

A row of white humanoid robots is shown in profile, facing right. They are set against a background of a blue-tinted, slightly blurred environment. The robot in the foreground is in sharp focus, while the others behind it are out of focus. The overall lighting is cool and futuristic.

Multimedia & *consumer electronics*

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FOCUS OF THE MONTH - Multimedia & consumer electronics - Issue 01/2017

This issue of *e-tech* takes a close look at technological advances in the field of multimedia and consumer electronics. The focus is on major trends from the 2017 International Consumer Electronics Show (CES) in Las Vegas, USA. It also outlines new developments in augmented and virtual reality, and the various aspects of artificial intelligence. It also features the need for IoT platforms and systems to be interoperable, which can be achieved through standardization.

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Aiming for 100% interoperability

Standards are part of the solution to make smart everything fully connected

The past year may not have seen significant breakthroughs in the tech world but 2017 is promising some interesting technological developments.

Internet of Things (IoT), voice recognition, augmented and virtual reality, artificial intelligence, autonomous vehicles, home automation: what was once science fiction is now reality. The technology is here, all it takes to really take off and become mainstream is interoperability.

We all possess a number of smart devices and appliances but too often, we realize that they cannot “talk” to one another. Standardization is a good part of the solution to make the IoT truly connect everything, everywhere without glitches. Once that condition is fulfilled, the IoT and all it brings with it will become really popular, be part of our environment and embedded into our lifestyle in a big way.

No need to wait until every new product is connected to everything else. We can rest assured that standards developers are hard at work to make it happen. In the meantime, we can still enjoy some of the technological advances the tech world is rolling out on a – almost – daily basis. Whether in the home, at work, when exercising or relaxing, the offer is so vast that we can all find the object that will make our life better, more efficient or more fun.



Claire Marchand
Managing Editor e-tech



Standardization is part of the solution to make the IoT fully connect everything everywhere



When fitted in cars, local speech recognition will allow drivers to automatically set course, control speed, change lanes or even park
(Photo: GetHomeSafe-fp7)

Tech trends 2017

Insights and predictions by Shawn DuBravac, chief economist, CEA

By Gabriela Ehrlich

For the first time in history, voice recognition has reached a level close to human understanding. This opens up new opportunities, notably in replacing the smartphone as a ubiquitous interface. The sensorization and digitization trends of previous years are now leading to adaptive automation and highly-specialized applications that fundamentally transform the user experience. Last but not least augmented (AR) and virtual reality (VR) are entering the real world of business.

50 years of CES

CES 2017 celebrated 50 years of existence. On its central market place CES showcased hundreds of gadgets that reflected some of the close to 600 000 products that were launched over the last decades at CES.

The Consumer Electronics Show started in New York in 1967 as a spin-off of the National Association of Music Merchants – the NAMM show. From the start it was highly successful with 17 000 visitors and 100 exhibitors on approximately 100 000 square feet (30 000 m²). At the time there were only three products presented: radios, TVs and disk players. Since 1998 the show is held in Las Vegas. This year CES hosted over 170 000 visitors on 62,5 million square feet (19 million m²). In 1967 the IEC existed since 60 years and had accompanied all major developments first in the electrical and then in the electronics fields. CTA participates actively in several technical committees (TCs) of the IEC.

The future in a crystal ball

Like every year, the IEC attended a special tech-trends briefing by Shawn

DuBravac, chief economist of the Consumer Technology Association (CTA) – formerly the Consumer Electronics Association (CEA) – which is the organization behind CES.

DuBravac is world renowned for his predictions, which are used by many high-tech firms as strategic input for their commercial strategies.

For the coming five years DuBravac sees five trends playing out. The full presentation can be found here.

1. The new voice of computing

Voice is showing up in many places, with Amazon's Alexa (also called Echo) largely in first place. According to DuBravac, this technology has quietly become the hottest smart product

on the market, commanding anything from household devices to audio or safety equipment, home automation to cars.

Voice recognition has come a long way. In 1994 Microsoft initiated the first voice recognition attempts with a 100% error rate, a measurement of the percentage of words that are not understood by the computer. By 2013 the error rate had improved to 25% and today we are at 5 to 6%, which is about the rate at which humans misunderstand things. Voice recognition has improved at the speed of sound (pun intended); with more progress achieved in the last 13 months than in the previous 23 years.

With voice having reached this level of accuracy, DuBravac sees screens



This year, CES celebrates its 50th anniversary (Photo: NVIDIA Blog)

and other interfaces – including the use of smartphones as an interface – gradually wane. Voice will increasingly be directly embedded in devices. Vocal computing will take over whenever possible and become the preferred way of commanding all kinds of devices and applications. You find more information on IEC work for voice computing in the article *Hearing lots of voices?* in this issue.

2. Connections and computations

Since 2003 digital has gradually transformed our previously analogue world. The trend started with smart phones or cameras and progressively moved to many other devices in the home (electronic door locks, fridges or washing machines), the car, offices, etc.

Today, increasingly intelligent systems connect many different objects and collect data to improve user experience and well-being. Wearables



HEAD's partnership with Sony's Smart Tennis Sensor helps players improve their performance, optimize their game, and even share the results with the tennis world (Photo: headcoach.se)

are a great example for this trend. While a lot of data was available before wearables came into being, information was not captured in a consistent way. Wearables started to change that.

And while general-purpose tracking devices continue to be of interest, a bifurcation is happening in that activity trackers are becoming much more specialized. They are geared to individual types of activities and often include artificial intelligence (AI) that helps improve the user's posture or movement, pointing out stress points and impact on articulations.

Sensorization of everything. We got pretty good at counting steps...we have moved to other problems. More water proofing and protecting of these devices. More measuring of niche sports: tennis, baseball. Kids that get involved in sports because it is interesting.

The IEC has recently approved the establishment of a new TC dedicated to wearable devices. Wearables are also intimately linked to the Internet of Things (IoT). We have interviewed the Convenor of the Joint Technical Committee ISO/IEC JTC 1/Working

Group 10 about the need for standardization in this area.

Adaptive automation

In 1967 during the first CES, The Jetsons cartoon was released. It portrayed an environment of magic automation. In addition to flying cars, big computers helped automate everything, from baking, to laundry, to shopping.

In the 80s and 90s, home automation started to become really popular, focusing on opening and closing blinds. Early programmable thermostats allowed one to select temperature ranges depending on week days but the programme didn't adapt to the habits of the home's occupants. It had to be changed by hand.

One of the newest trends is adaptive automation. While until recently many devices could be fine-tuned using a smartphone, now increasingly devices will adapt automatically to different environmental factors without any human intervention. A modern refrigerator will adjust cooling levels and humidity levels in accordance to outside factors, differently in winter



and in summer or during sunny or rainy days.

A smart bed presented during CES adapts its firmness to the sleeping position of the occupant automatically adjusting for different pressure points so as to keep an optimal comfort level. The bed also has a temperature control that keeps feet cosily warm and cools the sleeper during hot summer nights. The head piece slightly lifts up to avoid snoring (the dream of every wife).

In sum, a lot of automation will be happening in areas where we wouldn't want to do the adjustments ourselves. We will let our devices take over and do small subtle adjustments for us.

Combining different elements for new outcomes

The combination of sensing and advanced camera technology results in collision avoidance systems that can be applied to cars but also to things like drones. Here they help reduce the risk that expensive drones



Collision avoidance systems, already applied to cars, can now also be used on other devices such as drones

are lost bumping into pylons or trees. The connection of drones, cameras and security systems can provide a bird's-eye view of a property during an intruder alert.

As a general trend, autonomous elements of our lives will combine into bigger systems, for example smart buildings and smart cities.

3. Driver-assist technologies and driverless cars

DuBravac sees transportation as another area that will heavily benefit from digitalization and sensorization. In the self-driving space, multiple overlapping AIs provide drivers with a fuller picture of what is going on in and around the car. These AIs supervise posture, the direction of eye movements, vehicles and obstacles in proximity and other moving objects such as humans and animals. DuBravac sees a similar approach as relevant for spaces like the home or the office.

In previous years, multiple car manufacturers presented prototypes at CES that gave shape to their futuristic visions. What has changed in 2017 is that many of these cars are available in dealerships near you.

E-commerce might lead to new types of commercial vehicles that increase driver productivity. Here a concept delivery van features an automated logistics centre that includes an automated arm that brings packages forward so that the driver doesn't have to get out of the car, as well as integrated delivery drones that drop packages at the right door-step.



The Sleep Number 360™ smart bed senses movements and automatically adjusts firmness, comfort and support (Photo: Sleep Number)

4. AIs infusion into everything

DuBravac sees AIs penetrating a lot of areas. Beyond cars and devices, AIs will also penetrate services and content. Here AIs will be useful in providing recommendations that open up new experiences that a consumer might not have discovered by himself with current algorithms that are generally based on past behaviour. The perceived value of AIs will be based on things such as fluidity of conversations, value of recommendations and AI-infused adjustments.

AIs come in three categories:

- **Artificial Narrow Intelligence (ANI):** This is the level we are able to achieve with today's know-how. It is also referred to as *weak AI*. This type of AI specializes in a single area. It can for example beat a world chess champion in chess, but can't achieve anything else.
- **Artificial General Intelligence (AGI)** is sometimes referred as *strong AI* or *human-level AI*. It designates a computer as smart as humans across the board. It can perform any intellectual task a human being can do. It is unclear when this level can be reached
- **Artificial Superintelligence (ASI)** is defined as an intellect that is much smarter than the best human

brain in every field. It may be just a little smarter or trillions of times smarter than us.

5. Digitizing the consumer experience

Health and wellness, sport, sleep, family tech, wearables; these are some of the many manifestations of how the digitization of our environment impacts our life-style and choices. It has led to a democratization of healthcare. For example, 100 years ago most people wouldn't have known their weight or body temperature. Now devices are moving healthcare that was exclusive to the medical profession to the home.

Digitization is also playing an increasingly important role in smart assistance to elderly or disabled persons, allowing them to lead a good quality life for longer. New types of services help elders to stay in touch while preserving their autonomy, or allow family members to monitor the intake of medicines, and any abnormal inactivity remotely. A wide array of smart devices presented at CES was geared to monitoring and diagnostics, allowing people to measure their vitals and consult with doctors at a distance. Not far from now we will receive recommendations tailored to

our needs, exactly at the right time. Digitization and sensorization is also increasingly built into our work and impacting services delivered by businesses. For example cruise lines now includes thousands of sensors on their ships to deliver an optimal experience to their passengers. A personalized medallion tracks where each guest is, what they are doing and what they might want to do next, providing personalized recommendations. It also knows when a guest nears their cabin and pre-emptively turns on lights, air conditioning, music as desired.

There is also an increased trend to the digitization of senses, for example smell.

Smell sensors work fundamentally differently from cameras and microphones. Until recently this was one of the last frontiers where computers lagged behind. In the future smell detectors will be able to assist the perfume industry in quality control or know when food is going bad.

Faster mobile

The whole digital ecosystem is empowered by wireless connection and increasingly fast cellular networks. Over the past years we have seen exponential increases in network speeds. While 3G (G indicates the generation of wireless technology) brought speeds from 200 kilobytes per second (kbps) to a few megabytes (MB) per second, 4G technologies reach up to 200 and more MBs per second. The 5G network system is expected to offer speeds of 15 to 30 gigabytes (GB) per second of theoretical downlink. DuBravac predicts a whole new suite of services including real-time VR and AR, tactile response and haptic feedback. For example one will be able to sense the grain of wood, the smoothness of a button or the structure of sand.



Yumii, a robot that works through vocal command, can make the elderly interact with family, helpers and doctors (Photo: Yumii)

Where does the real world end?

