THE YEAR IN REVIEW

TECHNOLOGY FOCUS
Printed electronics
Cybersecurity
AR/VR trends
Transportation
New ways to deliver healthcare

IEC WORLD
World Smart City Forum

IEC FAMILY
IEC-AFRC fully operational
The sophistication, severity and impact of cyberattacks vary greatly according to the targets but can have catastrophic consequences if critical systems are affected. Printed electronics has already proven a disruptive, yet creative process that allows the production of new low-cost electronic devices. Initially developed for military and subsequently gaming scenarios, VR/AR applications have found their way into many industries. IECRE provides a framework within which to test and certify RE equipment and systems. The ultimate aim of IEC-AFRC, the Regional Centre for Africa, is to become a technical centre that helps coordinate IEC work as the other Regional Centres do. The first World Smart City Forum was held on 13 July in Singapore co-located with the World Cities Summit in the Marina Bay Sands Expo and Convention Centre in Singapore.

The year in review

Issue 06/2016 focuses on the 12 months since the IEC General Meeting in Minsk, Belarus, and highlights most of the technologies and TC work that were featured in e-tech. It provides an update on the IEC Conformity Assessment Systems, the IEC Young Professionals and Affiliate programmes and reviews some of the major events the IEC participated in.

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Message from Frans Vreeswijk, IEC General Secretary & CEO

IEC work impacts all aspects of life. Electricity and electronics are the cornerstone for all economies in developing and developed countries. IEC International Standards together with IEC Conformity Assessment Systems support 12 out of the 17 Sustainable Development Goals (SDGs).

By 2050 urban environments will be home to an estimated 70% of humanity. IEC work for cities provides the technical foundation for electricity access and all the hardware that enables modern transportation, water and waste management, lighting, automation, manufacturing, healthcare or administration. Without this foundation, data collection and modern city management would be impossible.

Electronic and electrical goods now represent 17.7% of total trade value. Parts and subassemblies transit through many countries before they are assembled, shipped and consumed. They are generally no longer the industrial manufacture of a single country. They are now “made in the world”. Your work enables global trade and allows countries and companies to efficiently participate in global value chains or to collaborate to deliver integrated solutions for big societal projects.

Many experts and a large number of our stakeholders will again meet in Frankfurt in October to discuss how to keep the IEC relevant now and in the future. In the meantime I hope you will discover new facets about the IEC in this issue of e-tech.

I thank you all for your work and your commitment and wish you a fruitful General Meeting.
Protecting against the new normal
The IEC plays a key role in protecting against cyberattacks aimed at critical assets

Morand Fachot

In an increasingly connected world, instances of cyberattacks targeting objects, systems, institutions and infrastructure are growing exponentially. The sophistication, severity and impact of these attacks vary greatly according to the targets but can have catastrophic consequences if critical systems are affected. Various IEC Technical Committees (TCs) and Subcommittees (SCs), and SCs of ISO/IEC JTC 1, the Joint Technical Committee set up by the IEC and the International Organization for Standardization (ISO), develop International Standards to protect against these attacks.

No target too small or too big
Cyberattacks targeting individuals and institutions through spam emails, viruses and other types of malware have been known for a long time. Their impact for those concerned may be serious, even catastrophic, and lead to financial losses, but have not resulted so far in a major disaster.

This may not last as critical assets are increasingly targeted and as the range of connected objects and systems keeps growing. As a result cybersecurity is becoming the new normal.

In late 2015, a special report by the London-based Chatham House think-tank identified the risks facing nuclear power plants (NPPs) with dozens of these having control systems accessible through the internet.

During the first half of 2015, at least five airlines, two airport operators and one civil aviation authority have been publicly reported as victims of online attacks, according to a recent International Air Transport Association (IATA) analysis.

Healthcare service providers and insurances have been increasingly targeted by criminals. Between 2010 and 2014, approximately 37 million healthcare records were compromised in data breaches in the US, but in the first seven months of 2015 alone, more than 105 million healthcare records had already been exposed through 153 separate attacks, according to the US Identity Theft Resource Center (ITRC).

Other targets of choice are retailers and institutions that keep financial details of their clients. In a well-publicized case, a cyberattack on a major US retailer led to the theft of the credit card details of an estimated 40 million customers in November 2013. The retailer paid some USD 10 million to compensate its customers and settled for USD 67 million with a credit card company.

Successful attempts at tampering with on-board systems in cars have opened the prospect of out of control vehicles representing a major road hazard. This forced a major manufacturer to recall some 1.4 million vehicles to fix a software vulnerability in July 2015. This incident, and others, also cast doubts on certain aspects of future autonomous cars.

Recently, appliances, such as fridges, and consumer electronics or toys, like dolls or learning toys have been shown to be open to cyberattacks, sometimes compromising the identity of their owners and damaging the reputation of companies that produced them.

Targets and objectives
The perception of which areas are considered parts of a country’s critical infrastructure varies from country to country. For the US government, and increasingly for many other governments, “critical infrastructure
means systems and assets, whether physical or virtual, so vital (…) that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters.” (Executive Order 13636, 12 Feb 2013)

The sectors/systems most at risk include:

- Energy supply (generation, transmission and distribution)
- Financial services
- Industrial controls systems
- Healthcare
- Telecommunications
- IT
- Insurance

The widespread introduction of connected objects and systems in a variety of domains in what is labelled the Internet of Things (IoT) presents a number of risks as security implications are often not given appropriate attention. The risks are particularly serious as regards the potential to target critical assets as these become more and more interconnected.

Cyberattacks have a number of objectives, whose consequences often overlap. They depend on both the targets and the attackers’ motives, such as shared passwords present security risks and must be better managed. Central user account management combined with Role Based Access Control (RBAC) is the perfect solution for managing user accounts and user permissions centrally and efficiently, while still providing a state of the art security solution.

IEC TC 57: Power systems management and associated information exchange, has developed International Standards, such as its IEC 62351 series of Standards on data and communications security. This series of technical security International Standards aims to secure power system-specific communication protocols such as described in the IEC 61850 series on communication networks and systems for power utility automation or IEC 60870-5-104:2016, Telecontrol equipment and systems – Part 5-104: Transmission protocols – Network access for IEC 60870-5-101 using standard transport profile, also developed by TC 57.

More standardization work to protect specific areas and keep industry safe includes Standards prepared by IEC TC 65: Industrial-process measurement, control and automation, such as the IEC 62443 series on industrial communication networks and for security for industrial automation and control systems.

IEC SC 45A: Instrumentation, control, and electrical systems of nuclear facilities, published IEC 62645:2014, Requirements for security programmes for computer-based systems, for the prevention and detection of and reaction to malicious acts by cyberattacks.

The healthcare sector has been increasingly reliant on IT systems for years, with medical equipment dependent on software to operate more efficiently and reliably.

IEC TC 62: Electrical equipment in medical practice, and its SCs develop International Standards for electrical equipment, electrical systems and software used in healthcare. The TC remit is to focus on safety and performance (e.g. data security, data integrity and data privacy), among other aspects.

The shipping industry has not yet been affected by major cyberattacks, but industry bodies see this as highly likely in the future. To prevent this, they recommend taking cybersecurity measures resting on a number of International Standards, many of which,
are being developed by ISO/IEC JTC 1/SC 27: Security Techniques.

For its part IEC TC 80: Maritime navigation and radiocommunication equipment and systems, published IEC 61162-460:2015, Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 460: Multiple talkers and multiple listeners – Ethernet interconnection – Safety and security. This Standard is “an add-on to the IEC 61162-450 standard where higher safety and security standards are needed, e.g. due to higher exposure to external threats or to improve network integrity”.

**Taking additional measures**

Given the seriousness of cyberattacks and the risks they pose to many sectors, the IEC established the Advisory Committee on Information Security and Data Privacy (ACSEC), in 2014. The Committee deals with information security and data privacy matters which are not specific to a single IEC TC. It also coordinates work and provides advice to TCs/SCs on information security and data privacy both generally and for specific sectors.

IEC Conformity Assessment Board (CAB) Working Group (WG) 17 on cybersecurity and IECEE WG 3: Cybersecurity Task Force will also contribute to IEC work on this topic.

The standardization work, conformity assessment and advisory activities carried out across various IEC committees and other groups will contribute significantly to better protection against cyberattacks in countless domains.

**Printing electronics anywhere**

Printed electronics, a fairly new kid on the block, is set to revolutionize industry

**Morand Fachot**

Although a relatively new technology, printed electronics has already proven a disruptive, yet creative process that allows the production of new low-cost electronic devices. It has started transforming the electronics industry and many other domains. This new technology led to the creation, in 2011, of IEC Technical Committee (TC) 119.

**Avoiding confusion**

The expression “printed electronics” may give the impression that the technology has been around for a long time, owing to the production, launched decades ago, of printed circuit boards (PCBs), which are used in computers, TV or radio sets and many other electronic products and parts.

For its part, printed electronics (PE) consists in the creation of electronic devices and components using various printing methods, equipment and material. This technology makes it possible to produce a wide variety of products that can be used in countless applications. It has other advantages, such as a much lower production cost than conventional electronics and it can be applied to flexible or rigid supports (or substrates).
**Wide range of materials**

PE transforms the way electronic devices are made and employed.

Using materials (inks and substrates) that have conducting, semiconducting, non-conducting, electroluminescent, photovoltaic (PV) or other properties, and different printing methods (e.g. lithography, inkjet, or screen printing) allows great design flexibility and possibilities.

Both inorganic and organic materials are used for printed electronics. Organic materials can be found in products such as organic light-emitting diodes (OLED) displays used in televisions sets, computer monitors or mobile phones, and OPVC (organic PV cells).

Innovative materials such as carbon nanotubes allow new or enhanced applications for batteries, new types of solar cells, ultracapacitors and electrical circuits.

Engineers throughout the world use printed electronics to design a variety of components and products, such as thin film transistor (TFT), flexible displays that can be unfolded to make up a large television, PV cells that fit windows or the roofs of cars or innovative and energy-efficient lighting solutions.

In the short and medium term, hybrid systems, combining printed, flexible electronics with building blocks containing classical (silicon) electronics, will be introduced.

**Multiple applications**

PE are already widely used in radio frequency identification (RFID) tags on product packaging to protect against shoplifting, to help managing stocks or to identify items during transport. They are also used in the production of flexible electronic circuits which are widespread in products where space constraints are significant, such as in small consumer electronics devices, e.g. digital cameras, mobile phones, or wearable smart devices (WSDs).

Technologies are being developed that make it possible to print electronic components, such as sensors, transistors, light-emitters, smart tags and labels or flexible batteries, to power flexible and printed electronics, memory, etc.

New printed electronics applications are emerging, opening up possibilities not envisaged before. One such application is in the domain of printed batteries. More than three years ago, US scientists printed a lithium-ion battery the size of a grain of sand that could one day power tiny medical implants as well as other microelectronic devices.

**From research to industrial design and to marketable products**

New technologies in the printed electronics domain are emerging all the time, many are still at the research stage or under development and not ready for commercialization yet.

However, PE are being found in more and more mass-produced items, in particular in the automotive, consumer electronics and pharmaceutical industries, as well as in packaging where smart labels can provide item-level tracking of quality data for goods such as pharmaceuticals and perishable food.

The printed electronics industry currently covers five main areas:

- Lighting, including both OLED and electroluminescent (EL) products
- Organic PV
- Flexible displays
- Electronics and components, including RFID, memories, sensors, batteries and other components
- Integrated smart systems (ISS) that include smart objects, sensors like microelectromechanical system (MEMS) and smart textiles

These areas that see widespread use of PE are already covered by several IEC TCs. This led TC 119 to embark upon a series of liaisons with other TCs and external organizations.

A good example of this is the liaison with IEC TC 47: Semiconductor devices, since many of the resultant products will be hybrid devices, with both printed and conventional silicon-based components being integrated.
Taking the integration model to industry
TC 119 Chair Alan Hodgson stresses that the liaison model used by IEC TC 119 and other TCs is also of interest to industry, as systems integration across multiple horizontal technologies is seen as a significant challenge. Academic collaborators, together with their government and industrial sponsors, are seeking ways to access communities that can add value to individual technologies through integrating components upwards through the value chain. In early February 2016, the liaison structure used within the IEC was presented as a model for systems integration at a conference on Large Area Electronics (innoLAE 2016). The proposition is to build upon an existing IEC community across various technology platforms, so gathering together the stakeholders needed to work on systems integration. The concept seems to be a strong one and worthy of testing on an industrialization project.

Wearable Smart Devices
Hodgson stresses that WSDs are a category of products of high interest to PE. This is a field that provides a very good illustration of a systems integration challenge that requires input from a substantial number of horizontal technologies.

WSDs can be categorized in a variety of classes, such as “in body”, “on body” and “near body”. Of particular interest to the field of printed electronics are flexible electronic components. One example of these would be electronics printed onto textile substrates that are flexible and/or stretchable, giving rise to flexible displays integrated into garments. These could then be integrated into conformable wearable devices that could fit into everyday life in a variety of implementations.

The IEC Standardization Management Board (SMB) has recognized the potential of WSDs and the wide number of IEC TCs that have stakes in the applicable technologies. The response in 2014 was to set up an ad hoc Group, ahG 56, to review pertinent activity in the IEC in this field and to identify the needs for further standardization. The ahG 56 report resulted in the decision to start a Strategy Group, SG 10: Wearable Smart Devices, with the intention to report back to the SMB on strategy options for standardization. SG 10 has been set up with the same liaison model as described above, with representation from semiconductor devices (TC 47), assembly (TC 119), applications (TC 62: Electrical equipment in medical practice, and TC 100: Audio, video and multimedia systems and equipment) and health, safety and environment issues (TC 77: Electromagnetic compatibility, TC 106: Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure, TC 108: Safety of electronic equipment within the field of audio/video, information technology and communication technology, and TC 111: Environmental standardization for electrical and electronic products and systems).

The health and safety aspect is of particular importance as the products will by definition be in close proximity to a human or animal. The substrates and functional materials employed must therefore of necessity be non-toxic and bio-compatible. As smart devices, they are likely to include some manner of wireless connection, so electromagnetic compatibility and safety are also important.

Even this simple overview serves to highlight some of the complex issues around systems integration, emphasizing the need for involvement of the multiple disciplines found in IEC TCs. The IEC is not the only organization looking at WSDs standardization. A Working Group of the Joint Technical Committee set by the International Organization for Standardization (ISO) and the IEC, ISO/IEC JTC 1/WG 10: Internet of Things, is also looking into this area. The challenge is to coordinate all these activities but the potential benefit in facilitating systems integration could certainly make the effort worthwhile.

The way forward
After many years, Hodgson notes, the gap between lab and fab (laboratory project to industrial fabrication) is narrowing at last. Printed electronics is ready for manufacture and integration with other technologies within the IEC family. There are significant challenges with systems integration and the knowledge available within the IEC community could be useful in helping with this, Hodgson says.

WSDs are of current interest within the IEC family. There are similar systems integration challenges within this platform of technologies and PE looks set to play its part in this. These are both fields in which the collaboration activities across TCs could add value to industry.
Electricity drives global move towards greener transport

As populations continue to grow, authorities must find ways to make transport greener and more efficient so that people leave their cars at home.

Antoinette Price

City traffic is increasingly congested and air quality often poor. However, transport systems which rely on full electric power, such as the metro, trams and railway lines, can transport huge numbers of people without causing pollution at the point of use. However, their infrastructure is very costly to build and if a route change is required, this will not be possible outside of the existing rail tracks.

On the bus!

Buses, on the other hand, complement transport systems. They can service all manner of streets and accommodate route changes in the event of obstructions or road works. However, most are powered by internal combustion engines (ICE), burning predominantly diesel which is polluting and can be noisy.

A number of IEC Technical Committees (TCs) and Subcommittees (SCs) produce International Standards used for all existing solutions adopted for the electrification of urban mass transport systems, for example, IEC TC 9: Electrical equipment and systems for railways, which develops International Standards covering “(...) metropolitan transport networks (including metros, trams, trolleybuses and fully automated transport systems)”. Components and systems within these systems are covered by IEC TC 20: Electric cables, IEC TC 22: Power electronic systems and equipment, IEC TC 32: Fuses, and IEC SC 48B: Connectors.

Over the year, e-tech has looked at how technology is changing the transport landscape, whether on the ground, in the air or at sea.

Batteries play major role in full electrification of urban buses

Many cities are beginning to green their bus fleets, but this will take years given the number of buses in some of the fleets (over 21,000 in Beijing, 16,000 in Shanghai or 8,700 in London). The gradual process will be linked to the life of existing buses, and for future ones, depend on the development of cleaner, more efficient technologies.

