Standards Australia can do to help fellow engineers?
Evans: Innovation is such an important part of industry. You get a good understanding of the processes and just how interesting it can be working in innovation. Standards give your engineers, technicians and managers the chance to focus on the creative side. Standards take away the need and the time it takes to set-up processes so that they can take advantage of industry and international best practice. They can focus on the parts that are unique to their business. There is a nice link between innovation and standards for that reason.

I want to ensure Standards Australia excels in the provision of contemporary, up-to-date and internationally aligned Australian Standards, to provide the engineering profession with the best available technical knowledge. Armed with this knowledge, Australian businesses will be in the strongest position to compete globally, innovate, and grow market-share.

We also want to educate in the broadest sense. We're talking to governments about how standards can help small to medium size enterprises. We're giving companies access to world's best practice so that they can be as efficient and as effective as possible and then focus on the innovation.

Linking innovation and industry

e-tech: In your new role as Chief Executive Officer of Standards Australia, what do you see as your priorities?
Evans: Standards Australia is in great shape. We have an excellent leadership team and wonderful, dedicated staff who are excited about our role in the national and global economy. I'll be very focused on maintaining and advancing this position. I want to enhance our Young Leaders Program, which is about developing the next generation of standards development commitment members. I'm also keen to further develop our links with industry, especially the leaders of industry, to ensure we are continuing to support the private sector with the tools we need for a strong, modern, competitive economy. Equally, I will be focusing my efforts to ensure our partnership with governments at all levels continues to advance innovation through a shared understanding of the value of Australian Standards.

Standards must reflect real needs

e-tech: What are some of the challenges that Standards Australia faces?
Evans: We are in a competitive and fast-paced region of the world with rapid advances in technologic innovation, so we have to make sure we are keeping pace with that change. This may include partnering with research and academic institutions to stay abreast of the technology trends. We have to ensure our standards portfolio reflects real needs in the community and the marketplace. So we will never grow complacent, despite our strong position today.

With music in the background

e-tech: If there was only one thing that you wanted people to know about you, what would that be?
Evans: I enjoy classical music. Ever since I was about 6 I learned piano and I now find it a wonderful relaxation. If I'm doing things I prefer to have classical music on in the background. I find it does lots of things. It's calming, it's exciting, and I guess the language of music speaks to me at different times.

Standards give engineers the chance to focus on the creative side of their work

World Smart Grid Forum provides real-life solutions

Hosted by IEC, State Grid Corporation of China and VDE

Results & Recommendations from the World Smart Grid Forum...

Janice Blondeau

Hundreds of energy leaders and experts from Asia, Europe and the Americas gathered in Berlin, Germany, on September 24-25, at the World Smart Grid Forum to help shape the path towards strong Smart Grids, Smart Communities and Smart Cities. Immediately after the event, a Results & Recommendations document was issued so that decision-makers, management, experts and Smart Grid communities the world over can benefit from the Forum's real-world solutions.

Leaders in Smart Grids and Smart Cities

The World Smart Grid Forum 2013 was officially opened by Dr Klaus Wucherer, President of the IEC. In his address, Dr Wucherer said that complex, interconnected and interdependent Smart Grid and Smart City systems need technology innovation and also the ability to analyze and crystallize proven success factors, to enable small-scale projects to evolve into broad-scale reality.

In the first keynote speech, Mr Zhenya Liu, Chairman of State Grid Corporation of China, addressed how to develop strong and smart grids for safe, clean and efficient energy development. The strong and smart grid, Liu said, is a powerful platform for energy conversion, efficient allocation and interactive services. It includes generation, transmission, transformation, distribution, consumption and dispatching.

The second keynote speech, *Smart Grid: Horizons–Visions–Challenges–Tasks*, was delivered by Mr Joachim Schneider of RWE Deutschland AG, President of VDE. He stated that Smart Grids cannot be built on a significant scale without major changes in the current framework conditions. These necessary changes will be accelerated and best accomplished by intensifying international cooperation in standardization and research efforts.

Real-world solutions

The Forum was held as a business, regulatory and technical executive perspective because of the importance

...can help shape the path towards strong Smart Grids, Smart Communities and Smart Cities

of capturing both the technical challenges and the decision-making aspects of roll-out of Smart Grids. Forum tracks dedicated to Future electricity grid supporting a low-carbon energy supply and Smart Energy – Visions for the Smart Grid evolving towards smart customers and smart markets provided participants with a highly condensed understanding that can serve as a foundation for real-life solutions. Results and recommendations from the World Smart Grid Forum are available at: http://worldsmartgridforum2013.org.

The World Smart Grid Forum was organized by the IEC (International Electrotechnical Commission), SGCC (State Grid Corporation of China) and VDE Association for Electrical, Electronic and Information Technology.