Blurring the lines

By Antoinette Price

Everyday activities, such as shopping, watching sport on TV or even the ways we work and learn are going to change profoundly in the coming years, as more industries, including education, use augmented and virtual reality (AR/VR).

Worldwide revenues for AR and VR are forecast to grow massively, from USD 5,2 billion in 2016 to more than USD 162 billion in 2020, according to market intelligence company, International Data Corporation.

As reality merges

During the 50th CES in Las Vegas this year, the AR/VR category was the largest yet seen. VR, for many, is associated with flight simulation and

gaming, while AR has become well recognized in TV sport programmes (superimposing stadium and court lines over live shots to show whether the ball has landed 'in' or 'out'), and more recently in smartphone apps, overlaying useful information on maps (about services or businesses), or in tourism (over artefacts in museums or historic destinations or monuments).

Now the two technologies are coming together in what is known as 'merged reality' (MR), where the real and virtual worlds merge and objects from both can interact. Advances in VR technology were demonstrated at CES, in a prototype tether-free wireless headset which doesn't require the hardware traditionally placed around a room in order to track movement and objects. Instead, the headset contains the processors, cameras and sensors that enable it

to do this. It can also track the user's movement in 3D space.

Where do Standards come in?

Behind the AR and VR scenes, software drives components such as displays, sensors, images, maps and tracking technology. It links to the hardware, which consists of processors, sensors and input devices (speech and gesture recognition systems). Displays include monitors and handheld devices such as smartphones and tablets. These contain optical sensors, accelerometers, gyroscopes, GPS and cameras for tracking movement. Eyeglasses, head-up display (HUD), computers, software and algorithms help AR systems integrate augmentations with the real world.

A number of IEC technical committees (TCs) and their subcommittees (SCs) produce International Standards which help ensure the reliability, safety, efficiency and interoperability of the components within this technology.

IEC and the International Organization for Standardization (ISO) have established a Joint Technical Committee, ISO/IEC JTC 1 to cover information technology.

ISO/IEC JTC 1/SC 29 deals with the coding of audio, picture, multimedia and hypermedia information, and has published ISO/IEC 23000-13, an International Standard which focuses on the data formats used to provide an AR presentation which uses 2D/3D multimedia content.

IEC TC 47 ensures that sensors, which are vital to this technology, work reliably and efficiently, while



Real-time sensor fusion and 3D model update for minimally invasive surgery (Photo: co-me.ch)

IEC TC 100 produces Standards which contribute to the quality, performance and interoperability of audio, video and multimedia systems and equipment.

Is VR the future of education?

The medical world is embracing VR applications, many of which employ merged reality. This innovative technology and approach to training surgeons allows them to improve performance, increase surgery

success rates and better explain health conditions and surgery procedures to their patients.

Meanwhile students will love their new anatomy classes, where books are exchanged for headsets, offering an entirely new and unforgettable way of learning.

Technology for training

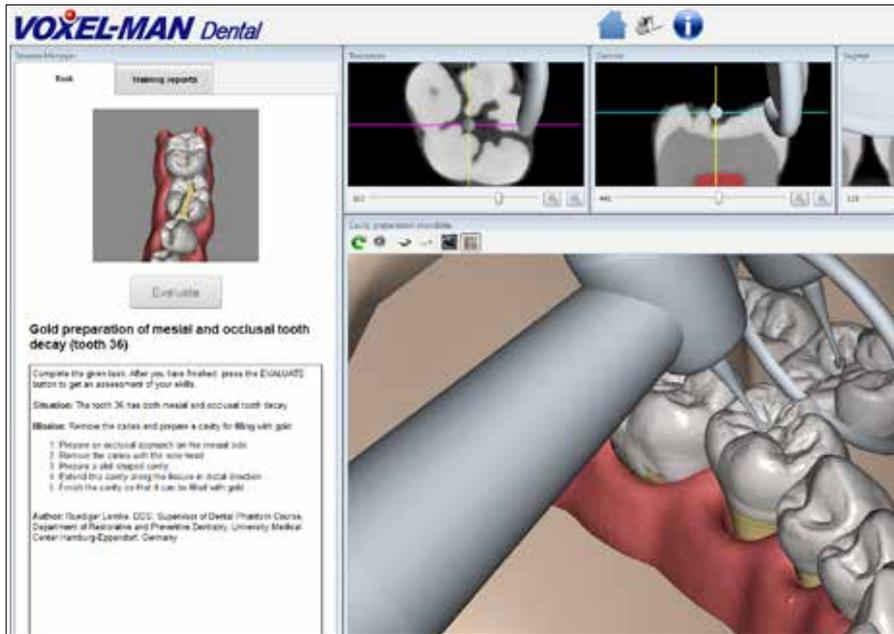
A prominent UK dental school has developed VR to allow dental

surgeries to teach students how much pressure to use when drilling.

A mirror and a haptic dental drill with feedback technology enable trainees to sense touch and force in a VR environment, as they operate on virtual 3D teeth shown on a screen. A real foot pedal controls the drill speed and settings, while eye glasses track head movement so that the 3D model on the screen moves relative to the head movement. Students practice procedures, watch their filmed performance and learn from mistakes



VR is being used more in schools, universities and for workplace training (Photo: touchstoneresearch.com)



VR is being used more in schools, universities and for workplace training (Photo: touchstoneresearch.com)

before they get anywhere near a patient.

Distance learning with a difference

Increasingly, surgery is being filmed and streamed live to students and professionals around the world, using 360° camera rigs and microphones atop the surgeon's head. Headset wearers follow the operation in real time, through the surgeon's eyes. They have unprecedented views, can replay it as many times as required and experience being in an operating theatre while the surgeon explains what he is doing and answers questions.

Anyone anywhere can see how highly-skilled surgeons work and interact with their teams. With few opportunities to do this before performing a first surgery, VR technology is opening new doors for the next generation of surgeons.

The ENGAGE VR platform was designed to overcome the challenges of geography. It offers content developers the chance to create

interactive virtual classrooms and trainings on diverse subject matters, anywhere in the world, for up to 30 individuals simultaneously. Instructors can observe and provide feedback, in real time, to students who interact with avatars. Oxford University academics demonstrated their life-saving LIFE product, which is based on ENGAGE, at CES. Through virtual distance learning, they helped train healthcare professionals in Africa in emergency care for infants, using an avatar baby.

Improving how we learn and diagnose

The Body VR platform created a buzz at CES for students and doctors alike. It allows developers to create content for higher education and simulations to help train radiologists, surgeons and physicians. Students put on headsets and move through the bloodstream, examining along the way how cell structures work, by interactively 'touching' and manipulating them. Doctors use it to view 3D volumetric renderings of imported CT or MRI scans, which they can manipulate

using hand controls to see different layers and specific aspects.

Teaching history by recreating it

History is another subject which lends itself well to AR and VR technology. Museums have already produced AR apps for smartphones to provide more information about their exhibits. VR offers headset wearers a first-hand experience amid historically accurate settings by transporting them back to a specific time and place.

Classes can go to the moon or relive the demise of the Titanic with VR, while tourists can see how the city they are visiting looked in ancient times, thanks to AR-equipped glasses which overlay the information before them.

You can read about other industries using VR applications in the May 2016 e-tech article *Experiencing life like never before*.

A few more stepping stones

The virtual world is a perfect place to train people for jobs where risk is involved, such as plant maintenance or surgery. Users can practise safely for as long as they like. In the classroom, VR, AR and MR offer a unique and engaging way to understand and remember complex subject matter. Knowledge can be shared globally in innovative and affordable ways, as experts 'enter' a classroom on the other side of the world or are beamed to a remote location to train people in the field.

In the coming years, many such educational platforms will become available. However, the industry still has a few challenges to overcome. It must make VR headsets and AR glasses more affordable and appealing, as well as create far more diversified content if this medium is to be adopted widely.

Hearing lots of voices?

AI takes connected devices to the next level

By Antoinette Price

In our smart world, a huge number of devices are part of the Internet of Things (IoT), or becoming so, many of them integrated with our homes, cities, manufacturing or transport systems and infrastructures. Added to this, a growing number of connected consumer devices, appliances and systems are able to carry out many human daily tasks in the home or workplace, whether for healthcare or entertainment. Research by Gartner forecasts the number of connected things will reach 20,8 billion by 2020, of which 13,5 billion will be from the consumer sector.

Artificial intelligence (AI) was one of the main themes at the 50th Consumer Electronics Show (CES) in Las Vegas this January, incorporated in devices ranging from hair brushes to cars, fridges and robots.

Two types of AI were prevalent, the first using voice as a way of operating smart devices, appliances and systems. The second theme concerned the way manufacturers are making their products more useful through deep learning. This form of AI enables the quick and effective analysis of huge amounts of data gathered by smart devices and used subsequently to improve their functions.

Standards supporting connected technology

The work of several IEC technical committees (TCs) and their subcommittees (SCs) contributes towards the development of aggregated learning technologies in general, and in particular to the area of

voice recognition. IEC TC 100: Audio, video and multimedia systems and equipment, has set up Technical Area (TA) 16: Active Assisted Living (AAL), accessibility and user interfaces, which covers voice recognition. Additionally, aspects of artificial intelligence, speech recognition, machine learning and neural networks are dealt with by ISO/IEC JTC 1, the Joint Technical Committee (JTC) for information technology, established by IEC and the International Organization for Standardization (ISO).

IEC also has a Working Group dedicated to the IoT. Given the importance of this domain, it was decided at the end of 2016 to convert this into ISO/IEC JTC 1/SC 41: Internet of Things and related technologies. This TC will focus on the JTC 1 standardization programme for the IoT, comprising sensor networks and wearable technologies, and provide

guidance to JTC 1, IEC, ISO and other entities developing IoT-related applications.

Read more about this in the interview with Sangkeun Yoo, Convenor, ISO/IEC JTC 1/WG 10: Internet of Things, in this issue.

Robots in all shapes and sizes

Finance, retail, healthcare, agriculture, manufacturing and many more industries will be impacted by robots, which will change our lives. In addition to this, the International Robotics Federation says that by 2018, sales of service robots for personal and domestic use will reach 35 million units.

CES 2017 was awash with such robots - lawnmowers, and personal assistants, both speaker versions that



Personal assistant robots play music, plan your day and control your smart home (Photo: Ubtech Lynx robot Brandon Widder/Digital Trends)

responded to spoken commands and humanoid versions - able to answer questions, do household chores and run other smart systems and devices in homes. Some humanoid robots already carry out meet and greet jobs in airports, providing flight or other useful information, while others will teach students skills and how to solve problems. Other developments are certain to follow.

The great potential of voice control

During CES, 170 000 people attended and watched as 20 000 products were launched over four days.

Shawne DuBravac, Chief Economist for the US Consumer Technology Association, said of the boom in AI technology, "In the last three years, the word-error rate in speech recognition has made great strides, dropping from 25% to 5 or 6%, which is similar to human speech". DuBravac

estimated that around five million voice-activated assistants have been sold to date and predicted another five million are likely to sell in 2017.

Activate the alarm

Many products at CES were operated by voice. Users ordered the different smart appliances and systems to dim, increase, switch on or off lighting, carry out various cleaning duties, arm or disarm a home security system, run the washing machine or select a specific TV programme and much more.

Making big data useful

AI information gathered by household appliances can add value to them in the form of extra features. For example, fridges no longer just preserve food. New models can manage their own temperature, scan food item bar codes and reorder

groceries directly from the shop when needed. The personal assistants can connect to other home systems, find recipes or play requested music.