IEC TC 21: Secondary cells and batteries, develops International Standards for all secondary cells and batteries, irrespective of type and chemistries (i.e. lithium-ion, lead-acid, nickel-based) or application (i.e. portable, stationary, traction, electric vehicles or aircraft). They cover all aspects such as safety, performance, dimensions and labelling, a new battery technology. Chemistry for flow batteries – another potential candidate for large-scale electrochemical energy storage – is now part of the TC remit.

Achieving full electrification will also require new infrastructure, which is not yet available. Before reaching this stage, other hybrid vehicles will be used and run on one of the following systems:

• Hybrid drive with an internal combustion engine (ICE) (diesel, liquid or compressed gas, petrol). Additionally, energy recovered from braking or energy harvesting shock absorbers is stored in energy storage devices, like batteries, ultracapacitors or flywheels. A start and stop function for the ICE allows...
the bus to run on batteries alone, when required. Advantages: low emissions and low thermal cut-off (TCO), i.e. the temperature at which the electrical safety device interrupts the electric current.

- Hybrid drive with fuel cell. Energy recovered from braking or energy harvesting shock absorbers is stored in energy storage devices, like batteries, ultracapacitors or flywheels. Advantages: no emission and low TCO.

IEC TC 105 prepares International Standards for all fuel cell technologies, including for transportation. Since fuel cells can ideally be used as the main power source for all-electric systems in ground vehicles, ships and aircraft, this TC works with a number of other TCs which contribute to standardization of component parts and systems for transport.

Additionally, IEC TC 40: Capacitors and resistors for electronic equipment, develops International Standards for electric double layer capacitors, which are better known as super or ultracapacitors.

**New ways to stay charged**

Except for trolleybuses, which generally take their power from overhead lines, electric buses will need batteries for power. Innovative systems are being trialed, which include charging batteries at end stations and on-road charging, for example through wireless power transfer (WPT).

WPT describes a range of technologies, which enable electric energy to be transmitted to a source of demand without the need for conductive cables or making a physical connection. One of the most developed WPT technologies is magnetic induction. This is being used on some London buses at terminals. Very like the way an electric toothbrush charges without needing direct electrical contact, the bus parks over an induction pad. The induction coil in the ground is matched with one installed on the bottom of the bus and allows the recharging to happen at a rate of 10kW every five minutes.

In Korea the online electric vehicle (OLEV) system being developed for electric transit buses is a cutting-edge WPT. The wireless-charging infrastructure installed under the road charges the batteries of electric buses as they operate over the road.

**Where do EVs fit in?**

Many of us go into a panic when our phones and other devices run low on battery power. We have become so used to the convenience of being connected all the time, which means having access to power sources and time for recharging. It is one thing to run out of phone battery, but what if it happens to your car and you’re in the middle of nowhere?

While electric vehicles (EVs) have the potential to greatly reduce cost in terms of the environment, consumers must first trust their range and battery life if they are to be broadly adopted. In other words, recharging infrastructure must be easily accessible everywhere and the process must not be too lengthy.

WPT, through magnetic induction, is seen as the most promising approach to resolving these issues. Capable of delivering significant power and increasingly rapid charging, it has already been rolled out in the first market-ready EV WPT system from Plugless and is the choice of a number of major auto manufacturers looking to do the same in the coming years. According to a research report, sales for wireless charging equipment for light duty vehicles will grow by a CAGR of 91% from 2013 to 2020. As wireless systems become an integrated part of new EVs, 283 000 units are expected to sell annually by 2020.

IEC TC 69 develops International Standards for road vehicles and industrial trucks that are totally or partly electrically propelled from self-contained power sources, including WPT. All of these are addressed by an IEC TC 69 Joint Project Team, JPT 61980: Electric vehicle wireless power transfer systems, established by IEC TC 69 and ISO/TC 22: Road vehicles. JPT 61980 develops International Standards for WPT.
and deals with issues such as interoperability, specific requirements for communication between EVs and infrastructure and magnetic and electric field power transfer systems.

In addition, for standardization work for batteries used in EVs and electric industrial trucks, IEC TC 21 and SC 21A as well as IEC TC 69 have created the following Joint Working Groups (JWGs):

- IEC JWG 69 Li: TC 21/SC 21A/TC 69 – Lithium for automobile/automotive applications
- IEC JWG 69 Pb-Ni: TC 21/SC 21A/TC 69 – Lead acid and nickel based systems for automobile/automotive applications

Playing with cars
Remember the excitement as a child of riding your first electric go-kart or car at a fair? Over the years EVs for children have expanded to cover cars, various motorcycles, all-terrain vehicles, quad bikes, trucks, tractors and more.

Many car companies licence their designs to toy companies and manufacturers, making toy vehicle features similar to real vehicles. They can contain sound systems, touch screens, electric motors, safety devices, lights, batteries as well as light and touch sensors. IEC TCs and SCs produce International Standards which cover these and other components.

Safety aspects concern the batteries and motors, operation and braking, remote control functions, or possible electrical fires if the wrong charger is used but also seat belts, speed limiters and smart pedals. All of these are guided by International Standards developed by IEC TC 61: Safety of household and similar electrical appliances. IEC 62115, Electric Toys – Safety, is intended for use by children under age 14 and also applies to toys containing lasers or light-emitting diodes (LEDs).

Looking beyond electric vehicles
It may be hard to imagine, but the next generation of energy independent vehicles (EIVs), which rely on the on-board conversion of harvested energy already exists and works, however, they are still too expensive to be introduced on a large scale.

In China, small bus-like EVs powered by solar panels can be bought with or without batteries. They can transport up to eight people and are ideal for tourist resorts. The Swiss Solar Impulse plane recently completed its flight around the world powered by solar panels, and the Nuon Solar, a solar powered car, recently won the World Solar Challenge in Australia.

Just as Formula 1 racing gave the world disc brake and flywheel recovery systems, research into the different ways to harvest energy will most likely benefit future transport and possibly other technology.

Innovative technology cleans up transport on land and at sea

Driverless vehicles – soon a reality or just a dream?

Antoinette Price
Authorities worldwide face the challenge of ensuring improved road safety and providing efficient transport systems to address congested roads and pollution in growing cities. They are also tasked with providing large aging populations and people with disabilities greater mobility.

The place of driverless cars in future urban networks
The fully automated car could be part of the answer to most of these issues, but it does not yet exist. Technological developments still need to be met. Vehicles will gradually connect to the Internet of Things (IoT), so that cars can communicate with roadside infrastructure and other cars, to improve traffic flow and avoid accidents. In recent months however, the news has highlighted some of the technical shortcomings in several incidents involving partly automated cars.

e-tech reported on a meeting organized by the International Telecommunication Union (ITU) and the United Nations

This lithium-ion battery enables optimization of energy generation and consumption
(Photo: Thomas Content, Milwaukee Wisconsin Journal Sentinel)
Economic Commission for Europe (UNECE) at the Geneva Motor Show entitled The future networked car. Vehicle manufacturers, automotive and information and communication technology (ICT) industries, governments and regulators discussed the status of vehicle communications and automated driving.

Key conclusions:

- International Standards will contribute to achieving safer, more reliable vehicles and deal with compatibility issues within complex intelligent transport systems, which in some regions like Europe, go beyond borders.
- Authorities must keep up with technology innovations and respond with more timely regulatory changes if required.
- Car technology must prioritize in-vehicle safety applications to gain user trust.
- Security measures to prevent data breaches and protect personal safety, as well as legal liability and insurance policies, must be established before such vehicles become mainstream.

The advent of self-driving cars is changing the auto industry. As the cars become more like computers on wheels which are increasingly run by software programmes, tech start-ups and traditional car makers are deciding whether to work together or compete. Examples of such partnerships include Volvo and Uber, Toyota and Tata Capital, GM and Lyft, a rideshare company, and Volkswagen and Gett, an Israeli car share app.

The new delivery man or rather machine

The new delivery man could come in many shapes and sizes. As more companies trial automated delivery services, your next online order may be dropped off by a drone or a driverless wheeled vehicle.

US technology research company Technavio predicts that the overall market for mail sorting robots, unmanned ground vehicles and drones that deliver products to customers from warehouses or manufacturing locations will grow to USD 54.07 million by 2020. According to Technavio, the global logistics robots market is expected to reach USD 2.15 billion from 2016 to 2020, growing at a rate of over 32% during this period. These figures are helped by the falling cost for sensors and computing power required by autonomous vehicles.

Though it may seem so, not all this technology is new. For years self-driving vehicles have been operating in warehouses, factories and on dockyards, while fleets of autonomous robots have ferried medical supplies and food around hospitals.

Powered by batteries, the terrestrial carriers being used to deliver small packets are equipped with sensors and location technology to avoid collisions in the street. These types of vehicles, like self-driving cars, contain many common safety requirements, particularly to minimize risks to pedestrians and other vehicles.

Other features include the same electronic stability control, rear- and forward-view camera systems and sensor arrays to transmit data between those systems and a vehicle’s engine. They have transmission, brakes and wireless communication subsystems to communicate with a controller and other vehicles.
Rapid developments in this industry mean that the next generation of autonomous delivery vehicles will likely contain more features that are already being tested in driverless cars. These include GPS receivers to detect obstacles and dangers and detailed maps for navigation. A range of 3D vision guidance systems and electronic sensors comprising laser-surveying systems or Lidars (light detecting and ranging), could scan the road as far as 200 metres ahead of the vehicle.

Delivery robot vehicles delivering mail or food items which can interact with customers using a smartphone app are being trialed in Europe, the US and Australia.

Once issues such as uneven footpaths and theft are resolved, this type of delivery could reduce time and cost as well as being cleaner than, for example, a dispatcher on a small motorcycle who brings the pizza to the door. Same day deliveries may become possible if drones are used.

**Cleaning up the murky waterways**

Like other transport industries, shipping must also consider the environment and make its operations and infrastructure as green as possible. While electric propulsion has been used on waterways since the 1880s, it was overtaken by more efficient internal combustion engines in the early 20th century. Today, it is making a comeback, thanks to advances in technology and proving to be much cleaner than other sources.

**New batteries aboard water transport**

One of the greatest challenges of going green for shipping has been ensuring reliable power supplies, both in terms of plug-in charging systems for moored ships, as well as the range and recharging times for battery-powered vessels.

Swedish Echandia Marine makes the case for using electricity only, to drastically reduce operating costs. It bases its estimates on the relative costs of diesel and electricity in a number of European countries. It cites an energy efficiency of 85-90% for fully electric ferries against 30-35% efficiency for a diesel engine. Advanced batteries, innovative charging systems, the cost of diesel and maintenance versus the cost of electric ferry maintenance contribute to this argument. Electric ferries also reduce carbon dioxide, nitrogen oxide and particle matter emissions to zero.

The Movitz ferry uses super-advanced batteries with different chemistries, such as nickel metal hydride (NiMH) 180 kWh and advanced charging systems. These enable charging in 10 minutes and last for one hour. When inductive charging is introduced, the recharge time could take as little as two to three minutes.

Many components of boats are covered by the work of a number of IEC TCs including batteries, electric cables for ships and mobile fixed offshore units, rotating machinery used in electric motors, lamps and related equipment, and solar photovoltaic (PV) energy systems. IEC International Standards also comprise general performance and safety aspects, and specifically for the heating, ventilation and air conditioning systems.

A number of IEC TCs and SCs develop International Standards which are helping to revive electric propulsion. The worldwide adoption of IEC/ISO/IEEE 88005-1:2012, Utility connections in port – Part 1: High Voltage Shore Connection (HVSC) Systems – General requirements, is one example. This International Standard was a collaboration between IEC TC 18: Electrical installations of ships and mobile and fixed offshore units, IEC SC 23H: Industrial plugs and socket-outlets, together with ISO/TC 8/SC 3: Piping and machinery, an SC of ISO/TC 8: Ships and marine technology, and the IAS Petroleum and Chemical Industry Committee (PCIC) of the Institute of Electrical and Electronics Engineers (IEEE).
New ways of seeing, working and doing business

Virtual and augmented reality applications can improve surgery techniques, increase manufacturing efficiency and take the way we view sports to a new level.

Antoinette Price
Initially developed for military and subsequently gaming scenarios, virtual reality (VR) and augmented reality (AR) applications have found their way into many industries, which are enhancing their products and services through innovative technology.

The booming augmented and virtual worlds
According to a report by Digi-Capital, a company advising AR/VR, mobile and games leaders in Asia, Europe and the US, AR/VR could hit USD 150 billion revenue by 2020, with AR accounting for USD 120 billion and VR for the remaining USD 30 billion.

The hardware that changes perspectives
Virtual reality replicates an environment and a perception of three-dimensional depth of space. It does this through computer simulation conveying audio and visual information via a range of multimedia systems. Users wear head-up displays (HUDs), which completely block the real world. Augmented reality, on the other hand, inserts live elements into a real-life environment, overlaying additional information. It is mostly done on a variety of displays, for activities such as driving or flying. Users wear smart glasses; however, in the future AR could also appear on windshields of cars, providing drivers with extra information.

How does the technology work?
AR and VR apps are evolving at a great rate. Complex objects can be tracked and rendered in real-time, while new sensing technologies (depth cameras and miniature 3D scanners) enable mobile devices to “see” the world and digitally capture a surrounding environment to be analyzed and augmented with real-time feedback.

Microelectromechanical systems (MEMS) sensors can be found in everything from automobiles, toys, PCs, medical devices and industrial applications to – more recently – portable consumer electronics. This is due to a reduction in their cost, size and power consumption. MEMS, which detect the orientation of a device, the direction in which it is moving and its absolute location in three dimensional space, are a key part of the technology required for location-based services using AR and VR applications.

The hardware required consists of:
• Processors
• Sensors and input devices (speech and gesture recognition systems)
• Displays including monitors and handheld devices such as smartphones and tablets which contain microelectromechanical systems – MEMS – sensors including optical, accelerometers, gyroscopes, GPS and cameras for tracking
• Eyeglasses, HUDs
• Computers, software and algorithms which help AR systems realistically integrate augmentations with the real world
• Special 3D AR software programmes allow the developer to link animation or contextual digital information in the computer programme with an AR “marker” in the real world

Standardization behind the technology scenes
Standardization ensures that manufacturers and companies can produce and sell reliable, safe products and services. Several IEC Joint Technical Committees (JTCs), Technical
Committees (TCs) and Subcommittees (SCs) prepare International Standards for AR and VR applications and the technology that enables them.

IEC SC 47E: Discrete semiconductor devices, and IEC SC 47F: Microelectromechanical systems, prepare a number of International Standards that enable manufacturers to build better, more efficient, more reliable sensors and MEMS. They facilitate the design, manufacture, use and reuse of MEMS.

ISO/IEC JTC1/SC 29: Coding of audio, picture, multimedia and hypermedia information, has published ISO/IEC 23000-13, Information technology – Multimedia application format (MPEG-A) – Part 13: Augmented reality application format. This International Standard focuses on the data formats used to provide an AR presentation and is designed to enable the use of 2D/3D multimedia content.

Electronic displays are everywhere, in the HUDs used in VR hardware, smartphones, tablets, laptops, TV screens and other portable devices on which AR and VR applications are used. IEC TC 110: Electronic display devices, prepares International Standards for all of them. Because of the increased use of different eyewear display technologies, TC 110 decided to create an ad hoc group, ahG 12, in Oct 2015. It is tasked with developing an outline of the technical requirements for eyewear displays.

Many of these products are powered by batteries, for which IEC TC 21: Secondary cells and batteries, develops product Standards.

The growing list of industries using AR and VR
Surrounding us today, VR and AR applications are already being used in many fields. As the technology develops, more industries will find new ways to tailor AR and VR to their area of expertise. Below are some examples.

Addressing health issues, surgery and training
AR is transforming the medical and healthcare sectors significantly for patients, doctors and pharmacy management alike.

In April this year, the Medical Realities app enabled the first VR live stream operation to be watched worldwide, from a UK Hospital. A 360° camera above the operating table allowed viewers to zoom into any part of the theatre, while the surgeon explained procedures. Students from as far away as Bangladesh used smartphones, headsets and tablets to get an unobstructed view. This experience could help train doctors in developing countries which do not have the same access to operating theatres and the latest technology.

PTSD Coach, an app for veterans and military service members with post-traumatic stress disorder, provides information about professional care, self-assessment, support and tools for managing daily stresses.
TECHNOLOGY FOCUS

Sports broadcasting
From the Superbowl to the World Cup and Olympics, the way spectators watch sports has changed forever.

A new sports broadcasting technology is making fans feel as if they are actually at the game. 360-degree VR is an audio-visual simulation of an altered environment around users wearing headsets. It can include live, real-time or pre-recorded footage, which enables users to look around the stadium in all directions, as they would in real life. Viewers of American football, athletics, basketball, boxing, golf, gymnastics, motorcycle racing, soccer, tennis, volleyball and more can stream live in VR.