The IEC Smart Grid Standards Mapping Tool shows standards in regards to their Smart Grid role

Advancing regional and global trade

IEC signs Memorandum of Understanding with Eurasian Economic Commission

The MoU will help smooth electrotechnical products trade by the reduction of excessive regulation...

Janice Blondeau

The recent signing of a Memorandum of Understanding between the IEC and the EEC (Eurasian Economic Commission) aims to smooth regional and international trade, while increasing the competitiveness and safety of electrical and electronic products in the region.

Trade enhancer

Frans Vreeswijk, IEC General Secretary and CEO, and Valery Koreshkov, EEC Minister for technical regulation, signed the MoU which also aims to eliminate excessive regulation in the trade of electrotechnical products – facilitating, for example, the acceptance of certificates issued by the IEC Conformity Assessment Systems.

...and wider acceptance of certificates issued by IEC Conformity Assessment Systems

Valery Koreshkov and Frans Vreeswijk at the Memorandum of Understanding signing

Capacity building

As part of this agreement, the EEC is planning, in coordination with the IEC National Committees, to send experts to participate in IEC work. This exchange of scientific and technological information will also help to establish EEC electrotechnical product requirements and guide relevant technical regulation. All EEC member states are also members of the IEC.

The Memorandum intends to promote further harmonization of the interstate standards (GOSTs) and the national standards of the EEC member states with IEC International Standards.

Important economic tool

Frans Vreeswijk stated, “This cooperation agreement has the potential to become an important tool for the region to further stimulate industrial development, grow international trade and simplify access to global markets.”

With this MoU the IEC also hopes to increase awareness amongst regional industry representatives and academia, as well as grow active participation in its standardization and conformity assessment work.

More about the EEC

The Eurasian Economic Commission is a single permanent regulatory body of the Customs Union of Belarus, Kazakhstan and Russia and the Single Economic Space of the Eurasian Economic Community. The main task of the EEC is to establish economic and technical conditions for the operation and development of its members. The EEC is based on the "the Eurasian Economic Commission" and "Eurasian Economic Commission Regulation" agreement signed on November 18, 2011.

Enabling real solutions to the energy challenge

Janice Blondeau

November saw the COP19 UN Climate Change Conference take place in Warsaw, Poland. Post-COP19 the IEC is urging countries, industry, and civil society to make better use of the real solutions that it offers to help meet the energy challenge and mitigate climate change.

Energy solutions for today

The IEC provides real solutions for today's real energy and environmental issues, through its global platform where thousands of experts from all over the world help build energy efficiency right into products. Practical steps to reduce emissions and to enable the take-up of new energy technologies are also part of what IEC offers in order to mitigate this global issue. The key partner for all actors of the energy sector, IEC also provides most of the technical International Standards for automation, power generation, transmission and distribution, including for Smart Grids and Smart Cities

Real emission reductions

IEC, with participation from 165 countries, provides the globally relevant solid technical foundation for the broad roll-out of the most efficient energy solutions. It provides the measurements, ratings, guidelines and recommendations for systems, devices and components which are used in the generation of energy from all sources, including renewables. In this way IEC helps to increase the reliability and affordability of all technologies, and enables meaningful performance comparisons.

Real access to energy

A multitude of stakeholders collaborated in the development of a series of IEC Technical Specifications for rural electrification, which is an important step to bring energy to remote areas. The stakeholders included government entities such as the US Department of Energy, research laboratories and universities, private industry, and the Global Lighting

Electric motors contribute to major energy efficiency gains. (Image: Apex Drive Laboratories)

The IEC provides real solutions for today's real energy and environmental issues

initiatives of IFC and the World Bank. The IEC is also a partner of the UN Sustainable Energy for All initiative. In bringing the IEC into its network, the UN recognizes that IEC International Standards play a major role in bringing safe and sustainable energy to those who do not have it today.

IEC's contribution includes, for example, IEC/TS 62257-9-5 for stand-alone lighting kits for rural electrification. While solar lanterns have been available for some time, IEC performance-based metrics and rigorous test protocols allows manufacturers to increase their quality, reliability and output while reducing cost. This increases consumer trust and results in the adoption of a safer, more efficient technology.

Real energy efficiency

Energy efficiency is still a major underexploited source of power. IEC efficiency ratings allow manufacturers to demonstrate and compare product efficiency levels and they provide a real-life basis for energy regulations. As well, intelligent automation and control systems and variable-speed motors help ensure that energy is only consumed when and where necessary.

Energy efficiency improvements of up to 30% are feasible right now if we just use already available technologies. Industry accounts for close to 40% of the world's

consumption of electric energy, with two-thirds of this used to drive electric motors. Increasing the efficiency levels of these motors by just a few percentage points, through the application of IEC Standards, has a significant impact on overall energy consumption worldwide. Moreover, with IEC International Standards, best practice energy management is continuously being built into electrical devices, from the start of a product's design. At the point of use this makes all the difference in reducing energy consumption.