Smart washing machine apps allow users to start their machines from anywhere with an Internet connection, monitor washing at all stages, track energy usage and, once finished, send a notification via the app.

IEC produces International Standards for many components of this technology. Some examples include sensors, which are vital to connected devices (IEC TC 47), automatic identification and data capture techniques for bar code technology (ISO/IEC JTC 1/SC 31), audio, video and multimedia systems and equipment as well as touch screens in an increasing number of our home appliances (IEC TC 100). These Standards help to ensure reliability, quality and interoperability of these systems and devices, as well as to



Connected car infotainment system (Photo: johndayautomotivelectronics.com)

establish a common vocabulary and test methods.

Start the car please

As part of the Internet of Things, research by Gartner estimates that a quarter of a billion connected cars will be on the road by 2020, enabling various levels of automated driving and opening up the scope for new in-vehicle services. For example, such cars could connect to an intelligent street lamp and be guided to a nearby free parking space.

As auto manufacturers race towards achieving fully-autonomous driving by 2020, cars are becoming more intelligent and complex. However, virtual assistants will help make them easier to interact with.

Car makers showcased various manifestations of AI technology that will revolutionize how and what we drive in the future. We will gradually drive less and talk more to all the connected technology and infrastructures in and outside the vehicle. We will tell our cars to open the connected garage doors, start up, adjust the temperature, and where to drive. Some cars will be able to connect to smart home systems and appliances while on the road.

Deep learning will enable driver profiles to be established, based on monitoring driver habits such as the radio stations they listen to and how they drive, with the data collected from sensor-embedded chairs. These cars will recognize drivers before or after they get in, using facial recognition capabilities, and automatically load the specific profile when the driver “logs in” or starts the car.

In a fully-connected world, cars will monitor vast amounts of technical information in real time and be able



Speaker form personal assistant (Photo: techcrunch.com)

to signal in advance when a part is going to break down, then connect to the nearest garage and find out if the replacement piece is available.

Facing the future

Facial recognition technology is already used in security systems in government, commercial or industrial contexts. Consumer technology will adopt it, for example to access smart home systems or connected cars. Registered users will be alerted if an unrecognized person enters the home, while cars could be stopped in their tracks if a registered driver profile isn't activated.

Several subcommittees of IEC/ISO JTC 1 produce International Standards for biometric technologies pertaining to human beings, to support interoperability and data interchange among applications and systems. They also cover biometric data protection techniques, biometric security testing and evaluation methodologies.

Making the IoT secure

Finally, anything which connects to the IoT could be subject to cyberattacks. As AI technologies become more widespread, gathering huge amounts

of personal information, ensuring the effective provision of data protection and privacy will be paramount.

The IEC undertakes a number of activities towards this. ISO/IEC JTC 1/SC 27 has produced the ISO/IEC 27000 family of International Standards on security techniques for IT Standards, which covers many aspects, including detecting and preventing cyberattacks. Other examples include protecting data in medical equipment, industrial automation and energy generation.

The IEC Advisory Committee on Security (ACSEC) is mandated to deal with information security and data privacy matters which are not specific to a single IEC TC; coordinating activities related to information security and data privacy and providing guidance to TC/SCs about this, both generally and for specific sectors.

In addition to the TCs which publish International Standards on this topic, Working Group 3: Cybersecurity Task Force, of IEC/IEEE, the IEC System of Conformity Assessment Schemes for Electrotechnical Equipment and Components, was established in 2014 to check cybersecurity for industrial automation against the IEC 62443 series of International Standards.

Why Smart is more than intelligent

The origin of the word Smart

By Gabriela Ehrlich

Smart is today widely used to signify added intelligence in an increasing number of otherwise ordinary constructs. The question is: why and when did we start to use the word SMART?

Have you noticed the recent proliferation of the word **Smart** as a positive attribute for things such as cities, the grid or mobility, to name just a few? Many of us have come to accept the American meaning of this word as intelligent or sharp. However, digging a bit deeper, you might discover that originally there was much more meaning embedded in this word.

The acronym S.M.A.R.T (the dots were lost over the years) was used in the context of setting goals in project management or employee management.

SMART criteria are commonly associated with Peter Drucker's



Smart is today widely used to signify added intelligence in a number of otherwise ordinary constructs

management by objectives (MBO) concept also known as management by results (MBR). It was first popularized by Peter Drucker in his 1954 book *The Practice of Management*.

Management by objectives is the process of defining specific objectives which management can convey to all members of the organization. Each objective can be put in sequence allowing managers to split work into individual, manageable steps. This

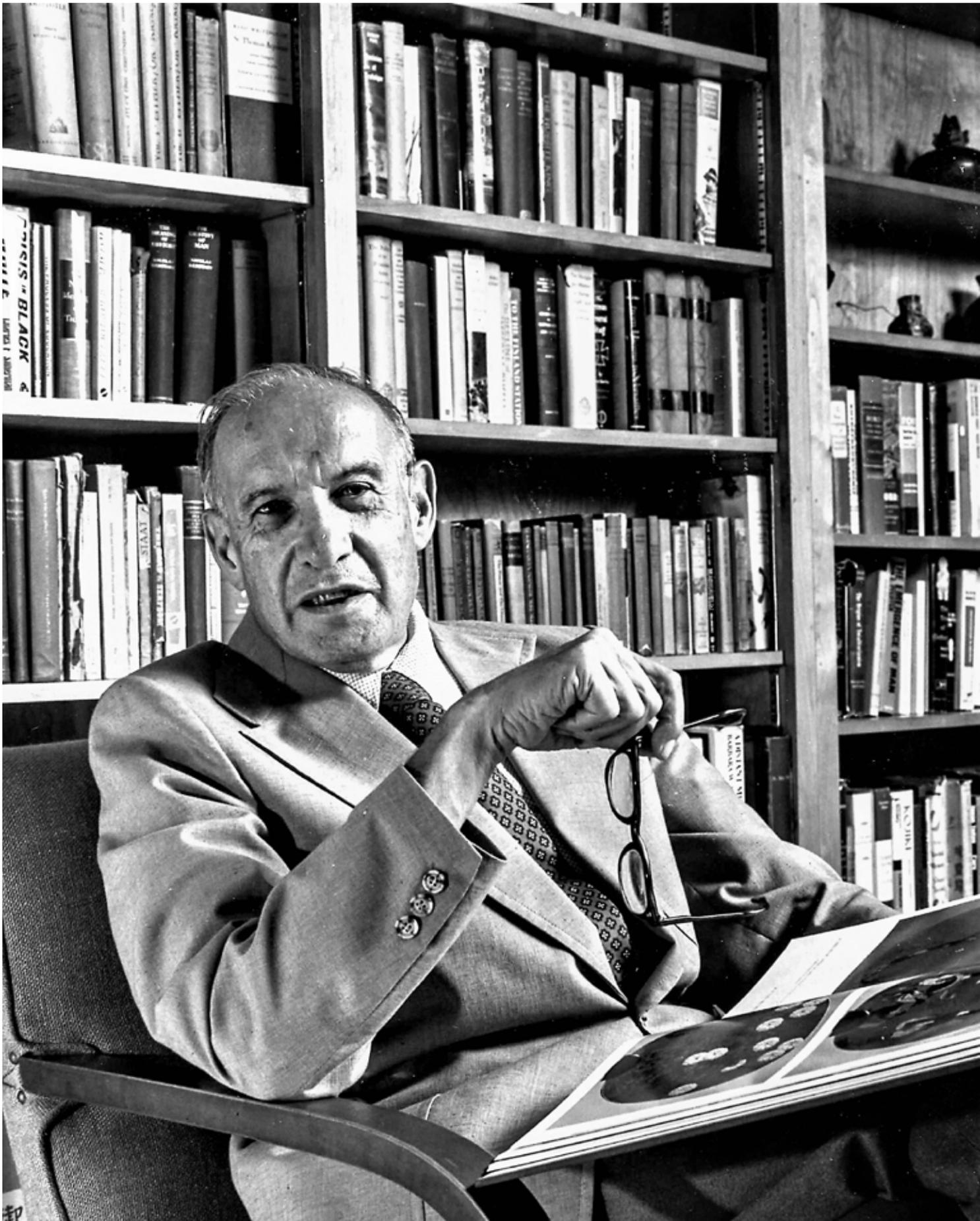
approach was seen to result in a calm, yet productive work environment. The first-known use of the term SMART occurs in the November 1981 issue of *Management Review* by George T. Doran.

According to Doran, “there is a SMART way to write management’s goals and objectives”.

SMART goals and objectives are generally described as follows:

Letter	Most common	Details
S	Specific	Target a specific area for improvement Strategic and specific
M	Measurable	Quantify or at least suggest an indicator of progress Also: motivating
A	Achievable	Specify who will do it Also: agreed, attainable and achievable, action-oriented, aligned with corporate goals
R	Relevant	State what results can realistically be achieved, given available resources Also: realistic, resourced, reasonable, result-based
T	Time-bound	Specify when the result(s) can be achieved. Also: trackable, time-based, time-limited, time/cost-limited, timely, time-sensitive, timeframe

Now the use of the word SMART makes a lot more sense. Doesn't it?



The S.M.A.R.T criteria are commonly associated with Peter Drucker's management by objectives concept

Energy efficiency trickles down into large applications

Essential in energy-hungry domains such as industry and buildings

By Morand Fachot

Achieving better Electrical Energy Efficiency (EEE) is a very broad task that extends well beyond the more efficient transformation of primary energy, chiefly fossil fuels, into electrical energy. It must be introduced in energy-intensive sectors like industry and buildings. Standardization work by numerous IEC Technical Committees (TCs) is central to this broader objective.

Electric motors

Increasing the efficiency of electric motors is probably by far the biggest and most affordable EEE opportunity that exists: more than 50% of all electricity worldwide is converted into mechanical energy by electrical motors.

IEC TC 2: Rotating machinery, prepares International Standards

regarding specifications for rotating electrical machines used in motors, with the exception of traction motors for railway equipment, and motors and generators used in electric road vehicles, industrial trucks or aeronautics and space applications.

The biggest user of motors is industry, which accounts for 40% of global electricity use according to the International Energy Agency (IEA). Around 70% of this electricity is consumed by electric motors for machines, and by pumps, fans, compressors, etc. Yet over 90% of these motors are unable to adjust their power consumption to fluctuations in power demand, thus wasting precious energy. Changing to electric motors with variable-speed drives (VSDs) reduces energy consumption by up to 50%. The annual energy cost of running a motor is usually many times greater than its initial purchase price and energy savings quickly amortize

the initial investment: the new motor basically pays for itself.

The IEC developed the IEC 60034 or IEC 61800 series of International Standards that rank electric motors according to their efficiency classes. Regulators everywhere in the world have taken on board this classification system and made it part of their policies.

Industry

In addition to motors, which drive the large majority of production processes and consume around 70% of electricity used by industry, several other technology areas offer a good potential for increased EEE.