American football and some European soccer players also use this technology very successfully for training.

Manufacturing goes between the cyber and the physical
More businesses use AR and VR manufacturing and production apps to plan full production and assembly processes virtually, down to the finest details of production line location, flow, cleaning and maintenance.

Engineers can “walk” inside a virtual power plant, manipulate a turbine model in real time, view products at life size, judge required components more accurately and measure walkways to improve safety. These apps also facilitate product reviews, simulation analyses, field service training, sales and marketing as well as customer and supplier interaction.

A leading German car manufacturer uses AR wearable technology to discover flaws before going to full production. Quality control, assessors take photos and video components with their smart glasses, replacing less accurate handwritten notes. They finalize reports by voice at the vehicle, instead of walking over to input data at computer terminals. This saves time, given that many cars require between 10 and 25 tests.

Discovering the past as it was through your phone
Moving inside, digital creativity is revitalizing museums and making exhibitions more engaging. For example, 3D scanning transforms artefacts back to their original state, by mending them virtually, adding colour and depth, and overlaying useful facts and information. Museums use the Sketchfab platform to publish 3D and VR content anywhere online. Once the partial artefact has been scanned and converted into a 3D model, it is then virtually reconstructed for viewing as the whole, original piece.

Obstacles to mainstream use
While many industries have embraced AR and seen great improvements in their products, services and operational processes, there are still some important hurdles in the way of mainstream use.

Technical glitches: for applications which need to track location, GPS is only accurate to within about eight metres and doesn’t work well indoors. There are also the usual issues for the devices running the apps, such as Wi-Fi connectivity and battery life.

Users of wearables such as smart glasses may experience information overload when they switch between the data on a car windshield and the actual road ahead. Before this kind or technology becomes mainstream, much more testing will be required.

Privacy: having quick access to all this information while on the go is one thing, but imagine being able to see another user’s Facebook, Twitter, Amazon or LinkedIn profiles by pointing the phone at that person. This will soon be possible using image recognition software and AR applications. Online data security and protection are not new topics, but this kind of instant accessibility needs to be considered carefully from legal and ethical viewpoints before building it into devices. ISO/IEC Joint Technical Committee (JTC) 1 produces International Standards for the security of information technology. Additionally, the IEC Advisory Committee on information security and data privacy (ACSEC) deals with information security and data privacy matters, coordinating activities related to these topics and providing any TC with guidance for the implementation of information security and data privacy.

Following the tech trends
As different industries increasingly incorporate AR and VR applications in their work processes, IEC will follow these developments and continue its standardization activities and quality assurance, which contribute to the performance, reliability, safety and interoperability of this technology.

Using virtual reality to develop new vehicle models (Photo: BMW)
We are more mobile today than ever before and expect to be able to carry out many daily activities outside the home or office. Having embraced the era of information overload, we want access to whatever information we need anytime and anywhere.

Always being connected
Gone are the days of reading a book on the way to work. Instead, we’re glued to our smartphones, because we can use them to answer emails, make purchases and reservations, pay bills, read the news, or “chat” with friends on diverse apps. It is all possible thanks to good Internet connections, tablets, iPads, smartphones and other portable smart devices. Technology has given us the freedom to get many things done while on the move. As well as constantly monitoring and recording what we do, we also share it with friends or colleagues on different social media platforms.

It comes as no surprise then, that the health and fitness industries are using this technology in very diverse wearable smart devices (WSDs), which can be worn on or near the body to monitor everything from sleep patterns, heart rate and the amount of steps we take, to glucose levels or body temperature.

Medical wearable devices and their parts
Medical wearables come in different shapes and sizes. On the whole, they are getting smaller, thanks to the evolution of nanotechnology, which involves manipulating materials on an atomic or a molecular scale to build microscopic devices. They are also getting smarter as components such as microchips, biosensors and very small-scale batteries allow them to connect to external smart devices, and transmit the information they gather.

Booming wearable healthcare
The value of the wearable electronic technology market will rise from USD 20 billion in 2015 to USD 70 billion by 2025, according to research company IDTechEx. This is hardly surprising given that some of the largest technology, medical and sports companies are heavily invested in developing the industry. According to this research, healthcare is the biggest sector, comprising medical, fitness and well-being.

As millions of people use wearables every day to check their health and fitness, they will need to trust that this technology is safe, reliable and compatible with other technologies, and functions as expected.

A number of IEC Technical Committees (TCs) and Subcommittees (SCs) develop International Standards for the components contained in medical wearables. IEC TC 62 creates Standards for electrical equipment in medical practice. Much of this electronic technology relies on sensors.
IEC TC 47: Semiconductor devices and IEC SC 47F: Microelectromechanical systems, enable the development of reliable and efficient sensors and MEMS. The work of IEC TC 113: Nanotechnology for electrotechnical products and systems, comprises terminology, measurement and characterization and performance assessment of substances for certain coatings on implanted devices.

Printed electronics Standards are developed by IEC TC 119, which covers printed electronics parts, their terminology, materials, processes, equipment, products and health/safety/environment aspects.

These devices are powered by batteries. IEC TC 21: Secondary cells and batteries, works on safety installation principles, performance, battery system aspects, dimensions and labelling.

Mobile medicine benefits many people
Portable medical devices bring great benefits to patients and how healthcare is being managed. They allow for real-time monitoring of patients 24 hours a day, for example continuous glucose monitors. Patients also receive alerts for lows and highs, and these devices are also discreet. They reduce doctor visits and give patients more time and freedom to live normal lives despite their conditions.

Patients in remote areas, disabled or aged people who may not be as mobile using such devices, can receive healthcare from a distance. Data gathered by the monitors is conveyed to doctors or health centres from smart devices, using different telecommunications technology.

As many countries face rapidly aging populations and significantly increased healthcare costs, active assisted living (AAL) offers solutions to extend independent living through the development and smart deployment of consumer electronics, connected and wearable medical and health-related devices.

IEC standardization work will prove crucial for the development of this sector, which will provide improved health and quality of life for millions of people, as well as major industrial and economic benefits.

The IEC established the Systems Committee on Active Assisted Living (SyC AAL), tasked with fostering standardization to enable usability and accessibility of AAL systems and services, and importantly, cross-vendor interoperability of the systems, services, products and components. It will also address systems-level aspects such as safety, security, including cybersecurity and privacy.

Also, IEC TC 100: Audio, video and multimedia systems and equipment, has created Technical Area (TA) 16 to address AAL aspects such as ‘accessibility, usability and specific user interfaces related to audio, video and multimedia systems and equipment within the scope of TC 100’.

How to trust the technology with your life
The monitoring and treatment of many medical conditions requires accurate, timely readings. Medical wearable devices monitor aspects of the heart (blood pressure and electrical and muscular function), read glucose levels in diabetics, and track the movement of elderly people. Medication doses are based on these measurements, and in the case of monitoring movement, reaching a person who has fallen over as quickly as possible could mean the difference between life and death.

People put their trust in these devices and expect them to function safely and reliably. The technology is evolving at a pace and becoming smaller, smarter and as a result delivering enhanced performance and functions.

The electronics which make these devices work are comprised of many components, such as, sensors, connectors, resistors, capacitors, semiconductors, diodes, light-emitting diodes (LEDs), microelectromechanical systems (MEMS) and nanoelectromechanical systems (NEMS), to name several.
Electronic component manufacturers and suppliers can use IECQ, the IEC Quality Assessment System for Electronic Components, to ensure that their products are safe, reliable and meet the strictest quality requirements.

Concerning the environment, IECQ developed a Scheme that has been running for over a decade, to ensure that products comply with the hazardous substances regulations: IECQ Hazardous Substances Process Management (IECQ HSPM). Products certified by the Scheme demonstrate that electrical and electronic components and assemblies meet hazardous substance-free local, national or international requirements such as the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) European Union Directive.

Protecting medical data
When we think of biometrics, often the first thing that pops to mind is having a fingerprint or iris scan for identification purposes, for example when clearing immigration in certain countries. However, medical biometrics or personal medical data, such as digital images and biorhythm recordings from ECGs and CTs have existed for decades. The digitization of these, combined with the new wearable technology and its real-time measurement capabilities, allows medical personnel to exchange this information with colleagues and develop data sets for solving medical problems and improving healthcare services.

Biometric data other than fingerprints and iris scans may also one day be used for security identification purposes.

Data has little value if it cannot be transmitted and received between medical professionals or patients. ISO/IEC Joint Technical Committee (JTC) 1: Information technology, prepares International Standards which cover data interchange formats and technical interfaces among others.

More personal information is being gathered by medical wearables and transmitted over the Internet to healthcare facilities, which use computerized management systems to store this information electronically. Patient files are gradually being converted from paper to what is known as electronic health records by hospitals, medical centres and doctor’s surgeries. Results from many of today’s medical scanning devices are saved on computers. Patients walk away with a compact disc showing still or moving scans, which can be easily accessed, used and shared between medical professionals and patients.

This type of technology has enabled the development of remote patient monitoring solutions, which are very useful for aged or disabled people with less mobility, or those in isolated locations.

We regularly hear about cybersecurity breaches, which also affect the healthcare industry. Based on a list compiled by the US Department of Health and Human Services, by March this year, 3.5 million medical records had already been compromised. Medical records in the US can be even more valuable than credit card theft, because they contain details such as social security numbers and addresses, which can then be used by fraudsters. The use of standards satisfies national and/or international security and privacy requirements which are increasingly important.

IEC actively works towards stopping cyberattacks and maintaining data privacy and security in a number of areas including medical. IEC TC 62 and its Subcommittees (SCs) develop International Standards that cover medical device software used in healthcare. There scope also includes “data security, data integrity and data privacy”.

ISO/IEC JTC 1 produces International Standards for the security of information technology. Additionally, the IEC Advisory Committee on information security and data privacy (ACSEC) deals with information security and data privacy matters, coordinating activities related to these topics and providing any TCs with guidance for the implementation of information security and data privacy.

Nanotechnology is revolutionize the way we detect disease and treat damage to the human body.
Poor water quality and water scarcity continue to pose a major threat to human health and are responsible for millions of deaths every year. Extracting water and treating used and contaminated waters requires complex installations which depend almost entirely on electrical and electronic systems and equipment. Standardization work by many IEC Technical Committees (TCs) and Subcommittees (SCs) is essential to ensure that people across the world have access to appropriate water supply and water treatment.

No electricity, no pumps, no water
Having access to clean and safe water is vital. Pumps are the basic piece of equipment used to extract fresh water from sources, to bring it to users and to move and treat wastewater.

Electricity is now the primary and the only practical source of energy for individual pumps and for pumping stations that supply water to towns and networks.

Pumps are built around rotating machinery. IEC TC 2 prepares International Standards for motors used in pumps.

The pumping of fresh water and wastewater is said to account for 10% of the world’s energy usage. Employing energy-efficient pumps is thus essential to keep in check electricity consumption. IEC TC 2 has developed publications that cover methods of and tests for determining the efficiency of motors. The efficiency of three-phase, single-phase and synchronous motors is the object of a classification given in IEC 60034-30-1: 2014, Rotating electrical machines – Part 30-1: Efficiency classes of line operated AC motors (IE code). The least efficient motors are classified IE1, the most efficient IE4.

Many companies that supply motors for fresh and wastewater pumps stress that they meet IEC high-efficiency ratings.

Renewable energies – a perfect match for complementing water supply
Solar-powered pumps are used where grid electricity is not available. They generally use photovoltaic (PV) panels. IEC TC 82: Solar photovoltaic energy systems, develops International Standards for various components and systems used in PV installations, such as controllers needed for voltage protection or the converters and inverters that are necessary when DC supplied by PV panels has to be converted to AC for certain pumps.

There is growing water scarcity in many parts of the world and “seawater desalination is the only additional renewable source of freshwater available on this planet”, according to Global Water Intelligence. Desalination is now used in 150 countries; it is a highly energy-intensive process. In many countries – in particular oil-rich countries – most desalination projects rely on energy from fossil fuels (oil and gas) to operate.

However, various sources of renewable energy (RE) now offer interesting prospects for clean energy desalination and several desalination projects using RE are being developed. Spain’s Abengoa RE company will build a 15 MW solar PV facility for a desalination plant to supply Al Khafji City in the north-east of Saudi Arabia, it will produce 60,000 cubic
metres of water a day. It is due to be commissioned in early 2017.

In Australia, the Perth Wave Energy Project has the ability to produce desalinated water using wave energy. IEC TC 114: Marine energy - Wave, tidal and other water current converters, prepares International Standards for these types of installations.

**Wastewater treatment/purification**

Wastewater (from domestic, industrial and other uses) treatment is a multiple-stage process that includes mechanical and chemical phases. All require electrical and electronic equipment.

Wastewater is sent first for treatment to clarifier tanks where rotating arms, relying on rotating machinery, skim off oils and fats. Chemicals are used in sedimentation tanks where they are added to wastewater to aggregate solid particles, which fall to the bottom of the tanks to be collected and recycled in various forms. For this process, chemicals must be added in the right proportions. This is made possible using digital dosing pumps, which can be microprocessor-controlled.

Water can also go through an ultraviolet (UV) sanitizer unit to kill pathogens, germs and viruses, and reduce significantly the quantity of chemicals, such as chlorine and bromine, needed to disinfect water.

IEC TC 61: Safety of household and similar electrical appliances, has developed IEC 60335-2-109:2013, an International Standard for particular requirements for UV radiation water treatment appliances. UV radiation treatment is important when water needs to be further processed to be potable, or for use in water recreational areas, in which case digital dosing pumps may again be essential to add certain chemicals in smaller volumes.

**Saving water in homes and public spaces**

Water is seen increasingly as a scarce resource that cannot be wasted. In homes and public places with conveniences, like restaurants, hotels, shopping centres and sporting installations, sensors are increasingly used to flush toilets or to get running water from taps automatically.

This is made possible through the work of IEC SC 121A: Low-voltage switchgear and controlgear, which has developed an International Standard, IEC 60947-5-2:2012, Control circuit devices and switching elements – Proximity switches, which covers these sensing means: inductive, capacitive, ultrasonic, diffuse reflective, photoelectric, non-mechanical, magnetic, retroreflective, photoelectric and through beam photoelectric.

IEC Standards apply to recreational use of water too

Recreational use of water, in swimming pools and spas, for instance, requires its own Standards. Some cover equipment and systems previously mentioned, others, such as certain safety requirements, are specific to the recreational environment.

A clean and comfortable setting is important in public and private swimming pools and spas.

Pool equipment and maintenance systems include a variety of devices for heating, cleaning, sweeping, pumping and lighting. They include automated systems, controllers and safety equipment. Most rely on electricity, but water and electricity have an uneasy relationship.

As safety is always at risk when water and electricity are in close proximity, in particular when individuals are around, the design and installation of such equipment and systems must meet strict criteria to protect against electric shock.

These criteria apply to electrical installations for swimming and paddling pools and their surrounding zones, and for basins and fountains as well as “areas in natural waters, lakes (…) specially intended to be occupied by persons for swimming, paddling and similar purposes”.

IEC TC 64: Electrical installations and protection against electric shock, developed IEC 60364-7-702:2010, Requirements for special installations.
or locations – Swimming pools and fountains. This Standard defines the dimensions of three zones in which such equipment may be installed and stipulates what may go where, as well as the characteristics of wiring and current-based equipment used in swimming pools.

Several IEC TCs and their SCs prepare International Standards for these electrical installations. They include TC 61: Safety of household and similar electrical appliances, and SC 34D: Luminaires.

Clean and clear
Cleaning of pools is essential for health reasons and to avoid contamination. It relies on mechanical and chemical processes which are all controlled by electrical systems.

Cleaning involves constant recycling by removing debris (i.e. hair) and dirt – such as creams or cosmetics – from water before sanitizing it.

The first stage is pumping water from the bottom of the pool or from the sides when it overflows into channels. Next it is sent to sand filters, which are large tanks filled with sand that trap dirt and small particles in the 20-100 micron range.

Following this first treatment, water goes through a UV sanitizer, similar to the ones used in wastewater treatment, which reduces significantly the quantity of chemicals – such as chlorine and bromine – needed to disinfect water. Some manufacturers claim that “savings of 70-85% in chlorine consumption are commonplace” when a UV sanitizer system is installed.

However, even after UV treatment, chemicals such as chlorine still need adding to make certain water is not contaminated. This is done using digitally-controlled dosing pumps that ensure the right amount of chemical is continuously injected into the water before it is pumped back into the pool.

Pleasant environment
Lighting can enhance swimming pool and spa environments and overall user experience. Lighting fixtures may be installed outside the pool, above ground or recessed, and underwater in appropriate housings. Light can be delivered via a variety of bulbs, LEDs or fibre optics.