IEC efficiency ratings provide a real-life basis for energy saving regulations (NMCandre / 123RF Stock Photo)

Real global relevance

The IEC is a trusted energy partner of industry, governments and international organizations, supporting them in their efforts to meet today's energy challenges. In addition, literally thousands of companies, from small SME's to huge multinationals also participate in IEC work.

Recognizing that there are still many challenges to be overcome to ensure sustainable energy is a reality for all, the IEC remains committed to its role as the organization that helps to keep the lights on.

Strengthen IP – Increase revenue

LSIS relies on strong standardization strategy

Claire Marchand

IEC Global Visions interviewed Dr Ja-Kyun Koo, CEO of LSIS, a global leader in the field of power solutions, automation and green business. In this interview, Koo explains why it is so important for a company to be able to monetize R&D and IP investment and how a standardization strategy can help in this.

Strong standardization strategy for high ROI

Koo explains that technology-based companies have to significantly invest in R&D on the one hand and to find the right balance between protecting their innovations and IP (intellectual property) while building their income and markets on the other. LSIS is successful in both.

LSIS has understood the need to standardize to allow its products to connect and communicate with those that are already in the market place, and also with those that will come later.

Koo says that LSIS creates technology solutions that can be used by many others, adding that the company prefers to have a big share of a very big pie, rather than its own small pie. In his opinion, this business strategy provides the most concrete ROI (return on investment).

Interoperability advances technological development

Koo looks at this from both the technological and the business point of view. On one side, engineers often don't want to make their technology available to others. They fear they will lose their competitive advantage and their ability to make money from their innovation. For him, this is exactly where the problem lies: making sure that other companies have products that can connect to your technology is better for business; it gives them good reasons to build interoperable products and advances further technology development.

When a company makes its technology broadly accessible, it creates a much bigger market. A successful technology will also stimulate competition. However, with a good standardization strategy, focused innovation and a high-quality manufacturing process, companies can achieve a good ROI. The ability to use standardized components in the manufacturing process also lowers production costs. Koo adds that it is not only important to innovate, it is equally important to allow markets to develop.

On active participation in IEC work

"Participating in IEC work allows us to link IP with business" says Koo. He cites as an example the development of an industrial automation technology which became part of the IEC 61158 series of International Standards on fieldbus specifications for industrial communication networks. "Having this kind of recognition not only helps build our business and increases our overall revenue, it also strengthens our IP."

Dr Ja-Kyun Koo, CEO, LSIS

According to Koo, active participation in IEC standardization work offers other benefits, such as the opportunity to learn in advance where technology is moving and the ability to share new technology development broadly. He is convinced that many more technology companies in Korea and elsewhere should take advantage of this and participate actively in the IEC.

Committed to investing more in standardization

Koo, who was a professor before joining LSIS, admits he knew next to nothing about standardization and didn't appreciate its importance and business impact. Only when he became CEO of LSIS in 2009 did he come to understand the major role played by standards in building Smart Grids or power equipment as well as in increasing overall efficiency. At that time Koo was also designated as the private sector member of the Korean Industrial Standards Commission.

Today, Koo expresses his firm belief in the importance of standardization, so much so that several members of his staff now actively participate in IEC work. "I am committed to investing more in this area because standardization will become more and more important. With it we are able to increase convenience and efficiency for everyone.

Innovation brings success

LSIS actively participates in all areas of IEC work that directly impact their business, for example the technologies that touch upon the Smart Grid. The company continuously innovates in renewable energy technologies. Koo explains that LSIS is probably one of the few profitable companies in the field of PV (photovoltaic) installations, with the development of a humidity- and freeze-proof floating solar structure that helps reduce impact on land. With these structures, trees don't have to be cut down to make space for solar farms. Instead these PV farms can be installed on open water and they can double up power generation on lakes behind hydro dams. In warm waters, the installation provides shade that can limit the growth of green algae.

George Arnold, Director of the Standards Coordination Office, NIST

IEC General Meeting in New Delhi, India

The next edition of *e-tech* will summarize much of the 2013 IEC General Meeting proceedings in New Delhi, India.

It will cover the President's address to Council and the IEC activity report presented by IEC General Secretary and CEO Frans Vreeswijk. Further reports will include management meetings such as SMB (Standardization Management Board, MSB (Market Strategy Board) and CAB (Conformity Assessment Board) and an outline of the Council Open Session on the theme "Challenges of power quality". The Affiliate Forum, the Young Professionals and Industrializing Country workshops will complete the table of contents.

Not to forget an extensive photo gallery of the event.

e-tech

News & views from the IEC

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- Managing Editor *e-tech*: Claire Marchand
- Editor in chief: Gabriela Ehrlich

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

3 rue de Varembé
PO Box 131
CH-1211 Geneva 20
Switzerland

T 41 22 919 02 11

Contact: iecetech@iec.ch
For more information visit: www.iec.ch