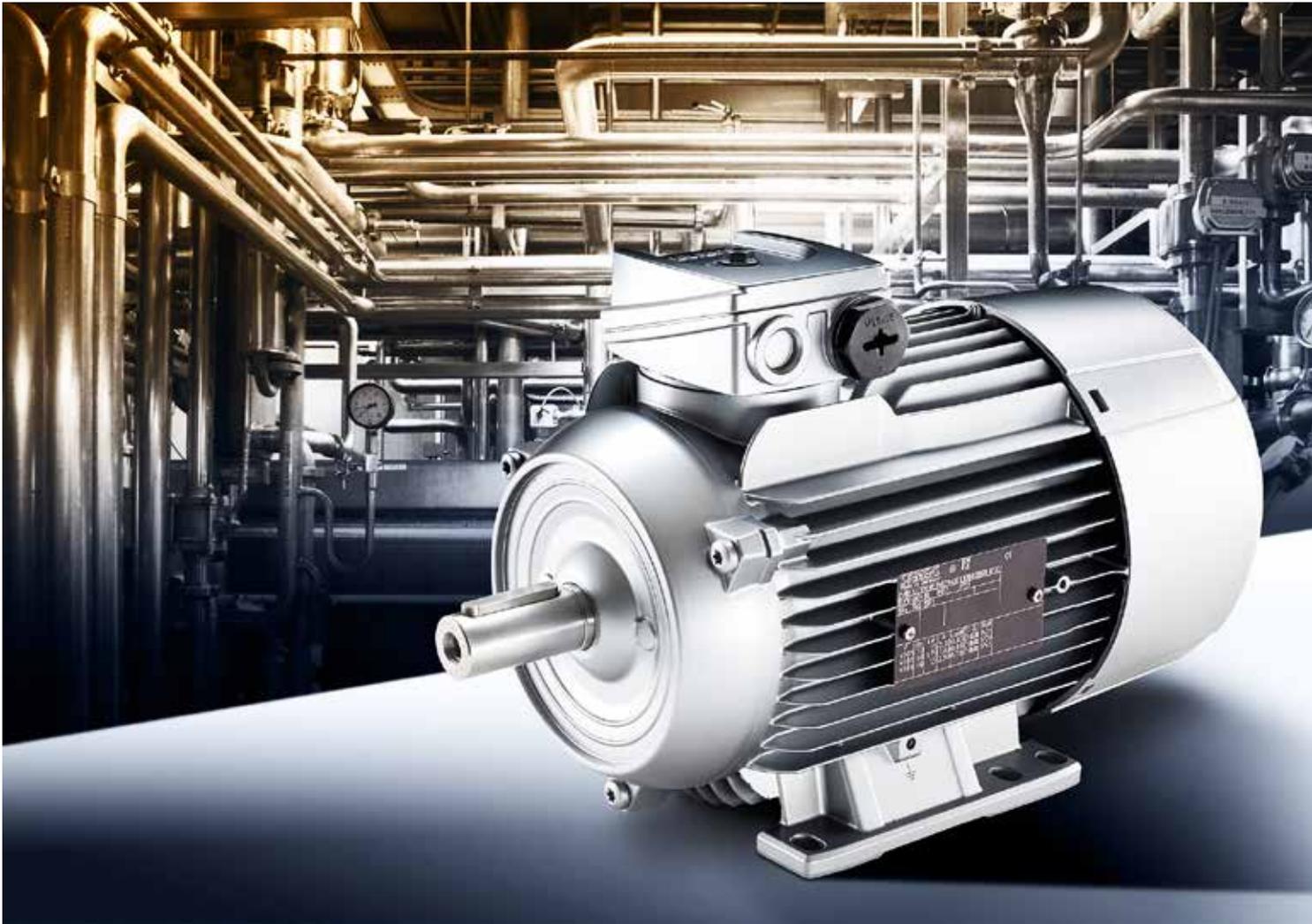
Heating and cooling

Around 20%, and in some industries up to 40%, of electricity is used in heating processes. These are deployed widely across many sectors from food processing and automotive applications to smelting. Electroheating offers many benefits over processes that use combustion of fossil fuels. Higher efficiency is just one of them; cleaner air, higher temperatures and better process control are among the others. The optimum energy efficiency of gas furnaces ranges from 40 to 80%, while that of an electric furnace can reach 95%.

IEC TC 27: Industrial electroheating and electromagnetic processing, plays a central role in preparing International Standards, including EEE criteria for electroheating installations.



Electric arc furnace for steel production are more efficient than gas furnaces
(Photo: Deutsche Edelstahlwerke)



Energy-efficient motor (Photo: Siemens press picture)

Technologies used include, among others:

- **Induction furnaces** that melt various metals including steel, copper and aluminium, with absolute temperature control
- **Resistance heating** for heat treating, forming, melting and drying metals; for cooking, sterilizing and roasting in the food industry or for firing and drying ceramic products
- **Plasma torches** for cutting steel plates
- **Microwaves** for treating food products
- **Radio-frequency electric fields** for drying textiles, fixing dyes, controlling moisture content and also for sterilizing medical equipment

- **Lasers** for welding, cutting and treating various metals
- **Infrared and radiation heating** for coating and curing surfaces

Automation

In a very real sense, automated systems for smart manufacturing will pave the way for more energy-efficient processes. They cover the whole life cycle of a product from idea to order, manufacturing and development, delivery and recycling, including all related services, as well as the integration of user or consumer input and feedback.

IEC work largely covers the process and plant floor. IEC TC 65 publishes the International Standards that address the safety and efficiency of

equipment and processes and the regulatory compliance and energy consumption, as well as the many protocols and methods that support the full range of communication, monitoring, control, safety and cybersecurity technologies in the area of automation. Many other IEC TCs publish the Standards that are needed for sensor networks, localization and tracing technologies, batteries, piezo-electrics, actuators, 3D printing, lasers and much more.

Cutting buildings' energy hunger

Commercial and residential buildings account for about 40% of primary energy consumption in many countries. This energy is used for lighting, heating, ventilation and air

conditioning systems, as well as for powering elevators, escalators, machinery and appliances.

Building automation

Building automation and control can improve the energy efficiency of buildings significantly. They include a wide variety of technologies that are connected wirelessly, including light detectors, timers, temperature, motion, humidity and many other sensor systems, as well as programmable logic controllers. Building automation can help optimize device use by switching devices off entirely or by reducing their use to the minimum. It can also highlight “bad habits” that should be corrected. For example by modifying the heating or cooling temperature settings by 2°C, up to 10% of energy can be saved. Additional energy savings can be achieved by upgrading and renovating a building's wiring and by installing low-consumption, high-efficiency lighting systems, more efficient motors and transformers.

A number of IEC TCs are developing Standards that help achieve better EEE.

IEC TC 8 focuses on overall systems aspects of electricity supply. IEC TC 57 deals with communications between equipment and electricity systems. IEC TC 47: Semiconductor devices, develops Standards for sensors and similar devices. ISO/IEC JTC1/SC 25: Interconnection of information technology equipment, covers building automation including energy harvesting.

Heating and cooling

Heat pumps represent one of the most efficient means of heating or cooling a building. They require a minimum amount of electricity to function and work on the principle of transferring heat from water, air, soil or other sources to provide heating, hot water

or air conditioning. Some Standards in the IEC 60335 series, developed by IEC TC 61: Safety of household and similar electrical appliances, provide specific requirements for heat-pumps, air-conditioners and dehumidifiers.

Moving people around

Elevators and escalators account for up to 10% of energy use in buildings. Innovative motors, using VSDs, and regenerative braking systems that recuperate energy help cut elevator power consumption in half. Escalators can be made more efficient by mounting sensors that turn them off when they are not needed or that activate soft start systems when the number of people carried is low. IEC TC 2, IEC TC 3: Information structures and elements, identification and marking principles, documentation and graphical symbols, and IEC TC 47 provide the technical foundation that ensures that elevators and lifts work as efficiently and safely as possible.

Lighting

Nearly 20% of total electricity production is consumed by electric lighting. By 2030, energy demand for artificial light is projected to be 80% higher than it is today.

The introduction of more energy-efficient lighting solutions is seen as a priority in many countries.

Here as elsewhere, the choice of technology makes a big difference in terms of EEE. Incandescent bulbs waste about 95% of electricity, mostly in the form of heat. Compact fluorescent lamps are 80% more efficient than incandescent bulbs and have been a good tool to reduce energy consumption in this area.

LEDs represent the highest energy efficiency levels currently available

commercially, reaching around 95%. LEDs find increasing application in street lighting systems and in large transportation hubs like train and underground stations or airports, where they can save up to 95% of energy in comparison with other technologies. Such savings generally help amortize the investment in a few years. They also find increasing application in low-power situations, for example off-grid or with batteries.

LEDs are complex electronic assemblies; in order for them to deliver on their efficiency and long-life promise, they need to be built with reliable components and to be quality tested. IECQ, the IEC Quality Assessment System for Electronic Components, offers a dedicated programme for the testing and certification of LED components and assemblies.

IEC TC 34: Lamps and related equipment, prepares the large majority of International Standards for safe and efficient lighting, including performance requirements, specifications, testing and measuring methods for all types of lamps and their auxiliaries. Their scope includes lamps/lighting equipment used in homes, medical facilities, offices, road and street lighting, commercial and other buildings, and for emergency lighting, etc.

Light management systems help switch lights on and off and regulate levels of lighting depending on weather and time of day. They can reduce energy waste significantly. IEC TC 23: Electrical accessories, and IEC TC 47 prepare the Standards that apply to electronically activated switches and sensors.

EEE is very significant in large energy-hungry applications, but it must extend also to other domains that touch individuals directly, such as consumer goods, individual and public transport or the ways cities will be designed in the future.



Current KONE elevators EcoDisc drives use 50% less energy than previous class (Copyright: KONE Corp.)

Why the IoT needs standardization

Interview with Sangkeun Yoo, Convenor for ISO/IEC JTC 1/WG 10: Internet of Things

By Antoinette Price

The Internet of Things (IoT) is already part of our lives. It's penetrated our smart cities and homes, agriculture, automotive/transportation, energy management, entertainment, healthcare, industrial automation and retail environments. It comprises billions of connected, sensorized devices and systems which help to simplify work and personal tasks. As it grows, the different systems and platforms will need to be interoperable, which can be achieved through standardization.

IEC and the International Organization for Standardization (ISO) established ISO/IEC JTC 1: Information technology, a joint technical committee (JTC) which produces International Standards for information and communication technologies (ICT) for business and consumer applications.

Sangkeun Yoo, Convenor of ISO/IEC JTC 1/Working Group 10: Internet of Things, has worked at the Electronics and Telecommunications Research Institute (ETRI) in Korea, in the area of standardization, since 2001. With extensive experience in RFID and sensor networks research, he has expanded more recently into IoT and digital manufacturing.

How the IEC contributes to IoT technology

e-tech: What do you see as the main added value of ISO/IEC JTC 1 to IoT?

Yoo: The IoT is not a stand-alone technology itself, rather a concept of a vision encompassing a lot of information technologies, such as communication, networking,

identification, security and so on. IoT standardization must be understood from the viewpoint of how to integrate and incorporate these technologies into a single vision. ISO/IEC JTC 1 deals with information technology. Over the years, many subcommittees (SCs) have been established to cover new information technologies.

As part of IEC and ISO, JTC1 has, technologically speaking, the capacity to bring very well-balanced IoT International Standards to the market.

In light of the importance of the IoT and these evolving technologies, in November 2016, the decision was taken by the JTC 1 Plenary to transform WG 10 into ISO/IEC JTC 1/SC 41: Internet of Things and related technologies. Its secretariat will be with IEC. This subcommittee will serve as the focus for the JTC 1 IoT standardization programme, including sensor networks and wearables technologies. It will also provide guidance to JTC 1, IEC, ISO and other entities developing IoT-related applications.

e-tech: What are the main highlights of WG 10?