IEC SC 34D: Luminaires, has published IEC 60598-2-18:1993, Luminaires – Particular requirements – Luminaires for swimming pools and similar applications. This International Standard details general test requirements, the classification of luminaires and characteristics of their construction. It also describes tests for mechanical strength and corrosion and many other features for light fittings that are used in the swimming pool environment.

Evacuating excess humidity from all areas in a swimming pool, from shower rooms to the main swimming hall and other areas, and maintaining the right temperature all year long make for a more pleasant environment. This requires extensive ventilation installations. IEC SC 61D: Appliances for air-conditioning for household and similar purposes, prepares International Standards for electrical air conditioners and dehumidifiers used in residential, commercial, industrial and other buildings.

The strongly-held belief that water and electricity don’t mix really doesn’t hold… water! Nowadays, there wouldn’t be water for personal, industrial, farming or recreational use without electricity or the right electrical systems and equipment. These are entirely dependent on IEC International Standards to function properly and safely.
From eight words a minute to 13 terabits per second in 150 years

IEC first President Lord Kelvin was central to the success of the first fully working transatlantic telegraph cable

Morand Fachot

Given today’s low-cost or free, crystal-clear voice calls and the real-time transfer between continents of vast volumes of data, including multimedia content, it’s easy to forget that just 150 years ago it took nearly two weeks for news from London to reach New York. The laying of the first fully working transatlantic telegraph cable from Ireland to Newfoundland cut that time to a few hours. IEC first President Lord Kelvin played a key role in the success of the project.

An ancient quest for fast transmission of news

Since times immemorial, men have felt the need to share critical or momentous news as quickly as possible with others in distant locations. Legend has it that in ancient Greece, news of the Greek victory over an invading Persian army, in Marathon in 490 BC, was brought to Athens by a runner who died shortly after completing a run of over 42 km (26 miles).

In ancient Greece also, homing pigeons were sent to villages at the end of each Olympic Games to announce the winners, so that villagers could welcome home their local heroes.

Homing pigeons have been used to convey news in many civilizations throughout history. Examples include a regular service between Baghdad and Syria from the late 12th century to the late 13th century, and the news of the defeat of Napoleon in Waterloo sent to London in 1815. In the 20th century all belligerents made extensive use of homing pigeons in the first world war. The American Expeditionary Forces reportedly had more than 10,000 pigeons in service at the end of the conflict. The US Army was still training homing pigeons in the second world war and the Swiss army disbanded its homing pigeons’ unit as late as 1994.

In some countries, in the late 18th century, messages delivered by men on horseback and homing pigeons started to be complemented by technical means. Semaphore signalling was a mechanical telegraph system using visual signals. However, it required a comprehensive infrastructure and was mostly useless in poor weather and at night.

Electrical telegraph provided more reliable and quicker news

Following a series of discoveries and inventions in the electrical domain, various telegraph systems started to be developed in both Europe and across the Atlantic in the first half of the 19th century. These experiments culminated in the development of the Morse electrical telegraph, which used a special code to transmit letters and numbers. Telegraph landlines soon criss-crossed countries and continents. The US west and east coasts were connected via overland Morse telegraph lines in 1861.

Successive technical achievements led to efforts to overcome another major obstacle: connecting countries and continents separated by sea. Initially, the main technical challenge was to reinforce and insulate underwater cables to protect them and to prevent current from leaking into water. This was achieved using gutta-percha, a form of latex produced from the sap of trees found in Southeast Asia, to coat iron-reinforcing wires protecting the copper conductor.
This allowed the first undersea cable to be laid between England and France in 1850. It was followed by more connections linking England with Ireland, Belgium and the Netherlands.

**The next frontier, crossing the Atlantic**

Soon after the first undersea cable was laid, a number of individuals, including the prime mover behind the project, New York businessman and financier Cyrus Field, proposed laying a transatlantic cable between Ireland and Newfoundland in 1854. They formed the Atlantic Telegraph Company in November 1856 to launch and exploit a commercial transatlantic telegraph cable.

In December 1856, IEC first President, William Thomson, Lord Kelvin, was appointed as an unpaid scientific adviser to the board of directors of the company.

The transatlantic cable idea was put to the test. The third attempt to link both sides of the Atlantic met with success in 1858 when, in mid-Atlantic, two ships connected the cables they carried before sailing respectively to Ireland and to Newfoundland.

The first transatlantic message, a 99-word telegram from Queen Victoria to US President James Buchanan, was sent on 16 August 1858. It took 16 hours to send (two minutes per letter...)

However, the cable was operational for just three weeks and provided a very weak signal. To boost this weak signal the Atlantic Telegraph Company’s chief electrician, Edward Whitehouse, proposed increasing voltage. Thomson opposed the idea thinking that this would fry the cable. Whitehouse applied higher voltage shocks to the cable which eventually failed. However, evidence suggests that the poorly manufactured and damaged cable would, in any case have failed within weeks, even without the application of the higher voltage.

**Lord Kelvin’s contribution**

Mentions of Thomson’s contribution to the transatlantic cable venture are often restricted to his development of two instruments central to the project: the mirror galvanometer and the syphon recorder. However, as early as October 1854 Thomson was delving into the theoretical issues facing a future transatlantic cable. By December 1854, he had laid out an entire mathematical theory explaining, in letters sent to fellow mathematician and physicist George Stokes, how a pulse of electricity travelled in an insulated submerged wire.

In his letters Thomson also analyzed the data rate that could be achieved, and explained the feasibility and economic consequences of completing a transatlantic cable.
Between 1856 and 1866, Thomson personally took part in each of the major transatlantic cable expeditions: one in 1857, two in 1858, one in 1865 and the round trip in 1866 where a new cable was laid and the 1865 cable was completed.

Following the failure of the 1858 cable, Thomson made recommendations for the design and manufacture of submarine cables, which included requirements for the conductivity of the copper core, the size of the conductors and the insulation. He also stressed the importance of “systematic and searching tests for the purity and conductivity of the copper” and of control in the manufacturing process.

Thomson was knighted by Queen Victoria in 1866 for his work on the transatlantic telegraph project.

In 1870 Thomson devised the syphon recorder, the first instrument used on long cables to record the received signals.

Later, he also designed the first modern deep-sea sounding machine for assessing the depth of water, an essential piece of equipment when laying submarine cables. His Kelvite Mark IV Sounding Machine, developed with the Royal Navy between 1903 and 1906, was still being produced with only minor modifications in the 1960s.

**Laying the 1866 cable**

Following the 1858 setback and delays resulting from the US civil war (1860-1865), there was an eight-year gap before another attempt was made in 1866.

The cable was laid by a single ship, the Great Eastern, itself an engineering feat of the time. Designed by the renowned English engineer Isambard Kingdom Brunel to carry 4,000 passengers this ship powered by five steam engines and sails was launched in 1857.

She was converted to a cable laying ship in 1865 and laid her first transatlantic cable (which snapped and was lost) in July 1865.

Exactly a year later, Great Eastern successfully brought another cable on shore in Newfoundland on 27 July and the first message from England, informing that “A treaty of peace has been signed between Austria and Prussia”, was received the following day.

A few weeks later Great Eastern grappled the cable lost in 1865 from the bottom of the sea, it was spliced to a new cable onboard the ship and brought to shore providing a second connection between Europe and North America in September 1866.

At eight words a minute, the transmission speed of the 1866 cable was markedly better than that provided by the 1858 cable.

**Paving the way to better communications**

This 1866 transatlantic cable paved the way for a rapid development of telegraph communications between continents. By the end of the 1880s, some 115,000 nautical miles (213,000 km) of undersea cables had been laid. The total reached 200,000 miles (370,000 km) in 1907 and over 329,000 miles (595,000 km) in 1914.

Transatlantic cables were used only for telegraph services until 1956, when the first underwater telephone service between Europe and North America was launched. It could initially carry 36 phone channels.

The first transatlantic fibre-optic cable, which could carry 40,000 channels, entered service in 1988.

The capacity of undersea cables has increased to such an extent that it is no longer classified by the number of channels carried but by data rate, that is gigabits or terabits per second (Gbps and Tbps).

**Global real-time exchange of voice and data now taken for granted**

The latest transatlantic telecommunications cable, AEConnect Cable System, a 5,500 km fibre-optic
cable laid from New York to Ireland went into service in January 2016. AEConnect says that the cable “will initially support 13 Tbps (130 x 100 Gbps) per fibre pair.” This 13 Tbps data rate is equivalent to transmitting 350 DVDs worth of data in a single second. AEConnect also indicates that this capacity will continue to increase “with the introduction of more advanced modulations.” AEConnect adds that this cable will offer “one of the lowest latency crossings of the Atlantic, projected at a speed of 53.9 milliseconds.”

This represents a quantum leap from the eight words per minute the first transatlantic cable could transmit and the total time it took to decipher and forward a message.

This great technical feat, often from the landing on the Moon, would have been impossible to achieve at the time without the theoretical and practical work done by Lord Kelvin, which covered so many aspects of the project.

Today’s undersea communications and power cables include elements that were developed for the first transatlantic cable, including better armouring and insulation to protect the conductors from water ingress, mechanical and friction damage and rupture.

Submarine power cables were introduced much later than their telegraphic counterparts, owing to the far more complex technical issues involved.

**IEC standardization work for undersea cable continuing in Lord Kelvin’s footsteps**

A number of IEC Technical Committees (TCs) and Subcommittees (SCs) continue the work started by Lord Kelvin, developing a number of International Standards necessary to the production and operation of undersea power and communication cables. They include:

**IEC TC 76: Optical radiation safety and laser equipment**

IEC TC 76 develops standards for laser equipment to transmit data via fibre optic cables.

**IEC TC 20: Electrical cables**

IEC TC 20 prepares International Standards for the design, testing and end-use recommendations (including current ratings) for insulated electrical power and control cables, their accessories and cable systems, for use in wiring and in power generation, distribution and transmission.

**IEC TC 86: Fibre optics**

IEC TC 86 prepares standards for cables used to transmit data and voice, which are increasingly widely deployed in submarine environments.
Smart Energy moves ahead
Systems Committee on Smart Energy Technical Committee Forum

Janice Blondeau
Smart Energy can be described as connecting many points of generation with many points of consumption, from end-to-end, not limited to just the electric grid. Smart Energy is also about all energy needs for Smart Cities. The IEC Systems Committee (SyC) on Smart Energy aims to create one international platform for a comprehensive portfolio of standards – efficient and easy-to-use standards that can be used by any project working on Smart Energy. The work of SyC Smart Energy includes wide consultation within the IEC community and a broader group of external stakeholders, in the areas of Smart Energy and Smart Grid, also including Heat and Gas.

IEC TCs are key
The SyC Smart Energy TC Forum, held in Geneva on 26 April 2016, aimed to engage Smart Energy-related IEC Technical Committees (TCs) and Subcommittees (SCs) to collect and share advanced information for the coordination of future standards development. More than 20 IEC TC representatives, experts and SyC Smart Energy members participated in the Forum, including TC 3, TC 8, TC 13, TC 57, TC 65, TC 69, SC 77A/TC 8, TC 95, ACEE Chair and a conformity assessment (CA) representative.

This is the first time that the SyC has met with IEC Technical Committees, through Advisory Group 1 (TC Forum), although since 2010, around 30 IEC TCs have worked with SyC Smart Energy predecessors, namely Strategic Group (SG) 3 and the Systems Evaluation Group (SEG) 2, via workshops, contributions to the mapping solution and the roadmap.

In their words
Says Ralph Sporer, IEC Advisory Committee on Energy Efficiency (ACEE) Chair: “In the area of Smart Energy there is a great risk in doing parallel work in the individual TCs. I am sure SyC Smart Energy will provide a good service and value with its deliverables to reduce the overlap in TC work and generally market the IEC achievements inside and outside of IEC.”

Says Toru Ishikuma, TC 65: Industrial-process measurement, control and automation, expert: “The TC Forum is a valuable project where SyC and TCs can learn their standardization activities for the common subject of Smart Energy and collaborate together through coordinating them effectively. Although we have challenging actions in front of us, this kick-off showed us a positive direction with practical steps.”

Says Dustin Tessier, TC 57: Power systems management and associated information exchange, expert: “It was encouraging to see the establishment of a platform where Technical Committees can collaborate and exchange visions, challenges, and high-priority initiatives as it relates to Smart Energy systems. The energy industry will be the ultimate beneficiary...”
from these harmonization activities, and it was refreshing to see the open-dialogue among the Technical Committee officers."

**Future work**

Richard Schomberg, Chair, SyC Smart Energy, has this to say: “What we are going to be is a convergence platform to help the TCs who are the factory of standards for the IEC. We want to create conditions to support the activities of the TCs – so that very early on they have more information than they had up to now. Then it’s up to the TCs to manage the way that they develop their Standards and the direction they want to follow.”

Adds Peter Lanctot, Secretary, SyC Smart Energy, “Hopefully we are going to gather TCs representatives with an expertise within a Technical Committee, who also have a good, broad overall understanding of what’s happening inside their own committee. Then the System Committee on Smart Energy will help to see where there are overlaps and where standards gaps exist.”

The job of the SyC is to take the Systems perspective and to coordinate and engage the TCs, and have them work with each other where it’s relevant.

All together, they are processing bottom up standardization needs with top down system needs. Closing the loops and repeating the process are two other key tactics. SyC Smart Energy will bring the relevant players around the table – National Committees, IEC Technical Committees, regulators, regional organizations, industry and other standards development organizations (SDOs).

IEC is taking the lead... it is working outside the silos for a truly Systems overview of the Smart Energy domain.

**Technological Committee Affairs**

Richard Schomberg, Chair SyC Smart Energy

The IEC Smart Grid Standards Map allows easy and instant identification of the standards needed for any part of the Smart Grid

**The technology that makes our world tick**

International Standards contribute to the prevention of cyberattacks

Antoinette Price

As more areas of our lives become connected to the Internet of Things (IoT), the work of experts in ISO/IEC Joint Technical Committee (JTC) 1: Information Technology, who develop worldwide International Standards for business and consumer applications in Information and Communication Technologies (ICT), is increasingly crucial.

Avoiding security breaches through standardization

IEC International Standards ensure that electronics and electrotechnical components found in everything from transport, medical wearables and toys, to data centres and tablet computers, function reliably and safely.

There is much technology behind the scenes that allows us, for example, to swipe our way into the office, scan food items at the supermarket, purchase a sofa online and arrange its delivery, do banking from home or clear immigration using a biometric passport.
To function smoothly, it must also be interoperable as well as protected from cyberattacks.

ISO/IEC JTC 1 produces International Standards for many fields, for example, smart cards, automatic identification and data capture (AIDC), information security, biometrics, cloud computing multimedia (MPEG) database query and programming languages, to name a few. It continues to follow technology trends and develop Standards. These are being applied in new areas, such as augmented reality and virtual reality applications, which are used in fields as diverse as military, transport, broadcasting, sports, gaming, construction, tourism, manufacturing and healthcare.

More specifically, the work of ISO/IEC JTC 1 covers the specification, design and development of systems and tools dealing with the capture, representation, processing, security, transfer, interchange, presentation, management, organization, storage and retrieval of information.

Keeping the cyber world safe
Smart Cities require a sustainable and reliable supply of energy and water, and must provide populations with efficient mobility and communication, while ensuring effective cybersecurity for all the tools and systems that enable their smooth functioning.

As a result of the growing contribution of IEC work towards Smart Cities, ISO/IEC JTC1/WG 11: Smart Cities, was established during the JTC 1 October 2015 plenary in Beijing. Representatives from this Working Group also participated in the World Smart City Forum in Singapore in July, organized by IEC in partnership with ISO and the ITU.

Along this theme, ISO/IEC JTC 1 updated its ISO/IEC 27000 family of International Standards on security techniques for information technology earlier this year. ISO/IEC 27000 gives an overview of these Standards, how they support the implementation of ISO/IEC 27001, Information technology – Security techniques – Information security management systems – Requirements, and how they relate to each other. It also provides a brief introduction to the information security area and information security management systems (ISMS), describing how to implement, operate, maintain and improve the ISMS.