Yoo: WG 10 was established two years ago with the development of ISO/IEC 30141, *Internet of Things Reference Architecture (IoT RA)*, which is now at the Committee Draft (CD) stage. WG 10 is currently developing ISO/IEC 20924, *Definition and vocabulary for the Internet of Things*, as well as the Proposed Draft Technical Report, ISO/IEC PDTR 22417, *IoT use cases*, for collecting different types of use cases from



Sangkeun Yoo, Convenor, ISO/IEC JTC 1/ WG 10: Internet of Things

various application domains. WG 10 has also recently begun developing a framework of interoperability for the Internet of Things Systems (ISO/IEC 21823-1). Given that the IoT has such a broad scope, IoT RA was seen as a starting point for establishing a common understanding among WG 10 members, who come from different backgrounds and as a guide for future work. It has reached the CD stage, and I expect it to be published as an International Standard before the end of 2017. JTC 1 will then be able to begin new IoT work.

e-tech: What do you see as the main standardization challenges for IoT?

Yoo: I always emphasize the most important thing for IoT is to provide interoperability, because many technologies and stakeholders are involved in a wide range of application domains. WG 10 has a work item for the framework of interoperability (ISO/IEC 21823-1) and is expecting other subsidiary items, such as network interoperability and semantic interoperability.



Connected devices run AR apps

Wearable technology and markets are rapidly increasing as one of the IoT application domains. In this case, we have to look carefully at what is going on in this area and prepare a strategy for wearable technology standardization. The

new IoT subcommittee is expected to create a study group for wearable technology at its first plenary this year. Following this, wearable technology standardization from the IoT point of view will be managed appropriately under ISO/IEC JTC 1.



Many devices and systems of Smart Cities are part of the IoT



Solar power Nellis Solar Power Plant, Nevada (Photo: Wikipedia)

Better to blow a fuse

Checking a critical part of electrical system reliability

By Antoinette Price

Ever run the washing machine, ironed a shirt and blown a fuse?

Part of electrical power systems

Low voltage power fuses (equal to or less than 1 500 V, are designed to protect electrical power systems, should there be an accidental or unintentional fault in the system wiring or components. They open circuits when excessive over-currents are present and prevent further damage occurring to the system.

Used across many industries, they safeguard electrical systems of photovoltaic (PV) technology from fault currents or lightning strikes. They are also part of the complex industrial electronics of manufacturing, used in automotive electronics, domestic appliances hazardous area mining, marine, in wiring for homes and lighting systems.

IEC Technical Committee (TC) 32 and its subcommittees (SCs) produce

International Standards for fuses. IEC TC 32/SC 32B for low voltage fuses has developed the IEC 60269 series of Standards. These are applied to fuses used to protect against overload and/or short-circuit currents in all types of circuits in electrical installations (industrial and domestic) and in systems apparatus or components (motors, electro-domestic appliances, semiconductor devices). The Standards also include labelling, electrical characteristics for design and maintenance and testing requirements.

Checking the safety measures

Given that electrical faults in systems, devices or machinery could cause serious damage to the environment and jeopardize human safety, it is crucial to ensure that safety measures will work when they are needed.

IECEE, the IEC System of Conformity Assessment Schemes for Electrotechnical Equipment and Components, was established to test



Electricity distribution box contains wires fuses and contactors

and certify electrical and electronic equipment.

Testing ensures safety, quality and consistency

IECEE CB Scheme provides the assurance that tested and certified electrical and electronic components, equipment and products meet the strictest levels of safety, functionality and performance, in compliance with the relevant IEC International Standards.

In the case of low voltage fuses, IEC 60269 recommends testing aspects, including temperature rise and power dissipation, verifying rated current, overload and checking time current characteristics.

Everyone stands to benefit from this process. Manufacturers and suppliers must ensure their products comply with relevant safety standards, while buyers and wholesalers want to be sure of the quality of products purchased and unhindered market access.



Low voltage fuses protect solar equipment (Photo: www.littlefuse.com)

The dynamics of success

IECEX is thriving despite the many challenges posed to the oil and gas sector

By Claire Marchand

The oil and gas industry sector has faced many challenges in recent years. The severe drop in oil prices has affected companies and economies throughout the world. In parallel, the need for developed and developing countries to tackle climate change, introduce cleaner energy sources – renewables such as solar and wind, hydro – into the mix and become more energy-efficient has seen some significant results when the Paris Agreement entered into force on 4 November 2016.

Fossil fuel demand still growing

However, while “the energy transition is gathering momentum, oil, coal and natural gas still account for more than 80% of primary energy demand. Demand for fossil fuels will continue to grow, in part because of the difficulties

in finding alternatives to oil in road freight, aviation and petrochemicals [...],” according to the International Energy Agency (IEA) World Energy Outlook 2016.

To meet these demands, the oil and gas industry has built larger and more complex installations for extraction, processing and distribution, and made higher and higher capital investment. To protect this investment and the persons working in and around these installations, compliance with international safety standards is paramount.

Safety is non-negotiable in the Ex sector

The IEC has long been involved in developing International Standards for equipment used in hazardous

areas. Set up in 1946, IEC Technical Committee (TC) 31: Equipment for explosive atmospheres, has a complete series of International Standards that cover all specific requirements for equipment and systems in explosive (Ex) areas, from general requirements to protection levels for apparatus used by all sectors that operate in hazardous environments, such as oil refineries, offshore oil rigs, gas plants, mines, sugar refineries, flour mills, grain silos and the paper and textile sectors.

All sectors of the Ex industry have embraced IEC International Standards but producing equipment based on Ex Standards is not enough. Most manufacturers, suppliers and end-users trade on the global scene and have to meet the very strict requirements put in place by national regulations and legislation – proving their adherence to those requirements can be both costly and time-intensive.

UNECE endorsement for IECEX

To provide a global and credible means of ensuring compliance with its International Standards, the IEC established IECEX, the IEC System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres.

Since its inception in 1996, IECEX has established mechanisms 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 of safety.

IECEX certification has become the world’s single best practice for



The 2017 IECEX International Conference will take place in Shanghai, China on 11-12 April

demonstrating compliance with International Standards. Its credentials include acceptance by end-users – oil and gas, mining, transportation and many more – as well as the formal endorsement by the United Nations, through the UN Economic Commission for Europe (UNECE), as the recommended model for regulating the safety of equipment and persons working in areas where the potential for an explosive atmosphere may exist.

Want to learn more about IECEx?

To help the Ex industry sector become better acquainted with the System in general and find out how to benefit from the services it provides, IECEx organizes international conferences that give a good overview of the System and its Schemes, address a number of topics relevant to the Ex sector as well as issues concerning regional requirements and regulations.

Register for the IECEx International Conference

After Dubai (United Arab Emirates) in 2012, Kuala Lumpur (Malaysia) in 2014 and Gdańsk (Poland) in 2015, the IECEx event will focus on China. The 2017 IECEx International Conference will take place in Shanghai on 11-12 April 2017.

Organized by the IEC and IECEx, together with the Certification and Accreditation Administration of the People's Republic of China (CNCA), in conjunction with UNECE, the two-day event is a unique opportunity to learn more about IECEx, get involved and network with the Ex community.

The speakers' list includes leading experts involved in standardization, equipment manufacturing, inspection, repair and overhaul of Ex equipment and systems, as well as in the assessment and certification of



Oil, coal and gas still account for more than 80% of primary energy demand



IECEX Executive Secretary Chris Agius and IECEX Chair Thorsten Arnhold

personnel competence. Through their presentations and contacts with participants, they will share their experience and knowledge on all matters pertaining to the Ex field.

All information on the IECEX International Conference can be found on the IECEX website: www.iecex.com. Enquiries should be addressed to info@iecex.com

One doesn't change a winning team

At its meeting in Frankfurt, Germany, during the IEC General Meeting, the Conformity Assessment Board (CAB) approved the nomination of Thorsten Arnhold for a second three-year term as IECEX Chair, and that of Chris Agius for a further five-year term as IECEX Executive Secretary.

Thorsten Arnhold

Prof. Dr. Thorsten Arnhold, Vice President Strategy and Technology

at R. STAHL, has been involved in IECEX for many years. He has seen the System grow and expand and has participated actively in its development and management, even before he became its Chair in 2014, serving on the Management Committee and in several Working Groups.

During Arnhold's first term, the number of published test reports and certificates was improved by more than 40%. Against the background of the dramatic oil price decrease in this period, this increase is especially impressive. The oil and gas industry covers the biggest part of hazardous areas by far. "The significant increase of our activities in times when the economic situation is difficult shows how robust our organization is and how great the international demand for the services of our member institutions. We can justifiably say that IECEX plays a leading role worldwide in certifying products, services and personal qualifications for hazardous areas", explains Arnhold.

Chris Agius

Agius has held the Secretariat position since the system began some 20 years ago. He has a long-standing involvement in the development of national and international standards and certification systems. Before joining IECEX he held various key positions within the Standards Australia Group, including those associated with the development and management of product/service-related certification schemes, including the AUSEX and ANZEX Schemes.

"I am proud and happy about the unanimous confirmation of my work as Chair of IECEX", says Arnhold. "I am also especially happy about the fact that our Executive Secretary, Chris Agius from Australia, has also been unanimously confirmed in his office. With him, his team in Sydney and all the other active members of IECEX, we have achieved much we can be proud of in the past three years. And we have already prepared the next big steps."

A certificate in record time

The IECQ Scheme for LED Lighting has issued its first certificate to Chinese LED manufacturer

By Claire Marchand

Demand for the use of solid state technology for general and specific lighting applications continues to grow at a very rapid pace. Light-emitting diodes (LEDs) in particular, on the market since the early 1960s, have been extremely successful in recent years. Mostly used as indicator lamps for electronic devices in the early days, they are now increasingly used in a wide range of domestic, commercial and industrial applications.

Gaining ground

LEDs use the light emission properties of specific semiconductor materials. Initially they were expensive to

produce so they found their market mainly in commercial use. Today, improved technology and economies of scale have seen prices fall, making them increasingly attractive to the public and private sector, including domestic consumers.

LEDs have often been described as the light source of the future, as they can be used in almost any kind of applications.

Safer and more attractive

The need to be more energy-efficient and cut public expenditures has led a great number of cities around the world to turn to LEDs not only for street lighting, but also as a solution

for upgrading roads, official buildings, schools and monuments. In doing so, they combine the practical and aesthetic benefits offered by LED fixtures.

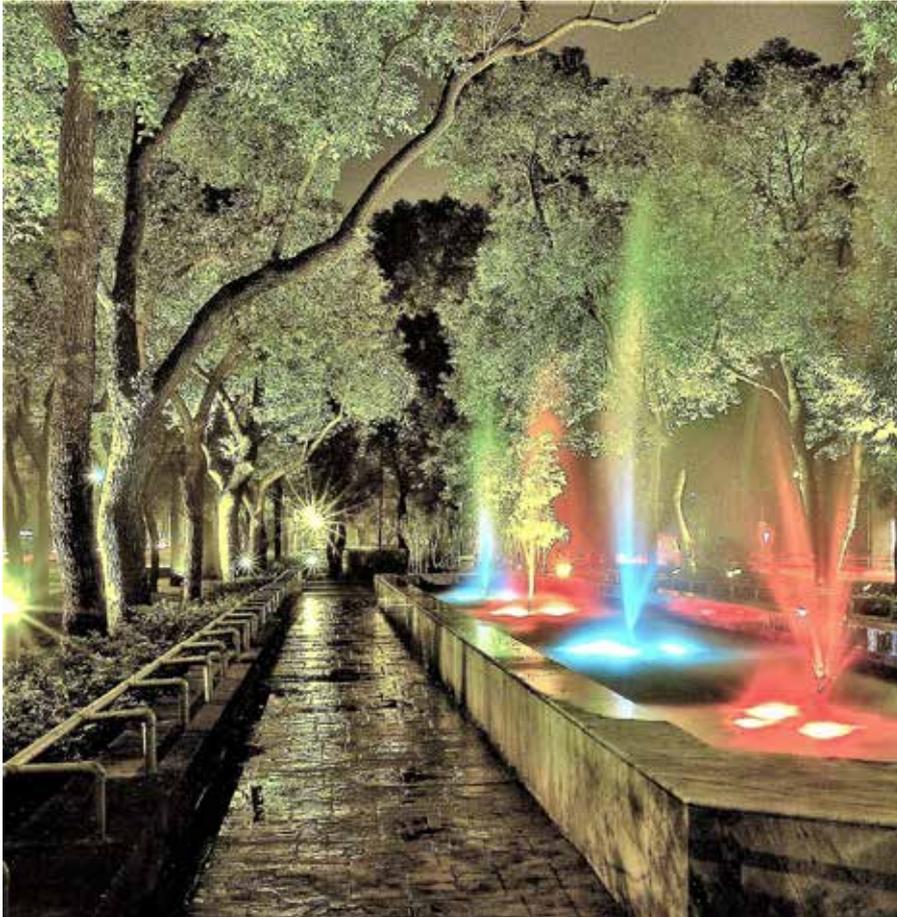
In the industrial and commercial environments, LED lighting solutions are now found widely in shops or sports arenas. They also make a big difference in parking structures where they provide daylight-like illumination 24 hours a day.

LED lighting solutions make cities, buildings and any type of infrastructure more attractive and, above all, safer for everyone.

With the emergence of LED technology, lights have become an



LED bulbs with different cooling surface-mount device (SMD) chips



LEDs offer infinite possibilities to urban designers

integral part of the car design, allowing automakers to create their own very distinctive signature look, identifiable at all times.

And with prices going down, LEDs have made their way into the homes of millions of people.

Many advantages

LEDs have many advantages over more traditional light sources, such as

incandescent or compact fluorescent lamp (CFL), including:

- low energy consumption
- long lifetime
- robustness, i.e. reduced cost of maintenance and replacement
- easy control
- fast switching

IECQ Scheme for LED Lighting

The IECQ Scheme for LED Lighting, under the umbrella of the generic IECQ Approved Component (AC) Scheme, offers a valuable qualification and supply-chain management tool that provides for the identification and verification of compliance with component and process specifications.

In line with the approved scope of IECQ, the IEC Quality Assessment

System for Electronic Components, the IECQ Scheme for LED Lighting 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.

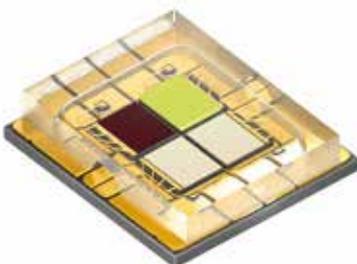
First certificate issued

In September 2016, IECQ issued the first certificate, under its IECQ Scheme for LED Lighting, to APT Electronics Co. Ltd. The company was founded in 2006 in Nansha, a district of the city of Guangzhou, in the Guangdong province of China, where it has built manufacturing as well as research and development plants. APT, which has developed and mass produced high-power (HP) LED chips and devices, has received many awards over the years, including the Hong Kong Technological Achievement award in 2011 and the Semi China Industry Award in 2012. In the high-technology area, APT has become a successful model of cooperation among enterprises, universities and research institutes.

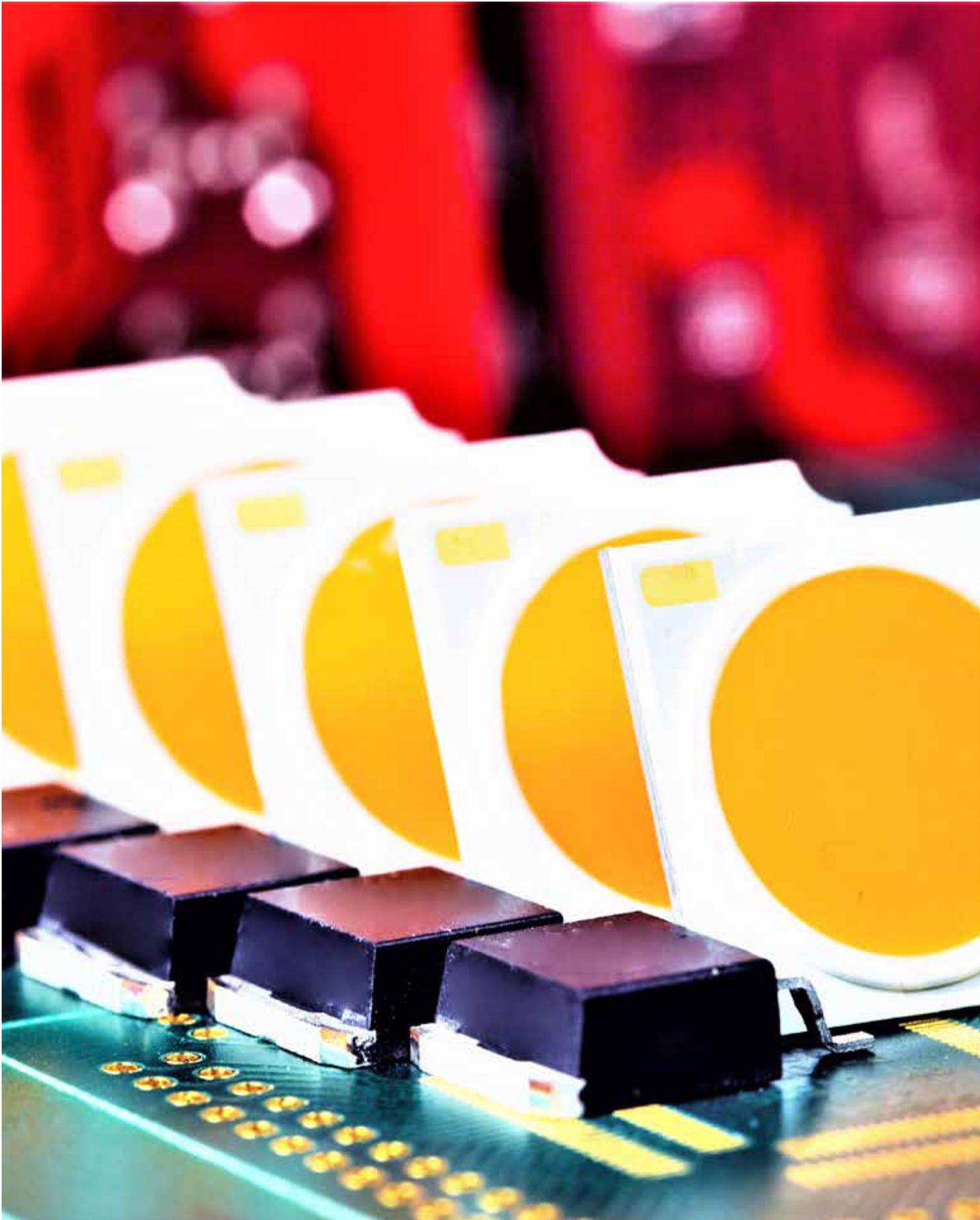
The fact that a very short time – two years – elapsed between the launch of the LED Initiative in autumn 2014, which led to the establishment of the IECQ Scheme for LED Lighting a year later, and the issuing of the first certificate is truly amazing. It was made possible because IECQ already had all the mechanisms in place in the IECQ AC Scheme.

Since the demand for a Scheme that specifically addresses LED technologies came from industry, there is no doubt that the certificate delivered to APT is the first in a long series.

More information on IECQ and its Schemes: www.iecq.org



High-power LED chip (Photo: Osram)



Chips on board

IEC work to advance international trade

Dr Shu Yinbiao at Davos 2017

By Janice Blondeau

Every January, international political, business and civil society leaders gather at the World Economic Forum in Davos, Switzerland, to discuss global politics, economics, and social issues. This year, the IEC was present at the meeting: Dr Shu Yinbiao, IEC Vice-President and Convenor of the Market Strategy Board (MSB), participated in the panel discussion *Preparing for the Fourth Industrial Revolution* on 17 January 2017.

At a time when the focus was on this Swiss mountain village, Dr Shu showcased how the work of the IEC encourages international trade. Here is an excerpt of Shu's Davos address where he speaks about the IEC:

"I have been working for the IEC for many years. IEC stands for International Electrotechnical

Commission. The products of the IEC are standards. Standards can promote international trade, with technology standards.

"IEC has now over 20 000 expert engineers from all over the world. With IEC standardization, the manufacturers and the labs can manufacture their products according to unique (international) standardization. This is very helpful.

"IEC was founded in 1906, we are 110 years old already. And it has a very good working procedure – everyone can participate in standardization development... the Standards are produced by consensus. Every expert has to agree with the Standard.

"The IEC work is divided into many groups. We call these groups Technical Committees (TCs). In the TCs they are working in a specific



Dr Shu Yinbiao participated in the panel discussion "*Preparing for the Fourth Industrial Revolution*"...

area, for example, like electric cars. The engineers come together, they meet several times in a year.

"For one Standard it may take several years to finish. So they are very careful for the standardization but it is not difficult, people are very enthusiastic to participate in the standardization development."

Also on panel were:

- Mary Barra, Chairman and Chief Executive Officer of the General Motors Corporation
- Vishal Sikka, Chief Executive Officer of Infosys
- Marc R. Benioff, Chairman and Chief Executive Officer of Salesforce
- Mukesh D. Ambani, Chairman and Managing Director of Reliance Industries
- Moderator: Professor Ngaire Woods, Dean of the Blavatnik School of Government, University of Oxford



...with (from left) Ngaire Woods, Mary Barra, Mukesh D. Ambani, Marc R. Benioff and Vishal Sikka.

Upcoming global events (February-May 2017)

On the agenda: cyberspace, Smart Grids, metering, IECEx and LVDC

By Claire Marchand

The IEC regularly supports key global and regional industry events, which can present the IEC endorsement on their website and materials.

International Conference on Cyberspace, Energy & Development – Protecting Critical Energy Infrastructure

Vienna, Austria, 16 February 2017

On the agenda: interaction of cyberspace, energy and development, based on key findings on security issues, including promoting awareness of collaborating in energy sector, developing capacity against cyber-threats and more.

More information on the conference website

energypact
Foundation

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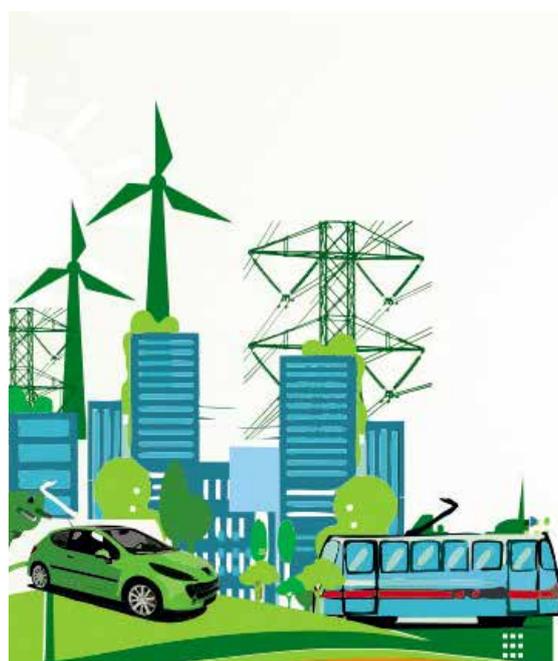


India Smart Grid Week 2017

New Delhi, India, 7-10 March 2017

India's electric utilities, policy makers, regulators, investors and world Smart Grid/Smart City experts will discuss

technology trends, cybersecurity, standards and interoperability of equipment and systems, EV charging infrastructure, renewable energies, smart microgrids for transport and more.