Updates include:
• Protecting information in the cloud (ISO/IEC 27017)
  Providers located around the world routinely transfer data across national boundaries. This International Standard contains a new code of practice for information security controls for cloud services.
• Integrated solutions for services (ISO/IEC 27013)
  It offers a systematic approach to facilitate the integration of an ISMS with a service management system. Users can lower implementation costs and avoid duplication as only one audit is needed for certification.
• Inter-sector and inter-organizational communications (ISO/IEC 27010)
  This International Standard guides the initiation, implementation, maintenance and improvement of information security in inter-organizational and inter-sector communications. It includes general principles on how to meet these requirements using established messaging and other technical methods. It is used for protecting critical national infrastructure, where exchanging sensitive information securely is of utmost importance, as well as by security incident response teams.
• Detecting and preventing cyberattacks (ISO/IEC 27039)
  Organizations must be able to detect and prevent cyberattacks, or identify where breaches occur and how to stop similar intrusions in the future. ISO/IEC 27039 provides guidelines to prepare and deploy Intrusion Detection and Prevention Systems (IDPS).
• Audit and certification (ISO/IEC 27006)
  Third-party certification audits demonstrate that organizations have implemented a solid information security management
system (ISMS), which conforms to ISO/IEC 27001 requirements. ISO/IEC 27006 provides the requirements that certification and registration bodies need to meet to be accredited so they can offer ISO/IEC 27001 certification services.

**IT Standards for developing countries**

During the October plenary, JTC 1 also held a workshop on *Enhancing developing countries capacity to participate in international standardization and implement standards related to IT*, which was attended by 17 countries. Overall feedback pointed to the need for more help in using available tools to improve participation in JTC 1 activities, funds to attend meetings, and facilitated discussions between developing countries and committee experts.

**Contributing to the Internet of Things**

The IoT is an important global trend, which needs Standards to ensure the interoperability, safety and energy efficiency of IoT devices and systems. In May, the first joint global workshop on the IoT Standards, organized by IEC, ISO and the ITU was held in Berlin. Hosted by the German Institute for Standardization (DIN) and led by ISO/IEC JTC 1, the event was aimed at sharing experiences of IoT and ongoing standardization activities among the three organizations. Topics discussed included Smart Grids, intelligent manufacturing, supply chain management, wearable smart devices, as well as the global challenges of energy conservation, smarter cities and improved healthcare. The issues of privacy and security were also discussed.

The workshop concluded that International Standards are key to building a global market of safe, energy efficient and interoperable IoT devices and systems.

**Working with other standards development organizations**

One of the roles of ISO/IEC JTC 1 is to work with other organizations that develop standards in the same field.

ISO/IEC JTC 1 approved the OASIS MQTT Standard for the Internet of Things. Published in June, ISO/IEC 20922, *Information technology – Message Queuing Telemetry Transport (MQTT) v3.1.1,* is a foundational standard for the IoT, developed by the Oasis consortium.

This light-weight publish-subscribe messaging protocol is designed for connections with remote locations or where the network bandwidth is limited. It is suited to IoT applications where resources such as battery power and bandwidth are at a premium. Hospitals use it to communicate with medical devices, such as pacemakers. Oil and gas companies monitor miles of pipelines. In smart cars it is a fundamental enabler for telematics, infotainment and mobile applications.
Keeping our powered lives safe

IECEE offers an efficient system for testing the quality, performance and energy use of many electronic devices

Antoinette Price

From the smartphone alarm first thing in the morning to switching off the lights last thing at night, many products and systems in our daily lives run off electricity. We use the hairdryer, washing machine, stove, get on and off transport and walk through automated doors at the office, take the elevator, fire up the computer and purchase items online, expecting that everything will work reliably and safely.

An efficient system for testing products

IECEE, the IEC System of Conformity Assessment Schemes for Electrotechnical Equipment and Components, ensures that electrical and electronic devices and equipment are reliable and meet expectations in terms of performance, safety, reliability and other criteria, by testing and certifying them against IEC International Standards.

With currently 54 Members, 78 National Certification Bodies (CBs) and 485 Testing Laboratories (CBTLs/ACTLs), IECEE expects to issue around 90,000 certificates in 2016.

Over the past year, e-tech has reported on different industries whose products and systems benefit from IECEE testing and certification.

Greener safer gadgets

We use an array of electrical appliances in homes from lighting to kitchen items, gardening power tools and toys, which must be safe and as green as possible. Improving their energy efficiency saves costs and reduces emissions. Many countries develop regulations and legislation for energy efficiency, for which IEC International Standards often serve as the basis. These Standards deal with safety and performance requirements for appliances and equipment. They also include the metrics and testing specifications that allow the IECEE Schemes to verify and certify the quality, performance and energy use of a multitude of devices.

MEPS for motors

Electric motors are the single biggest users of electricity, driving pumps, fans and a wide array of machinery. They can be found in heavy industry, hospital generators, power tools, pumps to clean swimming pools, and many transport vehicles.

In an attempt to increase electric motor efficiency, governments have introduced Minimum Energy Performance Standards (MEPS), which set obligatory minimum energy efficiency levels for motors. MEPS are generally based on IEC International Standards, which include four classes of energy efficiency for motors – IEC 60034-30-1, and IEC 60034-2-1 for testing.

In an effort to address trade barriers which can occur because of differing country regulations, the IECEE Global Motor Energy Efficiency Programme (GMEE) is based on the international IECEE CB Scheme. GMEE aims for one product, one test and one certificate to provide access to the world, by promoting the harmonization of national standards with IEC International Standards.

The changing healthcare landscape

The digital revolution has greatly impacted healthcare. Medical robotics are used in surgery, can help with rehabilitation or assist elderly people.

Nanotechnology in medical wearables and implants has changed the way we monitor, diagnose and treat many medical conditions. Telemedicine, which uses telecommunication and information technologies to provide clinical health care at a distance, allows medical professionals to better manage diseases and improve the quality of patients’ lives.

The IECEE Global Motor Energy Efficiency programme has been operational since 2015
The IECEE CB Scheme covers 23 categories, of which medical equipment is one. MED or electrical equipment for medical use, uses dozens of IEC International Standards against which products are tested and certified in the IECEE CB Scheme. One of the most important ones is the IEC 60601 series of Standards on the safety and performance of medical electrical equipment.

This Standard series also covers risks to patients, those who operate the equipment – doctors, nurses and technicians, and maintenance personnel.

IECEE looks at managing the risks associated with new technologies. In 2007 it set up the Medical Electrical Equipment Task Force (IECEE MEE) for the implementation of risk management requirements as set out in the third edition of IEC 60601-1, Medical electrical equipment – Part 1: General requirements for basic safety and essential performance, published in 2005. Some of the Task Force’s duties include:

• Developing a checklist aimed at assisting the medical equipment industry, official authorities and stakeholders around the world to test appropriately
• Organizing specific training sessions dealing with risk management issues

Medical wearable devices gather information about different health aspects of a person. The data is sent to clinics, hospitals or doctors, who can monitor it in real time or store it in electronic management systems and databases. Like anything that connects to the Internet of Things, the use of IT systems and software will need to ensure data is protected.

IEC Technical Committee (TC) 62: Electrical equipment in medical practice, and its Subcommittees, develop International Standards for electrical equipment, electrical systems and software used in healthcare. Its work focuses on safety and performance (e.g. data security, data integrity and data privacy), among other aspects.

**New task forces for functional safety and cybersecurity**

Whether at home, work, in a factory or public spaces, we are increasingly surrounded by electric and electronic devices. Many of these could cause harm to humans, animals or the environment if they didn’t have built-in safety mechanisms. For example, if a lawn mower is tipped over, built-in safety mechanisms will shut it off to avoid harm to the user.

When functional safety is maintained properly, the electronics and software that relate to the function of a device or system will work correctly in response to commands it receives. Under the Certification Management Committee (CMC), the Policy and Strategy Committee (PSC) proposed setting up a new Task Force for Functional Safety, to define market relevant solutions and services related to functional safety.

Every day we read about cybersecurity breaches in the news. As we become more connected to the Internet of Things, it is increasingly important for personal safety and privacy to ensure measures are in place to tackle the numerous cyberthreats we face. A new Task Force for Cybersecurity will be set up to provide conformity assessment to the IEC 62443 series of Standards.

Manufacturing processes have rapidly joined the data-driven Internet connected world, which has helped boost productivity and efficiency. If industrial control systems (ICS) and supervisory control and data acquisition (SCADA) of plants for oil and gas were compromised, the consequences could be dire. There have been successful cyberattacks for example at a German steel plant reported in 2014, and the well-known Iranian nuclear enrichment facility hack in 2011.

Against this backdrop, the Task Force for Cybersecurity will also cover conformity assessment elements pertaining to industrial automation cybersecurity in conjunction with the IEC 62443 series of International Standards.

More information: www.ieee.org
CONFORMITY ASSESSMENT

20 years and stronger than ever

IECEx recognized as centre of excellence in Ex compliance

Claire Marchand

Explosive (Ex) atmospheres – also termed hazardous areas/locations – which can be caused by flammable gases, mists or vapours or by combustible dusts, are by no means restricted to the oil, gas and petrochemical industry sectors. The risk of fire or explosion exists in a variety of other sectors, such as transportation – including aerospace – furniture manufacturing, automotive manufacturing and repair, pharmaceuticals, food processing, grain handling and storage, sugar refineries and coal mining. They all utilize flammable substances in quantities that may result in concentrations that are potentially explosive, whether that is during normal operation or due to abnormal situations arising.

Mitigating risks

Zero risk may not be conceivable but there are measures that can be taken to mitigate risks and make sure that those working in Ex environments do so in the safest possible way. These include installing and operating equipment that incorporates an explosion-protection technique as part of its design and manufacturing. It is also necessary to hire staff that has the necessary training, skills and competences to work in hazardous areas.

The IEC, through IECEx, the IEC System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres, has the mechanisms in place to help industry, authorities and regulators ensure that equipment (electrical and non-electrical) as well as the people working in Ex locations benefit from the highest level or safety.

IECEx in a nutshell

The Conformity Assessment (compliance) System operates the following industry-specific Schemes:

• IECEx Certified Equipment Scheme
• IECEx Certified Service Facilities Scheme
• IECEx Scheme for Certification of Personnel Competence

The IECEx Conformity Mark Licensing System operates in association with the IECEx Certified Equipment Scheme.

Day to day operations are overseen and managed by the IECEx Management Committee (ExMC), comprising experts from (currently) 33 countries with industry representatives and regulators as well as test and certification agencies forming the majority of the ExMC; other stakeholders such as repairers, installers, Ex training organizations and educators also participate in the work of the ExMC.

To deal with the expansion of the System, the IECEx Executive was formed to assist in the day-to-day operations; the IECEx Executive consists of appointed experts from Australia, China, France, Germany, Netherlands, Russia, Switzerland, UK and US.

A milestone for IECEx

IECEx celebrates its 20th anniversary this year.

The first meeting, in July 1996 in London, UK, marked the official launch of the System. It was a milestone for the IEC as well – IECEx was the first IEC Conformity Assessment (CA) System solely dedicated to a specific industry and technology sector, i.e. equipment for use in areas where flammable and combustible materials are used, handled, stored or transported, referred to as Ex areas.

While the System’s initial service offering was based on the IECEE CB
CONFORMITY ASSESSMENT

Scheme, providing for the mutual recognition of Test and Assessment Reports, IECEx went on to develop the IECEx Certified Equipment Scheme and introduced the IECEx On-Line Certificate of Conformity system where each and every certificate issued by Approved Certification Bodies (ExCBs) is fully accessible. In fact, it is the electronic online version of the certificate maintained as the Master controlled version, providing instant checking and verification of claims made in the marketplace.

Success throughout
IECEx rapidly made a name for itself as a truly international certification system. With the Certified Equipment Scheme well established, the System went on to develop other Schemes, i.e. the IECEx Certified Service Facilities Scheme followed a few years later by the IECEx Scheme for Certification of Personnel Competence. All three Schemes fulfilled the needs of the Ex industry sector and became extremely successful.

The System reached another milestone in 2010 when the United Nations, through the UN Economic Commission for Europe (UNECE), endorsed IECEx as the world’s best practice model for demonstrating conformity in the highly-specialized Ex field. Both IECEx and UNECE have a common goal: to promote the safety of equipment, services and personnel associated with explosive areas throughout the world.

Electrical and mechanical energies: a holistic approach...
The interoperation between electrical and mechanical energies has existed for a long time and the need to provide a holistic solution to cover both is vital to industry and the community. For instance, an electric motor for use in an Ex environment is designed and manufactured to meet minimum safety standards and may be covered by IECEx Certification, but until now the mechanical items driven by the electrical motor, e.g. pumps, gearboxes, and so forth, were ignored and left to the many differing local requirements.

This is no longer the case. In response to Ex industry demands, IECEx has worked on integrating new International Standards covering non-electrical equipment into its operation. Certificates can now be issued to show compliance of mechanical items, with the minimum safety standards set out in the new ISO/IEC 80079 and ISO 80079 series of International Standards developed and maintained by Subcommittee (SC) 31M of IEC Technical Committee (TC) 31: Equipment for explosive atmospheres.

...and the first Certificates
In February 2016, IEC SC 31M: Non-electrical equipment and protective systems for explosive atmospheres, published two Standards in the 80079 series:
- ISO 80079-36, Explosive atmospheres – Part 36: Non-electrical equipment for explosive atmospheres – Basic method and requirements
- ISO 80079-37, Explosive atmospheres – Part 37: Non-electrical equipment for explosive atmospheres – Non electrical type of protection construtional safety “c”, control of ignition source “b”, liquid immersion “k”

In June, the first Certificate for non-electrical equipment used in Ex areas – dosing pumps – was issued by INERIS, the French National Institute for Industrial Safety and Environmental Protection. And in September, two more Certificates were issued, by SGS Baseefa Ltd and SIRA Certification Service, respectively for cabinet coolers and sensing devices.

Training
In support of the IECEx Certified Persons Scheme, IECEx responded to further industry requests to provide a qualification programme that identifies Ex training organizations that would likely be able to assist a candidate in his/her preparation for the IECEx Certified Persons Scheme assessment process, and launched the IECEx Recognized Training Provider (RTP) Programme in May 2015.

There are currently 12 IECEx RTPs, in Australia, Asia and Europe, listed on the IECEx website; several others, currently at the application stage, may join them in the coming months. It is worth noting that one of the oil majors, PETRONAS of Malaysia, has successfully achieved IECEx RTP status for its own internal training facility.

IECEx Certificates accessible anytime, anywhere
IECEx was a pioneer when it launched its first mobile application in early 2013, providing easy access to all Certificates in the Certified Equipment Scheme. The upgrade of the original app in September 2015 was the occasion for the System to expand its offer with two additional apps covering the Service Facilities and Certified Persons Schemes.
End-users can synchronize the apps with the IECEx online Certificate System, as required. The offline mode provides advanced search capability and Certificates of Conformity (CoC) abstracts (simplified details), while the online version gives the full details of CoC.

With the abstracts, users can determine that the equipment has been installed or repaired in compliance with the relevant International Standards or that a person working on an Ex site has the required level of competence and skills. They can immediately verify the authenticity of a Certificate as the IECEx On-Line Ex Certificate System holds the definitive original certificate.

**Promoting the System**

In the past 12 months, IECEx Secretariat and Officers attended and made presentations at various key industry events, such as those organized by the Petroleum and Chemical Industry Committee (PCIC) in Europe, North America and the Middle East.

IECEx and Trainor, a Norwegian company offering training, consultancy services and hire of qualified personnel within the areas of electrical safety, automation and processes within the oil and gas sector – and one of the RTPs – jointly organized a Korean Shipbuilding Industry Roadshow in April 2016.

In 2016, the annual IECEx Industry Symposium took place in Singapore in June and the annual IECEx Management Committee meetings were held in Umhlanga, South Africa, in early September.

The next major event is set for April 2017: a two-day International Conference to be held in Shanghai, China. Information about the event (programme and logistics) will be posted on the IECEx website.

**Distinction for IECEx experts**

Two IECEx experts, Günter Gabriel (Germany) and Garry House (New Zealand), were nominated to receive the 2016 IEC 1906 Award, which recognizes exceptional recent achievements that contribute in a significant way to advancing the work of the Commission.

These, along with the contribution of past recipients of the 1906 Award, have made IECEx the success story of today. It is worth noting that in 2015, Ralph Wigg was awarded the prestigious Thomas A. Edison Award in recognition for his leadership and dedication to the development of the IECEx Certified Persons Scheme.

The gathering of a great number of experts over the past 20 years has created an international network that continues to gain respect worldwide.

To quote IECEx Chairman Thosten Arnhold: “In addition to being the centre of excellence in the area of Ex compliance, IECEx provides industry with real and practical solutions as a “one stop” for all compliance matters, which is no doubt why the United Nations via the UNECE formally endorses IECEx as the world’s best practice model.”

More information: www.iecex.com
Smart and connectivity are two of the words that probably best describe our society in the 21st century. Everyone and everything is connected nowadays. Cities, buildings, transportation means, mobile devices are becoming smarter. Even the most mundane objects – the smart frying pan is a good example – have their connected version.

Smart, smarter, smartest
All this connectivity, all this smartness would not be possible without electronic components, sensors in the first place. Sensors are what make devices smart, and they have become smart themselves. They form a crucial and integral part of the Internet of Things (IoT), i.e. “the increasingly prevalent environment in which almost anything imaginable can be outfitted with a unique identifier (UID) and the ability to transmit data over the Internet or a similar network”, according to the IoT Agenda.

Key technology
Sensors, smart or not, and sensor systems are a key underpinning technology for a wide range of applications. They can be used to improve quality control and productivity in manufacturing processes by monitoring variables such as temperature, pressure, flow and composition. They help ensure the environment is clean and healthy by monitoring the levels of toxic chemicals and gases emitted in the air, both locally and – via satellites – globally. They monitor area and regional compliance with environmental standards. They enhance health, safety and security in the home and workplace through their use in air-conditioning systems, fire and smoke detection and surveillance equipment. They play a major role in medical devices, transportation, entertainment equipment and everyday consumer products.

Technological innovations have brought a new generation of tiny sensors, such as microelectromechanical systems (MEMS) and nanoelectromechanical systems (NEMS). These are smaller, smarter and can be integrated into fixed and portable devices.

But whatever the size of the sensor, the device has to be accurate and reliable. Whatever it measures, the measurement has to be extremely precise. A defective sensor can have serious consequences, even putting human lives in jeopardy.

Safe, reliable and cost-effective
Sensor manufacturers and suppliers all over the world have a powerful tool at their disposal, enabling their products to meet the strictest requirements:

- IECQ testing and certification. IECQ is the IEC Quality Assessment System for Electronic Components.

As the worldwide approval and certification system covering the supply of electronic components, assemblies and associated materials and processes, IECQ tests and certifies components using quality assessment specifications based on IEC International Standards.

In addition, there is a multitude of related materials and processes that are covered by the IECQ Schemes. IECQ certificates are used worldwide as a tool to monitor and control the manufacturing supply chain, thus helping to reduce costs and time to market, and eliminating the need for multiple re-assessments of suppliers.

IECQ operates industry specific Certification Schemes:

- IECQ AP (Approved Process)
- IECQ AP-CAP (Counterfeit Avoidance Programme)
IECQ AC (Approved Component)
- IECQ AC-TC (Technology Certification)
- IECQ AC-AQP (Automotive Qualification Programme)
- IECQ Scheme for LED Lighting (LED components, assemblies and systems)

IECQ Avionics
IECQ HSPM (Hazardous Substances Process Management)
IECQ ITL (Independent Testing Laboratory)

While most of these Schemes have been in place for many years and are widely used by electronic component manufacturers and suppliers, IECQ AC-AQP and the IECQ Scheme for LED Lighting, both under the umbrella of the IECQ Approved Component Scheme, are more recent but very promising and well received by industry players throughout the world.

Addressing the needs of the automotive sector
IECQ AQP gives the automotive industry a standardized and cost-effective way of testing the components to ensure they meet expected quality, safety and reliability requirements. This way, automotive manufacturers know how the performances of components compare. IECQ AQP helps automotive manufacturers avoid multiple second party assessments, tests and related costs.

IECQ Scheme for LED Lighting
The new IECQ Scheme for LED Lighting, developed in 2015, can be applied to certify manufacturers and suppliers of electronic components, modules and assemblies used in the production of LED packages, engines, lamps, luminaires and associated LED ballasts/drivers. It provides a standardized approach for evaluating suppliers and is used as a powerful supply-chain management tool when assessing and monitoring the various tier-level suppliers.

This removes the cost burden of monitoring and controlling the supply chain by reducing the number of “second party” assessments and audits, from the original equipment manufacturers (OEMs) to their suppliers, while also protecting the OEM brand name in the market. This also helps prevent poor-quality LED systems from entering the market.

During its April 2016 meeting, the IECQ Management Committee finalized and approved for publication the new Rules of Procedures and Operational Documents addressing the certification of manufacturers and suppliers of components used in LED lighting systems.

IECQ Chair and experts to receive IEC Awards
The IEC Conformity Assessment Board (CAB) will bestow the Thomas A. Edison Award on Marie-Elisabeth d’Ornano, Chair of IECQ, in recognition of outstanding contribution to IEC work. She will receive the Award at the CAB meeting on 10 October, during the IEC General Meeting in Frankfurt.

Two IECQ experts, Howard Brewer (UK) and Joe Lee (US), were nominated to receive the 2016 IEC 1906 Award, which recognizes exceptional recent achievements that contribute in a significant way to advancing the work of the Commission.

Focus on supply chain management
As part of the annual IECQ meetings, in Paris, France, a one-day conference on International Supply Chain Management included presentation on key components of effective supply chains and the role played by IECQ, the control of hazardous substances in the supply chain and counterfeit avoidance.

Reaching out to industry
IECQ reached out to industry through participation at several international events in the past 12 months, including:
- Taitronics in Taiwan
- AutoTronics
- IECQ Auditor training in China and Chinese Taipei

Certificates
The IECQ On-Line Certificate System is the repository of all IECQ-issued certificates. Accessing the database provides industry with instant verification of any claims of compliance.

More information: www.iecq.org
Ensuring renewable energy systems are safe

IEC promotes the development of renewable sources for electricity production through standardization and certification

Antoinette Price

Renewable Energy (RE) plays an increasingly important role in providing global populations with clean, affordable, sustainable energy. RE production and use continues to increase thanks to the falling cost of equipment and installation.

Testing already underway

Like any products and services, equipment used to produce renewable energy, such as solar panels, wind turbines or wave energy convertors, must be safely installed and maintained, as well as function reliably.

A number of IEC Technical Committees (TCs) produce International Standards for the technical performance and safety of renewable energy systems (see below). IECRE (IEC System for Certification to Standards Relating to Equipment for Use in Renewable Energy Applications) provides a framework within which to test and certify that RE equipment and systems fulfil the requirements of these Standards.

Established in June 2014, the IECRE now has 15 Members. Its marine, solar PV and wind energy sectors have been working to put rules, processes and structures in place. Testing is underway and the first certificate for wind power is likely to be issued this year.

Awarding excellence

During the IEC GM in October 2015, Jonathan Colby, Chair of the Marine Energy Operational Management Committee (ME-OMC) and Convenor of the Renewable Energy Management Committee (REMC) WG001: Task Force and rules of procedure, now disbanded, received the *1906 Award in recognition of his commitment to RE. As well as establishing marine energy International Standards, he was given the Award for his meticulous and enthusiastic leadership in key positions and dedication to IECRE work.

Colby is also Technical Advisor of the US Technical Advisory Group to IEC Technical Committee (TC) 114: Marine energy – Wave, tidal and other water current converters, where his involvement in the IEC began in 2008. He is currently Director of Technology Performance for Verdant Power, a tidal energy technology developer based in New York City.

A global player in RE standardization

IEC works with a number of global organizations who develop standards for RE. Towards the end of 2015, the International Renewable Energy Agency (IRENA) launched an online platform called INSPIRE, which offers users access to 400 RE standards and more than two million patents.

Users can find information about IEC Technical Committees involved in RE standardization, including:

- IEC TC 1: Terminology
- IEC TC 4: Hydraulic turbines
- IEC TC 57: Power systems management and associated information exchange
- IEC TC 82: Solar photovoltaic energy systems
- IEC TC 88: Wind energy generation systems
- IEC TC 114: Marine energy – Wave, tidal and other water current converters
- IEC TC 117: Solar

*The 1906 Award is bestowed on technical experts around the world whose work is fundamental to the IEC.
Thermal Electric Plants, as well as the International Standards developed by these TCs. A number of other IEC publications, for example, White Papers are also available on the site.

In addition to standards and patents, INSPIRE offers a wealth of information about standards, how they can be used, why they are important for quality assurance, investor confidence and technology training.

**Participating in international events**

Representatives from IECRE have begun participating in international events. During IRENA Innovation Week in May, Frank Ormel, Chair of WE-OMC (wind) presented at the session entitled *Energy systems modelling and planning*, where he talked about the IECRE system and highlighted some of its benefits.

“IECRE aims to offer a harmonized approach around the world, which ensures uniform implementation and mutual recognition between certification bodies and test labs.”

The System comprises national member bodies, experts from industry who make up the working groups as well as stakeholders, including certification bodies, test laboratories, original equipment manufacturers (OEMs) and end users, which broaden the scope of participating parties.

Ormel emphasized the fact that IEC recognized Certification Bodies and Test Laboratories themselves fulfil high-level requirements so as to be able to carry out the quality assessments. This is in line with the goal for IEC certified equipment and services to be widely accepted, for example, by local and national authorities.

Also speaking at the event, Vimal Mahendru, IEC Ambassador and Convenor of the IEC Systems Evaluation Group for low voltage direct current (LVDC) applications, distribution and safety for use in developed and developing economies (SEG 4), participated in the session entitled *The future grid: electric highways*.

LVDC also supports much technology used today, from electric vehicles, RE technology, kitchen appliances, lighting, transport, to smartphones and tablets. Systems with data and embedded electronics, such as the IoT, smart homes and smart cities run on it.

IEC SEG 4 is tasked with evaluating the status of standardization in the field of LVDC applications and products, as well as identifying new areas for standardization work.

More information: www.iecre.org
Claire Marchand

Africa is the world’s second-fastest-growing region, topped only by emerging Asia. Over the coming years the African economy is expected to grow by 7.7% annually – almost double the rate of advanced economies. Even though Africa is starting from a low point, corresponding roughly to where Southeast Asia was 30 years ago, the opportunities are huge. Already now Africa is third in terms of investment, right after the European Union and China. A more reliable infrastructure and consistent energy access could significantly accelerate this trend.

Electricity access is a must

Today, according to World Bank statistics only about 24% of sub-Saharan Africa has access to electricity.

Going forward, African countries will need to produce more electric power faster than ever before. Many different solutions will need to be considered for this. Africa has an abundance of natural resources; the whole continent is basically one big solar panel. It has also wind and lots of water. And yet, 93% of Africa’s hydropower potential remains underdeveloped. Over 80% of African electricity generation is still from fossil fuels. Long-term energy security would benefit from adding other energy sources to the mix.

IEC-AFRC: focal point for the region

The IEC counts 48 countries in Africa. Eight are IEC Members and 40 are already involved with the IEC Affiliate Country Programme. And while some are really benefitting from the Programme, others may need assistance in finding out how to make better use of what it offers free of charge.

As the regional focal point for Africa, the ultimate aim of IEC-AFRC, the Regional Centre for Africa, is to become a technical centre that helps coordinate IEC work as the other Regional Centres do. It will achieve this by offering training and technical assistance and raise the awareness of IEC International Standards and the IEC Conformity Assessment (CA) Systems, both among governments, regulators and local industries.

Through visits and support to IEC Members and Affiliate Country Programme participants in the region, the Centre provides a link between the IEC and all African countries. It will also work closely with the African Electrotechnical Standardization Commission (AFSEC), the African Union and other regional bodies that are important for African development, and involve more African countries, at governmental level, in IEC work.

IEC-AFRC official opening

On 2 November 2015, the IEC officially inaugurated its new Regional Centre in Nairobi, Kenya, in the presence of African dignitaries, many international experts and representatives from IEC Members and Affiliate countries.

The day started by a workshop on how to bring safe and sustainable power access to everyone in Africa. Presentations gave a good overview of the situation in the region and local enterprises and organizations showed that solutions do exist (e.g. solar lamps and more extended use of renewable energies). IEC shared the experience of its conformity assessment activities within IECEE, the IEC System of Conformity Assessment Schemes.

IEC-AFRC Directors, François Ahoti and Evah Oduor

IEC-AFRC fully operational

IEC reinforces global presence with regional centre in Africa

The IEC-AFRC offices are in Nairobi, Kenya
for Electrotechnical Equipment and Components and IECRE, the IEC System for Certification to Standards Relating to Equipment for Use in Renewable Energy Applications.

The second part of the event was the inauguration as such. Among the speakers were Yinbiao Shu, IEC Vice President, Claude Koutoua, AFSEC President, Abel Didier Tella, General Secretary of the Association of Power Utilities of Africa (APUA) and Charles O. Ongwae, Managing Director of the Kenya Bureau of Standards (KEBS). H.E. Adan Mohamed, Minister of Industrialization and Enterprise development, officially declared the Regional Centre open.

The IEC-AFRC team
Evah Oduor, IEC Coordinator for Africa since 2008, has represented the IEC at regional and international fora. Her long experience in standardization, conformity assessment and metrology is an important asset for the Centre.

François Ahoti comes to the IEC from the United Nations Industrial Development Organization (UNIDO) where he was Chief Technical Advisor for a European Union-funded project to improve quality infrastructure in Haiti. Ahoti acquired extensive experience in certification, conformity assessment, management systems and quality tools when working for the National Standards Body of Côte d’Ivoire (CODINORM). He also helped establish and structure IEC National Electrotechnical Committees in Côte d’Ivoire and Haiti.

First steps
In December 2015, Ahoti presented the newly launched IEC Africa Regional Centre at an event held by UNECE in conjunction with the WTO 10th Ministerial Conference in Nairobi. The workshop on the role of standards and regulatory frameworks was the occasion for IEC-AFRC to present its role and action plan and to show how IEC International Standards and Conformity Assessment Systems facilitate trade in Africa.

IEC-AFRC participated in a bilateral Côte d’Ivoire-Morocco workshop on rural electrification in Abidjan in January 2016. The workshop aimed at speeding the development and emergence of local enterprises on the rural electrification market to support the energy policy of Côte d’Ivoire.

IEC shared its expertise and informed the participants on its series of International Standards and Technical Specifications for decentralized electrification systems, as well as on IECRE.

Region by region: West Africa...
The first trip made by IEC-AFRC in February 2016 was a visit to IEC Affiliates in West Africa – Burkina Faso, Côte d’Ivoire, Gambia, Ghana, Morocco, Nigeria, Senegal and Tunisia – to develop contacts and evaluate the need for assistance to enhance their participation in IEC work. The visits included meeting with NEC members and key stakeholders.

They undertook a second trip to the region in July 2016. In Mauritania, they were present at the inauguration of the Mauritanian National Electrotechnical Committee (NEC) and at a two-day workshop that brought together representatives from the electrotechnical sector. The IEC-AFRC team presented the benefits of participating in IEC standardization and CA work as well as the role of the new Regional Centre for Africa.

In Mali, a seminar took place during the team’s visit to reinforce the country capacity to adopt and use IEC International Standards, build CA capacities and facilitate full participation in IEC work as an Affiliate Country.

During this trip, they also visited Benin and Niger.

...Southern and East Africa
They provided training sessions for the Affiliate NECs in Namibia and Botswana and, while in the latter, took the opportunity to visit the Southern African Development Community (SADC) headquarters in Gaborone. In South Africa they attended the annual Utility Week in Cape Town and went on

Group photo taken on IEC-AFRC opening day
to Pretoria to participate in a strategic workshop organized by the South African National Committee, a Full Member of the IEC. Burundi, Rwanda and Uganda were also on their agenda.

The IEC-AFRC team is planning other tours later on this year: Central Africa in September and Southern Africa in November.

**Contacts with regional organizations**

The IEC-AFRC team also made contact with regional organizations such as the African Organization for Standardization (ARSO), the Economic Community of West African States (ECOWAS), the West African Economic and Monetary Union (UEMOA), and the East African Community (EAC). They presented the objectives and purpose of IEC-AFRC and how one could develop synergy to enhance participation in IEC work to boost the development of the electrotechnical standardization sector in Africa.

IEC-AFRC took part in the ECOWAS Technical Management Committee meeting (TMC) and its Industry Ministers meeting where 30 IEC International Standards have been recommended for national adoption within the 15 ECOWAS Member States.

They also attended the ARSO General Assembly in Tanzania where they could meet with the newly-appointed NEC Secretary.

*Up to 5,000 local people in the Shompole/Oloika area in Kenya can benefit from the solar plant operated and maintained by the local Cooperative (Photo: Energy for Development (e4D) Network)*

*Africa has near endless natural energy resources – DRC river*
Welcome to Kuwait
The country is the newest IEC member

Claire Marchand

In August 2016, Kuwait became the 84th IEC Member, joining a growing community of countries involved in electrotechnical standardization and conformity assessment.

Basic facts
Situated at the tip of the Persian Gulf, Kuwait shares borders with Iraq and Saudi Arabia. It has a population of 4.2 million and its capital is Kuwait City.

Petroleum accounts for nearly half of the Kuwaiti gross domestic product (GDP) and roughly 95% of export revenues and government income. Kuwait also has a well-developed banking system; the National Bank of Kuwait is the largest bank in the country and in the Arab world.

Total electricity production amounts to 57 billion kWh while electricity consumption reaches approximately 50 billion kWh (2013 est.). All energy generated comes from fossil fuels.