India SMART GRID Week 2017

International Conference and Exhibition on
Smart Grids and Smart Cities

07 - 10 March, 2017

Manekshaw Center, New Delhi, India

www.isgw.in

India Smart Grid Week 2017 will be held on 7-10 March 2017 in New Delhi, India



SGTech Europe 2017 will take place in Amsterdam, The Netherlands, on 28-30 March 2017

SGTech Europe 2017 - Smart Grid Technical Forum

Amsterdam, The Netherlands, 28-30 March 2017

On the agenda: smart substations, next generation SCADA, and packet telecoms. 250+ automation directors and their teams will look at utility case-study presentations, have technology panel discussions, interactive roundtable debates, and more. IEC participants benefit from a 10% discount, using the promo code SGTECH-17-IEC.



Metering India 2017 will be held on 6-7 April 2017 in New Delhi, India

Metering India 2017 - towards smart and sustainable utilities

New Delhi, India, 6-7 April 2017

Utilities, consultants, businesses, regulators and manufacturers will look

at how ICT can make Indian power utilities more sustainable. On the agenda: metering, communication technologies, demand-side management, IT infra, sustainable business processes and more.

2017 IECEx International Conference

Shanghai, People's Republic of China, 11-12 April 2017

On the agenda: an overview of IECEx and its three Schemes and the IECEx RTP programme; an update on IEC International Standards for Ex atmospheres; a practical approach to Ex installations; area classification's importance in the design of new plants and changes to existing plants and infrastructure; intrinsic safety; end-

user feedback; the conclusions of a UNECE Global Study into regulations for the Ex field; and more.

LVDC Conference – Sustainable Electricity Access

Nairobi, Kenya, 22-23 May 2017

Organized by IEC and Kenya Bureau of Standards. Technical experts, government representatives, funding agencies, investors, insurance companies, power utilities, equipment manufacturers and NGOs will learn about what is driving LVDC development, how to safely and broadly roll-out this technology, the role it will play in universal energy access and economic development, use-cases from other countries and more.



The LVDC Conference - Sustainable Electricity Access will be held in Nairobi, Kenya on 22-23 May 2017



The 2017 IECEx International Conference will take place in Shanghai, China, on 11-12 April

January and February 2017 nominations

The latest TC Chair nominations approved by the SMB

By Amy Bionda

In 2016, the Standardization Management Board (SMB) nominated several new Chairs for different IEC technical committees (TCs) who will begin their terms in in early 2017.

Robert Griffin

Robert Griffin is the new Chair of IEC TC 108: Safety of electronic equipment within the field of audio



Robert Griffin, Chair of IEC TC 108

video, information technology and communication technology. As the Director of Corporate Product Safety and Hardware Compliance at IBM, Griffin is responsible for compliance activities related to product safety, electromagnetic compatibility, and radio and telecommunications, on a global scale. With over 15 years of involvement in international standards development, Griffin received the IEC 1906 Award in 2011. He is currently the US Technical Advisor to

the IEC for the information technology, communications and consumer electronics industries.

Robert Griffin has been voted Chair of IEC TC 108 for the period of 2017-01-01 to 2023-31-12.

Sébastien Mirouze

With degrees in electrotechnical and industrial informatics, as well as civil aviation engineering, Sébastien Mirouze is currently Deputy Director for Civil Aviation Safety Oversight at Service Technique de l'Aviation Civile (STAC) in France. He began his term as Chair of IEC TC 97: Electrical installations for lighting and beaconing of aerodromes, in February. Mirouze has been involved with IEC TC 97 since 2011. His work includes airfield lighting maintenance and oversight, where he is both an audit manager for major airports and a teacher.

Sébastien Mirouze has been voted Chair of IEC TC 97 for the period of 2017-02-01 to 2023-01-31.



Sébastien Mirouze, Chair of IEC TC 97



Thomas Korszell, Chair of IEC TC 89

Thomas Korszell

Thomas Korszell took over as Chair of IEC TC 89: Fire hazard testing, in February of this year. With a background in electrical engineering and a career spanning nearly 20 years in the industry, Korszell is currently Managing Director of Svensk Elstandard (SEK), the Swedish National Committee of the IEC. He has been involved in IEC TC 89, as well as the Swedish mirror committee (TK 89), since 2006. Korszell was also an alternate member of the IEC Standardization Management Board (SMB) from 2007 to 2015, and an alternate member of the IEC Conformity Assessment Board (CAB) from 2006 to 2014.

Thomas Korszell has been voted Chair of IEC TC 97 for the period of 2017-02-01 to 2023-01-31.

Obituary - Wayne Paul Klug

Colleagues and friends mourn the passing of IEC expert

By Claire Marchand

It is with great sadness and regret that the IEC learnt of the passing of Wayne P. Klug on 25 January 2017, at the age of 56, after a long-lasting fight with cancer. He leaves behind his wife Nancy and three daughters.

From 1978 to 1982, Wayne attended the University of Michigan where he earned a Bachelor of Science in Mechanical Engineering. He started working at Whirlpool Corporation in 1984, and would continue working there as Principal Engineer, dishwasher technology, for the remainder of his life.

Significant contribution to IEC work

Klug, who was an expert in IEC Subcommittee (SC) 59A: Electric dishwashers, for many years, will be deeply missed by his colleagues, not only for his expertise and dedication, but also for his friendship and the way he cared for others. Their own words best describe how they will remember him:

“His positive outlook on life was most admirable and, despite his illness, he



Wayne Klug and his wife Nancy

was always dedicated to his work for our Subcommittee in order to bring forward and develop our Standards. He always had encouraging words for everyone and was highly appreciated by those who ever had the opportunity to meet him.

“When Wayne joined our IEC working groups, he significantly contributed to establishing a list containing all the changes in our Standards that was meant to help us remember why certain decisions were made. This was only one of his many projects that

underlined his admirable precision concerning his work.”

Klug was the Convenor of IEC SC 59A/Maintenance Team (MT) 2: Dishwasher tests, and a member of several working groups in IEC SC 59A and IEC SC 59C: Heating appliances.

IEC 1906 Award

Klug received the IEC 1906 Award in 2016. With the Award, the IEC honours the commitment and work 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.

Klug also earned the Association of Home Appliance Manufacturers (AHAM) Distinguished Service Award in 2013.

The IEC extends its deepest sympathies to his family, friends and colleagues around the world.



Wayne Klug, who worked for the Whirlpool Corporation for most of his professional career, was an expert in IEC SC 59A and IEC SC 59C

New edition of Standard for OLED displays

Measurement conditions and measuring methods for optical and electro-optical parameters to ensure better image quality

By Morand Fachot

The quest for better television pictures has been ongoing ever since TV was invented and in particular after it started reaching a wider audience. The second edition of an International Standard for Organic LED (OLED) displays adds to a series that will contribute to better image quality on these displays.

Constantly improving image quality

From fairly small and fuzzy black and white images displayed on cathode ray tubes (CRT) starting in the 1930s to higher definition (with more lines) black and white and the introduction (starting in the 1960s) of colour, TV

pictures never ceased to improve. The development of flat panel displays (FPDs), and of digital television later, marked a watershed. They allowed the broadcast and reception of ever better quality TV pictures.

Enter high definition

After the introduction, from the mid-2000s of High Definition TV (HDTV), for which the most common format consists of 1080x1920 (horizontal x vertical pixels), or Full HD, the industry is moving to so-called Ultra HDTV (UHDTV) even higher definition, which covers both 4K (3840x2160), or four times as many pixels as HDTV and 8K

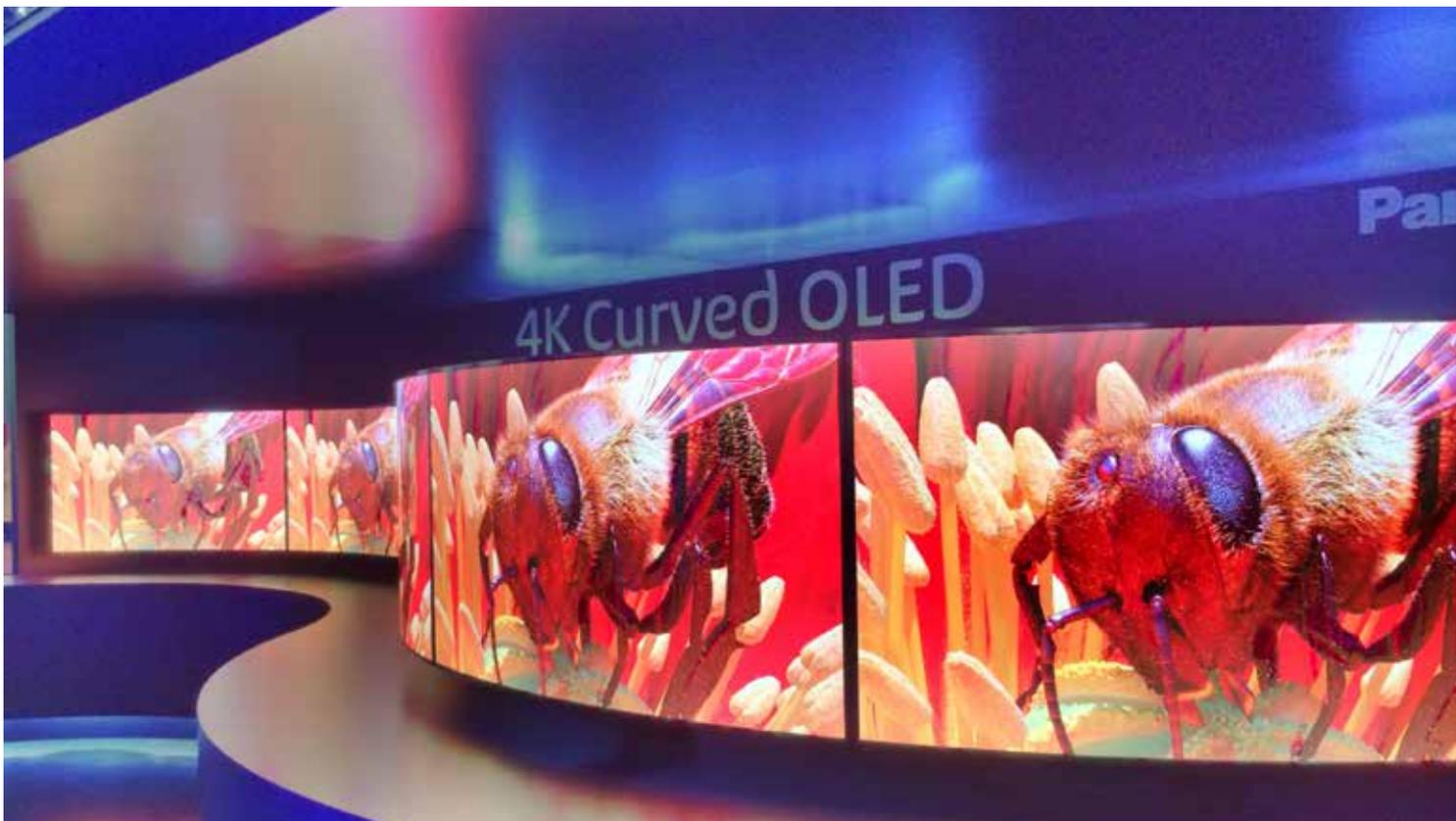
(7680x4320) 16 times as many pixels as HDTV.

These higher resolutions require better displays. Two display technologies (used also for HDTV) are currently under consideration for UHDTV: liquid crystal displays (LCD) using light-emitting diodes (LED) and Organic LED (OLED).

IEC TC 110: Electronic display devices, develop International Standards for both.