Regional interests
The country has been a member of the Gulf Cooperation Council (GCC) since its inception in 1981, together with Bahrain, Oman, Qatar, Saudi Arabia and the United Arab Emirates (UAE). As such it also belongs to the GCC Standardization Organization (GSO). With the arrival of Kuwait, all GCC countries are now IEC members as well.

Kuwait in the IEC
The electrotechnical interests of Kuwait in the IEC are represented by the Kuwait National Committee for Electrical and Electronics (KNCEE), the new IEC National Committee (NC). The NC stakeholders are experts and professionals from different sectors such as the Public Authority for Industry (PAI), the Ministry of Electricity and Water, laboratories, consumers, manufacturers, the petroleum industry, Kuwait University and the Public Authority for Applied Education and Training (PAAET).

The President of KNCEE is Fahhad S. Al-Mutairi, who is Assistant Undersecretary Deputy Director General for Standards & Industrial Services Affairs of PAI. The Secretary is Hessah S. Mohammed, who is Standards and Metrology Engineer at PAI.

Today the IEC counts a total of 169 countries, of which 84 are Members and 85 participate in the Affiliate Country Programme.
IEC Family

The IEC next generation steps up to the mark

IEC Young Professionals – 2016 workshop

Janice Blondeau

IEC National Committees have selected the IEC 2016 Young Professionals who will represent them at this year’s workshop, to be held in Frankfurt, Germany, from 10-12 October 2016, in parallel with the IEC 2016 General Meeting.

Go Ahead, Get ahead

The IEC Young Professionals (YP) Programme brings together the world’s up-and-coming expert engineers, technicians and managers, aged in their early 20s to mid-30s. IEC Young Professionals are selected by their IEC National Committee (NC) to represent their country as future leaders on the IEC global platform. They are also potential ambassadors for National Committees and for the IEC as a whole.

While these young experts and managers already have experience in using or developing standards, the Programme helps them to become more involved in IEC-related activities.

Growing our expert base

For the 2016 workshop, more than 40 NCs have registered over 80 participants. For many of those taking part, this workshop will be their first exposure to an IEC General Meeting and to standardization and conformity assessment at such a high level.

The IEC Young Professionals Programme was launched in 2010 to enable millennials to be more involved in IEC activities at the start of their careers. In the first six years of the IEC Young Professionals Programme, 335 YPs from more than 40 different National Committees have taken part.

Frankfurt workshop

The 2016 workshop starts with a welcome gathering on the first evening where participants will get to meet each other and the IEC Officers. Then follows a programme that gives both an overview and insights into the workings of the IEC. Day one provides an introduction to how the IEC works and the opportunity to hear from and meet IEC leaders. Participants will be introduced to the Standardization Management Board (SMB) and the Conformity Assessment Board (CAB), and they’ll have the opportunity to observe the SMB or CAB meeting. YPs will have the opportunity to work together in breakout groups to answer questions submitted from the SMB and CAB.

On the 2nd day of the workshop the IEC Young Professionals will attend a breakfast with their NC Officers to reinforce this relationship which plays an important part in getting more involved in IEC activities, helping identify the opportunities that are available for the YPs at national and international level. The YPs will also observe a technical meeting of their choice, participate in a technical meeting simulation session and present their outcomes from the breakout sessions of the day before. In the evening the YPs will have the opportunity to network with the wider IEC Community, especially with TC/SC Chairs.

On the 3rd day the YPs will chose to attend one of four interactive sessions and then will be a part of the Reinvention Lab where they will be asked to give their input into future challenges the IEC faces in regards to the next IEC Masterplan. In the afternoon the Host Committee has organized an industry visit to the VDE Testing Institute for the YPs.

Since its inception in 2010, 335 Young Professionals have participated in the Programme.
In addition, the 2015 Young Professional Leaders (YPLs) will be present at the workshop and will have an active role in it. This year’s workshop takes into account feedback received from participants of previous years’ activities.

Part of the IEC Family
Positive feedback has come from YPs who participated in the previous YPP workshops. They have gained a deeper understanding of standardization, a broadened network and the satisfaction of feeling part of a bigger world in which they have a personal role to play.

Companies have also benefited from the workshop, providing their staff with fast-track access to the world of standardization and boosting their personal motivation.

Let’s help the IEC Young Professionals to continue to develop in their IEC work and make these Young Professionals welcome within the IEC Family.

For many, the workshop is their first exposure to standardization and conformity assessment at such a high level.

Breakout sessions give YPs the opportunity to work together and answer questions submitted by the SMB and CAB.

Growing and thriving
Years of support, training and reaching out bear fruits

Claire Marchand
The Affiliate Secretariat team has been very busy since the IEC General Meeting (GM) in Minsk, Belarus. As always, workshops, seminars and conferences, mentoring and training, preparation for the next GM were on the agenda.

More hectic agenda
What makes a difference perhaps is the ever growing number of events attended by the team of two – Executive Affiliate Secretary Françoise Rauser and Project Coordinator Thomas Robertson – or those representing the Affiliate Country Programme in their respective regions, i.e. the Affiliate Leader, Rosario Urias, and the Regional Directors of the IEC Regional Centres in Asia-Pacific (IEC-APRC), Latin America (IEC-LARC) and more recently Africa (IEC-AFRC).

Not forgetting the nitty-gritty of the Programme: supporting, and giving advice to individual Affiliate countries upon request; encouraging more active participation in the Programme and the adoption of IEC International Standards as national ones; assisting in the establishment of National Electrotechnical Committees (NECs); liaising with IEC Members to set up partnerships for the Affiliate Mentoring Programme; and taking the time to explain what is expected of new countries wishing to join the Programme and what the benefits are, and so forth.

New countries on board
Since the Minsk GM, two countries have joined the IEC Affiliate Country Programme: Uzbekistan, in October 2015 and Syria in early July 2016. Together with Kuwait, which became an IEC Member in August 2016,
they bring the total number of countries in the IEC Family to 169 – 84 Members and 85 Affiliates.

Uzbekistan is affiliated through its national standardization body, UZSTANDART; Syria, through the Syrian Arab Organization for Standardization & Metrology (SASMO) which is part of the Ministry of Industry.

The next step for both countries is now to bring together stakeholders from the private and the public sectors to establish a NEC and start benefitting from what the IEC can offer to support trade and development.

**Conferences, workshops and seminars**

**IEC-PTB workshop**

IEC and PTB, the National Metrology Institute of Germany, organized a workshop on quality infrastructure and its link to energy management, in Tashkent, Uzbekistan in January 2016. The event brought together some 100 participants from the business sectors interested in energy management, the Uzbek National Standards Body (UZSTANDARD), public utility companies and other institutions.

The workshop was followed by an IEC workshop for UZSTANDARD and potential NEC stakeholders, including the International Solar Energy Institute (ISEI), cable manufacturers and the public electricity company. The objective was to discuss what joining the Affiliate Country Programme entails as well as the needs and benefits of setting up a NEC.

**Second Africa Smart Grid Forum and 5th AFSEC GA**

The IEC participated actively in the Second Smart Grid Forum for Africa held in Cairo, Egypt in March 2016. Several IEC international experts shared their expertise, including the convener of IEC Systems Committee (SyC) Smart Energy and the convener of IEC Systems Evaluation Group (SEG) 6: Non-conventional Distribution Networks/Microgrids. The forum included six technical sessions, workshops and ministerial discussions. It was opened by the President of the IEC National Committee (NC) of Egypt and the President of the African Electrotechnical Standardization Commission (AFSEC).

The AFSEC 5th General Assembly and the third meeting of the SEG 6 experts were also held in Cairo, straight after the Forum.

**SADC, 30th General Assembly**

The IEC Coordinator for Africa, Evah Oduor – now one of the IEC-AFRC Directors – represented the IEC at the 30th General Assembly of the Southern African Development Community (SADC) in Kinshasa, Democratic Republic of Congo. SADC brings together 15 countries, which are all part of the IEC Family (14 Affiliates and one Full Member, South Africa). The idea was to present IEC activities, in particular the participation of the SADC Region. There was a great deal of interest in IEC International Standards for national adoption as a number of regulatory organizations are referencing them in their regulations.

**DCMAS Network annual meeting**

The IEC met with its partners of the DCMAS Network in Paris, France, in March 2016 to exchange experiences, update one another on specific developments. Discussions focused on collaborative action in assisting developing countries to reinforce their national quality infrastructure, including metrology, standardization, conformity assessment (CA) and accreditation aspects. Present at the DCMAS Network meeting were the Bureau International des Poids et Mesures (BIPM), the International Trade Centre (ITC), the UN Economic Commission for Europe (UNECE), the International Organization of Legal Metrology (OIML), the International Laboratory Accreditation Cooperation (ILAC) and the International Accreditation Forum (IAF), ISO and the UN Industrial Development Organization (UNIDO).

**ARE Forum**

In April, the Alliance for Rural Electrification (ARE) organized the Africa-European Union Renewable Energy Cooperation Programme (ARE-RECP) Off-Grid Investment Forum 2016 in Amsterdam, Netherlands.
The IEC was represented and took part in a panel discussion on Talking Business and investment in Asia with hybrid minigrids and Facilitating rural electrification in developing countries through the use of IEC International Standards and CA Systems.

The event gave the IEC the opportunity to meet with regulators, private companies and investors, to better understand the challenges they faced and offer tailored advice on how to make best use of what the IEC can provide in terms of solutions for rural electrification.

IEC expands collaboration with Arab-speaking countries
In April also, Françoise Rauser and IEC-AFRC Regional Director François Ahoti attended the Arab Industrial Development and Mining Organization (AIDMO) 46th meeting of the High Consultative Committee for Standardization (HCSC) in Rabat, Morocco. AIDMO is in charge of implementing the Regional Arab Quality Infrastructure for 2014-2018. Seventeen AIDMO countries are part of the IEC, either as Members (12) or Affiliates (5).

Ahoti’s previous visit to the Moroccan NC led to an invitation for the IEC to present its activities, in particular its Programme for developing countries. The objective was to encourage all AIDMO members to take an active part in IEC work and to invite Djibouti, Somalia and Syria to join the Affiliate Country Programme (Syria joined the Programme in early summer).

Following this meeting, in June, AIDMO signed a Collaboration Pledge with the IEC to encourage its members that are also IEC Affiliates to participate actively in the Affiliate Country Programme.

Educating the younger generation
Rosario Uría, IEC Affiliate Leader since January 2015, attended the Pan American Standards Commission (COPANT) General Assembly in Guayaquil, Ecuador, in April 2016. Her presentation focused on an overview of INACAL, Peru’s National Standards Body and a member of COPANT, and the International Standardization Olympiad, where the Peruvian team won the Gold Medal. She explained that Peru has set up a National Standardization Olympiad to develop a quality culture and encourage creativity among students of the secondary level, the ultimate goal being to find sustainable solutions to everyday life problems through the use of standards. The IEC Affiliate Leader also updated the General Assembly on the IEC Affiliate Country Programme, including new guides and forthcoming guidelines for NECs.

World Trade Organization WTO TBT Committee
The IEC attended the WTO Technical Barriers to Trade (TBT) Committee meetings in November 2015, March and June 2016, and presented its reports highlighting activities of the IEC, its Members, Affiliates and Regional Centres geared to increasing the participation of developing and industrializing countries in IEC international standardization and CA activities.

WTO/ESCAP Regional Workshop
Last November in Bangkok, Thailand, IEC-APRC Director Dennis Chew attended the workshop, jointly organized by WTO and the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), on WTO Agreements on Sanitary and Phytosanitary Measures and Technical Barriers to Trade for Asia. He gave an overview of the IEC and its Affiliate Country Programme to participants, mostly government regulators and trade officials.

WTO national workshop in Bolívia...
The workshop, held in Bolívia in February, focused on Technical Barriers to Trade and the importance of International Standards, regional organizations and technical regulations for international trade. It also addressed how the local government can participate on TBT issues. IEC-LARC Regional Director Amaury Santos presented IEC standardization activities.

...and Zimbabwe
In May, the WTO held a national workshop in Harare, Zimbabwe.

Renewable energies were part of the discussions at the second Africa Smart Grid Forum, Cairo, Egypt – here the Gamesa wind farm near the Red Sea (Photo: Gamesa)
on the main provisions of the TBT Agreement, including transparency and notifications, the work of the TBT Committee and International Standards and systems for conformity assessment. On the request of Zimbabwe, an IEC Affiliate, the WTO invited the IEC to share its expertise in international standardization and CA. IEC was represented by Paul Johnson, Secretary of the South African NC and AFSEC Executive Secretary.

**Mentoring**

In the past year, a new partnership, between Ecuador and Mexico, has been established in the Mentoring Programme for Affiliate Countries. The IEC Affiliate countries and their respective mentors have committed for a period of two years to reinforce their NEC through a number of activities, including identifying and reaching out to relevant stakeholders, increasing the number of national adoptions of IEC International Standards and establishing mirror technical committees.

To date, 11 partnerships have been established under the Mentoring Programme for Affiliates: Afghanistan-Malaysia, Bhutan-Sweden, Côte D’Ivoire-France, DR Congo-France, Ecuador-Mexico, Ethiopia-Germany, Mongolia-Germany, Peru-Mexico, Rwanda-Austria, Uruguay-Norway, Zambia-Austria.

**ACAS e-Learning modules**

To raise awareness and provide a better understanding of the specific requirements linked to CA activities, the IEC Affiliate Country Programme Secretariat launched the Affiliate Conformity Assessment Status (ACAS) in 2013.

As part of ACAS, the IEC provides e-Learning modules to further the Affiliate Country participants’ understanding of and involvement in IEC CA activities. Two ACAS e-Learning modules are now available on the IEC website, covering IECEE and the CB Scheme, IECEx. The IECRE modules are expected to be ready soon, followed by IECQ.

**IECEE EASC ACAS Regional Seminar**

The IEC collaborated with the Euroasian Interstate Council (EASC) to hold an IECEE ACAS seminar on 20-21 April 2016 in Baku, Azerbaijan. After a general overview of the IEC and its CA Systems, the seminar focused on the IECEE CB Scheme, the application of IEC International Standards in a laboratory setting, and preparing a laboratory for operation in the IECEE CB Scheme. Around 30 delegates with a background in certification and testing came from the EASC region, including Azerbaijan, Belarus, Kazakhstan, Moldova, Russian Federation, Uzbekistan and Ukraine.

**Affiliate Plus, adoptions and NECs**

Since the Affiliate Country Programme began in 2001, more than 5,700 IEC International Standards have been adopted as national ones in 48 Affiliate countries, five of which have become IEC Members.

To date 50 countries have established their NEC with representatives of the public and private sectors, and 27 have become Affiliate Plus.

To qualify and upgrade to Affiliate Plus, countries have to fulfil two criteria:
- Adoption of at least 50 IEC International Standards as national ones or for reference in national regulations
- Establishment of a NEC with representatives from both public and private sectors

More information on the Affiliate Country Programme: www.iec.ch/affiliates/
Oil for the machine
IT activities facilitate the work of the community

Gabriela Ehrlich
For many years the IEC IT Department has provided services for the IEC community, i.e. the thousands of people in the National Committees (NCs) and Technical Committees and Subcommittees (TC/SCs). As a reminder, the IEC was a pioneer in introducing 100% electronic environment for its standardization work in the early 2000s. Since then, the number of IT services available has grown tremendously.

Managing standards projects
In line with the Standardization Management Board (SMB) decision to empower its technical leadership, IT is now putting in place an online system to support the project management aspects of standards development. New tools and services that will enable the online submission of documents and a dashboard for TC officers are due for delivery at the end of 2016.

Modernizing standards development
A wide range of IT activities are geared to modernizing standardization work in the IEC. Our vision calls for a platform enabling online collaborative development of Standards, and providing new opportunities to deliver innovative standards-related products and services to the broadest possible range of IEC stakeholders and end users. A ‘working model’ of a new standards development and business platform was shared with National Committees at the General Meeting in Minsk in October 2015 and an update was provided to the whole community through the SMB newsletter in June 2016. To lay the foundations for the new platform, an initial activity addresses the transformation of the current standards catalogue (7 000 publications) from Word format to XML. This process is expected to take around 2 years to complete. The plan is to also provide new collaboration tools to experts. NCs and TCs have been invited to participate in a reference group supporting this project.

Inviting comments from the public
To ensure transparency of standardization projects as well as broad participation of interested stakeholders, members of the public can now create a profile on the IEC website allowing them to preview and comment on current draft IEC Standards. The comments will be forwarded to the commenter’s local National Committee. This gives IEC National Committees and Affiliate National Electrotechnical Committees new opportunities for increased outreach to stakeholders in their territories and encourages increased national input to IEC drafts.