LED, OLED what's the difference?

In the back of LCD sets, LED backlight shining through liquid crystals covered by red, green or blue (RGB) filters



Curved 4K OLED TV display



OLED displays are perfect for 8K content, such as this NHK film

allows (or blocks) light through when activated (or not) by current running through them.

For their part, OLED displays produce images differently. Instead of backlight, colours are produced by organic [carbon-based] compounds that glow when current is applied to them. White OLEDs shine light through sets of RGB filters to create individually coloured pixels.

As each pixel can be shut off when no current is flowing, OLED displays give a deep black, unlike backlit LCD displays. OLED displays can be made very thin and have wide viewing angles, they can also be made transparent as well as mounted on flexible substrates. They are not used only in television sets, but also in a variety of other electronic devices, such as mobile phones.

IEC International Standards paving the way to better image quality for OLED displays

IEC TC 110 has published nine International Standards for OLED displays in the IEC 62341 series, and is developing more. These Standards define various characteristics,

measuring and testing methods for a number of parameters.

Four of these Standards concern measurements relevant to quality aspects, such as image sticking and lifetime, visual quality and ambient performance, and image quality

Also belonging to this category is the latest Standard in the series, IEC 62341-6-1:2017, which “specifies the standard measurement conditions and measuring methods for determining optical and electro-optical parameters of OLED display modules and, where specified, OLED display panels.” These “methods are limited to flat displays measured in a dark room.”

The Standard first gives details of standard measuring equipment and coordinate system, such as light measuring devices and viewing direction coordinate system, as well as measuring conditions, like environmental conditions, power supply, warm-up time, dark-room conditions and standard set-up conditions.

It then lists the various measuring methods of image quality concerning the viewing angle range, cross-talk, i.e. the cross coupling of electrical

signals between elements of an OLED display module, observable flicker, static image resolution and moving image resolution.

IEC 62341-6-1 details the various measuring conditions and setup, measurement and evaluation, and reporting provisions necessary to achieve measurements for each aspect.

It contains figures that show examples of the set-ups necessary for measurements, of test signals and graphs of measurements and results.

This second edition of the Standard, available in redline version (RLV) will contribute to ensuring optimal image quality on flat OLED displays.

RLVs provide a quick and easy way to compare all the changes between the Standard and its previous edition. They show changes from previous editions marked in colour.

A RLV is not an official IEC Standard, only the current version of the Standard is to be considered the official document.



Flexible OLED screen for mobile phone (Photo: LG)

Smart, compatible chargers

IEC enables smart charging solution for consumer portable devices

By Janice Blondeau

Over the last decade, technology advances have led to the rapidly growing use of consumer electronics, connecting millions of people as never before and changing the way we operate in everyday life. Until now, the emergence of all these intelligent devices has had one drawback: proprietary charging systems, meaning millions of chargers and cables that add to the already huge pile of e-waste throughout the world.



USB-IF logo

Reducing global e-waste

The amount of global e-waste – discarded electrical and electronic equipment – reached nearly

42 million tons in 2014. By 2017, it is predicted that the world will produce approximately 50 million metric tonnes of e-waste/year, according to a study

conducted by a partnership of United Nations organizations, industry, governments and scientists.

IEC has smart charging solution

In an effort to increase consumer convenience and reduce e-waste, the IEC is now enabling a smart charging solution that allows chargers to be re-used for many different consumer portable devices.

The IEC has published new International Standards dealing with charging interoperability that open the way for a new generation of smart and eco-friendly charging solutions that can be used in every country in the world.

Chargers for products ranging from smartphones to high power devices such as notebook computers, will not only be compatible with the same types of devices from different manufacturers, they will also be able to charge a wide range of other kinds of electronics. Consumers will be able to use their notebook charger to charge



USB Type-C™ cable...

Artist renderings courtesy of Foxconn

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....and connector rendering

a tablet or a smartphone or any other portable consumer electronic device. Likewise, if need be, a smartphone or tablet charger can be used to give a boost to a notebook, albeit at a slower rate.

Standardized charging interface

This new smart charging approach relies on a standardized charging interface defined by the following new IEC International Standards:

- IEC 62680-1-3, *Universal serial bus interfaces for data and power - Part 1-3: Universal Serial Bus interfaces - Common components - USB Type-C™ cable and connector specification*, and IEC 62680-2-1, *Universal serial bus interfaces for data and power*

- *Part 2-1: Universal Serial Bus Specification, Revision 2.0, based on the latest USB Type-C™ and USB Power Delivery specifications.* These Standards specify the common technologies needed to support charging of devices up to 100 watts

- IEC 63002: *Identification and communication interoperability method for external power supplies used with portable computing devices*, defines interoperability guidelines for chargers and devices that implement the latest USB technologies. In particular, it defines the data parameters for communicating power adapter characteristics and capabilities.

Global market adoption of these International Standards is expected to significantly increase charger re-usability well beyond smartphones

and other low power devices, which were enabled by legacy USB technologies and related International Standards IEC 62680-1-1, *Universal serial bus interfaces for data and power - Part 1-1: Common components - USB Battery Charging Specification, Revision 1.2*, the IEC 62680-2 series and IEC 62684, *Interoperability specifications of common external power supply (EPS) for use with data-enabled mobile telephones.*

Global support from industry

The standardization of this smart charging interface is supported by global industry as the best approach to enable broad re-usability of different chargers with different products. It ensures charging reliability and provides the flexibility needed for future innovations.



Chargers can be designed to optimally match the power and functional requirements of the target product while being able to charge many other products as well. Devices will be able to communicate with the smart charger to accurately identify its capabilities before safely drawing power. The expected broad adoption by industry will exponentially increase interoperability, compatibility and re-usability of chargers and as a result significantly increasing consumer convenience while contributing to global e-waste reduction.

Says Frans Vreeswijk, IEC General Secretary and CEO: “The IEC continues to be committed to reducing e-waste for developed and developing countries alike. These important new IEC International Interoperability Standards will further advance global environmental goals by substantially increasing the re-usability of chargers for consumer electronics and ICT devices.”

Says Shin Eguchi, Technical Area Manager, Technical Committee (TC) 100/Technical Area (TA) 14: “This innovative charging solution is the result of unprecedented global cooperation and industry participation. Its broad adoption will truly benefit consumers worldwide.”

Says Jeff Ravencraft, USB-IF President and COO: “The continued cooperation between IEC and USB-IF on IEC 63002, that supports USB Type-C and USB Power Delivery specifications, aligns with USB-IF’s belief that consumer satisfaction, product functionality and reducing e-waste are paramount. USB-IF is supportive of this significant step towards a new generation of interoperable, smart chargers.”

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Measuring effectiveness of information security

ISO/IEC 27004 explains how to develop, assess and report results of information security metrics

By Janice Blondeau

You simply can't be too careful when it comes to information security. Protecting personal records and commercially sensitive information is critical. But how can you tell that your ISO/IEC 27001 information security management system (ISMS) is making a difference? A new ISO/IEC International Standard can help you out.

New edition of ISO/IEC 27004

The recently updated ISO/IEC 27004:2016, *Information technology – Security techniques – Information security management – Monitoring, measurement, analysis and evaluation*, provides guidance on how to assess the performance of ISO/IEC 27001:2013, *Information technology -- Security techniques -- Information security management systems -- Requirements*. It explains how to develop and operate measurement processes, and how to assess and report the results of a set of information security metrics.



ISO/IEC 27001: the world's common language when it comes to assessing, treating and managing information-related risks

Prof Edward Humphreys, Convenor of the working group that developed the standard (ISO/IEC JTC 1/SC 27), says: "Cyberattacks are among the greatest

risks an organization can face. This is why the much improved version of ISO/IEC 27004 provides essential and practical support to the many organizations that are implementing ISO/IEC 27001 to protect themselves from the growing diversity of security attacks that business is facing today."

Insights into effectiveness of ISMS

Security metrics can provide insights regarding the effectiveness of an ISMS and, as such, have taken centre stage. Whether you're an engineer or consultant responsible for security



Hackers find many ways to breach IT security



ISO/IEC 27004 explains how to develop measurement processes and how to assess and report results of information security metrics

and reporting to management or an executive who needs better information for decision making, security metrics have become an important vehicle for communicating the state of an organization’s cyber risk posture.

In Prof Humphreys’ own words, “Organizations need help to address the question of whether the organization’s investment in information security management is effective, fit for purpose to react, defend and respond to the continually changing cyber risk environment. This is where ISO/IEC 27004 can provide numerous advantages.”

Many benefits

ISO/IEC 27004:2016 shows how to construct an information security measurement programme, how to select what to measure, and how to operate the necessary measurement processes. It includes extensive examples of different types of measures, and how the effectiveness of these measures can be assessed.

Among the many benefits to organizations of using ISO/IEC 27004 are:

- Increased accountability
- Improved information security performance and ISMS processes

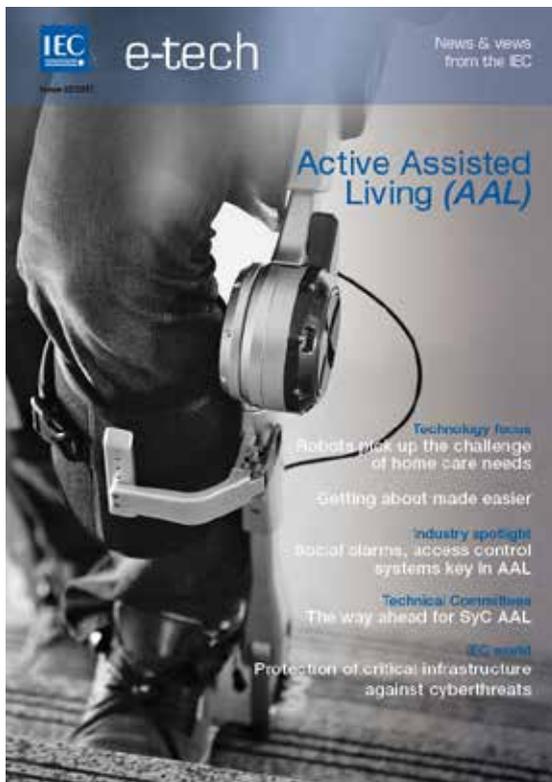
- Evidence of meeting requirements of ISO/IEC 27001, as well as applicable laws, rules and regulations

ISO/IEC 27004:2016 replaces the 2009 edition; it has been updated and extended to align with the revised version of ISO/IEC 27001:2013 to provide organizations with greater added value and confidence.

ISO/IEC 27004:2016 was developed by Subcommittee 27: IT security techniques, of ISO/IEC Joint Technical Committee (JTC) 1: Information technology.

In the next issue:

Active Assisted Living (AAL) - Issue 02/2017



In recent years, a great number of technological advances have made the life of athletes with disabilities a lot easier. High-tech equipment has given them the option to compete in many more disciplines than ever before. Also, with a rapidly ageing global population, the adoption of assistive robots designed to perform domestic handling and mobility assistance tasks, as well as analyze the environment and individuals around them to carry out monitoring functions, is increasing rapidly.

The IEC Systems Committee for Active Assisted Living (SyC AAL) is constantly expanding the scope of its activities to address transversal standardization and broader system-wide issues to cover different domains, such as medical devices, consumer electronics, Internet of Things, computer systems and networks.

On a different topic, the EnergyPact Foundation organized a conference, endorsed by the IEC, on *Protecting critical infrastructure from cyberattacks* in Vienna, Austria, in mid-February. An expert active in IEC Conformity Assessment and Standardization work gave an overview of IEC expanding activities aimed at enhancing cybersecurity for the energy sector.

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