The other side of the coin
IEC IT equally supports the IEC Conformity Assessment Systems in their work. Recently a new website was launched for IECEE. It aligns in look and feel with the other CA sites, offering vastly improved navigation.

The site is driven by a completely rebuilt global Oracle database, offering access to a fully integrated backend for updates from authorized IECEE Members.

For IECEx, IEC IT developed and deployed a number of mobile applications for accessing online and offline certificates for equipment, persons and service. An improved user interface was implemented for the IECEx online certificate site. Going forward, IT will develop a new harmonized platform to enable support of online certificate systems for all IEC CA Systems.

Transparent communication on new IT projects
The IT department has recently launched an online platform through which IT plans and project status reports can be shared with relevant stakeholders. The platform has been particularly well received by NCs and TCs, and is being used to request feedback and to enable open discussion about new ideas and concepts for tools and services.

Standards and conformity assessment are like two sides of a coin: only together do they deliver real value

The IT Department is working on a new standards development and business platform
Every year the IEC honours the commitment and work of a number of individuals in its community who, through their leadership and technical expertise, have contributed to making products and electrical systems safer, more energy efficient, more reliable and more compatible.

Lord Kelvin Award – the highest distinction of the IEC
Created and first bestowed in 1995, the IEC Lord Kelvin Award is named after the IEC first President, William Thomson, Lord Kelvin. It is the highest tribute of the IEC and is awarded in recognition of the long-term technical contributions that outstanding individuals have made to the Commission.

Nominations for the Lord Kelvin Award can be made by IEC National Committees (NCs), Technical Committee and Subcommittee (TC/SC) Chairs, and members of the Council Board (CB), Standardization Management Board (SMB) and Conformity Assessment Board (CAB). They submit their proposals based on their recognition of contributions made over time, irrespective of the nationality or technical area of the nominee.

To date, 34 laureates have received the Lord Kelvin Award. To qualify, candidates must still be active in the IEC and have contributed significantly to IEC work over more than five years. The award honours exceptional leadership and technical contributions to international electrotechnical standardization, Conformity Assessment (CA) or related activities. It recognizes the role of the awardee in promoting the image of the IEC worldwide and contributions to global trade and industry.

2016 IEC Awards
Recognizing excellence and commitment to the IEC

Uwe Kampet to receive the 2016 Lord Kelvin Award
The 2016 laureate is Uwe Kampet of Germany. A ceremony will be organized during the IEC General Meeting in Frankfurt, Germany, on 11 October 2016. He is to receive his gold medal, gold lapel pin and certificate from IEC President Junji Nomura.

For more than 20 years, Uwe Kampet has played a major role in IEC standardization and conformity assessment work.

From 2004 to 2015, Kampet was Chair of CIS/F: Interference relating to household appliances tools, lighting equipment and similar apparatus, a Subcommittee of CISPR, the international special committee on radio interference. Prior to that, he was the German head delegate to CIS/F from 1998 to 2004.

Thomas A. Edison Award
Created in 2010, the annual Thomas A. Edison Award recognizes exceptional achievements of TC/SC officers and
their IEC Conformity Assessment Systems counterparts.

To be nominated, TC and SC officers need to be active in IEC work. They must also have made an outstanding contribution to IEC systems and international standardization work, helping their committees to work more effectively on behalf of key stakeholders. The Award is given to up to nine recipients each year by the SMB and the CAB. Seven of these are reserved for TC/SC officers, and a maximum of two for officers in the CA bodies.

In 2016, the SMB chose six TC/SC Officers:
• Robert Arsenault, Secretary of TC 4: Hydraulic turbines
• Giovanni Cassinelli, Secretary of SC 23E: Circuit-breakers and similar equipment for household use
• Geoffrey S. Ibbott, past Chair of SC 62C: Equipment for radiotherapy, nuclear medicine and radiation dosimetry
• Yoshiaki Ichikawa, Chair of TC 111: Environmental standardization for electrical and electronic products and systems
• Maurice Montavon, Secretary of TC 5: Steam turbines
• Bernd Sisolefsky, past Chair of CIS/B: Interference relating to industrial, scientific and medical radio-frequency apparatus, to other (heavy) industrial equipment, to overhead power lines, to high voltage equipment and to electric traction

The 2016 IEC Thomas A. Edison Award laureates will receive their honours from IEC Vice-President and SMB Chairman Jim Matthews during the SMB session at the 2016 IEC General Meeting in Frankfurt.

The CAB will bestow the Award on:
• Marie-Elisabeth d’Ornano, Chair IECQ
• Heribert Schorn, IEC Coordinator in ISO CASCO WGs, representing IEC interests in ISO CASCO

1906 Award
The IEC 1906 Award was established in commemoration of the Commission’s foundation in that year and honours technical experts around the world whose work is fundamental to the IEC. Each year a maximum of five awards may be granted per TC, including its various subcommittees.

A total of 152 experts from 50 TCs (including ISO/IEC JTC 1) and 12 experts from the four CA Systems, representing 22 NCs. were nominated to receive this year’s 1906 Award. It recognizes exceptional recent achievements that contribute in a significant way to advancing the work of the Commission.
Moving cities to greater smartness
First World Smart City Forum: more than half a million city stakeholders reached

Gabriela Ehrlich
The first World Smart City Forum was held on 13 July 2016, co-located with the World Cities Summit in the Marina Bay Sands Expo and Convention Centre in Singapore. More than 300 participants joined the live event and listened to world experts who addressed, discussed and accepted live questions from audiences in the room and online. The event was simultaneously live-streamed to close to 1,000 online participants and IEC tweets reached well over half a million city stakeholders. The online community www.worldsmartcity.org has more than 1,000 active members.

Four pain points hold back Smart City development
During the Forum, discussions shaped around four pain points that are currently holding back Smart City development. Those include energy, water, cybersecurity/privacy as well as mobility.

Energy
Cities are giant systems with countless subsystems which require electricity for almost everything. Electricity fuels cars, subways and trains. It cools, heats and lights homes and businesses. It pumps water and processes food. It energizes telecommunications, web servers and data centres. Modern city management as well as efficient urban infrastructure would be impossible without a reliable electricity access and the ability to horizontally interconnect individual city systems and all the hardware that collects and shares data. In short: no electricity = no Smart City. The discussion can be viewed on: https://youtu.be/EP9tFmsVZ2A

Water
Going forward, cities need to be water resilient and make responsible use of resources. Appropriate water management will not only preserve and improve the environment; it also increases social welfare and the well-being of citizens. A smart, integrated set of technologies, solutions and systems can enable continuous monitoring, diagnosis and prioritization as well as facilitate maintenance and the management of issues. Among other things, the expert panel highlighted how data can help optimize all aspects of water production, distribution and treatment allowing cities to reach those objectives. The discussion can be viewed on: https://youtu.be/0cyhWmx2rSk

Cybersecurity and privacy
Cities increasingly depend on information and communications technology (ICT). With it the cybersecurity threat landscape for cities is evolving, from breaches of city data to more malicious assaults on urban infrastructure. The potential impact of cybersecurity attacks is of a magnitude that rivals major natural disasters. The panel discussed latest policies and essential governance priorities every mayor and city administrator needs to know to be confident their city is positioned for vibrant growth. The discussion can be viewed on: https://youtu.be/jnLYv17P4ol

Mobility
Cities need to successfully re-engineer the way goods and people move into and out of the city. The panel discussed successes and failures as well as emerging solutions for transportation and mobility in cities. The discussion can be viewed on: https://youtu.be/Hu02QbdVfw
Many standards from many organizations
Policies, regulation, citizen involvement and standards are all key components needed to build a viable Smart City. While all are important, in a path towards smarter cities, standardization will play a key role in ensuring consistent outcomes. Standards are relevant in the physical world, where they allow for the interconnection of hardware and technologies, but also in the virtual space where they facilitate data collection/sharing as well as city operation.

They can considerably facilitate the development of tailor-made solutions that are adapted to the particular circumstances of a given city. Standards are essential enablers that assure an expected performance level and compatibility between technologies. They embody strong technical and process expertise, facilitate the replication of outcomes and propose common metrics that permit the comparative analysis and benchmarking of solutions.

Cities are complex, multi-dimensional systems of systems. No single standards organization will be able to provide everything cities need. Here, as elsewhere, broad collaboration is required.

Smart City standardization: first global meeting of major standards organizations
On 14 July 2016, in the wake of the World Smart City Forum, representatives of IEC, ISO, ITU, IEEE, CEN, CENELEC and ETSI gathered for a meeting initiated by the IEC. More than 70 participants from national standards organizations also joined the meeting as observers. This was the first time these different standards organizations from around the world met to examine how to work together for the greater good of cities and citizens.

No single organization can provide all the standards
The vision of the IEC was to give an impulse that helps accelerate and better align Smart City standardization work. The fact is: no single organization can provide all the standards that are needed. Greater cooperation among standards organizations offers the prospect of more efficient, inclusive standards development for cities.

...at the Marina Bay Sands Expo and Convention Centre in Singapore
The IEC vision is that sometimes one organization will lead an effort and at other times it will share its expertise while another one leads.

Participants of these standards organizations expressed their commitment to uphold principles of mutual respect, transparency, openness and sharing of new work information. Discussions looked at gaps; where standards are needed but work is not yet advanced; overlaps, where different organizations may be active; and, how the standards world can collaborate to better serve the needs of cities and citizens.

Over the coming months the organizations develop a viable framework for cooperation in order to optimize outcomes and reduce duplication, wasted time and expense. A follow-up meeting organized by ISO is planned for 2017.

Greater cooperation among standards organizations offers the prospect of more efficient, inclusive standards development for cities.
Share your work
We need your stories

Claire Marchand
Take the 169 countries in the IEC family, the 20 000 technical experts who work in standards development, the many Certification Bodies (CBs) and Test Laboratories (TLs) in the IEC Conformity Assessment (CA) Systems, and add to the mix the rapid pace at which technologies are evolving today and you have hundreds, if not thousands of stories that can be told within the IEC community.

Reaching a large audience
Each month, e-tech covers a topic that is specific to IEC work and describes what TC/SCs and the four CA Systems do in that field. Reports on international and regional conferences, workshops and seminars, organized by the IEC or attended by IEC representatives, are also featured.

On the one hand, as in previous years, the e-tech editorial team will be reaching out to you to get your story. On the other, you shouldn’t hesitate to contact us – some of you have already done so in the past – if you think you can contribute to a specific issue in one way or another. In 2017, we plan to continue and increase the sharing of stories, get your input and include articles that are of direct relevance to your area of expertise.

This is our editorial plan for e-tech in 2017. We do look forward to receiving your comments, news and suggestions.

January/February 2017
Consumer electronics & multimedia
IBC and CES latest trends / IoT / Big Data / data protocols and security / cybersecurity / wearables / industry and service sectors using AR/VR (clothing, medical, sports, broadcasting, manufacturing, military, entertainment, architecture, marketing, retail, tourism, robots, real-time VR)

March 2017
Power generation
Power generation, transmission and distribution / integration of REs into the mix / rural electrification / PV / LVDC / live working

April 2017
Transportation
Autonomous vehicles / update on EV technology incl. batteries / wireless charging for public transport and cars / AI and ethics

May 2017
Disaster relief
Prevention / mitigation & recovery / emergency machinery / warning systems / functional safety / conformity assessment

June/July 2017
Printed electronics
Printed electronics / 3D printing / nanotech / graphene / energy harvesting / IDTechX latest trends

August/September 2017
Review of the year
From Frankfurt to Vladivostok

The January/February issue will focus on consumer electronics as well as issues relating to cybersecurity and Big Data
Energy harvesting is one topic that will be treated in June/July – Footwear with embedded energy harvester in the sole, developed by the University of Wisconsin-Madison researchers’ startup, InStep NanoPower, and Vibram, could charge mobile electronics (Photo: UW/Madison College of Engineering)

October 2017
AAL

Sensor tech / robots / intelligent, digital-inclusion apps to monitor medication intake / rugs / wearables / healthcare / GPS tech / accessibility / CCTV and surveillance

November 2017
Smart everything

Smart Energy / Smart Cities / Smart buildings / RE / Industrie 4.0 / robotics / automation / AI

December 2017
GM special / Lighting

OLEDs / LEDs / white laser as lighting

Industrial robotics will be featured in November – Baxter can perform a wide range of tasks, from line loading and machine tending to packaging and material handling (Photo: Rethink Robotics)

The December issue will report on the IEC General Meeting in Vladivostok, Russia, and focus on lighting, including OLEDs – OLED flexible screen (Photo: LG)
IEC and USB-IF united in e-waste fight
Global single-cable solution for audio, video, data and power

Janice Blondeau

The amount of global e-waste — discarded electrical and electronic equipment — reached nearly 49 tonnes in 2013. On average that is more than 20 kg for each person on the planet. By 2017 it is predicted that the world will produce approximately 65 million tonnes of e-waste, or a 33% increase, according to a study conducted by a partnership of United Nations organizations, industry, governments and scientists.

The IEC continues to be committed to reducing e-waste and fostering re-usability of electronic devices’ power supplies. In this context, the IEC works with the USB Implementers Forum (USB-IF) and has formally adopted the latest USB-IF specifications for high-speed data delivery and enhanced usages for device charging, in particular, the USB Type-C™ Cable and Connector, USB Power Delivery and USB 3.1 (SuperSpeed USB 10 Gbps) specifications. This means that a single cable for audio/video, data and power supply is now a reality.

This move will advance global action to reduce e-waste and help to increase re-usability of adapters and chargers for consumer electronics. Other benefits are increased consumer convenience, enhanced product reliability and safety while allowing for future technical innovations.

USB-IF Type-C, power delivery and USB 3.1

The USB-IF specifications were submitted to IEC Technical Committee (TC) 100: Audio, video and multimedia systems and equipment, and were approved for inclusion in the IEC 62680 series of International Standards on Universal Serial Bus interfaces for data and power. The IEC specification numbers are:

- IEC 62680-1-3 (USB Type-C)
- IEC 62680-1-2 (USB PD)
- IEC 62680-3-1 (USB 3.1)

In technical terms

The USB Type-C™ specification defines the physical USB Type-C cable and connector form factor, to facilitate thinner and sleeker product designs. In addition it enables enhanced usability and provides a growth path for performance enhancements for future versions of USB.

The USB Power Delivery specification defines standardized features that support the global adoption of interoperable power supplies. It was developed to provide flexible, bi-directional power capabilities by enabling faster charging and increased power levels up to 100W.
USB 3.1 enables speeds up to 10 Gbps, supporting audio/video for USB hosts, hubs and devices. Combined with USB Type-C, USB 3.1 and USB Power Delivery define a truly single-cable solution for audio/video, data and power delivery, building on the existing global ecosystem of USB/IEC 62680 series of International Standards compliant devices.

Widespread adoption of these International Standards will help to reduce poorly designed or manufactured aftermarket substitutes which may affect the operation of electronic devices in compliance with regulatory requirements.

“Simplify the mess of cables”
Writing in CNET, Stephen Shankland notes: “Once adoption picks up, USB-C can greatly simplify the mess of cables in your life. For one thing, its connector is reversible, so there’s no fiddling around trying to figure out which way is up.”

About the USB-IF
The non-profit USB Implementers Forum, Inc. was formed to provide a support organization and forum for the advancement and adoption of USB technology as defined in the USB specifications. USB-IF facilitates the development of high-quality, compatible USB devices through its logo and compliance program recognized around the globe and promotes the benefits of USB and the quality of products that have passed compliance testing. Further information, including postings of the most recent product and technology announcements, is available by visiting the USB-IF website.
Active Assisted Living

Issue 07/2016 of e-tech will focus primarily on Active Assisted Living (AAL), i.e. “intelligent systems of assistance for a better, healthier and safer life in the preferred living environment”. Seniors, people with disabilities can benefit from all new technological developments that help them remain as independent as is possible. AAL is also essential for those living in remote and isolated areas, especially in the healthcare and education sectors.

The issue will look at the home use of medical and wellness devices. They have drawn much attention in recent years, due to the convergence of a number of factors: ageing populations, growth of wearable technologies, increasing costs of healthcare and so forth. And as part of AAL, audiovisual services are important to “educate, inform and entertain” home-bound individuals or people suffering various forms of visual or hearing impairment.

Smart City developers will need to incorporate smart homes/buildings/transport and all the AAL technology to deal with the growing aging population and the stress it will put on healthcare providers and systems.

The 2016 Paralympic Games are also on the agenda: with cutting edge technology embedded in sports equipment for paralympians and high-level investment from car makers/Formula 1 and BAE (defense/aerospace) opening up new sports for the disabled, the technology may filter down for everyday use – for instance improved wheelchairs or prosthetics.

A number of IEC Technical Committees (TCs) and Subcommittees (SCs) develop International Standards for AAL devices and equipment.